



TRANSMISSION LINE & SUBSTATION PROJECTS
COMPANY:ENTERGY GULF STATES LOUISIANA, LLC

CUSTOMER: PID 246

FACILITIES STUDY

EJO NO. F4PPGS0466

PID 246 GENERATOR INTERCONNECTION

Revision: 0

Rev	Issue Date	Description of Revision	Prepared By	Approved By
A	8/19/10	Initial Draft by PM	BPH	RT
B	9/14/10	Updated with Transmission Design Input	BPH	RT
C	9/27/10	Updated with Final Cost	BPH	RT
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1. PROJECT SUMMARY

1.1 Background and Project Need

The purpose of this Facilities Study is to determine the availability to connect a new generation facility and provide the transfer capability at the point of interconnection. Also increased load flows, produced by making this interconnection, will be identified. This facility study will evaluate PID 246 request for interconnection of a total of 36.4 MW of combined cycle generation. The customer has requested a 20% estimate. Based on available time to complete the Facilities Study and in light of lack of survey, soil borings, environmental permitting, property owner's issues, etc, a good faith estimate has been provided. Many assumptions had to be made which could affect the overall accuracy of this estimate.

To evaluate this request, a study was performed on the latest available 2014 summer peak case, using PSS/E and MUST software by Siemens Power Technologies International (Siemens-PTI). The short circuit study was performed on the Entergy system short circuit model using ASPEN software.

The Facilities Study will identify the transmission interconnection requirements, any transmission constraints resulting from the requested power transfer, and any additional study also includes cost estimates to correct any transmission constraints.

The customer has requested Energy Resource Interconnection Service (ERIS) only. The System Impact Study indicated that under ERIS, the additional generation due to PID 246 generator does not cause an unacceptable increase in short circuit current; therefore no upgrades were identified for ERIS.

1.2 Customer Facilities

The customer facility in Sulphur, Louisiana operates two high temperature rotary kilns to process petroleum coke. The exhausts of the rotary kilns are combined and exit to atmosphere at temperatures ranging from 1800°F to 2100°F through a refractory lined stack. The proposed project would capture the lost energy and co-generate electricity for use at the facility and for sale to Entergy. A condensing steam-driven turbine generator would produce 36.4 MW of electricity. Up to 4 MW of the generated power will be consumed at the facility and the remainder exported to Entergy's Transmission system.

Under this proposal, the customer will install, own and operate the new generator, a new substation and a new 69kV tie circuit which will connect the proposed generation to the Entergy power grid. Minimum customer substation requirements include one 13.8/69kV step up power transformer, one 69kV circuit breaker to be utilized for the 69kV tie circuit and associated system protection/control equipment. The customer owned 69kV tie circuit shall be routed from the proposed customer substation to the existing Entergy Lone Star Cement 69/13.8kV Substation. The point of interconnection between the customer and Entergy is where the customer 69kV tie circuit connects to the Entergy Lone Star Cement Substation 69kV breaker disconnect switch.

1.3 Scope Summary

A. *Scope for NRIS:*

NRIS was not requested by customer.

B. *Scope for ERIS:*

- The ERIS was based on a request for interconnection on Entergy's transmission system located at the Lone Star Cement 69kV substation.
- A short circuit analysis was performed to determine if the proposed generation would cause the available fault current to surpass the fault duty of existing equipment within the Entergy transmission system. The analysis determined that additional generation proposed by PID 246 does not cause an increase in short circuit current such that it exceeds the fault interrupting capability of high voltage circuit breakers within the vicinity of PID 246.
- A Stability Study was performed to evaluate the impact of PID 246 on the stability of the Entergy transmission system and nearby generating stations. The study concluded that no stability violations exist following simulated three-phase normally cleared faults and single phase stuck-breaker faults. Additionally, no voltage criteria violations were observed.

1.4 Impact of Priors

PID 246 does not depend on other ongoing or planned Entergy Projects. As a result, the status of previously identified Entergy projects does not impact the cost or schedule of this interconnection.

1.5 Cost Summary

- The estimated total project cost is **\$2,267,964**. This amount includes AFUDC that may not be applicable based on how project is funded. This cost does not include Tax Gross Up. New interconnection with a generator can qualify for non-taxable treatment to Entergy if the IRS safe harbor requirements are satisfied.
- The ICT has assigned **\$2,267,964** as Supplemental Upgrades based on Attachment "T" of Entergy's ICT (Independent Coordinator of Transmission) filing to the FERC.

1.6 Schedule Summary (Worst Case)

The customer requested in service date for this interconnection is March 2012. Entergy's ability to complete the interconnection is not dependant on any other planned or ongoing Entergy projects. All work orders identified in the work scope below must be completed prior to providing an available interconnection point to the customer.

The table below includes an estimated completion date for each Entergy work order that is required to complete the customer interconnection. These dates are based on a preliminary (un-baselined) project schedule and assume that funding authorization is obtained no later than **January 17, 2011**. No significant outage approvals or permitting requirements have been identified.

Based on an assumed start date of **January 17, 2011** the estimated completion date of the project is **March 30, 2012**. See Attachment G for summary project schedule.

Project Name	Requested ISD	Estimated ISD
Choupique-Catalyst, Install Fiber on L-15	March 2012	3/30/12
Lone Star Cement to L-15 Tap, Install Fiber on L-293	March 2012	3/30/12
Lone Star Cement – Install 69kV breaker position	March 2012	3/30/12
Choupique Sub, Upgrade L-15 Relaying	March 2012	3/30/12
Catalyst Sub, Upgrade L-15 Relaying	March 2012	3/30/12

1.7 Long Lead and Major Material / Equipment

Quantity	Material Description	Lead Time (Weeks)
1	69kV Breaker (40kA, 3000A)	14-16
1	Prefabricated Control House (16' x 24')	16-18
3	69kV Disconnect Switch	14-16
3	Metering Accuracy PT's	16-18
3	Metering Accuracy CT's	16-18
1	69kV Adder Bay (lattice steel)	14-16
4	69kV Equipment Pedestal	14-16
1	15kV Disconnect Switch	14-16
15425 ft	DNO-8161 48 Fiber Optic – AlumaCore Cable (Line 15)	14-16
5100 ft	DNO-8161 48 Fiber Optic – AlumaCore Cable (Line 293)	14-16
7	Breaker control and/or relay panels	12-14
2	D400 RTU	10-12
3	69kV CCVT (used for line synchronization)	12-14

2. SAFETY

Safety is a priority with Entergy. Safety will be incorporated into all substation and transmission line design. Each design will consider safety during initial construction, future operation, and future maintenance of the equipment.

The *National Electric Safety Code* and the *National Electrical Code* will be used as standards for the design & construction of the identified projects.

