November 13, 2010

Scope of Work (SOW)

Jalalabad Electric Power Distribution

PURPOSE

A reliable commercial electric power distribution system in Nangarhar province to fuel economic growth is an important objective of the Government of Afghanistan (GIRoA). Nangarhar, with 1.33-million people, is the third most populous province of Afghanistan[1]. Its capital city, Jalalabad, with 183,000 people[2], is a population, education, healthcare, manufacturing, and transportation center. Population and economic activity is expected to grow vigorously if unconstrained by commercial electric power supply.

BACKGROUND

Current Physical Conditions

Da Afghanistan Breshna Sherkat in Nangarhar (DABS-Nangarhar) is the public utility in Nangarhar, Laghman, Kunar, and Nuristan provinces. Their sole generating asset is the Darunta Hydro-Power Plant which was designed for three (3) 3.8-MW units. Two (2) units are currently operating[3].

DABS-Nangarhar currently operates at medium voltage[4]:

1) Darunta Station[5] which steps the power produced there from 6-kV up to 35-kV
2) The 6-kV distribution system near Darunta
3) The 40-km long, 35-kV transmission line from Darunta
4) Three (3) other primary unit substations at Jalalabad[6], Ghowchak[7], and the Olive Factory[8]
5) 6-kV distribution lines from the primary substations.

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[1] Population of Nangarhar from *USAID Nangarhar Energy Assessment Project (NEAP), Infrastructure and Rehabilitation Program (IRP), Draft Report, 26 April 2009, USAID Contract No. 306-1-00-06-00517-00*, prepared by LBG/B&V quoting CSO, page 8.
[2] NEAP, page 8.
[3] From *Islamic Republic of Afghanistan – Ministry of Energy and Water, Design and Supervision of the Rehabilitation and Expansion of Urban Distribution Networks, Project No: 57406, Contract No: MEW/257/Con1, Preliminary Survey, Design and Estimation of Electricity Network Development Costs, Jalalabad City*, SMEC International Pty Ltd, Project Office Kabul, July 2006, Revision R0, page 2.
[4] SMEC, page 2.
[5] Darunta Station, 2 x 7.5-MVA, 6/35-kV; 34°, 29’ 04.35”N, 70°, 21’ 47.87E.
[6] Jalalabad Station, 2 x 4-MVA, 35/6-kV; near 34.42857°N, 70.45375°E.
[7] Ghowchak Station, 5.6-MVA 35/6-kV; 34.41713N 70.40159E.
[8] Olive Factory Station, a 1.8-MVA and a 1.6-MVA 35/6-kV; N, E.

DABS-Nangarhar customers are primarily in the city of Jalalabad. DABS-Nangarhar has approximately 11,275 customer service connections: 82% residential, 13% commercial, 2% industrial, and 3% government[9]. DABS-Nangarhar is only supplying power to residential and commercial customers for 4 hours every 3 days during peak hours (6:00PM -10:00PM). The government and industrial customers are supplied with power 24 hours a day, 7 days a week[10].

See Table 1, below, for a summary of the 6-kV radial feeders serving customer loads with 6/0.4-kV distribution transformers. Each transformer is rated between 100-kVA and 1,200-kVA[11].

Table 1

Station	Feeder	Substations/ Transformers	Total Transformer kVA
Jalalabad	F2	8 / 14	4,430
Jalalabad	F3	27 / 30	7,890
Jalalabad	F11	18 / 26	6,430
Jalalabad	F12	10 / 12	3,210
Subtotal		62 / 82	22,360
Darunta	Darunta	7 / 8	1,640
Ghowchak	Town	12 / 14	2,790
Olive Factory	N-J	27 / 26	2,900
Olive Factory	F-Hada	9 / 10	2,370
Subtotal		36 / 36	5,270
Total[12]		117 / 140	32,060

Due to wear and compatibility with proposed national standards[13], all 6-kV feeders and 6/0.4-kV distribution transformers will eventually need to be replaced when the new Jalalabad Station with transformation from 110/20-kV is operational.

Customer service connections in Jalalabad are reported to be in very poor condition[14].

