OFFICE OF THE SPECIAL INSPECTOR GENERAL FOR IRAQ RECONSTRUCTION

ZAKHO MILITARY ACADEMY
ZAKHO, IRAQ

SIGIR PA-06-039
APRIL 12, 2006

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 the Project Assessment of the Zakho Military Academy, Zakho, Iraq (Report Number SIGIR-PA-06-039)

We are providing this project assessment report for your information and use. We assessed the in-process construction work being performed at the Zakho Military Academy, Zakho, 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-06-039 **April 12, 2006**

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

Conclusions. The assessment determined that:

1. All project components were adequately designed prior to construction. The plans and specifications provided an accurate depiction and adaptation of the design to existing site conditions. Although the project consisted of construction and renovation work involving 14 facilities in addition to other USACE contract work taking place at the same time, the design took into consideration the sequencing of work and the relationship to other task orders and contract work. The design also took into account local availability of materials and labor skills. Additionally, the design considered architectural compatibility with existing and new facilities. Further, even though there were operations and maintenance requirements associated with the water treatment plant and wastewater treatment plant, both plants were designed to facilitate operations and maintenance.

2. All observed work met the standards of the design. Further, the construction and equipment installation was completed at a high level of workmanship by the contractor. In addition, the U.S. Army Corps of Engineers (USACE) Project Engineer and USACE Quality Assurance Representative (QAR) lived and worked at the military academy and were fully engaged in daily construction activities to ensure quality and compliance with the task order requirements. As a result, the project is

providing the military academy with facilities that will directly support the training of Iraqi Army personnel.

3. The contractor's quality control plan was sufficiently detailed to effectively guide the contractor's quality management program. Further, the contractor's daily quality control reports contained required project and work activity information to document construction progress and identify problems and required corrective action.

   The Government Quality Assurance program was effective in monitoring the contractor's quality control program. The Project Engineer and the Quality Assurance Representative ensured that all deficiencies cited during quality assurance inspections were corrected. The Quality Assurance Representative also maintained daily quality assurance reports that contained project specific information to document construction progress and highlight deficiencies.

4. The Zakho Military Academy construction and renovation project results were consistent with the original Task Order objectives. This occurred because of the Contractor's high quality of workmanship and because the USACE Project Engineer and QAR effectively managed the project.

5. Sustainability was addressed in the Task Order requirements. The Task Order specifications required a one-year warranty on all materials and workmanship for the buildings and facilities constructed or renovated in this project. The Task Order also required spare parts lists and operations and maintenance manuals for major equipment components. Additionally, the contractor is required to provide spare repair parts as recommended by the system manufacturer for the water treatment plant and wastewater treatment plant for the first year of operation. The contractor is also required to coordinate and provide technical training for up to ten military academy personnel on the systems within the water treatment plant and the wastewater treatment plant.

Recommendations and Management Comments. This report does not contain any negative findings. Although, management comments were not required, the Commander, Gulf Region Division of the U.S. Army Corps of Engineers provided comments concurring with the draft report.

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:

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4. Project results were consistent with original objectives; and
5. Project sustainability was addressed.

Pre-Site Assessment Background

Contract, Task Order and Costs

The Zakho[1] Military Academy Project is funded through the U.S. Government's appropriated Iraq Relief and Reconstruction Fund (IRRF) and administered by the U.S. Army Corps of Engineers, Gulf Region North (USACE-GRN) for the Multinational Security Transition Command-Iraq (MNSTC-I). USACE-GRN issued contract task order W916QW-05-D-0008-0001, an indefinite delivery/indefinite quantity (IDIQ) contract task order on 20 December 2004.

Although the assessment team requested a copy of the basic IDIQ contract from USACE-GRN, we were not provided a copy of the contract or any contract modifications. However, we were provided copies of Task Order 0001 and the five modifications to Task Order 0001. Therefore, our discussion in this section of the report is limited to Task Order 0001.

Task Order 0001 was issued on 20 December 2004 in the amount of $5,239,694 for the renovation of existing buildings and the construction of new buildings and other facilities at the Zakho Military Academy in Zakho, Iraq. The work under this Task Order is identified as Project Number 19144, listed in the Project and Contracting Office (PCO) construction database, dated 14 January 2005. At the time of our assessment, the project was reported to be 96% complete.

There were five modifications to the initial task order:

- Modification #01, issued 03 June 2005, incorporated changes to the task order Scope of Work (SOW). The total cost of the Task Order was increased by $351,015 from $5,239,694 to $5,590,709.
- Modification #02, issued 07 July 2005, added additional requirements to the task order SOW. The total cost of the Task Order was increased by $62,820 from $5,590,709 to $5,653,529.

[1] Due to the various spellings for cities in Iraq, and in an effort to achieve standardization in SIGIR reports, Zakho as noted in project documentation will be referred to as Zakho.

- Modification #03 issued 26 September 2005, added additional requirements to the task order SOW. The total cost of the Task Order was increased by $44,202 from $5,653,529 to $5,697,731.
- Modification #04 issued 17 January 2006, changed the contract completion date from 31 December 2005 to 31 January 2006. The total contract amount remained the same at $5,697,731.
- Modification #05 issued 22 January 2006, added additional requirements to the Task Order SOW. The total cost of the Task Order was increased by $116,302 from $5,697,731 to $5,814,033.