Should the work contained within this Facility Study be approved, a detailed Safety Plan will be formulated and incorporated within the project plan.

3. GENERAL ASSUMPTIONS

- Upon receipt of formal approval from customer authorizing design and construction, Entergy will prepare a detailed project execution plan.

- Estimate assumes that any property required for the substation expansion will be provided to Entergy by the customer at no cost.
- Estimate assumes that any underground obstructions (customer owned) located within the expansion area will be relocated by the customer.
- Due to timing constraints, surveys and soil borings were not performed when developing this facility study. As a result, civil design may be modified during detailed design which could impact the project cost. No contingent dollars were allocated for this risk.
- Due to timing constraints, a relay impact analysis was not performed. This study will be performed upon project approval and may identify additional requirements for remote station relay and/or CT replacements. No contingent dollars were allocated for this risk.
- Estimate assumes that the customer will conduct a phase two environmental assessment and will share the test results with Entergy. Testing is mandatory to mitigate industrial hygiene concerns for Entergy employees/contractors and to determine if contaminants are present in any spoils that will be created during construction.
- It is assumed that all spoils generated during substation construction will remain on the customer property and spoil disposition will be addressed by the customer. All spoils will be stockpiled near the substation by Entergy.
- The work plan for this interconnection includes use of a mobile substation to avoid long term customer outages during planned construction. This scope assumes that an Entergy mobile substation will be available for project use during construction. A short outage (1 day) will be required to connect the mobile substation and a short (1 day) outage will be required to disconnect the mobile sub. The tap to the mobile sub will involve approximately 3 temporary structures installed to the south of existing fence line, between the new control house and the substation steel. Entergy will coordinate with customer schedule when planning any total outages.
- Assumption was made that all local permits will be filed 60 days before start of construction.
- Assumption was made that no Environmental Permits are required for this installation.
- The quantities of materials listed in this document are approximate and could change with completion of detail design.
- Assumption was made that all existing transmission structures will be re-used for fiber optic installation.
- Assumption was made that laminated matting is required to install fiber optic cable between Catalyst, Choupique and Lone Star Cement Substations. A contingent budget of \$134,957⁺⁺ was allocated within the estimate to address this risk.
- Assumption was made that the existing customer distribution feed is adequate and no additional auxiliary components are required.
- All costs above represent good faith estimates in today's dollars. Price escalation for work in future years has not been included.

4. SCOPE OF WORK

4.1 Choupique-Catalyst, Install Fiber on L-15

General: See attachment B. Installation of a new 69kV breaker position at Lone Star Cement Substation will create a three terminal line between Catalyst Substation, Choupique Substation and Lone Star Cement Substation. Existing line relaying at the remote ends must be upgraded to a dual primary, direct fiber relay scheme in order to mitigate false trips to other industrial customers in the area. The upgraded relay scheme requires installation of fiber optic communications between all three substations. The fiber will be installed in the shield wire position along the existing 69kv transmission line (L-15) between Choupique Substation and Catalyst Substation. The total distance between these two stations is approximately 2.58 miles. L-15 is built on typical single circuit 69kV concrete and wooden structures with a typical ruling span average length of 300 feet. Structures #1 to #30 were designed to accommodate single 336 kcmil ACSR conductor rated for 605 amperes at 75 deg. Celsius or 212 deg. Fahrenheit. Structures #206/108-#103, and #37 to Choupique substation were designed to handle single 795 AA conductor rated for 1010 amperes at 75 deg. Celsius or 212 deg. Fahrenheit. 15,425 feet of 48 Fiber Optic 'AlumaCore' shield wire is required for this installation. The fiber optic cable will be installed on the east side of the transmission line from the dead-end tower at Catalyst Substation to Structure numbers 1, 1A, 1B, 2-30, 206/108-103, 37-47, and to the north side to the dead end tower at Choupique Substation. Three (3) splices boxes will be installed and the fiber will be spliced at the following structures: Catalyst Substation dead end tower, structure #15/11, and Choupique Substation dead end tower. *NOTE: Structures 1A, 27, 37-47 are typical concrete structures.* The existing 13,622 feet of 5/16" EHS static shield wire and associated hardware will be removed between Catalyst Substation to Choupique Substation.

Right of Way: No new/additional ROW is required for the fiber installation.

Right of Way Clearing: No ROW clearing is required for the fiber installation.

Permitting and Wetland Mitigation: It is assumed that no wetland mitigation is required for the fiber optic installation.

Design Criteria: Physical loadings will comply with NESC Medium and Light Loading Districts

Structures and Foundations: It is assumed that no new transmission line structures or foundations are required for fiber optic installation.

Conductor: No new conductor is required for the fiber optic installation.

Shield Wire: The new 'AlumaCore' fiber optic shield wire will replace the existing 5/16" EHS static shield wire.

Communications: 2.58 miles of OPGW fiber will be installed in the shield wire position along the existing Choupique-Catalyst L-15 pole line.

Removals: The existing 13,622 feet of 5/16" EHS static shield wire and associated hardware will be removed between Catalyst Substation to Choupique Substation.

Task/WO Specific Assumptions: The project team assumes that existing transmission structures are in good condition and will facilitate installation of the new fiber optic shield wire. All quantities of materials listed in this document are approximate and could change with completion of detailed design.

4.2 Lone Star Cement to L-15 Tap: Install Fiber on L-293

General: See attachment B. Installation of a new 69kV breaker position at Lone Star Cement Substation will create a three terminal line between Catalyst Substation, Choupique Substation and Lone Star Cement Substation. Existing line relaying at the remote ends must be upgraded to a dual primary, direct fiber relay scheme in order to mitigate false trips to other industrial customers in the area. The upgraded relay scheme requires installation of fiber optic communications between all three substations. The fiber will be installed in under build position along the existing 69kv transmission line (L-293). The total distance from Lone Star Cement Substation to the L-15 tap location is approximately 0.78 miles. L-293 is built on typical single circuit 69kV wooden structures with a typical ruling span average length of 300 feet. The structures 15/11, 12 to 25 were designed to accommodate single 336 kcmil ACSR conductor rated for 470 amperes at 75 deg. Celsius or 212 deg. Fahrenheit and structures 25 to Lone Star Cement substation were designed to handle single 336 AA conductor rated for 700 amperes at 75 deg. Celsius or 212 deg. Fahrenheit. 5,100 feet of 48 Fiber Optic 'AlumaCore' shield wire is required for this installation. The fiber optic cable will be installed on structure numbers 15/11, 12-25, and to the south side to the dead end tower at Lone Star Cement. One (1) splice box will be installed at the Lone Star Cement Substation dead end tower. The existing 4,119 feet of 5/16" EHS static shield wire and associated hardware will be left intact from the L-15 Tap to Lone Star Cement Substation.

