TRANSMISSION / DISTRIBUTION PROJECTS

COMPANY:EGSL

FACILITIES STUDY

EJO # F4PPGS0410

PID 208
ADDITION OF GENERATION AT FANCY POINT (RIVER BEND)

Revision: 2

Rev	Issue Date	Description of Revision	Revised By	Project Manager
A	02/17/08	Shell for engineering team input	Ibrahim Khan	Kevin Wright
B	04/06/08	Submitted for Construction input	Ibrahim Khan	Kevin Wright
0	5/29/08	Submitted to TPD	Ibrahim Khan	Kevin Wright
1	06/02/08	Submitted to ICT	Russell Saliba	Brian Warwick
2	06/13/08	ICT Classified Upgrades	Brad Finkbeiner	Jody Holland

1. EXECUTIVE SUMMARY

This facility study is in response to system improvements identified in System Impact Study PID 208 for connecting addition of 1594 MW generation at Fancy Point 500 kV substation by 01 January 2015. The facility study describes scope, estimates, and duration for engineering, construction and other details for various substations lines.

The facility study has been prepared in consultation with Entergy's expertise in the areas of environmental permitting, ROW acquisition, Construction and engineering.

Limited details are being provided relating to ROW acquisition and environmental permitting issues considering that no assessment or detailed study has been done. However, the estimates for lines and substations are based on expertise of Entergy personnel and would be refined upon approval of the project.

The facility study describes scope, estimates, and duration for engineering, construction and other details for various substations including Fancy Point, new and existing lines. While drawings and other documents prepared by B&V and System Impact Study were referred to in preparing the facility study, the finish product of this study reflects Entergy team's perspective and was not intended for comparison of any sort to that of ICT consultant's reports.

The target for accuracy of estimates is +/- 20%. The estimates developed are of the order of magnitude based on experience and expertise of engineering and construction professionals in Entergy – Transmission System. Time allowed to develop the scope and estimates does not allow field visits, site selection for new substation and lines, study of environmental and permitting issues, survey and soil boring, etc. For the purposes of this study, best judgment of expertise in the field has been employed and where possible assumptions have been made and documented.

Recommendation of this study (see page 139 for more elaboration) is to commence work as soon as possible with due consideration for availability of Contract labor in the market, delivery of material, available manpower in Entergy to undertake work and supervise contractors, etc; especially with due consideration for additional work of even higher magnitude to be done for adding generation at Grand Gulf for the same period of time – January 2015.

The duration of work associate with River Bend addition is determined to be 7 years at a cost of $947,237,601 (with priors) and $824,720,572 (without priors) – for the cost table refer to page 138. Please note that these are 2008 dollars and do not include tax gross-up where applicable (generally in the range of 36%) and escalation. The Overhead rate and tax gross-up rate could be different at the time of undertaking detailed scope and estimate.

2. SAFETY AWARENESS

Safety is a priority with Entergy. Safety will be designed into substations and lines. The designs will be done with the utmost safety for personnel in mind for construction, operation, and maintenance of the equipment.

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

All employees working directly or indirectly for Entergy shall adhere to all rules and regulations outlined within the Entergy Safety manual. Entergy requires safety to be the highest priority for all projects. All Entergy and Contract employees must follow all applicable safe work procedures.

3. SCOPE SUMMARY

The System Impact Study PID 208 has identified the following substation and line work:

3.1 Substations:

3.1.1 Fancy Point 500/230 kV substation expansion:

- Install new 500kV switching station to re-connect existing 500kV lines and the Fancy Point 500/230kV autotransformer and also to connect a new 500kV line to XYZ switching station, a new line to the generator transformer, and a new line to the station service / auxiliary transformer
- Replace 13 230 kV breakers with IPO (independent pole operated) breakers having fault current interrupting capability of 80 kA. These breakers include: #20610, #20620, #20635, #20640, #20650, #20660, #20665, #20670, #20690, #20695, #20735, #20740, and #20745

3.1.2 Big Cajun #2 500 kV:

Replace 5 breakers with a fault interrupting capability exceeding 43,559A. These breakers include: #20535, #20545, #20550, #20560, and #20575

3.1.3 Cleco Acadia 138 kV:

Replace 16 breakers with IPO breakers having fault current interrupting capability of 80 kA. These breakers include: #8901, #8909, #8912, #8916, #8920, #8923, #8927, #8931, #8934, #8938, #8942, #8945, #8949, #8953, #8956, and #8964.

3.1.4 Coly Split 230 kV:

The System Impact Study identified breaker #21285 to be replaced with a breaker of higher fault interrupting capability. Upon further study, Entergy Transmission Planning identified that the replacement is not required.

3.1.5 Repapco 138 kV:

Replace 2 oil circuit breakers with gas circuit breakers having a 40kA fault interrupting capability. These breakers include: #14655 and #20355

3.1.6 Richard 500/138 kV:

- Replace 21 breakers with breakers having a higher fault interrupting rating of 80kA. The breakers include #17235, #17240, #17245, #17250, #17255, #17260, #17265, #17270, #17275, #18425, #17430, #17435, #17440, #27140, #27145, #27150, #27155, #27160, #27165, #37390, and #37395. NOTE: Estimates for both IPO and non-IPO breakers have been provided in this scope, as requested by Transmission Planning.

- Add necessary number of breakers on 500 kV bus to terminate new lines from Fancy Point and Webre

3.1.7 Sabine 230 kV:

- Replace 9 breakers with a rating exceeding 54,111A interrupter rating – 13180/85/90/95/13200/50/55/60/65
- Add breakers to terminate line from Hartburg

3.1.8 Willow Glen 138 kV:

Replace 9 breakers with IPO breakers having fault current interrupting capability of 63 kA. These breakers include: #9825, #9850, #9855, #9860, #9865, #9900, #9905, #9910, and #9930.

3.1.9 Webre 500 kV:

Add breakers to terminate new line from Richard

3.1.10 Hartburg 500/230 kV:

- Add 230 kV breakers to terminate new line from Sabine
- Add a second 800 MVA, 500/230 kV transformer
- Revise relay setting on 500 kV line protection for line to XYZ substation

3.1.11 Cypress 230 kV:

Add breakers to terminate new line from Jacinto

3.1.12 Jacinto 230 kV:

Add breakers to terminate new line from Cypress

3.1.13 Kolbs 69 kV

Replace 1 breaker with a breaker having a higher fault interrupting rating of 50 kA. This breaker is #3505.

3.1.14 Mount Olive 500 kV

Install line traps for new XYZ 500kV switching station and revise relay settings

3.1.15 McKnight 500 kV

Replace relay panel for existing line from Fancy Point that was required to be re-terminated on to new bus

3.1.16 Sterlington 500 kV

Replace transformers #1 and 2 by 692 MVA terminated on split bus #2

3.1.17 Sterlington 115 kV

Split the bus and terminate feeders and transformers as follows:
Bus #1 – Line to Walnut Grove, Oak Ridge, IPCO, Selman
Bus #2 - Line to Drew, Downsville, Marion, Meridian, N Crosett, Lemkin and existing autos 1 and 2 with ratings of 600 MVA

3.2 Lines

3.2.1 New Line between Fancy Point and Richard 500 kV:

Build a new 500 kV 86 mile line between Fancy Point and Richard including one river crossing

3.2.2 New Line from Fancy Point to new XYZ 500 kV substation

Build new 140 miles of 500 kV line (including 2 river crossings) from Fancy Point connecting to XYZ new substation near Toledo Bend line between Hartburg and Mt. Olive 500 kV substations

3.2.3 New line between Richard and Webre 500 kV:

Build new 56 miles of 500 kV line connecting Richard and Webre 500 kV substations

3.2.4 New line between Hartburg and Sabine 230 kV:

Build new 21 miles of 230 kV line connecting Hartburg and Sabine substations

3.2.5 New line between Cypress and Jacinto 230 kV:

Build new 54 miles of 230 kV line connecting Cypress and Jacinto substations

3.2.6 New 500 kV line to Generator Transformer at Power plant

3.2.7 New 500 kV line to Station Service Transformer at Power plant

3.2.8 Sterlington to Drew 115 kV line upgrade

3.2.9 Drew – Cheniere 115 kV line upgrade

3.2.10 Cheniere – Riser 115kV Line upgrade

3.2.11 Riser – Froskraft 115kV Line upgrade

3.2.11 Tie Line between New 500kV Auto #4 and 115 kV Yard at Sterlington

3.2.12 Reroute Froskraft to Bus Split #1 at Sterlington for bus split

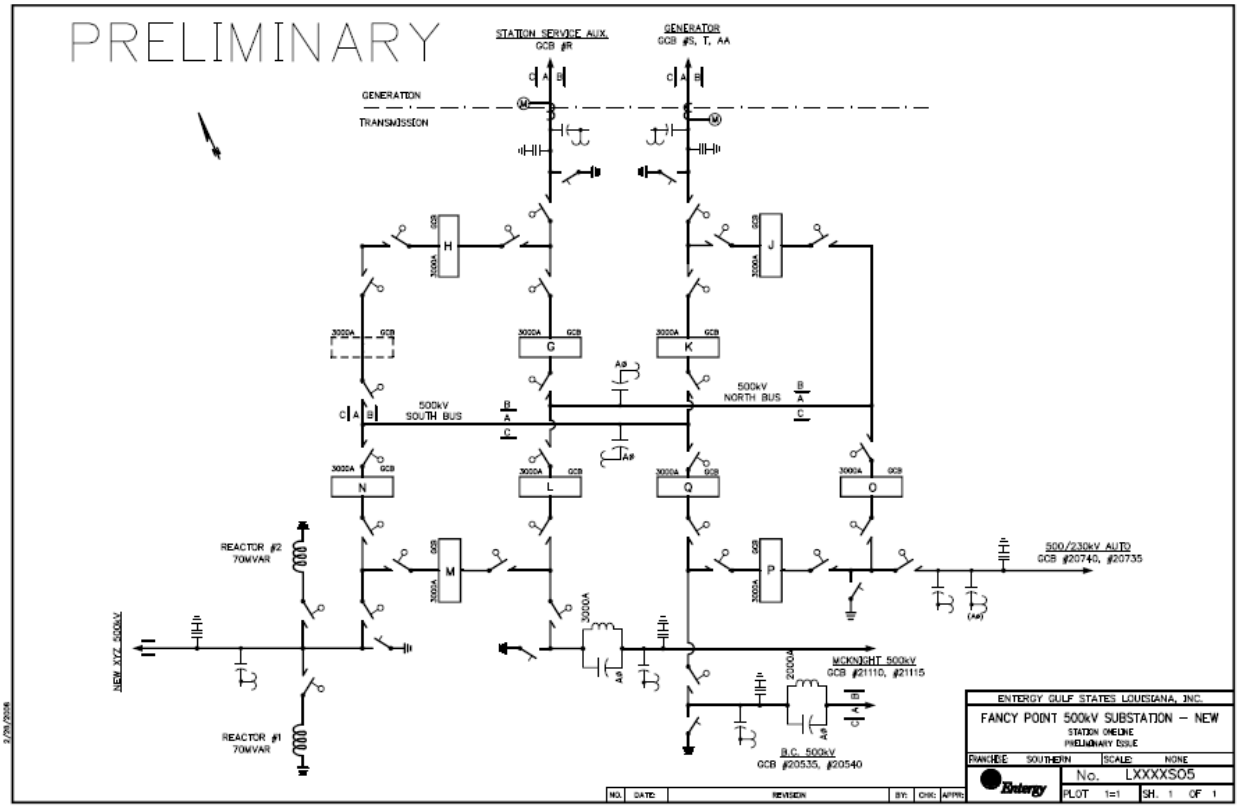
4. SCOPE DETAILS

4.1 Transmission Substations

4.1.1 Fancy Point 500 kV Substation:

Install new 500kV switching station to re-connect two existing 500kV lines and the Fancy Point 500/230kV autotransformer. This new switching station will also connect a new 500kV line to XYZ 500 kV switching station (With Priors), a new line to the generator transformer, and a new line to the station service transformer.

NOTE: PID 208 (Without Priors) requires a new line from Fancy Point 500 kV to Richard 500 kV instead of the new XYZ 500 kV. The same bay will be utilized whether the line terminates at XYZ 500kV or at Richard 500 kV. With this one exception, the scope of Fancy Point 500 kV switching station will be the same.



4.1.1.1 Site

The proposed expansion of the site will be 725’ x 1100’. The proposed layout will be west of the existing Fancy Point Substation.

HWY and communication tower need relocating:

Consistent with B&V report, there are two known conflicts with the proposed layout of the site.

The first conflict is a communication tower on the northwest side of the proposed substation layout. As the station is laid out, this tower will be in the way of numerous substation equipment and structures. The relocation of the tower will need to be accomplished in a way it does not conflict with the substation or future expansion. The second conflict is Hwy 965. The proposed southwest side of the substation will cross the highway. This highway should be relocated west of the proposed expansion of the substation. While relocating the tower is relatively plausible but the relocation of HWY is considered to be a risky, time consuming and high cost item. It would require a concerted effort in determining these factors and therefore it is assumed that it is possible and not included in this scope or estimate. It would be studied after the project approval and should the relocation of HWY become unachievable; a new site for Fancy Point would have to be selected. A document is attached in eroom in regard to tower relocation requirement and estimates. No specifics were available through ROW group for relocating the HWY and the estimate for substation assumes the relocation is possible and two million dollars have been added to the estimate.

Other details relating to the site:

A topographic and boundary survey will be needed in order to property design the site. This information has not been provided prior to completing the scope and the following quantities will be based off of assumption made from existing drawings and pictures of the site.

Soil borings will be needed in order to adequately design the foundations. These borings have not been taken. We will be assuming drill piers for the structures and pad with out piles for transformers, breakers and control house.

All appropriate permits and licenses will need to be obtained prior to construction.

The site is will be approximately 18.3 acres. A SWPPP will be needed. This work should be contracted out to the qualified contractor. Construction would insure this work is completed prior to the start of the bid process. This will allow the contractors bidding on the site work to understand and plan for our expectations.

Due to the lack of soil boring and survey information the following quantities are based on assumptions that were made from existing drawings and pictures of the site.

The drainage of the expansion area will be subsurface drainage routed back into the existing drainage in the station. We will elevate the site approximately 2 feet above the existing grade to allow for the subsurface drainage.

It is assumed that the site is heavily wooded. Grubbing and de-stumping will be needed in order to properly prepare the site.

Due to the amount of site and foundation work, we will have a large amount of spoil to remove during the construction. It is assumed that spoil removed during foundation installation can not be used as structural fill and spread across the site. Therefore, it will need to be removed from the site.

The soil at the site will need to be tested and the proper disposal will need to be determined prior to start of construction. The cost for disposing the spoil will not be able to be accurately determined until we know what the proper process will be of disposing it. This will be determined during the soil testing. The cost of disposing the spoil can be reduced if the plant has a designated spoil bank that this spoil can be disposed of on site.

It is assumed that the oil containment requirements will be meet by installing limestone across the site and monitoring the oil filled equipment with alarms.

1	EA	Topographic and boundary survey
5	EA	Soil borings including soil resistivity test
1	EA	Environmental impact study, permits and licenses
1	EA	SWPPP
1	EA	Soil Testing
83,000	CYD	Stripping, grubbing and de-stumping
18.3	ACRE	Wooded areas (Grubbing and De-stumping)
18.3	ACRE	Wooded areas (Disposal)
50	EA	Catch Basins
4500	FT	24” R.C.P. Culvert

166,000	CYD	Structural fill (Raise site 2.0 feet above existing elevation)
18.3	ACRE	Soil Sterilization
4800	FT	Access Roadways
42,000	TON	Limestone surface
3650	FT	7’ fence with 1’ of barb wire
1500	FT	Removal of fence
3.0	ACRE	Seed and mulch
3000	CYD	Soil Stabilizing
89,000	CYD	Hauling of spoil dirt

4.1.1.2 Foundation

Install thirty-six (36) IPO breaker foundations
Install two (2) oil-filled reactor foundations 30’ x 30’
Install one hundred eight (108) low switches foundations (C-Tower)
Install sixty-six (66) high switches foundations (D-Tower)
Install two hundred seventy-three (273) low bus supports foundations (A-Tower)
Install one hundred sixty-seven (167) high bus support foundations (B-Tower)
Install four (4) shield wire mask foundations (L-Tower)
Install eight (8) shield mask foundations (J-Tower)
Install twenty-one (21) pedestal foundations (CCVT) (F-Towers)
Install eighteen (18) pedestal foundations (Arresters) (F-Tower)
Install six (6) pedestal foundations (Trap) (G-Tower)
Install six (6) pedestal foundations (Metering CT) (G-Tower)
Install twenty (20) yard light foundations
Install three thousand (3000) feet of poured in place trough
Install 20’ x 80’ control house foundation. The control house will be site erected. The foundation contractor will be responsible for the design in construction of the control house and foundation as per Entergy’s standard. This will insure that the design of the house and foundation are compatible
Install twelve (12) Dead End Structure Foundations
Install fifty (50) Guard post

4.1.1.3 Electrical

Install a new open air four bay, eight position, folded breaker and a half 500kV switching station as shown on station oneline G7187S05. This arrangement is different from that described in the PID 208 Facility Study. The reason for the design modification is that Entergy does not typically build 500kV switching stations using a breaker and a half design to avoid

crossing bus with conductor from dead-end structures. The folded breaker and a half design provide higher reliability utilizing rigid bus throughout the station.

The new Fancy Point 500kV switching station shall utilize six of the eight positions as shown on station electrical arrangement G7187EA5. These include re-terminating three connections from the existing Fancy Point 500kV GIS switching station. These three terminations include one line from Big Cajun 500kV, one line from McKnight 500kV, and one to the 500/230kV autotransformer to Fancy Point 230kV switching station. Three additional positions shall be utilized by one new 500kV line from a new XYZ 500kV switching station, along with one line from the new generator and one line from the generator station service transformer.

Bus work shall be installed from the new bus to a new deadend structure terminating the new generator transformer line. Bus work shall be installed from the new bus to a new deadend structure terminating the new line to generator station service transformer. Buswork shall be installed from the new bus to a new deadend structure terminating the new XYZ 500kV line. This position of the new bus will include two 500kV, 70MVAR shunt reactors installed between the line switch and the deadend structure for the XYZ line. Buswork shall be installed through the existing Fancy Point 230kV switching station, to the existing McKnight 500kV dead-end structure. Buswork shall be installed to a new deadend structure on the existing Big Cajun 500kV line. Buswork shall be installed through the existing Fancy Point 500kV GIS switching station, to the existing Fancy Point autotransformer termination.

Sequencing into the re-termination of the three existing GIS nodes will require the removal of the existing Fancy Point 500kV GIS equipment. The strategy showing the sequence of construction of the new terminations and removal of the old GIS is outlined on onelines G7187S05 Sequence1 through Sequence 4.

To meet clearance requirements over rigid bus extension through the Fancy Point 230kV yard to the McKnight deadend structure, three 230kV lines shall be raised. This includes re-terminating both of the Port Hudson 230kV lines entering the south side of the 230kV switchyard to a higher position on the existing substation dead-ends. Install one prop structure to raise the Enjay 230kV line, also entering the south side of the 230kV switchyard. This is discussed further in Section 4.2 below.

