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## Closeout Report

Kandahar Helmand Power Project (KHPP)

COMPONENT 2 SUB-COMPONENT 1

### Build a New Substation at Durai Junction



Submitted by: Black & Veatch Special Projects Corporation (BVSPC)  
Kandahar Helmand Power Project (KHPP)  
USAID Contract Number 306-C-00-11-00506-00

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U.S. Agency for International Development (USAID)  
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Kabul, Afghanistan

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## Attachments

Document # (if applicable)	Description (Note: The Section references below are the BVSPC-USAID Contract sections wherein specific deliverable requirements are located.)	Status	In Closeout Package?
a-00	Closeout Package Attachment File Directory	Complete	Yes
a-01	Contract Closeout Procedures Manual (CCPM)	Complete	Yes
a-02	Security Plan (Section F.4.B(A)) - Site Specific	Complete	Yes
a-03	Implementation Plan - Work Plan (Section F.4.B-B)	Complete	Yes
a-04	Health and Safety Plan and Procedures (Section C.4.6; Section F.4.B-C)	Complete	Yes
a-05	Quality Control Plan (Section C.4.5; Section F.4.B-C)	Complete	Yes
a-06	Warranty Administration Plan (Section C.4.11; FAR 52.246.21)	Complete	Yes
a-07	Construction Manual (Section C.4.10)	Complete	Yes
a-08	Construction Schedule (Section C.4.10; Section F.4.B-C) - Component Specific	Complete	Yes
a-09	Photo Album	Complete	Yes
a-10	Small Business Utilization Subcontracting Plan (Section H.23; Section J - Attachment 19; FAR 52.219-8)	Complete	Yes
a-11	Operations and Maintenance Manuals (Section C.4.11; Section F.4.B-C)	Complete	Yes
a-12	Performance Monitoring and Evaluation Plan - each Component / Subcomponent, as stipulated by Contracting Officer's Representative (COR) (Section C.4.13)	Complete	Yes
a-13	Branding Implementation Plan (Section F.4 B,C; Section D.2)	Complete	Yes
a-14	Environmental Plan (Section H.16)	Complete	Yes
a-15	Environmental Compliance Documentation Schedule (Section H.16)	Complete	Yes
a-16	Environmental Closeout Report (Section H.16) - Site Specific	Complete	Yes
a-17	Environmental Reports (Section F.4.B-C) - Annual Reports until Mod 10 (16 Feb 2013), and then Quarterly Reports	Complete	Yes
a-18	Weekly Highlight Report (Section F.4.B-B)	Complete	Yes
a-19	Short Term Report - STTA Trip reports (Section F.4.B-B) - Site Specific	Complete	Yes
a-20	Design Submittals (Section F.4.B-C) - Site Specific	Complete	Yes
a-21	Inspection and Equipment Test Reports (Section F.4.B-C) - Site Specific	Complete	Yes
a-22	Concrete Strength tests: Steel reinforcements test reports (Section F.4.B-C) - Site Specific	Complete	Yes
a-23	Testing and Commissioning Report (Section F.4.B-C) - Site Specific	Complete	Yes
a-24	As-Built Construction Drawings (Section C.4.11; Section F.4.B-C) - Site Specific	Complete	Yes



Document # (if applicable)	Description (Note: The Section references below are the BVSPC-USAID Contract sections wherein specific deliverable requirements are located.)	Status	In Closeout Package?
a-25	Training Reports: Component-Specific	Complete	Yes
a-27	Final Closeout Report (Section C.4.11; Section F.4.B-C)	Complete	Yes
<b>Tasks for Subcomponent 2.1: Build a New Substation at Durai Junction (Section C.3.1.2)</b>			
b-01	Rebuild Durai Junction Substation while maintaining existing service for customers served by the Substation.		
b-01a	Land use agreements.	Complete	Yes
b-01b	Final as-installed drawings and inventory turnover data.	Complete	Yes
b-02	Install a breaker-and-a-half configuration, with line positions for the transmission line from Kajaki towards Kandahar and Lashkar Gah.	Complete	Yes; see b-01b
b-03	Install 110/20 kV transformers to serve local Durai loads. See Attachment 2, "Diagram 0-2, Durai Junction Single Line." The site must be located as identified in Attachment 3, "Diagram 3, Durai Junction Location." The camp must be site adapted from Attachment 4, "Diagram 0-4. Durai Junction Camp Layout."	Complete	Yes; see b-01b
b-04	Provide installation design for one 20 kV switchgear lineup (Type C) for future use as either a generation tie or for new distribution feeders. Convey one 20 kV Type C switchgear unit to Da Afghanistan Breshna Sherkat (National Electrical Utility) (DABS) (procured under C2S2 Task iii) and deliver the unit to DABS' secure laydown area in Kandahar. (USAID Acceptance of Switchgear Lineup Design)	Complete	Yes; see d-02
b-05	Construct battery storage facility adjacent to Control Building utilizing a retrofitted steel shipping container, and transfer all batteries from the Control Building to the new battery storage facility. The facility must be capable of storing all switchyard batteries such that no batteries need to be installed or stored in the Control Building. (USAID Acceptance of Battery Storage Facility)	Complete	See d-03
b-06	Camp Power - Coordinate with DABS to provide permanent power to the man-camp from the Substation. Design a 20 kV feeder from the Substation to a 20 kV/400Y transformer (supplied by DABS) located near the existing camp manual transfer switch ac electrical switch. Installation will be by DABS. The Contractor will provide a transformer, wire, cable, and hardware with DABS, providing the remainder of the materials, including all consumables. Conduct coordination/pre-construction meeting with DABS onsite to facilitate the work and communicate requirements for completing the connection prior to site turnover. (Submission of Camp Power Information)	Complete	See d-04
b-07	Internet Connection - Specify voice and data infrastructure for procurement and installation by DABS. Utilize, to the extent practical, existing communication infrastructure onsite currently used by the Contractor and planned to be turned over to DABS. Provide an estimate of installation and recurring maintenance costs. (Submission of VOIP Connection and Equipment Information)	Complete	See d-05
b-08	Erroneous Numbering in Modification 11 – No Task viii.		
b-09	Provide a general Operation & Maintenance (O&M) plan for the Substation. Items to be addressed must include, but not be limited to: listing of applicable equipment O&M manuals; preventive maintenance requirements not covered by O&M manuals; operator position descriptions and associated minimum training requirements, including recommendations for recurring training. (Submission of O&M Plan and Manuals)	Complete	See d-06
b-10	Procure spare parts for Substation components. Notify the COR of planned parts' purchases and associated costs prior to procurement. (USAID Acceptance of Spare Parts List)	Complete	See d-07

Document # (if applicable)	Description <b>(Note: The Section references below are the BVSPC-USAID Contract sections wherein specific deliverable requirements are located.)</b>	Status	In Closeout Package?
<b>Deliverables for Subcomponent 2.1: Build a New Substation at Durai Junction (Section F.4.A)</b>			
<b>d-01</b>	Contractor shall complete construction and commission the Durai Substation. (Submission of Final Drawings and Final Inspection to USAID)	Complete	Yes
<b>d-02</b>	Installation design of 20 kV switchgear lineup. (Design Drawings)	Complete	Yes
<b>d-03</b>	Design and construction of the battery storage facility. (Drawings and Photos of Battery Storage Facility)	Complete	Yes
<b>d-04</b>	Provision of materials for permanent power to the man-camp from the Substation. (Design Documents and Materials Lists)	Complete	Yes
<b>d-05</b>	Specifications of voice and data infrastructure for internet connection, along with estimate of installation and recurring maintenance costs. (Specification Documents and Equipment Turnover Documents)	Complete	Yes
<b>d-06</b>	O&M plan for the Substation. (O&M Plan and Manual for Breshna Kot)	Complete	Yes
<b>d-07</b>	Spare parts for the substation components - Site inspection & Document review. [Transfer Documents (Pre-Mod 11) and Spare Parts Procurement List (Post-Mod 11)]	Complete	Yes
<b>c-05</b>	Subcontract/Purchase Order Matrix which Indicates Closeout Status.	Complete	Yes
<b>g-06</b>	USAID Final Disposition Instructions.	Complete	Yes
<b>g-07</b>	Complete & Submit Handover/Disposal documents to USAID.	Complete	See g-06
<b>m-01a</b>	SUBSTANTIAL COMPLETION: 1) Certificate of Substantial Completion with Schedule of Defects (if applicable).	Complete	Yes
<b>m-01b</b>	FINAL INSPECTION AND ACCEPTANCE 1) Final Punch List (if applicable). 2) Final Completion and Acceptance Certificate. 3) Draft Bilateral Agreement with Supporting Documentation.	Complete	Yes
<b>m-01c</b>	WARRANTY PERIOD & FINAL WARRANTY INSPECTION: 1) Warranty Certificate	Complete	Yes
<b>m-02</b>	Prime Contract original signed copy in files KC.	Complete	Yes
<b>m-03</b>	Copy of all Fully Executed Prime Contract Modifications and Change Orders in electronic folder.	Complete	Yes
<b>m-04</b>	USAID Closing Statement Letter+ B&V Response Letter.	Complete	Yes
<b>m-05</b>	Copy of Closeout Documentation - List of closeout documentation handed over/uploaded to USAID.	Complete	Yes

# 1 KANDAHAR HELMAND POWER PROJECT (KHPP) OVERVIEW

## 1.1 KHPP Background

The purpose of the Kandahar Helmand Power Project (KHPP) contract, issued by the United States Agency for International Development (USAID) on 9 December 2010, was to increase the supply and reliability of electrical power in the areas in southern Afghanistan served by the South East Power System (SEPS), particularly the City of Kandahar. The contract was to support the SEPS reconstruction and thereby increase the quality of life of the people in Kandahar and Helmand Provinces. The KHPP was conceived as a critical component of the United States' government's Counterinsurgency (COIN) strategy in southern Afghanistan. KHPP is a part of a larger United States (US) government sponsored program involving multiple USAID Implementers, the US Army Corps of Engineers (USACE), and other Donors to improve the SEPS and connect it with other electrical grids in Afghanistan.

A reliable, sustainable electric power generation, transmission, and distribution system in Kandahar and Helmand Provinces is an important objective of the Government of the Islamic Republic of Afghanistan (GIROA). The system is expected to fuel economic growth not currently possible, especially in Kandahar City, the second largest city in Afghanistan and a center for education, health care, manufacturing, and transportation. Kandahar City has an electrical supply shortfall of at least 40 megawatt (MW) for its approximately 850,000 residents.

SEPS as a system is composed of multiple generation islands, an aged transmission system, and multiple distribution systems in southern Afghanistan serving 380,000 of the 1.7 million people residing in the region. Diesel generator sets and the Kajaki Hydroelectric Power Plant (HPP) provide the majority of the electrical power generation in the system. The 222 kilometers (km) SEPS transmission system operates at 110 kilovolts (kV), medium voltage distribution at 20 kV, and low voltage distribution at 400 volts (V). Kandahar City represents the largest power demand node within SEPS.

The Kajaki HPP was the first significant generation source installed in SEPS. Kajaki HPP, supported by the US government, went online in the mid-1970s. Prior to execution of the KHPP contract, its power was delivered to Kandahar City through one aged 25 megavolt amperage (MVA) transformer located at the Kandahar Breshna Kot (BK) Substation. In 2003, USAID began rehabilitation of the Kajaki HPP. At peak production, the Kajaki HPP currently provides 32 MW (during high water periods), with 12 MW of power serving Kandahar City and 20 MW of power transmitted to the remaining distribution nodes served by the SEPS transmission backbone.

To supplement generation for Kandahar City during the Kajaki HPP rehabilitation, USAID facilitated the installation of fourteen (14) KTA-50 diesel generators at the BK Substation in late 2003. Five (5) additional diesel generators owned by Da Afghanistan Breshna Moasessa (now known as Da Afghanistan Breshna Sherkat, or DABS) were installed at BK in 2008. This upgrade was done to increase the short term generation capacity, as the rehabilitation efforts at Kajaki HPP had been prolonged due to continued insurgent activities and, the Kandahar City power supply was taking on increasing importance in the International Security Assistance Force's (ISAF's) COIN strategy in the area.

As of this report date, the BK Substation diesel generators have a combined generating capacity of 20.5 MW at peak production due to new units either provided by or installed by USAID. These units consist of the 10.5 MW MTU units, 5 MW of aged derated KTA-50 units, and 5 MW provided by aged derated QSK-60 units. The new 10.5 MW MTU units were installed and commissioned by the KHPP.

