



Report on the

HL20S Facilities Study for 20 MW PV Generation Interconnection



El Paso Electric

Project No. 69671

November 2012

**HL20S Facilities Study for
20 MW PV Generation Interconnection**

Prepared for

**El Paso Electric Company
El Paso, Texas**

November 2012

Project No. 69671

Prepared by

**Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri**

COPYRIGHT © 2012 BURNS & McDONNELL ENGINEERING COMPANY, INC.



TABLE OF CONTENTS

| | <u>Page No.</u> |
|--|-----------------|
| CERTIFICATION | 1 |
| EXECUTIVE SUMMARY | 2 |
| 1. INTRODUCTION..... | 4 |
| 1.1 DESCRIPTION OF PROJECT..... | 4 |
| 1.2 GENERATOR INTERCONNECTION FACILITIES..... | 5 |
| 1.3 EPE INTERCONNECTION FACILITIES..... | 5 |
| 1.4 NETWORK UPGRADES | 5 |
| 1.5 DISCLAIMER | 5 |
| 2. INTERCONNECTION FACILITIES AND NETWORK UPGRADES | 6 |
| 2.1 SUBSTATIONS..... | 6 |
| 2.1.1 HL20S POI 115 kV SUBSTATION | 6 |
| 2.2 TRANSMISSION LINES | 10 |
| 2.2.1 HOLLOMAN TO LARGO 115 kV TRANSMISSION LINE RECONFIGURATION | 10 |
| 3. PROJECT SCHEDULE | 12 |
| 3.1 SUBSTATION | 12 |
| 3.2 TRANSMISSION | 12 |
| 3.3 TOTAL PROJECT SCHEDULE | 12 |
| 4. SUMMARY..... | 14 |
| 4.1 TOTAL COST SUMMARY | 14 |
| 4.2 PROJECT SCHEDULE SUMMARY | 14 |

LIST OF TABLES

| | |
|---|---|
| TABLE E-1: HL20S POI 115 kV SUBSTATION – TOTAL COST ESTIMATE | 2 |
| TABLE E-2: TOTAL HL20S PROJECT COST ESTIMATE..... | 2 |
| TABLE E-3: PROJECT SCHEDULES..... | 3 |
| TABLE 2-1: HL20S POI 115 kV SUBSTATION – LAND ACQUISITION COST ESTIMATE..... | 7 |
| TABLE 2-2: HL20S POI 115 kV SUBSTATION – PERMITTING COST ESTIMATE..... | 8 |
| TABLE 2-3: HL20S POI 115 kV SUBSTATION – EPE INTERCONNECTION COST ESTIMATE..... | 9 |
| TABLE 2-4: HL20S POI 115 kV SUBSTATION – NETWORK UPGRADE COST ESTIMATE | 9 |

TABLE 2-5: HL20S POI 115 kV SUBSTATION – TOTAL COST ESTIMATE..... 10

TABLE 2-7: HOLLOMAN TO LARGO 115 kV LINE TIE-IN AT HL20S POI - COST ESTIMATE..... 11

TABLE 3-1: HL20S POI 115 kV SUBSTATION SCHEDULE 12

TABLE 3-3: HL20S POI TIE-IN SCHEDULE 12

TABLE 3-4: TOTAL PROJECT SCHEDULE 13

TABLE 4-1: TOTAL UPGRADE COST ESTIMATE..... 14

TABLE 4-2: TOTAL PROJECT SCHEDULE 14

LIST OF FIGURES

FIGURE 1-1: HL20S POINT OF INTERCONNECTION 4

FIGURE 2-1: HL20S POI CONNECTION AND CONFIGURATION 7

APPENDICES

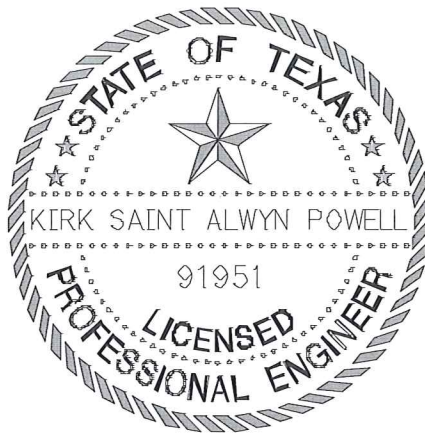
- APPENDIX A:** BILL OF MATERIALS
- APPENDIX B:** PROJECT SCHEDULES
- APPENDIX C:** SUBSTATION PHYSICAL LAYOUTS

* * * * *

CERTIFICATION

Texas State - Certification

I hereby certify, as a Professional Engineer in the state of Texas, that the information in this document was assembled under my responsible charge. This report is not intended or represented to be suitable for re-use by El Paso Electric Company or others without specific verification or adaptation by the Engineer (Burns & McDonnell). This certification is made in accordance with the provisions of the laws and rules of the Texas State Board of Engineers Administrative Code.



Approved P.E. Seal (Electrical)

Electrical Engineer

A handwritten signature in blue ink, appearing to read "Kirk Powell", written over a horizontal line.

Kirk Powell, P.E.

TX License No. 91951

Date: November 28, 2012

EXECUTIVE SUMMARY

This Facilities Study was performed to examine the cost and schedule of El Paso Electric (EPE) facilities identified in the HL20S PV Feasibility Study Report¹ (Feasibility Study) for system constraints and to define the project requirements for each of these facilities required to mitigate the constraints.

The HL20S 20 MW PV project has an in-service date of December 31, 2014 and will interconnect to the existing Holloman to Largo 115 kV line at a new interconnection substation designated as the HL20S POI 115 kV substation. The new HL20S POI 115 kV substation will be located 1/4 mile south from the Holloman 115 kV substation tapped into the existing Holloman to Largo 115 kV line.

The facility upgrades and total costs required for HL20S interconnection are shown in Table E-1 and Table E-2. The total cost for the HL20S POI 115 kV substation is \$6,442,000. Table E-2 shows the total HL20S project cost for all EPE interconnection and network facility upgrades is \$7,035,000.