Install the following electrical material:

(1) Control house

(4) Deadend structures to terminate the new XYZ transmission line, the new generator line, the new generator station service transformer line and the existing Big Cajun transmission line

(10) 500kV IPO breakers

(2) 500kV, 70MVAR oil-filled shunt reactors

(29) 500kV disconnect switches, including six with ground blades and all with motor operators

(174) 500kV switch structures, six per switch

(18) Arresters, three for each line

(18) Arrester support structures

(6) Line traps, three for the Big Cajun line and three for the McKnight line

(6) Trap support structures

(6) Metering CT support structures

(21) CVT support structures, three for each line, 4 for auto and one for each bus

(440) bus supports to support the buswork forming the folded breaker and a half bays and for connecting to the auto transformer and the line terminations

(701) post insulators (includes nine insulators per switch)

(21,500) feet of 5” SCH 40Aluminum tubing bus

(23,100) feet of strung bus (795ACSR) for bus vibration damping and equipment jumpers

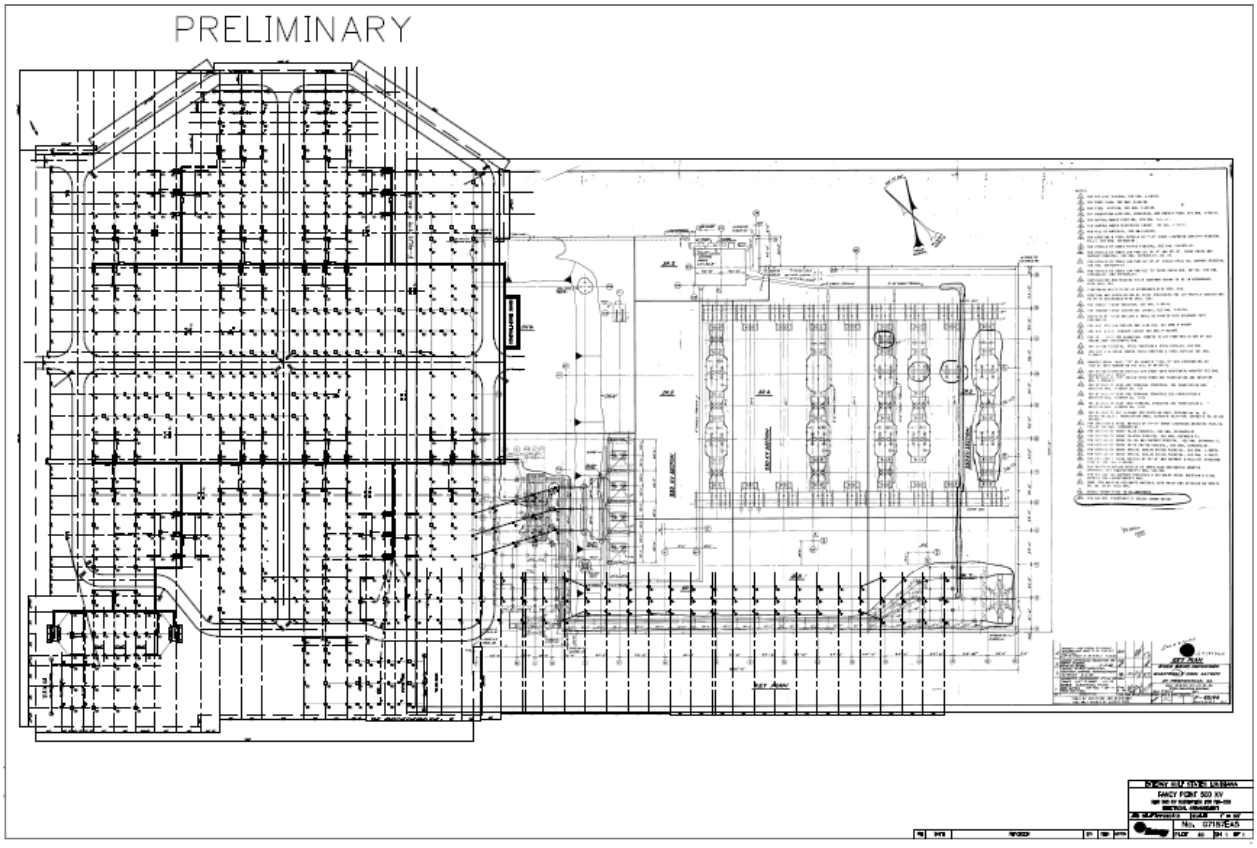
(9,000) feet of conduit

(12) Shield masts and shield wire support structures

(1) Lot of shield wire

(2) Station service transformers

(1) Lot 4/0 copper conductor to tie to the existing ground grid



4.1.1.4 Relay

- Replace Transformer Differential Relaying (230kv & 500kv)
  - (2) – Primary & Backup Auto Diff Panels (230kv)
  - (2) – Primary & Backup Auto Diff Panels (500kv)

- Replace Big Cajun 500 Kv Line Relaying
  - (1) – Primary #1 Line Panel (Unblocking Carrier)
  - (1) – Primary #2 Line Panel (Microwave)
  - (1) – Line Trap
  - (1) – Line Tuner
  - Microwave Equipment (Digital)
  - Breakers Ordered With Capacitance.

- Replace Mcknight 500kv Line Relaying
  - (1) – Primary #1 Line Panel (Unblocking Carrier)
  - (1) – Primary #2 Line Panel (Microwave)
  - (1) – Line Trap
  - (1) – Line Tuner
  - Microwave Equipment (Digital)
  - Breakers Supplied With Sufficient Capacitance.

- New 500kv Line Relaying (Xyz)

  - (1) – Primary #1 & Primary #2 Line Panel (Fiber – 421, 311l)
  - (1) – Primary #1 Differential Panel for reactor
  - (1) – Primary #2 Differential Panel for reactor
  - Fiber Equipment (Dual Fiber)

- New 500kv Gen Line Relaying
  - (1) – Primary Bus Diff (5 Inputs – K,J,S,T,Aa)
  - (1) – Backup Bus Diff (5 Inputs – K,J,S,T,Aa)
  - (1) – Backup Line Panel Looking Into Generator
  - (3) – Metering Ct's

- New S.S. Line Relaying
  - (1) – Primary Bus Diff (3 Inputs – H,G,R)
  - (1) – Backup Bus Diff (3 Inputs – H,G,R)
  - (1) – Backup Line Panel Looking Into S.S. Xfmrs
  - (3) – Metering CTs

- (2) – Primary & Backup North Bus Panels (4 Inputs – G,J,L,O)
- (2) – Primary & Backup South Bus Panels (4 Inputs – H,K,N,Q)
- (10) – Single Breaker Control Panels (G,H,J,K,L,M.N,O,P,Q)

- Control House/Substation Equipment
  - (2) – Battery Sets And Racks
  - (2) – Battery Chargers
  - (2) – Dc Panels
  - (2) – Battery Switching Panels
  - (1) – DFR
  - (11) – MOS Panels (3-Mos)
  - (1) – Metering Panel (2 Meters)
  - (1) – Ac Panel
  - (21) – 500kv CVTs – Relaying Accuracy (2 Bus, 11 Line Relay Acc, 6 Line Metering Acc And 4 Auto Xfmr)
  - (3) – Indoor Bus CVT Junction Boxes
  - (3) – Outdoor Bus CVT Junction Boxes
  - (6) – Three Phase CVT Junction Boxes
  - (2) – Ct Junction Boxes
  - (1) – Large RTU
  - (4) – SEL-2032's
  - Metering At Xyz Substation
  - (1) – Lot Control Cable
  - (1) – Lot Shielded Control Cable
  - (1) – Lot ADSS Fiber Cable

4.1.1.5 Relay Settings

Relay setting will be required in the following panels:

- 2 – Primary auto diff panels
- 2 – Backup auto diff panels
- 2 – Primary #1 line panels

- 2 – Primary #2 line panels
- 1 – Primary #1 & #2 line panel
- 4 – Primary bus diff panel
- 4 – Backup bus diff panel
- 2 – Backup line panel
- 2 – Reactor differential panel
- 10 – Single breaker control panels

4.1.1.6 SCADA and communications

A configuration for the new RTU will be required. There will also be 4 SEL-2032 communication processor configurations required at this station

4.1.1.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor or to allow internal Entergy Resources to perform portion of this work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Due to the large amount of work for each phase of this project, it may be necessary to award portions of this work to different contractors. This approach will be reviewed after the design packages have been issued. This project may pose special issues as related to the relocating of Highway 965. This will not only be a physically challenging task, but may also carry political ramifications from the local community.

Prior to the start of any site work the communications tower relocation will need to be completed. This scope of work will be contracted to an approved Entergy contractor capable of this undertaking. At this point the site, foundation, steel and electric, protection & control work and associated line re-routes/installations may proceed. Upon completion of all steel and electrical components, and substantial completion of the required protection & control components, T-Line components will be terminated. The actual sequence of the outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component may require an outage consisting of possibly several weeks; the durations are dependant on the final designs and system constraints

The construction of this substation will require the removal of the existing 500kV GIS bus. This work will take place after completion of the new 500kV open air station.

Due to the close proximity to an operating nuclear facility, all work will be coordinated with the River Bend operations department. Outages to the Entergy system will require coordination with River Bend as well as the Entergy TOC. Special security requirements may be deemed necessary by River Bend for individuals performing work on this project.

4.1.1.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
1	Control house	28
10	500kV breaker	26
2	500kV, 70 MVAR Reactors	78
1 Lot	500kV steel structure	20
29	500kV switch	26
18	Arrestor	18
2	Line traps	18
700	Insulators	20
1 lot	EHV 5’ bus	20
21	500kV CCVT	16
1 lot	795 ACSR Conductor (strung bus)	
30	Relaying panels (auto diff, bus diff, bkr control, line, metering)	18
3	AC and DC panels	18
11	MOS panels	18
21	500kV CVT’s	36
1	RTU	12
2	Line tuners	14

4.1.1.9 Assumptions:

Site assumptions are noted in the site work description. All existing GIS equipment will be removed in sequencing into the new open air facility. The cost of removing the GIS equipment is not known at this time. The cost of relocating the switching station impediments (Hwy 965 and the communication tower) is not known at this time and will have to be determined by others.

4.1.2 Fancy Point 230 kV Substation:

Replace thirteen 230kV circuit breakers. The System Impact study identified twelve breakers for replacement. However, Transmission Planning requested that an additional breaker, #20740, also be replaced for consistency through out the station. These breakers include #20610, #20620, #20635, #20640, #20650, #20660, #20665, #20670, #20690, #20695, #20735, and #20745.

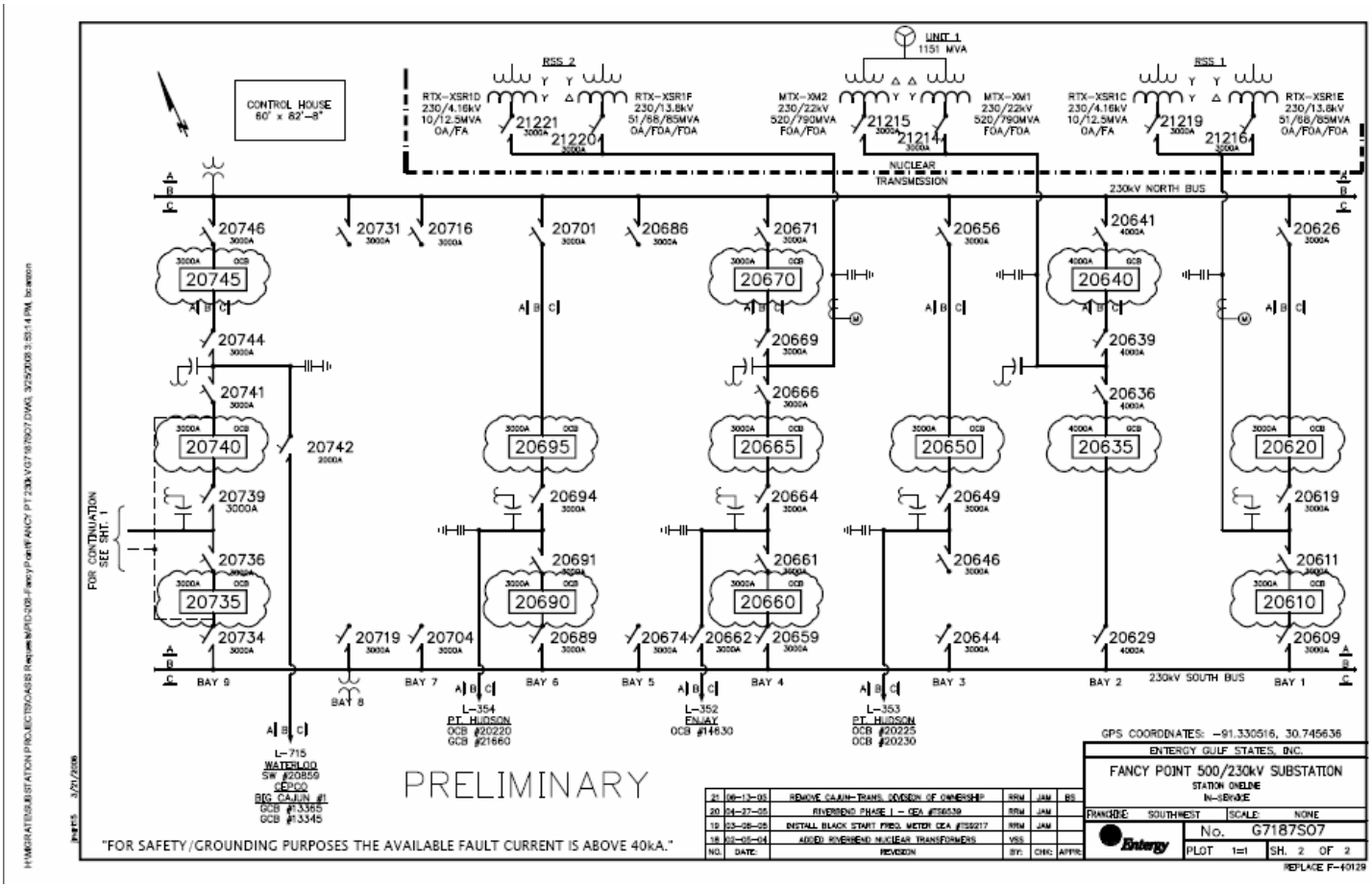
Eleven of the existing breakers are 3000A oil breakers, rated for interrupting 40,000 amps of fault current. Two of the existing breakers, #20635 and #20640, are 4000A gas breakers rated for interrupting 63,000 amps of fault current. The study requires that the identified breakers must be able to interrupt 67,340 Amps of fault current.

An analysis was performed to determine if the bus insulators could support the anticipated increase in fault current. The equations from IEEE P605/D13 section 11.3.3.1 were used to test the strength of the bus insulators against the new fault currents. The following assumptions and parameters were used to calculate the anticipated forces exerted on the bus supports:

Isc = 67340A
Bus Phase spacing = 12’6”
Average bus span = 21’
Constant for 3 Phase fault = .866
Insulators assumed to have cantilever strength of 2450 LB

Based on these parameters and assumptions, the resulting force exerted on the bus is approximately is 2375 LBft/Ft.

Based on this preliminary analysis, with assumed wind loads added, the calculated force will require that 684 station post and switch insulators will be replaced with 2750 LBft/Ft insulators. It is assumed that a ground grid analysis will have to be performed to ensure that the ground grid is able to withstand the increased fault currents.



4.1.2.1 Site

No Site Package needed as the work would be minimal. Estimated 500 tons of limestone to be used to grade sites and repair damages done during construction

4.1.2.2 Foundation

Minor foundation work will be required. It is assumed that each foundation will need to be extended two feet. The extension will be installed on 13 breakers foundations.

4.1.2.3 Electrical

Replace eleven (11) 230kV circuit breakers including #20610, #20620, #20650, #20660, #20665, #20670, #20690, #20695, #20735, #20740, and #20745 with 230kV, 3,000 Amp, 80kA, 2 cycle, IPO breakers.

Replace two (2) 230kV circuit breakers including #20635 and #20640 with 230kV, 4,000 Amp, 80kA, 2 cycle, IPO breakers. See drawing FANCY PT 230kV G7187SO7.

In order to achieve an 80 kA level of interrupting capability, additional capacitance will be required. To minimize site and foundation work, this capacitance can be bushing mounted on the circuit breakers.

(684) station post and switch insulators

(3,200) feet of strung bus for jumpers

(4,000) feet of conduit

4.1.2.4 Relay

Fancy Point 230kv (13 Bkrs - IPO)

- Bus Diff Relays OK
- Existing D20 RTU (4S)
- (4) New S-Cards
- (1) RTU Power Supply
- (3) Line/Bkr Panels
- (2) Battery Sets (535AH Ec-13)
- (2) Battery Chargers (75A)

4.1.2.5 Relay Settings

Relay setting will be required in the following panels (if needed):

- 3 – Line/breaker panels

4.1.2.6 SCADA and communications

RTU configuration will be required for the following:

- 4 – D20 S-cards

4.1.2.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work. Replacement of the proposed thirteen breakers will require coordination with River Bend. The methodology will be to schedule the required outages in conjunction with the 12 week River Bend Work Schedule and the TOC. This method will ensure that the required outages will not affect the operation and safety of River Bend. It is imperative that the required outages do not jeopardize the redundant off site power into River Bend.

4.1.2.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
13	230kV circuit breakers	26
684	230 kV insulators	14
3	Panels (line/bkr – if needed)	18

4.1.2.9 Assumptions:

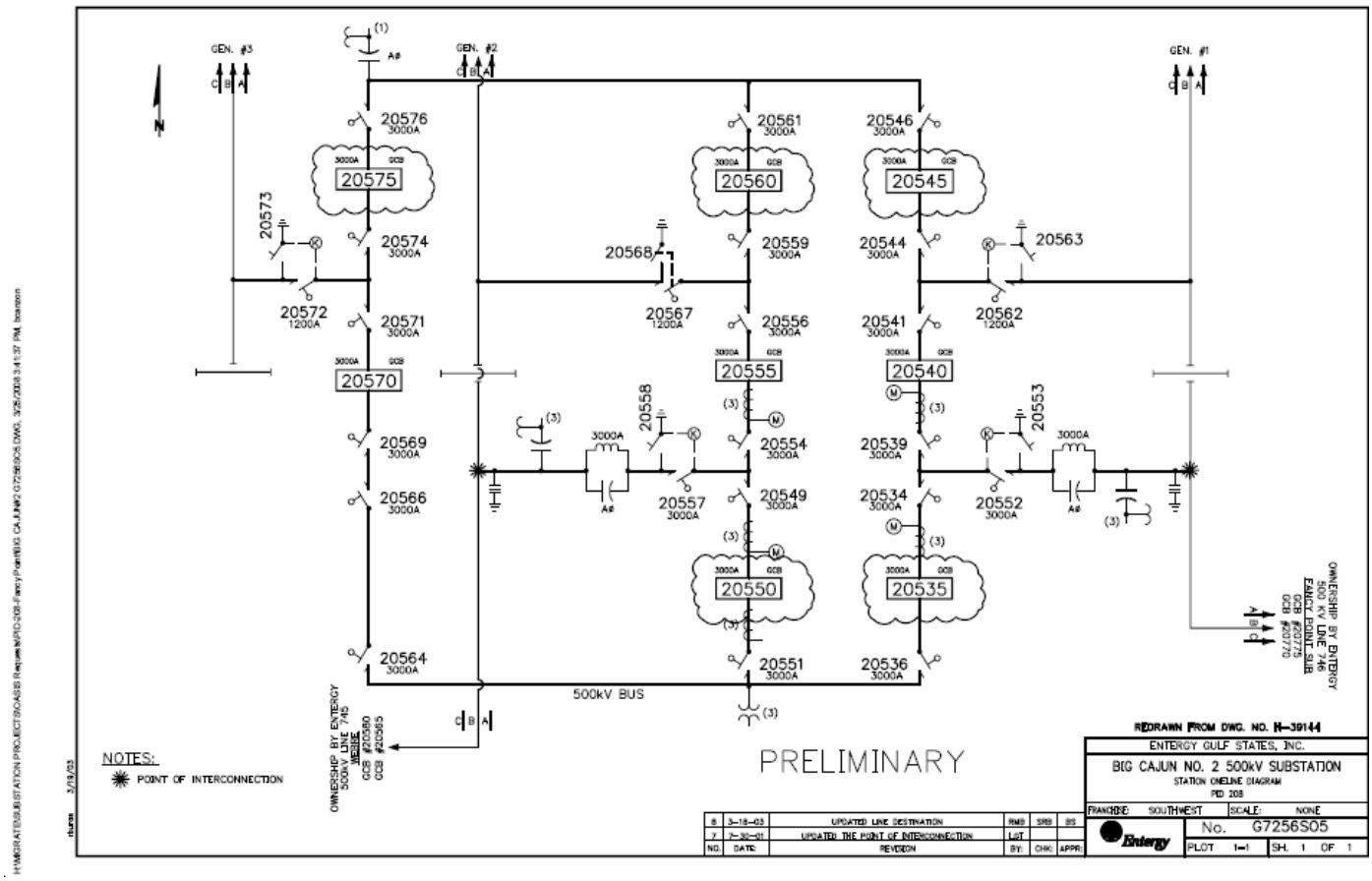
- New cable
- 80% of line and breaker relay are sufficient
- Control house space is sufficient
- Not splitting circuits for two trip coils
- Breakers have 12amp trip coils
- Breakers have 6 sets of CTs (3 on each side)
- Batteries are sufficient for non-IPO breakers
- Batteries to be upgraded for IPO breakers

4.1.3 Big Cajun #2 500 kV Substation:

The Big Cajun No. 2 500kV Substation is not owned by Entergy. For a complete scope of work to replace equipment at this switching station, a study would be required from LAGen. However, Entergy will provide a high level scope and estimate for replacing the identified breakers under-rated for fault current. The scope and estimates by LAGen could be different than what is being scoped.