[9] NEAP Table 6.1, page 29.
[10] NEAP, page 29.
[11] SMEC, Annex 2, 'List of Distribution Transformers in Jalalabad', pages A2-1 through A2-3.
[12] Not all subtotals add up precisely.
[13] DABS is advocating 20-kV as the national standard distribution voltage. Citation needed.
[14] SMEC, page 3, "The LV system is 0.4kV, 3 phase and neutral. It is totally an overhead bare conductor network. This network also needs extensive rehabilitation. Service connections do not comply with any

Current Financial Conditions

The current tariff for electric power is based solely on energy consumed. There is no time-of-day metering, no demand metering, and no reactive power metering. Rates are Af10/kWH ($0.20/kWH[15]) for Government, Holy Places, Shops, Unregistered Factories, and NGOs; Af6/kWH ($0.12/kWH) for Registered Factories; and for Households the first 300-kWH per billing cycle costs Af1.5/kWH ($0.03/kWH), the next 400-kWH cost Af4.0/kWH ($0.08/kWH) and additional usage costs Af6.0/kWH ($0.12/kWH). Billing cycles are two months long[16].

Based on DABS-Nangarhar billing data for April through November 2008 in Jalalabad, the average residential customers consumed 1,171-kWH; the average commercial customer consumed 1,952-kWH; and the average government and industrial customer consumed 53,194-kWH[17].

See Table 2, below, for the April through November 2008 billing cycles in Jalalabad, effective billing rates based on meter readings.

Table 2

Customer Class	Existing Customers[18]	8 months Billed[19]	8 months kWH metered[20]	Effective billing rate
residential	8,699	$464,646	7,405,152	$0.063/kWH
commercial	983	$371,546	2,300,239	$0.162/kWH
government	231	$3,995,253	19,401,365	$0.206/kWH
Industries	234			
overall	10,145	$4,831,445	29,106,756	$0.166/kWH

Also during this billing cycle, $4,831,445 was billed but only $1,017,106 was paid. This wide discrepancy is due almost completely to non-payment from government customers. Approximately 90% of residential and commercial customers paid their bills while only 6.2% of government customer bills were collected[21]. The collected rate was only $0.035/kWH[22].

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acceptable standard and the material used for construction is not suitable for the purpose. Total rehabilitation is necessary service connections also."

[15] The current exchange rate is slightly fewer Afghani than Af50=$1.00. Rough cost equivalents are used throughout.

[16] AEIC website, "The Tariff of DABM for the year 1387".

[17] NEAP, Table 6.2, page 30.

[18] SMEC, Table 2.3, page 3.

[19] NEAP, Table 7.2, page 38.

[20] NEAP, Table 7.2, page 38.

[21] NEAP, Table 7.2, page 38. Government customers accounted for $3,746,059 of the total of $3,814,339 of the unpaid bills.

[22] NEAP, Table 7.2, page 38, $1,017,106 collected for 29,106,756-kWH metered total.

The total power generated at the Darunta Hydro-Power Plant was 35,582-MWH during the same period[23]. Therefore, approximately 6,476-MWh or 18.2% of the generated electricity was not accounted for and reported as technical losses.

DABS-Nangarhar has been generating electric power for customers from Darunta for a cost of $0.03 per kWH[24]. Given the 18.2% technical losses determined above, the delivery cost would therefore be $0.037/kWH[25]. Within the timeframe cited above, the 35,582-MWH generated at Darunta would have cost DABS-Nangarhar $1,067,460 as compared to the $1,017,106 in revenues received. Thus, DABS-Nangarhar was operating at a 5% loss during this period.

These are not DABS-Nangarhar's only losses. Deferred maintenance has been accumulating for decades. Capital costs, renewal costs, and capital stock have been neglected. Service has not been expanding to new customers, new connections or new geographic communities. Customer connections are in disrepair. The 35-kV transmission line is also in disrepair. The actual cost of service is substantially above the revenues collected and needs to be much closer to the effective billing rates for DABS-Nangarhar to be economically sustainable.

DABS-Nangarhar has 325 employees including mechanics, electricians, professionals, technical labor, administrative, and services[26].