## 1.2 KHPP Summary of Scope of Work

The KHPP scope of work initially contained six (6) Components with ten (10) Subcomponents, outlined below, which, integrated with other work on SEPS, were designed with the purpose of increasing and improving the sustainability and reliability of electric supply provided by the SEPS:

### **Component 1. Improve Kandahar Power Distribution System**

Subcomponent 1: Replace the Kandahar Breshna Kot Substation.

Subcomponent 2: Refurbish Kandahar City Medium Voltage (MV) Distribution System.

Subcomponent 3: Construct a new Kandahar East Substation to (1) enhance the reliability of the system serving Kandahar, and (2) serve as a receiving point for an expected link between the SEPS and the North East Power System (NEPS), which is Afghanistan's major source of lower cost, imported power from the Central Asian Republics.

Subcomponent 4: Construct a transmission line between the Kandahar Breshna Kot Substation and the new Kandahar East Substation.

Subcomponent 5: Replacement of Aged Diesel Generators at the Breshna Kot Substation.

### **Component 2. Build Durai Junction Substation**

Subcomponent 1: Build a new Substation at Durai Junction.

Subcomponent 2: Procure equipment for additional Substations.

### **Component 3. Program Support and Program Management**

### **Component 4. Transportation, Installation, Operation and Maintenance of Kandahar (also known as Shorandam) Industrial Park Diesel Power Plant (also known as SIPD).**

### **Component 5. Rebuild the Kajaki Dam Substation and Local Distribution System**

### **Component 6. Installation and Commission Kajaki Unit 2**

Subcomponent 1: Perform inventory assessment of Government Furnished Equipment (GFE).

Subcomponent 2: Repair GFE, and provide missing and additional new equipment for completing Kajaki Unit 2 installation.

Subcomponent 3: Install and commission Kajaki Unit 2.

USAID issued the KHPP contract to Black & Veatch Special Projects Corporation (BVSPC) to provide engineering, procurement, construction, and all material, equipment and/or services necessary to successfully complete each of the Components and Subcomponents in accordance with the requirements of the contract.

BVSPC was tasked with developing appropriate engineering design and construction methodologies, being responsible for procurement, design, construction, quality control, testing, and commissioning. Additionally, BVSPC provided the support services needed to implement those activities (security, life support, ground and air movements, etc.). BVSPC was also responsible for issuing relevant warranties for the equipment and work provided under each Component and Subcomponent. Sustainability of the infrastructure being developed was one of the key deliverables of the KHPP. Drawing from previous Operation and Maintenance (O&M) training programs that BVSPC implemented on behalf of USAID through the Afghanistan Infrastructure Rehabilitation Program (AIRP), BVSPC was required to recommend and, in most instances, implement the training and skills development needed to sustain the efforts undertaken in this contract.

In addition, BVSPC was to provide spare parts' inventory necessary for DABS to perform the required operation and maintenance of installed equipment for each Component and its Subcomponent. These recommendations were, in select instances, to be submitted to USAID prior to initiation of the respective subcomponent, and were to be based on the BVSPC assessment of the capability and intent of the recipient to execute required O&M functions.

As KHPP was implemented, the security situation in the southern region of Afghanistan changed. While Regional Command Southwest and the US Marines achieved substantial success in clearing the Upper Sangin Valley in late 2011, enabling KHPP to execute the first contractor convoy to Kajaki in several years, the region was impacted by significant increases in anti-government activity in 2011 to 2012 as the GIRoA, with ISAF support, increasingly imposed GIRoA control over the region. As a result, companies and organizations willing to work in the region significantly increased their pricing to accommodate the higher risk and security costs by escalating their "risk premium" with their standard pricing. In addition, commodity costs and construction costs within Afghanistan increased more rapidly than expected during 2011. The unexpected cost increases impacted all implementing agencies from KHPP to USACE, and diminished the collective capability of all agencies involved to meet initial objectives.

Recognizing these budgets would not allow delivery of all Components and Subcomponents, USAID, in concert with Regional Command South, reviewed the KHPP program in mid-2011 to determine what adjustments could be made to retain core program objectives aligned with the COIN strategy while cutting projected costs. This review produced the realignment and de-scoping of select project activities. The net result was the de-scoping of Subcomponent 1.3, construction of a new Kandahar East Substation and 1.4, construction of a transmission line between the Kandahar BK Substation, and the new Kandahar East Substation, with the intent to transfer these activities to USAID's Power Transmission Expansion and Connectivity (PTEC) program, which was then under development. In addition, the scope of Subcomponent 1.2 was adjusted to eliminate planned additional connections to the Kandahar distribution system, thereby avoiding

potential “negative COIN impact” until such time additional sustainable, non-diesel based generation to supply additional customers could be supplied (Kajaki Unit 2 and the NEPS to SEPS connection to provide lower cost imported hydropower).

The elimination of the Substation at Kandahar East and the transmission line was accompanied by a realignment of Subcomponent 1.5, and the placement of 14 MTU generators, representing 21 MW of installed capacity at the Kandahar East location. With the implementation of the diesel power “bridging solution” in Kandahar City by US Forces Afghanistan which added two (2) 10 MW diesel plants in early 2011 operating in separate island modes and, increasing concern regarding the sustainability of additional diesel generation within Kandahar City, the installation of the 14 MTU units was suspended until USAID could further assess the situation. Following the adjustment of KHPP scope, all six (6) original Components remained in the contract, but with the original ten (10) Subcomponents reduced to eight (8).

### 1.3 KHPP Contract Evolution

Table 1 lists a history of the changes which have occurred in the Prime Contract between BVSPC and USAID as needs and demands were adjusted due to changing ground conditions in order to maximize the benefits to the people of Afghanistan.

**Table 1: History of Changes in USAID Contract No. 306-C-00-11-00506-00**

Contract	Date	Description
Initial Contract Award	09 Dec 2010	This contract will support US Agency for International Development (USAID), Afghanistan Mission’s Kandahar Power Initiative (KPI).
Contract Modification 01	1 Feb 2011	The purpose of this modification was to add the following in Section H, Special Provisions/Special Contract Requirements to the listed contract as follows: <ul style="list-style-type: none"> <li>• Use of Synchronized Pre-deployment and Operational Tracker (SPOT) for Contractors Supporting a Diplomatic or Consular Mission Outside the United States (Supplement to FAR 52.225-19).</li> <li>• Serious Incident Reporting in Afghanistan.</li> <li>• Gender Integration Requirements.</li> </ul>
Contract Modification 02	17 Mar 2011	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Revise Section B.5 “Indirect Cost” based on BVSPC latest approved NICRA for FY2010.</li> <li>• Revise Section H.22 “Consent to Subcontracts” to incorporate the approved Subcontracting Plan dated 28 February 28 2011.</li> <li>• Change the project name from “Kandahar Power Initiative (KPI)” to “Kandahar Helmand Power Project (KHPP).”</li> </ul>
Contract Modification 03	27 Jun 2011	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Incorporate the following clause: <i>The Contractor shall comply with and adhere to all USAID Afghanistan Implementing Partner Notices. Copies of the notices are provided to implementing partners at the time of issuance. Copies are also available upon request from your Cognizant Contracting Officer.</i></li> <li>• Remind the Contractor of the recently issued Implementing Partner Notice No. OAA-IP- 2011 – 004 which incorporates Mission Order No. 201.04 entitled, “National Security Screening (Non-US Party vetting).”</li> </ul>
Contract Modification 04	17 Jul 2011	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Incorporate no cost changes in the sections C and F.</li> <li>• Incorporate the FAR Clause 52.209-9 under PART II – CONTRACT CLAUSES. SECTION I – CONTRACT CLAUSES.</li> </ul>
Contract Modification 05	19 Jul 2011	The purpose of this modification was to provide funding in the amount of [REDACTED], thereby bringing the total obligated amount to [REDACTED].

Contract	Date	Description
Partial Suspension of Work	09 Aug 2011	Partial suspension of work affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.3</li> <li>• Subcomponent 1.4</li> <li>• Subcomponent 1.5</li> <li>• Component 4</li> </ul>
Change Order – Scope of Work	08 Sep 2011	SOW changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.3</li> <li>• Subcomponent 1.4</li> <li>• Subcomponent 1.5</li> <li>• Component 4</li> </ul>
Change Order – Amendment 01	20 Sep 2011	Changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.3</li> </ul>
Change Order – Amendment 02	22 Sep 2011	Changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.5 - Diesel Generators</li> </ul>
Change Order – Amendment 03	01 Oct 2011	Changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.5 – Diesel Generators</li> <li>• Extension of the Submission Deadline</li> </ul>
Change Order – Amendment 04	13 Oct 2011	Changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.5 – Diesel Generators</li> </ul>
Change Order – Amendment 05	16 Oct 2011	Changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.5 – Diesel Generators</li> </ul>
Change Order – Amendment 06	22 Oct 2011	Changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.5 – Diesel Generators</li> </ul>
Contract Modification 06	12 Nov 2011	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Provide incremental funding in the amount of [REDACTED], thereby increasing the total obligated amount from [REDACTED] to [REDACTED].</li> <li>• Revise Section B.5 “Indirect Cost” based on BVSPC’s approved provisional rates for FY2011.</li> <li>• Revise Sections C, F and J.</li> </ul>
Change Order – Scope of Work	06 Feb 2012	SOW changes affecting: <ul style="list-style-type: none"> <li>• Subcomponent 1.1</li> <li>• Subcomponent 1.5</li> </ul>
Contract Modification 07	26 Sep 2012	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Provide incremental funding in the amount of [REDACTED], thereby increasing the total obligated amount from [REDACTED] to [REDACTED].</li> <li>• Modify PART I-THE SCHEDULE I. SECTION B-SUPPLIES OR SERVICES AND PRICE/COSTS, paragraph (c).</li> </ul>
Contract Modification 08	29 Sep 2012	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Provide incremental funding in the amount of [REDACTED], thereby increasing the total obligated amount from [REDACTED] to [REDACTED].</li> <li>• Modify PART I-THE SCHEDULE I. SECTION B-SUPPLIES OR SERVICES AND PRICE/COSTS, paragraph (c).</li> </ul>
Contract Modification 09	30 Sep 2012	The purpose of this modification was to: <ul style="list-style-type: none"> <li>• Correct Modification 8 to provide incremental funding in the amount of [REDACTED], thereby decreasing the total obligated amount from [REDACTED] to [REDACTED].</li> <li>• Provide incremental funding in the amount of [REDACTED], thereby increasing the total obligated amount from [REDACTED] to [REDACTED].</li> </ul>
Partial Suspension of Work	28 Jan 2013	Partial suspension of work affecting: <ul style="list-style-type: none"> <li>• Subcomponent 6.3</li> </ul>

Contract	Date	Description
Contract Modification 10	14 Feb 2013	The purpose of this modification was to revise Sections B, C, F, H, I, J and contract attachments.
Contract Modification 11	29 Sep 2013	The purpose of this modification was to extend the period of performance from 30 September 2013 to 31 December 2013, revise budgets, and to clarify deliverables in multiple sections.
Contract Modification 12	24 Dec 2013	The purpose of this modification was to add Subcomponent 6.4, Technical Assistance to USAID on Kajaki Unit 2 on budget implementation until 30 November 2015 and to extend all remaining SUBCOMPONENTS to 28 February 2014.
Contract Modification 13	06 Aug 2014	The purpose of this modification was to finalize agreements on fee, Durai Junction cure cost absorbed by BVSPC, applicable NICRA, and clarify Tasks and Deliverables as needed.
Contract Modification 14	22 Sep 2014	Environmental considerations for generators changed from USEPA Tier 4 standards to Tier 2 standards.

See **Attachment m-03** for the documentation listed in the table above.

The key to effectiveness throughout the implementation of KHPP has been to maintain flexibility in order to meet new opportunities to enhance program impact as the succession of operations in southern Afghanistan changed. In partnership with USAID, BVSPC maintained significant flexibility and made adjustments as needed and directed in order to deliver significant benefit to the people served by the SEPS.

#### 1.4 KHPP Contract Coordination and Communication

At the inception of the KHPP, USAID coordinated the relationship with DABS-Kabul to maintain communication and reporting of KHPP activity and progress. BVSPC maintained communication and reporting of KHPP field activity with the DABS-Kandahar Director and his direct reports. BVSPC continued to coordinate and maintain liaison with Kandahar DABS, as well as Regional Command South (RC-S) and Regional Command Southwest (RC-SW) as requested by the COR and the USAID Onsite Managers (OSM). BVSPC worked directly with DABS in Kandahar and Helmand Provinces, throughout the implementation of the KHPP. The COP and the Transmission and Distribution Lead and Generation Lead (“Leads”) coordinated the communications with all stakeholders in Kandahar and Helmand addressing with each issues of concern as needed. The COP and COR communicated and coordinated all issues of implementation between themselves usually on a daily basis.