Replace five 500kV of the six circuit breakers identified in the System Impact study. These breakers include #20535, #20545, #20550, #20560, and #20575. Although breaker # 20565 was identified for being under-rated for higher fault current levels, this breaker does not exist in the switching station.

The existing 3000A gas circuit breakers are rated for interrupting 40,000 amps of fault current. The study requires that the identified breakers must be able to interrupt 43,994 Amps of fault current.



4.1.3.1 Site and Foundation

No Site Package needed and work required would be minimal. Estimated 500 tons of limestone to be used to grade sites and repair damages done during construction

4.1.3.2 Foundation

Minor foundation work will be required. It is assumed that each foundation will need to be extended two feet and that the existing foundations are slab on grade. The extension will be installed on 5 breakers foundations.

4.1.3.3 Electrical

Replace five (5) breakers #20535, #20545, #20550, #20560, and #20575 with 550kV, 3,000A, 63KA gas circuit breakers. See drawing BIG CAJUN#2 G7256SO5.

(1,200) feet of strung bus for jumpers

(4,500) feet of conduit

4.1.3.4 Relay

Big Cajun #2 500kv (5 Breakers)

- No relay drawings available
- Additional status points needed
- Estimate (1) new RTU
- (1) line/bkr panel

Big Cajun 500kv substation

The existing relays on the Big Cajun to Fancy Point Line are SEL-421 and SEL-321. These relays will be compatible with the new relays at Fancy Point.

4.1.3.5 Relay Settings

Relay setting will be required in the following panels:

- Existing Fancy Point line relays (SEL-421 & SEL-321)
- 1 – Line/breaker panels (if needed)

4.1.3.6 SCADA and communications

RTU configuration will be required for the following:

- 1 – D20 RTU (if needed)

4.1.3.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor or to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. In this case the site work, installation of limestone, may be performed at the end of the project. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent to, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the foundations and all associated conduit and grounding breaker installation can commence. The sequence of the installation will require coordination with LaGen and is not know at this time. Upon completion of all Steel and Electrical components, and substantial completion of the required Protection & Control components, T-Line components will be terminated. The actual sequence of the 500kV T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several weeks; the durations are dependant on the final designs and system constraints

4.1.3.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
5	500kV breaker	26
2	Panels (line)	18
1	Panel (line/breaker – if needed)	18
1	RTU (if needed)	12

4.1.3.9 Assumptions:

It is assumed that only the breakers will be replaced and no additional foundation expansion will be required.

Information is not available to Entergy to determine if bus insulators can support the anticipated increase in fault current. It is recommended that this analysis be performed by LAGen.

Relay Assumptions:

- New cable
- 80% of line and breaker relay are sufficient
- Control house space is sufficient
- Not splitting circuits for two trip coils
- Breakers have 12amp trip coils
- Breakers have 6 sets of CTs (3 on each side)
- Batteries are sufficient for non-IPO breakers
- Batteries to be upgraded for IPO breakers

4.1.4 Cleco Acadia 138 kV Substation:

The CLECO Acadia is not owned by Entergy. For a complete scope of work to replace equipment at this switching station, a study would be required of CLECO. However, Entergy will provide a high level scope and estimate for replacing the identified breakers under-rated for fault current. The sixteen breakers include #8901, #8909, #8912, #8916, #8920, #8923, #8927, #8931, #8934, #8938, #8942, #8945, #8949, #8953, #8956, and #8964. The scope and estimates by Cleco could be different than what is being scoped.

These breakers have a fault interrupting rating of 63,000 Amps. The System Impact Study requires that the identified breakers must be able to interrupt up to 65,747 Amps of fault current.

For generation stability, these replacement breakers will be assumed to be IPO.

4.1.4.1 Site and Foundation

No Site Package needed and work required would be minimal. Estimated 1000 tons of limestone to be used to grade sites and repair damages done during construction

4.1.4.2 Foundation

Minor foundation work will be required. It is assumed that each foundation will need to be extended four feet and that the existing foundations are slab on grade. The extension will be installed on 16 breakers foundations.

4.1.4.3 Electrical

Replace sixteen breakers including #8901, #8909, #8912, #8916, #8920, #8923, #8927, #8931, #8934, #8938, #8942, #8945, #8949, #8953, #8956, #8964 with 245 kV, 3,000 Amp, 80 kA, 2 cycle IPO breakers. In order to achieve an 80 kA level of interrupting capability, 245 kV breakers and additional capacitance will be required. To minimize site and foundation work, this capacitance can be bushing mounted on the circuit breakers.

(3,900) feet of strung bus for jumpers

(14,400) feet of conduit

4.1.4.4 Relay

Cleco-Acadia 138kv (16 Bkrs - IPO)

- No relay drawing available
- Estimate (1) new large RTU
- (4) line/bkr panels
- (2) battery sets (620AH EC -15)
- (2) battery chargers (75A)

4.1.4.5 Relay Settings

Relay setting will be required in the following panels:
- 4 – Line/breaker panels (if needed)

4.1.4.6 SCADA and communications

RTU configuration will be required for the following:
- 1 – D20 RTU (if needed)

4.1.4.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor or to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. In this case the site work, installation of limestone, may be performed at the end of the project. Dependent on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for the sixteen breaker foundation modifications. Any foundation modifications that will be under, near, adjacent to or in close proximity of energized conductors that could be determined to be a safety risk will require an outage. All outages will require coordination with other outages in the CLECO system prior to submittal.

Upon completion of the foundations and all associated conduit and grounding breaker installation can commence. The sequence of the installation will require coordination with CLECO and is not know at this time.

4.1.4.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
16	245kV breaker	26
4	Panels (line/breaker – if needed)	18
1	RTU (if needed)	12

4.1.4.9 Assumptions:

It is assumed that only the breakers will be replaced and no additional foundation expansions will be required.

Information is not available to Entergy to determine if bus insulators can support the anticipated increase in fault current. It is recommended that this analysis be performed by CLECO.

Relay Assumptions:

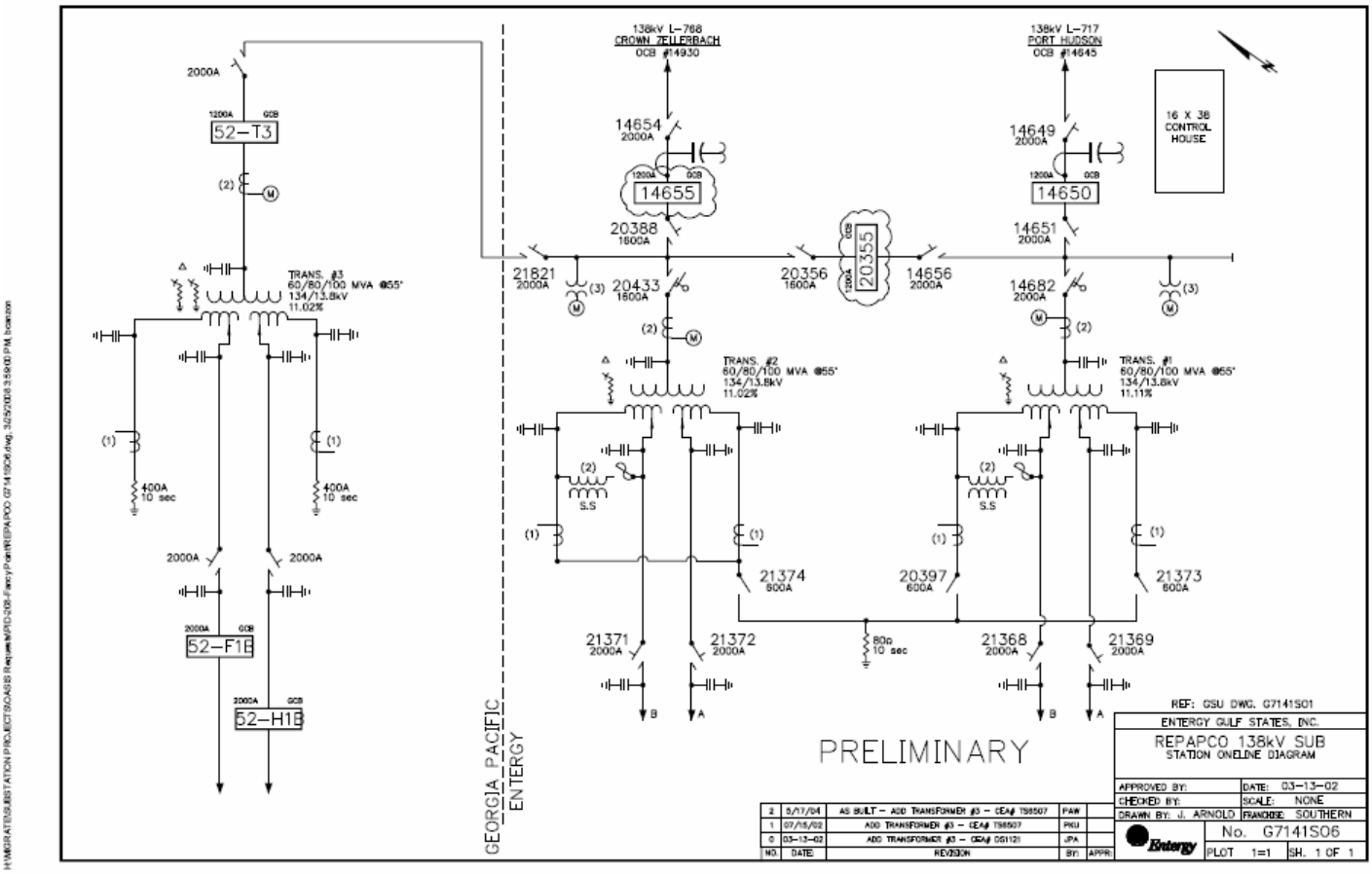
- New cable
- 80% of line and breaker relay are sufficient
- Control house space is sufficient
- Not spliting circuits for two trip coils
- Breakers have 12amp trip coils
- Breakers have 6 sets of CTs (3 on each side)
- Batteries are sufficient for non-IPO breakers
- Batteries to be upgraded for IPO breakers

4.1.5 Coly 230 kV Substation:

The System Impact Study identified breaker #21285 to be replaced with a breaker of higher fault interrupting capability. The primary reason was due to this breaker being tested for re-closing and an assumed reduced interrupting rating. This breaker, along with #21280 protecting the Jaguar 230kV line, does not use re-closing and therefore no replacement will be necessary.

4.1.6 Repapco 138 kV Substation:

The System Impact Study requires that two breakers be replaced with breakers having a higher fault interrupting rating. Breakers #14655 and # 20355 are fully rated at 20,920 Amps. The study requires that these breakers must be able to interrupt at least 21,041 Amps of fault current.



4.1.6.1 Site and Foundation

No Site Package needed and work required would be minimal. Estimated 250 tons of limestone to be used to grade sites and repair damages done during construction

4.1.6.2 Foundation

Minor foundation work will be required. It is assumed that each foundation will need to be extended two feet and that the existing foundations are slab on grade. The extension will be installed on 2 breakers foundations.

4.1.6.3 Electrical

Replace two (2) oil circuit breakers #14655 and # 20355 with 138kV, 2,000 Amp, 40kA gas circuit breakers. See drawing REPAPCO G7141SO6.

(500) feet of strung bus for jumpers

(500) feet of conduit

4.1.6.4 Relay

Repapco 138kV (2 bkrs)

- Miss -matched CTs on bus diff #2
- (1) bus diff panel (4 inputs)
- Existing D25 (1S=32pt & 1S=16pt)
- (2) new s-card (32pt)
- (1) line/breaker panel

4.1.6.5 Relay Settings

Relay setting will be required in the following panels:
- 1 – Bus diff panel
- 1 – Line/breaker panel (if needed)

4.1.6.6 SCADA and communications

RTU configuration will be required for the following:
- 2 – D20 RTU S-cards

4.1.6.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor or to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. In this case the site work, installation of limestone, may be performed at the end of the project. Dependent on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for the two breaker foundation modifications. Any foundation modifications that will be under, near, adjacent to or in close proximity of energized conductors

that could be determined to be a safety risk will require an outage. All outages will require coordination with other outages in the Entergy system prior to submittal.

Repapco Substation is located in an industrial facility (paper mill). All activities will require close communication with plant personnel to ensure all safety rules and procedures are adhered to.

4.1.6.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
2	138kV breaker	26
1	Panel (bus diff)	18
1	Panel (line/breaker)	18

4.1.6.9 Assumptions:

It is assumed that substation post insulators are adequate to support the anticipated increase

in fault current.

Relay assumptions:

- New cable
- 80% of line and breaker relay are sufficient
- Control house space is sufficient
- Not splitting circuits for two trip coils
- Breakers have 12A trip coils
- Breakers have 6 sets of CTs (3 on each side)
- Batteries are sufficient for non-IPO breakers
- Batteries to be upgraded for IPO breakers

4.1.7 Richard 138 kV Substation:

The system Impact Study identified nineteen breakers to be replaced with breakers having a higher fault interrupting rating. The breakers include #17235, #17240, #17245, #17250, #17255, #17260, #17265, #17270, #17275, #18425, #17430, #17435, #17440, #27140, #27145, #27150, #27155, #27160, and #27165. At the time the Study was performed, two additional breakers installed for a new SLEMCO circuit to Eunice were not included. These two breakers, #37390 & #37395, will also have to be replaced.

These breakers have a fault interrupting capability of 63,000 Amps. The study requires that these breakers have an interrupting capability of at least 65,369 Amps.

NOTE: Estimates for both IPO and non-IPO breakers have been provided in this scope, as requested by Transmission Planning.

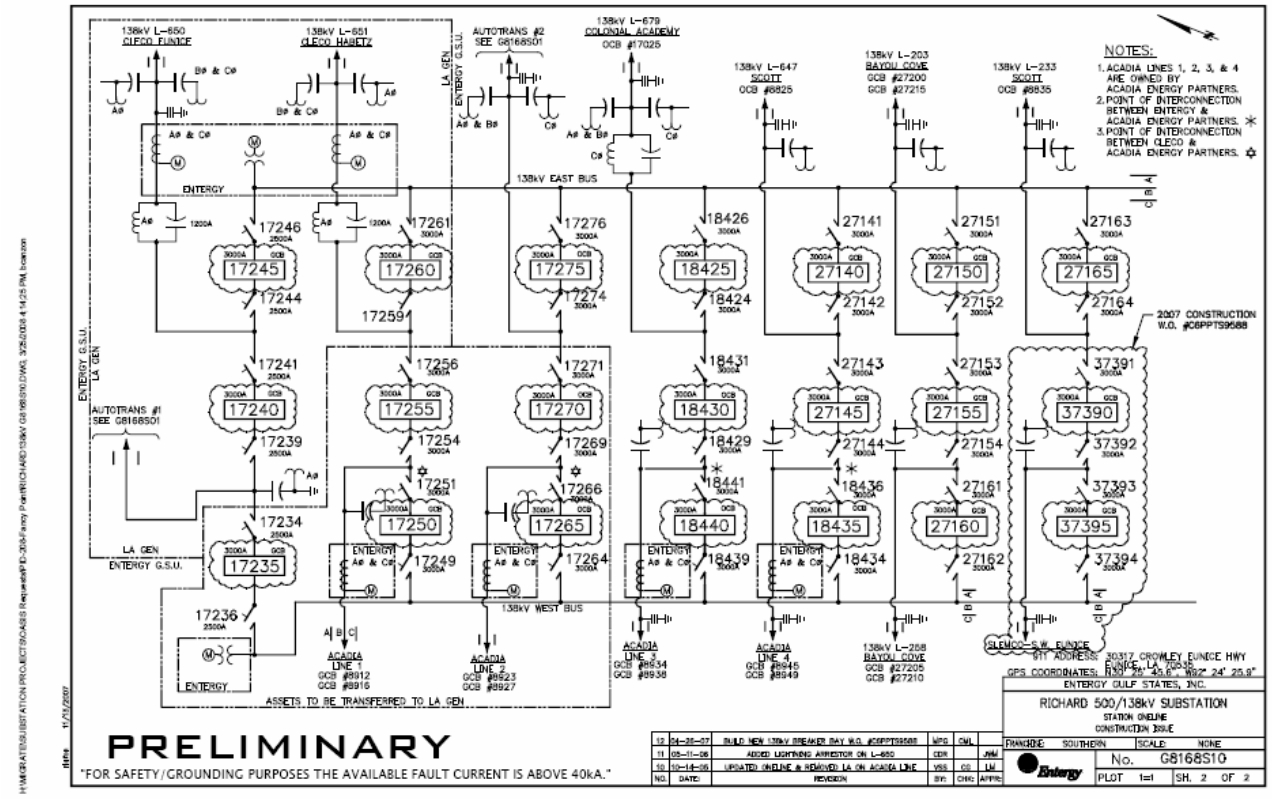
An analysis was performed to determine if the bus insulators could support the anticipated increase in fault current. The equations from IEEE P605/D13 section 11.3.3.1 were used to test the strength of the bus insulators against the new fault currents. The following assumptions and parameters were used to calculate the anticipated forces exerted on the bus supports:

Isc = 65370A
Bus Phase spacing = 10’
Longest bus span = 27’
Constant for 3 Phase fault = .866
Insulators assumed to have cantilever strength of 1450 LB

Based on these parameters and assumptions, the resulting forces exerted on the bus is approximately is 3597 LBft/Ft.

Based on this preliminary analysis, these forces will require that 424 station post and switch insulators will be replaced with 4000 LBft/Ft insulators.

It is assumed that a ground grid analysis will have to be performed to ensure that the ground grid is able to withstand the increased fault currents.



4.1.7.1 Site and Foundation

No Site Package needed and work required would be minimal. Estimated 500 tons of limestone to be used to grade sites and repair damages done during construction

4.1.7.2 Foundation

Minor foundation work will be required. It is assumed that each foundation will need to be extended four feet and that the existing foundations are slab on grade. The extension will be installed on 21 breakers foundations.

4.1.7.3 Electrical

Replace twenty-one (21) breakers including #17235, #17240, #17245, #17250, #17255, #17260, #17265, #17270, #17275, #18425, #17430, #17435, #17440, #27140, #27145, #27150, #27155, #27160, #27165, #37390, and #37395 with 245kV, 3,000 Amp, 80kA, 2 cycle IPO (or non-IPO) breakers. In order to achieve an 80 kA level of interrupting capability, 245kV breakers and additional capacitance will be required. To minimize site and foundation work,

this capacitance can be bushing mounted on the circuit breakers. See drawing RICHARD138kV G8168S10.

(424) station post and switch insulators

(5,100) feet of strung bus for jumpers

(3,200) feet of conduit

4.1.7.4 Relay

Richard 138kV (21 bkrs - IPO)

- Bus diff relays ok
- Existing D20 – (8S) - bkrs have around 6 alarms existing
- (3) new s-cards
- (5) line/bkr panels
- (2) battery sets (710AH EC-17 & 440ah EC-11)
- (2) battery chargers (75A & 50A)

For non-IPO breakers, battery sets and chargers will not be upgraded

4.1.7.5 Relay Settings

Relay setting will be required in the following panels:

- 5 – Line/breaker panels (if needed)

4.1.7.6 SCADA and communications

RTU configuration will be required for the following:

- 3 – D20 RTU S-cards

4.1.7.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

Replacement of the proposed twenty-one breakers will require coordination with LaGen and the Entergy TOC. The sequence of the proposed breaker change-outs will be determined at a later date when more information is available.

