Southwest Power Pool

Facility Study For Generation Interconnection Request GEN-2006-026

SPP Tariff Studies
(#GEN-2006-026)

March, 2007

Summary

Pursuant to the tariff and at the request of the Southwest Power Pool (SPP), Xcel Energy performed the following Facility Study to satisfy the Facility Study Agreement executed by the requesting customer and SPP for SPP Generation Interconnection request Gen-2006-026. The request for interconnection was placed with SPP in accordance SPP's Open Access Transmission Tariff, which covers new generation interconnections on SPP's transmission system.

Facilities Study For
[Omitted Text]

502-604 MW 2 in 1 Combined Cycle Natural Gas Generating Facility
Lea County, Hobbs, NM
SPP #GEN-2006-026

March 9, 2007

Xcel Energy Services, Inc.
Transmission Planning

Executive Summary

[Omitted Text] in October 2006 ("Interconnection Customer") requested the interconnection of a natural gas electric generating plant ("Plant") to the Southwestern Public Service Company (SPS) (d/b/a Xcel Energy, Inc) transmission network. This facility has a net capacity of 502 MW summer and 604 MW winter. The Interconnection Customer was chosen as a result of the Xcel Energy Commercial Enterprises request for proposal (RFP) for the SPS territory. The Interconnection Customer plans to build the generating plant in Lea County, N.M., one mile northwest of the SPS Maddox Plant in Hobbs, New Mexico. The Southwest Power Pool (SPP) evaluated the request to interconnect this generating facility to the SPS transmission system in a System Impact Study (SIS) (GEN 2006-026) completed in November 2006.

The interconnection request was studied using a two in one combined cycle generating plant composed of two 150 MW combustion turbines and one 210 MW steam turbine. The Interconnection Customer requested a back-feed date to the plant and commercial operation of January 1, 2008 and June 1, 2008, respectively.

Xcel Energy requires that all construction for this request be in compliance with the latest revision of the Xcel Energy Interconnection Guidelines for Transmission Interconnection Producer-Owned Generation Greater than 20 MW, Version 3.0 dated Dec 31, 2006, and is available at (http://www.xcelenergy.com/XLWEB/CDA/0,3080,1-1-1_16699_24407-1428-0_0_0-0,00.html). This document describes the requirements for connecting new generation to the Xcel Energy transmission systems including technical, protection, commissioning, operation, and maintenance. Xcel Energy will also require that the Interconnection Customer be in compliance with all applicable criteria, guidelines, standards, requirements, regulations, and procedures issued by the North American Electric Reliability Council (NERC), Southwest Power Pool (SPP), and the Federal Energy Regulatory Commission (FERC) or their successor organizations.

The Interconnection Customer is responsible for the cost of the Interconnection Customer's Interconnection Facilities and any Direct Assigned Facilities. The Interconnection Customer will be responsible for the cost incurred when SPS terminates from the Interconnection Facility to the Plant's high side dead-end structure.

It is anticipated that the entire process of constructing the new Interconnection Facility for the acceptance of the Plant's output, will require approximately 20 months to complete to include filing of the CCN, reviews, permits, engineering and construction. The cost of these upgrades, inclusive of the Interconnection Customer's cost for the interconnection of this Plant, is shown below in Table 1, with the detailed description of the cost shown in Table 4.

Table 1, Cost Summary[1]

Stand-alone Network Upgrades:	$9,669,639
Network Upgrade:	$5,875,891
Interconnection Facilities [2]:	$ **693,737**
Total:	**$16,239,267**

[1] The cost estimates are 2007 dollars with an accuracy level of ±20%, no AFUDC added.

[2] This is a direct assigned cost to the Interconnection Customer.

General Description of SPS[3] Facilities

1. **Construction a new Switching Station:** See Appendix A, Figure A- 1 for general vicinity location map.

   1.1. **Location:** Xcel Energy will construct a new switching station just to the north of the proposed generating plant located approximately one mile north of the existing SPS Maddox plant in Hobbs, New Mexico. Appendix A, Figure A- 2, shows a one-line of the new switching station, while Figure A- 3 shows a plan view of the new switching station.

   1.2. **Bus Design:** The bus design for this new switching station will be "breaker and a half" configuration with six (6) 115kV and two (2) 230 kV line terminals and one 150 MVA 230/115 kV autotransformer with the future possibility of adding two 230 kV and 345kV bus strings configuration to the west of the proposed switching station.

   1.3. **Line Terminals:** The 230kV, 115kV lines and static wire terminals will be designed to accommodate 2,000 pounds per phase conductor at maximum tension, with a maximum 15 degree pull off from normal.

   1.4. **Control House:** A control house approximately 20 feet by 78 feet will be installed to contain the metering, protection and control devices, terminal cabinets, and any fiber-optic cable terminations, etc.

   1.5. **Security Fence:** The switching station will have a 7-foot chain-link fence with steel posts set in concrete, with 1-foot of barbed wire on the top in a "V" configuration. The enclosed area will be approximately 585' × 500', with a rock yard surface.

   1.6. **Ground Grid:** A complete ground-grid will be installed per ANSI/IEEE STD 80-1986, with our standard 4/0 copper ground mesh on 40-foot centers with ground rods and 20-foot centers in corners and loop outside of fence.

   1.7. **Site Grading:** Company contractor, per company specifications, will perform initial site grading and erosion control of the new switching station. Soil compaction shall be not less that 95% of laboratory density as determined by ASTM-D-698.

   1.8. **Station Power:** The station power will be supplied from the 230/115 kV autotransformer's tertiary output. A backup station power source will be taken from local distribution if it is available or a generator will be installed if none is available. A flip-flop to automatically transfer the station power will be installed.