Table E-1: HL20S POI 115 kV Substation – Total Cost Estimate

| Item | Material Cost | Contract Labor | Engineering | Construction Management | Contingency | EPE Direct Cost | Total |
|-----------------------------------|--------------------|--------------------|------------------|-------------------------|--------------------|------------------|--------------------|
| EPE Interconnection Upgrades | \$353,000 | \$208,000 | \$55,000 | \$60,000 | \$115,000 | \$43,000 | \$834,000 |
| Network Upgrades | \$2,202,000 | \$1,409,000 | \$362,000 | \$362,000 | \$869,000 | \$262,000 | \$5,466,000 |
| Permitting | \$0 | \$0 | \$51,000 | \$0 | \$13,000 | \$4,000 | \$68,000 |
| Land Acquisition | \$42,000 | \$4,000 | \$17,000 | \$0 | \$7,000 | \$4,000 | \$74,000 |
| HL20S POI Substation Total | \$2,597,000 | \$1,621,000 | \$485,000 | \$422,000 | \$1,004,000 | \$313,000 | \$6,442,000 |

Table E-2: Total HL20S Project Cost Estimate

| Item | Material Cost | Contract Labor | Engineering | Construction Management | Contingency | EPE Direct Cost | Total |
|---|--------------------|--------------------|------------------|-------------------------|--------------------|------------------|--------------------|
| EPE Interconnection Upgrades (Substation) | \$353,000 | \$208,000 | \$55,000 | \$60,000 | \$115,000 | \$43,000 | \$834,000 |
| Network Upgrades (Substation, Permitting, Land Acquisition, Tie In) | \$2,439,000 | \$1,593,000 | \$490,000 | \$437,000 | \$941,000 | \$301,000 | \$6,201,000 |
| Total HL20S Project Cost | \$2,792,000 | \$1,801,000 | \$545,000 | \$497,000 | \$1,056,000 | \$344,000 | \$7,035,000 |

Based on the project start date of August 2013, the project completion date is estimated to be September 2014. Energization is scheduled to occur in October 2014.

Table E-3 below shows the start and finish dates for each project phase.

¹ HL20S PV Feasibility Study Report – July 2012.

Table E-3: Project Schedules

| Project Phase | Start Date | Finish Date | Total Duration |
|----------------------|--------------------|-----------------------|-----------------------|
| Substation | August 2013 | September 2014 | 14 Months` |
| Transmission Line | September 2013 | September 2014 | 13 Months |
| Total Project | August 2013 | September 2014 | 14 Months |
| Energization | October 2014 | | |

* * * * *

1. INTRODUCTION

1.1 DESCRIPTION OF PROJECT

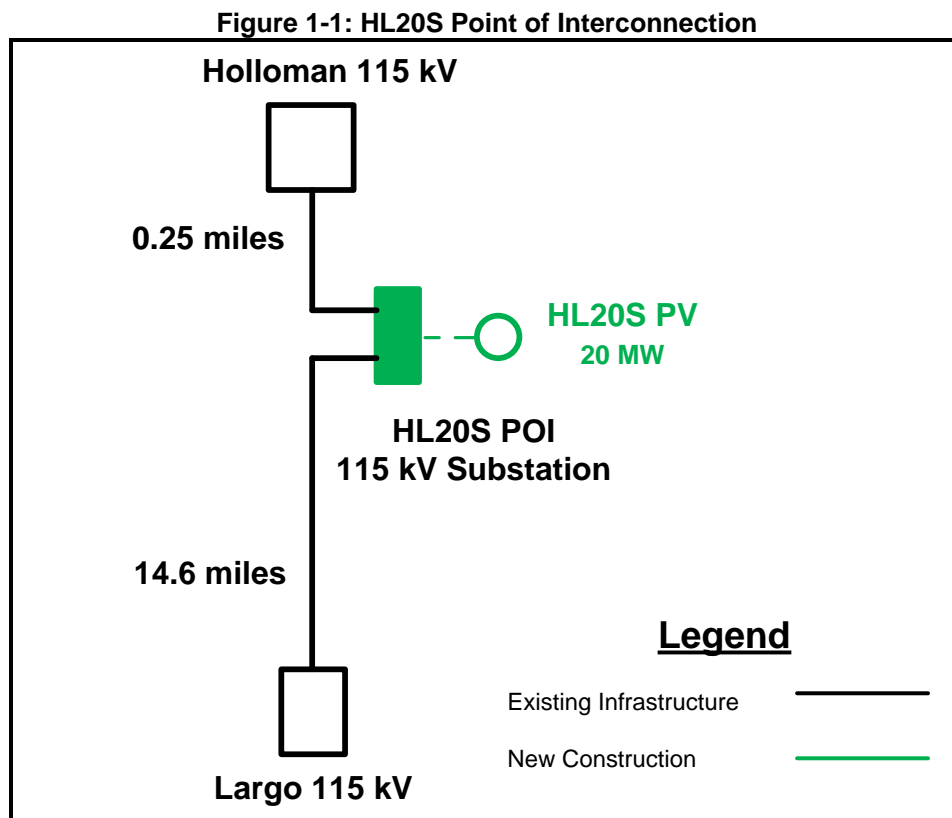
El Paso Electric (EPE) has requested Burns & McDonnell Engineering (BMCD/Engineer) to perform a Facility Study to examine the EPE facilities identified in the HL20S PV Feasibility Study Report² (Feasibility Study) for system constraints and to define the project requirements for each of these facilities required to mitigate the constraints.

HL20S is a 20 MW PV solar plant proposing interconnection to the EPE system approximately ¼ mile south of Holloman Substation on the Holloman to Largo to Amrad 115 kV line. The desired service back-feed is October 31, 2014 and desired commercial operation is December 31, 2014.

This Facilities Study shall identify the purpose and necessity; provide preliminary cost estimates; and develop a preliminary schedule for the facility upgrades required for the interconnection of HL20S.

Figure 1-1 shows the relative POI for the interconnection of HL20S.

Details of the direct connection and network upgrades required for the generation interconnection are provided in Sections 1.2, 1.3 and 1.4.



² HL20S PV Feasibility Study Report – July 2012.

1.2 GENERATOR INTERCONNECTION FACILITIES

Generator Interconnection Facilities are facilities paid for by the Interconnection Customer (IC), owned and operated by the IC from the generator facilities to the Change of Ownership Point. The Change of Ownership Point is the dead-end pole that connects the interconnection line into the POI substation. The HL20S interconnection customer will be responsible for the design, engineering and construction of all facilities up to the Change of Ownership Point. The Generator Interconnection Facilities include all generator step-up transformers, breakers, and any VAR support equipment needed to integrate the HL20S project.