Near Term Plans by Others

1) Asian Development Bank (ADB)

A 60-km long, 110-kV electrical transmission line from Naghlu Station[27] to a new Jalalabad Station[28] is being funded by the Asian Development Bank (ADB)[29]. The 110-kV circuit will double back part way (36-km) and then spur off to serve a new Mehtarlam Station[30] in Laghman province. Only a single circuit line is planned except for the section where the line doubles back on itself.

A 16-MVA 110/20-kV transformer is planned at new Jalalabad Station[31]. A 4-MVA 110/20-kV transformer is planned at Mehtarlam Station[32]. Each station has a second, unoccupied transformer bay ready for a future primary transformer[33].

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[23] NEAP, page 39.
[24] *Nangarhar Electric Expansion Initiative Case Study*, undated.
[25] $0.03/kWH/(1-18.2%) = $0.03/kWH/(.818) = $.0366/kWH.
[26] NEAP Table 7.1, "2009 DABM Staff", page 36
[27] Naghlu Station near reservoir at 34°, 39' 27.79N, 69°, 43' 01.17"E.
[28] New Jalalabad Station, 34.40611°N, 70.41298°E
[29] Get project description from ADB.
[30] The total circuit length is 36-km. Mehtarlam Station (Mihtarlam) 34°, 38' 46.33N, 70°, 11' 12.90".
[31] MEW Drawing No. 2864628-JLB1, Rev. 2, Jalalabad Substation, 110/20 kV Single Line Diagram.
[32] MEW Drawing No. 2864628-MHT1, Rev. 2, Mehtarlam Substation, 110/20 kV Single Line Diagram. There are reports, based on conversations, that this transformer is expected to be replaced with a 16-MVA unit.

These lines will connect DABS-Nangarhar and the existing DABS-Nangarhar electric power transmission and distribution systems to the North East Power System[34] (NEPS) power grid. The grid operation is controlled by the DABS dispatch center at Tarakhil. This portion of the NEPS grid consists of the hydro power plants east of Kabul and the Tarakhil thermal power station. It is not currently synchronized to the NEPS import power line from Uzbekistan.

The 110-kV work is scheduled for completion in March 2011. This date is not firm and is expected to slip to August 2011[35].

Electric power delivered by the NEPS grid to DABS-Nangarhar is expected to cost at least $0.06 per kWH.

ADB is also planning to install a short segment of 20-kV distribution line and distribution to new customers in Jalalabad. Five (5) 100-kVA and two (2) 160-kVA 20/0.4-kV distribution transformers are in their scope of work[36]. 8,200 new households are expected to be served[37].

2) USAID

USAID is funding the rehabilitation of all three 3.8-MW, 6-kV generating units at Darunta. It is expected for all three units to be completed by the end of 2010. This will restore the Darunta Hydro-electric plant capacity up to 11-MVA.

OBJECTIVE

DABS-Nangarhar should become a sustainable provincial operating unit of DABS capable of providing high quality electric power service to meet the demand in Nangarhar province and particularly in its capital, Jalalabad. Sufficient revenue should be generated to operate the system, deliver a reliable supply of power to all customers, adequately maintain the system and provide for capital improvements that add customers. The DABS-Nangarhar operating unit should be able to demonstrate a return on investment that will enable and encourage further investment.

It is intended to have the capability within this work to have DABS perform as much of the installation work as they are capable of doing with USAID providing the equipment, materials, including specifications and procurement then free issue to DABS, and provide QA on DABS installation work. USAID must provide

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[33] The second transformer bay at Jalalabad may be used for a 40-MVA transformer, funded by USACE, as early as fiscal year 2011.
[34] NEPS is the electric power grid operated by DABS in the northern and eastern regions of Afghanistan.
[35] The delayed completion date was quoted by the DABS Regional Manager, Engineer Redigul Paiman, to USAID, Dick Dumford, in September 2010.
[36] E-mail from KSN Murthy, Sr. Manager – Projects, KEC International Ltd., Kabul to Marc Laderman, OIEE AESP, 27 March 2010.
[37] Per MEW 337, Lot 1 published in *Energy Sector Status Report, April-June 2010, Revision 1.*

oversight to confirm that equipment and materials are applied to the work by DABS and not diverted.