In order to establish USAID field presence for the project, and facilitate two-way reporting and communication, USAID designated one OSM for each of the two Regional Commands. The OSMs played a strong role in enhancing communications between all stakeholders in Kandahar and Helmand Provinces. The OSM reported to the COR, while maintaining coordination lines of communication with BVSPC Leads and Managers. The BVSPC Construction Managers and the O&M Managers, meanwhile, worked directly with their counterparts in Kandahar DABS, and also communicated mutual needs and concerns in coordination with Leads. The working relationships between BVSPC staff and the Kandahar DABS Director, senior managers, and DABS staff, in coordination with the COR and OSM, were consistently positive and productive.

## 2 SUBCOMPONENT 2.1: BUILD A NEW SUBSTATION AT DURAI JUNCTION

### 2.1 Objectives

The objective of Subcomponent 2.1 was to build a new Substation at Durai Junction to better isolate faults in the SEPS and prevent system-wide disturbances by performing the following tasks (as defined in Modification 10 of the KHPP Contract):

- i. Build a new Substation at Durai Junction while maintaining existing services for SEPS customers.
- ii. Install a breaker-and-a-half configuration, with line positions for the transmission lines from Kajaki towards Kandahar and Lashkar Gah.
- iii. Install one (1) 110/20 kV transformer to enable service to local Durai Junction area loads:
  - In accordance with “Diagram D-2, Durai Junction Single line.”
  - The site must be located as identified in “Diagram 3, Durai Junction Location.”
  - The camp must be site adapted from “Diagram D-4, Durai Junction Camp Layout.”
- iv. Design and install one 20 kV switchgear lineup (Type C), utilizing one lineup as originally procured for Tangi switchyard for future use as either a generation tie or for new distribution feeders.

### 2.2 History

The need for the rebuilding of the Durai Junction Substation was identified as a strategic infrastructure addition for the development of the Southeast Power System (SEPS). The existing Substation was built in the 1970s with the 110 kV transmission line and had experienced significant damage over the years. The Substation had been reduced to consist only of deteriorated concrete transmission structures with hard connections between the three transmission line sections: Kajaki to Durai Junction, Durai Junction to Lashkar Gah, and Durai Junction to Kandahar City Breshna Kot. Figure 1 illustrates the location of these structures. No switching equipment was installed at this location and, no system protection capabilities were functional.



On behalf of USAID through the AIRP work, a preliminary location of the new Substation was established, technical requirements were identified, an engineering, procurement, and construction services scope of work was identified, a tender for the work was issued, and the bid evaluation was conducted. With the award of the KHPP project, BVSPC approached the highest evaluated bidder and requested a refresh of the schedule and pricing, as several months had passed. The Request for Consent (RFC) was then issued with updated pricing and schedule. USAID issued Consent in January 2011. As a requirement of the issuance of Consent, USAID notified BVSPC that work could not proceed until a “Certification Regarding Responsibility Matters” was completed by the Subcontractor’s President. This certificate was issued to USAID and subsequently accepted by USAID in March 2011.

The proposed location of the Substation was approximately 90 kilometers west of Kandahar near the Ring Road (Highway 1), a very isolated location with little if any services. The Maiwand District Governor, at the direction of the Kandahar Provincial Governor, provided the land for the Substation to DABS. The supporting documents for the agreement are included in **Attachment b-01**. With the land agreements finalized in March 2011, B&V provided the Subcontractor with a limited notice to proceed to perform topographical survey and geotechnical investigation work. This work identified the presence of several artesian wells on the property. The presence of these wells required the Substation orientation to be rotated by 90 degrees, as well as some design rework by the Subcontractor.

As BVSPC proceeded with overall implementation and, as part of overall KHPP technical planning and requirements identification, BVSPC notified USAID that a subcontract amendment would be issued to accomplish the following:

- Align the type of power transformer required with the units requested in Subcomponent 2.2 (utilize one three-phase unit rather than three single-phase units).
- Implement the recently accepted DABS *High Voltage Protection Guidelines*.
- Change the implementation plan for the Subcontractor to build the construction camp for BVSPC personnel and the overall site security infrastructure.
- Update the subcontract to include environmental requirements utilized for KHPP, but not included in the AIRP scope of work.

This change in approach for the provision of the camp and security infrastructure was requested as a result of an unsolicited proposal being received from the Subcontractor. The Subcontractor was actively working in the area on Highway 611. Facilities and equipment were readily available to perform the work. This decision improved the implementation schedule by eliminating the need to tender the work separately. BVSPC issued the RFC to USAID for Amendment 1 on 20 June 2011, including the newly implemented Partner Information Form per the USAID Subcontractor vetting requirements. Consent was received on 30 June 2011; the notice of eligibility was received on 07 July 2011. Design and construction of life support facilities (containerized kitchens, training room, offices, and living quarters) commenced immediately. The facilities were constructed at the Subcontractor's fabrication site located 1 kilometer north of Amtex Village. Regular inspections were conducted during fabrication and finish work.

USAID, USACE, and BVSCP reviewed respective project scopes of work, technical requirements, and implementation plans throughout the summer and fall of 2011. Meetings were also held with RC(S) and RC(SW) regarding site security, use of local labor, convoy planning, and mobilization. Detailed design information was also supplied to USAID to support their PTEC project.

The original execution plan included utilizing a Subcontractor to provide life support during construction; however, BVSPC identified local personnel with the skills and qualifications necessary to perform this work. The personnel were hired and worked with the construction team through completion of the project. The original budget for this Subcomponent included camp and life support costs. These costs were transferred to Subcomponent 3.3 with Modification 10. Camp closeout reports are addressed in the Closeout Report for Component 3.

BVSPC Security, BVSPC's security Subcontractor, APPF, and the Risk Management Company Subcontractor mobilized to the site on 15 September 2011. This date was delayed due to the unavailability of local national security personnel to staff the site, Ramadan, and a request by RC(SW) due to activities in the area. Demining work commenced, and the perimeter boundary was secured with trenches. Immediately upon completion of demining work, work began on site grading, the Subcontractor's camp, and BVSPC's camp. Site visits were conducted every 10 to 14 days until the site perimeter was secure and the BVSPC camp was complete.

The Subcontractor and two Sub-subcontractors performed the design work. One Sub-subcontractor was located in Pakistan, and performed the detail civil and physical design. Another Sub-subcontractor was located in the United States (US), and performed quality control, primarily on the control and protection system. The Subcontractor procured major equipment from India, commodities from Pakistan, and the control and protections system from the United States (designed in the US and manufactured in Mexico). Upon the subcontract award by B&V of its Subcomponent 2.2 transformer and circuit breaker equipment to Compton Greaves, Ltd, India (CGL), the Durai Junction Subcontractor requested to change the supplier in its bid to CGL. Using the same equipment throughout the SEPS system provides O&M benefits to DABS; therefore, BVSPC accepted this request. B&V inspected these units at the factory when it inspected its own procurements. BVSPC performed a site inspection and witnessed factory acceptance testing for the control and protection panels.

As part of Modification 7, BVSPC was requested to provide design and structures, materials, and construction management for DABS to install one lineup of Type C switchgear, procured in the scope Subcomponent 2.2. DABS subsequently requested this switchgear not be installed at this time and for the unit to be placed in storage at the Kandahar City Junction 2 location. As part of Modification 11, USAID modified the BVSPC scope of work to limit the work to provide the design and then transport the switchgear from Amtex Village to Junction 2. BVSPC submitted 10, 30, 60, and 90 percent design submittals to USAID as noted in **Attachments a-20**.

BVSPC mobilized its Government Furnished Equipment (GFE) to the site 30 October 2011. This equipment consisted of a clinic, offices, recreation room, security office, and fuel tank. Life support, quality control, and engineering staff mobilized to the site in November 2011, and full staff mobilized to the site on 09 January 2012. The Field Progress Measurement System (FPMS) was implemented to track construction work progress. Quantities of material and work were measured and tracked weekly to establish construction progress.

DABS visited the site and performed inspections on a regular basis, with the first trip occurring 08 March 2012. On this same date, the BVSPC technical staff was demobilized due to unrest in Kandahar Province and for the transition to the Afghanistan Public Protection Force (APPF) and to the Risk Management Company (RMC). Additional details, including risk mitigation measures, are included in the Component 3 report identifying security incidents. Local national technical and camp staff remobilized to the site on 25 April 2012. The demobilization remained in place through 13 May 2012.

BVSPC issued a subcontract amendment in May 2012 to update the specification for changes that occurred during the detail design process to the camp and to remove the requirement for Supervisory Control and Data Acquisition (SCADA) equipment from the scope of work. Removal of the SCADA equipment was a result of an inquiry to DABS requesting a status of their intent to install a control system for the SEPS system. DABS indicated the control system would not be installed in the immediate future and, thus, any equipment installed at that time would not be compatible with the future system(s). BVSPC did ensure the Substation was “SCADA ready” by using electronic relays and an Ethernet switch to allow communication with each device.

The closure of Pakistan's Port of Quetta from 28 November 2011 through 04 July 2012 impacted the delivery of the power transformer and circuit breakers, as well as other critical Substation components. With the port reopening, the containers were then held at Kandahar Customs.

On 21 June 2012, BVSCP notified USAID of a 45 day schedule slip due to security issues and the Pakistan border closure. Throughout July 2012, the APPF guards were considering stopping work for reasons associated with APPF policies and procedures, specifically payment. Then, on 31 July 2012, the APPF guards implemented a work strike, closing the entry control points and forcing construction to stop; the work stoppage lasted 1 day.

Major equipment and materials were onsite by 31 August 2012, except for the control and protection panels and line tuner. This equipment arrived by 25 November 2012.

Seven DABS personnel arrived onsite on 01 October 2012 to begin Substation operation and maintenance training. The APPF guards at Durai Junctions implemented a work strike, closing the entry control points and forcing site construction to stop on 02 October 2012. The work stoppage remained in place through 11 October 2012. Additional details are included in the Component 3 report identifying security incidents. The Subcontractor has filed a claim for this delay. This work stoppage also delayed the DABS training. The training scheduled to commence on 01 October 2012 was temporarily halted and then resumed on 10 October 2012.

All foundation work was completed late in the fall of 2012; however, daily schedule meetings were conducted to expedite work and testing progress beginning in November 2012. Testing and commissioning work started in October 2012 on the field equipment (CTs, CVTs, and circuit breakers).

The Subcontractor, an Afghanistan firm, experienced some quality issues during construction. The quality of the steel erection and conduit and raceway system required improvements. The Subcontractor also experienced a delay due to their approach to installing the concrete floor in the control house. By installing the floor after the walls and ceilings were complete, the concrete slab floor took an extensive period of time to cure. This curing time delayed the sealing of the floor and the installation of the control and protection panels and the ac/dc system, including batteries. For the transmission towers, the shear angle bracket installation was inconsistent and required modifications to each bracket to ensure adequate strength.

On 10 January 2013, one tower arm failed while installing a conductor on the northwest tower at the Substation. This event triggered a Notice of Cure from USAID on 07 February 2013. The subsequent investigation indicated that poor fabrication, specifically welding, and less-than-effective Quality Control both at the factory and onsite were the causes of failure. BVSPC conducted an extensive investigation of the quality of both the design and manufacturing. As a result of this investigation, BVSPC issued a Notice of Cure to the Subcontractor and requested redesign of the towers and replacement of the towers from the body to the top.

During this recovery, BVSPC mobilized additional technical staff to Afghanistan, including a new construction manager, transmission tower engineer, and transmission line construction superintendent. The design was reviewed in detail with regular reviews and meetings with the subcontractor. With the design completed and manufacturing commencing, BVSPC hired a third part quality inspector (Bureau Veritas) to monitor fabrication at the factory and intensified its onsite Quality Control staff. Replacement materials arrived at the site on 25 May 2013. BVSPC provided significant assistance to the Subcontractor to ensure the structures were assembled and then erected as designed as the erection progressed. This work continued through July 2013.

BVSPC incurred a total cost of [REDACTED] to remedy the failure, which was not billed to USAID. Engineering, testing Subcontractor, factory inspection Subcontractor, and additional site technical and construction management costs totaled [REDACTED] of this total cost. USAID and BVSPC agreed that two delay periods occurred which were directly attributable to cure actions, one from 24 April 2013 to 01 May 2013, and one from 25 July 2013 to 29 August 2013. The Life Support costs during these delay periods totaled [REDACTED]. The security costs incurred during these delay periods totaled [REDACTED]. In addition, USAID determined that [REDACTED] of the helicopter costs was attributable to Cure actions. The costs presented here do not include costs the Subcontractor incurred to rectify the tower arm failure and the resulting redesign, remanufacture, installation, and erection of the transmission structures to meet quality standards acceptable to BVSPC.

