



**USAID**  
FROM THE AMERICAN PEOPLE

# Closeout Report

## Kandahar Helmand Power Project (KHPP)

### COMPONENT 1 SUBCOMPONENT 2

# Refurbish Kandahar City Medium Voltage Distribution System



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

Submitted to: Office of Economic Growth and Infrastructure (OEGI)  
U.S. Agency for International Development (USAID)  
Great Massoud Road  
Kabul, Afghanistan

Submittal Date: 7 February 2014  
Revision 01: 01 May 2014  
Revision 02: 24 June 2014  
Final Revision: 12 August 2014  
Final for Approval: 05 September 2014

## **Table of Contents**

<b>1</b>	<b>KANDAHAR HELMAND POWER PROJECT (KHPP) OVERVIEW .....</b>	<b>6</b>
1.1	KHPP Background.....	6
1.2	KHPP Summary of Scope of Work .....	7
1.3	KHPP Contract Evolution.....	9
1.4	KHPP Contract Coordination and Communication.....	11
<b>2</b>	<b>SUBCOMPONENT 1.2: REFURBISH KANDAHAR CITY MEDIUM VOLTAGE (MV) DISTRIBUTION SYSTEM.....</b>	<b>12</b>
2.1	Objectives.....	12
2.2	History .....	12
2.3	Subcomponent 1.2 Modifications and Change Order History.....	17
2.4	Deliverables.....	26
<b>3</b>	<b>PROJECT EXECUTION .....</b>	<b>28</b>
3.1	Organizational Structure and Management Details.....	28
3.2	Implementation of Work.....	30
3.3	Subcontracts and Major Procurements.....	36
3.4	Budget and Expenditures .....	37
3.5	Government Property Summary .....	37
3.6	Final Schedule.....	38
<b>4</b>	<b>PROJECT PHYSICAL COMPLETION.....</b>	<b>38</b>
4.1	Documentation of Completion.....	38
4.2	Photo Album.....	38
<b>5</b>	<b>SUSTAINABILITY .....</b>	<b>38</b>
<b>6</b>	<b>SECURITY PLAN AND INCIDENT REPORTS .....</b>	<b>43</b>
<b>7</b>	<b>SAFETY PROGRAMS/PLANS .....</b>	<b>43</b>
<b>8</b>	<b>QUALITY CONTROL PROGRAM/PLAN .....</b>	<b>43</b>
<b>9</b>	<b>ENVIRONMENTAL CONTROL.....</b>	<b>44</b>
<b>10</b>	<b>STATEMENT OF PATENTS, ROYALTIES OR CLASSIFIED MATERIALS .....</b>	<b>44</b>
<b>11</b>	<b>VALUE ENGINEERING CHANGES (IF APPLICABLE) .....</b>	<b>44</b>
<b>12</b>	<b>ENHANCING BEST PRACTICES (LESSONS LEARNED) .....</b>	<b>44</b>
<b>13</b>	<b>WARRANTY .....</b>	<b>45</b>
<b>14</b>	<b>OUTSTANDING ISSUES .....</b>	<b>46</b>
<b>15</b>	<b>CONCLUSION: IMPACT ASSESSMENT .....</b>	<b>46</b>
<b>16</b>	<b>DEVELOPMENT EXPERIENCE CLEARINGHOUSE (DEC) .....</b>	<b>47</b>

## List of Tables

Table 1: History of Changes in USAID Contract No. 306-C-00-11-00506-00.....	9
Table 2: Subcomponent 1.2 – USAID Contract Modification History .....	17
Table 3: Subcomponent 1.2 – Contract Deliverables Scheduled and Achieved Dates .....	26
Table 4: Subcomponent 1.2 – Contract Deliverables Status.....	27
Table 5: Contract Table 1 – Urgent Upgrades of Transformers, Panels & Switches.....	31
Table 6: Contract Table 2 – Medium Voltage Distribution Items .....	32
Table 7: Contract Table 3 – Low Voltage Distribution Items .....	33
Table 8: Subcomponent 1.2 – Financial Summary .....	37
Table 9: Subcomponent 1.2 – Considerations from Implementation.....	45

## 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 Document File List.	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).	Not Applicable	N/A
a-08	Construction/Final 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, 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.	Not Applicable	N/A
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.	Not Applicable	N/A
a-20	Design Submittals (Section F.4.B-C) - Site Specific.	Not Applicable	N/A



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?
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.	Not Applicable	N/A
a-23	Testing and Commissioning Report (Section F.4.B-C) - Site Specific.	Not Applicable	N/A
a-24	As-built Construction Drawings (Section C.4.11; Section F.4.B-C) - Site Specific.	Not Applicable	N/A
a-25	Training Reports (Component-Specific) - Site Specific.	Complete	Yes; d-07
a-27	Final Closeout Report (Section C.4.11; Section F.4.B-C).	Complete	Yes
<b>Task Documents for Subcomponent 1.2 Refurbish Kandahar City Medium Voltage (MV) Distribution System (Section F.4.A)</b>			
b-01	Coordinate the DABS installation of the Urgent Upgrades, Table 1.	Complete	Yes
b-02(a)	Maintenance Work Requisitions (MWR) (USAID Acknowledgement of MWR Submission via Hard Drive).	Complete	Yes
b-02(b)	Corrective Maintenance Process Documents (USAID Acceptance and Corrective Maintenance Plan).	Complete	Yes
b-02(c)	Work Plan (Work Plan Documents).	Complete	Yes; d-04
b-03	Procurement of Distribution Materials in Tables 1, 2 and 3 (Tasks i, ii(d) and iii) (USAID Acceptance).	Complete	Yes
b-04	Final Single Line Diagrams (USAID Acceptance).	Complete	Yes
b-05(a)	Distribution Planning Study dated 03 June 2011 and Scope of Work for New Study (USAID Acceptance).	Complete	Yes
b-05(b)	Transmission Plan for Kandahar (USAID Acceptance).	Complete	Yes
b-06(a)	Lineman Training Plan (USAID Acceptance).	Complete	Yes
b-06(b)	USACE Coordination Documents (RFI Documents).	Complete	Yes
<b>Deliverables for Subcomponent 1.2 Refurbish Kandahar City Medium Voltage (MV) Distribution System (Section F.4.A)</b>			
d-01	Updated Single-Line Diagrams (Planned & Installed Diagrams).	Complete	Yes
d-02	Updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams & Recommendations for Material Not Used (GIS Tracker Information and Transfer Documents).	Complete	Yes
d-03	Training Plan submitted.	Complete	Yes
d-04	Work plan for Task ii, Sub-task (e) (Work Plan Process Documents).	Complete	Yes
d-05	Narrative Description of Distribution Planning Study.	Complete	Yes
d-06	Narrative Description for Transmission Plan.	Complete	Yes
d-07	Report on Transmission and Distribution Work Methods Training.	Complete	Yes
c-05	Procurement Matrix Indicating Closeout Status.	Complete	Yes
g-06	USAID Final Disposition Instructions.	Complete	Yes
g-07	Complete & Submit Handover/Disposal documents to USAID.	Complete	Yes; d-02
m-01a	SUBSTANTIAL COMPLETION: 1) Certificate of Substantial Completion with Schedule of Defects (if applicable)	Complete	Yes



<b>Document #</b> (if applicable)	<b>Description</b> <b>(Note: The Section references below are the BVSPC-USAID Contract sections wherein specific deliverable requirements are located.)</b>	<b>Status</b>	<b>In Closeout Package?</b>
<b>m-01b</b>	FINAL INSPECTION AND ACCEPTANCE 1) Final Punch List (if applicable). 2) Final Completion and Acceptance Certificate (FCA). 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 + BV Response Letter.	Not Received from USAID	N/A
<b>m-05</b>	Copy of Closeout Documentation - List of Closeout Documentation handed over 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, the placement of fourteen (14) MTU generators, representing 21MW 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 located at (1) Bagh-e-Pohl and (2) Shorandam Industrial Park; and increasing concern about the sustainability of additional diesel generation within Kandahar City, the installation of the 14 MTU units was suspended until USAID could further assess options to maximize the impact of and use of the diesels. USAID worked with DABS and ISAF on appropriate alternate uses for the units while maintaining overarching program objectives and mitigating sustainability challenges. Implementation Letter 46, issued in August 2012 and agreed to bilaterally by USAID and DABS, allocated the units to various DABS load centers and set forth conditions for installation and sustainment. Refer to the Closeout Report for Subcomponent 1.5 for the ultimate disposition of all MTU diesel generators.

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 provides a history of the changes which have occurred in the Prime Contract between BVSPC and USAID as the needs and demands adjusted due to changing ground conditions in order to maximize 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	01 Feb 2011	The purposes of this modification were 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	Date	Description
Contract Modification 02	17 Mar 2011	The purposes of this modification were 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 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 purposes of this modification were 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 Office.</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 purposes of this modification were to: <ul style="list-style-type: none"> <li>• Incorporate no cost changes in Sections C and F.</li> <li>• Incorporate the FAR Clause 52.209-9 under PART II – CONTRACT CLAUSES. SECTION I – CONTRAT 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].
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 purposes of this modification were 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>



Contract	Date	Description
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 purposes of this modification were 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> </ul> Modify PART I-THE SCHEDULE I. SECTION B-SUPPLIES OR SERVICES AND PRICE/COSTS, paragraph (c).
Contract Modification 08	29 Sep 2012	The purposes of this modification were 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> </ul> Modify PART I-THE SCHEDULE I. SECTION B-SUPPLIES OR SERVICES AND PRICE/COSTS, paragraph (c)
Contract Modification 09	30 Sep 2012	The purposes of this modification were to: <ul style="list-style-type: none"> <li>• Correction to 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 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 purposes of this modification were 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 purposes of this modification were 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.

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 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 1.2: REFURBISH KANDAHAR CITY MEDIUM VOLTAGE (MV) DISTRIBUTION SYSTEM**

### **2.1 Objectives**

The goal of Component 1 was to improve the reliability and available generating capacity of the Kandahar Power Distribution System. In order to accomplish this goal, USAID determined that BVSPC would need to add generation as part of a bridging solution and upgrade the level of electrical service to existing customers by providing materials. In addition, BVSPC would need a standardized process in coordination with DABS in order for DABS to remove targeted distribution system constraints to enhance access to others in the Kandahar City area.

The focus of Subcomponent 1.2 involved providing DABS with training using a systematic approach to implementing a distribution system maintenance program and providing the materials needed for DABS to rebuild and replace specific deteriorated facilities in the existing Kandahar City medium voltage distribution system. The program and its results would then produce increased capacity and reliability of the electric distribution system.

### **2.2 History**

#### Scope of Work

The scope of work of refurbishing the Kandahar City Medium Voltage Distribution System was developed based on work completed by the Afghanistan Infrastructure Rehabilitation Program (AIRP) Task Order - 22 (TO-22). TO-22 performed an assessment of the Kandahar City low and medium voltage distribution system and estimated the materials required to completely replace the deteriorated facilities. The quantity of materials required for this replacement work was directly placed into the scope of work of this Subcomponent. The materials were grouped into three categories (by table):

1. Table 1 - Transformers, Panels, and Switches. This work is also known as the “Urgent Upgrade” work.
2. Table 2 - Medium Voltage Distribution Items.

### 3. Table 3 - Low Voltage Distribution Items.

These materials were to be procured and provided to DABS. Since DABS did not have the systems to implement a program of this magnitude and, to ensure sustainability of the subsequent improvements, the scope of this Subcomponent work then evolved into the development of a basic maintenance work program in close coordination with and implemented by DABS.

To track the work progress, USAID requested that BVSPC utilize information generated by TO-22, specifically to update the Kandahar Existing Distribution System Technical Condition Single Line Diagrams, to illustrate where the materials in Tables 1, 2, and 3 would be installed. USAID also requested that fixed work packages by feeder be developed to support the planning and installation work by DABS. TO-22 also identified a need to expand the distribution system to be able to connect new customers (customers without connection facilities) and customers currently waiting for service (customers not supported due to limited generation).

The scope of this Subcomponent changed significantly as the DABS capability, the work of other US government organizations, and the priorities of the City's electrical system became clear. The changes are identified below as each area of focus is discussed.

Materials for Table 1, Table 2, and Table 3. (See Section 2.3 Contract Modification 10 dated 14 Feb 2013 for final Tables.)