PROPOSED MID-TERM PLANS

1) Customer Connections
   a. Replace Existing Customer Connections
   b. New Customer Connections
2) DABS-Nangarhar Commercial Viability
   a. Commercialization
   b. Jalalabad Dispatch Center
3) Synchronize Darunta HPP to NEPS
   a. Maintain the 35-kV Darunta Line until all 6-kv feeders have been replaced
   b. Darunta Station and Line Integration into NEPS

1) CUSTOMER CONNECTIONS

At first, after the 110-kV transmission line from Naghlu and the new 110/20-kV Jalalabad and Mehtarlam Stations are completed, they will not have any load unless outgoing complimentary service-voltage feeder and distribution systems are replaced or new feeders and corresponding new customers are added. Maintaining service to customers in Jalalabad is a priority.

6-kV feeders are desired to be phased out of operation once the new Jalalabad Station is operational. Afghanistan is attempting to move most of its distribution to 20-kV.

The new Jalalabad 110/20-kV Station can accept load as soon as it is operational. The feeder preparation work can begin immediately and be ready to receive power from the NEPS grid through the new stations as soon as the station is energized.

8,200 new household connections are being provided by ADB as described above. All existing customer connections will also eventually have to be replaced as part of this scope of work.

a. Replace Existing Customer Connections

Scope of Work: Customer connections will be replaced first to bring these connections up to safe, good and orderly condition once the feeder voltage is increased. 6-kV feeder replacement should proceed in the following order; Jalalabad first, heaviest load first, and then work its way back out to Darunta. This would result in the following sequence; F3 first, F11, F2, F12, NJ, F-Hada, Town and finally Darunta (see Table 1).

Feeder F3, being first, should be ready to be replaced with a 20-kV feeder soon after the 110-kV Jalalabad Station is operational; that is by January 2011. It currently has thirty (30) distribution transformers in twenty-seven (27) locations.

Other feeders will be replaced sequentially until all 6-kV feeders have been replaced with 20-kV feeders. Per a planned schedule to be provided by the contractor, feeder by feeder, additional 6-kV feeders will be replaced with 20-kV feeders and all the 6/0.4-kV distribution transformers on that feeder will be replaced with 20/0.4-kV distribution transformers.

Specific tasks:

It is expected that new 20-kV feeders will be run parallel to the existing 6-kV feeders keeping the 6-kV feeders in operation during the transition. Discussions with DABS Nangarhar indicate that a two phase methodology is recommended to change over the existing customers from being fed with 6/0.4-kV transformers to new 20/0.4-kV transformers as follows:

Every other (alternate) transformer substation should be targeted in the first phase of work:

1) Customer connection will be temporarily moved to the 6/0.4-kV transformer stations not being replaced.
2) The first group of transformer substations will be replaced with 20/0.4-kV transformer substations.
3) All customer connections will be brought to the new 20/0.4-kV transformer stations.

After this phase is complete, the second phase of work can begin:

4) The remaining 6/0.4-kV transformer substations will be replaced with 20/0.4-kV transformer substations.
5) Customer connections can be redistributed to all of the transformer stations as desired. Additional land easements and rights-of-way, if necessary, will have to be negotiated.

Deliverables:

- Project Management and Coordination: Provide management of the project team. Attend meetings and reviews. Provide updates and communications to USAID. Coordinate with other consultants and USAID. Respond to USAID comments and revisions.
- Pre-Design Support Services: Prepare and confirm base line information supplied by others and determined through field investigation. This information will form the basis for subsequent analysis, documents, exhibits and reports. Field verify existing

conditions. Prepare a base map in AutoCAD or similar format of the site area with the field data collected and the design information provided.