4.1.7.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
19	245kV breaker	26
424	230 kV insulators	14
5	Panels (line/breaker)	18

4.1.7.9 Assumptions:

- New cable
- 80% of line and breaker relay are sufficient
- Control house space is sufficient
- Not splitting circuits for two trip coils
- Breakers have 12amp trip coils
- Breakers have 6 sets of CTs (3 on each side)
- Batteries are sufficient for non-IPO breakers
- Batteries to be upgraded for IPO breakers

4.1.8 Richard 500 kV Substation:

As a result of adding a new line between Richard and Webre, the following work would be required as shown on drawing G8168S08:

4.1.8.1 Site

The proposed expansion of the site will be 150’ by 675’.
A topographic and boundary survey will be needed in order to property design the site. This information has not been obtained prior to completing the scope and the following quantities will be based off of assumption made from existing drawings and pictures of the site.

Soil borings will be needed in order to adequately design the foundations. These borings have not been taken. We will be assuming drill piers for the structures and pad with out piles for transformers, breakers and control house.

All appropriate permits and licenses will need to be obtained prior to construction.

The site is will be approximately 2.5 acres. A SWPPP will be needed. This work should be contracted out to the qualified contractor. The project manager shall insure this work is completed prior to the start of the bid process. This will allow the contractors bidding on the site work to understand and plan for our expectations.

Due to the lack of soil boring and survey information the following quantities are based on assumptions that were made from existing drawings and pictures of the site. The drainage of the expansion area will be surface drainage routed back into the existing drainage in the station. We will elevate the site approximately 1.5 feet above the existing grade to allow for the drainage. It is assumed that the site is heavily wooded. Grubbing and de-stumping will be needed in order to properly prepare the site. Due to the amount of site and foundation work, we will have a large amount of spoil to remove during the construction. It is assumed that spoil removed during foundation installation can not be used as structural fill and spread across the site. Therefore, it will need to be removed from the site. The soil at the site will need to be tested and the proper disposal will need to be determined prior to start of construction. The

cost for disposing the spoil will not be able to be accurately determined until we know what the proper process will be of disposing it. This will be determined during the soil testing.

1	EA	Topographic and boundary survey
1	EA	Soil borings including soil resistivity test
1	EA	Environmental impact study, permits and licenses
1	EA	SWPPP
1	EA	Soil Testing
10500	CYD	Stripping, grubbing and de-stumping
2.5	ACRE	Wooded areas (Grubbing and De-stumping)
2.5	ACRE	Wooded areas (Disposal)
19000	CYD	Structural fill (Raise site 1.5 feet above existing elevation)
2.5	ACRE	Soil Sterilization
5250	TON	Limestone surface
975	FT	7’ fence with 1’ of barb wire
675	FT	Removal of fence
.25	ACRE	Seed and mulch
11000	CYD	Hauling of spoil dirt

4.1.8.2 Foundation

Install 350 cubic yards of concrete including foundations for one 500kV deadend tower, one shield tower, one breaker, and several switch support and bus support structures. Expand the existing ground grid to include the 150’ x 675’ area of expansion and install ground leads to new structures and equipment. Install conduit from existing cable trench to new breakers, CVT’s, and motor operators.

4.1.8.3 Electrical

Install one breaker in the existing ring bus between breaker 13000 and the Nelson line termination as shown on oneline G8168S08. Install the new Webre line termination between the new breaker and breaker 13000. The following equipment shall be installed:
(1) Shield Tower, type J and associated shield wire to adjacent towers
(1) 500kV Breaker
(1) 500kV line disconnect switch with ground switch and motor operators
(2) 500kV disconnect switches with motor operators for breaker isolation in the ring and mounted on existing structures
(3) Surge arresters
(1) 500kV deadend

(29) 500kV “A” tower bus supports
(15) 500kV “B” tower bus supports
(6) 500kV “C” tower bus supports
(4) “F” tower CVT support structures
(3) Arrester support structures
(1) Lot of insulators, bus, and associated hardware

4.1.8.4 Relay

Weber Line:

- Install Two (2) 28” line panel. The panel will use an SEL 421 for primary digital and an SEL 421 for digital backup step distance protection. .
- Install three (3) CVT with carrier accessories.
- Install a Three-phase potential junction box for the line CVT.
- Install a line trap and a line tuner on A phase. Relay settings will provide appropriate carrier frequencies.

Breaker Control:

- Install One (1) breaker control panel. The panel will use an SEL 351 for sync, re-close, and breaker failure.
- Install an indoor potential /current distribution box.

Motor Control:

- Install One (1) MOS control panel. The panels will be used to control motor operated switches on line and ring bus

Control House Equipment:

- Install Two (2) Coastcom communication Channel Bank
- Install Two (2) Fiber Optic Misc (Patch Panel/Splice Box/Patch Cords/Connectors)
- Install One (1) Communications Processor, SEL2032
- Install One (1) Communications Processor, Orion 5r
- Install One (1) Junction Box, Potential
- Install ADSS fiber from Dead End tower into control house.
- Install One (1) Lot Control Cable
- Install One (1) Lot Shielded Control Cable

4.1.8.5 Relay Settings

- New relaying to set
  SEL-421 Weber Line (2)
  SEL-351 Breaker Control (1)

Existing relaying to set

A study must be done to determine what relaying at remote stations will be affected

4.1.8.6 SCADA

With the installation of a new breaker and relays a new RTU configuration will be required.

4.1.8.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical installations as well as Protection & Control Installations will commence. For the installation of the proposed components to terminate the Webre 500kV T-Line, an outage consisting of several weeks duration will be required on the affected section of the Richard 500kV Ring Bus. This outage will require the section of the Richard 500kV Ring Bus between Switch # 13072, and Switch # 18416 to be switched out, tested, and grounded. This will facilitate the removal and installation process in order to terminate the new proposed Webre 500kV T-Line.

Upon completion of the proposed additions to the Richard 500kV Ring Bus, all preliminary checkouts and commissioning components that can be made at this juncture will be made, with the exception of the activities that must take place upon final energization.

Preferably, if the final design will allow, the first span of the new proposed Webre 500kV T-Line could be terminated into the newly established portion of the node with a point of isolation to allow the Richard 500kV Ring Bus to be closed. If possible, the proper temporary Protection and Control Settings may be installed to facilitate this action as an interim measure.

Upon completion of the new proposed Webre/Richard 500kV T-Line, final commissioning and checkout will be performed. This will also include end to end checkouts, and Remote Settings.

Required Outages:

Richard 500kV Ring Bus, between Sw. # 18416, and Sw. # 13072 must be isolated.

Note: This will require an outage on the Richard/Nelson L-620 500kV Line.

4.1.8.8 Substation long delivery items:

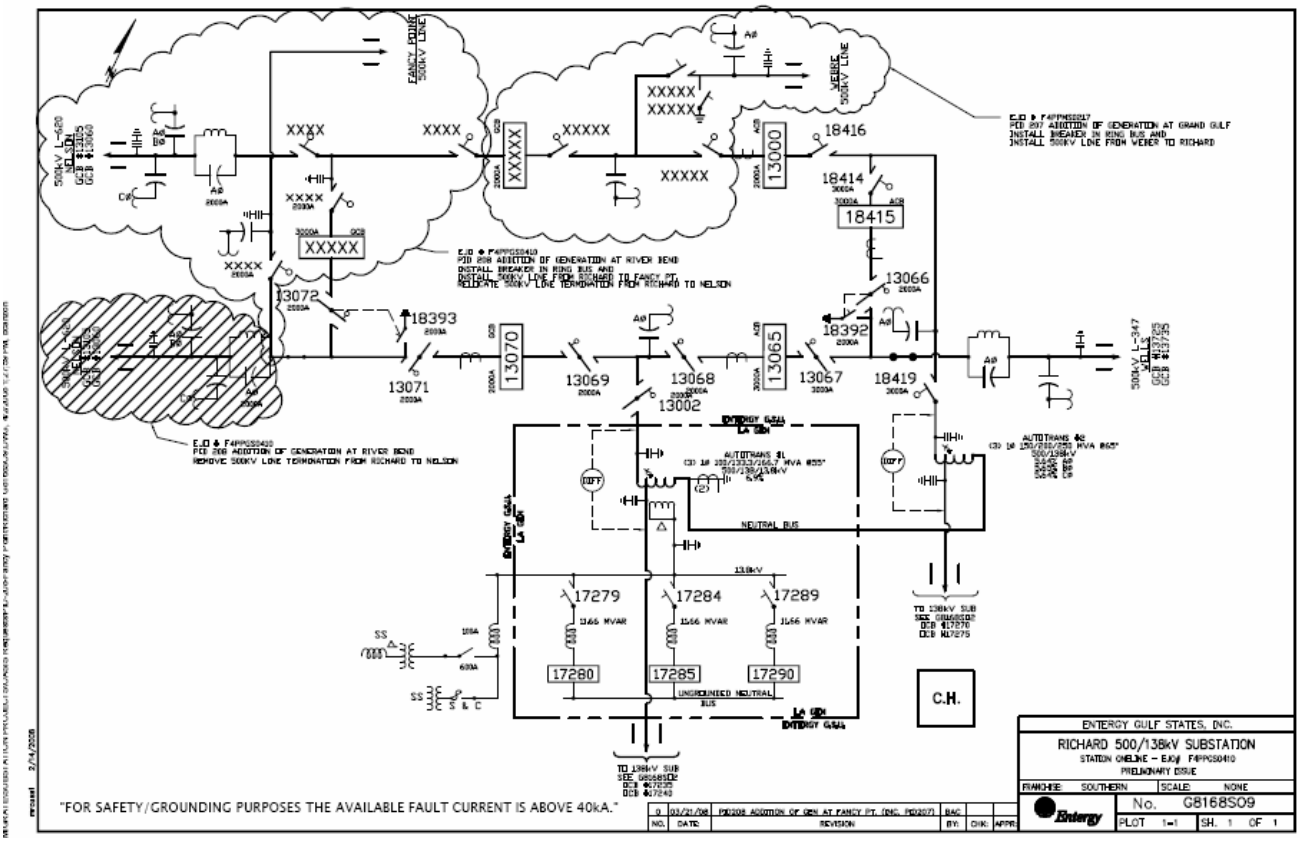
Quantity	Material Description	*Lead Time (weeks)
1	500kV Breaker	26
1	500kV line disconnect switch with ground switch and motor operators	26
2	500kV disconnect switches with motor operators	26
3	surge arresters	18
1 lot	Steel Structures	20
1 lot	500kV insulators	20
1 lot	EHV buswork	20
1	500 KV Brk cntl panel	16
2	500 KV Line panel P1/P2	16
3	500 kV CCVT	16
1	MOS Panel	10

4.1.8.9 Assumptions:

None provided by the team

4.1.9 Richard 500 kV Substation (Without Priors):

In addition to the work required as a result of adding a new line between Richard and Webre, the following work would be required for adding a new line to Fancy Point 500 kV. The existing Nelson 500 kV line shall be re-terminated into a bay between the new breaker for the new Webre line and an additional new breaker. The new Fancy Point line shall terminate in the old Nelson line bay between breaker 13070 and the new breaker as shown on drawing G8168S09:



4.1.9.1 Site

In addition to the site work needed for the new Richard to Webre 500 kV line bay, the following site work will be needed in order to bring the new Transmission line in from Fancy Point. The same assumptions will be used to prepare the estimate as were used on the Richard to Weber line bay.

The proposed expansion of the site will be 300’ by 500’. A topographic and boundary survey will be needed in order to property design the site. This information has not been obtained

prior to completing the scope and the following quantities will be based off of assumption made from existing drawings and pictures of the site.

Soil borings will be needed in order to adequately design the foundations. These borings have not been taken. We will be assuming drill piers for the structures and pad with out piles for transformers, breakers and control house.

All appropriate permits and licenses will need to be obtained prior to construction.

The site is will be approximately 3.5 acres. A SWPPP will be needed. This work should be contracted out to the qualified contractor. The project manager shall insure this work is completed prior to the start of the bid process. This will allow the contractors bidding on the site work to understand and plan for our expectations.

Due to the lack of soil boring and survey information the following quantities are based on assumptions that were made from existing drawings and pictures of the site. The drainage of the expansion area will be surface drainage routed back into the existing drainage in the station. We will elevate the site approximately 1.5 feet above the existing grade to allow for the drainage. It is assumed that the site is heavily wooded. Grubbing and de-stumping will be needed in order to properly prepare the site. Due to the amount of site and foundation work, we will have a large amount of spoil to remove during the construction. It is assumed that spoil removed during foundation installation can not be used as structural fill and spread across the site. Therefore, it will need to be removed from the site. The soil at the site will need to be tested and the proper disposal will need to be determined prior to start of construction. The cost for disposing the spoil will not be able to be accurately determined until we know what the proper process will be of disposing it. This will be determined during the soil testing.

The quantities listed below are for the Richard to Fancy Point line bay only.

1	EA	Topographic and boundary survey
1	EA	Soil borings including soil resistivity test
1	EA	Environmental impact study, permits and licenses

1	EA	SWPPP
1	EA	Soil Testing
15555	CYD	Stripping, grubbing and de-stumping
3.5	ACRE	Wooded areas (Grubbing and De-stumping)
27222	CYD	Structural fill (Raise site 1.5 feet above existing elevation)
3.5	ACRE	Soil Sterilization
7778	TON	Limestone surface
1000	FT	Access Road
800	FT	7’ fence with 1’ of barb wire
700	FT	Removal of fence
.25	ACRE	Seed and mulch
16255	CYD	Hauling of spoil dirt

4.1.9.2 Foundation

In addition to the foundations needed for the new Richard to Webre 500 kV line bay, the following foundations will be needed in order to bring the new Transmission line in from Fancy Point. The same assumptions will be used to prepare the estimate as were used on the Richard to Weber line bay.

Install 700 cubic yards of concrete including foundations for two 500kV deadend tower, two shield tower, one breaker, and several switch support and bus support structures. Expand the existing ground grid to include the 300’ by 500’ area of expansion and install ground leads to new structures and equipment. Install conduit from existing cable trench to new breakers, CVT’s, and motor operators.

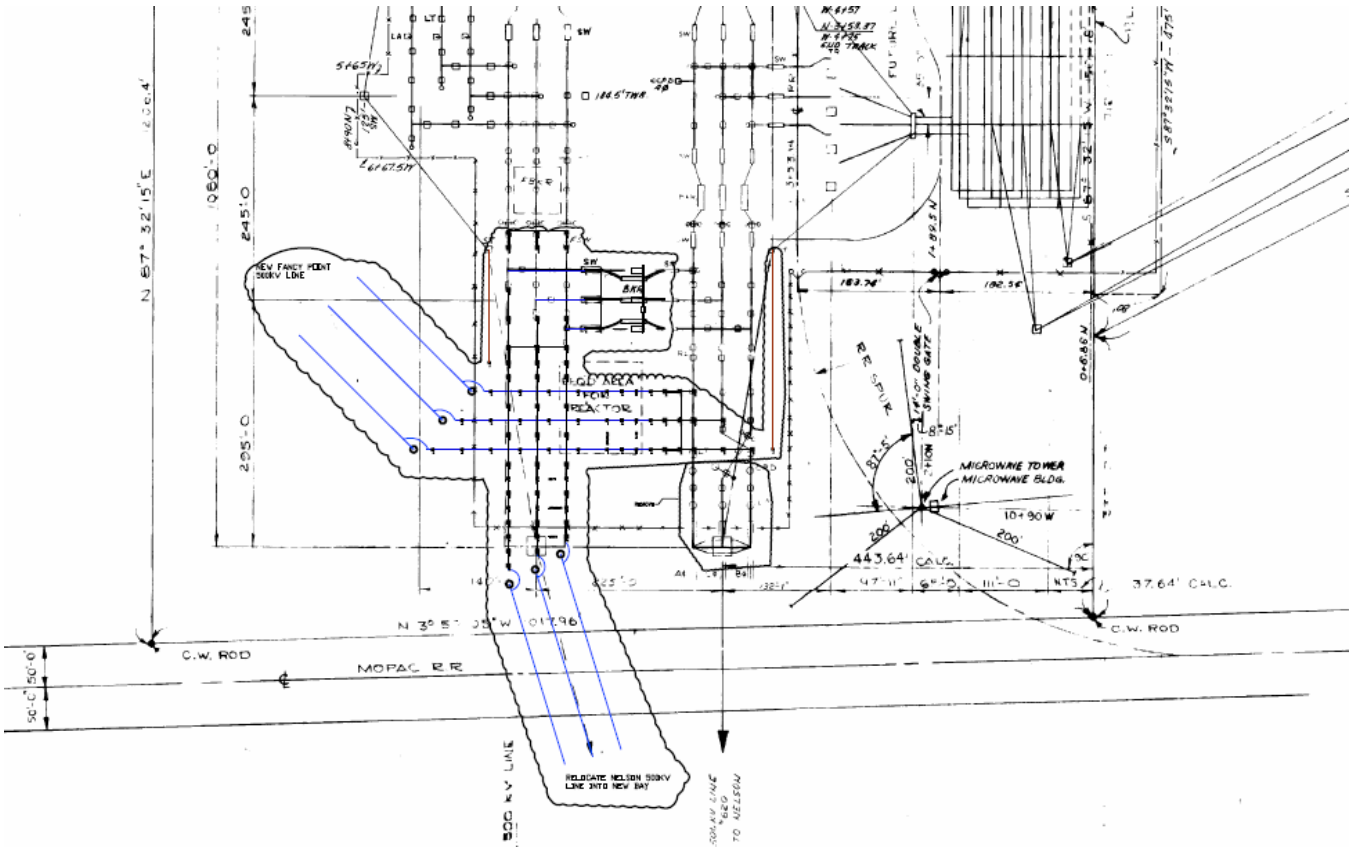
4.1.9.3 Electrical

Complete the six breaker ring bus arrangement by installing one breaker in the ring bus between breaker 13070 and the new breaker installed for the new Webre line. To prevent single breaker failure from removing two lines to the east, the Nelson line shall be re-terminated into the northwest bay between the two new breakers as shown on one-line G8168S09 and electrical arrangement G8168EA2. Install the new Fancy Point line termination southwest bay between the new breaker and breaker 13070. In addition to the equipment installed for the new Richard to Webre 500 kV line, the following equipment shall also be installed:

(1) 500kV 3000 Amp, 40kA, breaker
(2) 500kV 2000A, line disconnect switches with motor operators

(2) 500kV 2000A disconnect switches with motor operators for breaker isolation in the ring, one with a ground switch
(6) CCVTs
(6) Surge arresters
(3) line traps
(2) 500kV dead-end
(21) 500kV “A” tower bus supports
(31) 500kV “B” tower bus supports
(6) 500kV “C” tower switch supports
(18) 500kV “D” tower switch supports
(6) “F” tower CVT support structures
(2) Shield Tower, type J and associated shield wire to adjacent towers

(6) Arrester support structures
(3) “G” tower trap supports
(1) Lot of insulators, 5” SCH 80 aluminum tubing bus, and associated hardware
(1) Lot 4/0 copper conductor to tie new construction to existing ground grid
Removal of existing CCVTs, traps, arresters, bus, and supports from the old Nelson line termination



4.1.9.4 Relay

Richard 500KV Substation (additional material not already included in PID-207)

- New 500kv line relaying (Fancy Point)
  - (1) – primary #1 & primary #2 line panel (fiber – 421, 311l)
  - Fiber equipment (dual fiber)
  - (1) – single breaker control panel
  - (3) – CVTs
  - (1) – three phase CVT junction box

- Relocate Nelson 500kv line
  - (1) – single breaker control panel
  - (1) – primary #1 line panel (DTT carrier)
  - (1) – primary #2 line panel (digital microwave)
  - (1) – line trap
  - (1) – line tuner
  - (3) – CVTs
  - (1) – three phase CVT junction box
  - (1) – 3 MOS control panel
- Control house equipment
  - (1) – lot control cable
  - (1) – lot shielded control cable

4.1.9.5 Relay Settings

Relay setting will be required in the following panels:
- 1 – Primary #1/Primary #2 line panel
- 1 – Primary #1 line panel
- 1 – Primary #2 line panel
- 2 – Single breaker control panels

4.1.9.6 SCADA

Status, control and alarms to be added for new additions

4.1.9.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent to, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical installations as well as Protection & Control Installations will commence. For the installation of the proposed components to terminate the new Fancy Point 500kV T-Line, an outage consisting of several weeks duration will be required. The new 500kV line will be terminated in the southwest bay as indicated in section 4.1.8.