   1.9. **Relay and Protection Scheme**: The new switching station 115 kV line terminals to Cunningham Plant #1 & #2; Lea Co Interchange; and Maddox Plant will use a Charge Comparison System (CCS) and step distance relaying utilizing one SEL 311-L for primary protection. The backup protection will utilize one SEL 321-1 relay with directional comparison blocking scheme through mirrored bits over fiber optics. A fiber-optic system will be used as the pilot wire for the all CCS scheme. A SEL 279H-2 relay will be used for re-closing and a SEL 501-0 will be used for breaker failure scheme.

   The 115 kV lines to Taylor and Denver City Sub will utilize directional comparison blocking (DCB) over power line carrier with a Pulsar TC10B. A SEL 321-1 (DCB) and a SEL 311-C

[3] All modifications to SPS facilities will be owned, maintained and operated by SPS.

(step distance) will be used as primary and secondary relaying respectively. A SEL 279H-2 relay will be used for re-closing and a SEL 501-0 will be used for breaker failure.

The Lea Co 230 kV line relaying will utilize one SEL 311-L for primary protection, also using CCS. The backup protection will utilize one SEL 321-1 relay with directional comparison blocking scheme through mirrored bits over fiber optics. A SEL 279H-2 relay will be used for re-closing and a SEL 501-0 will be used for breaker failure scheme.

The Midland Sub 230 kV line relaying will be directional comparison blocking (DCB) over power line carrier with a Pulsar TC10B. A SEL 321-1 (DCB) and a SEL 311-C (step distance) will be used as primary and secondary relaying respectively. A Direct Transfer Trip (DTT) scheme will be added using a Pulsar TCF10B to this line terminal. A SEL 279H-2 relay will be used for re-closing and a SEL 501-0 will be used for breaker failure.

The new switching station to the Interconnection Customer's Generators line relaying will also use CCS and step distance relaying utilizing an SEL 311-L as primary protection. An SEL 321-1 relay with directional comparison blocking scheme through mirrored bits over fiber optics will be use as backup relaying. A SEL 279H-2 relay will be installed; however **there will not be any automatic re-closing**. The SEL 279H-2 will be used for line/bus conditions and sync check along with supervisory closing of the breaker. A SEL 501-0 will be used for breaker failure.

The bus voltage and GCB amps will be the SATEC PM type meters that shows all three phases eliminating the need for a switch and transducers. The batteries will be a set of 440 AH Varta batteries with a 75 amp charger.

1.10. **Revenue Metering:** The two 115 kV and 230 kV lines to the Interconnection Customer's generator, an individual billing meter will be installed along with an ION 8400 meter unit, ANSI C12.1 accuracy class 0.2 (3-PT's IEEE C57.13 accuracy class 0.3 and 3 CT's IEEE C57.13 accuracy class 0.15) for full 3 phase 4-wire metering. Also installed for the metering units will be 3-PT's and 3-CT's for full 3-phase 4-wire metering. There will be two meters per line terminal: one will be primary and the other will be back up, each will have full 4 quadrant metering. Pulses out of the primary billing meter will be sent via SCADA to the Transmission Owner's Control Center in Amarillo, Texas.

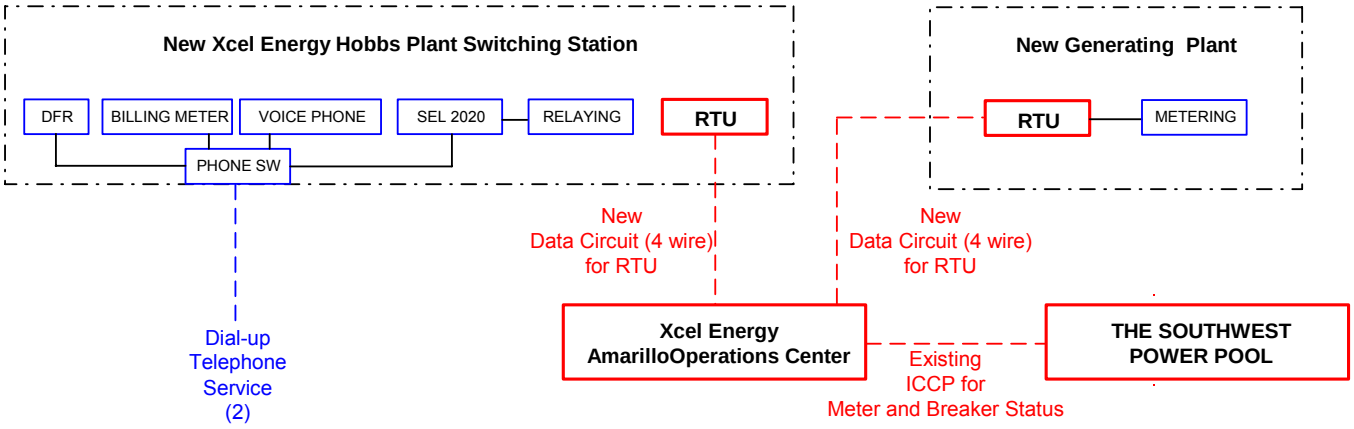
1.11. **Disturbance Monitoring Device:** Disturbance-monitoring equipment, capable of recording faults, swings, and long term trending, will be installed to monitor and record conditions in the substation and on the transmission lines. The disturbance equipment shall also be equipped with a GPS time synching clock. This equipment will have communication capability with a dedicated communication circuit. The disturbance equipment will have its own dedicated dial-up communications telephone circuit.

1.12. **Remote Terminal Unit (RTU):** A new RTU will be utilized with communications for the new switching station. An SEL 2020 will be installed for relay communications and other functions as required. SPS will provide and install an RTU for metering and telemetry at the interconnection costumer facility as required by the latest Xcel Energy Interconnection Guidelines. The direct cost will be charge to the interconnection costumer.