- Construction Documents. Provide general, civil, structural and electrical drawings and specifications. Drawings will be to USAID format. Specifications will be based on UFGS series. Provide a Bill of Quantity (BOQ) and a cost estimate for all specified work.
- Construction Support Services: A senior engineer will attend weekly construction meetings in person or by video conference during the period of construction. The engineer will provide quality assurance by: 1) Answering questions, RFIs from contractors by phone or e-mail. Providing insight. 2) Reviewing product submittals and shop drawings. 3) Initiating field change orders. 4) Performing periodic site inspections. 5) Participating in the construction walk-through at each point of substantial completion. 6) Reviewing all as-built drawings prepared by the contractor.

Period of Performance; Performance Schedule:

Work will begin as soon as a notice to proceed (NTP) is issued by USAID. The phased design for replacing Feeder F3 is due within 180-days after the NTP. Other feeders will be replaced as agreed with USAID depending on funding availability.

b. New Customer Connections

Scope of Work: Design for 20-kV feeders to 1) portions of Jalalabad, 2) Rodat industrial park[38], and 3) areas between Jalalabad to the east toward Rodat. Design 20/0.4-kV transformer stations, metering and connections to customer in these areas heretofore not served by commercial electric power. Approximately 30,000 customer connections are expected. Add a new 40-MVA 110/20-kV primary substation transformer to Jalalabad Substation[39].

Specific locations targeted for new customers:

1. Afghani Mina which is located northwest of the first zone of the municipality of Jalalabad.

2. Khowchak zone and Surkhroad district. Which is an agricultural district located 6-km from Khowchak substation. Villages in this area are Charbagh Dipalow, Amirkhile, Mastikhile, Sultan Porsafly, Sultan Poralia and Bawali.

[38] I think Rodat industrial park is near 34.29N, 70.70E.
[39] The 40-MVA transformer may be provided by the USACE. The contractor shall quote an alternate 16-MVA transformer as an option.

3. Shikh Mesry industrial park.

4. Nagemullajamad in zone six of the City of Jalalabad.

5. Khowsh Gonbad agricultural area located opposite the Jalalabad airport.

6. Behasood region in the northern portion of the City of Jalalabad.

Specific tasks: Proposed design:

1. The anticipated load at these municipalities to be served will be assessed.
2. The schematic design phase will identify the 20-kV feeder routing and the location of proposed distribution substations. Substation locations will be based on customer cluster service lengths. Right of way and land acquisition requirements will be established.
3. After all right of way and land acquisition questions have been resolved, the design development will establish anticipated loads at each substation, materials and methods.
4. Customer services will be designed by DABS-Nangarhar or the appropriate local utility engineering staff after applications for service from customers are received.

Deliverables:

- Project Management and Coordination: Provide management of the project team. Attend design meetings and reviews. Provide updates and communications to USAID. Coordinate with other consultants and USAID. Respond to USAID comments and revisions.
- Pre-Design Support Services: Prepare and confirm base line information supplied by others and determined through field investigation. This information will form the basis for subsequent analysis, documents, exhibits and reports. Field verify existing conditions. Prepare a base map in AutoCAD or similar format of the site area with the field data collected and the design information provided.
- Construction Documents. Provide general, civil, structural, and electrical drawings and specifications. Drawings will be to USAID format. Specifications will be based on UFGS series. Provide a Bill of Quantity (BOQ) and a cost estimate for all specified work.
- Construction Support Services: A senior engineer will attend weekly construction meetings in person or by video conference during the period of construction. The engineer will provide quality assurance by: 1) Answering questions, RFIs from contractors by phone or e-mail. Providing insight. 2) Reviewing product submittals and shop drawings. 3) Initiating field change orders. 4) Performing periodic site inspections.

Participating in the construction walk-through at each point of substantial completion. 6) Reviewing all as-built drawings prepared by the contractor.

Period of Performance; Performance Schedule:

Work will begin as soon as a notice to proceed (NTP) is issued by USAID. Construction documents are due 180-days after NTP.

2) DABS-NANGARHAR COMMERCIAL VIABILITY

Concurrent with the import of NEPS power via the new 110-kV transmission line, DABS-Nangarhar needs to establish a more viable commercial operation. This work is represented in two tasks; Commercialization and a Jalalabad Dispatch Center.