The Subcontractor continued to complete the control and protection work at the site, as well as address the quality items noted simultaneously to the transmission structure redesign and manufacturing.

As a result of the April site visit, in early May 2013, USAID requested price and schedule information from BVSPC for additional work, including:

1. Design and construct a separate enclosure for the Substation batteries.
2. Design and provide materials for DABS to provide a permanent power source to the camp.
3. Design and procure materials to provide remote monitoring of the Substation in the camp operations office.
4. Design and procure materials for Voice Over Internet Protocol (VOIP) to provide telephone communications at the Substation.

BVSPC provided this information and, on 22 May 2013, USAID directed BVSPC to proceed with Items 1, 2, and 4. BVSPC notified USAID the work could not be completed in the requested timeframe.

Cut-over planning was finalized in May 2013 and, DABS and BVSCP reviewed the plan in detail on 08 June 2013. The cut-over team met again on 24 June 2013 and discussed the requirements in detail to interconnect the transmission line, particularly the condition of the DABS structures that would need to connect to the new conductor being provided by BVSPC. DABS then notified B&V of its intent to construct a “shoo-fly” to allow the existing transmission line to be connected to the Substation and retain power flow to Lashkar Gah and Kandahar City. This addition would allow the Substation to be tested without interrupting service to these key load centers. The construction work was completed in

July 2013. Following completion of the shoo-fly, DABS began to upgrade the structures directly adjacent to the new transmission structures. This upgrade was difficult for DABS to perform due to their limited availability of manpower and materials. This upgrade extended into August 2013, delaying the energization of the Substation.

Throughout June, July, and August of 2013, BVSPC notified USAID of the status of the work, including delays associated with APPF unrest, extreme heat and windstorms impacting production, Ramadan productivity rate decreases, and DABS needing to complete improvements on its transmission facilities. On 17 July 2013, USAID and DABS were formally notified of BVSPC’s intent to turn Substation site security over to DABS on or about 15 August 2013. On 01 September 2013, BVSPC notified DABS that the camp permanent power design, materials, and construction management support were available for installation of the facilities by DABS. Additional notifications were provided; however, BVSPC was notified that DABS Lashkar Gah attempted to perform the underground installation work unsuccessfully on 10 October 2013.

When USAID requested BVSPC to identify the materials and scope of work for VOIP service at Durai Junction, BVSPC worked directly with the DABS Director of ICT and Information Services to specify the equipment and share anticipated installation and operation costs. Final direction was received from USAID on 18 July 2013. The equipment was received and handed over to DABS on 22 August 2013.

All testing and commissioning work was completed on 23 August 2013. DABS completed their work on 24 August 2013. The Substation was energized on 25 August 2013. The transmission line section to Kandahar was energized on 26 August 2013, resulting in the Kandahar City loads being carried by Durai Junction. USAID completed its walk-through of the site on 28 August 2013. The final design and construction drawings were issued to USAID on 28 March 2013.

USAID requested additional spare parts to be provided to DABS in Modification 11. The scope change was a two-step process, first to provide a recommended list to the COR and then, with approval, obtain pricing for the items on the parts list. Procurement was then allowed to proceed. As some of these spare parts had long lead times, the delivery of all approved items was completed in November 2014.

### 2.3 Subcomponent 2.1 Modifications and Change Order History

Table 2 lists USAID Task (Contract Section C) and Deliverables (Contract Section F) modifications to Subcomponent 2.1 to date. The final Tasks and resulting Deliverables agreed upon between USAID and BVSPC described in the following modifications and change orders are shown in **bold** within Table 2.

**Table 2: Subcomponent 2.1 – USAID Contract Modifications**

Source & Date	Task	Change & Date
Original Contract 09 Dec 2010	Task i: Rebuild Durai Junction Substation while maintaining existing service for customers served by the Substation.	Deleted and Replaced 14 Feb 2013

Source & Date	Task	Change & Date
<b>Contract Modification 10</b> 14 Feb 2013	<b>Task i: Build a new Substation at Durai Junction while maintaining existing service for SEPS customers.</b>	
Original Contract 09 Dec 2010	Task ii: Install a breaker-and-a-half configuration, with line positions for the transmission lines from Kajaki towards Kandahar and Lashkar Gah,	Deleted and Replaced 14 Feb 2013
<b>Contract Modification 10</b> 14 Feb 2013	<b>Task ii: Install a breaker-and-a-half configuration, with line positions for the transmission lines from Kajaki towards Kandahar and Lashkar Gah.</b>	
Original Contract 09 Dec 2010	Task iii: Install 110/20 kV transformers to serve local Durai loads.	Deleted and Replaced 14 Feb 2013
<b>Contract Modification 10</b> 14 Feb 2013	<b>Task iii: Install one (1) 110/20 kV transformer to enable service to local Durai Junction area loads.</b>	
Contract Modification 10 14 Feb 2013	Task iv: Design and install one 20 kV switchgear lineup (Type C), utilizing one lineup as originally procured for Tangi switchyard for future use as either a generation tie or for new distribution feeders.	Deleted and Replaced 29 Sep 2013
<b>Contract Modification 11</b> 29 Sep 2013	<b>Task iv: Provide installation design for one 20 kV switchgear lineup (Type C) for future use as either a generation tie or for new distribution feeders. Convey one 20 kV Type C switchgear unit to DABS (procured under C2S2 Task iii) and deliver the unit to DABS' secure laydown area in Kandahar.</b>	
<b>Contract Modification 11</b> 29 Sep 2013	<p><b>Task v: Construct battery storage facility adjacent to Control Building utilizing a retrofitted steel shipping container, and transfer all batteries from the Control Building to the new battery storage facility. The facility must be capable of storing all switchyard batteries such that no batteries need to be installed or stored in the Control Building.</b></p> <ul style="list-style-type: none"> <li>(a) Utilize a retrofitted standard steel shipping container.</li> <li>(b) Provide a non-occupied facility with single entry/exit.</li> <li>(c) Provide conduit and cabling as required between the Control Building and the facility.</li> <li>(d) Provide heating, ventilation and air conditioning (HVAC) as required to maximize battery life. Provide insulation of the walls and ceiling, as well as adequate roofing to ensure effective temperature control within the facility and longevity. Loss of HVAC will be alarmed to the Substation annunciator.</li> <li>(e) Provide hydrogen and smoke monitoring systems in the facility. Relocate the hydrogen monitoring system from the Control Building to the storage facility. Both systems will be alarmed to the Substation annunciator.</li> <li>(f) Provide lighting and electrical service as required.</li> <li>(g) Place batteries temporarily in the Control Building for switchyard testing and commissioning purposes. Cut-over from the Control Building to the new storage facility must occur with minimal impact to testing, commissioning or operation of the Substation.</li> </ul>	



Source & Date	Task	Change & Date
Contract Modification 11 29 Sep 2013	<b>Task vi: Camp Power</b> Coordinate with DABS to provide permanent power to the man-camp from the Substation. Design a 20 kV feeder from the Substation to a 20 kV/400 V transformer (supplied by DABS) located near the existing camp manual transfer switch ac electrical switch. Installation will be by DABS. The Contractor will provide a transformer, wire, cable, and hardware, with DABS providing the remainder of the materials, including all consumables. Conduct coordination/pre-construction meeting with DABS onsite to facilitate the work and communicate requirements for completing the connection prior to site turnover.	
Contract Modification 11 29 Sep 2013	<b>Task vii: Internet Connection</b> Specify voice and data infrastructure for procurement and installation by DABS. Utilize, to the extent practical, existing communication infrastructure onsite currently used by the Contractor and planned to be turned over to DABS. Provide an estimate of installation and recurring maintenance costs.	
Contract Modification 11 29 Sep 2013	<b>Task viii: Provide a general O&amp;M plan for the Substation.</b> Items to be addressed must include, but not be limited to: listing of applicable equipment O&M manuals, preventive maintenance requirements not covered by O&M manuals, and operator position descriptions and associated minimum training requirements, including recommendations for recurring training.	
Contract Modification 11 29 Sep 2013	<b>Task x: Procure spare parts for Substation components. Notify the COR of planned parts' purchases and associated costs prior to procurement.</b>	
Contract Modification 13 06 Aug 2014	<b>Task x: Procure spare parts for Substation components. Notify the COR of planned parts' purchases and associated costs prior to procurement. Provide the COR an estimated cost and schedule to complete the task on a monthly basis until all parts have been transferred to DABS or USAID's designee.</b>	Added to Task x 06 Aug 2014
Original Contract 09 Dec 2010	Deliverable 1: Contractor shall complete construction and commission the Durai Substation – 24 months following NTP.	Deleted and Replaced 14 Feb 2013
Contract Modification 10 14 Feb 2013	<b>Deliverable 1: Contractor shall complete construction and commission the Durai Substation – 30 months following NTP.</b>	
Contract Modification 11 29 Sep 2013	<b>Deliverable 2: Installation design of 20 kV switchgear lineup (Type C) – 31 August 2013.</b>	
Contract Modification 11 29 Sep 2013	<b>Deliverable 3: Design and construction of the battery storage facility – 31 August 2013.</b>	
Contract Modification 11 29 Sep 2013	<b>Deliverable 4: Provision of materials for permanent power to the man-camp from the Substation – 31 August 2013.</b>	
Contract Modification 11 29 Sep 2013	<b>Deliverable 5: Specifications of voice and data infrastructure for internet connection along with estimate of installation and recurring maintenance costs – 31 August 2013.</b>	
Contract Modification 11 29 Sep 2013	<b>Deliverable 6: O&amp;M plan for the Substation – 30 November 2013.</b>	
Contract Modification 11 29 Sep 2013	<b>Deliverable 7: Spare parts for the Substation components – 31 December 2013.</b>	

## 2.4 Deliverables

A listing of the scheduled and achieved dates related to the work required by Subcomponent 2.1 is provided in Table 3 below:

**Table 3: Subcomponent 2.1 – Contract Deliverables Scheduled and Achieved Dates**

Deliverable	Original Schedule	Achieved Date
Deliverable 1: Contractor shall complete construction and commission the Durai Substation.	30 months following USAID Consent to Proceed dated 15 March 2011 <sup>+</sup>	25 August 2013
Deliverable 2: Installation design of 20 kV switchgear lineup (Type C).	31 August 2013	3 August 2013
Deliverable 3: Design and construction of the battery storage facility.	31 August 2013	30 August 2013
Deliverable 4: Provision of materials for permanent power to the man-camp from the Substation.	31 August 2013	01 September 2013
Deliverable 5: Specifications of voice and data infrastructure for internet connection, along with estimate of installation and recurring maintenance costs.	31 August 2013	15 September 2013
Deliverable 6: O&M plan for the Substation.	30 November 2013	20 December 2013
Deliverable 7: Spare parts for the Substation components.	31 December 2013	18 October 2014

<sup>+</sup> Consent was conditional based on Subcontractor resolution of Certification Regarding Responsibility Matters. Milestones taken from Schedule of Deliverables of Contract Modification 11 (Attachment m-03).

The statuses of contract deliverables are as follows in Table 4:

**Table 4: Subcomponent 2.1 – Contract Deliverables Status**

Activity No.	DELIVERABLE	METHOD OF VERIFICATION	STATUS	ATTACH.
1	Contractor must complete construction and commission the Durai Substation.	Witness of commissioning according to government approved commissioning plan.	Complete	d-01
2	Deliverable 2: Installation design of 20 kV switchgear lineup (Type C).	Document Review	Complete	d-02
3	Deliverable 3: Design and construction of the battery storage facility.	Site Inspection & Document Review	Complete	d-03
4	Deliverable 4: Provision of materials for permanent power to the man-camp from the Substation.	Site Inspection & Document Review	Complete	d-04
5	Deliverable 5: Specifications of voice and data infrastructure for internet connection, along with estimate of installation and recurring maintenance costs.	Site Inspection & Document Review	Complete	d-05
6	Deliverable 6: O&M plan for the Substation.	Site Inspection & Document Review	Complete	d-06
7	Deliverable 7: Spare parts for the Substation components.	Site Inspection & Document Review	Complete	d-07

Deliverables as of Contract No. 306-C-00-11-00506-00 Modification 11.