The only transmission system upgrade as part of the HL20S Generator Interconnection Facilities is the distance of 115 kV transmission line from HL20S to the POI at the new HL20S POI 115 kV substation.

1.3 EPE INTERCONNECTION FACILITIES

EPE Interconnection Facilities are facilities paid for by IC but owned and operated by EPE from the Change of Ownership Point to the POI. These costs include facilities from the dead-end pole to the POI (including the pole, wire from the pole to the POI and the revenue metering equipment). The costs of the EPE Interconnection Facilities are not subject to transmission credits.

The EPE Interconnection Facilities required for the interconnection of HL20S include the interconnection dead-end pole to HL20S POI bus termination point and revenue metering between the HL20S interconnection line dead-end pole and the HL20S POI 115 kV Substation.

1.4 NETWORK UPGRADES

Network upgrades are facilities from the POI out to the transmission system, which are paid for by the IC but owned and operated by EPE. The costs of the network upgrades are subject to being reimbursed from EPE to the IC in the form of transmission credits.

The network upgrades required for the interconnection of HL20S are listed as follows:

1. **New 115 kV HL20S POI Substation:** to accommodate new 115 kV tie from HL20S
2. **Reconfigure Holloman to Largo to Amrad 115 kV Line:** in-out loop into the proposed HL20S POI substation
3. **Permitting and Land Acquisition:** 350' x 300' parcel for the new HL20S POI Substation

1.5 DISCLAIMER

Estimates, forecasts, projections, and schedules relating to costs, quantities, demand pricing (including but not limited to, property costs, construction, operation or maintenance costs, and/or energy or commodity demand and pricing), are opinions based on the Engineer's experience, qualifications and judgment. The Engineer has no control over the weather, cost and availability of labor, materials and equipment, labor productivity, energy or commodity pricing, demand or usage, population demographics, market conditions, change in technology, and other economic or political factors effecting such estimates or projections. The Transmission Provider acknowledges that actual results may vary significantly from the representations and opinions herein. Nothing herein will be construed as a guarantee or warranty (actual or implied) that rates, demand, pricing, costs, performance schedules, quantities, technology, or any other related items will not vary from the opinions contained in the report prepared by the Engineer.

* * * * *

2. INTERCONNECTION FACILITIES AND NETWORK UPGRADES

The following sections describe the facilities upgrades required for the interconnection of HL20S and the corresponding cost estimates.

The cost estimates for facilities are provided with a plus or minus 20% accuracy for substation and transmission, and a plus or minus 50% accuracy for permitting and land acquisition/right of way. In addition, contingency costs varied for substation, transmission, permitting and land acquisition/right of way. The contingency costs are provided within each estimate table, and are rounded up to the nearest thousand.

2.1 SUBSTATIONS

To accommodate the additional generation load from HL20S to EPE's system, a new 115 kV substation HL20S POI will have to be constructed 1/4 mile south of Holloman Substation on the Holloman to Largo 115 kV line. The general assumptions made in the design and cost estimate of the substation facility upgrades are as follows:

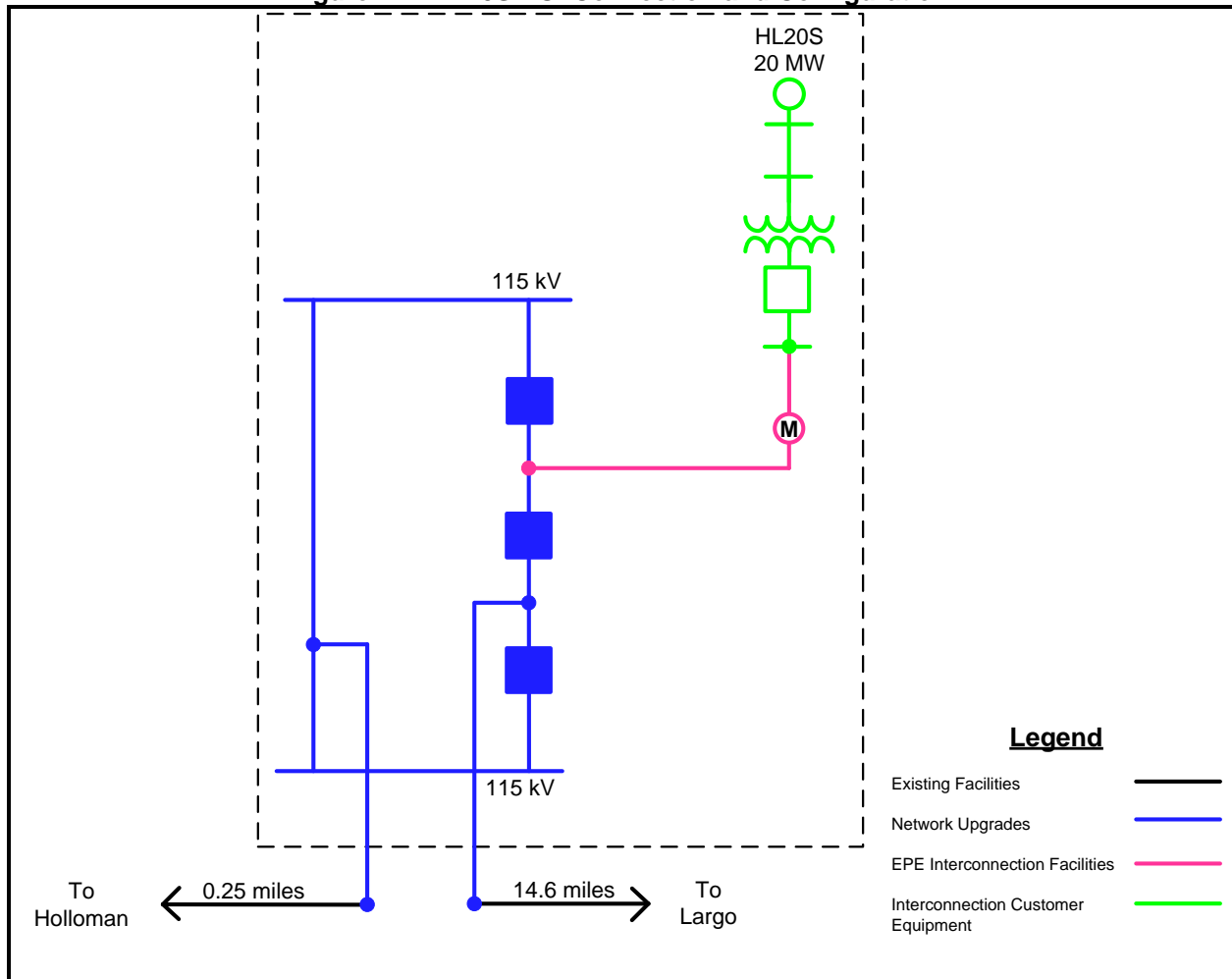
1. Cost estimates were based on 2012 dollars, no escalation or discount rates were included
2. Costs adjusted to El Paso, TX city cost index
3. No state, county or city taxes are included
4. Contingency costs were assumed to be 20% of the total engineering, material, labor and construction costs rounded up to the nearest thousand
5. Engineering costs include detail design engineering and design engineering management.
6. Engineering and construction management costs were each assumed to be 10% of the total material and labor costs.
7. Direct costs for EPE are included in the cost estimates at 6% of project total rounded up to the nearest thousand. Direct costs may include, but are not limited to EPE program management, project management and overhead costs. Actual direct costs may differ from the estimated value.