Right of Way: No new/additional ROW is required for the fiber installation.

Right of Way Clearing: No ROW clearing is required for the fiber installation.

Permitting and Wetland Mitigation: It is assumed that no wetland mitigation is required for the fiber optic installation.

Structures and Foundations: It is assumed that no new transmission line structures or foundations are required for fiber optic installation.

Conductor: No new conductor is required for the fiber optic installation.

Shield Wire: No new shield wire is required for the fiber optic installation.

Communications: 0.78 miles of OPGW fiber will be installed in the under built position along the existing Lone Star Cement to L-15 tap location. Installation in the shield position was dismissed due to total outages that are required on all radial customers served out of Lone Star Cement Substation.

Removals: N/A

Task/WO Specific Assumptions: The project team assumes that existing transmission structures are in good condition and will facilitate installation of the new fiber optic shield wire. All quantities of materials listed in this document are approximate and could change with completion of detailed design.

4.3 Lone Star Cement: Install 69kV breaker position

General: See attachments C, D, E and F. The scope at Lone Star Cement Substation is to modify the station to accept a 37MW customer generator tie. The substation currently consists of one fused 7MVA transformer, one customer dedicated 13.8kV fused feeder and one 13.8kV fused feeder that serves other area customers. The station is a radially served, tapped load served from 69kV transmission Line 15 between Choupique and Catalyst Substations.

Site: In order to facilitate the customer 69kV generator interconnection tie circuit, the station footprint will be expanded to the north, west, and south as per the preliminary electrical arrangement. This scope assumes that the customer will relocate underground customer owned facilities as needed to facilitate substation expansion. All vegetation and topsoil will be removed from the new expansion area and resurfaced with crushed limestone. This scope assumes that the asphalt roadway located on the west and south side of the station will be removed as needed for the expansion. Geotechnical Soil Data and survey/topo data were not available when writing this scope. It is also assumed that the top 1' of soil in the expansion area will need to be removed and replaced with fill.

The site scope of work includes:

- ❖ The site will be cleared and graded with provisions for appropriate drainage.
- ❖ Approximately 215' of the existing station fence (including two gate entrances) will be removed and 330' of new station fence (with three new gate entrances) will be installed for the new footprint.
- ❖ One (1) abandon wooden pole will be removed from the yard.
- ❖ Approximately 285 cyd of compacted fill will be installed.
- ❖ 6" of crushed limestone (approximately 215 tons) will be installed over the expanded area.

Foundations: Foundations will be installed for the new 69kV adder bay, metering PT's and CT's, the new 69kV breaker position, a single 69kV CCVT position and a new control house. Specific foundation design will be determined during detailed design, after soil borings have been obtained. Existing scope assumes that piles are not required.

The foundation scope of work includes:

- ❖ Two (2) foundations will be installed for the new 69kV adder bay as per standard drawing SBFD01A0.
- ❖ One (1) foundation will be installed for the new 69kV gas circuit breaker.
- ❖ One (1) foundation will be installed for a new 1Ø CCVT pedestal.
- ❖ One (1) foundation will be installed for the new 3Ø CT's pedestal. The foundation consists of two (2) footers.
- ❖ Three (3) foundations will be installed for the new 1Ø PT's pedestal.

- ❖ One (1) set of foundation will be installed for the new control house.
- ❖ Approximately 1200' of new PVC conduits will be installed from the control house to the new construction. This includes the run for the fiber optic cable.
- ❖ All new construction including perimeter ground and 19 #9 copperweld "pigtailed" will be tied to the existing ground grid as per Entergy grounding standards.
- ❖ Three (3) existing abandoned foundations will be removed from underneath the existing 69kV bay.

Electrical: A new 69kV adder bay will be installed to facilitate the new bus work and equipment. A new control house is also required to enclose relaying associated with this equipment. A concrete control house is needed in order to obtain the required code fire rating due to spatial clearance between the control house and the transformer. The new 69kV bus work will be connected to the existing 69kV bus work and will extend westward. In addition, a 15kV gang operated switch will be installed on the low side for isolating the transformer and feeder. A station outage is required to install the new 69kV adder bay and bus work. In order to reduce planned outage time to customers, a mobile substation will be used to supply customer electrical feeds while the station is de-energized.

The electrical scope of work includes:

- ❖ One (1) 69kV 3000A 40KA gas circuit breaker will be installed as per the preliminary electrical arrangement. The breaker will be oriented such that the control cabinet is facing east.
- ❖ Three (3) 69kV 2000A vertical break disconnect switches will be installed as per the preliminary electrical arrangement. Two (2) of the switches that are associated with the line terminal will be equipped with a ground switch attachment. The switches will be mounted on the new 69kV adder bay.
- ❖ Three (3) 69kV metering PT's will be installed as per the preliminary electrical arrangement. The PT's will be mounted on GSU 8' equipment pedestal as per standard drawing CEPASPPB to match existing construction.
- ❖ Three (3) 69kV metering CT's will be installed as per the preliminary electrical arrangement. The CT's will be mounted on GSU 8' equipment pedestal as per standard drawing CEPASPPC to match existing construction.
- ❖ One (1) 69kV CCVT will be installed and used for Transmission line synchronization.
- ❖ One (1) concrete control house will be installed as per the preliminary electrical arrangement.
- ❖ Replace the 15kV bus support outrigger with a new 15kV switch support outrigger (Field modification will be required to mount the new outrigger on existing feeder bay).

- ❖ One (1) 15kV 1200A gang operated vertical break disconnect switch will be installed on the new outrigger as per preliminary electrical arrangement.
- ❖ All new strung bus will be 4/0 Cu. (rated at 523A) minimum.

Relay: Installation of the new breaker position at Lone Star Cement will create a three terminal line that currently utilizes tone relaying. In order to mitigate relay coordination concerns associated with a three terminal line, Entergy must install direct fiber relaying between Lone Star Cement Substation, Choupique Substation and Catalyst Substation. The direct fiber scheme will incorporate dual primary relaying via SEL 421 and SEL 311L at all three Entergy substation sites in order to mitigate risk to other industrial and commercial customers in the 69kV loop.

Relaying is also required between the proposed new 69kV breaker position at Lone Star Cement Substation and the customer substation. The customer will install a 69kV breaker at their switchyard. The customer station will be located approximately 1200' from Lone Star Cement Sub. The line segment between the new Entergy 69kV breaker and the customer 69kV breaker will be protected with a bus differential scheme and a distance relay.