As the materials for Table 1 were noted by DABS as urgent, work began immediately upon award of the contract to specify and procure distribution transformers (Subcontract KCDE.63.3804), 20 kV fused disconnect switches (Subcontract KCDE.63.7041), and low voltage distribution panels (Subcontract KCDE.63.3603). Adhering to the Afghan First policy of USAID, the tendering process used criteria emphasizing Afghan based suppliers. Each supplier finally awarded a contract located outside of Afghanistan due to a lack of local suppliers.

The transformers and switches were received at the site during the third quarter of 2011. The low voltage disconnect panels were delayed due to the Pakistan port/border closure of 28 November 2011 through 03 July 2012. DABS developed the priority where the existing ten transformers and switches would be replaced. BVSPC then proceeded to convey transformer and switches in sets of two to DABS to ensure that work progressed. Replacement of the deteriorated transformers and switches was completed in July 2012. Nine of the ten original locations were used. The tenth location was modified due to overloading at an updated location.

The low voltage disconnect panels cleared the backlog of containers at the Port of Quetta in Pakistan during July 2012, and cleared Kandahar Customs in August 2012. Due to the footprint required for the panels and the condition of existing panels, DABS requested the panels be used at alternate locations. Nine panel installations were complete and the tenth location was in progress as of October 2013.

Table 2 Medium Voltage (MV) and Table 3 Low Voltage (LV) material lists were based on descriptions and quantities provided by TO-22. BVSPC utilized the Ministry of Energy & Water (MEW) standards and additional data discussed with DABS to develop the procurement specifications. Wire and cable were ordered first (subcontract KCDE.63.7025). BVSPC then reviewed the material requested with DABS. The Kandahar DABS Director requested the service cables be of alternate sizes and configurations. BVSPC identified an equivalent quantity of materials and submitted the change to USAID for approval, which was granted. The wire and cable shipment was also delayed due to the Pakistan port closure. The materials were delivered to site in August 2012.

Three events resulted in quantity changes to Table 2 and Table 3 materials simultaneously as the work described above. First, USAID reviewed the work required and changed the focus of the replacement of deteriorated facilities to replacing the aged facilities on the "backbone" section of each feeder, removing the feeder spurs and low voltage work from this Subcomponent. The purpose of this change was twofold: first to improve the reliability and capacity of the existing system for the maximum number of customers, and second to establish an achievable target for work to be completed by DABS within this Contract time period. The change of focus reduced the number of locations requiring work, thus reducing the Table 2 quantities and removing the remaining Table 3 materials from the scope of work.

The second event involved updating the material list reflected within Table 2 to reflect this focus change. MEW then began the process of procuring electric distribution materials for Kandahar City. USAID further reduced the quantities of materials to be procured by KHPP with this MEW material list. Material and equipment lists in tables 2 and 3 are general in nature. Poles were redefined to procure lattice and tubular types structures: Class 4 and Class H1, the former for inline structures (also known as tangent or suspension structures) and the latter for angle and dead-end structures (also known as tension structures). The original structure height was listed as 9-12 meter; however, 12 meter structures were procured following clarification from USAID. Cross arm assemblies were also procured with the structures subcontract (Procurement Subcontract No. KCDE.63.4204) to ensure compatibility.

The bids were higher than anticipated once the original tender responses were received. Additional technical detail was defined, and the tender was then reissued with an expanded bidders list. In order to ensure constructability, the structures subcontract was used as a technical reference, and the next tender was issued for structure and conductor hardware, including insulators, pins, bolts, gain plates, etc. (Procurement Subcontract No. KCDE63.7080). For structures and cross arms, a factory inspection was performed to confirm manufacturing to specifications and that the equipment was packed adequately for shipment. This work was performed by Bureau Veritas (Procurement Subcontract No. KHPP.12.2001).

Additional materials, tools, and equipment were required to accomplish the replacement of the deteriorated facilities, as noted herein Section 3.3: Subcontracts and Procurements. As

DABS defined the materials required at specific locations, the quantity of materials required was modified, and minor procurements were issued to supplement the original estimate.

The third event to impact the Table 2 materials was the procurement of construction vehicles by USACE. Once the USACE procurement focus and lists became available to USAID, the provision of a line truck (Subcontract No. KCDE.69.1001) was removed from the KHPP scope of work; however, the need to procure an auger for the USACE vehicle was added to the KHPP scope. Materials, tools, and equipment were received in Kandahar and turned over to DABS through September 2013.

#### Maintenance Work Management Program

As the capacity of the DABS Kandahar organization to plan and implement work became known to USAID and BVSPC, additional focus was added to develop and implement a work management methodology. Working with the DABS Planning Manager and Technical Assistant, a sustainable methodology and implementation program was developed to: (a) identify the work and set overall objectives, (b) schedule material and labor to perform the work, (c) replace the deteriorated facilities, and (d) inspect and close out the work.

Duties and responsibilities for each of these phases of the management program were established to transition from the methodology as agreed upon with DABS to an implementable program. Forms and tools were also developed, including the Maintenance Work Requisition form (MWR). The MWR is the form and tool used to identify the work to be performed, identify the materials, tools and equipment required, and to document its completion. DABS completed MWRs for each deteriorated facility location. BVSPC staff quality checked both the design of the work and the materials and resources specified to perform the work. BVSPC also translated the Dari language based DABS work to English, and created both Dari and English program details and forms.

A minor number of locations were already repaired as DABS reviewed each location to be identified; therefore, DABS recommended alternate locations. These alternate locations were referred to as the "grey scale" locations. Training on the maintenance program was conducted as DABS changed staff and for key construction personnel. The maintenance program training also included distribution and transmission electric system fundamentals and design. The MWR documenting the work to be performed is included as part of the hard drive submittal to USAID and as an attachment in the Bilateral Agreement submitted by portable electronic storage device.

#### Work Progress

To provide an overall tracking tool, the TO-22 supplied single line diagram (SLD) was updated to show the locations where work was planned to be performed and the major materials to be utilized (transformers, structures, and other work). Periodic updates of this SLD were developed, with a final SLD update at the completion of the project.

DABS organized the MWR into work packages, labeled Package A through Package NN, to facilitate the detailed planning of the work. Each package identified work at approximately

20 locations. Planned work targets were established with DABS using these packages. Periodic updates were provided to DABS and USAID.

DABS issued a request to USAID for the provision of an auger and backfill material following arrival of the structures. The footprint of the lattice dead-end structures exceeded the auger size on their existing vehicle; therefore, the auger was requested. The backfill material was requested as DABS did not have funding for construction consumable materials. These materials were provided by BVSPC to DABS upon approval from USAID.

During the implementation of KHPP, USACE was also working with DABS to rebuild Feeder 511 and to build a new Feeder 521. Both USACE and KHPP were using a common group of resources to complete the electric system improvement work. Due to the timing of the structures and insulator deliveries, as well as the overlap with USACE, the DABS construction work applicable to the KHPP began in earnest in June of 2013. By the end of September, deteriorated facilities were replaced in 295 locations. This work was completed primarily on Feeder 513/514, Feeder 513, and Feeder 514. For Feeder 514, DABS elected to construct a new line parallel to the existing line, but located on the west side of the highway. This relocation work was well in progress at the end of the KHPP program, with many kilometers of line only lacking a conductor. The conductor was installed, as well as reconductor work as recommended by TO-22 and KHPP, following the project. The MWR documenting the work to be performed and the inspection after the work was completed is included as part of the hard drive submittal to USAID and as an attachment in the Bilateral Agreement submitted by portable electronic storage device.

### New Connections

The original scope of this project requested B&V to develop a plan and implement, with DABS, the addition of 10,518 new connections, including circuit breaker panels and service drops, and to connect an additional 16,822 customers ready for service. In order to plan this work, a system study was required to determine if the existing distribution system capacity was sufficient. A scope of work was identified and tendered (KCDE.12.7001); no qualified bids were received. B&V then performed a preliminary analysis of the system and submitted the analysis to USAID. The analysis indicated that if generation was available and the new Substation was completed, the distribution system itself had the capacity if the conductor and facilities were in good condition [see **Attachment b-05(a)**]. Recognizing the system was not in good working condition, USAID changed the focus of the replacement work to limit the scope to improving the condition of the backbone section of each feeder. Modification 7 modified the scope of work to provide a scope, schedule, and cost to add these customers; however, when USAID finalized the generation expansion plan for Kandahar City (Subcomponent 1.5 and Component 4) and Kajaki (Component 6), the scope of work to add customers and to connect customers was ultimately removed.

With the removal of the new connections work in Modification 10, USAID added to the scope of work to join with DABS to build technical capacity and develop the scope of work for a distribution planning study. The objective of the planning study was to identify 20 kV system improvements required to efficiently use the current generation to service all currently connected customers and those in areas with the greatest future growth potential.

USAID simultaneously requested that a narrative description be developed describing a medium to long term transmission system expansion plan for Kandahar City. The plan assumed a transmission line from Kabul to Kandahar was implemented. Both of these documents were completed jointly with DABS and accepted by USAID. (See **Attachments d-05 and d-06.**)

### Training

Modification 7 expanded the training requirements for DABS personnel, including its lineman personnel. The scope of the training included four technical areas, and required all training to be videotaped. Additional training information is included herein **Section 5: Sustainability**. BVSPC worked with DABS, USAID, and USACE to identify a long term training site. Many sites were considered; however, with DABS unable to provide 24/7 security for a permanent training site, a temporary site was established at AMTEX Village. (See **Attachment a-09 and d-07.**)

## 2.3 Subcomponent 1.2 Modifications and Change Order History

Changes/modifications to the Prime Contract impacting Subcomponent 1.2 are provided in Table 2:

**Table 2: Subcomponent 1.2 – USAID Contract Modification History**

Source & Date	Task	Change & Date																				
Original Contract 09 Dec 2010	Task i: Procure the transformers, panels, and switches listed in Table 1:  Table 1 Transformers, Panels, Switches <table border="1"> <thead> <tr> <th>Item</th> <th>Noun</th> <th>Description</th> <th>QTY</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Distribution Transformer</td> <td>630 kVA, 20/.4 kV</td> <td>10</td> <td>Ea</td> </tr> <tr> <td>2</td> <td>Distribution Panel</td> <td>1,600 Amp with automatic main switch</td> <td>10</td> <td>Ea</td> </tr> <tr> <td>3</td> <td>Isolating Switches</td> <td>20 kV, Outdoor Rated</td> <td>10</td> <td>Ea</td> </tr> </tbody> </table>	Item	Noun	Description	QTY	Unit	1	Distribution Transformer	630 kVA, 20/.4 kV	10	Ea	2	Distribution Panel	1,600 Amp with automatic main switch	10	Ea	3	Isolating Switches	20 kV, Outdoor Rated	10	Ea	Revised 17 Jul 2011
Item	Noun	Description	QTY	Unit																		
1	Distribution Transformer	630 kVA, 20/.4 kV	10	Ea																		
2	Distribution Panel	1,600 Amp with automatic main switch	10	Ea																		
3	Isolating Switches	20 kV, Outdoor Rated	10	Ea																		
Contract Modification 04 17 Jul 2011	Task i: Change Task i to read: "Procure the <u>urgent</u> upgrade transformers, panels, and switches listed in Table 1."	Delete and replace 14 Feb 2013																				
Contract Modification 10 14 Feb 2013	<b>Task i: Procure and coordinate with DABS to install the urgent upgrade transformers, panels, and switches listed in Table 1:</b>  Table 1- Urgent Upgrades Transformers, Panels, Switches <table border="1"> <thead> <tr> <th>Item</th> <th>Noun</th> <th>Description</th> <th>QTY</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Distribution Transformer</td> <td>630 kVA, 20/.4 kV</td> <td>10</td> <td>Ea</td> </tr> <tr> <td>2</td> <td>Distribution Panel</td> <td>1,600 Amp with automatic main switch</td> <td>10</td> <td>Ea</td> </tr> <tr> <td>3</td> <td>Isolating Switches</td> <td>20 kV, Outdoor Rated</td> <td>10</td> <td>Ea</td> </tr> </tbody> </table>	Item	Noun	Description	QTY	Unit	1	Distribution Transformer	630 kVA, 20/.4 kV	10	Ea	2	Distribution Panel	1,600 Amp with automatic main switch	10	Ea	3	Isolating Switches	20 kV, Outdoor Rated	10	Ea	
Item	Noun	Description	QTY	Unit																		
1	Distribution Transformer	630 kVA, 20/.4 kV	10	Ea																		
2	Distribution Panel	1,600 Amp with automatic main switch	10	Ea																		
3	Isolating Switches	20 kV, Outdoor Rated	10	Ea																		