2.1.1 HL20S POI 115 kV Substation

A new HL20S POI 115 kV substation will need to be constructed for the interconnection of HL20S to the EPE transmission system. The cost of the new HL20S POI 115 kV substation will be the full responsibility of the HL20S project and include land acquisition and permitting. The cost of the network upgrades (shown in blue in Figure 2-1 below) are subject to being reimbursed from EPE in the form of transmission credits. The cost estimates also include the EPE Interconnection Facilities required to interconnect HL20S. These include the transmission facilities between the HL20S interconnection line dead-end pole and the termination point at the HL20S POI 115 kV substation bus, as well as any revenue metering upgrades between the POI and the interconnection line.

Figure 2-1 below shows the HL20S POI 115 kV substation tied into the existing Holloman to Largo 115 kV line and the POI configuration. The physical layout for HL20S POI 115 kV substation can be found in Appendix C.

Figure 2-1: HL20S POI Connection and Configuration



2.1.1.1 Land Acquisition

The land size requirements for the new HL20S POI 115 kV substation was assumed to be 350' x 300'. Land acquisition costs were estimated to be \$74,000 as shown in Table 2-1 below.

Table 2-1: HL20S POI 115 kV Substation – Land Acquisition Cost Estimate

| Item | Total |
|----------------------------------|-----------------|
| Acreage | \$42,000 |
| Title Search & Appraisal | \$2,000 |
| Survey | \$2,000 |
| Project Management | \$17,000 |
| Total without Contingency | \$63,000 |
| Contingency (10%) | \$7,000 |
| EPE Direct Cost (6%) | \$4,000 |
| Total with Contingency | \$74,000 |

2.1.1.2 *Permitting Assumptions and Cost Estimate*

Assumptions used to estimate permitting costs for the new HL20S POI 115 kV substation include:

- Noise testing will not be required
- Project centerline, new substation and expansion substation areas will be clearly marked/staked by the EPE (land surveyor) prior to initiating the field survey
- EPE will provide access to all of the properties prior to the start of the pedestrian surveys
- No deep testing will be required for Cultural Resources Surveys
- Inclement weather (heavy rainstorms, lightening, hurricanes, etc.) may delay fieldwork. No costs for weather related delays are included
- Assuming Environmental Assessment (EA) will be required by the BLM
- The EA will only analyze impacts to proposed transmission line route
- EPE will provide the most current route of the transmission line
- No view shed analysis will be required
- No traffic impact study will be conducted
- There will be no federally listed threatened or endangered species affected by project implementation, and therefore, no formal consultation with USFWS will be required
- No Native American Consultation will be required
- EPE will pay all permit and application fees
- No open house meetings will be required
- No significant impacts to wetlands will occur and project can be permitted under a Nationwide Permit with no formal consultation with the USACE
- No state siting applications or support will be necessary
- No public hearing will be required for any special use permitting

Table 2-2 shows the permitting cost estimates for HL20S POI 115 kV substation to be \$68,000.

Table 2-2: HL20S POI 115 kV Substation – Permitting Cost Estimate

| Item | Total |
|---|-----------------|
| Wetland, Cultural Resource, Endangered Species, Storm Water Pollution Surveys/Permits/Reports | \$26,000 |
| FAA, County, City Permits | \$25,000 |
| Total without Contingency | \$51,000 |
| Contingency (25%) | \$13,000 |
| EPE Direct Cost (6%) | \$4,000 |
| Total with Contingency | \$68,000 |

2.1.1.3 *Design and Construction Assumptions and Cost Estimate*

Assumptions used to estimate design and construction costs for the new HL20S POI 115 kV substation include:

- Line switches will be motor operated and installed on the dead end structures.
- Grading and Foundation installation does not include any shale or rock excavation.
- Site is approximately 350' x 300' and is assumed to be flat.
- Site is adjacent of access road.
- Owner standard structures with loading criteria will be used for foundation design.

- The remote end line terminals at Largo/Amrad and Holloman have sufficient matching line relaying and an upgrade for line relaying is not required.
- Backup station power will be provided by the local utility distribution line. Location of pole is also assumed.
- All breaker disconnect switch will be manually operated.
- Ground grid conductor will be 4/0, 19 strand bare copper.
- Ground grid conductor spacing will be 15' between runs.
- Actual ground grid conductor and spacing may differ from assumptions once ground grid design is complete.

Table 2-3 below shows the EPE interconnection costs associated with interconnecting HL20S to the HL20S POI 115 kV substation. The total EPE interconnection cost for HL20S is \$834,000.