The relay scope of work includes:

- ❖ An operational oneline must be created to show the relaying being added to the substation
- ❖ Purchase, design, and install one (1) Low Impedance Bus Differential Panel referencing Entergy Standard PM0602, option B, latest revision. This panel will be used to protect the line segment between Entergy's 69kV breaker and the customer's 69kV breaker.
- ❖ Purchase, design, and install one (1) 28" line relaying control panel with no pilot referencing Entergy Standard PM1803, option R, latest revision. This panel will be used to control Entergy's new 69kV breaker and protect the line segment between Entergy's breaker and the customer's breaker.
- ❖ Purchase, design, and install one (1) 28" line/breaker relay panel referencing Entergy Standard PM1803, option A2. This panel incorporates a Schweitzer Engineering Lab model SEL 421 and a SEL model 311L for dual primary protection. This panel will be used for protection of 69kV line between Choupique and Catalyst (L-15).
- ❖ Purchase and install one (1) CCVT for line synchronization.
- ❖ Purchase, design and install one (1) CCVT junction box.
- ❖ Purchase, design and install one (1) bus potential junction box.
- ❖ Purchase, design and install one (1) Teltone line sharing switch.
- ❖ Purchase, design, and install one (1) AC/DC split panel per Entergy Standard PM0101, option C.
- ❖ Purchase and install one (1) SEL 2407 GPS clock. This clock will be placed in the RTU cabinet.

- ❖ Purchase and install one (1) SEL 2411 to digitize inputs from the 69kV breaker to the bus differential relay.
- ❖ Size, purchase and install a 125V lead-acid battery set. It is estimated that a 150 AH battery set will be needed. Reference Entergy Standard PM0203, latest revision for sizing guidelines. A two-step seismic zone 1 battery rack will be needed.
- ❖ Size, purchase and install one (1) 130V battery charger. Reference Entergy Standard PM0302, latest revision, for sizing guidelines. It is estimated that a 12A battery charger will be needed.
- ❖ Purchase, design and install one (1) battery switch panel per Entergy Standard PN1003, latest revision. It is estimated that a 100A panel will be needed.
- ❖ Purchase, design, and install one (1) D400 RTU enclosed in a NEMA 4 cabinet equipped with mag locks and a card reader.
- ❖ Purchase and install one (1) customer interface box for terminations of current, potential and indication points required for relaying between Entergy and the customer. The specifics of these terminations will be determined during scoping.

Relay Settings: New settings will be developed for the dual primary direct fiber relaying scheme at Lone Star Cement, Choupique and Catalyst Substations. If the project is approved, a system impact study will be conducted to determine if additional relay upgrades are required to coordinate relay settings. No contingent budget was allocated for relay replacements outside of Catalyst, Choupique and Lone Star Cement Substations. Any settings revisions will be coordinated with generation plants, load customers, and other interconnected utilities as appropriate. Any settings revisions will comply with PRC-001, PRC-023 and relevant procedures, standards and guidelines.

Communications and SCADA: No RTU currently exists at this site. A new D400 RTU will be installed for station communications. All communications will be routed through fiber from Lone Star Cement Substation to Catalyst Substation where a connection will be made to existing Entergy backbone fiber.

Metering: 69kV metering accuracy PT's and CT's will be installed on the new 69kV bus. Four quadrant, 3 element revenue meters will be installed in the proposed control house. Meter data will be communicated from the station to the Entergy SOC/TOC via fiber optics that will be installed for direct fiber relaying.

Task/WO Specific Assumptions: This work scope assumes that the customer will not require an additional auxiliary power feed for their generator. This estimate assumes that the customer will allow substation footprint expansion as proposed above. This work scope assumes that the customer will take responsibility for disposal of any spoils created during substation construction. This work scope assumes that the customer will allow a 12 hour total station outage that is required to temporarily bypass the Lone Star Cement Substation during the construction period and a 12 hour total station outage to reconnect the newly reconfigured station after construction is complete.

4.4 Choupique Sub: Upgrade L-15 Relaying

General: The scope at Choupique 69kV Substation is to upgrade the existing tone relaying on the Choupique-Catalyst 69kV transmission line to dual primary relaying over direct fiber. The upgrade is required due to the three terminal line created by the requested customer generator interconnection.

Site: Minor site work is required to install underground 2" PVC conduit from the Choupique Substation dead end structure to the Choupique Substation control house. This conduit will contain fiber optic cable required for the direct fiber relay scheme. Additionally, conduit will be installed from a new CCVT location to the control house.

Foundations: One foundation will be installed for a 69kV CCVT pedestal.

Electrical: One 69kV CCVT and pedestal will be installed for line synchronization.

Relay: The relay upgrade will require removal of the existing L-15 relay panel. This line panel will be replaced with a new 28" line/breaker control panel referencing Entergy Standard PM1803, option A2. This panel incorporates a Schweitzer Engineering Lab model SEL 421 and a SEL model 311L for dual primary protection. Relay communications will utilize direct fiber as previously described and will require installation of a new Teltone line sharing switch. A new CCVT will be installed at this location along with a CCVT junction box to facilitate line synchronization. The existing Landis and Gyr RTU at Choupique Substation must be replaced with a D400 RTU to support the new direct fiber relaying scheme.

Relay Settings: New settings will be developed for the dual primary direct fiber relaying scheme at Catalyst Substation. Any settings revisions will be coordinated with generation plants, load customers, and other interconnected utilities as appropriate. Any settings revisions will comply with PRC-001, PRC-023 and relevant procedures, standards and guidelines.

Communications and SCADA: A channel bank will be installed at Choupique Substation to facilitate fiber optic termination. The new RTU will be configured for the new line panel.

Metering: No metering changes are required for the relay upgrade.

Task/WO Specific Assumptions: No assumptions were made when developing this work scope.

4.5 Catalyst Sub: Upgrade L-15 Relaying

General: The scope at Catalyst 69kV Substation is to upgrade the existing tone relaying on the Choupique-Catalyst 69kV transmission line to dual primary relaying over direct fiber. The upgrade is required due to the three terminal line created by the requested customer generator interconnection.

Site: Minor site work is required to install conduit from the transmission line ROW to the Catalyst control house. This conduit will contain fiber optic cable required for the direct fiber relay scheme.

Foundations: No foundation work is required for the relay upgrade.

Electrical: No electrical work is required for the relay upgrade.

Relay: The relay upgrade will require removal of the existing L-15 relay panel. This line panel will be replaced with a new 28" line/breaker control panel referencing Entergy Standard PM1803, option A2. This panel incorporates a Schweitzer Engineering Lab model SEL 421 and a SEL model 311L for dual primary protection. Relay communications will utilize direct fiber as previously described and will require installation of a new Teltone line sharing switch. A new CCVT will be installed at this location along with a CCVT junction box to facilitate line synchronization. The existing Landis and Gyr RTU at Choupique Substation must be replaced with a D400 RTU to support the new direct fiber relaying scheme

Relay Settings: New settings will be developed for the dual primary direct fiber relaying scheme at Catalyst Substation. Any settings revisions will be coordinated with generation plants, load customers, and other interconnected utilities as appropriate. Any settings revisions will comply with PRC-001, PRC-023 and relevant procedures, standards and guidelines.