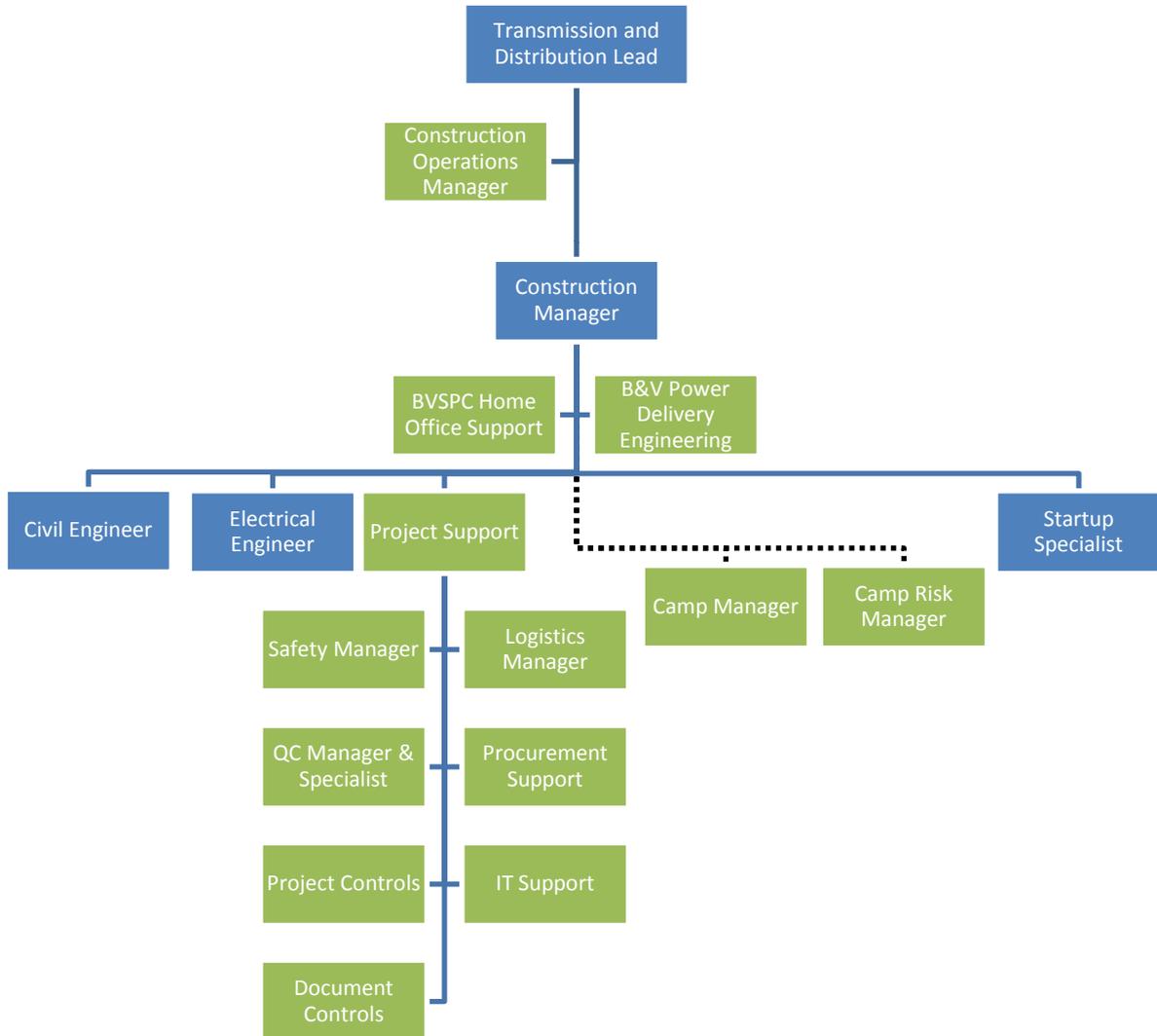
Electronic copies of these documents are included in CDs/DVDs submitted with this report.

### 3 PROJECT EXECUTION

#### 3.1 Organizational Structure and Management Details

**Figure 2 - Organization Structure of Subcomponent 2.1 as of May 2013**

(Reference Component 3 to review the entire Organization Chart for KHPP)



##### 3.1.1 Sector Lead – Transmission & Distribution

The Transmission and Distribution (T&D) Sector Lead was based at the KHPP Regional Camp located at Amtex Village, Kandahar. The Sector Lead assumed the overall responsibility for Subcomponent 2.1 implementation scope, schedule and budget, and was responsible for all related subcontract management, client coordination and reporting, correspondence, invoice approval, mobilization of personnel, approval of home office personnel applied to Subcomponent 2.1 and other project management activities in coordination with KHPP Program Management. The primary individual responsible for this position included Lynn Liikala-Seymore.

### **3.1.2 Construction Operations Manager**

The Construction Operations Manager was responsible for coordination of the Substation safety, construction, testing, and commissioning on the project. This coordination included compliance with the schedule, safety, cost, and quality decisions in conjunction with the Construction Manager and Sector Lead. The primary individuals responsible for this position included Howard Wakefield and Michael Tennyson.

### **3.1.3 Construction Manager**

The Construction Manager reported directly to the T&D Sector Lead and was based at the Durai Junction Camp. The Construction Manager was responsible for the execution of the Substation design and construction and the distribution line construction project scope of work within schedule. Additional responsibilities included implementation of DABS training for and oversight and assistance in the operation and maintenance of the facility during construction, budget and cost control, ensuring daily activities were documented and reported in accordance with the Project Execution Plan, and the coordination of work effort with KHPP Program Management resources, Sector Lead, COR, and DABS officials located in Kandahar. The primary individuals responsible for this position included Ian Clarke and Richard Taylor.

### **3.1.4 Field Engineer Civil**

The Field Engineer Civil reported directly to the Construction Manager and was based at the Durai Junction Camp. The Field Engineer was responsible for the execution of the civil works of the Substation design and construction project. Additional responsibilities included implementation of DABS training for and oversight and assistance in the operation and maintenance of the Substation, civil design review to completion, ensuring daily activities were reported and in accordance with the schedule and the Project Execution Plan, and the coordination of work effort with KHPP Program Management resources. The primary individual responsible for this position included Reese Wheat.

### **3.1.5 CCN Field Engineer Civil**

One Field Engineer Civil was local national staff. The job description is equivalent to 3.1.4.

### **3.1.6 Field Engineer Electrical**

The Field Engineer Electrical reported directly to the Construction Manager and was based at the Durai Junction Camp. The Field Engineer was responsible for the execution of the electrical works of the Substation design and construction project. Additional responsibilities included implementation of DABS training for and oversight and assistance in the operation and maintenance of the facility, electrical design review to completion, ensuring daily activities were reported and in accordance with the schedule and the Project Execution Plan, and the coordination of work effort with KHPP Program Management resources. The primary individual responsible for this position included Richard Ngotho.

### **3.1.7 CCN Field Engineer Electrical**

One Field Engineer Electrical was local national staff. The job description is equivalent to 3.1.6.

### **3.1.8 Safety Manager**

The Safety Manager reported directly to the Construction Operations Manager and was based at the KHPP Regional Camp. The Safety Manager was responsible for the safe execution of the Substation design and construction project scope of work. Additional responsibilities included assistance with Job Hazard Analysis (JHA) as required. The Safety Manager was also responsible for training of DABS staff in Safety and Health as part of oversight and assistance in the operation and maintenance of the facility, Safety and Health Inspections of the Work Site, and ensuring daily activities were in accordance with the KHPP Safety Plan, as well as the coordinating work effort with KHPP Program Management resources. Onsite Safety Management was by design to be undertaken daily by local Afghan Staff trained and overseen by the Safety Manager. The primary individuals responsible for this position included Phillip Brundage, Tom Franzoni, and Benny Garza.

### **3.1.9 CCN Safety Manager**

One Safety Engineer was local national staff. The job description is equivalent to 3.1.8.

### **3.1.10 Quality Control (QC) Manager**

The Quality Control Manager reported directly to the Construction Operations Manager and was based at the KHPP Regional Camp. The QC Manager was responsible for the execution of the Substation design and construction project scope of work in accordance with the Three-phase QA program of the US Army Corps of Engineers, per Prime Contract requirements. Additional responsibilities included oversight of materials and equipment testing and phased acceptance of completed work as meeting QA Plan requirements. The QC Manager maintained daily Inspections of the Work Site and ensured daily work activities were in accordance with the KHPP QC Plan while coordinating work effort with KHPP Program Management, as well as USAID onsite inspection resources. The primary individuals responsible for this position included Robert Lester, Ross Reyes, and Roland Hanooman.

### **3.1.11 CCN Quality Control Manager**

One Quality Control Engineer was local national staff. The job description is equivalent to 3.1.10.

### **3.1.12 Document Control Specialist**

The Document Control Specialist reported directly to the KHPP Deputy Chief of Party and was based at the KHPP Regional Camp. The Document Control Specialist was responsible for the control and proper archiving of all documents and reports applicable to Substation design and construction. The Document Control Specialist would be working on multiple projects simultaneously and ensuring all staff was following proper filing protocols. The primary individuals responsible for this position included Iba Wagner, Ilir Marevci, Leah Boice, Vicki Feazell, and Marina Bouwer.

### **3.1.13 Startup Specialist**

The Startup Specialist reported directly to the Construction Operations Manager and was based at the Durai Junction Camp. The Startup Specialist was responsible for oversight of the startup of the Substation. Additional responsibilities included implementation of DABS training for and oversight and assistance in the operation and maintenance of the facility, ensuring daily activities are reported and in accordance with the schedule and the Project Implementation Plan. The Startup Specialist was also responsible for the coordination of work effort with KHPP Program Management resources. The primary individuals responsible for this position included Ratchasit Jitkarun and Les Zotzman.

### **3.1.14 Camp Manager**

The Camp Manager reported to the KHPP Life Support and Air Operations Manager and was based at the Durai Junction Camp. The Camp Manager was responsible for ensuring quality control of all life support functions at the Substation design and construction project site. The primary individual responsible for this position included Ken Stewart and Geoff Lee.

### **3.1.15 Deputy Camp Manager**

One Deputy Camp Manager was local national staff. The job description is equivalent to 3.1.14. One additional Administrative Assistant was a local national staff and served as the Acting Deputy Camp Manager as requested.

### **3.1.16 In-Country Program Management Resources**

In-Country Program Management Organization (PMO) resources include: Program Management, Finance, Contracts - Procurement - Compliance, Logistics, Security, Health & Safety, Environmental, Reporting, Quality Control, Project Controls, Document Controls and Human Resources. The PMO team was located in Kandahar, Afghanistan, and made periodic visits to KHPP sites on an as-needed basis. The primary responsibilities of the PMO were to provide functional support to all Components in accordance with approved Implementation Plans, KHPP Program, and BVSPC Corporate and USAID established policies and procedures.

### **3.1.17 Home Office Program Management Resources**

Home Office management resources were available to perform project support throughout the duration of the KHPP program. Home Office project management resources provided back-reach support to field office support personnel in all KHPP program support areas. The field and home office jointly performed accounting, finance, human resources, and procurement and compliance functions. Monthly intensive reviews of the project were performed at the Black & Veatch Special Projects Corporation, Federal Services Division Headquarters in Overland Park, Kansas, USA.

### **3.1.18 Home Office Engineering Resources**

Home Office Engineering resources includes civil, structural, electrical, and control and protection engineers, as well as drafters and technicians. The primary responsibilities of the Home Office Engineering Resources were to provide design and engineering for the electric distribution system analysis, the new Substation,

and the new transmission line for connecting to the existing line. Home Office Engineering Resources were also responsible for specifying the distribution materials needed for DABS to perform the system expansion and improvement work. This work also included writing the technical requirements to procure materials and construction services necessary to build the Substation and to procure materials for the distribution system expansion and improvements. This work was provided in accordance with approved plans, policies, and procedures. The primary individuals responsible for this position included Chris Martens, Samir Awad, Jason Hussey, Jon Osborn, and Bill Scheidker.

### **3.1.19 Technical Training Manager**

The Technical Training Manager reported to the Construction Manager. The Technical Training manager was responsible for developing lessons and course content for Substation Operations & Maintenance. Topics also included job management, safety, and Ministry of Energy & Water (MEW) standards. The primary individual responsible for this position included Rod Patullo.

### **3.1.20 CCN Technical Training Manager**

One Technical Training Manager was local national staff. The job description is equivalent to 2.1.19.

### **3.1.21 Project Controls Engineer**

The Project Controls Engineer reported to the Construction Manager. The Project Controls Engineer was responsible for developing and maintaining cost and schedule reports, including tracking work progress at the construction site. The primary individuals responsible for this position included Arlan Resoco and Daryl Robert.