Table 2-3: HL20S POI 115 kV Substation – EPE Interconnection Cost Estimate

| HL20S Interconnection Upgrades | Material Cost | Contract Labor | Engineering | Construction Management | Total |
|---|------------------|------------------|-----------------|-------------------------|------------------|
| Substation | \$166,000 | \$90,000 | \$26,000 | \$26,000 | \$308,000 |
| System Protection & Control | \$91,000 | \$40,000 | \$14,000 | \$14,000 | \$159,000 |
| Line Interconnection | \$96,000 | \$78,000 | \$15,000 | \$20,000 | \$209,000 |
| Total Interconnection Cost without Contingency | \$353,000 | \$208,000 | \$55,000 | \$60,000 | \$676,000 |
| Contingency (20% Substation, 10% Transmission) | \$61,000 | \$34,000 | \$10,000 | \$10,000 | \$115,000 |
| EPE Direct Cost (6%) | \$22,000 | \$13,000 | \$4,000 | \$4,000 | \$43,000 |
| Total HL20S Interconnection Upgrades | \$436,000 | \$255,000 | \$69,000 | \$74,000 | \$834,000 |

Table 2-4 shows the network upgrade cost of the proposed HL20S POI 115 kV substation. The total network upgrade costs for the HL20S POI 115 kV substation is \$5,466,000.

Table 2-4: HL20S POI 115 kV Substation – Network Upgrade Cost Estimate

| HL20S POI Substation Network Upgrades | Material Cost | Contract Labor | Engineering | Construction Management | Total |
|---|--------------------|--------------------|------------------|-------------------------|--------------------|
| Substation | \$1,590,000 | \$1,067,000 | \$266,000 | \$266,000 | \$3,189,000 |
| System Protection & Control | \$612,000 | \$342,000 | \$96,000 | \$96,000 | \$1,146,000 |
| Total Network Upgrade Cost without Contingency | \$2,202,000 | \$1,409,000 | \$362,000 | \$362,000 | \$4,335,000 |
| Contingency (20% Substation) | \$441,000 | \$282,000 | \$73,000 | \$73,000 | \$869,000 |
| EPE Direct Cost (6%) | \$133,000 | \$85,000 | \$22,000 | \$22,000 | \$262,000 |
| Total HL20S Network Upgrade Costs | \$2,776,000 | \$1,776,000 | \$457,000 | \$457,000 | \$5,466,000 |

2.1.1.4 *Total Substation Cost Estimate*

The total HL20S POI 115 kV substation cost including EPE interconnection upgrades, design and construction network upgrades, permitting network upgrades and land acquisition network upgrades are shown in Table 2-5 below. The total HL20S POI 115 kV substation cost estimate is \$6,442,000.

Table 2-5: HL20S POI 115 kV Substation – Total Cost Estimate

| Item | Material Cost | Contract Labor | Engineering | Construction Management | Contingency | EPE Direct Cost | Total |
|-----------------------------------|--------------------|--------------------|------------------|-------------------------|--------------------|------------------|--------------------|
| EPE Interconnection Upgrades | \$353,000 | \$208,000 | \$55,000 | \$60,000 | \$115,000 | \$43,000 | \$834,000 |
| Network Upgrades | \$2,202,000 | \$1,409,000 | \$362,000 | \$362,000 | \$869,000 | \$262,000 | \$5,466,000 |
| Permitting | \$0 | \$0 | \$51,000 | \$0 | \$13,000 | \$4,000 | \$68,000 |
| Land Acquisition | \$42,000 | \$4,000 | \$17,000 | \$0 | \$7,000 | \$4,000 | \$74,000 |
| HL20S POI Substation Total | \$2,597,000 | \$1,621,000 | \$485,000 | \$422,000 | \$1,004,000 | \$313,000 | \$6,442,000 |

The corresponding substation bill of materials can be found in Appendix A.

2.2 TRANSMISSION LINES

The following sections summarize the Holloman to Largo 115 kV line upgrades recommended in the Feasibility Study. Also included are details of the design and cost assumptions and cost estimates for the line upgrade.

The design and cost estimates for the overhead transmission line are based on the following general assumptions:

1. Cost estimates provided are good faith “scoping estimates”
2. Cost estimates were based on 2012 dollars, no escalation or discount rates were included.
3. Costs adjusted to El Paso, TX city cost index.
4. No state, county or city taxes are included
5. Contingency is assumed to be 10% of total material and labor costs
6. Direct costs for EPE are included in the cost estimates at 6% of project total rounded up to the nearest thousand. Direct costs may include, but are not limited to EPE program management, project management and overhead costs. Actual direct costs may differ from the estimated value.

2.2.1 Holloman to Largo 115 kV Transmission Line Reconfiguration

HL20S will interconnect the EPE transmission via the proposed HL20S POI substation which will be located on the existing Holloman to Largo 115 kV line. The new HL20S POI Substation will be located approximately 0.25 miles from Holloman substation on the Holloman to Largo to Amrad 115 kV line. The cost of the new 115 kV transmission facilities include engineering, procurement and construction of 2 new self-supporting steel dead-end structures on drilled shaft foundations, which will tie the existing Holloman to Largo 115kV transmission line to the HL20S POI Station. New OPGW will also be installed from HL20S POI to Holloman on existing structures, utilizing new hardware.

The following sections describe the cost estimate assumptions and cost estimate for looping in the existing Holloman to Largo 115 kV transmission line into the proposed HL20S POI substation.

2.2.1.1 *Design and Construction Assumptions and Cost Estimate*

In addition to the general cost estimate assumptions listed in Section 2.2, the following specific assumptions apply to the design and cost estimate of the Holloman to Largo 115 kV Line tie-in at HL20S POI substation:

1. Location of HL20S POI Substation shall be within the existing 115 kV Holloman to Largo to Amrad line ROW

2. Two dead-end structures will be required to terminate the line adjacent to the new HL20S POI Substation and no existing structure modifications will be necessary
3. The conductors shall be in a horizontal single conductor configuration and will require spacers and dampers. Conductors shall be 115 kV single 954 kcmil “Rail” ACSR per phase.
4. All hardware assemblies shall use polymer insulators with armor rods and formula suspension clamps
5. All dead-end assemblies shall use polymer insulators and compression fittings

The cost estimate to tie-in the existing Holloman to Largo 115 kV line at HL20S POI is shown in Table 2-7 below. The total cost of constructing the tap in and out of the Holloman to Largo 115 kV line is estimated at \$593,000.