Communications and SCADA: A channel bank will be installed at Choupique Substation to facilitate fiber optic termination. The RTU will be reconfigured for the new line panel.

Metering: No metering changes are required for the relay upgrade.

Task/WO Specific Assumptions: No assumptions were made when developing this work scope.

5. COST

The ICT has reviewed and determined whether each required upgrade will be considered a Base Plan Upgrade or a Supplemental Upgrade. For more information on cost responsibility for Base Plan and Supplemental Upgrades, see Attachment T to Entergy's OATT.

The costs shown in the table include all applicable overheads but do not include tax gross up. This amount includes AFUDC that may not be applicable based on how project is funded. Entergy incurs a tax liability proportional to the amount of customer contributions. The current tax rate is 27.4%. New interconnection with a generator can qualify for non-taxable treatment to Entergy if the IRS safe harbor requirements are satisfied.

Cost Analysis

Description	2011	2012	Total
Choupique-Catalyst: Install Fiber on L-15 ^{**}	\$49,780	\$250,963	\$300,743
Lone Star Cement to L-15 Tap: Install Fiber on L-293 ^{**}	\$18,715	\$126,002	\$144,717
Lone Star Cement – Install 69kV breaker position	\$423,445	\$757,668	\$1,181,113
Choupique Sub: Upgrade L-15 Relaying	\$91,814	\$251,088	\$342,902
Catalyst Sub: Upgrade L-15 Relaying	\$75,457	\$223,032	\$298,489
Total	\$659,211	\$1,608,753	\$2,267,964

^{**} See statement in Section 9 Risk Assessment

6. UPGRADE CLASSIFICATION

The ICT has reviewed and determined whether each required upgrade will be considered a Base Plan or Supplemental Upgrade. For more information on cost responsibility for Base Plan and Supplemental Upgrades, see Attachment T to Entergy’s OATT.

Task	Total Cost	Base Plan	Supplemental	Reference
Choufique-Catalyst: Install Fiber on L-15 ^{**}	\$300,743	--	\$300,743	Section 4.1
Lone Star Cement to L-15 Tap: Install Fiber on L-293 ^{**}	\$144,717	--	\$144,717	Section 4.2
Lone Star Cement – Install 69kV breaker position	\$1,181,113	--	\$1,181,113	Section 4.3
Choufique Sub: Upgrade L-15 Relaying	\$342,902	--	\$342,902	Section 4.4
Catalyst Sub: Upgrade L-15 Relaying	\$298,489	--	\$298,489	Section 4.5
Total	\$2,267,964	--	\$2,267,964	

^{**} See statement in Section 9 Risk Assessment

7. SCHEDULE

A detailed schedule will be prepared subsequent to customer approval to proceed with the project. Based on the Task duration schedules listed below, the overall project in-service date is projected to be **3/30/2012**. Based on an assumed customer approval date of **1/17/11**, the following are approximate schedule dates:

Task Name	Estimated Start Date	Estimated ISD/Completion
Choufique-Catalyst, Install Fiber on L-15	Jan 2011	3/30/2012
Lone Star Cement to L-15 Tap, Install Fiber on L-293	Jan 2011	3/30/2012
Lone Star Cement – Install 69kV breaker position	Jan 2011	3/30/2012
Choufique Sub, Upgrade L-15 Relaying	Jan 2011	3/30/2012
Catalyst Sub, Upgrade L-15 Relaying	Jan 2011	3/30/2012

The table above will be the Milestone dates for the LGIA Appendix B.

Notes to Duration Schedules:

- Schedule allows approximately 5 months between the project approval date and the actual start of design date. This time is needed in order to complete front end loading tasks required to perform detailed design. These tasks include obtaining soil borings and performing a relay impact analysis. Design tasks will begin subsequent to completion of project definition.
- All construction work requiring outages will be performed during acceptable periods of system condition to ensure reliable operation of the system which most often is the off-peak load season. Line outages will be discussed with the SOC and TOC and the assumption is made that line outages will be executed as planned. However, an evolving system

condition may result in cancellation of approved outages by the SOC/TOC and may also result in additional schedule delay.

- Substation construction will be coordinated with the transmission line outages when possible.
- Construction resources are available when required.
- This schedule does not account for non-typical adverse weather conditions.
- Schedule durations are high level estimates at this time. A detailed schedule will be prepared upon project approval.
- The duration schedule allows approximately 4 weeks of schedule float to allow for coordination of customer outages.

8. INTERCONNECTION STANDARDS

Interconnection standards can be found at the following link:

http://www.energy.com/transmission/facility_requirements.aspx

9. RISK ASSESSMENT

Please note assumptions in Section 3 when reviewing scope based risks below. A contingent budget of **\$134,957⁺⁺** has been included in the estimate (provided in Section 5) to address Transmission ROW conditions during construction. If needed, these dollars will be utilized to install laminated matting and address ROW damage claims.

Risk	Comment	Impact
Contractor Labor rates	Contractor labor rates are dependant on market conditions which can have a substantial impact (either positive or negative) to overall project cost. Contract labor will be utilized for all engineering/design, all civil installation and all transmission line installation.	***
Material Costs	Variable steel, copper, fuel and other market conditions could impact estimated material cost.	*
Inclement Weather	Inclement weather such as long periods of rain and/or hurricanes can negatively impact schedule	*
Outage Availability	Preliminary schedule assumes that Entergy system conditions and customer status will support planned outage approval.	*
Scope is based on design assumptions which may change (see section 3, General Assumptions for detailed list)	Surveying and Soil borings were not obtained for this study due to time constraints. These activities will be completed after project approval is provided and prior to start of detailed design. Varied impact on cost and schedule.	***

Adverse ROW conditions	ROW conditions during construction will vary depending on weather conditions. Additional dollars for laminated mats have been included as contingency in the Transmission line estimates.	**
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*-low impact to cost, ** - moderate impact to cost, ***- high impact to cost, **** - very high impact to cost.

10. CONFIRMED RESERVATIONS

The following modifications were made to the base cases to reflect the latest information available:

- Approved transmission reliability upgrades for 2010 – 2012 were included in the base case. These upgrades can be found at Entergy’s OASIS web page, <http://www.oatiaoasis.com/EES/EESDocs/INFO.htm> under the Transmission Studies table link “ICT Planning Studies and Related Documents”.