Upon completion of the proposed additions to the Richard 500kV Ring Bus, all preliminary checkouts and commissioning components that can be made at this juncture will be made, with the exception of the activities that must take place upon final energization.

Upon completion of the new Fancy Point 500kV T-Line, final commissioning and checkout will be performed. This will also include end to end checkouts, and remote settings.

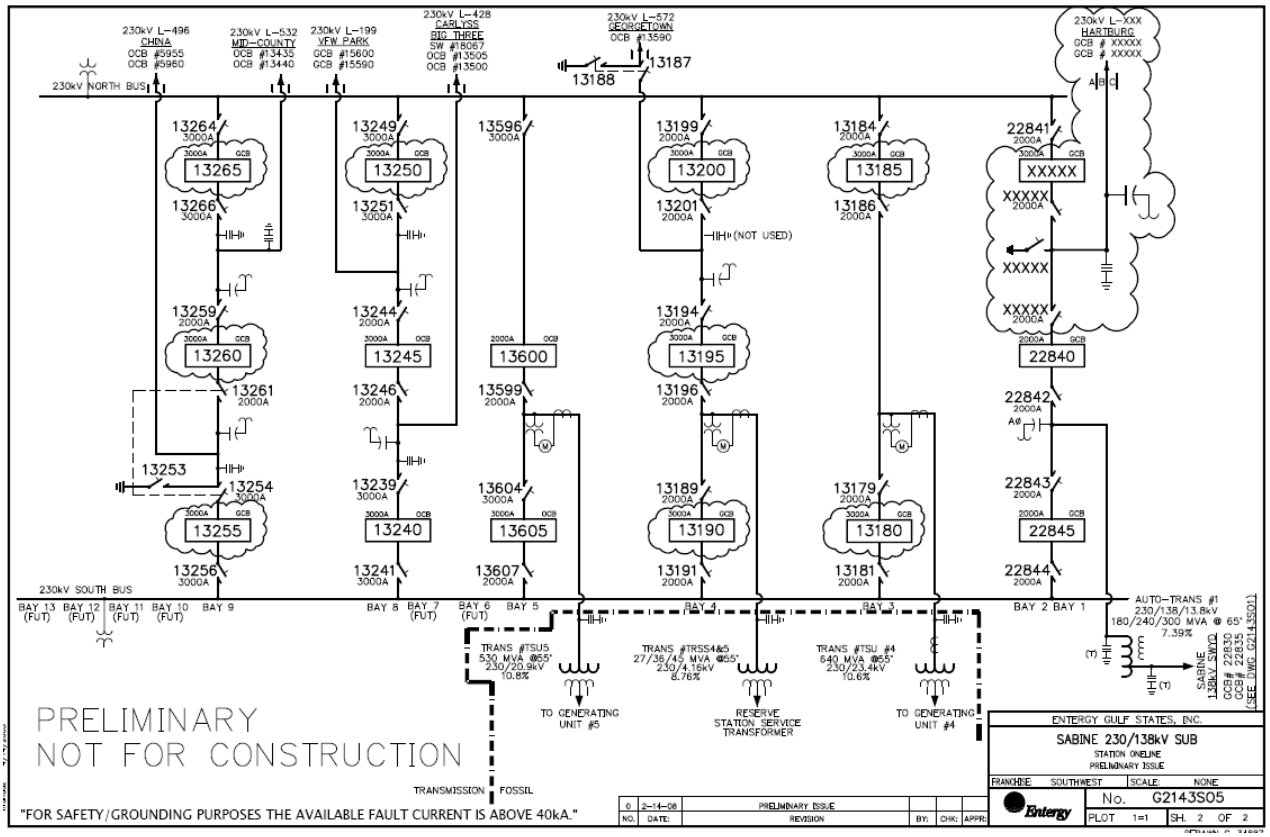
4.1.9.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
1	500kV Breaker	26
1	500kV line disconnect switch with ground switch and motor operators	26
3	500kV disconnect switches with motor operators	26
6	surge arresters	18
1 lot	Steel Structures	20
1 lot	500kV insulators	20
1 lot	EHV bus work	20
2	500 KV Brk cntl panel	18
3	500 KV Line panel P1/P2	18
6	500 kV CCVT	36
1	500 kV line traps	18
1	500 kV line tuner	14
1	MOS Panel	18

4.1.9.9 Assumptions:
The existing ground grid is adequate to support the anticipated fault current.

4.1.10 Sabine 230 kV Substation:

The new 230kV transmission line from Hartburg Substation will be terminated in the 230kV yard at Sabine Substation. This will be accomplished through the following work.



4.1.10.1 Site and Foundation

- This is an existing site and no expansion of the substation will be required. Minimal site work will be required for soil stabilization and final dress up after construction is complete. An estimated 500 tons of limestone will be required.

4.1.10.2 Foundation

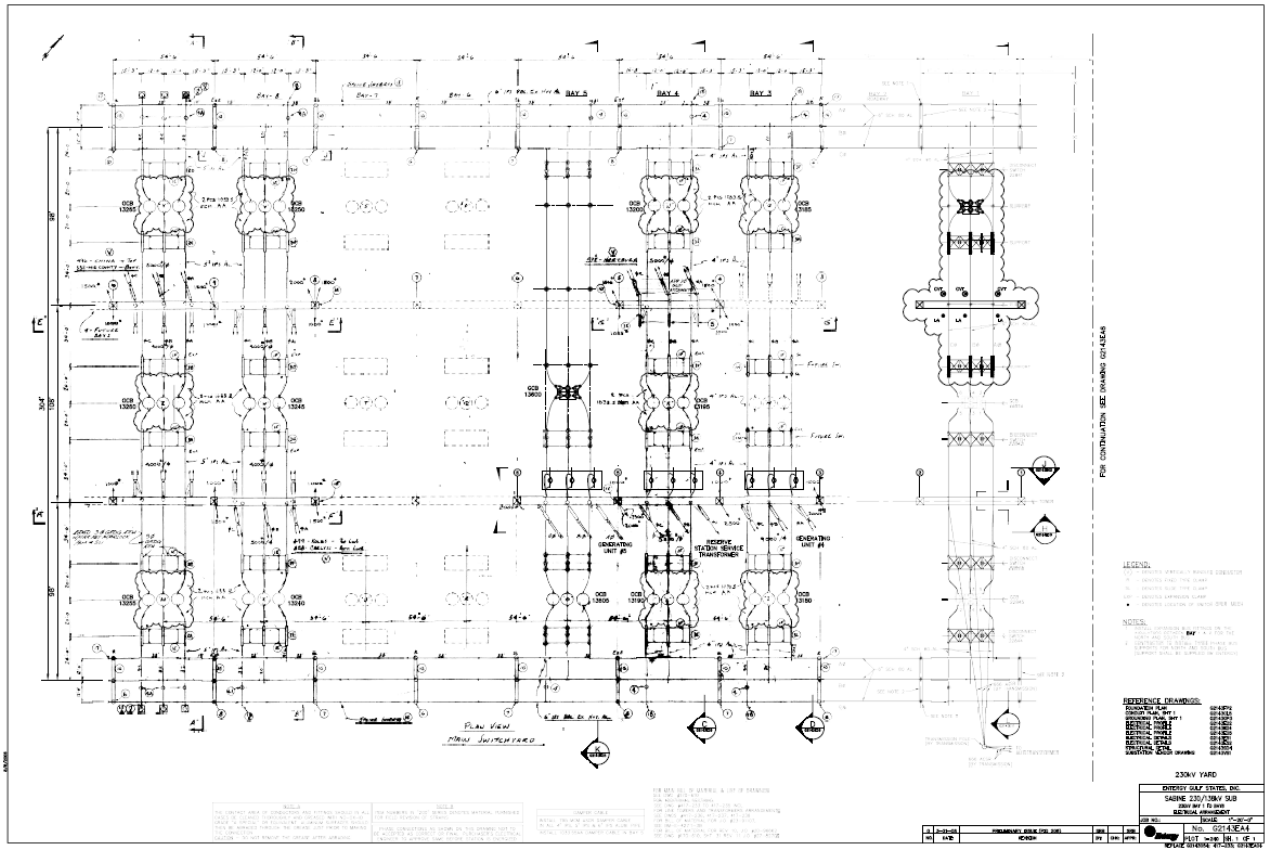
It is assumed that the existing ground grid is adequate for the new construction. If deemed appropriate a ground grid analysis will be performed during detailed design to confirm this assumption. All new structures will be tied to the existing grid with 4/0 copper conductor as per Entergy grounding standards.

- The following foundations will be required for the new construction:
- 230kV A-frame dead end foundation (F5) as per drawing G2143F12
  NOTE: each dead end foundation consists of eight separate footings
- 230kV circuit breaker foundation (F6) as per drawing G2143F12
- 230kV CVT support foundation (F3) as per drawing G2143F11
- 230kV arrester support foundation (F3) as per drawing G2143F11

- (9 yards) foundation concrete for modifications of existing slabs for breaker replacements.
- (500') pre-cast cable trench
- Remove (3) 230kV single phase bus support foundations to accommodate the new breaker installation.

4.1.10.3 Electrical

- A new 230kV transmission line termination point will be installed in the existing 230kV switchyard at Sabine Substation. This will be accomplished by building out Bay #1 to a full breaker-and-a-half bay. The new Hartburg 230kV transmission line will terminate in the newly finished Bay #1. Existing structures will be used where appropriate for two new switch installations. Three bus supports will be removed to accommodate the new breaker installation. A new 230kV A-frame transmission line dead end will be installed to terminate the new transmission line. And, a new 230kV circuit breaker will be installed to complete the bay.
- Additionally, the facility study identified the following nine circuit breakers to be upgraded to 63kA fault interrupting capacity: 13180, 13185, 13190, 13195, 13200, 13250, 13255, 13260, and 13265.
- Please see the attached preliminary electrical arrangement and station one-line diagram for detailed equipment layout information.



4.1.10.4 Relay

Control House General Equipment

- Two (2) new panels will be required for this project. These new panels are to have the GSU wingwall design in order to be inserted into the existing 230kV protection row. Consult with Asset Maintenance to ensure Panel Layout is in the best ergonomic configuration.
- The existing GE Harris D20 RTU will require expansion to provide adequate SOE and alarms for the new breaker alarm points. Purchase and install two (2) additional D20S cards.
- Purchase and install one (1) 19" Communications Rack containing an SEL 2032, one (1) Teltone port switcher and mounting bracket, one (1) SEL 2407 satellite clock, one (1) Starcomm modem model number 240-0199 and one AC adapter. The following cables will be needed for relay communications:

    - One (1) 50' SEL C290 cable for connection of the SEL 2032 to the GE Harris D20 RTU
    - Three (3) 50' SEL C273A cables for connection of the SEL 2032 to the SEL 421, SEL 311L, and SEL 351 relays
    - One (1) 3' SEL C220 cable for connection between the SEL 2032 to the Starcomm modem

New 230kV Hartburg Line

- Design, purchase and install one (1) 28" GSU wingwall Dual Primary Line Panel referencing Entergy Standard PM1803, latest revision and the Line 345 Webre to Wells panel located at Webre Substation in GSU-LA. This panel uses a Schweitzer Engineering Lab model SEL 311L Current Differential relay for Primary #1 protection and a Schweitzer Engineering Lab model SEL 421 Distance Relay for Primary #2 protection. The panel includes a Pulsar carrier set which will not be needed for this project. This application will use direct relay to relay fiber optic and redundant multiplexed communications circuits.
- Design, purchase and install one (1) 28" GSU wingwall Breaker Control Panel using a Schweitzer Engineering Lab model SEL 351 relay for all breaker protection and control functions referencing Entergy Standard PM0501, latest revision.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new 230kV circuit breaker will be required.
- This circuit breaker will be used for protection and control of the 230kV Line to Hartburg. It must also replace breaker 22840's input to the 230kV North bus differential.
- Purchase and install three (3) relaying accuracy capacitive voltage transformers (CVT's) for bus/line potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes.
- Purchase and install one (1) three phase CVT junction box per Entergy Standard PM2402, latest revision.

Existing 230kv Breaker Replacement

- Remove the following equipment from the Sabine 230kV substation:
    - Breakers 13180, 13185, 13190, 13195, 13200, 13250, 13255, 13260, & 13265

- Replace the above 230kV breakers with 3000A, 63kA, 2 cycle, IPO breakers. It is assumed for the purposes of this scope that all breakers will use the existing breaker contol relaying and will not be configured for single pole breaker operation.
- Due to the increased trip coil current of the new circuit breakers, new control cable from the breaker to the control panel for each breaker will be required. The new control cable will be shielded control cable.
- GCBs 13265, 13250, 13200, 13185, and the new 230kV breaker for the line to Hartburg are associated with the 230kV North Bus. Careful consideration must be given to specification of the CTs required for input to the North Bus differential. The PVD scheme must maintain a consistent CT ratio for all CTs tied to the North Bus. At this time, the CT ratio in use for the North Bus differential is 3000:5.
- GCBs 13255, 13190, 13180 are associated with the 230kV South Bus. Careful consideration must be given to specification of the CTs required for input to the South Bus differential. The PVD scheme must maintain a consistent CT ratio for all CTs tied to the South Bus. At this time, the CT ratio in use on the South Bus differential is 3000:5.

4.1.10.5 Relay Settings

- Due to the replacement of OCB 3505 with 69kV, 3000A gas circuit breakers (GCB) with 63kA fault duty:
    - System modeling verification will be required and settings for North and South Bus high impedance differential will need generated.
    - Perform ground over current study in the immediate area.

4.1.10.6 SCADA and communications

- RTU configuration will be required

4.1.10.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the

installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 230kV facilities require a 6-12 months advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical, as well as Protection & Control installations will commence. Upon completion of all Steel and Electrical components and substantial completion of the required Protection & Control components the installation of the proposed T-Line components will be to terminate, the Hartsburg 230kV T-Line. The actual sequence of the 230kV Substation and T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several days in duration. The durations are dependant on the final designs, and system constraints.

SWPPP implementation, monitoring and removal is required and estimated in estimating document. Station security is required and is estimated. Following are estimated time period for some construction activities:

Foundation, grounding and conduits will require approximately four weeks.
Installation of electrical equipment will require approximately twelve weeks.
Installation of relay equipment, termination, testing and commissioning will require approximately eight weeks

4.1.10.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
1	230kV A-frame dead end	24
10	230kV 3000A 63kA IPO gas circuit breaker	26
2	230kV 3000A vertical break disconnect switch	18
1	230kV ground switch attachment	18
3	230kV station class surge arrester	16
3	230kV CVT support	24
3	230kV surge arrester support	24
Lot	Bus, conductor, and fittings	14
Lot	2” SCH 40 PVC conduit	-
2	Panels	18
3	230kV CVTs	56

4.1.10.9 Assumptions:
The existing foundations will require minimal modifications to accommodate the new circuit breakers.
The existing ground grid is adequate to support the anticipated fault current.
New cable will be installed to all new breakers.
Line and breaker relays are sufficient.
Control house space is sufficient.
Not splitting the circuits for two trip coils when one trip coil is currently in use.

The new breakers will have 12amp trip coils and have 6 sets of CTs (3 on each side)
The control house batteries are sufficient.

4.1.11 Willow Glenn 138 kV Substation:

The system Impact Study identified nine breakers to be replaced with breakers having a higher fault interrupting rating. The breakers include #9825, #9850, #9855, #9860, #9865, #9900, #9905, #9910, and #9930.

These breakers have a fault interrupting capability of 55, 000 Amps. The study requires that these breakers have an interrupting capability of at least 55,061 Amps.

For generation stability, the replacement breakers will be IPO.

An analysis was performed to determine if the bus insulators could support the anticipated increase in fault current. The equations from IEEE P605/D13 section 11.3.3.1 were used to test the strength of the bus insulators against the new fault currents. The following assumptions and parameters were used to calculate the anticipated forces exerted on the bus supports:

Isc = 55061A

Bus Phase spacing = 10’

Longest bus span = 37’

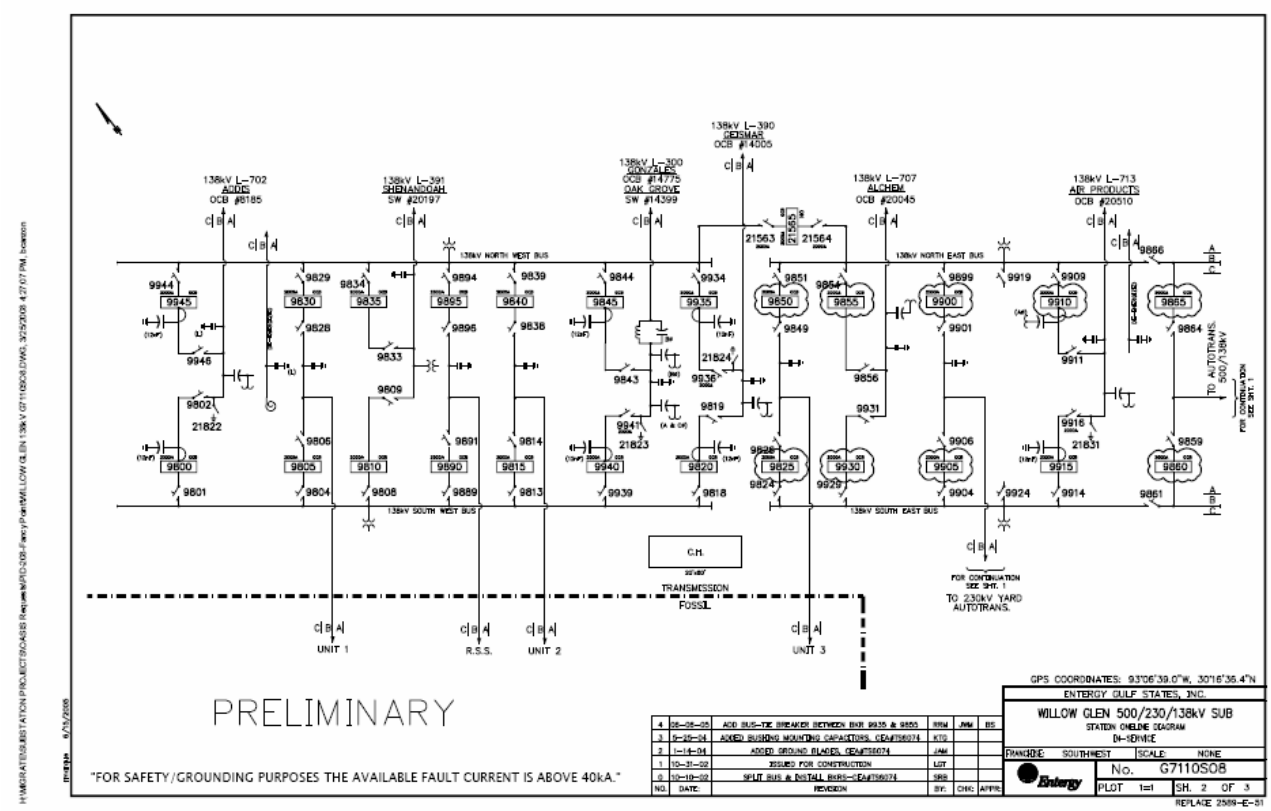
Constant for 3 Phase fault = .866

Insulators assumed to have cantilever strength of 2200 LB

Based on these parameters and assumptions, the resulting forces exerted on the bus is approximately is 3497 LBft/Ft.

Based on this preliminary analysis, these forces will require that 504 station post and switch insulators will be replaced with 4000 LBft/Ft insulators.

It is assumed that a ground grid analysis will have to be performed to ensure that the ground grid is able to withstand the increased fault currents.



4.1.11.1 Site and Foundation

20’ x 36’ expansion to existing control house for new breaker panel installation

No Site Package needed as the site work will be minimal. Estimated 500 tons of limestone to be used to grade sites and repair damages done during construction

4.1.11.2 Foundation

Minor foundation work will be required. It is assumed that each foundation will need to be extended two feet and that the existing foundations are slab on grade. The extension will be installed on 9 breakers foundations.