Project Objective

The overall objective of the Task Order SOW was to provide design and phased construction services for the renovation and improvement of the Zakho Military Academy. Specifically, the improvement and renovation of the facilities at the Military Academy included rehabilitation of existing buildings and construction of new buildings and other facilities.

Description of the Facility (preconstruction)

The description of the facility (preconstruction) was based on information obtained from the contract and the USACE project file. The project site is located at the existing military academy complex located in Zakho, Iraq, approximately 10 kilometers (km) from the Turkish border. The military academy is one of Iraq's two national military officer academies and is similar in mission to the U.S. Army's Military Academy at West Point. The academy is on the outskirts of the City of Zakho, but there is some residential development adjacent to the academy perimeter. The city lies on an alluvial plain within the mountainous region of northwestern Iraq, but the topography of the military academy site is level.

Prior to construction, the existing academy consisted of a number of concrete block buildings used for barracks, training classrooms, dining facilities and administrative areas. Commercial power to the academy was provided by the Ministry of Electricity. An offsite well provided water to the academy, and system pressure and demand was maintained through the use of a water tower on the academy grounds. Septic tanks were utilized to dispose of wastewater.

Scope of Work of the Contract

The Task Order Scope of Work required the contractor to:

- Renovate and expand the existing dining facility – Building (Bldg.) #1090
- Renovate the existing dining facility – Bldg. #1060
- Renovate the existing training building
- Construct one barracks building
- Construct one headquarters building
- Extend the existing perimeter security wall approximately 2.9 km around newer sections of the academy
- Research, design, and renovate the overall existing water supply and distribution system and the new packaged water treatment plant
- Research, design, and renovate the overall existing sanitary sewer distribution system and the new packaged wastewater treatment plant

- Drill and develop a water well that will be connected to the new water treatment plant
- Construct a 440 meter (m) track with interior soccer field
- Construct an obstacle course
- Construct a paved drill & ceremonies training ground (aka parade field) with stadium lighting
- Renovate the existing swimming pool and supporting utilities
- Construct access roads, parking area and sidewalks around the new headquarters building

Current Project Design and Specifications

The task order SOW includes requirements for project design and specifications submittals and approval. The SOW required submission of concept, 35%, 60%, 90%, and 100% design drawings and specifications for review and approval to the Government. The contractor was also required to develop the design in accordance with, but not limited to, the most current, applicable regulations, requirements, and criteria of the following publications.

- International Building Codes
- American Water Works Association
- American National Standards Institute
- American Standard Testing Materials
- Occupational Safety and Health Association
- National Electric Code
- American Society of Mechanical Engineers
- International Organization for Standardization
- Institute of Electrical and Electronic Engineers
- British Standards Institute
- Local Standards and Regulations
- Accepted Industry Standards and Practices

In addition, the task order SOW stated:

> *"After receipt of the contract Notice to Proceed, the Contractor shall initiate design, comply with all design submission requirements as covered under the specifications and Scope of Work. The Contractor may begin construction on portions of the work for which the Government has reviewed the final design submission and has determined satisfactory for purposes of beginning construction."*

Based on our review of the submittal transmittals, the contractor submitted design drawings at various intervals in the design and review process. The USACE Resident Engineer (RE) provided electronic copies of the 90% design drawings and specifications to the assessment team. The design drawings included detailed architectural, mechanical, electrical and structural plans for the construction of the barracks and headquarters buildings, as well as the renovation and expansion of Building 1090, one of the two dining facilities. We also received architectural, mechanical and electrical drawings for the renovations of the other dining facility (Bldg. 1060) and the swimming pool. Additionally, we obtained the architectural and electrical drawings for the training building renovation, but mechanical drawings

were not provided. Comprehensive drawing packages were provided for the new wastewater treatment plant and water treatment plant, which also included details on their respective distribution systems (e.g., piping, trenching, manholes, etc.). The water treatment plant and wastewater treatment plant were designed as "packaged units" for ease in operations and maintenance.

In addition to the buildings and utility systems, we received drawings for the construction of the following:

- Concrete parade field
- Obstacle course
- Running track with enclosed soccer field
- Perimeter fence and entry gates

The specifications received from USACE included individual specification chapters for the wastewater treatment plant and the water treatment plant. We also received specifications (referred to as the technical requirements) for the remaining facilities.

The overall design took into consideration the sequencing of work and the relationship to other Task Order and contract work. The design also took into account local availability of materials and labor skills. Based on our review of the drawings and specifications, they appear to be complete and consistent with the contract's requirements, and demonstrate the contractor's understanding of the entire Scope of Work.