Prior generator interconnection ERIS requests that were included in this study:

PID	Substation	MW	In-Service Date
PID 223	Green Forest S. - Harrison W.	125	10/1/2010
PID 224	Green Forest S. - Harrison W.	100	12/1/2009
PID 226	Grand Gulf	206	6/1/2012
PID 231	Good Hope	31	4/30/2010
PID 233	Marshall-Botkinburg	150	12/31/2013
PID 244	Big Cajun 2, Unit 1	13	10/1/2011

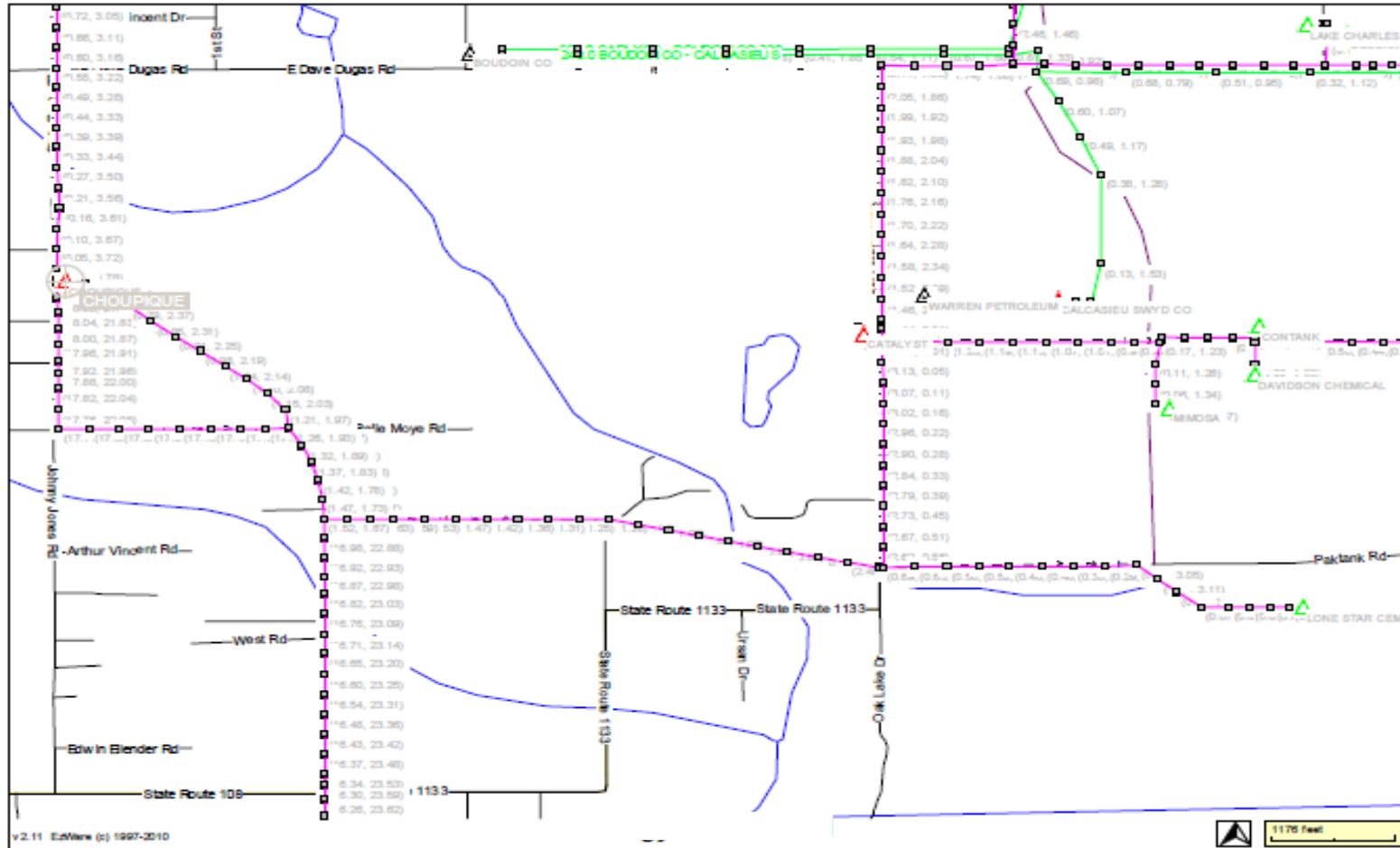
11. ATTACHMENTS

11.1 Table of Acronyms (add any acronyms used in the document)

ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
ADEQ	Arkansas Department of Environmental Quality
AFUDC	Allowance for Funds Used During Construction
ATC	Available Transfer Capability
EES	Entergy Control Area
EHV	Extra-High Voltage
ERIS	Energy Resource Interconnection Service
ICT	Independent Coordinator of Transmission
kV	Kilo-Volt
MCM	(M) Thousand Circular Mils
MVA	Mega-Volt Amp
MW	Mega-Watt
NPDES	National Pollution Discharge Elimination System
NOI	Notice of Intent
NRIS	Network Resource Interconnection Service
OASIS	Online Access and Same-time Information System
OATT	Open Access Transmission Tariff
POD	Point of Delivery
POR	Point of Receipt
SES	Steam Electric Station
SOC	System Operations Center
SHV	Super High Voltage
SW	Switch Station
TOC	Transmission Operations Center