Source & Date	Task					Change & Date	
Original Contract 09 Dec 2010	Task ii: Procure the Medium Voltage Items listed in Table 2:					SOW Change 29 Feb 2012	
	Table 2 Medium Voltage Distribution Items						
	Item	Noun	Description	QTY	Unit		
	1	Tension Lattice Pole	9-12 m	33	Pcs		
	2	Tension Concrete Pole	9-12 m	80	Pcs		
	3	Tension Tubular Pole	9-12 m	54	Pcs		
	4	Tension Wooden Pole	9-12 m	5	Pcs		
	5	Suspension Lattice Pole	9-12 m	109	Pcs		
	6	Suspension Concrete Pole	9-12 m	228	Pcs		
	7	Suspension Tubular Pole	9-12 m	320	Pcs		
	8	Suspension Wooden Pole	9-12 m	13	Pcs		
	9	Drill Machine with truck		1	Vehi cle		
	10	Earthing	Galvanized Sheet	842	Ea		
	11	Guide Wire Anchors		172	Ea		
	12	Pole Console		842	Ea		
	13	PVC Conduit		100	Lm		
	14	Steel Guide Wire		1,720	Lm		
	15	Cross Arm	20 kV, with all accessories	1,744	Pcs		
	16	Insulator	20 kV, with all accessories	1,712	Ea		
17	ACSR – overhead line	ACSR-120 mm <sup>2</sup>	15.42	Km			
18	ACSR-overhead line	ACSR-70 mm <sup>2</sup>	19.44	km			



Source & Date	Task						Change & Date	
Request for a Proposal – Contract Modification 07 29 Feb 2012	Task ii: Develop DABS capacity to plan, schedule and implement electric corrective maintenance work by: <ol style="list-style-type: none"> <li>a) In coordination with DABS, replace deteriorated facilities on the backbone section of the seven (7) exiting feeders of the Kandahar City distribution system, with the intent to improve overall system reliability, reduce losses, and effectively evacuate generation. For Feeders 511 and 514, the focus of the repair shall be between Breshna Kot and Bagh-e-Pohl and between Breshna Kot and SIP, respectively.</li> <li>b) Develop DABS capacity for establishing a Corrective Maintenance Process to support subtask (a), including work package identification and planning, work scheduling and materials management, construction, and work closeout.</li> <li>c) Establish DABS work package development and execution benchmarks for sub-task (a). Contractor and DABS will jointly review benchmarks monthly; if the benchmarks are not obtained, the Contractor shall notify USAID with recommendations for corrective action or alternate implementation plans as appropriate.</li> <li>d) Procure the Medium Voltage Items listed in Table 2:</li> </ol>							
	Table 2 Medium Voltage Distribution Items							
	Item	Noun	Description	Unit	Original QTY	MEW QTY		Modif QTY
	1	Deadend/An gle Poles	9-12 m	Pcs	172	60		112
	2	Tangent Poles	9-12 m	Pcs	670	230		440
	3	Drill Machine with Truck		Vehicle	1	0		0
	4	Earthing	Galvanized sheet	Ea	842	290		552
	5	Guide Wire Anchors		Ea	172			552
	6	Pole Console		Ea	842			552
	7	PVC Conduit		Lm	100			100
	8	Steel Guide Wire		Lm	1,720			1,128
	9	Cross arm	20 kV, with all accessories	Pcs	1,744			1,143
	10	Insulator	20 kV with all accessories	Pcs	1,712			1,712
	11	ACSR – overhead line	ACSR – 120 mm <sup>2</sup>	Km	15.42	NA		15.42
12	ACSR – overhead line	ACSR – 70 mm <sup>2</sup>	Km	19.44	NA	19.44		
	e) Submit a proposed work plan for Sub-task (a), including DABS and Contractor staffing requirements and performance benchmarks to the COR no later than 30 April 2012.							



Source & Date	Task	Change & Date																																																																																		
<p>Contract Modification 10 14 Feb 2013</p>	<p>Task ii: Develop DABS capacity to plan, schedule, and implement electrical system corrective maintenance work:</p> <ul style="list-style-type: none"> <li>a) In coordination with DABS, replace deteriorated facilities on the backbone section of the seven (7) exiting feeders of the Kandahar City distribution system, with the intent to improve overall system reliability, reduce losses, and effectively evacuate generation. The “backbone” of the feeders is defined as the main circuit (no taps or spurs) where the conductor size is typically 120 mm<sup>2</sup> or larger. The scope of this task shall include the main circuit of Feeder 514-South, regardless of conductor size, between SIPD and the airport. Prioritize the work based on the results of Task v (a) to ensure the condition is optimal. If previously identified deteriorated facilities have been corrected by DABS or others, Table 2 material may be used elsewhere in the Kandahar City medium voltage system based on re-prioritization of repair locations coordinated with DABS and as approved by the COR.</li> <li>b) Develop DABS capacity for establishing a Corrective Maintenance Process to support Sub-task (a), including work package identification and planning, work scheduling and materials management, construction, and work closeout.</li> <li>c) Establish DABS work package development and execution benchmarks for Sub-task (a). Contractor and DABS will jointly review benchmarks monthly; if the benchmarks are not obtained, the Contractor must notify USAID with recommendations for corrective action or alternate implementation plans as appropriate.</li> <li>d) In support of Sub-task (a), procure the Medium Voltage Items listed in Table 2:</li> </ul>																																																																																			
	<p style="text-align: center;">Table 2 Medium Voltage Distribution Items</p> <table border="1"> <thead> <tr> <th>Item</th> <th>Noun</th> <th>Description</th> <th>Unit</th> <th>Original QTY</th> <th>MEW QTY</th> <th>Modified QTY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Deadend/Angle Poles</td> <td>9-12 m</td> <td>Pcs</td> <td>172</td> <td>60</td> <td>112</td> </tr> <tr> <td>2</td> <td>Tangent Poles</td> <td>9-12 m</td> <td>Pcs</td> <td>670</td> <td>230</td> <td>440</td> </tr> <tr> <td>3</td> <td>Earthing</td> <td>Galvanized sheet</td> <td>Ea</td> <td>842</td> <td>290</td> <td>552</td> </tr> <tr> <td>4</td> <td>Guide Wire Anchors</td> <td></td> <td>Ea</td> <td>172</td> <td></td> <td>552</td> </tr> <tr> <td>5</td> <td>Pole Console</td> <td></td> <td>Ea</td> <td>842</td> <td></td> <td>552</td> </tr> <tr> <td>6</td> <td>PVC Conduit</td> <td></td> <td>Lm</td> <td>100</td> <td></td> <td>100</td> </tr> <tr> <td>7</td> <td>Steel Guide Wire</td> <td></td> <td>Lm</td> <td>1,720</td> <td></td> <td>1,128</td> </tr> <tr> <td>8</td> <td>Cross arm</td> <td>20 kV, with all accessories</td> <td>Pcs</td> <td>1,744</td> <td></td> <td>1,143</td> </tr> <tr> <td>9</td> <td>Insulator</td> <td>20 kV with all accessories</td> <td>Pcs</td> <td>1,712</td> <td></td> <td>1,712</td> </tr> <tr> <td>10</td> <td>ACSR – overhead line</td> <td>ACSR – 120 mm<sup>2</sup></td> <td>Km</td> <td>15.42</td> <td></td> <td>15.42</td> </tr> <tr> <td>11</td> <td>ACSR – overhead line</td> <td>ACSR – 70 mm<sup>2</sup></td> <td>Km</td> <td>19.44</td> <td></td> <td>19.44</td> </tr> </tbody> </table> <p>e) Revise the work plan for Sub-task (a) based on DABS’ linemen crew capacity and performance benchmarks to the COR. The plan must include DABS and Contractor’s staffing requirements.</p>		Item	Noun	Description	Unit	Original QTY	MEW QTY	Modified QTY	1	Deadend/Angle Poles	9-12 m	Pcs	172	60	112	2	Tangent Poles	9-12 m	Pcs	670	230	440	3	Earthing	Galvanized sheet	Ea	842	290	552	4	Guide Wire Anchors		Ea	172		552	5	Pole Console		Ea	842		552	6	PVC Conduit		Lm	100		100	7	Steel Guide Wire		Lm	1,720		1,128	8	Cross arm	20 kV, with all accessories	Pcs	1,744		1,143	9	Insulator	20 kV with all accessories	Pcs	1,712		1,712	10	ACSR – overhead line	ACSR – 120 mm <sup>2</sup>	Km	15.42		15.42	11	ACSR – overhead line	ACSR – 70 mm <sup>2</sup>	Km	19.44
Item	Noun	Description	Unit	Original QTY	MEW QTY	Modified QTY																																																																														
1	Deadend/Angle Poles	9-12 m	Pcs	172	60	112																																																																														
2	Tangent Poles	9-12 m	Pcs	670	230	440																																																																														
3	Earthing	Galvanized sheet	Ea	842	290	552																																																																														
4	Guide Wire Anchors		Ea	172		552																																																																														
5	Pole Console		Ea	842		552																																																																														
6	PVC Conduit		Lm	100		100																																																																														
7	Steel Guide Wire		Lm	1,720		1,128																																																																														
8	Cross arm	20 kV, with all accessories	Pcs	1,744		1,143																																																																														
9	Insulator	20 kV with all accessories	Pcs	1,712		1,712																																																																														
10	ACSR – overhead line	ACSR – 120 mm <sup>2</sup>	Km	15.42		15.42																																																																														
11	ACSR – overhead line	ACSR – 70 mm <sup>2</sup>	Km	19.44		19.44																																																																														



Source & Date	Task					Change & Date		
Original Contract 09 Dec 2010	Task iii: Procure the Low Voltage Distribution Items listed in Table 3:					SOW Change 29 Feb 2012		
	Table 3 Low Voltage Distribution Items							
	Item	Noun	Description	QTY	Unit			
	1	Tension Lattice Pole	9 m	23	Pcs			
	2	Tension concrete poles	9 m	15	Pcs			
	3	Tension Tubular pole	9 m	154	Pcs			
	4	Tension Wooden Pole	9 m	8	Pcs			
	5	Suspension Lattice Pole	9 m	24	Pcs			
	6	Suspension Concrete Pole	9 m	12	Pcs			
	7	Suspension Tubular Pole	9 m	317	Pcs			
	8	Suspension Wooden Pole	9 m	5	Pcs			
	10	Earthing	Galvanized Sheet	558	Ea			
	11	Guide Wire Anchors		200	Ea			
	12	Pole Console		23	Ea			
	13	Steel Guide Wire		2,000	Lm			
	14	Cross arm		1891	Pcs			
	15	Tension Insulator	0.4 – 1 kV, with all accessories	716	Pcs			
	16	Suspension Insulator	0.4 – 1 kV, with all accessories	930	Pcs			
	17	Overhead line	ACSR-70 mm <sup>2</sup>	30	Km			
	18	Overhead line	ACSR-50 mm <sup>2</sup>	88	Km			
	19	Cable	Cu-16 mm <sup>2</sup>	64,000	Lm			
20	Cable	Cu-10 mm <sup>2</sup>	100,000	lm				