In addition to design drawings and specifications, the SOW stated:

> *"The construction plans, specifications, and approved product submittals shall be the overall governing documents for construction."*

The Task Order specifications required the contractor to submit detailed specifications and manufacturer's written product data for all materials, equipment, and procedures to be incorporated into the construction. We verified that 240 submittals from the contractor were reviewed and processed by the USACE RE. Examples of submittals on this project included catalog cuts for items such as sanitary sewer pipe; preliminary drawings of various facilities like the water treatment plant, product data; and compliance certificates for building features such as air conditioning registers, grilles, and diffusers. The USACE RE maintained a submittal log and tracking system. The USACE RE also utilized other GRN engineering assets for review of specialized mechanical or electrical submittals. Based on our review of the information provided by the USACE RE, it appears there was an adequate system in place for the transmittal and review of submittals including required design plans and specifications, catalog cuts, product data, and compliance certificates.

Site Assessment

On 24 January 2006, we performed an on-site assessment of the Zakho Military Academy project. The on-site assessment included inspections of each facility included in the Task Order scope. Some of the facilities in the Task Order had been turned over to the military academy for its use, including the two dining facilities, the barracks, the perimeter fencing and gates, the track and soccer field, the paved parade field and the obstacle

course. The other facilities were essentially complete except for punch list items and commissioning activities. We were accompanied on the site visit by the USACE RE and the USACE Quality Assurance Representative. The contractor's Project Engineer also accompanied us for part of the facility tour and inspection.

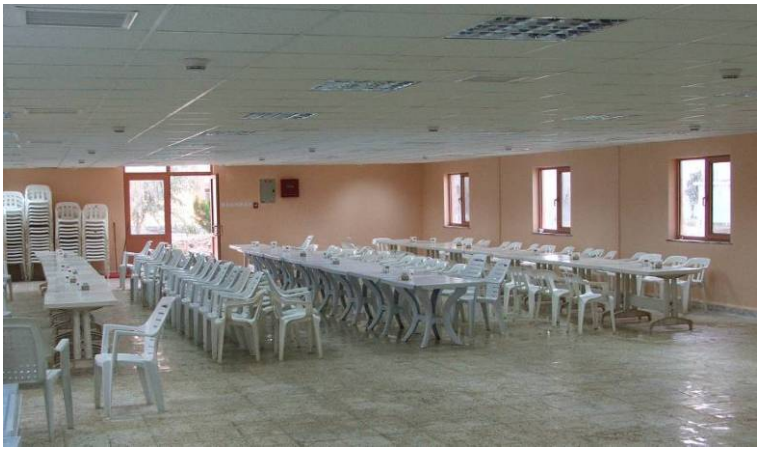
In addition to this project, USACE-GRN was also managing other construction projects under separate contracts at the Zakho Military Academy that had recently completed or that were close to being finished. These included a gymnasium, an electrical power generation facility and distribution system, an urban warfare training facility, a repelling tower, guard towers and perimeter lighting, an ammunition supply facility, an armory, and a guest house. USACE-GRN was also managing the renovation of an existing headquarters building. As a result of the volume of work at the Zakho Military Academy, the USACE QAR resided on the grounds of the academy. In addition, the USACE RE who recently assumed duties in Dahuk, Iraq, as the RE had served the previous six months as a full time project engineer at the military academy.

Work Completed

Dining Facility (Bldg. 1090)

The task order required the existing building to be extended by a steel column and beam system, which corresponded to an additional 150 square meters in the dining area. The extension required reinforced concrete footings and new floor slab. The renovation of the dining facility incorporated a central chilled water HVAC[2] system, which also included exhaust fans in the kitchen area. In addition to the kitchen being renovated, a latrine area with toilets and hand wash areas was added, as well as separate rooms for food storage. The renovation scope included new electrical panels, wiring, receptacles, fire alarms, smoke detectors, and light fixtures. For interior finishes, the Task Order also required the replacement of existing steel doors and windows with new aluminum ones, a new suspended acoustical tile ceiling, and walls refinished with gypsum plaster and enamel paint.

The facility had been turned over to the military academy in December 2005. Site Photo 1 shows the interior of the dining area in the renovated facility between the morning and afternoon meals. The interior of the facility appeared to meet the requirements of the task order except for some minor moisture damage in one small wall area which the USACE QAR was following up on for repair.



Site Photo 1. Interior of renovated dining facility, Bldg. 1090

[2] HVAC refers to heating, ventilation and air conditioning.

In addition to the renovation of the kitchen area, the Task Order required the procurement and installation of 14 new items of kitchen equipment. Major items included a service counter, a stove, and an industrial refrigerator. Site Photo 2 shows the location of the stove and exhaust hood in the kitchen. We did not take an inventory of the 14 items, but the kitchen appeared to be fully functional with an oven, stove, sinks, refrigerator, food preparation and storage areas.

Site Photo 2. Kitchen in Bldg. 1090

The Task Order also required the contractor to make all necessary repairs to the building exterior, including the repair of holes and cracks, prior to cleaning and plastering with a cement stucco finish, followed by painting. In addition, the task order required the construction of a new hip roof using corrugated metal to cover the entire building. We did not observe any problems or defects in any of the dining facility's exterior Task Order work.