Install foundation for expansion - 20’ x 36’ control house

4.1.11.3 Electrical

Replace nine (9) breakers including #9825, #9850, #9855, #9860, #9865, #9900, #9905, #9910, and #9930 with 138 kV, 3,000 Amp, 63 kA, 2 cycle IPO breakers. See drawing WILLOW GLEN 138kV G7110SO8.

(504) station post and switch insulators

(2,200) feet of strung bus for jumpers

(1,350) feet of conduit

4.1.11.4 Relay

Willow Glen 138kv (9 bkrs - IPO)

- Bus diff relays OK
- Existing d20 (10S)
- (4) S-cards
- (2) line/bkr panels
- (1) battery set (620AH EC-15)
- (1) battery charger (100A)
- Exception – no room in control house

4.1.11.5 Relay Settings

Relay setting will be required in the following panels:

- 2 – Line/breaker panels (if needed)

4.1.11.6 SCADA and communications

RTU configuration will be required for the following:

- 4 – D20 RTU S-cards

4.1.11.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. The expansion of the control house may need to be contracted to a separate contractor with the appropriate qualifications to perform the expansion. Dependant on the final foundation design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent to, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. The nine breakers that will be replaced will require specific outages. These outages will be submitted by Construction Management and coordinated with other outage requests in the Entergy system.

The proposed work will be performed within the confines of an operating Entergy facility. All work must be coordinated with the Willow Glenn Control Room Supervisor.

4.1.11.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
9	138kV breaker	26
2	Panels (line/breaker – if needed)	18

4.1.11.9 Assumptions:

- New cable
- 80% of line and breaker relay are sufficient
- Control house space is sufficient
- Not splitting circuits for two trip coils
- Breakers have 12A trip coils
- Breakers have 6 sets of CTs (3 on each side)
- Batteries are sufficient for non-IPO breakers
- Batteries to be upgraded for IPO breakers

4.1.12 Webre 500 kV Substation:

Install a new breaker and line position in the existing ITE GIS equipment for a line to Richard as shown on the Webre electrical plan and drawing G7198S06. The following work would be required:

4.1.12.1 Site and Foundation

The proposed expansion of the site will be 350' x 200'.
A topographic and boundary survey will be needed in order to proper design the site. This information has not been obtained prior to completing the scope and the following quantities will be based off of assumption made from existing drawings and pictures of the site.

Soil borings will be needed in order to adequately design the foundations. These borings have not been taken. We will be assuming drill piers for the structures and pad with out piles for transformers, breakers and control house.

All appropriate permits and licenses will need to be obtained prior to construction.

The site expansion will be approximately 1.6 acres. A SWPPP will be needed. This work should be contracted out to the qualified contractor. The project manager shall insure this work is completed prior to the start of the bid process. This will allow the contractors bidding on the site work to understand and plan for our expectations.

Due to the lack of soil boring and survey information the following quantities are based on assumptions that were made from existing drawings and pictures of the site. The drainage of the expansion area will be surface drainage routed back into the existing drainage in the station. We will elevate the site approximately 2.0 feet above the existing grade to allow for the subsurface drainage. It is assumed that the site is light brush. Stripping and grubbing will be needed in order to properly prepare the site. Due to the amount of site and foundation work, we will have a large amount of spoil to remove during the construction. It is assumed that spoil removed during foundation installation can not be used as structural fill and spread across the site. Therefore, it will need to be removed from the site. The soil at the site will need to be tested and the proper disposal will need to be determined prior to start of construction. The cost for disposing the spoil will not be able to be accurately determined until

we know what the proper process will be of disposing it. This will be determined during the soil testing.

1	EA	Topographic and boundary survey
1	EA	Soil borings including soil resistivity test
1	EA	Environmental impact study, permits and licenses
1	EA	SWPPP
1	EA	Soil Testing
8,000	CYD	Stripping, grubbing and de-stumping
1.6	ACRE	Light brush and grubbing
1.6	ACRE	Light brush and grubbing (Disposal)
6	EA	Catch Basins
400	FT	24” R.C.P. Culvert
16,100	CYD	Structural fill (Raise site 2.0 feet above existing elevation)
1.6	ACRE	Soil Sterilization
600	FT	Access Roadways
4,500	TON	Limestone surface
1100	FT	7’ fence with 1’ of barb wire
1100	FT	Removal of fence
.25	ACRE	Seed and mulch
8,750	CYD	Hauling of spoil dirt

4.1.12.2 Foundation

Install the following foundations for a new open air position ring bus:
(1)-500kV Breaker Foundations
(3)-500kV Equipment Support Structure Foundations for surge arresters
(3)-500kV Equipment Support structure foundations for CVTs
(30)-500kV Bus Support foundations for single phase bus supports
(6)-500kV Switch Support foundations for high elevation
(1)-500kV Dead-end, Full Tension foundations
(1)-500kV Type "J" Shield Wire Mast Foundations
(5) - yard light foundations
(1) Lot of grounding to significantly expand the ground grid and bond all structures and electrical equipment to that grid

4.1.12.3 Electrical

Install a new breaker and line position in the existing ITE GIS equipment for a line to Richard as shown on the Webre electrical plan and drawing G7198S06. The following work would be required:
(1) 500kV deadend structures for the new Richard transmission lines
(1) 500kV breakers
(2) Gas insulated 500kV disconnect switches, with ground blades
(1) 500kV air break disconnect switches, with ground blades and both with motor operators
(6) 500kV switch structures, six per switch
(3) Arresters, three for each line
(3) Arrester support structures
(3) 500kV CVT support structures
Several bus supports to support air insulated buswork and gas insulated buswork expanding the ring and connecting to the transmission line terminations
(1) Lot of bus work
(1) Lot of insulators
(1) 500kV shield wire support structure
(1) Lot of shield wire

4.1.12.4 Relay

Wells Line:

- Upgrade line panel. The panel will use digital backup step distance protection.

Richard Line:

- Install two (2) 28” line panel. The panel will use an SEL 421 for primary digital and an SEL 421 for digital backup step distance protection. .
- Install three (3) CVT with carrier accessories.
- Install a Three-phase potential junction box for the line CVT.
- Install a A phase line trap and a line tuner. Relay settings will provide appropriate carrier frequencies.

Breaker Control:

- Install one (1) breaker control panels. The panel will use an SEL 351 for sync, re-close, and breaker failure.
- Install an indoor potential /current distribution box.

Motor Control:

- Install one (1) MOS control panels. The panels will be used to control motor operated switches on line and ring bus

Control House Equipment:

- Upgrade Harris D20 RTU – mother board, cards for control, status, analog, and software. In addition to the data from Entergy’s equipment, status from the customer circuit switchers will be routed to the RTU.
- Install two (2) SEL 2032.
- Install one (1) Orion Comm Processor
- Install wall mounted AC panel.
- Install wall mounted DC panels.

- Install two (2) Fiber communication racks for dual OPGW fiber, mux, channel bank, patch panel, 48volt converter
- Install two (2) fiber slice box. The box will be located on dead end tower
- A dedicated four-wire data circuit will be installed for SCADA communication between the substation and the TOC.
- RTU configuration will be required.
- Relay settings will be required.
- Host database changes will be required.
- Install a one lot of shielded cable
- Install a one lot of cable
- Install a one lot of ADSS fiber optic cable

4.1.12.5 Relay Settings

- New relaying to set

  SEL-421 Richard (2)
  SEL-351 Breaker Control (1)

Existing relaying to set

A study must be done to determine what relaying at remote stations will be affected

4.1.12.6 SCADA and communications

A configuration for the new RTU will be required. There will also be 2 SEL2032 configuration required at this station.

4.1.12.7 Construction Strategy and timing of outages:

The proposed method to perform the installation of the new 500kV GIS breaker will be to sole source the entire installation of the breaker and associated equipment to the breaker vendor (ABB). This method of installation will require close coordination with the Entergy design and construction management departments. All methods of installation and the materials used will be required to meet Entergy standards and specifications.

Entergy personnel will oversee all construction activities to ensure every effort is made to utilize construction methods that will minimize outages, such as low profile excavation equipment. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules.

The actual sequence of the 500kV T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time The new proposed Richard 500kV T-Line component could be terminated without requiring an outage, whereas this is a green-field T-Line, terminating into a green-field Substation.

Upon completion of the proposed 500kV GIS Breaker installation, all preliminary checkouts and commissioning components that can be made at this juncture will be made, with the exception of the activities that must take place upon final energization of each component. All checkouts and commissioning will be performed by Entergy personnel.

Required Outages:

Webre/Wells 500kV, L-345
Webre/Willow Glenn, L-346
Webre/Big Cajun #2, L-745

4.1.12.8 Substation long delivery items:

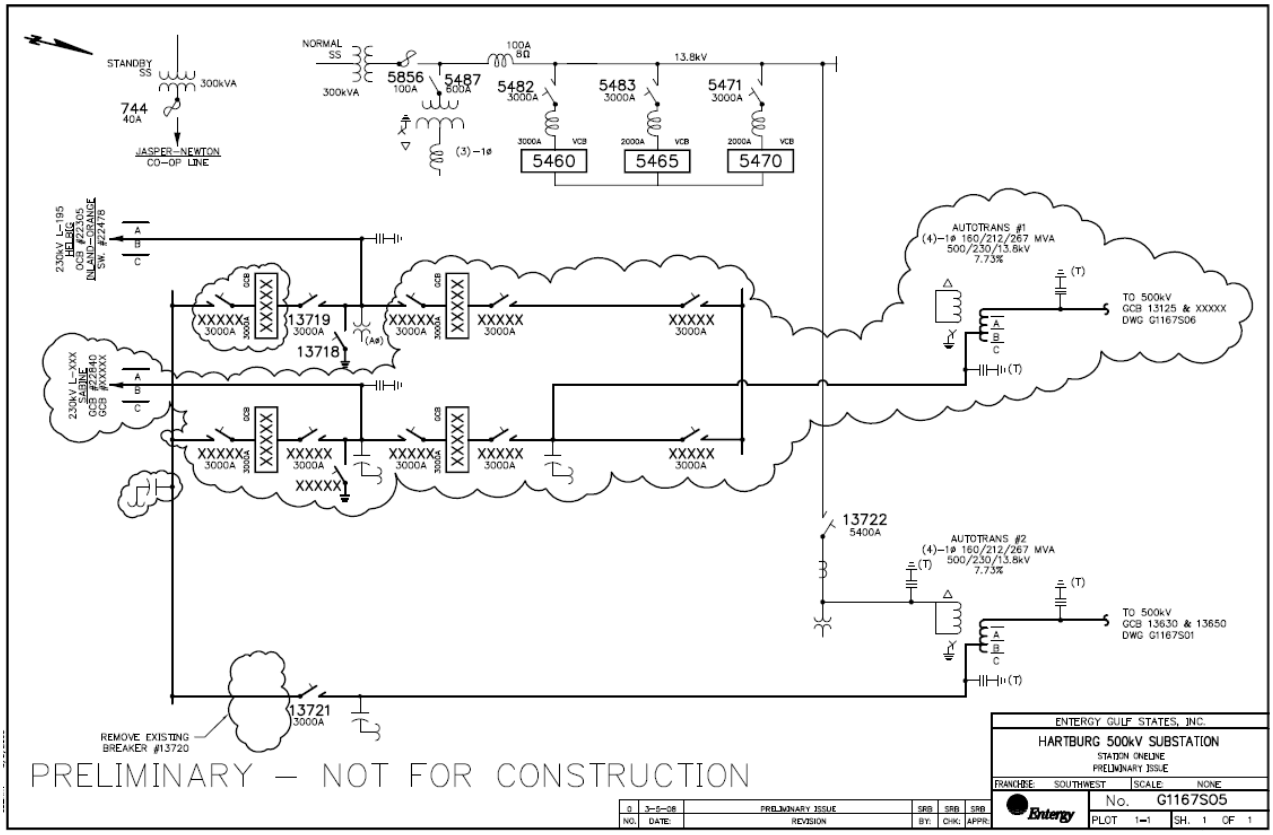
Quantity	Material Description	*Lead Time (weeks)
1 lot	Gas insulated expansion buswork	78
1	500kV Breaker	26
1	500kV Switch	26
3	Arresters	18
1 lot	500kV Steel Structures	20
1 lot	500kV insulators	20
1 lot	EHV buswork	20
1	500 KV Breaker control panel	16
2	500 KV Line panel P1/P2	16
3	500 kV CCVT	16
1	MOS Panel	10

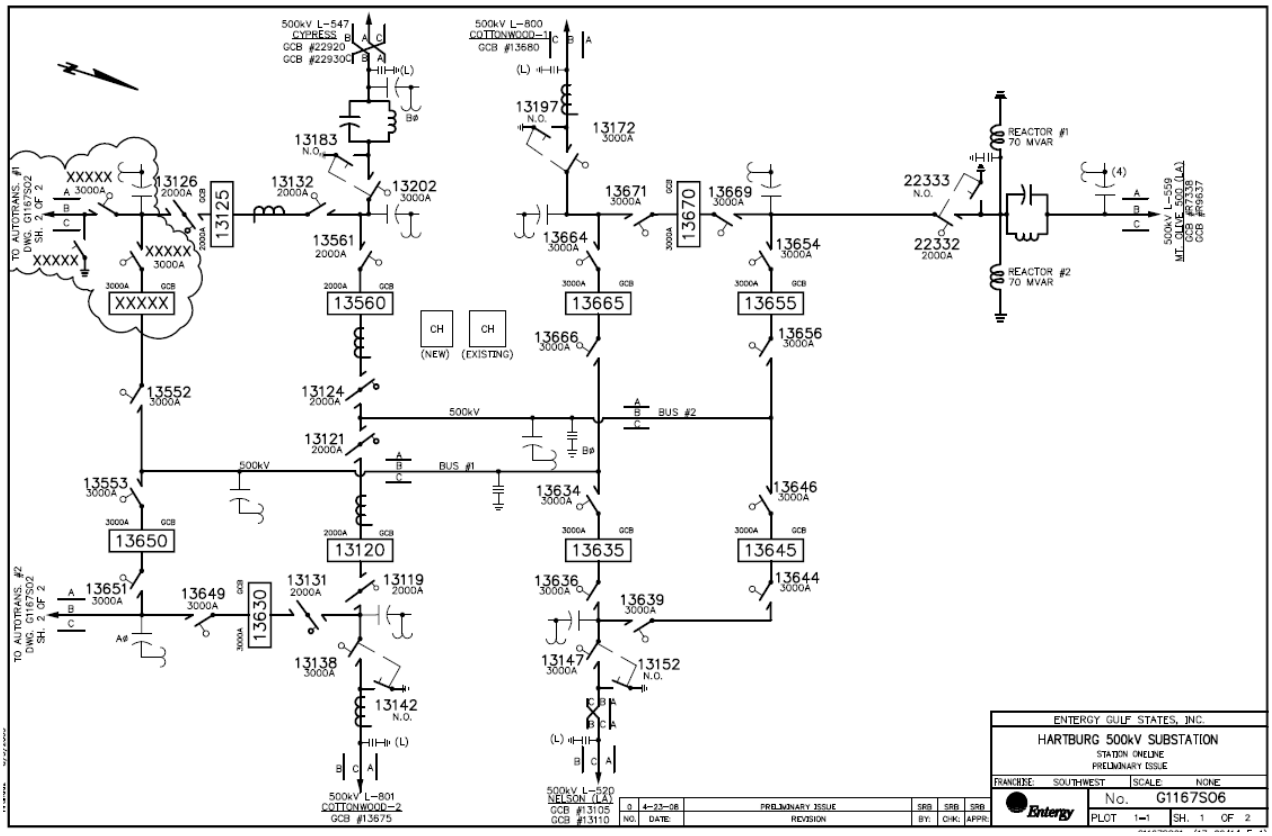
4.1.12.9 Assumptions:

Site assumptions are noted in the site work description. In an effort to minimize construction outages, new electrical equipment shall be installed instead of re-using existing material. This applies to the control house as well, but the size must be determined. Some of the existing 500kV bus work and structures will be removed to facilitate the new construction, but the cost of removing the existing gas bus is not known at this time. Assume the GIS will be abandoned in place.

4.1.13 Hartburg 500/230 kV Substation:

A new 230kV transmission line termination point will be installed in the existing 230kV switchyard at Hartburg Substation. Additionally, a new 500/230kV autotransformer will be installed between the 500kV and 230kV yards. This will be accomplished through the following work.





4.1.13.1 Site and Foundation

- This is an existing site and no expansion of the substation will be required. Minimal site work will be required for soil stabilization and final dress up after construction is complete. An estimated 500 tons of limestone will be required.
- The existing station road will be extended approximately 300’ to accommodate the new autotransformer installation.

4.1.13.2 Foundation

It is assumed that the existing ground grid is adequate for the new construction. If deemed appropriate a ground grid analysis will be performed during detailed design to confirm this assumption. All new structures will be tied to the existing grid with 4/0 copper conductor as per Entergy grounding standards.

The following foundations will be required for the new construction:

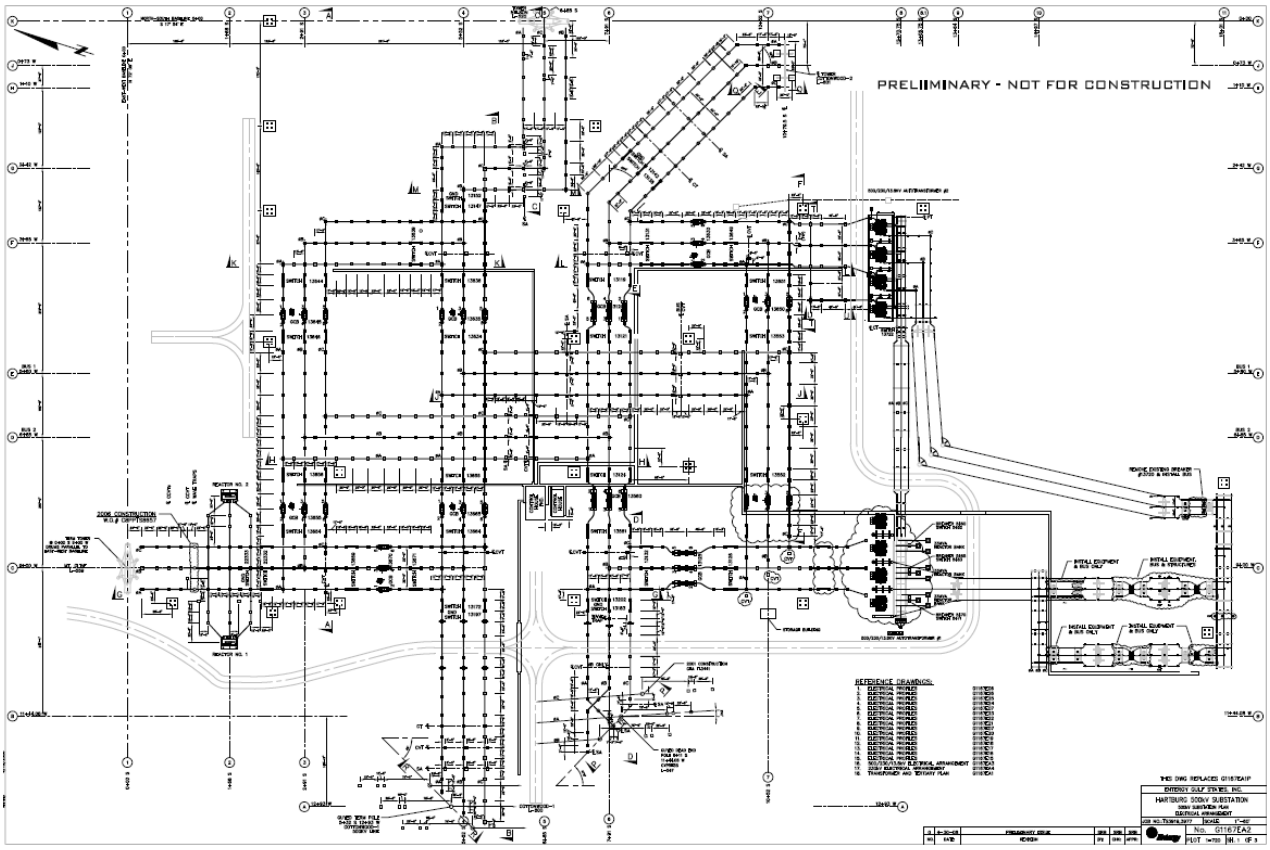
- (3) 230kV circuit breaker foundation (MM1) as per drawing G1167F12
- (3) 230kV switch support foundation (CC1) as per drawing G1167F11
  NOTE: each switch support foundation consists of two separate footings
- (9) 230kV single phase bus support foundation (AA1) as per drawing G1167F11
- (6) 230kV CVT support foundation (FF1) as per drawing G1167F11
- (1) 230kV A-frame dead end foundation (DE1 & DE2) as per drawing G1167F11 & F1167F12
  NOTE: each dead end foundation consists of four separate footings

- 500/230kV autotransformer foundation
  NOTE: this foundation includes four foundations for each phase and all necessary fire walls.
- 500kV circuit breaker foundation
- 500kV CVT support foundation

All necessary underground and aboveground conduit and fittings to be installed as per Entergy conduit standards.