Table 2-6: Holloman to Largo 115 kV Line Tie-In at HL20S POI - Cost Estimate

| Item | Material Cost | Labor | Total |
|----------------------------------|------------------|------------------|------------------|
| Structure Costs | \$120,000 | \$25,000 | \$145,000 |
| Foundation Costs | \$50,000 | \$50,000 | \$100,000 |
| Installed Wires | \$25,000 | \$35,000 | \$60,000 |
| Construction Incidentals | \$0 | \$70,000 | \$70,000 |
| Engineering | \$0 | \$60,000 | \$60,000 |
| Construction Management | \$0 | \$75,000 | \$75,000 |
| Total without Contingency | \$195,000 | \$315,000 | \$510,000 |
| Contingency (10%) | \$20,000 | \$32,000 | \$52,000 |
| EPE Direct Cost (6%) | \$12,000 | \$19,000 | \$31,000 |
| Total with Contingency | \$227,000 | \$366,000 | \$593,000 |

The corresponding transmission bill of materials can be found in Appendix A.

* * * * *

3. PROJECT SCHEDULE

The project schedules for land acquisition, permitting, substation and transmission line are shown below. Based on the project start date of August 2013, the project completion date is estimated to be September 2014 and energization in October 2014. According to the schedule, the desired commercial operation of December 2014 is achievable.

3.1 SUBSTATION

Table 3-1 and Table 3-2 show the engineering, procurement and construction schedules for the HL20S POI 115 kV substation. If preliminary engineering begins in August 2013, final construction can be complete by September 2014.

Table 3-1: HL20S POI 115 kV Substation Schedule

| Project Phase | Start Date | Finish Date |
|----------------------------------|--------------------|-----------------------|
| Preliminary Engineering | August 2013 | October 2013 |
| Detailed Engineering | October 2013 | March 2014 |
| Procurement | October 2013 | July 2014 |
| Construction | April 2014 | September 2014 |
| Testing & Commissioning | September 2014 | September 2014 |
| HL20S POI 115 kV Schedule | August 2013 | September 2014 |
| Energization | October 2014 | |

3.2 TRANSMISSION

Table 3-3 below shows the engineering, design, procurement, delivery and construction schedules for the Holloman to Largo 115 kV transmission line tie-in to the new HL20S POI 115 kV substation. With an estimated start date of September 2013, construction completion is estimated to be September 2014.

Table 3-2: HL20S POI Tie-in Schedule

| Project Phase | Start Date | Finish Date |
|----------------------------------|-----------------------|-----------------------|
| Engineering | September 2013 | January 2014 |
| Procurement | December 2013 | June 2014 |
| Construction | June 2014 | September 2014 |
| HL20S POI Tie-in Schedule | September 2013 | September 2014 |
| Energization | October 2014 | |

3.3 TOTAL PROJECT SCHEDULE

The total project schedule, from completion to end is estimated to take 14 months, starting in August 2013 and ending in September 2014. Table 3-4 shows the start and finish dates for each project phase.

Table 3-3: Total Project Schedule

| Project Phase | Start Date | Finish Date | Total Duration |
|----------------------|--------------------|-----------------------|-----------------------|
| Substation | August 2013 | September 2014 | 14 Months |
| Transmission Line | September 2013 | September 2014 | 13 Months |
| Total Project | August 2013 | September 2014 | 14 Months |
| Energization | October 2014 | | |

A detailed project schedule can be found in Appendix B.

4. SUMMARY

The interconnection of the HL20S 20 MW PV project to the Holloman to Largo 115 kV line requires upgrades to existing system facilities as identified in the Feasibility Study.

The cost estimates and construction schedules of the facility upgrades are summarized in the following sections.

4.1 TOTAL COST SUMMARY

The total EPE interconnection costs and network upgrade cost estimates are presented in Table 4-1 below. EPE interconnection costs are \$834,000 and the network upgrade costs is estimated at \$6,201,000. Total project cost is estimated at \$7,035,000.

Table 4-1: Total Upgrade Cost Estimate

| Item | Material Cost | Contract Labor | Engineering | Construction Management | Contingency | EPE Direct Cost | Total |
|---|--------------------|--------------------|------------------|-------------------------|--------------------|------------------|--------------------|
| EPE Interconnection Upgrades (Substation) | \$353,000 | \$208,000 | \$55,000 | \$60,000 | \$115,000 | \$43,000 | \$834,000 |
| Network Upgrades (Substation, Permitting, Land Acquisition, Tie In) | \$2,439,000 | \$1,593,000 | \$490,000 | \$437,000 | \$941,000 | \$301,000 | \$6,201,000 |
| Total HL20S Project Cost | \$2,792,000 | \$1,801,000 | \$545,000 | \$497,000 | \$1,056,000 | \$344,000 | \$7,035,000 |

4.2 PROJECT SCHEDULE SUMMARY

Based on the project start date of August 2013, the project completion date is estimated to be September 2014.

Table 4-2 below shows the start and finish dates for each phase of the project.

Table 4-2: Total Project Schedule

| Project Phase | Start Date | Finish Date | Total Duration |
|----------------------|--------------------|-----------------------|------------------|
| Substation | August 2013 | September 2014 | 14 Months |
| Transmission Line | September 2013 | September 2014 | 13 Months |
| Total Project | August 2013 | September 2014 | 14 Months |
| Energyization | October 2014 | | |

* * * * *

**APPENDIX A
BILL OF MATERIALS**

HL20S Substation Interconnection Bill of Materials

Substation Electrical Equipment and Foundations

| Substation Electrical Equipment | Unit | Quantity |
|---|-------------|-----------------|
| 115kV, 2000A, Vertical Break (Line Sw.) | EA | 1 |
| 115KV CCVT & Accessories | EA | 3 |
| 115kV PT/CT Metering Combo Unit & Accessories | EA | 3 |
| 115kV Surge Arresters | EA | 3 |
| 115kV Station Post Insulators | EA | 3 |
| 115kV Line Terminal Kit | EA | 1 |
| 125VDC Switch Motor Operator | EA | 1 |
| Foundations | Unit | Quantity |
| Foundations | LOT | 1 |