Dining Facility (Bldg 1060)

The Task Order Scope of Work for this dining facility interior and exterior renovation required essentially the same items of work as Bldg. 1090. The existing facility's renovation also included the construction of a new latrine and a food storage room. The kitchen renovation included the installation of new kitchen equipment.

We were not able to inspect the interior of the building because of time constraints, but the facility had been in operation since the end of August 2005, when it was turned over to the military academy for its use. We did examine the exterior and did not find any noticeable defects associated with the exterior finishes or roof. Site Photo 3 shows the exterior of the building with the painted cement stucco finish.

Site Photo 3. Exterior of renovated dining facility (Bldg. 1060)

Training Building

The training building, a two-story reinforced concrete structure in-filled with concrete block, is comprised of four wings that are interconnected to a central core area. The building consists primarily of classrooms, barracks rooms, administrative space, and a multipurpose auditorium. The Task Order scope included new electrical panels, wiring, receptacles, fire alarms, smoke detectors, and light fixtures. Additionally, the Task Order required a complete renovation of the latrines, including the replacement of all old and missing bathroom fixtures with new ones. The renovation of the training building also included replacement of roof-mounted HVAC units with new units as well as the replacement of roof top exhaust fans. For interior finishes, the Task Order required the classroom ceiling and walls to be repaired and painted and the existing tile floors cleaned. The Task Order also required the replacement of existing steel doors and windows with new aluminum ones. During our inspection, we did not find any defects associated with the interior work including the plumbing, electrical, and architectural finishes. Site Photo 4 shows one of the renovated classrooms. One half of the building had been turned over to the military academy in October 2005. The other half was substantially complete, with punch list items remaining.

Site Photo 4. Classroom in the renovated training building

In addition to the finishes described above, the auditorium (Site Photo 5) included a new suspended acoustical tile ceiling, central air conditioning, and a stage with new wood flooring.

Site Photo 5. Auditorium in the training building

Required exterior work on the building included repair of holes, cracks and expansion joints, as well as cleaning of exterior surfaces and painting. The contractor also replaced the roof by removing the existing concrete panels and installing new waterproofing material, insulation, and gravel ballast. Site Photo 6 shows the exterior of one wing of the training building after the repairs, cleaning and painting.

Site Photo 6. Exterior view one wing of the training building

Barracks

The completed barracks had been turned over to the military academy and was occupied by students earlier in the week. The barracks had been designed as a two-story rectangular reinforced concrete structure with exterior and interior concrete

block walls. The building design included centrally located latrines, a laundry, and a lounge on both floors, flanked by student rooms in each wing. The barracks contained 76 rooms for student billeting, with each barracks room approximately 3 m wide by 4.8 m long. Finished rooms included painted gypsum plastered walls and suspended acoustical tile ceilings with granite tile floors. Site Photo 7 shows the barracks first floor hallway. Site Photo 8 is an exterior view of the barracks.

Site Photo 7. Interior hallway on first floor of the barracks

Site Photo 8. Exterior of new barracks facility

Based on the review of the contract requirements, the design, and our observations on site, the construction of the barracks met the requirements of the contract. However, since our site visit was in January, which typically is a wet month, the grounds of the military academy were muddy and there was a great deal of standing water. The construction around the academy exacerbated these problems. Since there were few sidewalks interconnecting buildings, there were few places to walk between buildings without having to walk in the mud. As a result, a large amount of mud was being tracked inside the barracks, particularly into the latrines.

Headquarters Building

The Task Order required the design and construction of a one-story reinforced concrete and concrete block building – approximately 1,500 m^2 with a cement-stucco exterior and interior office space. The design included open administrative space, conference rooms, latrines, a central roof-mounted HVAC system augmented by separate split HVAC units for the conference rooms, 240 volt/50 Hertz power, communications wiring, and interior finishes (gypsum plaster painted walls, granite tile floors, and suspended acoustical ceiling). Site Photo 9 taken in November 2005, shows one of the administrative areas still under construction and Site Photo 10 shows the completed administrative area at the time of our site visit. The building was not yet occupied, but was essentially complete, except for correction of punch list items. The outfitting of the facility with free standing and modular furniture was the responsibility of the military academy.

Site Photo 9. Administrative space under construction – Photo provided by MNSTC-I

Site Photo 10. Completed administrative space

In addition to inspecting the interior, we also checked the roof. The built-up roof consisted of a layer of polystyrene heat insulation over two layers of waterproofing membrane that was placed over the reinforced concrete roof slab. The polystyrene insulation was topped with a layer of gravel ballast. The roof was sloped to drain outward to roof drains. Even though it had rained recently, there was no standing water at any location on the roof. The HVAC units were also located on the headquarters building roof. Site Photo 11 shows the combination of split system condensing units and the central Carrier HVAC unit.

Site Photo 11. Headquarters building roof with roof-top HVAC units

The architectural style of the headquarters building is similar to the barracks. As shown in Site Photo 12, the structural concrete frame of the headquarters building was infilled with concrete block walls and covered with a painted cement-stucco finish. The color scheme of the headquarters building matched the exterior color scheme of the barracks, as well as the two dining facilities and the training building.