1.13. **Communications:** Communications from the new switching station to the Amarillo Control Center will consist of a telephone and data circuit. ***It is the Interconnection Customer's responsibility to make arrangements with the local phone company to provide both the four-wire data circuit and both telephone circuits to the new switching station and the***

new generation facility. Prior to any construction the Interconnection Customer is required to contact the Xcel Energy substation-engineering department for all details.

A schematic outlining the proposed communications is provided below:



2. **Transmission Work:**

The Interconnection Customer will construct, own, operate, and maintain any customer owned 115kV and 230 kV transmission line from the Interconnection Customer's substation to the new switching station. ***The Xcel Energy transmission design group prior to any construction by the Interconnection Customer or its contractor on any customer owned 115kV and 230 kV transmission lines, or doing work in close proximity to any SPS transmission line, will require an engineering review of the customer's design. It is the Interconnection Customer's responsibility to initiate the design review in a timely manner before construction of any transmission line begins. If the review has not been made or the design at any of the aforementioned locations is deemed inadequate, the crossing(s) and or termination into the new switching station will be delayed until the matters are resolved. Xcel Energy will not be held responsible for these delays.***

2.1. **Circuit K-49:** SPS will re-route and terminate the existing 230 kV transmission circuit from Lea Co Interchange to Midland Sub (K-49) to the new SPS switching station. The work will consist of four 3-pole corner/termination structures and two wood tangent structures, all on 2 separate lines. The conductor used is 2-conductor bundled 795 MCM ACSR.

2.2. **Circuit V-96:** SPS will re-route and terminate the existing 115 kV transmission circuit from Maddox Plant to Lea Co Interchange (V-96) to the new SPS switching station. The work will consist of four H-frame corner/termination structures and one wood tangent structure, all on two separate lines. The conductor is 795 MCM ACSR.

2.3. **Circuit T-15:** SPS will re-route and terminate the existing 115 kV transmission circuit from Cunningham Plant to Taylor Interchange (T-15) to the new SPS switching station. The work will consist of a steel, single pole, double circuit in and out tap; two single pole termination structures, one single pole corner structure and two single pole tangent structures. The conductor is 397.5 MCM ACSR.

2.4. **Circuit V-54:** SPS will re-route and terminate the existing 115 kV transmission circuit from Cunningham Plant to Denver City Interchange (V-54) to the new SPS switching station. The work will consist of a steel, single pole, double circuit in and out tap; two single pole

termination structures; one single pole 45 deg angle structure and two single pole tangent structures using 397.5 MCM ACSR conductors.

2.5. **Generating Plant to Substation Terminations:** The Interconnection Customer is responsible for terminating the outputs from their generators to the new SPS switching station buses as shown in Appendix A, Figure A- 4. The 210 MW steam turbine output will terminate at the 230 kV bus and the two-150MW combustion turbine output will terminate at the 115 kV bus as indicated in Appendix A, Figure A- 3 to Figure A- 5.

2.6. **Termination Structure:** The Interconnection Customer's line termination structures located south of the new switching station will require final approval from the Xcel Energy Transmission Design Group. This is to assure, but is not limited to, the maintaining of proper clearance on the slack span from the termination structure into the substation. SPS will terminate from the 230 kV and 115kV bus at the new switching station to the Interconnection Customer Generating Plant facility as shown Appendix A, Figure A- 3 thru Figure A- 5.

3. **Right-Of-Way:**

3.1. **Switching Station Real Estate:** SPS will provide Interconnection Customer with easement detailing the metes and bounds description for the required switching station real estate. The Interconnection Customer will obtain all necessary signatures from landowner(s) for the easement needed on the land where the new SPS switching station will be built.

3.2. **Permitting**: Permitting for the construction of this new switching station is required from the New Mexico Public Utility Commission.

4. **Construction Power and Distribution Service:** It is the sole responsibility the Interconnection Customer to make arrangements for both construction and station power, which may be required for the Interconnection Customer's generating facility. **Additionally, if the Interconnection Customer's substation(s) and/or construction site(s) are located outside of the Xcel Energy service area, Xcel Energy cannot provide station power (retail distribution service) and the Interconnection Customer needs to make arrangements for distribution service from the local retail provider.**

5. **Project and Operating Concerns:** Close work between the Transmission group, the Interconnection Customer's personnel and local operating groups will be imperative in order to meet any in-service date that has been established.

6. **Fault Current Study:** The available fault current at the interconnection location, without any contribution from the generating facility, is shown in Table 2 while fault currents available with contribution from the generating facility is shown in Table 3. The addition of the Generating Plant will raise the available fault current in the area. An analysis was also performed with and without the existing Cunningham/Maddox Plant generation to determine if the circuit breakers had adequate single line to ground and three phase interrupting capability. The results of that upgrade are shown in Appendix A, Table A - 1 and Figure A- 6 for breaker location. SPS's philosophy is to replace any breaker with less than 5% margin (shown as a –5% in the table) for either line to ground or three phase faults. Table A - 1 was prepared assuming that all generation is running including Hobbs Plant, Maddox Plant, and Cunningham Plant. If only Hobbs Plant is running, then only breakers at Cunningham (L900, L920, L930, and L950) must be replaced. Priority will be given to these breakers and then the most under-rated breaker in the replacement program.