Substation Structures, Grounding, Conductors & Other

| Structures | Unit | Quantity |
|----------------------------|-------------|-----------------|
| Structures | LOT | 1 |
| Grounding Materials | Unit | Quantity |
| Grounding Materials | LOT | 1 |
| Bus and Conductors | Unit | Quantity |
| Bus and Conductors | LOT | 1 |

System Protection & Control Equipment

| Metering Equipment | Unit | Quantity |
|---|-------------|-----------------|
| External Leased line Modem | EA | 1 |
| Control House, Relay Racks, Auxilliary Racks | Unit | Quantity |
| 115kV Bus Differential Panel | EA | 1 |
| Metering Panel | EA | 1 |
| Loose Materials | EA | 1 |

Other

| Misc. | Unit | Quantity |
|--|-------------|-----------------|
| Lighting, Station Power and Yard Service | LOT | 1 |
| Conduit & Cable | LOT | 1 |

EA - Each
CY - Cubic Yards
FT - Feet

HL20S Substation Network Bill of Materials

Substation Electrical Equipment & Foundations

| Substation Electrical Equipment | Unit | Quantity |
|--|------|----------|
| 115kV, 2000A, Vertical Break (Line Sw.) | EA | 2 |
| 115kV, 2000A, Vertical Break Disc. Sw. | EA | 8 |
| 115kV, 2000A, 40kAIC Circuit Breakers | EA | 3 |
| 115kV, CCVTs & Accessories | EA | 6 |
| Primary Station service Power Trf. & Accessories | EA | 1 |
| Backup Station service Power Trf. & Accessories | EA | 1 |
| 115kV Surge Arresters | EA | 6 |
| 115kV Line Termination Kit | EA | 2 |
| 115kV Station Post Insulators | EA | 60 |
| 125VDC Switch Motor Operator | EA | 2 |
| Foundations | Unit | Quantity |
| Foundations | LOT | 1 |

Substation Structures, Grounding, Conductors and Other Costs

| Structures | Unit | Quantity |
|--------------------------------|------|----------|
| Structures | LOT | 1 |
| Grounding Materials | Unit | Quantity |
| Grounding Materials | LOT | 1 |
| Other | Unit | Quantity |
| 8' Fence | LOT | 1 |
| Bus and Conductors | Unit | Quantity |
| Bus and Conductors | LOT | 1 |
| Other Substation | Unit | Quantity |
| Testing and Commissioning | LOT | 1 |
| Sitework & Grading (350'x300') | LOT | 1 |
| Loading & Unloading | LOT | 1 |
| Station Stone | LOT | 1 |
| Miscellaneous | LOT | 1 |
| Mobilization | LOT | 1 |

System Protection and Control Equipment

| Control House, Relay Racks, Auxilliary Racks | Unit | Quantity |
|---|------|----------|
| 20' x 28.5' Precast Concrete Control House w/battery system, AC & DC station service equipment, lighting, outlets, cable tray and HVAC. | EA | 1 |
| 115kV Breaker Control/Breaker Failure | EA | 1 |
| 115kV T-Line Panel W/ Breaker Control & Failure | EA | 2 |
| Fiber distribution Rack | EA | 1 |
| Fault Recorder Rack | EA | 1 |
| Supervisory/RTU/Communication Rack | EA | 1 |

Other

| Lighting, Station Power and Yard Service | Unit | Quantity |
|--|------|----------|
| Lighting, Station Power and Yard Service | LOT | 1 |
| Conduits, Cables, Pull boxes & Raceway | Unit | Quantity |
| Conduits, Cables, Pull boxes & Raceway | LOT | 1 |
| Other SP&C Costs | Unit | Quantity |
| Removals | LOT | 1 |
| Testing and Commissioning | LOT | 1 |
| Update relay settings at Amrad, Largo & Holloman | LOT | 1 |
| Miscellaneous | LOT | 1 |

EA - Each

CY - Cubic Yards

FT - Feet

HL20S Transmission Line Bill of Materials

| Equipment | Unit | Quantity |
|--------------------------------------|-------------|-----------------|
| Deadend Poles | EA | 2 |
| Conductor Deadend Assembly | EA | 18 |
| Conductor | FT | 1000 |
| Shield Wire Deadend Assembly | EA | 7 |
| Shield Wire | FT | 650 |
| Optical Ground Wire Deadend Assembly | EA | 6 |
| Optical Ground Wire Tangent Assembly | EA | 4 |
| Optical Ground Wire Splice | EA | 2 |
| Optical Ground Wire | FT | 1800 |
| Pole Bottom Ground Assembly | EA | 2 |
| Pole Top Ground Assembly | EA | 10 |