4.1.13.3 Electrical

- A new 230kV transmission line termination point will be installed in the existing 230kV switchyard at Hartburg Substation. This will be accomplished by creating a three breaker ring bus configuration in the 230kV switchyard. The existing Helbig transmission line and 500/230kV autotransformer will occupy two of the electrical nodes of the new ring bus and the new Sabine transmission line will occupy the third node. Existing structures will be used where appropriate. Existing circuit breaker #13720 will be removed to accommodate the new configuration. Please see the attached preliminary electrical arrangement and station one-line diagram for detailed equipment layout information.
- A new 500/230kV autotransformer will be installed between the 500kV and 230kV yards. This will be accomplished by installing a new 500kV breaker and switch in the appropriate locations to complete the breaker-and-a-half bay in the 500kV yard. Pease see the attached preliminary electrical arrangement and station one-line diagram for detailed equipment layout information.



4.1.13.4 Relay
Control House General Equipment

- Twelve new panels will be required for this project. These new panels are to have the GSU wingwall design in order to be inserted into the existing 230kV protection row. Consult with Asset Maintenance to ensure Panel Layout is in the best ergonomic configuration.

230kV Breaker Control Panels

- Design, purchase and install four (4) 28" GSU wingwall Breaker Control Panel using a Schweitzer Engineering Lab model SEL 351 relay for all breaker protection and control functions referencing Entergy Standard PM0501, latest revision.
- The first breaker control panel will be used for protection and control of the new 230kV circuit breaker located between the Helbig line and the new 500/230kV Autotransformer. The second breaker control panel will be used for protection and control of the new 230kV circuit breaker located between the Helbig line and the existing 500/230kV Autotransformer. The third breaker control panel will be used for protection and control of the new 230kV circuit breaker located between the new Sabine line and the existing 500/230kV Autotransformer. The fourth breaker control panel will be used for protection and control of the new 230kV circuit breaker located between the new Sabine line and the new 500/230kV Autotransformer.
- Complete design of the AC and DC control schematics as well modification of the existing 500/230kV autotransformer differential scheme and 230kV Line 195 protection scheme will be required. In addition, monitoring alarms for these new 230kV circuit breakers will be required.

New 230kV Sabine Line

- Design, purchase and install one (1) 28" GSU wingwall Dual Primary Line Panel referencing Entergy Standard PM1803, latest revision and the Line 345 Webre to Wells panel located at Webre Substation in GSU-LA. This panel uses a Schweitzer Engineering Lab model SEL 311L Current Differential relay for Primary #1 protection and a Schweitzer Engineering Lab model SEL 421 Distance Relay for Primary #2 protection. The panel includes a Pulsar carrier set which will not be needed for this project. This application will use direct relay to relay fiber optic and redundant multiplexed communications circuits.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new 230kV circuit breaker will be required.
- Purchase and install three (3) relaying accuracy capacitive voltage transformers (CVT's) for line potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes.
- Purchase and install one (1) three phase CVT junction box per Entergy Standard PM2402, latest revision.

Existing 230kV Helbig Line 195

- Modification of the existing 230kV Line 195 protection scheme will be required in removing 230kV breaker 13720 and placing line 195 node between two new 230kV breakers. Contingency dollars have been included in the estimate for issues concerning adapting the existing design for an additional breaker.

Existing 500/230kV Autotransformer

- Modification of the existing 500/230kV autotransformer differential scheme will be required in removing 230kV breaker 13720 and extending the autotransformer differential zone between two new 230kV breakers. Contingency dollars have been included in the estimate for issues that may arise during design concerning adapting the present scheme to include an additional breaker.
- Purchase and install three (3) relaying accuracy capacitive voltage transformers (CVT's) for bus/line potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes.
- Purchase and install one (1) three phase CVT junction box per Entergy Standard PM2402, latest revision.

New 500/230kV Autotransformer

- Purchase and install three (3) relaying accuracy 230kV capacitive voltage transformers (CVT's) for bus potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes.
- Purchase and install one (1) bus potential junction box and one (1) bus potential distribution box per Entergy Standard PM2402, latest revision.
- Purchase and install two (2) HV Bus Differential Protection Panels per Entergy Standards PM0602, latest revision. One protection panel will be installed on the 230kV. The other protection panel will be installed on the 500kV bus.
- Purchase and install two (2) HV Transformer Differential Protection Panels. One protection panel will be installed to encompass a large differential zone including both 230kV breakers and both 500kV breakers associated with the 500/230kV autotransfomer. The other protection panel will be installed to encompass a small differential zone including only the 500/230kV autotransformer.
- Design, purchase and install one (1) HV Protection Panels housing a SEL 351 relay. This protection panel will be designed to protect the tertiary bus if it is carried out of the autotransformer.

500kV Breaker Control Panel

- Design, purchase and install one (1) 28" GSU wingwall Breaker Control Panel using a Schweitzer Engineering Lab model SEL 351 relay for all breaker protection and control functions referencing Entergy Standard PM0501, latest revision.
- This breaker control panel will be used for protection and control of the new 500kV circuit breaker located between the Cypress 500kV line and 500kV bus #1.
- Complete design of the AC and DC control schematics as well modification of the existing 500kV bus #1 differential scheme will be required. In addition, monitoring alarms for this new 500kV circuit breaker will be required.

500kV Equipment

- Purchase and install three (3) relaying accuracy capacitive voltage transformers (CVT's) for bus potential per Entergy Standard PN0201, latest revision.
- Purchase and install one (1) bus potential junction box and one (1) bus potential distribution box per Entergy Standard PM2402, latest revision.
- Design, purchase, and install one (1) 500kV MOS panel for control of the autotransformer disconnect switch.

4.1.13.5 Relay Settings

All associated new relays and those affected will require settings

4.1.13.6 SCADA and communications

Configuration for new alarms, status and control will be required

4.1.13.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 230kV facilities require a 6-12 months advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical, as well as Protection & Control installations will commence. Upon completion of all Steel and Electrical components and substantial completion of the required Protection & Control components the installation of the proposed T-Line components will be to terminate, the Sabine and Helbig 230kV T-Line. The actual sequence of the 230kV Substation and T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several days in duration. The durations are dependant on the final designs, and system constraints.

SWPPP implementation, monitoring and removal is required and estimated in estimating document. Station security is required and is estimated. Following are estimated time period for some construction activities:

Foundation, grounding and conduits will require approximately ten weeks.
Installation of electrical equipment will require approximately ten weeks.
Installation of relay equipment, termination, testing and commissioning will require approximately six weeks

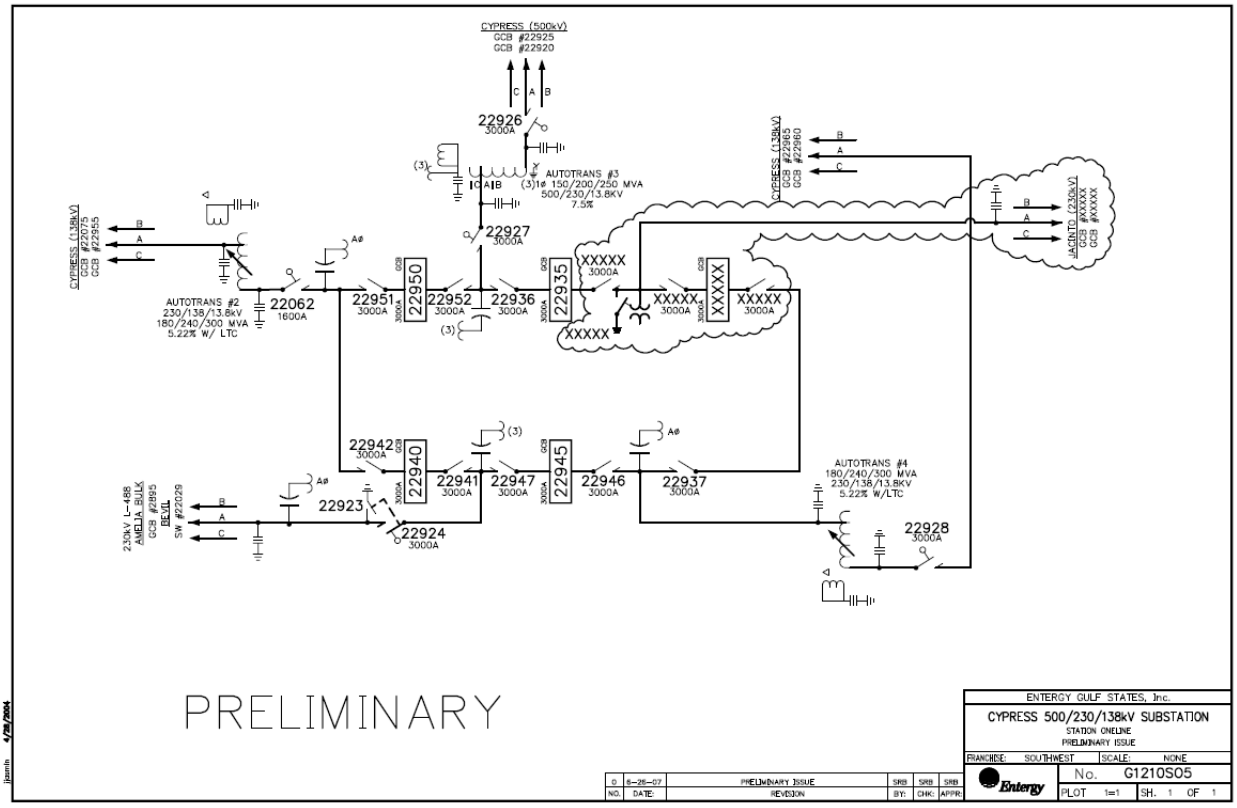
4.1.13.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
1	230kV A-frame dead end	24
3	230kV 3000A 63kA gas circuit breaker	26
7	230kV 3000A vertical break disconnect switch	18
1	230kV ground switch attachment	18
3	230kV station class surge arrester	16
6	230kV CVT support	24
9	230kV single phase bus support	24
4	230kV switch support	24
Lot	Bus, conductor, and fittings	14
4	Panels	18
6	230kV CVTs	36
3	500/230kV 267MVA autotransformers	104
1	500kV 3000A 63kA gas circuit breaker	26
3	500kV CVT support	24

4.1.13.9 Assumptions:
The existing ground grid is adequate to support the anticipated fault current.
The existing structures are adequate for the proposed construction.
Control house space is sufficient.
The control house batteries are sufficient

4.1.14 Cypress 230 kV Substation:

A new 230kV transmission line (Line 839) will be routed into the existing 230kV yard at Cypress 500/230/138kV Substation. The existing arrangement in the 230kV yard is a 4 breaker ring bus with available nodes to accommodate two more elements. The new Line 839 will enter the 230kV yard on the East side of the station and will span over the existing 138kV bus-work and terminate on an A-frame substation dead end. The strain bus will then continue to another A-frame dead end to the appropriate position in the ring configuration. The addition of the new line will change the 230kV configuration from a 4 breaker ring bus to a 5 breaker ring bus. Please note that the work proposed will not interfere with the ability to expand the ring to a full 6 breaker ring bus should another interconnection to the 230kV yard become necessary in the future. For reference please see the preliminary electrical arrangement and one-line included with this document.



4.1.14.1 Site and Foundation

- There will be minimal site work associated with this project. Only back fill and dressing of excavated soil and limestone from conduit and miscellaneous foundation installations. It is assumed that approximately 500 tons of limestone will be required.

4.1.14.2 Foundation

- Two (2) foundations will be installed for the new A-frame substation dead ends as per existing foundation “K1.” Each foundation consists of four (4) footers as per drawing G1210F06. Four (4) foundations associated with single phase bus supports will either be

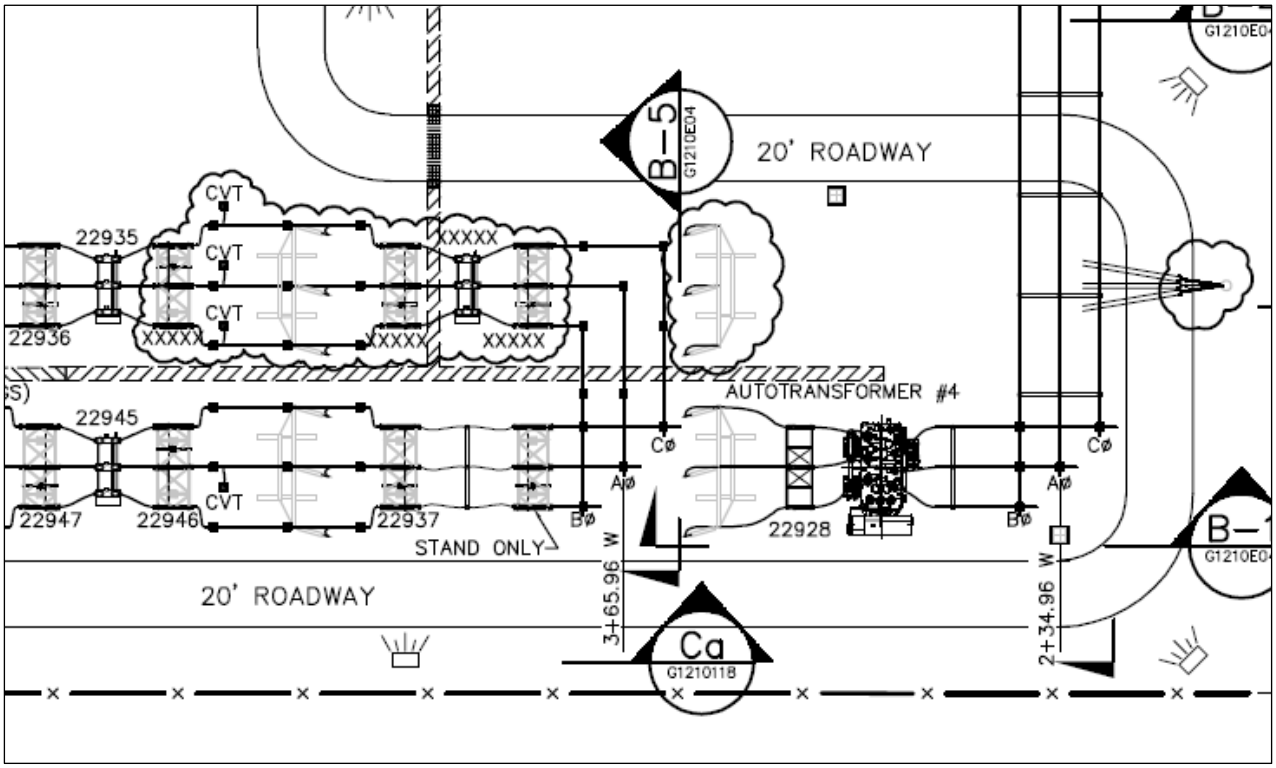
abandoned in place or removed to accommodate the new A-frame foundation. This scope assumes that the foundations will be abandoned in place; however, this will be verified by Civil design group during detailed design.

- One (1) foundation will be installed for the new gas circuit breaker as per existing foundation “CD2.” See drawing G1210F03 for foundation details. Two (2) foundations associated with an existing 3 phase bus support will be removed to accommodate the new breaker foundation. For details of the foundations to be removed see drawing G1210F06, detail “F1.”
- Eight (8) foundations will be installed for new single phase bus supports as per existing foundation “H1.” See drawing G1210F06 for foundation details.
- Three (3) foundations will be installed for the line CVTs as per existing foundation “G1.” See drawing G1210F06 for foundation details.
- Three (3) foundations will be installed for the line arresters. There are no line arrester support foundations in the existing 230kV yard to duplicate; however, the existing CVT foundations should be adequate for the line arresters. Civil engineering will be required to verify that the CVT foundations are adequate for the line arresters.
- All new construction will tied to the existing station ground grid with 4/0 copper conductor as per Entergy grounding standard SF0201 Revision 02.
- Six (6) 2” PVC conduits will be installed from the new circuit breaker control cabinet to the existing cable trough.
- One (1) 2” PVC conduit will be installed from each of the new CVTs to a new CVT junction box. Three (3) 2” PVC conduits will be installed from the new CVT junction box to the existing cable trough.
- Two (2) 2” PVC conduits will be installed from the A-frame substation dead end tower that the transmission line terminates on to the existing cable trough for the fiber optic communications cable.

4.1.14.3 Electrical

- Two (2) A-frame substation dead ends as per drawings G1210VS24,25,26 will be installed as per the preliminary electrical arrangement. One dead end will be installed within the electrical ring and the other will be installed to the East of the ring and will be where the new 230kV Line 839 will be terminated. Three (3) 230kV station class line arresters will be mounted under the latter dead end structure. Civil engineering will be required to modify the existing CVT pedestal (G1210VS12) to accommodate the bolt hole pattern of the new arresters.
- One (1) 230kV 3000A 63kA IPO gas circuit breaker will be installed as per the preliminary electrical arrangement. The relaying on the new breaker will consist of three (3) 3000:5 C800 CTs on each of six (6) bushings. The breaker will be oriented with the control cabinet facing west to facilitate the new conduit runs.
- Three (3) 230kV vertical break, horizontal mount, 3000A air break switches will be installed as per the preliminary electrical arrangement. One of the switches that are electrically connected to the new line will be installed with a ground switch attachment.
- Three (3) CVT’s will be mounted under the A-frame substation dead end as per the preliminary electrical arrangement. The CVT’s will be mounted on steel pedestals as per steel drawing G1210VS13. A CVT junction box will be mounted on the C phase CVT pedestal.

- Eight (8) new single phase low bus supports will be installed under the A-frame substation dead end tower as per the preliminary electrical arrangement. The bus supports will be as per steel drawing G1210VS15. Four (4) existing single phase low bus supports will be removed during construction. During detailed design it will be determined if it will be feasible to reuse these existing bus supports. This scope and estimate assumes that the existing bus supports will not be reused.
- All new hard bus will be 5" SCH 80 Aluminum tubing. All new strain bus will be bundled 1272MCM Aluminum conductor. 666MCM dampening cable will be installed in all new Aluminum bus runs.
- An existing shield mast is in close proximity to where the substation line dead end structure will be located. Care should be taken to ensure that all substation minimum clearances are maintained between the incoming transmission line conductor and the shield mast.



4.1.14.4 Relay

Control House General Equipment

- Two new panels will be required for this project. These panels are to be standard wingwall design and to be installed in open floor space next to Autotransformer #4 protection panels.
- There are existing dual EC-7 battery sets installed at the substation, both in good condition. The chargers associated with these battery sets are 50A models and have 4A and 5A load, respectively. No upgrades will be necessary due to the added equipment.