11.2 Scope Summary Diagram / Area Map

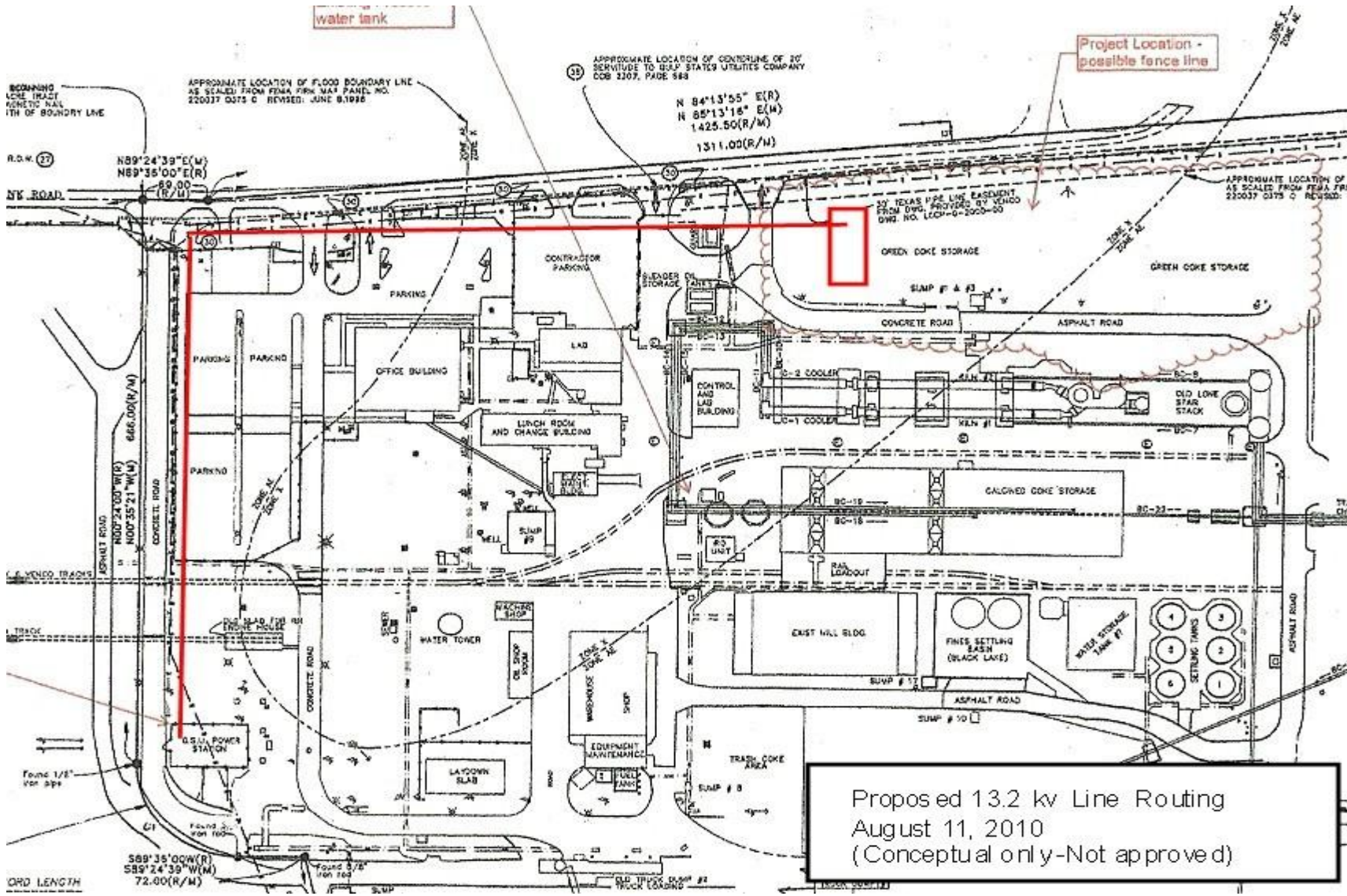
PID 246 Area Map



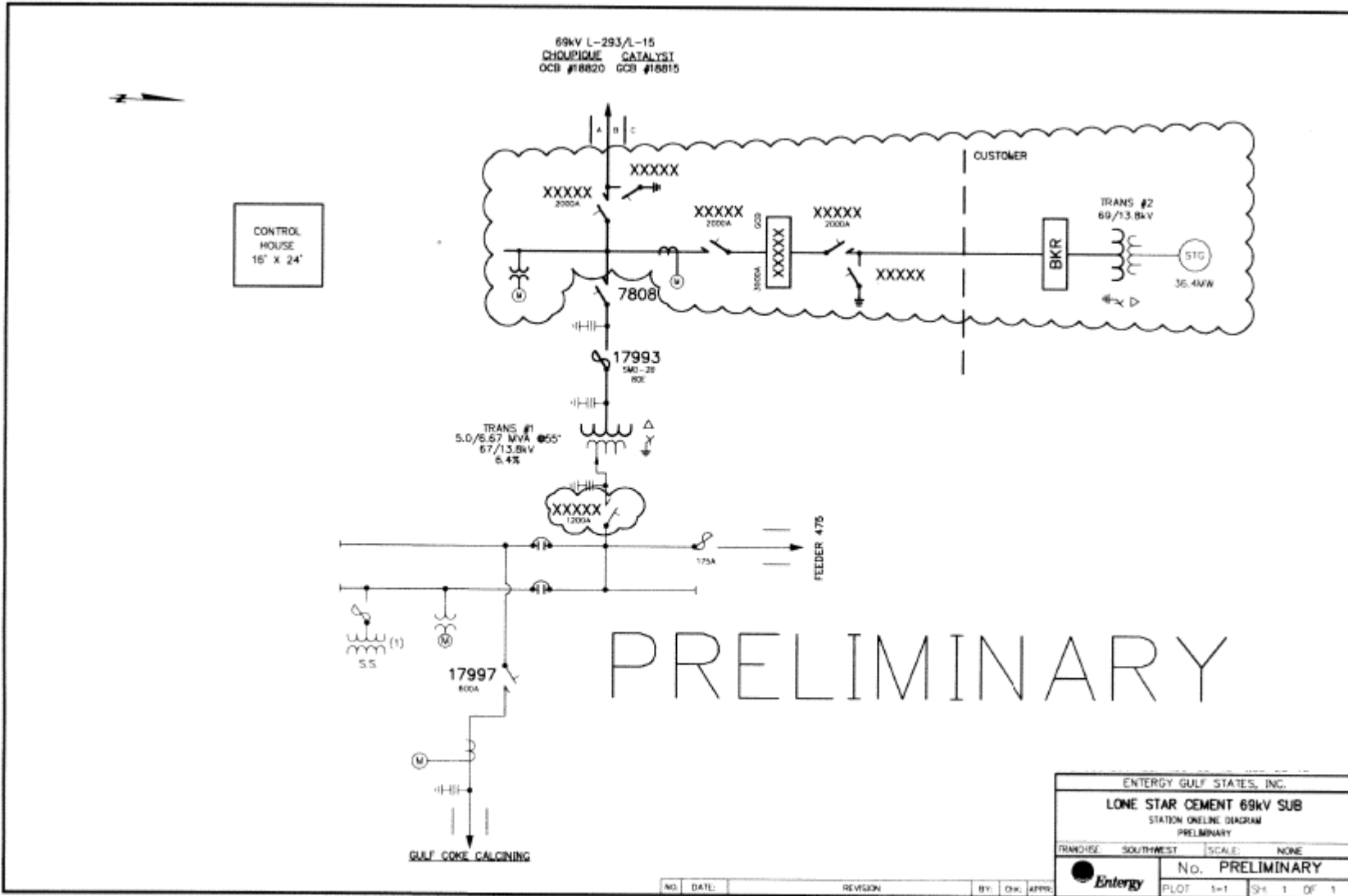
11.3 Company Interconnection Facility Location, Lone Star Cement Substation