Site Photo 12. Exterior view of the headquarters building

The completed construction of the headquarters building met the requirements of the Task Order. There were no noticeable defects in the interior finishes and with the exterior of the building, including the roof.

Perimeter Security Fencing and Gates

The Task Order scope required a 2.9 km extension of the existing military academy's perimeter security wall. The new concrete block perimeter wall (2.5 m in height) covered an area around the shooting and grenade ranges located in the north part of the academy. The design required one roll of concertina wire to be anchored to the top of the concrete block wall. The design also called for reinforced concrete block posts spaced every 3.2 meters along the wall.

In addition to the perimeter wall, the Task Order required the gates at two locations to be 20 feet, double wide sliding metal gates. At the time of our assessment, the construction of the perimeter wall and the two gates was complete.

Although we did not inspect the entire perimeter wall, we did examine the wall at several locations, which included one gate near the wastewater treatment plant. The sections of wall that we inspected met the requirements of the design and specifications. Site Photo 13 shows the perimeter wall along the north side of the academy. Also shown in the photo is one of the guardhouses, which was built under another contract and not part of our assessment. Site Photo 14 shows one of the sliding gates in operation along the east side of the academy.

Site Photo 13. The perimeter wall along the north part of the Military Academy

Site Photo 14. Sliding gate along the east wall of the military academy

Packaged Water Treatment Plant

The task order design specifications required the contractor to design and construct a water treatment plant (WTP) with a capacity for 1,200,000 liters per day (lpd). Based on the design requirements, the plant components (in the sequential order of the treatment, storage and distribution processes) include:

- Raw Water Pumping Station
- 70 micron point-of-entry sediment filters to remove large particle sediments
- 15 micron (quartz sand/anthracite/activated carbon) filter system to remove organic matter, and control for odor and taste
- 5 micron filter system to remove sediments over 5 microns
- Reverse Osmosis (RO) purification units
- Chemical cleaning unit for the RO system
- Chemical dosing station for disinfection
- Conditioned water pressure boosting station

- Potable water storage tank (265 m^3 capacity)
- Water distribution system to individual buildings and facilities at the military academy

At the time of our assessment, the construction of the WTP was complete and all equipment installed. The pumps, filtration units, and RO units were housed in a pre-engineered metal building constructed by the contractor. Site Photo 15 shows the tanks containing the 15 micron (quartz sand/anthracite/activated carbon) filter system and Site Photo 16 shows the pressure vessels containing the RO thin film membrane elements.

Site Photo 15. Tanks enclosing the 15 micron filters

Site Photo 16. Reverse osmosis purification units

Although the WTP components were in place and interconnected according to the design and specifications, the treatment plant was not yet operating. The commissioning and start-up of the WTP, as well as the new wastewater treatment plant (WWTP), were contingent on the completion of electrical power upgrades being made to the academy under a separate USACE contract (W917ER-05-C-

0016). According to the QAR report of 14 January 2006, the electrical power generation and distribution upgrade project is behind schedule, but is 86% complete. On the day of our assessment, the contractor for this project was working on the substation electrical panels and pulling cable to connect the panels. Therefore, operation of the water treatment system could not be assessed, although the components were consistent with Task Order requirements.

Packaged Wastewater Treatment Plant (WWTP)

The Task Order design specifications required the installation of a new packaged wastewater treatment facility with design flow requirements of 1,000,000 lpd. At the beginning of the wastewater treatment cycle, the design called for an underground reinforced concrete flow equalization tank (200,000 liters). The purpose of the tank was to regulate flow through the WWTP by storing excess wastewater during flow surges that may be incurred during peak flow times. The specifications also required the installation of Rotating Biological Contactor (RBC) domestic wastewater treatment units to serve as the main treatment mechanism. To separate course materials from the influent before entering the RBCs, the design also required a baffled sedimentation tank. Other major components incorporated into the design included a final settlement tank (for sludge removal), a sludge disposal tank, a chlorination unit (for disinfection), a filtrated water tank, and a control panel. At the time of our assessment, the installation of the WWTP was complete. However, the plant had not been commissioned and turned over to the military academy for operation because USACE was waiting on the completion of the electrical generation and distribution contract. Site Photo 17 shows the WWTP package RBC units. There are five separate RBCs which are designed to operate in parallel or in series. The WWTP is also covered by a sheet metal roof that is supported by a series of steel trusses, girders, and columns.

The equalization, final settlement, filtrated water, and the sludge disposal tanks are underground, constructed below the RBCs, so we did not inspect them. Although the plant was not yet operational, the components we observed appeared to be installed according to the design and specifications. We did not see any defects in the RBC units or with the above ground piping and piping connections.

Site Photo 17. Five RBC units for treating domestic wastewater at the WWTP

The Task Order specifications also required the design and construction of a sanitary sewer collection system consisting of a series of underground wastewater high density polyethylene piping, and pre-cast concrete manholes. The sanitary sewer system would terminate at the WWTP. According to the USACE Quality Assurance Representative (QAR) report of 4 January 2006, the sanitary sewer system was complete, except for the repair of road cuts. Since the piping and manholes were backfilled, we did not assess this component of the project. However, a review of the USACE Quality Assurance (QA) reports and contract submittals indicate the project was completed in accordance with the Task Order requirements.