## **3.2 Implementation of Work**

In December 2010, USAID awarded BVSPC Contract No. 306-C-00-11-00506-00 to perform the Kandahar Power Initiative (later re-named Kandahar Helmand Power Project or KHPP), and began immediately executing activities under Component 2 Subcomponent 1. At the inception of the KHPP, USAID coordinated the relationship with DABS Kabul to maintain communication and reporting of KHPP activity and progress. BVSPC maintained communication and reporting of KHPP field activity with the Kandahar DABS Director. BVSPC continued to coordinate and maintain liaison with Kandahar DABS and Helmand DABS, as well as Regional Command - South (RC-S) and Regional Command - Southwest (RC-SW) and the USAID Onsite Managers (OSM) working directly with DABS in Kandahar and Helmand Province. This communication and reporting continued throughout the implementation of KHPP. The OSM reported to the COR. The construction Manager worked directly with their counterparts in Kandahar DABS and Helmand DABS, and communicated mutual needs and concerns. The working relationships between KHPP staff and the Kandahar DABS Director and the Helmand DABS Technical Assistant, senior managers, and staff were consistently positive and productive.

After receiving USAID consent, a Firm Fixed Price EPC Subcontract was issued to Venco Intiaz Construction Company (VICC) to construct the Substation.

Three Amendments were issued to the work to construct the camp and build security infrastructure, align technical requirements between the Subcomponent 1.1 Substation and DABS requests, and to add facilities for turnover to DABS.

**Task i:** *Build a new Substation at Durai Junction while maintaining existing services for SEPS customers.*

**Status: COMPLETE**

In consultation with USAID and DABS, the new Substation at Durai Junction was completed and commissioned while maintaining existing electrical services for the customers of the South East Power System. The Substation was handed over to USAID and DABS on 26 August 2013. The inspection to establish substantial completion was held 17 September 2013 with attendance by USAID, DABS, BVSPC, and BVSPC's Subcontractor. The Substation and camp were established at the site provided by DABS through the Maiwand District Governor (**Attachment b-01a and b-01b**).

**Task ii:** *Install a breaker-and-a-half configuration, with line positions for the transmission lines from Kajaki towards Kandahar and Lashkar Gah.*

**Status: COMPLETE**

BVSPC utilized a breaker-and-a-half configuration at the Substation, with line positions for the transmission lines from Kajaki towards Kandahar and Lashkar Gah. This configuration is shown in the single line diagram, Drawing 042246-DJCN-E7100, and in the switchyard layout and sections, Drawing E7000, sheets 0 through 7 (**Attachment b-01b**).

**Task iii:** *Install one (1) 110/20 kV transformer to enable service to local Durai Junction area loads.*

- *In accordance with Attachment 2 of the Prime Contract titled "Diagram D-2, Durai Junction Single Line."*
- *The site must be located as identified in Attachment 3 of the Prime Contract titled "Diagram 3, Durai Junction Location."*
- *The camp must be site adapted from Attachment 4 of the Prime Contract titled "Diagram D-4, Durai Junction Camp Layout."*

**Status: COMPLETE**

BVSPC installed one (1) 110/20 kV 20 MVA transformer manufactured by Compton Greaves, Limited, India. The serial number of the unit installed is ET10010/1. A 20 kV circuit breaker and a load side 20 kV disconnect switch were installed for DABS to connect their 20 kV feeder. This interconnection point enabled service to be provided to the local Durai Junction area loads. This configuration is shown in the single line diagram, Drawing 042246-DJCN-E7100, and in the switchyard layout and sections, Drawing 042246-DJCN-E7000, sheets 3, 5, and 6 (**Attachment b-01b**).

**Task iv:** *Provide installation design for one 20 kV switchgear lineup (Type C) for future use as either a generation tie or for new distribution feeders. Convey one 20 kV Type C switchgear unit to DABS (procured under Subcomponent 2.2, Task iii) and deliver the unit to DABS's secure laydown area in Kandahar.*

**Status: COMPLETE**

BVSPC completed the design for this work and provided the installation design drawings for the 20 kV switchgear lineup to USAID and DABS as indicated in this task (**Attachment d-02**).

**Task v:** *Construct battery storage facility adjacent to Control Building utilizing a retrofitted steel shipping container, and transfer all batteries from the Control Building to the new battery storage facility. The facility must be capable of storing all switchyard batteries such that no batteries need to be installed or stored in the Control Building.*

- a) *Utilize a retrofitted standard steel shipping container.*
- b) *Provide a non-occupied facility with single entry/exit.*
- c) *Provide conduit and cabling as required between the Control Building and the facility.*
- d) *Provide HVAC as required to maximize battery life. Provide insulation of the walls and ceiling, as well as adequate roofing to ensure effective temperature control within the facility and longevity. Loss of HVAC will be alarmed to the Substation annunciator.*
- e) *Provide hydrogen and smoke monitoring systems in the facility. Relocate the hydrogen monitoring system from the Control Building to the storage facility. Both systems will be alarmed to the Substation annunciator.*
- f) *Provide lighting and electrical service as required.*
- g) *Place batteries temporarily in the Control Building for switchyard testing and commissioning purposes. Cut-over from the Control Building to the new storage facility must occur with minimal impact to testing, commissioning, or operation of the Substation.*

**Status: COMPLETE**

In consultation with USAID and DABS, BVSPC utilized its Subcontractor to perform the engineering, procurement, and construction of a battery storage facility adjacent to the Control Building, utilizing a retrofitted steel shipping container, and transferred all switchyard batteries, previously stored in the Control Building, to the new battery storage facility. The steel shipping container was provided by DABS (**Attachment d-03**).

**Task vi:** *Camp Power: Coordinate with DABS to provide permanent power to the man-camp from the Substation. Design a 20 kV feeder from the substation to a 20 kV/400 V transformer (supplied by DABS) located near the existing camp manual transfer switch ac electrical switch. Installation will be by DABS. The Contractor will provide a transformer, wire, cable, and hardware, with DABS providing the remainder of the materials, including all consumables. Conduct coordination/pre-construction meeting with DABS onsite to facilitate the work and communicate requirements for completing the connection prior to site turnover.*

**Status: COMPLETE**

In consultation with USAID and DABS, BVSCP utilized its Subcontractor to provide a design and procure long lead materials (20 kV/400 V, 150 kVA transformer, 20 kV cable, and 20 kV cable accessories) for the camp power. Additional detail design work was then completed and the remaining equipment and materials were procured. Detailed drawings

and materials were provided to DABS for construction. BVSPC also provided a design and drawings for DABS to construct a containment system around the camp diesel generator.

A pre-construction meeting was held with the DABS. BVSPC and the Subcontractor each subsequently notified DABS (both the Lashkar Gah Director and the Kandahar Director) on multiple occasions to establish a start work date. DABS Lashkar Gah did attempt to install the underground cable; however, the terminations were not installed correctly and both the terminations and the bushings on the transformer failed. DABS installed the facilities; however, the installation was not as designed. At the completion of the site work, this system had not been built (**Attachment d-04**).

**Task vii:** *Internet Connection: Specify voice and data infrastructure for procurement and installation by DABS. Utilize, to the extent practical, existing communication infrastructure onsite currently used by the Contractor and planned to be turned over to DABS. Provide an estimate of installation and recurring maintenance costs.*

**Status: COMPLETE**

In consultation with USAID and DABS, the estimate of costs was provided to USAID on 17 July 2013. The equipment was received and handed over to DABS on 22 August 2013. DABS notified BVSPC subsequent to the handover that internet service would not be provided, as DABS could not afford the monthly expense (**Attachment d-05**).

**Task viii:** *Provide a general O&M plan for the Substation. Items to be addressed must include, but not be limited to, listing of applicable equipment O&M manuals, preventive maintenance requirements not covered by O&M manuals, and operator position descriptions and associated minimum training requirements, including recommendations for recurring training.*

**Status: COMPLETE**

Building on the DABS O&M plan, BVSPC expanded the plan to identify activities required to be performed each week for 2014. The plan identifies the equipment manual that applies to the work and the form to be completed while the maintenance is performed (**Attachment d-06**).

**Task ix:** *Procure spare parts for Substation components. Notify the COR of planned parts' purchases and associated costs prior to procurement. Provide the COR an estimated cost and schedule to complete the task on a monthly basis until all parts have been transferred to DABS or USAID's designee.*

**Status: COMPLETE**

In consultation with USAID and DABS, two sets of spare parts have been identified for the Substation: (a) spare parts typical to a Substation and were provided by the Subcontractor as part of the EPC scope of work, and (b) additional spare parts as requested in Modification 11 to be provided by BVSPC. Per Modification 11, using the spare parts identified by manufacturers, as well as spare parts procured by Subcontractors, BVSPC submitted a recommended spare parts list to the COR on 24 October 2013. With this agreement on the list of parts, BVSPC obtained estimated pricing and lead times. This information was then submitted to and accepted by the COR; procurement of this material

then progressed. Lead times of the parts varied from off-the-shelf to 6 months. The materials were delivered to the site starting in March 2014 and continued through November 2014 (**Attachment d-07**).

- a) Spare parts provided by BVSPC's subcontractor include:
  1. Transformer parts and tools for the 110/20 kV power transformer.
  2. Circuit breaker parts and tools for the 110 kV circuit breakers.
  3. Control house building lights and other miscellaneous items.
  4. Connectors, AC fuse and fuse holders, data cables, bulbs, and bulb holders.
  5. Construction materials and tools, bus materials, grounding materials, lighting, cable, conductor, data cable, hardware, etc.
  6. Control panel lamps.
  7. Outdoor lighting lamps.
- b) Spare parts provided by BVSPC per Mod 11 include:
  1. Protective relays:
    - i. GE D60
    - ii. SEL-587Z
    - iii. SEL-387A
    - iv. SEL-787
    - v. SEL-2414
  2. Transformer components:
    - i. Complete set of switches, contactors, and auxiliary relays used on transformer tap changer drive and cooling equipment.
    - ii. Complete set of gas kit for cover, manhole, and hand hole with lubricating grease.
    - iii. Tap changer protection relay.
    - iv. Cooling fans with motors.
    - v. Complete of pressure relief device for transformer.
    - vi. Oil temperature indicator, mercury type, for transformer.
    - vii. Complete Buchholz relay.
    - viii. Air breathers for transformer.
    - ix. Complete set (12) of valves for transformer.
    - x. Magnetic oil level indicator.
  3. 4 core current transformer.
  4. Capacitive Voltage Transformer
  5. Circuit breaker components:
    - i. Trip and close coils.
    - ii. Auxiliary switch set.
  6. Disconnect switch components:
    - i. Closing coil for disconnect and earthing switches.
    - ii. Opening coil for disconnect and earthing switches.
    - iii. Interlocking coil for disconnect and earthing switches.
  7. Miscellaneous Control Building and switchyard components:
    - i. Fluorescent light choke.
    - ii. Branch circuit breakers.
    - iii. Fire extinguisher (for inside Control Building).
    - iv. Fire extinguisher (for outside Control Building).
    - v. 250 watts HPSV lamp.

vi. ac filters.

### 3.3 Subcontracts and Major Procurements

As part of the project management process, all filing and procurements utilized a four letter location code to designate the component/subcomponent. For this Subcomponent, 2.1, the code is “DJCN.” A unique identifier was then added as a suffix for each subcontract for procurements. A KHPP location code was used if a subcontract was issued for either the camp or multiple components. All subcontracts used for this Subcomponent are listed in **Attachment c-05**.

#### 3.3.1 DJCN.73.1003 - Venco Imtiaz Construction Company (VICC) Subcontract:

Venco Imtiaz Construction Company (VICC) performed the major subcontracted elements of work for this Subcomponent. On 17 March 2011, after receiving USAID consent, a Firm Fixed Price EPC Subcontract was issued to VICC by BVSPC for [REDACTED].

The scope of project services for this subcontract consisted of (1) designing, engineering, procuring, manufacturing, testing and inspection of equipment at manufacturer's works; (2) packing, supply, transportation, transit insurance, delivery to site, unloading and handling at site, storage, insurance and equipment erection including associated civil and structural works; (3) construction facilities; (4) installing and checking equipment; (5) checking out systems; (6) startup and commissioning, and performance testing a complete Substation. In addition, the scope included all the required cabling, lighting, lightning protection, earthing, association of Sub-subcontractors in the erection, supervision, site testing, inspection and commissioning of the work.

BVSPC responsibilities for monitoring the Subcontractor's work included, but were not limited to, the following:

- Review and monitor schedules and milestone dates established by the Subcontractor and reported in Subcontractor's monthly progress report.
- Monitor Subcontractor performance to ensure negotiated technical specifications are complied with and all obligations are met.
- Monitor quality assurance reviews by Subcontractor with equipment vendors as needed to ensure proper manufacture, assembly, and testing under the cooperation with Purchaser's independent inspection.
- Review critical shop drawings, documents, and reports as appropriate.
- Review main design criteria and parameters, concepts, techniques, procedures, and schedules provided by the Subcontractor.
- Witness shop test of major equipment.