The ability of DABS-Nangarhar to pay for this imported power, at rates higher than the cost of power locally generated, is questionable given their current receipts. Subsidizing DABS-Nangarhar operations have not been considered as an option.

A Commercialization team needs to be in place as soon as DABS-Nangarhar begins purchasing wholesale power from NEPS. There is a need to inspire confidence in the financial stewardship of DABS-Nangarhar. Commercialization will include the following:

1. Management advice
2. Customer enumeration and regularization of unregistered and illegal customers
3. Information technology (IT) system installation that will provide standard electric utility information systems and hardware for technical, administrative, financial and commercial operations
4. A metering program including procurement and installation
5. Identification of technical losses leading toward their reduction
6. Revenue improvements including reduction of commercial losses and improved collections
7. Human resource systems to train personnel, create procedures, systems, and methods.

The Jalalabad Dispatch Center will be the business and operation center where:

1. The system is monitored
2. Direction is given to bring feeders and other equipment in and out of service
3. Orders for energy production at Darunta are made
4. Wholesale power purchases from NEPS are made.

a. Commercialization

Scope of Work: Assist DABS-Nangarhar with improving electric power delivery service to their customers and reduce the need for donor and government subsidies for capital projects. Eventually, DABS-Nangarhar is expected to become self-sustaining both in terms of operating revenue and in terms of funding improvements and repairs to the system it operates.

Program focus will cover the three main areas of 1) Revenue Management (financial focus), 2) Electricity Delivery (technical focus) and 3) Utility Management.

Specific tasks:

1. Provide management advice to DABS-Nangarhar and Da Afghanistan Breshna Sherkat (DABS). A management team member will be employed at DABS-Nangarhar during all normal business hours.
2. Complete enumeration of customers and regularization of unregistered and illegal customers. An account and financial advisor will be employed at DABS-Nangarhar during all normal business hours.
3. Reduce commercial and technical losses, and improve collection efficiency in DABS-Nangarhar. A commercial and revenue advisor will be employed at DABS-Nangarhar during all normal business hours.
4. Design and implement a DABS-Nangarhar metering program, including procurement and installation, and make operational of bulk, zonal and customer meters. An electrical delivery advisor will be employed at DABS-Nangarhar during all normal business hours.
5. Design, install and make operational commercial and technical information technology systems, including a loss reduction and commercial performance management system. An information technology advisor will be employed at DABS-Nangarhar during all normal business hours.
6. Design new human resource systems, train staff in new work procedures, systems and methods, and establish and provide technical assistance and training for supervisory systems related to loss reduction and commercialization for DABS-Nangarhar staff for the contract period. A human resources advisor will be employed at DABS-Nangarhar during all normal business hours.

Deliverables:

- Project Management and Coordination: Provide management of the project team. Attend meetings and reviews. Provide updates and

communications to USAID. Coordinate with other consultants and USAID. Respond to USAID comments and revisions.

- Support Services: Prepare and confirm base line information supplied by others and determined through field investigation. This information will form the basis for subsequent analysis, documents, exhibits, and reports. Field verify existing conditions. Prepare a base map in AutoCAD or similar format of the site area with the field data collected and the design information provided.
- Assessment Reports: Prepare regular reports with recommendations. Meet with USAID in Kabul and in Jalalabad to discuss the reports.

Period of Performance; Performance Schedule:

Work will begin as soon as a notice to proceed (NTP) is issued by USAID. The management team will be in place within 90-days after the NTP. The management team will remain in place for two years.

b. Jalalabad Dispatch Center

Scope of Work: Once the new Jalalabad Station is in operation, DABS-Nangarhar will have access to a much larger pool of power. It will be necessary to effectively control the amount and cost of power dispatched to Nangarhar and within the system.

Feeders will be put in and out of service by direction of the director of the electrical dispatch center.