Table 2, Available fault current at interconnection location

Table 2: Short Circuit Information "without" contribution from Hobbs Generating Facility				
Fault Location	Fault Current (A)		Impedance (p.u Ω)[4]	
	Line-to-Ground	3–Phase	Z^+	Z^0
230 kV Bus	10,539	9,225	0.00011457+j0.0270485	0.0007762+j0.0168416
115 kV Bus	23,085	18,791	0.0011802+j0.02264344	0.0004541+j0.0117105

Table 3, Available fault current at interconnection location

Table 3: Short Circuit Information "with" contribution from Hobbs Generating Facility				
Fault Location	Fault Current (A)		Impedance (p.u Ω)[5]	
	Line-to-Ground	3–Phase	Z^+	Z^0
230 kV Bus	12,670	11,832	0.0006629+j0.0211139	0.0007762+j0.0168416
115 kV Bus	29,553	25,592	0.0004096+j0.0194483	0.0004541+j0.0117105

[4] Z^+ – Positive Sequence Impedance in p.u on a 100 MVA base
Z^0 – Zero Sequence Impedance in p.u on a 100 MVA base
[5] Z^+ – Positive Sequence Impedance in p.u on a 100 MVA base
Z^0 – Zero Sequence Impedance in p.u on a 100 MVA base

Estimated Construction Costs

The projects required for the interconnection of this 502-604 MW generating facility consist of the projects summarized in the table below:

Table 4, Required Interconnection Projects[6]

Project	Description	Estimated Cost
	Stand-alone Network Upgrade	
1	Hobbs Plant Switching Station Facility	$ 9,514,514
2	Control House	$ 80,750
3	Disturbance Monitoring Device	$ 74,375
	Subtotal:	**$9,669,639**
	Network Upgrade	
4	Relay Upgrades at remote terminals	$ 320,000
5	Transmission Line Work	$ 2,493,857
6	Overstressed Breakers Upgrade	$ 2,968,034
7	Right-Of-Way [7]	$ 94,000
	Subtotal:	**$5,875,891**
	Interconnection Facilities (at the Interconnection Customer's expense)	
8	Communications [8]	*$ see footnote*
9	Remote Terminal Unit (RTU)	$ 45,000
10	Revenue metering	$ 201,451
11	230 kV and 115 kV Line arrestors	$ 49,000
12	Transmission Work Termination	$ 398,286
	Subtotal:	**$ 693,737**
	Total Cost:	**$16,239,267**

As of the date of this report, this project has not been granted internal management approval by Xcel Energy, nor has the necessary construction resource planning been performed. The required approval process and construction resource planning may impact this project's feasible in-service date.

Engineering and Construction:

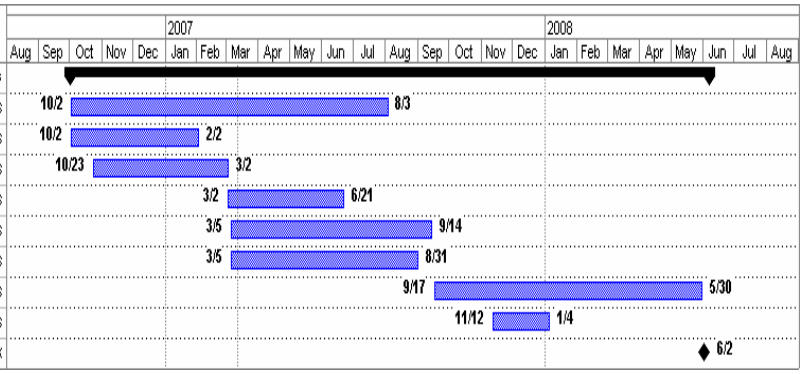
An engineering and construction schedule for this project is depicted below and is estimated at approximately 20 months. The schedule is shown for project duration purposes only and other factors associated with clearances, equipment delays and work schedules could cause additional delays. The schedule below is applicable after all required agreements are signed and internal approvals are granted.

[6] The cost estimates are 2007 dollars with an accuracy level of ±20%, no AFUDC added.

[7] Surveying cost; Interconnection Customer will acquire the Xcel Energy easement needed for the land upon which the new switching station will be built, see Section 3.1.

[8] It is the Requester's responsibility to provide both the data circuit and both dial-up telephone circuits, see Section 1.13.

ID		Task Name	Duration
1		**Hobbs Generation Plant**	**440 days**
2		Transmission route selection	44 wks
3		Engineering	18 wks
4		Prepare CCN filing (including environmental reviews & permits)	4.75 mons
5		File CCN	4 mons
6		Order substation material	28 wks
7		Order Transmission line material	26 wks
8		Substation construction	37 wks
9		Transmission line construction	8 wks
10		Substation commissioning	1 wk



All additional cost for work not identified in this study is the sole responsibility of the Interconnection Customer unless other arrangements are made.