Drill and Develop a Water Well

This facility was added by modification to the original Task Order and required the contractor to design and construct a new deep well and pump house, and to construct supply water lines to an existing elevated water storage tank adjacent to the new WTP. The well (drilled to a depth of 150 m), well house, and piping to the existing elevated water storage tank were completed in October 2005. Site Photo 18 taken during the construction, shows the well house, as well as the excavation and backfill for the water line installation.

Site Photo 18. Water main installation from new well house – Photo provided by USACE

The control panel inside the well house was completed in November 2005. Although, at that point, the well was ready for startup and testing, commissioning activities could not begin until the electrical generation and distribution contract, mentioned previously, are completed.

During our site assessment, we were not able to go inside the well house because the building was locked and the USACE QAR did not have the key. However, the exterior of the well house appeared to meet the requirements of the Task Order.

440 m Track and Interior Soccer Field

The Task Order SOW required the contractor to design and construct a 440 m track with an interior soccer field that would be properly graded for storm water drainage and to prevent the effects of erosion. The track cross-section design required a "synthetic grass" type surface adhered to an 80 millimeter non-structural concrete base. The design also required a 100 mm sand sub-base underneath the concrete. In addition, the design called for the application of fine sand between the yarns of the synthetic surface.

The track and soccer field construction was completed and turned over to the military academy in December 2005. When we toured the area and checked the track, we did not find any problems associated with the construction. The track was level, marked properly with stripped lanes, and free of bumps, rips, or other defects in the surface. Site Photo 19 shows the track and one half of the soccer field.

The soccer field was sodded in September 2005 and appeared to drain well. There was no standing water. The grass was dormant because of the colder winter weather in Zakho, but a review of QAR's progress photos indicate the sod was placed properly and irrigated prior to the winter months.

Site Photo 19. Synthetic track surface on the outside of the soccer field

Obstacle Course

The Task Order design and specifications required a horseshoe shaped course, 350-400 m long, containing 16 obstacles, such as an inclined wall, a balance beam, a rope bridge, etc. The obstacle course construction was completed and turned over to the military academy in October 2005. We toured the site during our assessment. Sixteen obstacles were in place along a horseshoe shaped course. All appeared to be in serviceable condition. Site Photo 20 shows one of the 16 obstacles, the "double high bridge."

Site Photo 20. Obstacle #8 along the course – "Double High Bridge"

Paved Parade Field with Stadium Lighting

The SOW required the design and construction of a "60 m by 60 m paved drill field, or what the designated area would allow". The contractor, however, was able to design a 75 m by 110 m paved parade field. The design cross section consisted of 10 centimeters of non-reinforced concrete panels over a 10 centimeter gravel base. Beneath the base, the design required 30 centimeters of "blockage" material.

The design for the lighting system included six galvanized metal poles, 25 m high. Four of the six were corner poles and the two others were placed in the middle of each long side (110 m) of the parade field. The design for the light fixtures called for 1000 watt sodium vapor luminaries, four mounted at the top of the corner poles and five mounted on the top of the middle poles. In addition, the design required two 1000 watt metal halide luminaries on each pole in order to have pre-lighting of the parade field before the sodium vapor luminaries could fully illuminate.[3]

Construction of the entire project, including the stadium lighting, was completed in November 2005. Site Photo 21 shows a portion of the concrete parade field observed during our assessment. In Site Photo 22, a corner light post with four sodium vapor and two metal halide luminaries is shown.

Site Photo 21. Concrete parade field

Site Photo 22. Light Post

We found the quality of the concrete workmanship on the paved parade field to be good. The surface was uniform, free from any noticeable cracking or other defects. The expansion joints were in place and cut according to the design. The lighting system layout was also according to design. The lighting system was not tested during our assessment, but the QAR did test and operate it for the final inspection.

Swimming Pool Renovation

The swimming pool renovations included major repairs and improvements to an existing 13 m by 26 m swimming pool. The SOW also included renovations in the

[3] High pressure sodium vapor luminaries were selected because they have high lighting output. However, pre-lighting is needed, since the sodium vapor luminaries require seven minutes to reach full lighting capacity.

adjacent pool house building containing the pool's pumping, filtration, and disinfection systems, as well as the locker, shower and bathroom facilities. The design drawings and specifications for the pool house building called for new doors, windows, light fixtures, as well as repairing and painting the interior ceiling and walls, and exterior walls and trim. The design also required a renovation of the pool house latrines, including installation of shower stalls and replacement of all fixtures (wall mounted faucets, wall hung lavatories, wall hung urinals, and water coolers).

The swimming pool renovation included replacement of the pool walls and floor with a new ceramic tile surface supported by new reinforced concrete walls and floor. Overflow gutters were required along all four walls of the pool. The pool filtration design included five new automatic filters using a quartz sand medium with a capacity of filtering 800,000 gallons of water in four hours. The design also called for the replacement of the chlorine regulator and installation of a pH regulator. The pool was to be heated by a series of five heat exchangers rated at 18 kilowatts each, and illuminated with eight, 300 watt lamps located along the pool walls.