**APPENDIX B
PROJECT SCHEDULES**

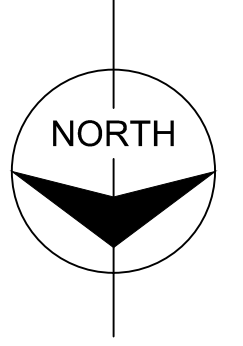
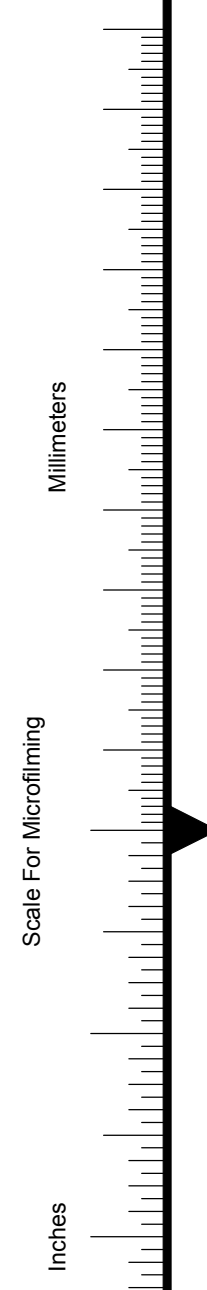
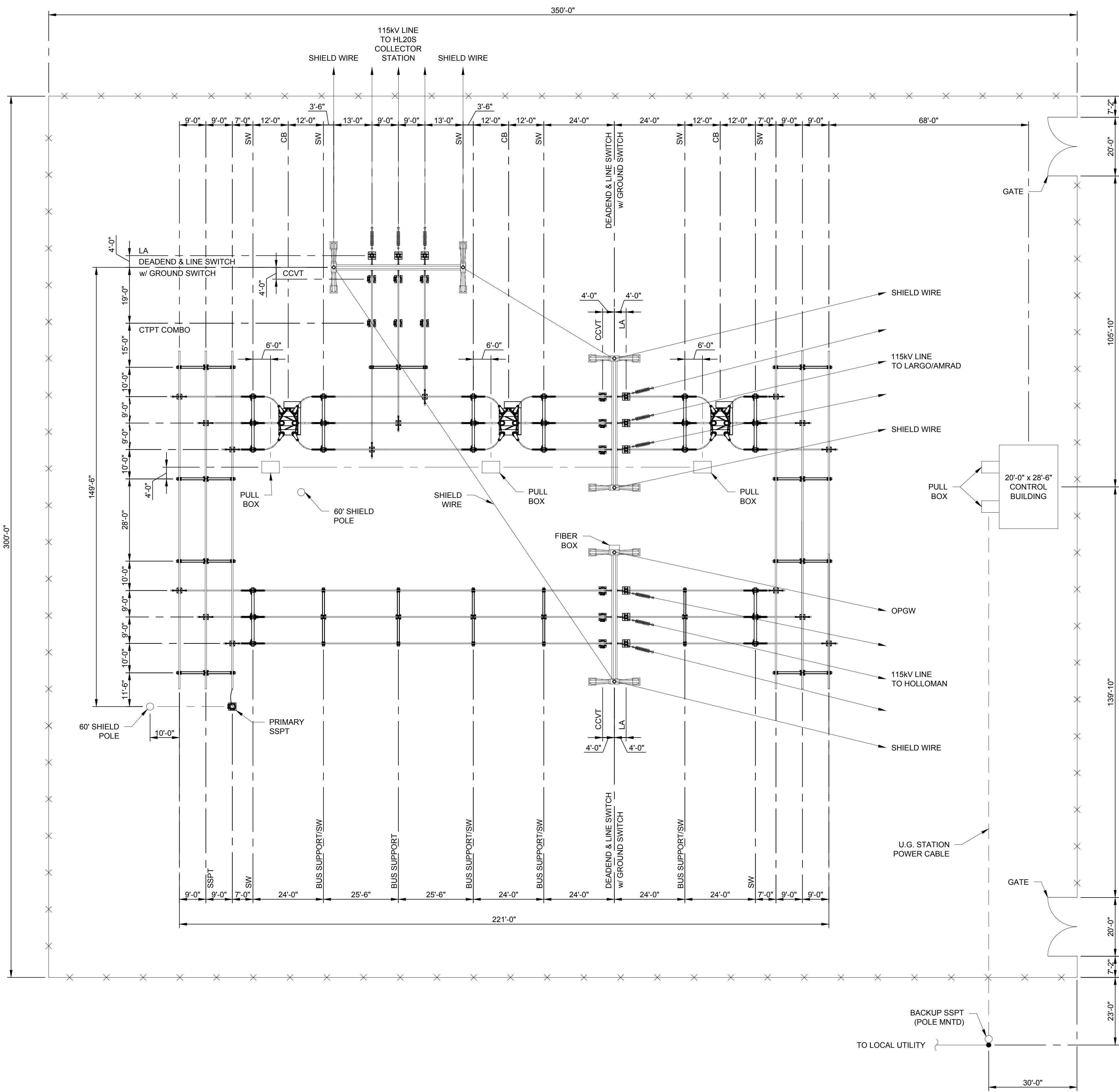
HL20S 20 MW PV Facility Study Project Milestone Schedule

| ID | Task Name | Duration | Start | Finish | 2013 | | | | | | | | | | | | 2014 | | | | | | | | | | | |
|----|---|------------------|--------------------|---------------------|------|---|---|---|---|---|---|---|---|---|---|---|------|---|---|---|---|---|---|---|--|--|--|--|
| | | | | | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | | | | |
| 1 | Substation Eng, Procurement, & Construction | 325 days | Mon 8/5/13 | Fri 10/31/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Engineering (Preliminary) - All Substation | 45 days | Mon 8/5/13 | Fri 10/4/13 | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Engineering (Detailed) - HL20S | 106 days | Mon 10/7/13 | Mon 3/3/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Procurement - HL20S | 183 days | Fri 10/18/13 | Tue 7/1/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Materials required onsite | 1 day | Thu 5/1/14 | Thu 5/1/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Construction - HL20S | 119 days | Tue 4/1/14 | Fri 9/12/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Testing & Commissioning | 10 days | Mon 9/15/14 | Fri 9/26/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Back Feed Date | 1 day | Fri 10/31/14 | Fri 10/31/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Transmission Line Eng, Procurement, & Construction | 287 days? | Thu 9/26/13 | Fri 10/31/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Engineering - HL20S Tie-In | 87 days | Thu 9/26/13 | Fri 1/24/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Procurement - HL20S Tie-In | 131 days | Thu 12/26/13 | Thu 6/26/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Construction - HL20S Tie-In | 67 days | Thu 6/26/14 | Fri 9/26/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | Energization HL20S | 1 day | Fri 10/31/14 | Fri 10/31/14 | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

HL20S 20 MW PV Facility Study
Project Milestone Schedule
Date: Fri 11/16/12

| | | | |
|--------------------|--|-----------------------|--|
| Task | | Duration-only | |
| Milestone | | Manual Summary Rollup | |
| Summary | | Manual Summary | |
| Inactive Task | | Start-only | |
| Inactive Milestone | | Finish-only | |
| Inactive Summary | | Progress | |
| Manual Task | | | |

APPENDIX C
SUBSTATION PHYSICAL LAYOUTS



FOR COST ESTIMATE ONLY
NOT FOR CONSTRUCTION



| | |
|-----------------------|-------------------------|
| date 10/22/12 | detailed G. GONZALES |
| designed H. D'BOUK | checked K. POWELL |



ELPASO ELECTRIC COMPANY
HL20S SUBSTATION
GENERAL LAYOUT

| | |
|-----------------------------|-------------|
| project 69671 | contract |
| drawing HL20S-LAY | |
| sheet 1 | of 1 sheets |
| file | |