Appendix A

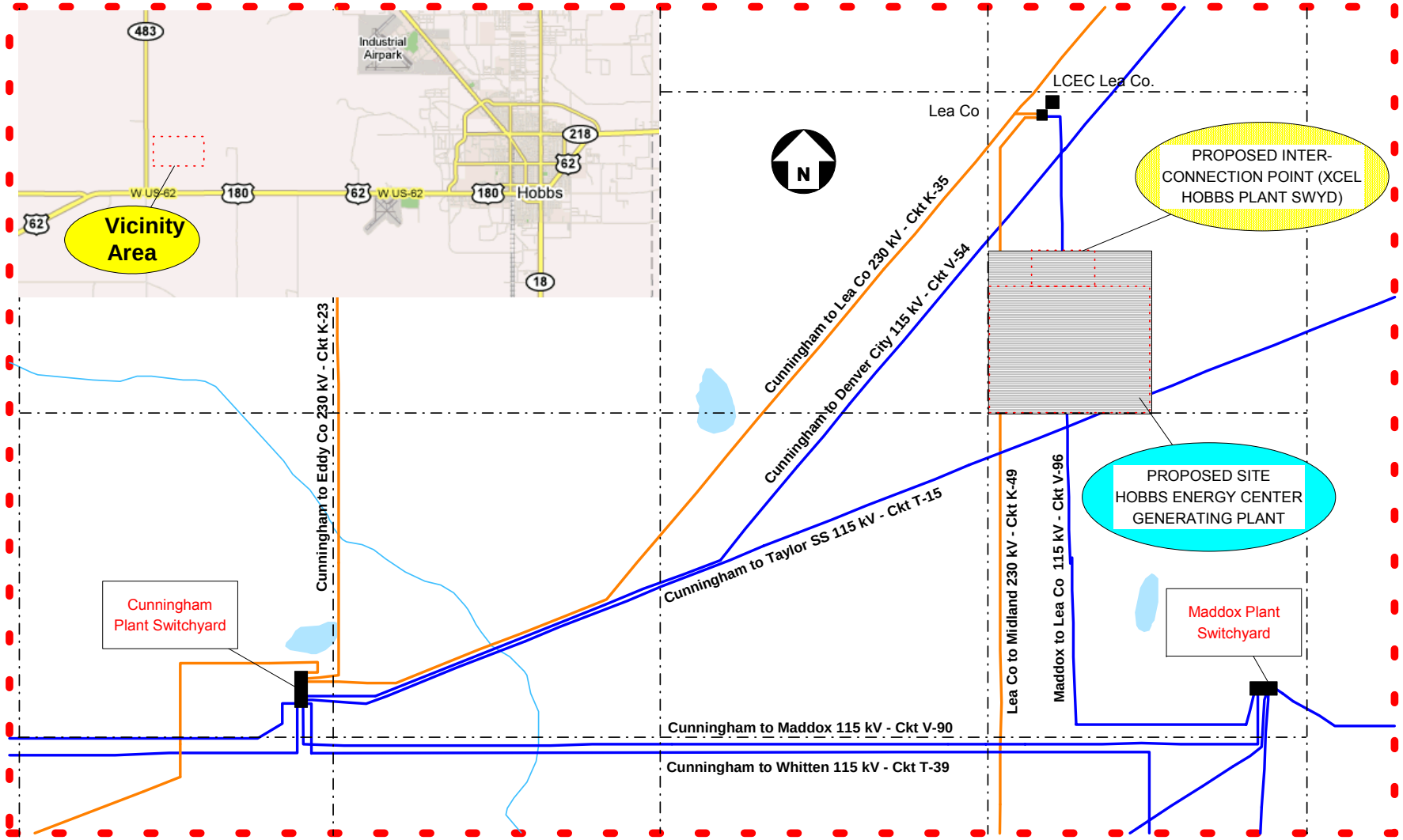


Figure A- 1 Approximate location of proposed switching station