In addition, VICC's scope of services included, but was not limited to, provision of all required project management. including administration, project coordination, scheduling, estimating, scheduling, etc.

Engineering services provided by VICC included:

- Taking all statutory clearances from regulating and controlling authorities for various equipment and services.

- Detailed layout and project detailed design.
- Equipment and material specification preparation.
- Procurement and expediting of all Substation, transmission line, and distribution line equipment, materials, and supplies.
- Delivery of equipment and materials to job site.
- Relay setting and coordination calculations.
- Site and soils investigations and surveys.
- Detailed design of the civil, structural, and electrical systems.
- Design documentation.
- Submittal of Subcontractor-generated documents for compliance review.
- Quality assurance/quality control (QA/QC).
- Spare parts control and inventory.
- O&M manuals and instructions.
- Reconciliation with customs authorities in case of foreign suppliers.
- Complete design engineering documentation.
- Conformed to construction records” (as-built) drawings.
- Participation in meetings as requested and requires through the course of the project.

Construction services included in VICC’s subcontracted scope of work included, but were not limited to, the following:

- Construction management.
- Construction scheduling.
- Erection documentation/philosophy.
- Construction, equipment erection and installation, labor, labor supervision, and tools required to implement the engineering designs as also provided by VICC.
- Construction equipment.
- Temporary (construction) power supply.
- Construction facilities, services and utilities.
- Safety and loss prevention.
- Quality assurance/quality control (QA/QC).
- Expediting procurement.
- Manufacture’s field services.
- Site security to be a coordinated effort with the Purchaser’s site security team.
- Equipment/material receiving, handling, and storage.
- Pre-operational checkout, testing, and startup.
- Commissioning.
- Construction closeout.

In order for VICC to furnish a complete Substation, their scope of work also included site preparation, surveying, and topographic mapping. Once this work was completed, VICC designed a site pad and location and performed required excavation, fill and soil improvements, and compaction. Required drainage, waste disposal, roads, and walkways were also included in the site preparation and construction.

This subcontract furnished, but was not limited to, the following: (1) make earth resistivity measurements at site (based on the four electrode method), and (2) design and install the earthing grid in accordance with the applicable codes and standards. The earthing grid was then completed, along with earthing of all Substation equipment, including transformers. Complete direct stroke lightning protection using Lightning Mast and/or shield wire and its connection to earth grid, power and control cables, cabling (including interpole and interpanel), cable support angles, cable trays and accessories necessary for cable erection (e.g., glands, lugs, clamps for cables, ferrules, and cable ties) were furnished and installed as required.

Power and control cable schedule and termination schedules were prepared by VICC and reviewed by the Purchaser. Substation AC and DC services, including automatic transfer switches, medium voltage power transformer, distribution transformers, generator set, batteries, battery chargers, and protective equipment for these services, were included. In addition, VICC included a lighting system for a complete Substation within the Substation perimeter wall, control and protection system, and a metering system, including distance recorder, fault locators, event logger and global positioning system (GPS) time synchronization equipment. VICC also furnished bay identification plates, phase markers, and danger plates.

VICC's scope of work also included all structures/facilities required for the effective functioning of the diesel power plant, whether or not they are specifically mentioned. The scope of Subcontractor for Civil and Structural works included, but was not limited to, detailed design criteria, including basis of design being prepared by the Subcontractor based on various requirements specified elsewhere in the specifications. All the above documents are to be finalized after Purchaser's review and, the same shall form the basis of detailed engineering work.

Civil and structural works associated with the Substation gantry structure and Lightning Mast as required, civil and structural works associated with the Substation equipment supporting structures and station service equipment, as required, and the foundations for the equipment support structures are to include foundations for the structures and equipment pads. The Subcontractor determined the foundation type required based on site conditions. Support structures are galvanized steel and structures are galvanized steel. All protection measures to prevent any damage to the adjoining structures/facilities were also included.

Purchaser furnished equipment specifications are included in this Scope of Work. The Subcontractor provided any and all items, as required and not specifically listed in these specifications, necessary for the installation, testing, and operations of this Substation. Any items, though not specifically mentioned but which are required to make the Substation complete in all respects for its safe, efficient, reliable, and trouble-free operation, were also deemed to be included and were supplied and erected by Subcontractor, as required, unless they were specifically excluded.

VICC also provided consumables and spare parts for construction, startup, testing, and commissioning until commercial operation was achieved, including, but not limited to, grease, lubricating oils (flushing and operating), maintenance materials,

spare parts warehousing, management, and turnover to the Purchaser. In addition, VICC provided training and instruction of the Owner's Operation and Maintenance staff in the operation, maintenance and repair of all Substation equipment, including any and all SCADA systems used. Coordination of checkout, startup, and initial operation of Substation equipment and systems with Purchaser, DABS and Owner was conducted.

A tower arm failed during the execution of the transmission tower construction and conductor installation. USAID issued a Notice of Cure while BVSCP was performing an investigation into the cause of the failure. BVSPC immediately issued a Notice of Cure to VICC. VICC worked with BVSPC to conduct an in-depth review of the design of the towers and updated the design to meet the subcontract requirements. VICC then worked closely with the manufacturer for the timely production of new tower bodies, arms, and tops. VICC and BVSPC inspected the tower materials at the site prior to and during assembly. Erection and restringing work was complete in 20 August 2013.

**Amendment 1:**

On 20 July 2011, BVSPC amended the contract with VICC for an additional [REDACTED] cost to engineer, procure, and construct the man-camp at the work site.

**Amendment 2:**

On the 07 May 2012, BVSPC amended the contract with VICC at no cost to modify the contract language from "performance payments" to "milestone payments."

**Amendment 3:**

On 10 October 2012, BVSPC drafted an amendment to the subcontract with VICC to increase the subcontract value by [REDACTED]. This amendment accounted for the storage and demurrage costs associated with closure of the Pakistan border. No cost modifications to the milestone schedule were included. This subcontract amendment was not executed.

**Amendment 4:**

On 01 August 2013, BVSPC amended the subcontract with VICC to increase the contract value by [REDACTED]. This amendment accounted for the relocation of the existing battery bank to a newly furnished and installed enclosure, purchase of long lead materials for provision of permanent camp power and for design, and materials and construction and safety management to install permanent camp power and fuel containment.

**3.3.2 Voice-over Internet**

As part of Modification 11, BVSPC was requested to provide equipment to allow voice communications over an internet service. These materials were procured with Subcontract DJCN.68.1027. The detailed components are listed in **Attachment d-05**.

### 3.3.3 Spare Parts List

As part of Modification 11, BVSPC was requested to provide Substation spare parts. The following subcontracts were issued:

- DJCN.63.2001 - SEL relays (to replace one that failed during commissioning and to procure one additional type spare).
- DJCN.63.6002 - Compton Greaves equipment components.
- DJCN.63.6003 - SEL relays.
- DJCN.63.6004 - General Electric relays.
- DJCN.63.6005 - Schneider AC panel components.
- DJCN.63.6008 - EMEK switch components.

### 3.3.4 Quality Control

- DJCN.78.0312 - Site survey services were provided by a local Kandahar company, Zurmat.
- KHPP.12.2003 - Testing services, including moisture content, compaction, and material analysis, were provided by a local Kandahar company, Real Eiffel.
- KHPP.12.2004 - Testing services, including material analysis, were provided by a local Kandahar company, Shawal.

### 3.3.5 Camp, Life Support, and Construction Offices

BVSPC self-performed the life support function at the Substation site and maintained full time site construction offices; therefore, multiple subcontracts were utilized for food, IT equipment, printers, plotters, generators and generator parts, diesel fuel, and other life support activities and materials. These subcontracts are identified in detail in **Attachment c-05**.

### 3.3.6 Request for Equitable Adjustments

Three contractual issues are outstanding: (1) work stoppage due to the APPF lockout at the construction site, (2) liquidated damages assessment due to late performance, and (3) performance bond recovery due to poor quality of work:

1. With the implementation of the APPF, several work delays occurred at the site due to implementation of payroll processes and procedures by APPF. Two claims were filed by VICC. BVSPC is developing a Request for Equitable Adjustment and Request for Consent to compensate the Subcontractor for the lost work days associated with the site lockouts implemented by the APPF. The lockout dates are noted in the Security section of this report, Section 7.
2. Due to the border closure and APPF delays, BVSPC and the Subcontractor mutually agreed upon a subcontract completion date of 26 March 2013. The Subcontractor completed the work with the design and construction delays. Energization and turnover to DABS occurred on 26 August 2013; however, as of the date of this report, the Subcontractor has as-built drawing work outstanding. BVSPC is in the process of assessing liquidated damages to the Subcontractor to help recover its schedule related costs. The maximum liquidated damage penalty that can be issued is equal to 10 percent of the subcontract value, which is [REDACTED].
3. With the tower arm failure and multiple delays due to poor construction, BVSPC is considering calling the Performance Bond. The final decision is pending.

### 3.4 Budget and Expenditures

Per the Contract, the estimated cost and fixed fee values are established at the Component 2 level. The final costs of this subcomponent may vary; however, the sum of the final costs of all Component 2 subcomponents is limited to the total value of Component 2. A summary of the Subcomponent 2.1 Estimated Cost (revised as of Contract Modification 13) and costs billed through 25 July 2014 (as reflected in Invoice 105), is provided in Table 5 below.

**Table 5: Subcomponent 2.1 – Financial Summary**

Cost Report	Estimated Cost (Modification 13)	Costs Billed thru 25 July 2014	Remaining Budget
<b>TOTAL COST (Including Fee)</b>	██████████	██████████	██████████

The costs indicated above do not include costs that BVSPC incurred to rectify the tower arm failure and the resulting redesign, remanufacture, and installation and erection of the transmission structures. The value of the excluded costs is ██████████. In addition, the Subcontractor incurred extensive costs to reconcile quality issues with the transmission line structure, transmission structure foundations, gantry steel, and raceway systems. The Subcontractor costs for rectification were also not included in the budget.

### 3.5 Government Property Summary

Physical inventories were conducted by BVSPC Electrical Engineer and the DABS Durai Junction Substation Manager, and witnessed by a USAID designee (IRD/EQUALS) for various components of the Durai Junction site. Transfer documentation was signed by BVSPC, DABS and IRD/EQUALS to signify the transfer of equipment took place, and that the task was completed. USAID issued disposition instructions directing B&V to turn over designated equipment and supplies to DABS.

The following Durai Junction site sections and corresponding GFE were turned over to DABS on the following dates:

- Substation Inventory, including Control Room – completed 31 July 2013.
- Camp Inventory, including life support and office equipment – completed 17 September 2013.
- VICC Spare Parts inventory (items required to be provided in the subcontract) – completed 14 October 2013.
- Voice-over Internet Protocol (VoIP) Inventory – completed 22 August 2013.
- Permanent Power Inventory – completed 24 August 2013.

Modification 11 of the Prime Contract required BVSPC to identify and procure additional spare parts and consumable supplies for the Durai Junction Substation. These items are currently being procured, and will be sent to USAID through IRD/EQUALS for delivery and issuance to DABS at the Durai Junction Site.

### 3.6 Final Schedule

The overall schedule is included in **Attachment a-08**. The overall schedule was impacted by numerous events, including:

- a. Implementation Decree 63 slowed the ability of BVSPC to hire a Private Security Company (PSC) and private guard force until 7 months into the project. The site was not accessible until this subcontract was in place.
- b. Transition from PSC to the use of a Risk Management Company. The APPF again impacted the site due to the change in the risk profile. All expatriate personnel were evacuated from the construction site for 66 days.
- c. Closure of the Port of Quetta from 28 November 2011 through 04 July 2012 impacted the delivery of all goods manufactured outside of Afghanistan.
- d. Periodic closures of the border between Afghanistan and Pakistan.
- e. Security incidents at the site and in Kandahar, thus limiting work and movement.
- f. Security on Highway 1 never allowed ground transportation for personnel, resulting on the reliance on rotary wing aircraft.
- g. Weather, particularly fog and dust storms, impacted the availability to transport personnel.
- h. Transmission arm failure and resultant transmission structure rework resulted in a project delay. USAID and BVSPC have agreed to the time periods of this delay, 24 April to 31 May 2013, and 25 July to 29 August 2013, for a total of 72 days.

On 21 June 2012, BVSCP notified USAID of a 45 day schedule slip due to security issues and the Pakistan border closure.

Throughout June, July, and August of 2013, BVSPC notified USAID of the status of the work, including delays associated with APPF unrest, extreme heat and windstorms impacting production, Ramadan productivity rate decreases, and DABS needing to complete improvements on its transmission facilities.