Source & Date	Task	Change & Date																																																							
Request for a Proposal – Contract Modification 07 29 Feb 2012	<p>Task iii: Procure the Low Voltage Distribution Items listed in Table 3 already ordered as of 15 February 2011 and ensure standard MEW conductors have been ordered:</p> <p style="text-align: center;">Table 3 Low Voltage Distribution Items</p> <table border="1"> <thead> <tr> <th>Item</th> <th>Noun</th> <th>Description</th> <th>QTY</th> <th>Unit</th> </tr> </thead> <tbody> <tr><td>1</td><td>ACSR-overhead line</td><td>ACSR-70 mm<sup>2</sup></td><td>30</td><td>Km</td></tr> <tr><td>2</td><td>ACSR-overhead line</td><td>ACSR-50 mm<sup>2</sup></td><td>88</td><td>Km</td></tr> <tr><td>3</td><td>Overhead Service Conductor</td><td>3/c #6</td><td>19,100</td><td>m</td></tr> <tr><td>4</td><td>Overhead Service Conductor</td><td>4/c #6</td><td>3,200</td><td>m</td></tr> <tr><td>5</td><td>Overhead Service Conductor</td><td>3/c #10</td><td>10,500</td><td>m</td></tr> <tr><td>6</td><td>Overhead Service Conductor</td><td>4/c #10</td><td>1,700</td><td>m</td></tr> <tr><td>7</td><td>Underground Service Conductor</td><td>3/c #6</td><td>8,200</td><td>m</td></tr> <tr><td>8</td><td>Underground Service Conductor</td><td>4/c #6</td><td>1,400</td><td>m</td></tr> <tr><td>9</td><td>Underground Service Conductor</td><td>3/c #10</td><td>7,000</td><td>m</td></tr> <tr><td>10</td><td>Underground Service Conductor</td><td>4/c #10</td><td>1,800</td><td>m</td></tr> </tbody> </table>	Item	Noun	Description	QTY	Unit	1	ACSR-overhead line	ACSR-70 mm <sup>2</sup>	30	Km	2	ACSR-overhead line	ACSR-50 mm <sup>2</sup>	88	Km	3	Overhead Service Conductor	3/c #6	19,100	m	4	Overhead Service Conductor	4/c #6	3,200	m	5	Overhead Service Conductor	3/c #10	10,500	m	6	Overhead Service Conductor	4/c #10	1,700	m	7	Underground Service Conductor	3/c #6	8,200	m	8	Underground Service Conductor	4/c #6	1,400	m	9	Underground Service Conductor	3/c #10	7,000	m	10	Underground Service Conductor	4/c #10	1,800	m	Delete and replace 14 Feb 2013
Item	Noun	Description	QTY	Unit																																																					
1	ACSR-overhead line	ACSR-70 mm <sup>2</sup>	30	Km																																																					
2	ACSR-overhead line	ACSR-50 mm <sup>2</sup>	88	Km																																																					
3	Overhead Service Conductor	3/c #6	19,100	m																																																					
4	Overhead Service Conductor	4/c #6	3,200	m																																																					
5	Overhead Service Conductor	3/c #10	10,500	m																																																					
6	Overhead Service Conductor	4/c #10	1,700	m																																																					
7	Underground Service Conductor	3/c #6	8,200	m																																																					
8	Underground Service Conductor	4/c #6	1,400	m																																																					
9	Underground Service Conductor	3/c #10	7,000	m																																																					
10	Underground Service Conductor	4/c #10	1,800	m																																																					
Contract Modification 10 14 Feb 2013	<p><b>Task iii: Procure the Low Voltage Distribution Items listed in Table 3, ensuring the use of MEW standard conductors. Given the USAID directed descoping of low voltage distribution work in Subcomponent 1.2, the Contractor of DABS will utilize Table 3 materials to the extent feasible, and as approved by the COR, within various activities under the contract. Prior to the completion date of the contract, the Contractor must convey remaining materials to DABS upon approval of the COR.</b></p> <p style="text-align: center;">Table 3 Low Voltage Distribution Items</p> <table border="1"> <thead> <tr> <th>Item</th> <th>Noun</th> <th>Description</th> <th>QTY</th> <th>Unit</th> </tr> </thead> <tbody> <tr><td>1</td><td>ACSR-overhead line</td><td>ACSR-70 mm<sup>2</sup></td><td>30</td><td>Km</td></tr> <tr><td>2</td><td>ACSR-overhead line</td><td>ACSR-50 mm<sup>2</sup></td><td>88</td><td>Km</td></tr> <tr><td>3</td><td>Overhead Service Conductor</td><td>3/c #6</td><td>19,100</td><td>m</td></tr> <tr><td>4</td><td>Overhead Service Conductor</td><td>4/c #6</td><td>3,200</td><td>m</td></tr> <tr><td>5</td><td>Overhead Service Conductor</td><td>3/c #10</td><td>10,500</td><td>m</td></tr> <tr><td>6</td><td>Overhead Service Conductor</td><td>4/c #10</td><td>1,700</td><td>m</td></tr> <tr><td>7</td><td>Underground Service Conductor</td><td>3/c #6</td><td>8,200</td><td>m</td></tr> <tr><td>8</td><td>Underground Service Conductor</td><td>4/c #6</td><td>1,400</td><td>m</td></tr> <tr><td>9</td><td>Underground Service Conductor</td><td>3/c #10</td><td>7,000</td><td>m</td></tr> <tr><td>10</td><td>Underground Service Conductor</td><td>4/c #10</td><td>1,800</td><td>m</td></tr> </tbody> </table>	Item	Noun	Description	QTY	Unit	1	ACSR-overhead line	ACSR-70 mm <sup>2</sup>	30	Km	2	ACSR-overhead line	ACSR-50 mm <sup>2</sup>	88	Km	3	Overhead Service Conductor	3/c #6	19,100	m	4	Overhead Service Conductor	4/c #6	3,200	m	5	Overhead Service Conductor	3/c #10	10,500	m	6	Overhead Service Conductor	4/c #10	1,700	m	7	Underground Service Conductor	3/c #6	8,200	m	8	Underground Service Conductor	4/c #6	1,400	m	9	Underground Service Conductor	3/c #10	7,000	m	10	Underground Service Conductor	4/c #10	1,800	m	
Item	Noun	Description	QTY	Unit																																																					
1	ACSR-overhead line	ACSR-70 mm <sup>2</sup>	30	Km																																																					
2	ACSR-overhead line	ACSR-50 mm <sup>2</sup>	88	Km																																																					
3	Overhead Service Conductor	3/c #6	19,100	m																																																					
4	Overhead Service Conductor	4/c #6	3,200	m																																																					
5	Overhead Service Conductor	3/c #10	10,500	m																																																					
6	Overhead Service Conductor	4/c #10	1,700	m																																																					
7	Underground Service Conductor	3/c #6	8,200	m																																																					
8	Underground Service Conductor	4/c #6	1,400	m																																																					
9	Underground Service Conductor	3/c #10	7,000	m																																																					
10	Underground Service Conductor	4/c #10	1,800	m																																																					

Source & Date	Task	Change & Date
Original Contract 09 Dec 2010	Task iv: Provide updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams with take-offs showing where the equipment provided in Tables 1, 2 and 3 shall be installed in the existing Kandahar Distribution System.	SOW Change 29 Feb 2012
Request for a Proposal – Contract Modification 0 7 29 Feb 2012	Task iv: Provide updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing where the equipment provided in Tables 1 and 2 is (1) planned and (2) ultimately installed in the existing Kandahar Distribution System.	Delete and replace 14 Feb 2013
<b>Contract Modification 10 14 Feb 2013</b>	<b>Task iv: Provide updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing where the equipment provided in Tables 1 and 2 is (1) planned and (2) ultimately installed in the existing Kandahar Distribution System.</b>	
Original Contract 09 Dec 2010	Task v: In coordination with DABS, expand the distribution system, adding 10,518 new connections inclusive of placing circuit breaker panels within service drops. In addition, 16,822 customers currently connected but not served due to generation capacity constraints shall also be served.	SOW Change 29 Feb 2012
Request for a Proposal – Contract Modification 0 7 29 Feb 2012	Task v: In coordination with OSM, the Kandahar PRT and DABS identify the power sources for the 16,822 existing connections per TO-22 to be served when generation is available. Establish the scope of work required to provide service to these connections. Submit proposed scope, schedule, and budget for implementation to USAID no later than 01 June 2012.	Delete and replace 14 Feb 2013
Contract Modification 10 14 Feb 2013	<p>Task v: (a) Provide capacity building to DABS Kandahar for electrical utility planning. Using the KHPP Report “Identifying the Need for Distribution Planning Study,” dated 03 June 2011 as a basis, coordinate with DABS to develop and submit the narrative description for a distribution planning study for Kandahar City to the COR. The narrative must identify conceptual 20 kV MV system improvements, current and projected, required to ensure efficient use of current generation and reliable system operation for serving all connected customers, including those in areas of greatest future growth potential. Assume a medium term (5 to15 year) planning horizon and coordinate with the COR and DABS on planning assumptions.</p> <p>(b) Based on the results of AIRP TO 21.05 report entitled, “Southern Afghanistan Energy Assessment (SAEA)” and any further updated currently available information developed under Subcomponent 1.2 and, in conjunction with DABS Kandahar, develop the narrative description to support the medium to long term (20 year) power transmission plan for the city of Kandahar. This plan should leverage the design basis, substation configurations, and equipment provided by the KHPP and SEPS contracts. The plan must be based on the assumption that the planned “Kandahar East” Substation is located adjacent to the former Russian textile factory on Route 1 and on the requirement that the NEPS-SEPS connection is capable of providing 100 percent of the power demand for SEPS. The narrative description must include a recommendation of whether or not to proceed with a proposed double circuit 110 kV transmission line between Kandahar East and Breshna Kot Substations. Recommendations must optimize functionality of the NEPS-SEPS interface, reflect maintenance and reliability considerations, and be supported by cost-benefit analysis.</p>	Scope Added 29 Sep 2013



Source & Date	Task	Change & Date
<p>Contract Modification 11 29 Sep 2013</p>	<p><b>Task v: (a) Provide capacity building to DABS Kandahar for electrical utility planning. Using the KHPP Report “Identifying the Need for Distribution Planning Study,” dated 3 June 2011 as a basis, coordinate with DABS to develop and submit to the COR the narrative description for a distribution planning study for Kandahar City. The narrative must identify conceptual 20 kV MV system improvements, current and projected, required to ensure efficient use of current generation and reliable system operation for serving all connected customers, including those in areas of greatest future growth potential. Assume a medium term (5 to 15 year) planning horizon and coordinate with the COR and DABS on planning assumptions.</b></p> <p><b>(b) Based on the results of AIRP TO 21.05 report entitled, “Southern Afghanistan Energy Assessment (SAEA)” and any further updated currently available information developed under Subcomponent 1.2 and, in conjunction with DABS Kandahar, develop the narrative description to support the medium to long term (20 year) power transmission plan for the city of Kandahar. This plan should leverage the design basis, Substation configurations, and equipment provided by the KHPP and SEPS contracts. The plan must be based on the assumption that the planned “Kandahar East” Substation is located adjacent to the former Russian textile factory on Route 1 and on the requirement that the NEPS-SEPS connection is capable of providing 100 percent of the power demand for SEPS. The narrative description must include a recommendation of whether or not to proceed with a proposed double circuit 110 kV transmission line between Kandahar East and Breshna Kot Substations. Recommendations must optimize functionality of the NEPS-SEPS interface, reflect maintenance and reliability considerations, and be supported by cost-benefit analysis.</b></p> <p><b>For Tables I and 2, materials not utilized by the end of the contract, provide recommendations for future use of these materials. Recommendations must address unfinished prioritized corrective work requirements identified under Task ii (a) and must be coordinated with the results of Task v (a).</b></p>	
<p>Original Contract 09 Dec 2010</p>	<p>Task vi: Provide capacity development by utilizing DABS staff to the extent possible. Create fixed work packages by feeder circuit for the MV and LV portions of the system that can be installed by DABS staff.</p>	<p>SOW Change 29 Feb 2012</p>
<p>Request for a Proposal – Contract Modification 07 29 Feb 2012</p>	<p>Task vi: The Contractor shall conduct apprentice level training of DABS personnel on the fundamentals of transmission and distribution work methods. The Contractor shall videotape all training conducted in the classroom, and turn over videotape copies to DABS and USAID. Training shall include, but not be limited to:</p> <ul style="list-style-type: none"> <li>• Erecting distribution structures.</li> <li>• Installing and sagging conductors.</li> <li>• Selecting and installing hardware.</li> <li>• Safety.</li> </ul> <p>The Contractor shall submit a training plan no later than 01 May 2012 to include schedule and estimated costs for review and approval by the COR.</p>	<p>Delete and replace 14 Feb 2013</p>