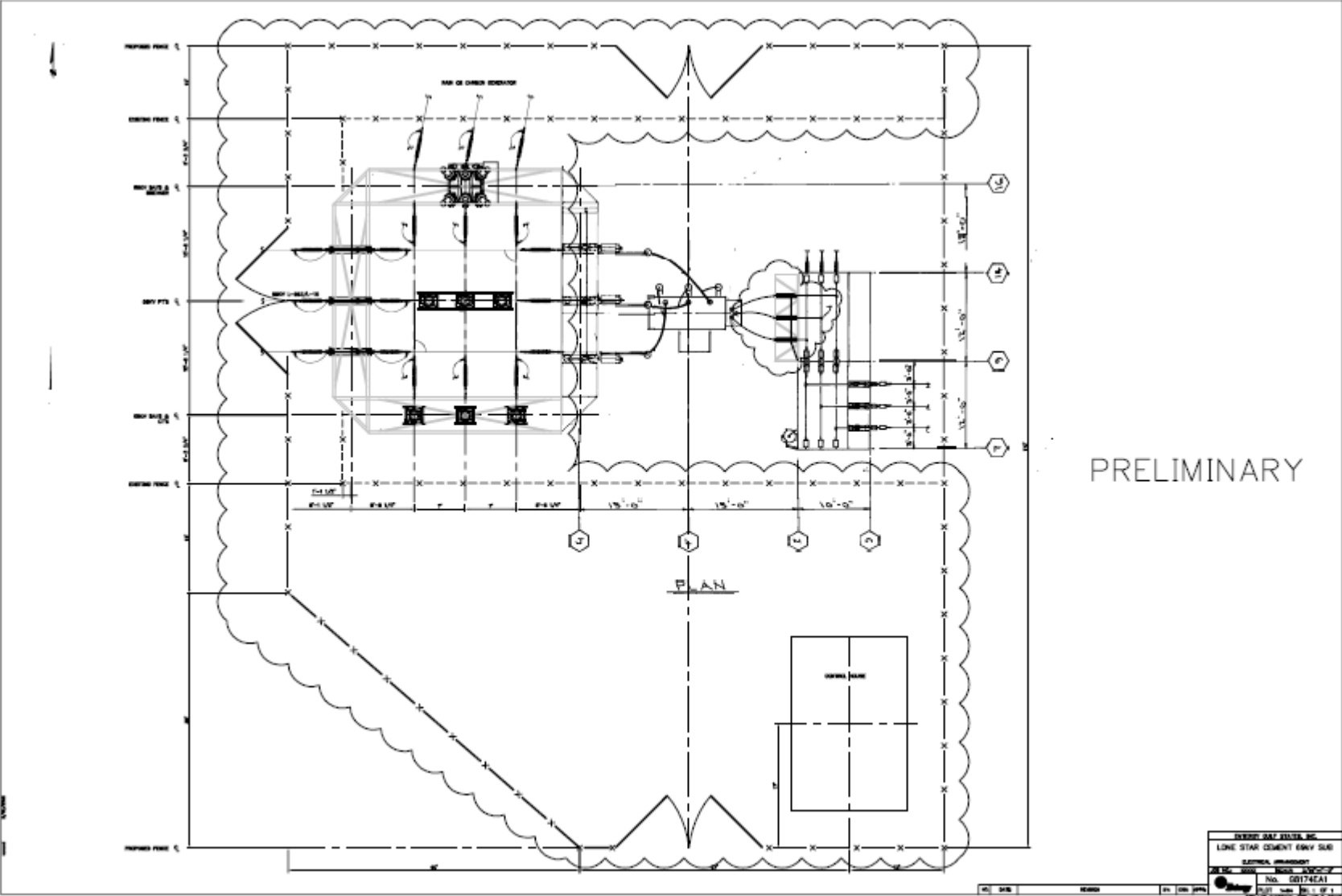
11.4. Customer's Facility Location



11.5 Preliminary One Line, Lone Star Cement Substation



11.6 Preliminary Electrical Arrangement, Lone Star Cement Substation



11.7 Duration Schedule

Facility Study SWPP PID 246 -		PMC Meeting Layout		10-04-10 13:17	
Activity Name	Planned Duration	Start	Finish		
Facility Study SWPP PID 246 - Sub Interconnection	576	08-11-10 A	11-12-12		
INITIATION (Facility Study)	55	08-11-10 A	10-05-10		
Scope Definition: Sub Interconnection	110	01-17-11	06-21-11		
INITIATION	10	01-17-11	01-28-11		
DEFINITION	110	01-17-11	06-21-11		
Lone Star Cement – Install 69kV breaker position	303	06-22-11	08-30-12		
DESIGN	131	06-22-11	12-28-11		
CONSTRUCTION	162	08-10-11	03-30-12		
Contractor Selection/Bid Period	89	08-10-11	12-14-11		
Site Preparation	15	10-06-11	10-26-11		
Foundations	16	11-07-11	11-29-11		
Steel and Electrical Equipment Installation	20	12-13-11	01-12-12		
System Protection Construction	29	12-29-11	02-09-12		
In Service Date	38	02-08-12	03-30-12		
As-Built Documents	129	10-27-11	05-01-12		
CLOSEOUT	107	04-02-12	08-30-12		
L-15 Choupique-Catalyst, to L-15 Tap & L-293 Install Fiber	276	06-22-11	07-24-12		
Transmission Line Design	105	06-22-11	11-17-11		
Transmission Line Design	33	06-22-11	08-08-11		
Perform Work Order Maintenance	13	07-21-11	08-08-11		
Material Procurement (High Level)	80	07-28-11	11-17-11		
CONSTRUCTION	159	08-15-11	03-30-12		
Contractor Selection	40	08-15-11	10-10-11		
Milestones Transmission Line Construction	35	02-13-12	03-30-12		
T-Line Work	59	01-09-12	03-30-12		
Transmission Line in Service Date	1	03-30-12	03-30-12		
As-Built Documentation	20	04-02-12	04-27-12		
CLOSEOUT	80	04-02-12	07-24-12		
Catalyst Sub, Upgrade L-15 Relaying	489	09-27-10	08-30-12		
DESIGN	85	10-07-11	02-09-12		
CONSTRUCTION	71	12-19-11	03-30-12		
Contractor Selection/Bid Period	39	12-19-11	02-15-12		
System Protection Construction	30	02-20-12	03-30-12		
In Service Date	2	03-29-12	03-30-12		
As-Built Documents	419	09-27-10	05-22-12		
CLOSEOUT	107	04-02-12	08-30-12		
Choupique Sub, Upgrade L-15 Relaying	489	09-27-10	08-30-12		
DESIGN	85	10-07-11	02-09-12		
CONSTRUCTION	71	12-19-11	03-30-12		
Contractor Selection/Bid Period	39	12-19-11	02-15-12		
System Protection Construction	30	02-20-12	03-30-12		
In Service Date	2	03-29-12	03-30-12		
As-Built Documents	419	09-27-10	05-22-12		
CLOSEOUT	107	04-02-12	08-30-12		
FP Closeout / ISD	158	03-30-12	11-12-12		