The Substation was energized on 25 August 2013, and turned over to DABS for operation on 26 August 2013. All site work was completed by 29 September 2013. All project work was completed by 30 September 2013, with the exception of the following which were / will be completed during 2014:

- a. Organizing testing and commissioning documents finalized as of 28 February 2014.
- b. Procuring spare parts per Modification 11. The recommended spare parts list was approved for pursuing pricing by USAID on 24 October 2013, and was on order by 28 February 2014. All parts are anticipated to be onsite by 30 September 2014.
- c. Developing the maintenance plan for the Substation. This work was completed on 20 December 2013, and final O&M Plan was fully revised and accepted by USAID on 16 March 2014.
- d. Completing the updating of the as-built and final drawings, which were accepted by USAID on 13 July 2014.

## 4 PROJECT PHYSICAL COMPLETION

### 4.1 Documentation of Completion

This project was complete with the provision of all materials, equipment, and services to DABS on 26 August 2013, with the following exceptions:

- a. Spare Parts: Material turnover planned to be issued to DABS no later than 30 September 2014.

Project substantial completion, punch lists, and final completion documents are included in **Attachment m-01a** and **Attachment m-01b**.

### 4.2 Photo Album

The photo album is presented as **Attachment a-09**.

## 5 SUSTAINABILITY

The addition of this Substation to the SEPS system is a significant infrastructure investment required a significant training investment for DABS operators. The goal of the training program was to enable DABS to effectively operate the Substation and modify, reprogram, reconfigure, upgrade, and commission the Substation with minimal manufacturer's technical assistance. The complete training report is included in **Attachment a-25**.

Substation training was completed using two approaches. First, equipment training (110/20 kV Power Transformers, 110 kV Circuit Breakers, and 20 kV Switchgear) was conducted at the respective factory. This training was conducted using the equipment specifically manufactured for KHPP. The details of this training are included in the closeout report for Subcomponent 2.2, **Attachment a-25**, Procure Equipment for Additional Substations. Five DABS Kandahar representatives attended these training sessions. Second, the Durai Junction Substation Subcontractor conducted onsite detailed training. The details of this onsite training are presented next.

### 5.1 Onsite Training Contents and Learning Objectives

Upon arrival, the trainees were assessed for reading, writing, and mathematics skills. The reading, writing, and mathematics skills of the trainees were found to be limited. Some trainees possessed some English and/or basic computer skills. Some trainees had worked outside of the home, such as in the capacity of a nurse or teacher. One of the trainees was selected to be the Manager of the Substation. None of the trainees were prior DABS employees.

Training material presented varied significantly depending on the topic. When classroom and onsite training was insufficient, BVSPC staff supplemented the trainers' material and presentations. Two BVSPC local national employees participated daily in the training, one as a Training Manager and one as a Technical Reference.

Training materials were provided in Dari, Pashto, and/or English languages, depending on the topic. The Subcontractor's training was frequently supplemented with training by the onsite BVSPC staff, which included safety, control and protection systems, switching procedures, and lockout/tag out procedures. The entire construction site was available to the trainees.

The DABS trainees were trained on the learning objectives listed below. All these training activities were conducted onsite.

- a. Guide to safety.
- b. Basic electrical power system concepts.
- c. DJCN electrical single line diagram, configuration, and switching operations.
- d. Instrument transformers.
- e. Substation design and erection.
- f. Substation energization procedure.
- g. Circuit breaker.
- h. Disconnect switches.
- i. Surge arrestors.
- j. Insulators.
- k. Power line carrier components.
- l. Fault analysis.
- m. Control Building operations, bay control unit relays.
- n. Batteries and battery chargers.
- o. Protection system and relays.
- p. Power and auxiliary transformers.
- q. Alarms and annunciator system

Onsite training began on 01 October 2012, and was completed in July 2013 for a total of 196 training days. The number of trainees varied, with attendance between five and nine persons, with attendance rates ranging from 19 to 92 percent. BVSPC provide life support for the trainees while onsite. DABS did not officially hire the trainees as employees until well into the course. This lack of salary impacted attendance and concentration.

Most of the trainees increased their level of participation, including additional interaction with the trainers and the technical staff, as the training progressed and the Substation construction moved into the testing phase. With additional support from senior staff from the DABS Lashkar Gah and DABS Kandahar staff, these trainees will be able to operate the Substation; however, the maintenance skills of the trainees are limited.

## 6 SECURITY PLAN AND INCIDENT REPORTS

The work associated with this project was performed at the Durai Junction Substation located in a remote area at grid location MGRS 41RPR7189410836 along the provincial border separating Helmand and Kandahar. BVSPC operated under a program-wide Security Plan (**Attachment a-2**) managed and coordinated by the BVSPC Security Managers in conjunction with Mondial Risk Management Company and the Afghanistan Public Protection Force. A site-specific Durai Junction Security Plan (**Attachment a-2**) was developed due to the remote location of the Substation. This plan provided additional details and security measures for protection of the site. Additional off-site incidents also contributed to delays in travel due to incidents and risks in Kandahar.

At Durai Junction, 31 security incidents impacted work, including the following:

- Eighteen involved insurgent ambushes with small arms and improvised explosive devices (IEDs) against traffic on Rte 611, the route used for movement by

Subcontractor VICC to the site, in locations ranging from 1 to 3 kilometers from the site. No VICC movements reported damages or injuries. Occasional stray rounds from these ambushes required B&V staff onsite to temporarily seek cover.

- On 04 June 2012, a local ANA commander demanded access to the site. The site was secured. This action prevented BVSPC and its Subcontractor personnel from working on the construction site. No construction work was able to be performed.
- On 05 July 2012, small arms fire at the Afghan National Army camp across the road from the site forced staff to temporarily take cover.
- On 31 July 2012, the APPF site guard force refused to work due to late payment of their salaries by APPF Headquarters in Kabul. The guards prevented BVSPC and its Subcontractor personnel from working on the construction site. No construction work was able to be performed.
- On 02 September 2012, the APPF site guard force refused to work due to late payment of their salaries by APPF Headquarters in Kabul.
- On 02 October 2012, the APPF site guard force refused to work due to late payment of their salaries by APPF Headquarters in Kabul. The guards prevented BVSPC and its Subcontractor personnel from working on the construction site. No construction work was able to be performed. This lockout lasted through 10 October 2012.
- On 03 February 2013, a B&V CCN interpreter was physically assaulted by members of the APPF guard force who accused him of stealing money.
- On 15 June 2013, the APPF site guard force refused to work due to late payment of their salaries by APPF Headquarters in Kabul. The guards prevented BVSPC and its Subcontractor personnel from working on the construction site. No construction work was able to be performed. This lockout lasted through 18 June 2013.
- On 27 July 2013, two APPF guards were terminated for selling drugs onsite.
- During September 2013, insurgent activity in the area destroyed several DABS transmission towers, resulting in no power flow to the Substation for approximately 10 days. Service was returned on 14 September 2013.

On 25 August 2013, a representative from the ANA visited the site to inspect the site and review security. On 26 August 2013, BVSPC turned over the site to USAID/DABS. BVSPC vacated the site on 29 September 2013.

## 7 SAFETY PROGRAMS/PLANS

BVSPC operated under a program-wide **Health and Safety Plan and Procedures (Attachment a-04)** managed by the BVSPC Health and Safety Manager. No safety incidents were reported throughout the duration of this portion of the project.

## 8 QUALITY CONTROL PROGRAM/PLAN

BVSPC operated under a project-wide **Quality Control Plan (Attachment a-05)**. The implementation of a QC program at Subcomponent 2.1 – Build Durai Junction Substation was the responsibility of the KHPP professionals and Subcontractors engaged in the O&M work. Oversight and guidance was provided by qualified KHPP Quality Management professionals. BVSPD maintained both an expatriate and local national safety manager at the site, as noted in the Organization section.

## 9 ENVIRONMENTAL CONTROL

KHPP's overall **Environmental Plan (Attachment a-14)** governed the activities executed under this contract component. BVSPC also developed site-specific environmental plan associated with the Durai Junction Substation site provided as part of **Attachment a-14**. Regular environmental reports were submitted to USAID as required by the contract. An Environmental Closeout Report was also submitted and approved by USAID at the conclusion of BVSPC's activities at Durai Junction, and is detailed in **Attachment a-16**.

## 10 STATEMENT OF PATENTS, ROYALTIES OR CLASSIFIED MATERIALS

No patents, royalties, or classified materials were obtained or generated under the activities of this task order.

## 11 VALUE ENGINEERING CHANGES (IF APPLICABLE)

Two value engineering opportunities were utilized:

1. With DABS providing a relatively large site, when artesian wells were identified, the design was readily rotated to fit within the bounds of the area. The large site also enabled construction work to occur in multiple areas with minimal impact to other work, i.e., work was permitted to proceed on parallel versus consecutive paths. The size of the site also allowed all construction staff, equipment, and materials to all be co-located, thus limiting travel risks and security costs and increasing the interactions between the organizations.
2. After BVSPC awarded the Subcomponent 2.2 subcontract for circuit breakers and transformers, the Subcontractor changed from the original supplier to the same supplier as BVSPC. This supplier change accomplished the following:
  - Reduced the transformer design review process and thus the lead time for the transformer.
  - Limited the types of equipment on which DABS needed to be trained for operations and maintenance.
  - Allowed a single set of spare parts to be available for both Substations.

## 12 ENHANCING BEST PRACTICES (LESSONS LEARNED)

The major lessons learned through the Task Order are listed in Table 6 below:

**Table 6: Subcomponent 2.1 – Considerations from Implementation**

Observation	Lesson	Recommendation
Trainees were not getting paid.	Understand DABS hiring procedures.	Ensure t DABS hiring procedures have been followed and implemented before allowing trainees onsite.
During trial operation period 30 September 2012 through 10 October 2012, DABS trainees stopped coming to work due to long work hours and no overtime pay incentive.	To maintain the necessary staffing to perform operations and maintenance, O&M staff should not be expected or scheduled to work longer than 48 hours per week.	<ol style="list-style-type: none"> <li>1. DABS to pay overtime or create other incentives for O&amp;M staff to work overtime.</li> <li>2. DABS to limit O&amp;M staff to a maximum of a 48 hour work week.</li> </ol>

Observation	Lesson	Recommendation
DABS provided extremely young trainees.	DABS missed an opportunity for their experienced staff to expand their knowledge of Substation design, construction, operations, testing, and safety.	When local DABS organization does not meet its commitments or the commitment is minimal, raise the issue sooner to management. Encourage and facilitate opportunities to engage the local DABS management in all aspects of project execution, particularly during testing and commissioning.
Subcontractor staff turnover impacts production and safety.	Staffing changes bring both additional motivation and challenges to a project. Challenges include lost expertise and history and practiced teamwork.	Be proactive in identifying staff improvements for Subcontractors. Be proactive in facilitating conflict resolution amongst Subcontractor staff to eliminate turnover.
The young staff needs assistance and guidance when abnormal conditions occur.	Communication with DABS staff at DJCN is limited since DABS Kabul determined not to provide internet communications to the site.	Plan early in the project to establish a solid communication infrastructure for remote DABS sites.

### 13 WARRANTY

BVSPC as required by the Prime Contract has a project-wide Warranty Plan (**Attachment a-06**). For Subcomponent 2.1, the warranty conditions reflect the Letter of Warranty provided to USAID applicable to this Component.

### 14 OUTSTANDING ISSUES

There is one outstanding issue open related to completing Subcomponent 2.1:

1. Closure of the Substation EPC subcontract. One issues are outstanding:
  - a. Two requests for equitable adjustment related to delays caused by the APPF which resulted in work stoppages.

### 15 CONCLUSION: IMPACT ASSESSMENT

Subcomponent 2.1 designed, constructed, tested, and energized a new 110 kV Substation to replace a severely deteriorated, non-functional switching facility. This new Substation provided the first major upgrade to the SEPS system in over 35 years. With buswork and equipment rated for 1,600A (260 MW), this Substation provides a pivotal power transfer location for a variety of future generation capacity improvement projects.

DABS has gained both knowledge and experience with current technology and with current Substation configuration application. DABS has obtained a new generation of employees developing a career path in the utility industry.

The reliability of service to all customers served by the SEPS system has improved due to additional fault identification, sectionalizing, and options for restoration of service. In addition, the Substation configuration itself allows equipment to be taken out of service for maintenance



without the need for customer outages. Approximately 93,000 people have been impacted by this improvement. The Performance Monitoring Plan for KHPP provides the metrics indicating the impact of the implementation of this project (**Attachment a-12**). The impact of this Substation will continue to increase as additional generation and transmission facilities are added without the need for outages or reconfigurations of the Substation.

## 16 DEVELOPMENT EXPERIENCE CLEARINGHOUSE (DEC)

The following documents will be submitted to the DEC as required:

1. Subcomponent 2.1 Closeout Report