Source & Date	Task	Change & Date
Contract Modification 10 14 Feb 2013	<p><b>Task vi: The Contractor must conduct apprentice level training of DABS personnel provided by DABS in fundamentals of transmission and distribution work methods. The Contractor must videotape all training conducted in the classroom, and turn over videotape copies to DABS and USAID. Training must include, but not be limited to:</b></p> <ul style="list-style-type: none"> <li>• Erecting distribution structures.</li> <li>• Installing and sagging conductors.</li> <li>• Selecting and installing hardware.</li> <li>• Safety.</li> </ul> <p><b>Coordinate with USACE as appropriate for materials and equipment for training and with DABS for a training site that can be jointly utilized by USAID and USACE. The Contractor must submit a transmission and distribution training plan and a report for review and approval by the COR.</b></p>	
Source & Date	Deliverable	Change & Date
Original Contract 09 Dec 2010	Deliverable 1: Updated diagrams with take-offs finalized – 8 months following NTP.	Deleted and Replaced 14 Feb 2013
Contract Modification 10 14 Feb 2013	<b>Deliverable 1: Updated single line diagrams – 8 months following NTP.</b>	
Original Contract 09 Dec 2010	Deliverable 2: Urgent upgrades (transformers, cabling, meters, etc.) installed – 6 months following NTP.	Delivery Schedule Change 14 Feb 2013
Contract Modification 4 17 Jul 2011	Deliverable 2: Urgent upgrades (transformers, cabling, meters, etc.) installed – October 2011.	Deleted and Replaced 14 Feb 2013
Contract Modification 10 14 Feb 2013	Deliverable 2: Updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing where the equipment provided in Tables 1 and 2 is (1) planned, and (2) ultimately installed in the existing Kandahar Distribution System. - 01 Feb 2013 for planned locations 30 September 2013 for final closeout.	Deleted and Replaced 29 Sep 2013
Contract Modification 11 29 Sep 2013	<b>Deliverable 2: Updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing where the equipment provided in Tables 1 and 2 is (1) planned, and (2) ultimately installed in the existing Kandahar Distribution System along with recommendations for future use of Tables 1 and 2 materials not utilized by the end of the contract. - 01 February 2013 for planned locations; 31 October 2013 for final closeout.</b>	
Original Contract 09 Dec 2010	Deliverable 3: All equipment installed. – 24 months following NTP.	Deleted and Replaced 14 Feb 2013
Contract Modification 10 14 Feb 2013	<b>Deliverable 3: Training Plan Submitted - 01 May 2012.</b>	
Contract Modification 10 14 Feb 2013	<b>Deliverable 4: A work plan for Task ii. Sub-task (e), including DABS staffing requirements and performance benchmarks - 15 April 2013.</b>	

Source & Date	Task	Change & Date
Contract Modification 10 14 Feb 2013	Deliverable 5: Narrative description for Distribution Planning Study for Kandahar City - 01 July 2013.	
Contract Modification 10 14 Feb 2013	Deliverable 6: Narrative description in support of a transmission plan for Kandahar City - 01 July 2013.	
Contract Modification 10 14 Feb 2013	Deliverable 7: Report on Transmission and Distribution work methods training. - 01 July 2013.	

## 2.4 Deliverables

Table 3 provides a listing of major deliverable scheduled and achieved dates for the work required by Subcomponent 1.2:

**Table 3: Subcomponent 1.2 – Contract Deliverables Scheduled and Achieved Dates**

Deliverables	Original Schedule	Achieved Date
Deliverable 1: Updated Single Line Diagrams.	8 months following NTP	Planned locations accepted 30 May 2012 Actual Locations accepted 23 Oct 2013
Deliverable 2: Updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams & Recommendations for Material Not Used.	Planned: 01 February 2013 Installed: 30 September 2013	30 September 2013
Deliverable 3: Training Plan submitted.	01 May 2012	Training plan accepted 07 August 2012
Deliverable 4: Work plan or Task ii, Sub-task (e).	15 April 2013	Original work to be completed issued 21 January 2012. All MWR completed 9 October 2013
Deliverable 5: Narrative Description of Distribution Planning Study.	01 July 2013	Original Planning study Accepted 23 April 2013 Mod 10 added scope accepted 21 October 2013
Deliverable 6: Narrative Description for Transmission Plan.	01 July 2013	Accepted 10 September 2013
Deliverable 7: Report on Transmission and Distribution work methods training.	01 July 2013	23 October 2013 Training Plan Summary submitted to USAID for acceptance

*Milestones taken from Schedule of Deliverables of Contract Modification 11 (Attachment m-03).*

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

**Table 4: Subcomponent 1.2 – Contract Deliverables Status**

ITEM NO.	DELIVERABLE	METHOD OF VERIFICATION	STATUS	DOCUMENT
1	Updated Single Line Diagrams.	Government approval (COR) of updated diagrams.	Complete	d-01
2	Updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing where the equipment provided in Tables 1 and 2 is (1) planned, and (2) ultimately installed in the existing Kandahar Distribution System along with recommendations for future use of Tables 1 and 2 materials not utilized by the end of the contract.	Diagrams, photographs, and explanatory narrative documenting equipment installation and recommendations on future use of unused equipment submitted	Complete	d-02
3	Training Plan Submitted	Government approval of submitted plan	Complete	d-03
4	A work plan for Task ii, Sub-task (e), including DABS staffing requirements and performance benchmarks.	Government approval of submitted plan	Complete	d-04
5	Narrative Description for Distribution Planning Study for Kandahar City.	Document Review	Complete	d-05
6	Narrative description in support of a transmission plan for Kandahar City.	Document Review	Complete	d-06
7	Report on Transmission and Distribution work methods training.	Document Review	Complete	d-07

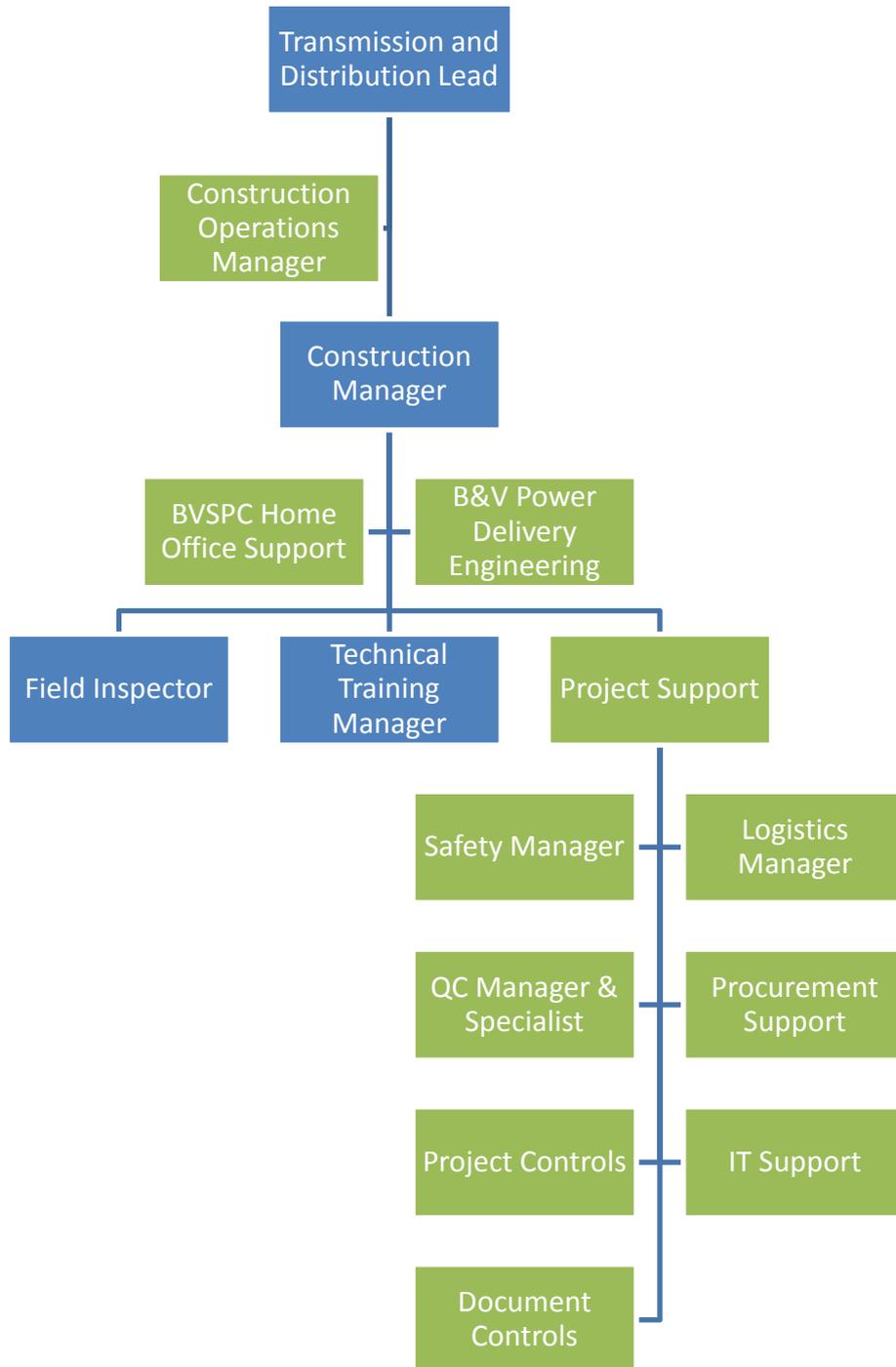
*Deliverables as of Contract No. 306-C-00-11-00506-00 Modification 12*

Electronic copies of these documents are included with this report.

### 3 PROJECT EXECUTION

#### 3.1 Organizational Structure and Management Details

An organizational chart of KHPP Component 1.2 staff as of May 2013 is provided below. (Component 3 includes the entire Chain of Command and project support organizations. Those positions are noted in green below.)



### **3.1.1 ELECTRICAL TRANSMISSION & DISTRIBUTION LEAD**

The Electrical Transmission and Distribution (T&D) Lead was based at the KHPP Regional Camp Project Management Organization (PMO) office located at Amtex, Kandahar. The Sector Lead assumed the overall responsibility for the distribution line construction implementation scope, schedule, and budget. The Electrical T&D Lead was also responsible for all related subcontract management, client coordination and reporting, correspondence, invoice approval, mobilization of personnel, approval of home office personnel applied to Subcomponent 1.2, 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 (CM) was responsible for providing DABS with information and training, as outlined within contract specifications, to allow the work to proceed as scheduled. The CM was responsible for coordinating the interpretation of technical requirements and managing Quality Assurance (QA) oversight of work accomplished by DABS. The primary individuals responsible for this position included Kevin Armstrong and David McPherson.

### **3.1.4 FIELD INSPECTOR**

The Field Inspector reported to the Construction Manager. The Field Inspector was responsible for inspecting the existing conditions to identify work to be performed, monitoring and coaching work to be performed by DABS, performing quality inspections after the work was completed, and providing safety awareness and inspections. The primary individuals responsible for this position included David McPherson, Heidi Young, and Jeff Behrick.

### **3.1.5 FIELD INSPECTOR**

Two Field Inspectors were local national staff. The job description is equivalent to 3.1.4.

### **3.1.6 PROJECT CONTROL MANAGER**

The Project Controls Manager supervised and had lead responsibility over a group of project controls personnel, and functioned as a technical specialist assisting in developing schedules. The primary individuals responsible for this position included Arlen Resoco, and Daryl Robert.

### **3.1.7 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 distribution line construction Subcomponent 1.2. The Document Control Specialist worked on multiple projects simultaneously, and ensured all staff was following proper filing protocols. The primary individuals responsible for this position included Iba Wagner and Ilir Marevci.

### **3.1.8 QUALITY CONTROL (QC) MANAGER**

The Quality Control (QC) 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 distribution line construction project scope of work in accordance with the Three-phase Quality Assurance (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 was to maintain daily Inspections of the Work Site and ensure daily work activities are in accordance with the KHPP QC Plan while coordinating the work effort with KHPP Program Management, as well as USAID onsite inspection resources. The primary individuals responsible for this position included Somkiet Nantasan Roland Hanooman.

### **3.1.9 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 distribution system design and overhead line construction, and providing training to DABS staff as developed. Training topics also included job management, safety, and MEW standards. The primary individual responsible for this position included Rod Patullo.

### **3.1.10 TECHNICAL TRAINING MANAGER**

One Technical Training Manager was local national staff. The job description is equivalent to 3.1.9.

## **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 1 Subcomponent 2. 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, 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 communicated mutual needs and concerns. The working relationships between KHPP staff and the Kandahar DABS Director, senior managers, and staff were consistently positive and productive.