Specific tasks: Design of the dispatch center facility:

1. The control room at the new Jalalabad Station will be fit up as an electrical dispatch center. Tenant fit-out design will be fully completed.
2. The DABS-Nangarhar system will be fully modeled and the mimic diagrams will be graphically drawn on walls and displayed on monitors in the dispatch room. SCADA or equivalent data collection protocols will be designed and built into the DABS-Nangarhar system to effectively monitor, in real time, the system status and condition. Provisions for future SCADA connections to remote sites will be provided.
3. Personnel will be trained to operate all aspects of the electrical dispatch center including purchasing, monitoring, controlling, and directing maintenance and field personnel.
4. The DABS-Nangarhar Jalalabad electrical dispatch facility will communicate with DABS-Nangarhar Darunta dispatch facility and the DABS-NEPS system controller and other. Provide communications equipment at each location.

Deliverables:

- Project Management and Coordination: Provide management of the project team. Attend design meetings and reviews. Provide updates and communications to USAID. Coordinate with other consultants and USAID. Respond to USAID comments and revisions.
- Pre-Design Support Services: Prepare and confirm base line information supplied by others and determined through field investigation. This information will form the basis for subsequent analysis, documents, exhibits, and reports. Field verify existing conditions. Prepare a base map in AutoCAD or similar format of the site area with the field data collected and the design information provided.
- Construction Documents: Provide general, civil, structural, and electrical drawings and specifications. Drawings will be to USAID format. Specifications will be based on UFGS series. Provide a Bill of Quantity (BOQ) and a cost estimate for all specified work.
- Construction Support Services: A senior engineer will attend weekly construction meetings in person or by video conference during the period of construction. The engineer will provide quality assurance by: 1) Answering questions, RFIs from contractors by phone or e-mail. Providing insight. 2) Reviewing product submittals and shop drawings. 3) Initiating field change orders. 4) Performing periodic site inspections. Participating in the construction walk-through at each point of substantial completion. 6) Reviewing all as-built drawings prepared by the contractor.
- Training: Provide a trainer at the dispatch center for 90 days to ensure proper understanding and operation of the facility by DABS-Nangarhar personnel.

Period of Performance; Performance Schedule:

Work will begin as soon as a notice to proceed (NTP) is issued by USAID. Construction documents are due 90-days after NTP.

3) Synchronize Darunta HPP to NEPS

There are no immediate plans to synchronize the existing DABS-Nangarhar system to the incoming NEPS grid. The two systems will probably not be connected until after all distribution work has been changed from 6-kV to 20-kV. This could be up to five years in the future or by end of 2015.

When synchronized to the NEPS system, the Darunta transmission line can be downgraded from 35-kV to 20-kV. At 20-kV, the 11-MVA generated would only require the conductors to carry 318-A per phase, and some of the power

generated at Darunta HPP would actually not even be transmitted as it is consumed locally or at the intermediate points between Darunta and Jalalabad.

a. Maintain the 35-kV Darunta Line until all 6-kV feeders have been replaced

Scope of Work: An immediate assessment is needed to identify emergency repairs. The towers are reported to be in fair condition while the conductors are known to be in poor condition with many splices in them. Replacing towers or conductors should not result in prolonged power outages to the city of Jalalabad. Schemes to reduce the frequency and duration of any outages and to confine them to times of limited use such as between 11:00PM and 5:00AM should be considered.

Explore the possibility of using the ADB 110-kV transmission line, after it is strung with conductors, but before it is energized, as an alternate line to carry the 35-kV during emergency repairs. Explore the possibility of using a new 20-kV distribution line, after it is strung with conductors, but before it is energized, to temporarily carry the 35-kV from the vicinity of Ghowchak to the old Jalalabad Station during emergency repairs.

Specific tasks: Survey the existing condition of the 35-kV line. Analyze alternatives and make recommendations about the work necessary to have the line continue in operation for the near future. Prepare an assessment report. Meet with USAID to arrive at a final report which will include recommendations. Produce construction documents that will implement the results of the assessment report. Support the design implementation during construction.