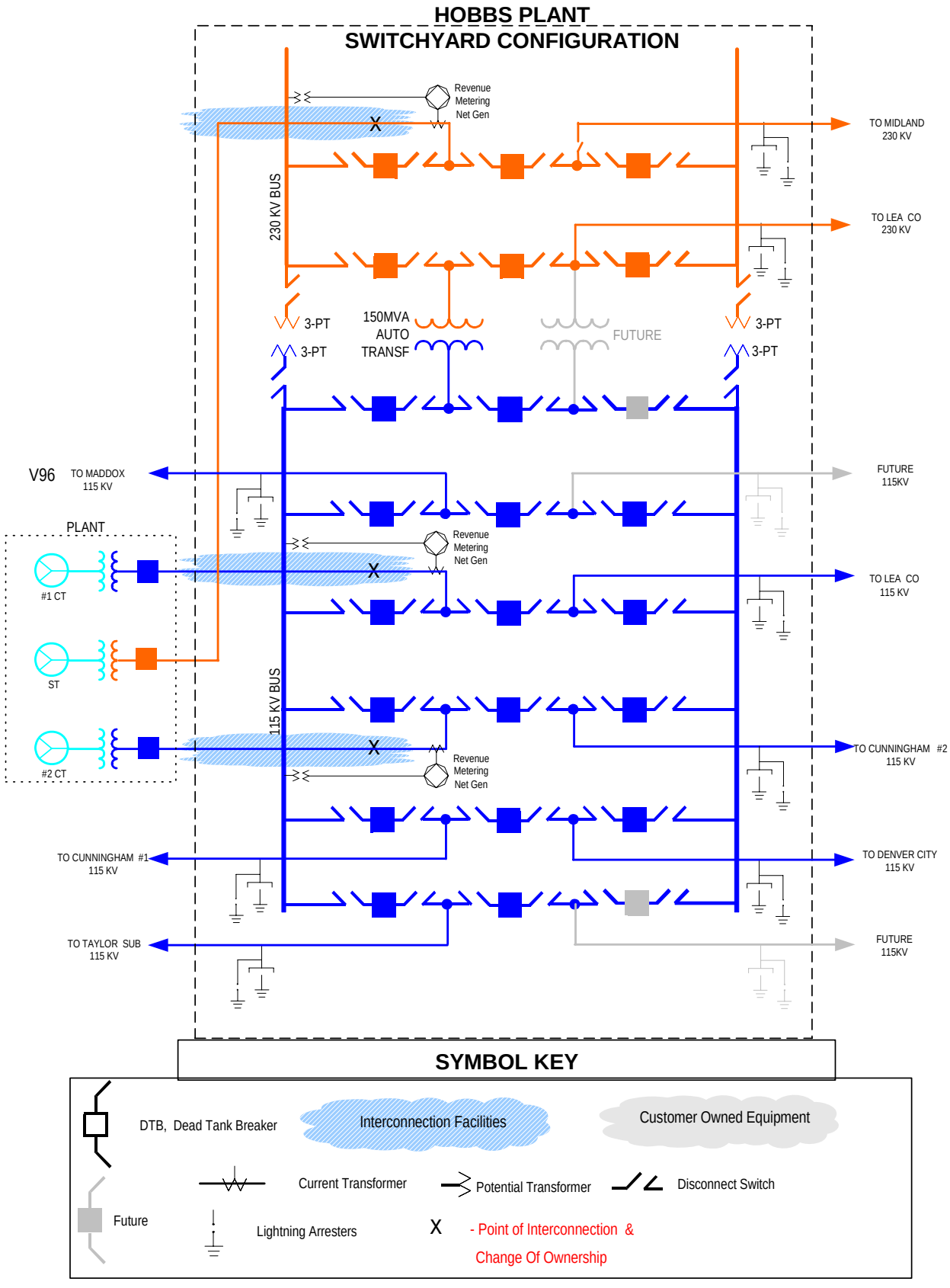


Figure A- 2 One-line Diagram of New Switching Station

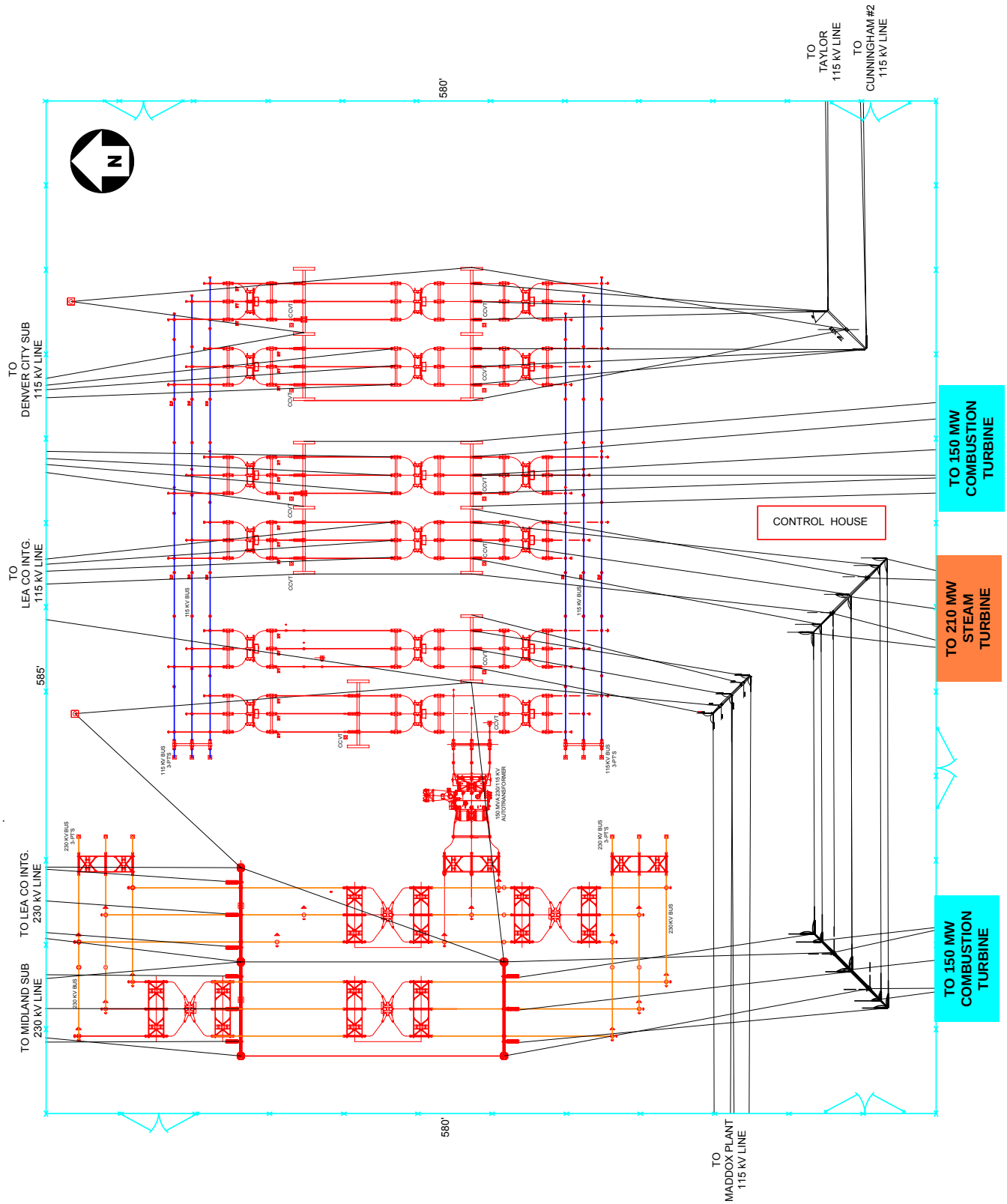