The tasks for this subcontract were performed by KHPP staff, including process development and implementation, technical study work, procurement, and training. The materials were provided by subcontractors.

**Task i:** *Procure and coordinate with DABS to install the urgent upgrade transformers, panels and switches listed in Table 1 (Table 5):*

**Table 5: Contract Table 1 – Urgent Upgrades of Transformers, Panels & Switches**

Item	Noun	Description	Qty	Unit
1	Distribution Transformers	630 kVA; 20/.4 kV	10	Ea
2	Distribution Panel	1,600 Amp with automatic main switch	10	Ea
3	Isolating Switches	20 kV; Outdoor rated	10	Ea

**STATUS: COMPLETE**

In coordination with USAID and DABS, BVSPC procured and then coordinated with DABS to install the urgent upgrade transformers, panels, and switches listed above in Table 1, **Attachment d-02**. Two reports were issued to document the installation work, Urgent Upgrades Installation Progress Report Revision 2 and LV Disconnect Panel Installation Report. At the completion of KHPP, DABS had installed all urgent upgrade materials with the exception of one distribution panel. (See **Attachment b-01**.)

**Task ii:** *Develop DABS capacity to plan, schedule, and implement electrical system corrective maintenance work:*

- a. *In coordination with DABS, replace deteriorated facilities on the backbone section of the seven (7) exiting feeders of the Kandahar City distribution system, with the intent to improve overall system reliability, reduce losses, and effectively evacuate generation. The “backbone” of the feeders is defined as the main circuit (no taps or spurs) where the conductor size is typically 120 mm<sup>2</sup> or larger. The scope of this task shall include the main circuit of Feeder 514-South, regardless of conductor size, between SIPD and the airport. Prioritize the work based on the results of Task v (a) to ensure the condition of the feeder backbone is optimized to deliver maximum power and reliability. Utilize Table 3 materials where LV circuits are connected to MV facilities to ensure the feeder backbone condition is optimal. If previously identified deteriorated facilities have been corrected by DABS or others, Table 2 materials may be used elsewhere in the Kandahar City medium voltage system based on re-prioritization of repair locations coordinated with DABS and as approved by the COR.*



- b. *Develop DABS capacity for establishing a Corrective Maintenance process to support Sub-task (a), including work package identification and planning, work scheduling and materials management, construction, and work closeout.*
- c. *Establish DABS work package development and execution benchmarks for Sub-task (a). Contractor and DABS will jointly review benchmarks monthly; if the benchmarks are not obtained, the Contractor must notify USAID with recommendations for corrective action or alternate implementation plans as appropriate.*
- d. *In support of Sub-task (a), procure the Medium Voltage Items listed in Table 2 (Table 6):*

**Table 6: Contract Table 2 – Medium Voltage Distribution Items**

Item	Noun	Description	Unit	Original QTY	MEW QTY	Modified QTY
1	Deadend /Angle Poles	9 – 12 m	Pcs	172	60	112
2	Tangent Poles	9 – 12 m	Pcs	670	230	440
3	Earthing	Galvanized Sheet	Ea	842	290	552
4	Guide Wire Anchors		Ea	172		552
5	Pole Console		Ea	842		552
6	PVC Conduit		Lm	100		100
7	Steel Guide Wire		Lm	1,720		1,128
8	Cross Arm	20 kV, with all accessories	Pcs	1,744		1,143
9	Insulators	20 kV, with all accessories	Pcs	1,712		1,712
10	ACSR – overhead line	ACSR – 120 mm <sup>2</sup>	Km	15.42	N/A	15.42
11	ACSR – overhead line	ACSR – 70 mm <sup>2</sup>	Km	19.44	N/A	19.44

- e. *Revise the work plan for Sub-task (a) based on DABS’ linemen crew capacity and performance benchmarks to the COR. The plan must include DABS and Contractor’s staffing requirements.*

**Status: COMPLETE**

In coordination with USAID and DABS, BVSPC developed DABS capacity to plan, and scheduled and implemented electrical system corrective maintenance work:

- a. Replaced deteriorated facilities on the backbone section of the seven (7) exiting feeders of the Kandahar City distribution system. BVSPC worked with DABS to prioritize the work based on the results of Task v (a), optimize feed backbone and deliver maximum power and reliability. Utilized Table 3 materials where LV circuits were connected to MV facilities to ensure the feeder backbone condition was optimal. Table 2 materials were utilized based on re-prioritization of repair locations coordinated with DABS and as approved by the COR. The MWR developed as part of Task ii c, document the locations to be worked and document the work completed at the corresponding location. The single line diagrams from Task iv illustrate the both the planned locations and the completed work locations. The Tables 2 and 3

material procurements and handover to DABS are included in **Attachment d-02**. As part of Modification 11, BVSPC updated USAID’s QA partner’s geographical information system (GIS) database with the materials used at each location. This submittal is included as **Attachment d-02**.

- b. Developed DABS capacity for establishing a Corrective Maintenance process to support Sub-task (a), including work package identification and planning, (b) work scheduling and materials management, (c) construction, and (d) work closeout. The Corrective Maintenance Process documentation is included in **Attachment b-02(b)**. The process was documented and training was conducted in both English and Dari languages.
- c. Established DABS work package development and execution benchmarks for Sub-task (a). BVSPC and DABS jointly reviewed benchmarks on a monthly basis and, in those instances where the benchmarks were not obtained, BVSPC notified USAID with recommendations for corrective action or alternate implementation plans as appropriate. On 17 April 2012, DABS accepted the work requisition and facility replacement work targets. The work plans then evolved as the scope of work changed, as DABS resources were committed to this work and work by other agencies, and as materials were received. The work plans are included in **Attachment d-04**. Work plans consisted of monthly targets for MWR development and construction. Construction work was not complete until all work required was 100 percent completed, the identified deteriorated facilities were replaced, and no hazards remained.
- d. In support of Sub-task (a), procured the Medium Voltage Distribution Items listed in Table 2 above (**Attachments b-03 and d-02**). These materials were initially turned over by package and, as DABS gained construction momentum, the remaining materials were issued in bulk. Turnover of materials was complete in October 2013.
- e. Revised the work plan for Sub-Task (a) based on DABS’ linemen crew capacity and performance benchmarks to the COR. The plan included DABS and BVSPC’s staffing requirements. DABS and BVSPC met weekly to review MWR development and construction progress. Updated plans were issued periodically to DABS and to USAID. (See **Attachment d-04**.)

**Task iii:** *Procure the Low Voltage Distribution Items listed in Table 3, ensuring the use of KMEW standard conductors. Given the USAID-directed descoping of low voltage distribution work in Subcomponent 1.2, the Contractor or DABS will utilize Table 3 materials to the extent feasible, and as approved by the COR, within various activities under the contract. The Contractor must convey remaining materials to DABS upon approval of the COR prior to the completion date of the contract.*

**Table 7: Contract Table 3 – Low Voltage Distribution Items**

Item	Noun	Description	Qty	Unit
1	ACSR – Overhead Line	ACSR – 70 mm <sup>2</sup>	30	Km



Item	Noun	Description	Qty	Unit
2	ACSR – Overhead Line	ACSR – 50 mm2	88	Km
3	Overhead Service Conductor	3/c #6	19,100	m
4	Overhead Service Conductor	4/c #6	3,200	m
5	Overhead Service Conductor	3/c #10	10,500	m
6	Overhead Service Conductor	4/c #10	1,700	m
7	Underground Service Conductor	3/c #6	8,200	m
8	Underground Service Conductor	4/c #6	1,400	m
9	Underground Service Conductor	3/c #10	7,000	m
10	Underground Service Conductor	4/c #10	1,800	m

**Status: COMPLETED**

In coordination with USAID and DABS, BVSPC procured the Low Voltage Distribution Items listed in Table 3, **Attachments b-03 and d-02**. DABS, under the supervision of BVSPC, utilized the Table 3 materials to the extent feasible, and as approved by the COR, within various activities under the contract. BVSPC conveyed the remaining materials to DABS from May 2013 through October 2013 as directed by the COR. These materials were initially turned over by package and, as DABS gained construction momentum, the remaining materials were issued in bulk.

**Task iv:** *Provide updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing the installation locations for which the equipment provided in Tables 1 and 2 was originally planned and is ultimately installed in the existing Kandahar Distribution System. For Tables 1 and 2 materials not used by the end of the contract, provide recommendations for future use of these materials. Recommendations must address unfinished prioritized corrective work requirements identified under Task ii (a) and be coordinated with the results of Task v (a).*

**Status: COMPLETED**

In coordination with USAID and DABS, BVSPC provided updated Kandahar Existing Distribution System Technical Condition Single Line Diagrams showing where Tables 1 and 2 equipment was initially planned to be installed. BVSPC later provided the diagrams showing where the materials were ultimately installed in the existing Kandahar Distribution System, **Attachment d-01**. For Tables 1 and 2 materials not used by the end of the contract, BVSPC provided recommendations for future use of these materials, **Attachment d-02**.

**Task v(a):** *Provide capacity building to DABS Kandahar for electrical utility planning. Using the KHPP Report titled, “Identifying the Need for a Distribution Planning Study,” dated 03 June 2011 as a basis, coordinate with DABS to develop and submit to the COR the narrative description for a distribution planning study for Kandahar City. The narrative must identify conceptual 20 kV MV system improvements, current and projected, required to ensure efficient use of current generation and reliable system operation for serving all*

*connected customers, including those in areas of greatest future growth potential. Assume a medium term (5 to 15 years) planning horizon and coordinate with the COR and DABS on planning assumptions.*

**Status: COMPLETE**

In coordination with USAID and DABS, BVSPC provided capacity building to DABS Kandahar for electrical utility planning. BVSPC used the KHPP Report titled, "Identifying the Need for a Distribution Planning Study," dated 03 June 2011 as the basis, and coordinated with DABS to develop and submit an updated report to DABS in the form of a narrative description for a distribution planning study for Kandahar City. The narrative identified conceptual 20 kV MV system improvements, current and projected, required to ensure efficient use of current generation and reliable system operation for serving all connected customers, including those in areas of greatest future growth potential. BVSPC assumed a medium term (5 to 15 years) planning horizon and coordinated with the COR and DABS on planning assumptions. (See **Attachments b-05(a)** and **d-05.**)

**Task v(b):** *Based on the results of AIRP TO 21.05 report entitled, "Southern Afghanistan Energy Assessment (SAEA)" and any further updated, currently available information developed under Subcomponent 1.2 and, in conjunction and coordination with DABS Kandahar, develop the narrative description to support the medium to long term (20-year) power transmission plan for the City of Kandahar. This plan should leverage the design basis, Substation configurations, and equipment provided by the KHPP and SEPS contracts. The plan must be based on the assumption that the planned Kandahar East Substation is located adjacent to the former Russian textile factory on Route 1 and on the requirement the NEPS-SEPS connection is capable of providing 100 percent of the power demand for SEPS. The narrative description must include a recommendation of whether or not to proceed with a proposed double circuit 100 kV transmission line between Kandahar East and BK Substations. Recommendations must optimize functionality of the NEPS-SEPS interface, reflect maintenance and reliability considerations, and be supported by cost-benefit analysis.*

**Status: COMPLETED**

In coordination with USAID and DABS, BVSPC developed a narrative description to support the medium to long term (20-year) power transmission plan for the City of Kandahar. This plan leveraged the design basis, Substation configurations, and equipment provided by the KHPP and SEPS contracts. The Kandahar DABS Director and technical staff provided information from the Kandahar City Planning Department. The plan was based on the assumption that the planned Kandahar East Substation would be located adjacent to the former Russian textile factory on Route 1 and on the requirement the NEPS-SEPS connection be capable of providing 100 percent of the power demand for SEPS. The narrative description included a recommendation of whether or not to proceed with a proposed double circuit 110 kV transmission line between Kandahar East and BK Substations. BVSPC's recommendations optimized functionality of the NEPS-SEPS interface, reflected maintenance and reliability considerations, and were supported by cost-benefit analysis. (See **Attachments b-05(b)** and **d-06.**)

**Task vi:** *The Contractor must conduct apprentice level training of DABS personnel provided by DABS in fundamentals of transmission and distribution work methods. The Contractor must videotape all training conducted in the classroom, and turn over videotape copies to DABS and USAID. Training must include, but not be limited to:*

- *Erecting distribution structures.*
- *Installing and sagging conductors.*
- *Selecting and installing hardware.*
- *Safety.*

*Coordinate with USACE as appropriate for materials and equipment for training, and with DABS for a training site which can be jointly utilized by USAID and USACE. The Contractor must submit a transmission and distribution training plan and a report for review and approval by the COR.*

**Status: COMPLETED**

In coordination with USAID and DABS, BVSPC conducted apprentice level training of DABS personnel provided by DABS in the fundamentals of transmission and distribution work methods. KHPP staff video-recorded all training sessions conducted in the classroom, and turned over all video footage copies to DABS and USAID. The training included erecting distribution structures, installing and correcting sagging conductors, selecting and installing hardware, as well as lineman safety training. (See **Attachments b-06(a)** and **d-07.**)

BVSPC coordinated with USACE to obtain materials and equipment for training, and worked with DABS to secure the training sites which could be jointly utilized by USAID and USACE in instances where appropriate. BVSPC developed a transmission and distribution training plan along with a report outlining those training efforts, which were reviewed and approved by the COR. The training site was at the AMTEX Village location due to the need to ensure a 100 percent secure training location.