Deliverables:

- Project Management and Coordination: Provide management of the project team. Attend design meetings and reviews. Provide updates and communications to USAID. Coordinate with other consultants and USAID. Respond to USAID comments and revisions.
- Pre-Design Support Services: Prepare and confirm base line information supplied by others and determined through field investigation. This information will form the basis for subsequent analysis, documents, exhibits and reports. Field verify existing conditions. Prepare a base map in AutoCAD or similar format of the site area with the field data collected and the design information provided.
- Assessment Report: Prepare a report with recommendations. Meet with USAID in Kabul and in Jalalabad to discuss the report. Revise the report incorporating USAID comments and issue a final assessment report.

- Construction Documents: Provide general, civil, structural, and electrical drawings and specifications. Drawings will be to USAID format. Specifications will be based on UFGS series. Provide a Bill of Quantity (BOQ) and a cost estimate for all specified work.
- Construction Support Services: A senior engineer will attend weekly construction meetings in person or by video conference during the period of construction. The engineer will provide quality assurance by: 1) Answering questions, RFIs from contractors by phone or e-mail. Providing insight. 2) Reviewing product submittals and shop drawings. 3) Initiating field change orders. 4) Performing periodic site inspections. Participating in the construction walk-through at each point of substantial completion. 6) Reviewing all as-built drawings prepared by the contractor.

Period of Performance; Performance Schedule:

Work will begin as soon as a notice to proceed (NTP) is issued by USAID. The assessment report is due within 60-days after the NTP. Construction documents are due 90-days after acceptance of the assessment report by USAID.

b. Darunta Station and Line Integration into NEPS

Scope of Work: Provide reliable power transmission and integration of the Darunta Hydro-electric power station into the North East Power System (NEPS) of Afghanistan. A rehabilitated transmission line is also expected to suffer from less technical loss even though it will be operating at a lower voltage. The rehabilitated system will be more easily assimilated into the proposed NEPS-Nangarhar system.

Specific tasks: Design a rebuilt station and transmission line:

1. The 40-km long Darunta to Jalalabad Station transmission line will be downgraded from 35-kV to 20-kV to be more easily assimilated into the proposed NEPS-Nangarhar system. Poles will be replaced as needed. Conductors and pole hardware will be replaced.
2. Relaying as necessary to allow synchronous connection of Darunta Station to the NEPS.
3. The two (2) 7.5-MVA, 6/35-kV step-up transformers at Darunta will be replaced with two (2) 7.5-MVA, 6/20-kV step-up transformers. The Jalalabad Station will already have been reconfigured to accept the new 20-kV transmission line voltage.
4. Darunta vicinity will continue to be fed at 6-kV.
5. The Ghowchak distribution system will require reconfiguration as described above. A 6-MVA, 20/6-kV step-down transformer will be installed to replace the existing 5.6-MVA, 35/6-kV transformer.

6. The Olive Factory distribution system will require reconfiguration as described above. A 6-MVA, 20/6-kV step-down transformer installed to replace the existing 1.6-MVA and 1.8-MVA, 35/6-kV transformers.

Deliverables:

- Project Management and Coordination: Provide management of the project team. Attend design meetings and reviews. Provide updates and communications to USAID. Coordinate with other consultants and USAID. Respond to USAID comments and revisions.
- Pre-Design Support Services: Prepare and confirm base line information supplied by others and determined through field investigation. This information will form the basis for subsequent analysis, documents, exhibits, and reports. Field verify existing conditions. Prepare a base map in AutoCAD or similar format of the site area with the field data collected and the design information provided.
- Construction Documents: Provide general, civil, structural, and electrical drawings and specifications. Drawings will be to USAID format. Specifications will be based on UFGS series. Provide a Bill of Quantity (BOQ) and a cost estimate for all specified work.
- Construction Support Services: A senior engineer will attend weekly construction meetings in person or by video conference during the period of construction. The engineer will provide quality assurance by: 1) Answering questions, RFIs from contractors by phone or e-mail. Providing insight. 2) Reviewing product submittals and shop drawings. 3) Initiating field change orders. 4) Performing periodic site inspections. Participating in the construction walk-through at each point of substantial completion. 6) Reviewing all as-built drawings prepared by the contractor.

Period of Performance; Performance Schedule:

Work will begin as soon as a notice to proceed (NTP) is issued by USAID. Construction documents are due 180-days after NTP.

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