During our site assessment, we did not go inside the pool house because the building was locked and because of time constraints. However, our review of the Contractor Quality Control (QC) reports, Government QA reports, and progress photos indicate the building renovation work and pool mechanical system upgrades were accomplished according to the Task Order requirements. The final inspection by the USACE had not been conducted as of our site visit. Although functionally complete, the mechanical system had not yet undergone final inspection because of the requirement for electrical power that was to be provided upon completion of USACE's electrical generation and distribution upgrades contract.

The swimming pool portion of the work was completed in November 2005. The pool at the time of our assessment was drained except for surface water accumulation at one end of the pool as shown in Site Photo 23. The swimming pool finish work appeared to meet the requirements of the Task Order. Further, the quality of workmanship was good. The gutters were constructed alongside the pool waters and covered with a protective screening material. The tiles were in place, properly positioned, and grouted. Lane markings and waterproof light fixtures were also installed according to the design requirements.

Site Photo 23. Swimming pool and the new barracks

Work in Progress

At the time of our site visit, the project was 96% complete. Major work items were substantially complete. The contractor's work crews were focusing on correction of punch list items.

Work Pending

Remaining work included construction of the access road, parking lots and sidewalks around the headquarters building. Other work included commissioning activities for the WTP, WWTP, the water distribution and wastewater collection systems, and the swimming pool mechanical system.

Project Quality Management

Contractor's Quality Control Program

The Task Order required the contractor to submit a Quality Control (QC) plan for approval.

The contractor submitted a QC plan that was approved by USACE on 24 March 2005. The plan addresses the QC organization, inspections, nonconforming items, testing and test plans, submittal procedures, reports and records, material handling and storage. The plan also included a list of the definable features of work. We determined the contractor's QC plan met the standards addressed in Engineering Regulation 1180-1-6 (*Construction Quality Management*) or PCO Standard Operating Procedure CN-103 (*Contractor Construction Quality Control Plan*).

The contractor submitted QC reports on a daily basis, which were reviewed by the QAR and Project Engineer. These reports contained information such as work accomplished each day with the location, activity and by whom, test results, deficiencies and corrective actions, labor distribution, equipment utilized, and material received on site. In addition, the contractor prepared daily inspection checklists for each definable feature that was scheduled to be worked on each day. The contractor also maintained deficiency logs to document problems noted with construction/renovation activities.

Government's Quality Assurance Program

The QAR maintained daily QA reports that documented any deficiencies noted at the site. Based on our review, we found the QAR's reports to be sufficiently complete, accurate, and timely. In addition to containing project specific information to document construction progress and highlight deficiencies, the QAR also supplemented them with detailed photographs that reinforced the narrative information provided in the reports. The USACE QAR did not maintain a QA deficiency log; however, the Project Engineer and the QAR did ensure that all deficiencies cited during QA inspections were corrected.

The Project Engineer and QAR were on site everyday in managing this project and the other USACE projects at the military academy. They spent a significant amount of their time at project sites interacting with the contractor and observing

construction activities. Further, they ensured that potential construction deficiencies were detected, evaluated, and properly corrected, in a timely manner.

The Government Quality Assurance program was effective in monitoring the contractor's Quality Control program for the Zakho Military Academy construction and renovation project. In addition, QA activities were sufficiently and accurately documented. This condition occurred because of the efforts of the Project Engineer and QAR during the course of the project.

Project Sustainability

The Task Order specifications required a one year warranty on all materials and workmanship for the buildings and facilities constructed or renovated in this project.

In addition, the contractor is required to provide spare parts lists (in indexed binders in Arabic and English) for major equipment components installed on this project with sufficient information to allow procurement of spare parts by follow-on military academy maintenance personnel.

For operations and maintenance instruction, the Task Order requires the contractor to conduct on-site "conference(s)" with designated military academy personnel for the purpose of providing operation, maintenance, and repairs instruction for the following equipment and procedures:

- Electrical Power systems to include procedures for switching to back-up system power
- Water supply system for replacing filters
- HVAC systems
- All dining facilities food preparation, serving, and storage equipment

Key topics of the conference include step-by-step startup and shutdown procedures, routine maintenance operations, and trouble shooting procedures.

The contractor is also required to provide Operations & Maintenance (O&M) manuals for major equipment installed for the project.

Further, for the WWTP and WTP, the contractor is required to provide spare repair parts, as recommended by the system manufacturer, for one complete year of operation. The contractor is required to provide two sets of O&M manuals that will detail the step-by-step procedures required for system startup, operation, and shutdown; one in Arabic and one in English. In addition to providing spare parts and O&M manuals, the contractor is required to set up technical training, from the system's manufacturers, for up to ten military academy personnel.

In addition to the Task Order requirements addressing sustainability, MNSTC-I, whose mission is to develop, organize, train, equip, and sustain Iraqi security forces, is also developing sustainment plans for the Iraqi Army's base infrastructure. MNSTC-I is assisting the Iraqi Army in the creation of Garrison Support Units throughout Iraq that will ultimately be responsible for providing life support services, including operations and maintenance at Iraqi Army bases, which also includes the military academies.