### 3.3 Subcontracts and Major Procurements

The final scope of work for this project was completed with the major procurements listed below. As part of the project management process, all filing and procurements used a four letter location code to designate the component/subcomponent. The code for Subcomponent 1.2 is "KCDE." A unique identifier was established for each subcontract for procurements. A KHPP location code was used if a subcontract was issued for either the camp or multiple Components .

- KCDE.12.7001 Distribution System Planning Study (cancelled due to lack of qualified bidders).
- KCDE.61.4204 Distribution Structures and Cross Arms (Table 2).
- KCDE.61.4306 Cross Arms and Support Braces with Bolt Assemblies (Table 2).
- KCDE.63.3603 Low Voltage Disconnect Panels (Table 1).
- KCDE.63.3804 20 kV/400 V 630 kVA Transformers (Table 1).
- KCDE.63.7025 Wire and Cable (Tables 2 and 3).

- KCDE.63.7025 Connectors (Table 2).
- KCDE.63.7041 20 kV Isolating Switches (Table 1).
- KCDE.63.7080 Insulators and Hardware (Table 2).
- KCDE.63.7081 Connectors (Table 2).
- KCDE.63.7082 Dies and Splices (Tables 2 and 3).
- KCDE.69.1001 Digger Derrick (Table 2, then cancelled per USAID).

The procurement information is included in **Attachment c-05**.

In addition to the above procurements, inspection services were performed by Bureau Veritas (Procurement Subcontract No. KHPP.12.2001). Multiple Components and Subcomponents used this subcontract. The inspection work for Structures and Cross Arms was performed using Task Order 12 for a value of [REDACTED].

BVSPC procured insulators from the local marketplace in order to expedite the work which had been delayed by shipping and customs delay. The insulators were found to have been procured from Iran upon inspection. BVSPC promptly provided a voluntary self-disclosure notification to the United States Department of the Treasury Office of Foreign Assets Control (OFAC) on 23 July 2013. The 256 insulators had a value of [REDACTED]. These insulators were retrieved from DABS. The 256 insulators were destroyed on 18 September 2013. The cost of these insulators, including retrieval from DABS, was solely incurred by BVSPC and not by USAID. OFAC was issued a Summary of Findings and a Request for Confidential Treatment and Certification on 25 October 2013. The KHPP Contracting Officer provided the final OFAC notification on 11 November 2013. OFAC issued a Cautionary Letter to BVSPC and considered this matter closed on 8 January 2014.

### 3.4 Budget and Expenditures

Per the Contract, the estimated cost and fixed fee values are established at the Component 1 level. The final costs of this subcomponent may vary; however, the sum of the final costs of all Component 1 subcomponents is limited to the total value of Component 1. A summary of the Subcomponent 1.2 estimated cost (revised as of Contract Modification 13) and costs billed through 15 August 2014 (as reflected in Invoice 106), is provided in Table 8 below.

**Table 8: Subcomponent 1.2 – Financial Summary**

Cost Report	Estimated Cost (Modification 13)	Costs Billed thru 15 August 2014 (with fee)	Remaining Budget
<b>TOTAL COST (Including Fee)</b>	[REDACTED]	[REDACTED]	[REDACTED]

### 3.5 Government Property Summary

All materials procured under Section 3.2 were transferred to DABS Kandahar. (**Attachment d-02**).

### 3.6 Final Schedule

The schedule challenges related to project execution and key events that impacted the schedule included:

- The lack of sufficient design detail of the MEW standards impacted the tendering process. The first tender based primarily on MEW standards received no bids. Additional drawings and specifications had to be developed and the tender reissued. The specification development and re-tendering delayed work for 6 months.
- The multiple Pakistan (PK) Port of Quetta closures, AF-PK border closures, and Pakistan trucker strikes impacted deliveries of all materials. Deliveries were delayed between 2 and 9 months.
- The lack of timely clearing of customs in Kandahar City delayed deliveries typically 3 to 5 weeks.
- DABS' provision of commodity items in support of construction (backfill, connectors, fuel, etc.) created daily and weekly delays on a location basis.
- Scope changes as a result of MEW procurements and USACE procurements.

The final project schedule is provided as **Attachment a-08**.

## 4 PROJECT PHYSICAL COMPLETION

### 4.1 Documentation of Completion

The project was complete with the provision of materials and services to DABS, 28 October 2013. DABS continued to replace deteriorated facilities with the materials provided by BVSPC. Refer to **Attachments m-01a** and **m-01b**, which provide the confirmation from USAID of completion based upon inspections by USAID's implementer EQUALS and submission of documentation related to the deliverables and tasks associated with this contract component.

### 4.2 Photo Album

A photo album is provided as **Attachment a-09**.

## 5 SUSTAINABILITY

Two key objectives for this Component were to: (a) develop maintenance program management capacity, and (b) improve the design and construction skills of DABS Kandahar. This two-prong approach increases the reliability of the distribution system and the effectiveness of the design and construction staff. BVSPC then provided materials, and DABS demonstrated its ability to plan, schedule, and upgrade the distribution system. A detailed training report is included as **Attachment d-07**.

In summary, the existing level of expertise of the DABS engineers and linemen was investigated to understand the knowledge baseline in order to develop effective training courses. The courses were then developed to build upon the current knowledge and skill level of the participants.

The course content for the engineers included electricity fundamentals, MEW design standards, work management fundamentals, and distribution planning fundamentals. The specific courses were as follows:

### **Contents of Training for Technical Staff - Engineers and DABS Managers**

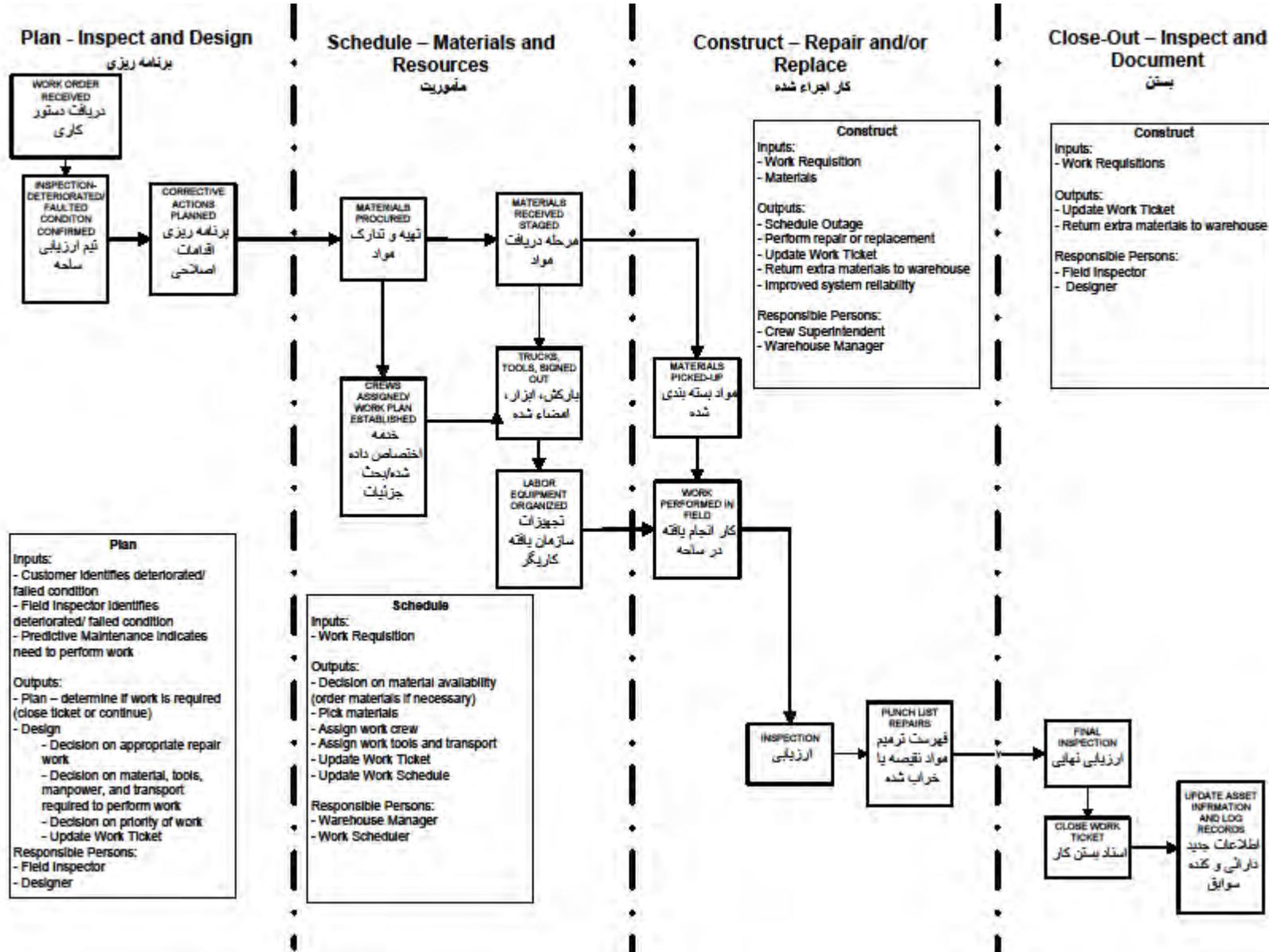
#### **1. Maintenance Program Management:**

- Identify the locations that require repairs - MV circuit, backbone portion.
- Coordinate and finalize field work requisition (design field repair requirements).
- Identifying key positions required to organize work (roles and responsibilities).
- Training steps to enable DABS to develop their own Work Requisitions.
- Identifying repair requirements using MEW Standards/Materials.
- Materials tracking/inventory.
- Understanding work requisitions/forms for construction documentation.
- Work Requisition closeout processing.
- Basic computer skills training and mapping familiarization.
- Work flow (identify the work, design and plan the work, schedule the work and order materials, construct the work, and quality check the work and the documentation).  
The corrective maintenance process work flow is illustrated on Figure 1 below.

#### **2. Overhead Distribution Line Design:**

- Introduction to overhead distribution lines.
- Insulators:
  - Insulator types.
  - Electrical rating of insulators.
  - Mechanical rating of insulators, characteristics of lightning.
- Conductors:
  - Electrical characteristics.
  - Mechanical characteristics.
- Conductors Sag and Tension:
  - Sag and tension theory.
  - Ruling span/sag.
  - Tension calculation.
- Cross Arm:
  - Design loads.
  - Conductors spacing.
  - Types of cross arms and application of cross arms.
- Pole/Structures:
  - Design loads.
  - Pole foundation.
  - Steel/concrete/lattice.
  - Types of poles.
- Guy Wires:
  - Calculation of forces.
  - Application pole bending moment.

Figure 1 - Corrective Maintenance Work Flow



- Connectors and RFI:
    - Radio frequency interference at HV, MV, LV.
  - Transformers:
    - Size of transformers.
    - Different types transformers.
  - Fault Analysis:
    - Fault types.
    - Fault calculations.
3. Distribution Planning Study, Load Forecasting and Transmission Line:
- Distribution System Planning:
    - What is distribution system planning?
    - General Purpose of Training.
    - Scope of Distribution system Planning.
    - Planning Procedure.
  - Electric Load Forecasting or Electric Demand Forecasting:
    - Spatial or geospatial load forecasting.
    - Small area forecasting.
    - Distribution load forecasting.
    - Transmission load forecasting.
    - Weather normalization.
  - Overhead Transmission Lines:
    - Overhead transmission line.
    - Classification of overhead transmission lines.
    - Transmission lines' important terms.
    - Class discussion.