Figure A- 3 Hobbs Plant Interconnection Facility Plan View

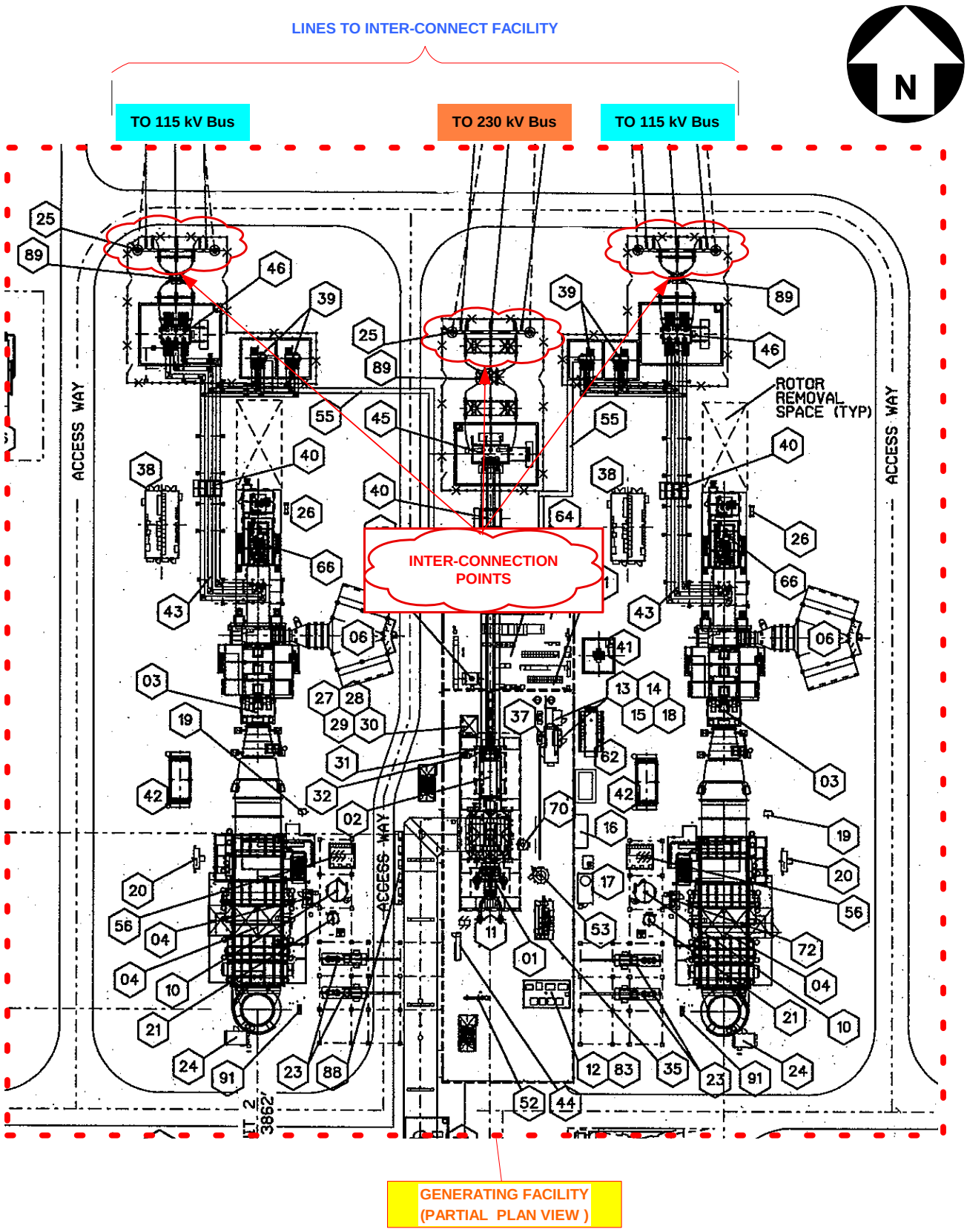
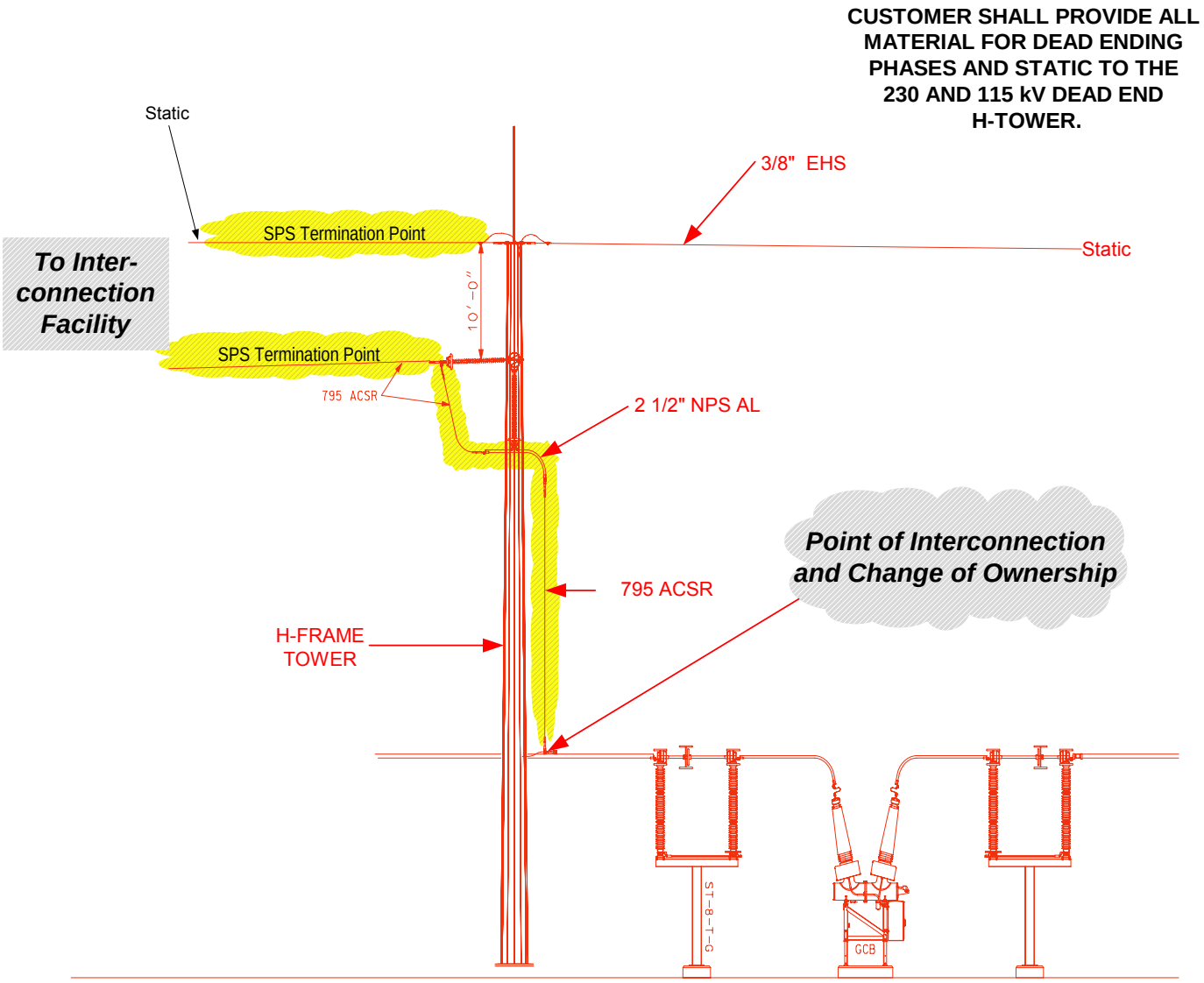