Another issue that could impact sustainability is the poor drainage around the military academy. Our assessment was conducted in January, when precipitation is typically

greater. We noted a significant amount of standing water located throughout the academy grounds. Further, there were few sidewalks interconnecting buildings that would keep students and staff from having to walk in the mud when moving between academy facilities. Except for some minor grading around each site, the access road, and the parking area and sidewalks to be constructed around the new headquarters building, the project did not address drainage.

In discussions with MNSTC-I staff, drainage improvements, sidewalks, and pavements are not a priority at any of the Iraq bases being constructed. The higher priority is to utilize the limited Iraq Relief and Reconstruction funds to construct facilities that directly contribute to the mission of developing and sustaining the Iraq security forces, such as a barracks, a training facility, an armory, etc.

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 components were adequately designed prior to construction or installation.

   The project components were adequately designed prior to construction. The plans and specifications provided an accurate depiction and adaptation of the design to existing site conditions. Although the project consisted of construction and renovation work involving 14 facilities in addition to other USACE contract work taking place at the same time, the design took into consideration the sequencing of work, and the relationship to other task order and contract work. The design also took into account local availability of materials and labor skills. Additionally, the design considered architectural compatibility with existing and new facilities. Further, even though there are operations and maintenance requirements associated with the water treatment plant and wastewater treatment plant, they were designed for ease in operations and maintenance.

2. Determined whether construction met the standards of the design.

   All observed work met the standards of the design. Further, the construction and equipment installation were completed at a high level of workmanship by the contractor. In addition, the USACE Project Engineer and USACE QAR lived and worked at the military academy and were fully engaged daily in construction activities to ensure quality and compliance with the task order requirements. As a result, the project is providing the military academy with facilities that directly support the training of Iraq Army personnel.

3. 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 effectively guide the contractor's quality management program. Further, the contractor's daily Quality Control reports contained required project and work activity information to document construction progress and identify problems and required corrective action. The contractor also prepared daily inspection checklists for each definable feature that was going to be scheduled and worked each day and also maintained deficiency logs to document problems noted with construction/renovation activities.

The Government Quality Assurance program was effective in monitoring the contractor's quality control program. The Project Engineer and the QAR ensured that all deficiencies cited during QA inspections were corrected. The QAR also maintained daily QA reports that contained project-specific information to document construction progress and highlight deficiencies. The QAR also supplemented the daily reports with detailed photographs that reinforced the narrative information provided in the reports.

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

   The Zakho Military Academy Construction and Renovation project results were consistent with the original task order objectives. This occurred because of the Contractor's high quality of workmanship and because the U.S. Army Corps of Engineers Project Engineer and Quality Assurance Representative effectively managed the project.

5. Determine if project sustainability was addressed.

   Sustainability was addressed in the Task Order requirements. The Task Order specifications required a one-year warranty on all materials and workmanship for the buildings and facilities constructed or renovated in this project. The Task Order also required spare parts lists and O&M manuals for major equipment components. Additionally, the contractor is required to provide spare repair parts as recommended by the system manufacturer for the WTP and WWTP for the first year of operation. The contractor is also required to coordinate and provide technical training for up to ten military academy personnel on the systems within the WTP and the WWTP.

Recommendations and Management Comments

This report does not contain any negative findings. Although, management comments were not required, the Commander, Gulf Region Division of the U.S. Army Corps of Engineers provided comments concurring with the draft 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: Task Order, Task Order Modifications, contract documentation, and Scope of Work;
- Reviewed the design package (drawings and specifications), Quality Control Plan, Contractor's Quality Control Reports, USACE Quality Assurance Reports, Construction Progress Photos, Punch Lists, and Turnover Letters;
- Interviewed the U.S. Army Corps of Engineers Resident Engineer, Quality Assurance Representative, and the Multinational Security Transition Command J-7 (Engineering Directorate) staff; and
- Conducted an on-site assessment and documented results at the Zakho Military Academy Construction and Renovation Project in Zakho, Iraq.

Appendix B. Acronyms

GRN	Gulf Region North
HVAC	Heating, Ventilation and Air Conditioning
km	Kilometer
m	Meter
MNSTC-I	Multinational Security Transition Command - Iraq
QA	Quality Assurance
QAR	Quality Assurance Representative
QC	Quality Control
RBC	Rotating Biological Contactor
RE	Resident Engineer
SOW	Scope of Work
USACE	United States Army Corps of Engineers
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

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
Auditor General of the Army

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
Inspector General, Department of Commerce
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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 International Operations and Terrorism
- Subcommittee on Near Eastern and South Asian Affairs

Senate Committee on Homeland Security and Governmental Affairs
- Subcommittee on Federal Financial Management, Government Information and International Security
- Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia

U.S. House of Representatives

House Committee on Appropriations
- Subcommittee on Defense
- Subcommittee on Foreign Operations, Export Financing and Related Programs
- Subcommittee on Science, State, Justice and Commerce and Related Agencies

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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