Due to the limited education and reading level of the linemen, the courses were designed using visual aids and practical examples to enhance comprehension. Emphasis was placed on oral and visual learning techniques to facilitate knowledge transfer. Use of slide shows emphasizing visual concepts, and videos were used along with a dialog exchange including question-and-answer sessions to confirm the concepts were understood. These methodologies were used in both the classroom theoretical training and the practical and field training sessions

### **Contents of Training for Construction - Linemen and Construction Supervisors**

The training courses were presented in two parts, classroom theory and practical hands-on training.

#### **A. Classroom Theory**

1. Lineman Course 1- Safety Course:
  - Electrical Safety.
  - Fall Protection.
  - PPE and Lock Out/Tag Out (LOTO).
  - Confined Space Entry.
  - Slips, Trips, and Falls.
  - Machine Guarding.



- Power Portable Tools.
  - Welding Cutting and Brazing.
  - Excavation/Trenching and Flammable Liquids.
2. Linemen Course 2 - Theory Course:
- T-01 Basic Electrical Math (Basic Electricals Law Ohm's Law and Industrial Math).
  - T-02 Risk Assessment and JHA.
  - T-03 LOTO Procedures.
  - T-04 Electrical Troubleshooting Skills.
  - T-05 First Aid and Cardiopulmonary Resuscitation (CPR) Training.
  - T-06 DABS Specifications (MEW Standards & Chapter U and other required. specification of Contract of KHPP).

#### B. Practical Work Training

3. Linemen Course 3 - Practical Course:
- P-01 Risk Assessment.
  - P-02 Vehicles/Auxiliary.
  - P-03 Pole Top Rescue.
  - P-04 Pole/ Stay Excavation (Stay Angle/Terminal& Bisection Method) and Stay Assembly.
  - P-05 Conductor Stringing.
  - P-06 Cross Arms Change.
  - P-07 Replace Tension Insulators.
  - P-08 Mid-span Compression Joints.
  - P-09 Fuse Insulator Switch Transformer.
  - P-10 Polarity Testing and Phase Rotation (the only lesson unable to complete).
4. Lineman Course 4 - On-the-Job Training:
- Specialist Tools.
  - Pole Setting/Erection.
  - Pulling Line/Sag.
  - Inspection/Maintenance.
  - Inventory Receiving/Warranty (this Lesson unable to complete).
  - Reporting/Recordkeeping.
  - Tool Management.
  - Corrective Maintenance Procedures.

For the technical manager training, twenty-five (25) days of intensive training was provided and six persons participated, five DABS and one BVSPC. For linesman training, twenty (20) days of intensive training was provided and twenty-six (26) linemen of various skill levels participated. The Lineman Construction Manager also attended many of the technical training sessions.

Participants brought questions to class throughout the training and construction. Quality control personnel provided feedback to the instructors. Both of these inputs resulted in returning to the subject during the next class session. The DABS leader used BVSPC materials to present the course content when DABS supervisors and managers demonstrated

competence to emphasize their leadership responsibilities and skills. All training sessions were very interactive, with trainers and technical specialists each monitoring student participation and progress. All training sessions used learning objectives and handouts, and were videotaped. Due to the file storage size of the videotaped training sessions, the video was hand delivered to USAID on an external hard drive on 28 October 2013, and is not included as an attachment with this Closeout Report.

Training courses, attendance sheets, and video data was transmitted to USAID using a dedicated hard drive. The training plan and summary are included in **Attachment d-03** and the acceptance of this work is included in **Attachment b-06(a.)**. With the visibility of the work and the outcome of the work to its customers, DABS technical and construction staff quickly recognized the system improvements they were making by using proven design, construction, and safety skills was benefitting the community by providing an increasingly fully functional and reliable electric system.

## 6 SECURITY PLAN AND INCIDENT REPORTS

BVSPC operated under a project-wide Security Plan which covers the activities associated with Subcomponent 1.2, since activities took place at multiple locations. No major security incidents were associated with activities conducted under Subcomponent 1.2. The scope of work required to be performed by DABS was throughout the entire geographical area of the city for Subcomponent 1.2. The BVSCP Security Plan required the local Afghan Staff to perform the preview inspection to identify the work to be performed (design) and post inspection work (construction quality control). The local staff was also required to be protected by the Afghanistan Public Protection Force (APPF). This pre- and post inspection work was occasionally deferred due to lack of resources as a result of APPF staff limitations. All inspections were impacted by security lockdowns or no-movement days. A local staff of limited design and construction knowledge resulted in required frequent site inspections and varying quality of the inspections. BVSPC staff worked diligently using photographs and video to supplement the inspection process and train its own staff.

## 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 during the implementation of Subcomponent 1.2.

## 8 QUALITY CONTROL PROGRAM/PLAN

BVSPC operated under a project-wide Quality Control Plan (**Attachment a-05**). The implementation of a QC program was the responsibility of the KHPP professionals engaged in training and monitoring the DABS installation work. KHPP professionals provided oversight and guidance.

In addition to QC of onsite oversight of DABS construction activities, the assessment program included a thorough inspection of materials received and of the completed work sites as DABS work progressed.

## 9 ENVIRONMENTAL CONTROL

The activities executed under this contract component were governed by KHPP's overall Environmental Plan (**Attachment a-14**). All reasonable environmental protective measures were taken in the procurement and delivery of the requested equipment.

## 10 STATEMENT OF PATENTS, ROYALTIES OR CLASSIFIED MATERIALS

No patents, royalties or classified materials were obtained or generated during the execution of this contract Subcomponent.

## 11 VALUE ENGINEERING CHANGES (IF APPLICABLE)

Three value engineering opportunities were enacted:

1. The original scope of work requested four types of structures: wood poles, concrete poles, lattice poles, and tubular poles. To minimize the number of structure types in the DABS system and decrease the number of accessories required to be bought and warehoused for each type of structure, BVSPC recommended to USAID that only two types of structures be used. Steel structures were recommended due to the soil conditions and the availability of materials.
2. Structures and cross arms were procured from the same vendor to ensure all hardware alignment and fittings were designed as an integral assembly. This strategy ensured the assemblies were designed, manufactured, and factory tested to ensure an integral fit of all components.
3. During the bidding process, suppliers were requested to consider providing a proven design for their structure/cross arm submittal and, as part of this submittal, to clearly identify variances from the requested design requirements. This approach resulted in a lower cost structure, as costs for detailed design and testing of new structures were not required. This approach also decreased the lead time for the structures as this design and testing work was avoided.

## 12 ENHANCING BEST PRACTICES (LESSONS LEARNED)

Table 9 below lists some considerations to enhance best practices resulting from the implementation of Subcomponent 1.2:

**Table 9: Subcomponent 1.2 – Considerations from Implementation**

Observation	Lesson	Recommendation
Marketplace buying policies need to be clear, and training provided on a regular basis to prevent inadvertent purchasing of materials manufactured in unauthorized countries.	The authorized source of procurement for this Contract is geographic Code 935.	Provide regular training to procurement, construction, and logistics staff, including local national staff, on the acceptable countries from which goods may be procured or manufactured.
Government organizations working with a common AF agency did not utilize common design standards.	While the opportunity existed to supplement each other's short term material needs, the difference in engineering standards did not allow the sharing to occur.	In the planning phase of project, identify stakeholders and seek opportunities for synergies, particularly for materials, logistics, and training.
Skill sets of trainees varied significantly, including week-to-week as different persons attended the training.	Technical staff often requires training in identifying skill sets of trainees.	For technical staff, provide information and training on how adults learn and how to assess a student's understanding of information.
	Visual aids work for all skill sets; additional effort in identifying atypical visual aids was valuable.	For each lesson, trainers and technical staff need to "practice" presenting the information. The practice sessions would allow the the presenters to evaluate the effectiveness of their teaching tools, particularly visual aids.

### 13 WARRANTY

The warranty is limited to covering the failure of the manufactured materials provided to DABS for the purpose of rebuilding and/or replacing various components of the existing Kandahar City medium voltage distribution system. The warranty is limited to coverage of defects due to poorly-manufactured equipment, and does not cover the following conditions:

- Damages sustained due to improperly handled, transported, or stored materials.
- Damages sustained due to improperly installed materials.
- Acts of God or acts of war that result in damages to materials.

These manufactured materials are covered for the period of 1 year, effective the date of equipment transfer and acceptance by DABS. The last and final transfer of MV equipment occurred on 22 October 2013 as indicated in **Attachment d-02**. The effective dates for the warranty period are:

Commencing on: 22 October 2013  
Ending on: 21 October 2014

## 14 OUTSTANDING ISSUES

BVSPC is in progress of closing out all procurement contracts executed during the course of Subcomponent 1.2.

## 15 CONCLUSION: IMPACT ASSESSMENT

Subcomponent 1.2 developed and implemented a corrective maintenance program for the local utility. This program included developing the utility management skills capacity, as well as correcting deteriorated facilities. By implementing both process and actual work, DABS not only gained a more reliable system, but obtained key sustainable management skills which can then be applied to other utility asset management systems.

The development and management of the corrective maintenance program and the performance of replacement facilities had two components which impacted DABS and the community: (1) urgent upgrades including the replacement of overloaded transformers and the re-use of the replaced transformers to add customers, and (2) the replacement of deteriorated facilities. The impacts of each component are detailed as outlined below. The Performance Monitoring Plan for KHPP provides the metrics indicating the impact of the implementation of the corrective maintenance program. (See **Attachment a-12.**)

1. For the urgent upgrade, the impact of USAID providing these transformers and DABS installing the materials include:
  - ✓ DABS identified the locations of overloaded facilities.
  - ✓ DABS obtained the additional hardware materials required for the installation.
  - ✓ DABS planned the work, including the safe pickup and transport of the transformers and switches.
  - ✓ DABS scheduled the outages and performed the work.
  - ✓ 4,804 customers are now served by normally loaded transformers.
  - ✓ Potential outages due to failed components impacting **33,628** customers were avoided.
  
2. For the replacement of deteriorated facilities, DABS focused their efforts on Feeders 513/514, 513, and 514. By completing this replacement work, the following items were realized:
  - ✓ Feeder 513/514 is estimated to have a 94.1% decrease in distribution line failures.
  - ✓ Feeder 513 is estimated to have a 45.8% decrease in distribution line failures.
  - ✓ Feeder 514 is estimated to have a 12.9% decrease in distribution line failures.
  - ✓ An overall 25.3% decrease in line failures on the 20 kV backbone system.

"Line failures" refer only to the equipment or material failures on the feeder itself while the feeder may experience multiple trips per day. Many of these trips are due to downstream causes, e.g., service drop failures, customer caused failures, rotating and outages. With the multiple causes of outages and, DABS not tracking the causes of the outages, a direct reduction in overall outages impacting each person could not be calculated.

For Feeder 514, DABS was rebuilding the existing line in a new location; the downstream customers will not see improvements until a completely sectionalized section of line is

complete. At the rate the work was proceeding, the relocation work would be complete in 2013. Assuming sectionalizing capability, Feeder 514 is estimated to have a 13 percent decrease in failures and, when complete, an 82 percent decrease in failures, resulting in a 41 percent overall system decrease in failures during the work completed as part of KHPP.

For the reliability calculation, since the repairs were completed on the backbone section of the feeder, B&V assumed an outage impacts all connections and people served (all downstream services). Overall, **58,982 persons** received improvements in the quality of their electric service which, in turn, improved the quality of their lives and assisted in achieving COIN impacts.

The activities executed under Subcomponent 1.2 not only provided DABS improvement in a utility core competency (the successful management of a corrective maintenance program), but the notable visibility of the system improvements to the. With DABS utilizing new equipment, new uniforms, and new construction throughout the City, the community itself increases its civic pride, thus creating improvements in their daily lives. USAID's direction for this Subcomponent achieved its objective in improving the lives of many people in Kandahar by this and other related Components within the Prime Contract.

## **16 DEVELOPMENT EXPERIENCE CLEARINGHOUSE (DEC)**

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

- a. Transmission Plan for Kandahar
- b. Distribution Planning Study
- c. Subcomponent 1.2 Closeout Report