Figure A- 4 Hobbs Plant Generating Facility Plan Partial View



Interconnect Point at Generating Facility
(Typical for both 230 & 115 kV voltage levels)

Figure A- 5 Point of Interconnection & Change of Ownership (Typical)

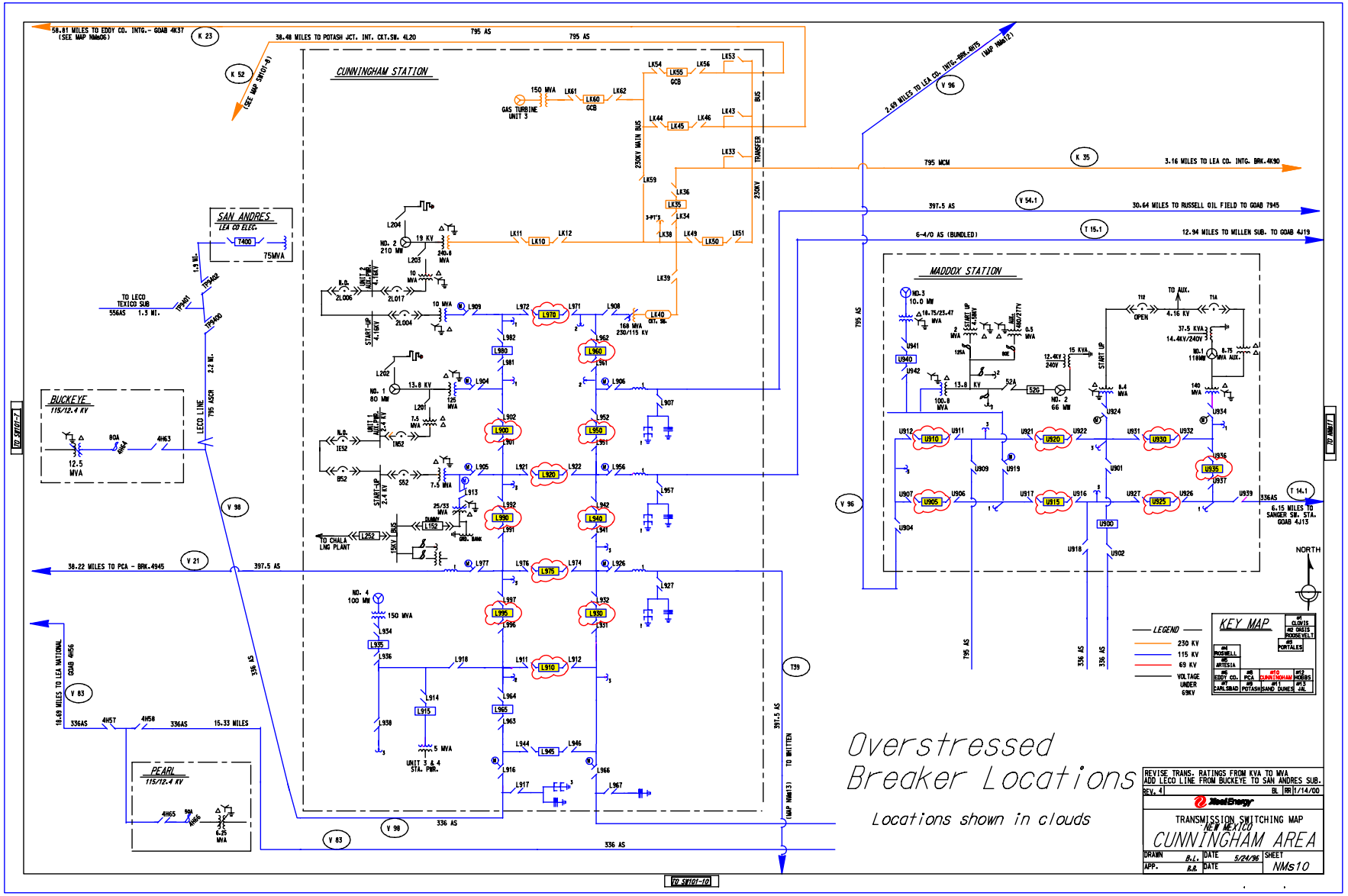


Figure A- 6 Overstressed breakers Location

Table A - 1 Overstressed Breakers

Substation	Breaker	Breaker Duty Margin in Percent [9]	
Location	Number	3 Phase	SLG
Cunningham	L950	-65.1	-89.9
Maddox	U905	-65.2	-67.7
Cunningham	L920	-35.0	-56.9
Cunningham	L900	-35.0	-56.9
Cunningham	L930	-34.3	-56.0
Maddox	U910	-51.6	-53.4
Cunningham	L975	-18.1	-37.3
Cunningham	L995	-18.1	-37.3
Cunningham	L960	4.0	-11.7
Cunningham	L910	5.5	-9.8
Cunningham	L970	5.5	-9.8
Cunningham	L940	-5.6	-5.6
Cunningham	L990	12.1	-5.4
Maddox	U915	1.9	-3.8
Maddox	U925	1.9	-3.8
Maddox	U920	2.5	-3.1
Maddox	U930	2.5	-3.1
Maddox	U935	2.7	-2.8

[9] A " Zero" value means breaker is at 100% capability. A "positive" number means above 100% capability and the breaker has adequate capacity. A "negative" number means it is less than 100% capability and the breaker must be replaced.

– END OF REPORT –