- The existing stand alone AC panel has one spare 60A double pole breaker, one spare 30A double pole breaker, one spare 20A double pole breaker and 23 spare 20A single pole breakers. This will be sufficient for the project.
- Stand alone DC panel #1 has six spare 50A breakers, and stand alone DC panel #2 has 25 spare 50A circuit breakers. This will be sufficient for the project.
- The existing GE Harris D20 RTU has 31 spare SOE points, 76 spare alarms, 9 spare analogs and 25 spare trip/close control pairs. This will be sufficient for the project.
- All new equipment to be added to the Digital Fault Recorder installed at the substation.
- Shielded control cables will be required.
- The existing communications panel has two Schweitzer Engineering Lab model SEL 2030 installed, and both units are full. Purchase and install one (1) SEL 2032 and one (1) Starcomm modem model number 240-0199 with AC adapter. The following cables will be needed for relay communications:
  - One 50' SEL C290 cable for connection of the SEL 2032 to the GE Harris D20 RTU
  - Three 50' SEL C273A cables for connection of the SEL 2032 to the SEL 421, SEL 311L, and SEL 351 relays
  - One 3' SEL C220 cable for connection between the SEL 2032 to the Starcomm modem

New 230kV Jacinto Line 839

- Design, purchase and install one (1) 30" standard wingwall Dual Primary Line Panel referencing Entergy Standard PM1803, latest revision and the Line 345 Webre to Wells panel located at Webre Substation in GSU-LA. This panel uses a Schweitzer Engineering Lab model SEL 311L Current Differential relay for Primary #1 protection and a Schweitzer Engineering Lab model SEL 421 Distance Relay for Primary #2 protection. The panel includes a Pulsar carrier set which will not be needed for this project. This application will use direct relay to relay fiber optic and redundant multiplexed communications circuits. The panel is also capable of initiating single pole tripping and reclosing functions. This panel will be installed on empty floor space inside the existing control house.
- Design, purchase and install one (1) 24" standard wingwall High Voltage Breaker Control Panel capable of single pole breaker operation referencing Entergy standard PM0501, latest revision, and the Breaker 26200 control panel located at Jacinto Substation. This panel uses a Schweitzer Engineering Lab model SEL 351 relay for all breaker protection and control functions. The SEL 351 will communicate via SEL Mirrored Bits with a similar control panel located at Jacinto substation through a multiplexed circuit. The panel will be used for protection and control of the 230kV circuit breaker to be installed between the Jacinto line and Autotransformer #4 nodes. This panel will be installed on empty floor space inside the existing control house.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new Independent Pole Operation 230kV circuit breaker will be required. This circuit breaker should also be purchased with three sets of 3000:5A multi-ratio, C800 accuracy class current transformers per bushing.
- This circuit breaker will be used for protection and control of the 230kV Jacinto Line 839 and Autotransformer #4.
- Purchase and install three (3) relaying accuracy potential transformers per Entergy Standard PN0701, latest revision.

- Purchase and install one (1) three phase bus potential junction box per Entergy Standard PM2402, latest revision.

Circuit Breaker 22935

- This circuit breaker will be removed from Autotransformer #4 and GCB 22495 breaker failure protection and control schemes.
- The circuit breaker will now be used for protection and control of the 230kV Line to Jacinto.
- Breaker failure trips and initiates will now be moved to the new IPO breaker.

Autotransformer #4 Protection and Control

- The primary and backup protection panels will now trip, breaker failure initiate and lockout close capabilities for the new IPO breaker.

4.1.14.5 Relay Settings

Require settings on all new and affected relays

4.1.14.6 SCADA and communications

Require configuration for all new status, alarm and controls

4.1.14.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 230kV facilities require a 6-12 months advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical, as well as Protection & Control installations will commence. Upon completion of all Steel and Electrical components and substantial completion of the required Protection & Control components the installation of the proposed T-

Line components will be to terminate, the Jacinto 230kV T-Line. The actual sequence of the 230kV Substation and T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several days in duration. The durations are dependant on the final designs, and system constraints.

SWPPP implementation, monitoring and removal is required and estimated in estimating document. Station security is required and is estimated. Following are estimated time period for some construction activities:

Foundation, grounding and conduits will require approximately four weeks.
Installation of electrical equipment will require approximately four weeks.
Installation of relay equipment, termination, testing and commissioning will require approximately five weeks

4.1.14.8 Substation long delivery items:

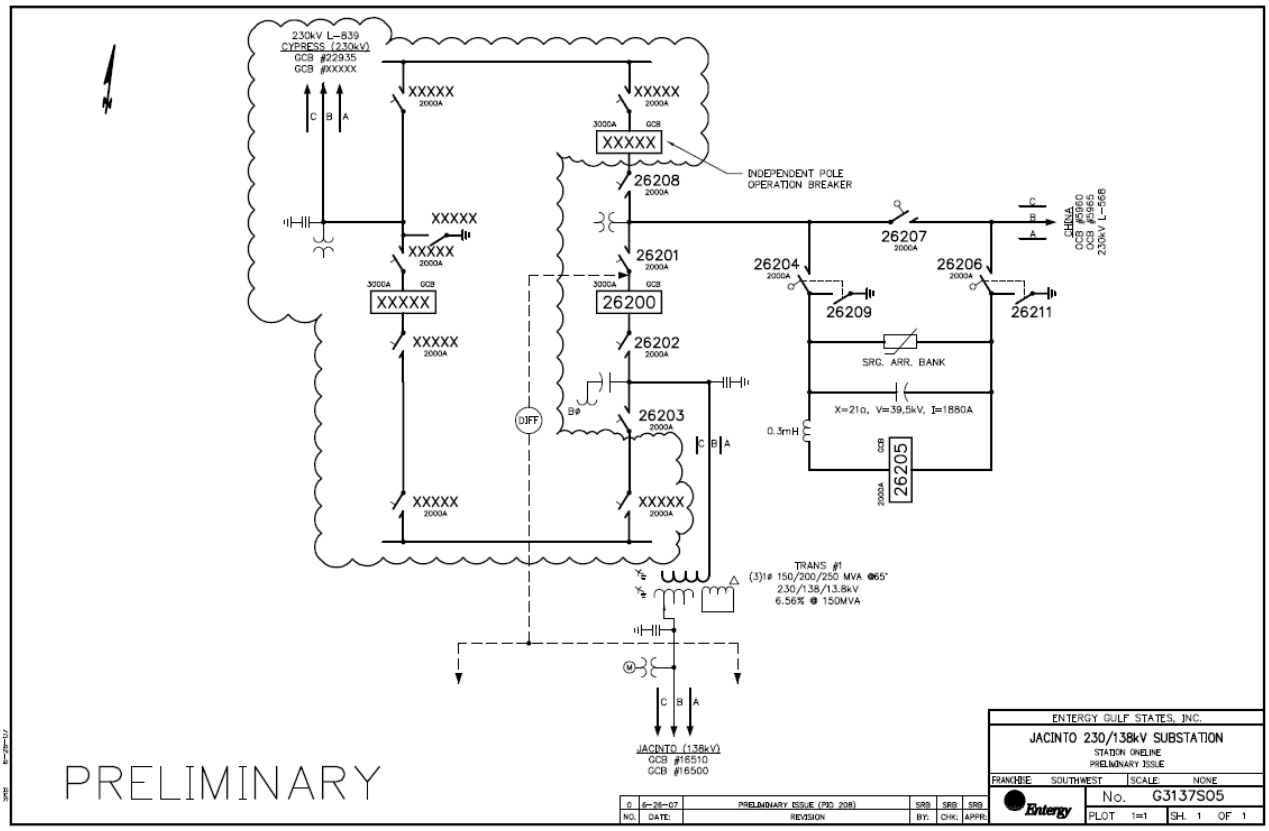
Quantity	Material Description	*Lead Time (weeks)
2	230kV A-frame dead end	24
1	230kV 3000A 63kA IPO gas circuit breaker	26
3	230kV vertical break disconnect switch	18
1	230kV ground switch attachment	18
3	230kV CVT support	24
8	230kV single phase bus supports	24
Lot	Bus, conductor, and fittings	14
2	Panels	18
3	230kV PTs	26

4.1.14.9 Assumptions:

None reported

4.1.15 Jacinto 230 kV Substation:

A new 230 kV transmission line (Line 839) will be routed into the existing 230 kV yard at Jacinto 230/138 kV Substation. The existing arrangement in the 230 kV yard is designed to be expandable to a ring bus configuration. The new Line 839 will enter the 230 kV yard on the North side of the station and will terminate on an H-frame substation dead end structure in the new line bay. The addition of the new line will change the 230 kV configuration to a 3 breaker ring bus. For reference please see the preliminary electrical arrangement and one-line included with this document.



4.1.15.1 Site and Foundation

- A new 20’ station road will be installed between the existing line bay and the new line bay in the 230 kV yard. This new road will be approximately 325’ long. Civil design will be required for the new station road.
- Back fill and dressing of excavated soil and limestone from conduit and miscellaneous foundation installations will also be required. Approximately 1000 tons of limestone will be required.

4.1.15.2 Foundation

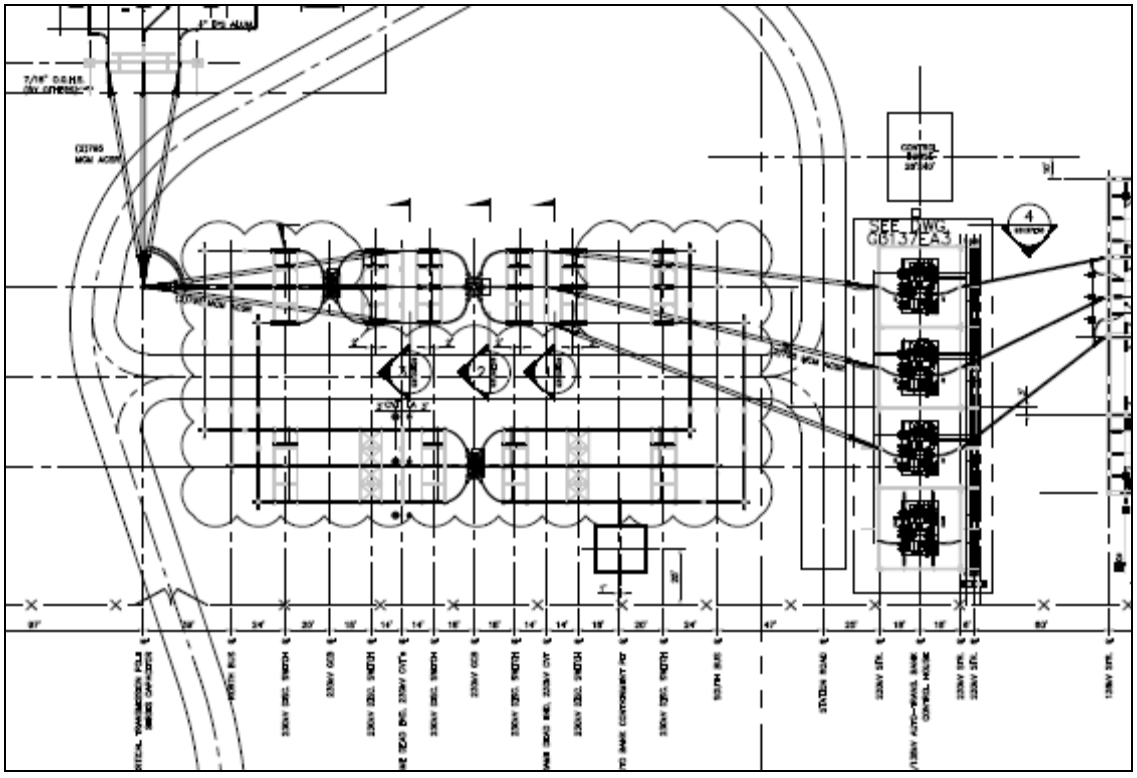
- One (1) foundation will be installed for the new H-frame substation dead end as per existing foundation “F20.” The foundation consists of two (2) footers as per drawing G3137F04.
- Two (2) foundations will be installed for the new gas circuit breakers as per existing foundation “F19.” See drawing G3137F07 for foundation details.

- Eight (8) foundations will be installed for the new 230 kV disconnect switches as per existing foundation “F22.” Each foundation consists of two (2) footers as per drawing G3137F04.
- Sixteen (16) foundations will be installed for new single phase high bus supports. There is no existing foundation to duplicate; therefore, civil design will be required for the high bus support foundations.
- Sixteen (16) foundations will be installed for new single phase low bus supports. There is no existing foundation to duplicate; therefore, civil design will be required for the low bus support foundations.
- Three (3) foundations will be installed for the transmission line arresters. There is no existing foundation to duplicate; therefore, civil design will be required for the transmission line arresters.
- Three (3) foundations will be installed for the line CVTs as per existing foundation “F21.” See drawing G3137F04 for foundation details.
- Approximately 150’ of new cable trench will be installed as per the preliminary foundation plan. The new trench will tee off of the existing trench and proceed west to the new construction.
- Six (6) 2” PVC conduits will be installed from each of the new circuit breakers to the existing and new sections of cable trench as appropriate. Three (3) 2” PVC conduits will be installed from the new CVT junction box to the cable trench. One (1) 2” PVC conduit will be installed from the CVT junction box to each of the appropriate CVTs.
- All new construction will be tied to the existing ground grid with 4/0 copper conductor as per Entergy grounding standards.

4.1.15.3 Electrical

- The existing 230kV line bay will be completed by adding one additional circuit breaker and the associated disconnect switches. A new line bay will be installed to the west of the existing line bay creating a 3 breaker ring bus that will be expandable to a 6 breaker ring bus and ultimately to a breaker and a half scheme. See the preliminary electrical arrangement for the proposed layout.
- Two (2) 230kV 3000A 40kA gas circuit breakers will be installed as per the preliminary electrical arrangement. All breakers will be oriented such that their control cabinets are facing east. The circuit breaker to the north of the existing circuit breaker (that will create an electrical node for the series capacitor) will be an IPO circuit breaker. The relaying on the non-IPO breakers will consist of two (2) 3000:5 C800 CTs on each of six (6) bushings. The relaying on the IPO breaker will consist of three (3) 3000:5 C800 CTs on each of six (6) bushings.
- Six (6) 230kV 2000A vertical break horizontal mount disconnect switches will be installed as per the preliminary electrical arrangement. One of the switches associated with the new line terminal will be equipped with a ground switch attachment. The switches will be mounted on 10’-6” switch racks as per Valmont vendor drawing G3137VS1. In order to provide adequate electrical clearance between the switch racks and the new CVT’s and lightning arresters mounted under the H-frame dead ends, the switch racks will be offset by 2’ from the spacing of the existing switch racks. Please see the preliminary electrical arrangement for spacing details. Two additional switch racks will be used as bus supports as per the preliminary electrical arrangement.

- Three (3) CVT's will be mounted under the new H-frame substation dead end as per the preliminary electrical arrangement. The CVT's will be mounted on steel pedestals as per Valmont vendor drawing G3137VS2. A CVT junction box will be mounted on the A phase CVT pedestal.
- Three (3) lightning arresters will be mounted under the new H-frame substation dead end as per the preliminary electrical arrangement. The arresters will be mounted on Valmont tapered tube single phase lightning arrester stands to match existing construction.
- One (1) new H-frame dead end structure will be installed as per the preliminary electrical arrangement. See Valmont vendor drawing G3137VS3 for structure details. The existing H-frame dead ends do not have provisions for static wire attachments. The new H-frame dead end will be ordered with the static attachments. The new H frame dead end will be a Valmont Type B structure.
- Sixteen (16) new single phase low bus supports will be installed as per the preliminary electrical arrangement. There are no existing low bus supports to duplicate. The new bus supports will be Valmont tapered tube low profile bus supports to match existing construction. The height of the low bus supports will be approximately 11'-6".
- Sixteen (16) new single phase high bus supports will be installed as per the preliminary electrical arrangement. There are no existing high bus supports to duplicate. The new bus supports will be Valmont tapered tube low profile bus supports to match existing construction. The height of the high bus supports will be approximately 20'-6".
- All new hard bus will be 4" SCH 80 Aluminum tubing. All new strain bus will be bundled 795MCM Aluminum conductor. 666MCM dampening cable will be installed in all new Aluminum bus runs.



4.1.15.4 Relay

Control House General Equipment

- Three new panels will be required for this project. These new panels are to have the GSU wingwall design in order to be inserted into the existing 230kV protection row. Blank panels #4, #6 and #8 will be removed in order to create floor space for the new panels. Consult with Asset Maintenance to ensure Panel Layout is in the best ergonomic configuration.
- The existing battery charger is a 50A model with 5.2A load, and the existing 600Ah battery set is in good condition. No upgrades will be necessary due to the added equipment.
- The existing stand alone AC panel has two spare 50A double pole breakers, thirteen spare 30A double pole breakers and sixteen spare 30A single pole circuit breakers. This will be sufficient for the project.
- The existing stand alone DC panel has four spare 50A circuit breakers and 21 spare 30A circuit breakers. A total of six 50A breakers will be required for this project. Purchase and install two (2) additional 50A circuit breakers.
- The existing GE Harris D20 RTU has 28 spare SOE points, 33 spare alarms, 2 spare analogs and 11 spare trip/close control pairs. Purchase and install two (2) additional D20S cards with compression terminals.
- Purchase and install one 19" Communications Rack containing an SEL 2032, one Teltone port switcher and mounting bracket, one SEL 2407 satellite clock, one Starcomm modem model number 240-0199 and one AC adapter. The following cables will be needed for relay communications:

    - One 50' SEL C290 cable for connection of the SEL 2032 to the GE Harris D20 RTU
    - Four 50' SEL C273A cables for connection of the SEL 2032 to the SEL 421, SEL 311L, and SEL 351 relays
    - One 3' SEL C220 cable for connection between the SEL 2032 to the Starcomm modem

Existing 230kV China Line 568 (Series Compensated)

- Design, purchase and install one (1) 28" GSU wingwall High Voltage Breaker Control Panel capable of single pole breaker operation referencing Entergy standard PM0501, latest revision, and the Breaker 26200 control panel located at Jacinto Substation. This panel uses a Schweitzer Engineering Lab model SEL 351 relay for all breaker protection and control functions. The SEL 351 will communicate via SEL Mirrored Bits with a similar control panel located at Cypress substation through a multiplexed circuit. The panel will be used for protection and control of the 230kV circuit breaker to be installed between the Cypress and China line nodes. This panel will be installed on empty floor space inside the existing control house created by removal of existing blank control panels.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new Independent Pole Operation 230kV circuit breaker will be required. This circuit breaker should also be purchased with three sets of 3000:5A multi-ratio, C800 accuracy class current transformers per bushing.

- This circuit breaker will need to be added into the existing Line 568 protection and control for both Line 568 and the existing Fixed Series Capacitor at Jacinto.
- This circuit breaker will also be used for protection and control of the new line 839 to Cypress.

New 230kV Cypress Line 839

- Design, purchase and install one (1) 28" GSU wingwall Dual Primary Line Panel referencing Entergy Standard PM1803, latest revision and the Line 345 Webre to Wells panel located at Webre Substation in GSU-LA. This panel uses a Schweitzer Engineering Lab model SEL 311L Current Differential relay for Primary #1 protection and a Schweitzer Engineering Lab model SEL 421 Distance Relay for Primary #2 protection. The panel includes a Pulsar carrier set which will not be needed for this project. This application will use direct relay to relay fiber optic and redundant multiplexed communications circuits. The panel is also capable of initiating single pole tripping and reclosing functions. This panel will be installed on empty floor space inside the existing control house created by removal of existing blank control panels.
- Design, purchase and install one (1) 28" GSU wingwall Breaker Control Panel using a Schweitzer Engineering Lab model SEL 351 relay for all breaker protection and control functions referencing Entergy Standard PM0501, latest revision. This panel will be installed on empty floor space inside the existing control house created by removal of existing blank control panels. This panel will be used for protection and control of the new 230kV circuit breaker located between the 230/138kV autotransformer and the new Line 839 to Cypress.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new 230kV circuit breaker will be required.
- This circuit breaker will be used for protection and control of the 230kV Line to Cypress, as well as the 230/138kV autotransformer.
- Purchase and install three (3) relaying accuracy potential transformers per Entergy Standard PN0701, latest revision.
- Purchase and install one (1) three phase bus potential junction box per Entergy Standard PM2402, latest revision.

4.1.15.5 Relay Settings

Require setting all new and affected relays

4.1.15.6 SCADA and communications

Require configuration for status, alarms and control of all new devices

4.1.15.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as

any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 230kV facilities require a 6-12 months advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical, as well as Protection & Control installations will commence. Upon completion of all Steel and Electrical components and substantial completion of the required Protection & Control components the installation of the proposed T-Line components will be to terminate, the Cypress 230kV T-Line. The actual sequence of the 230kV Substation and T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several days in duration. The durations are dependant on the final designs, and system constraints.

SWPPP implementation, monitoring and removal is required and estimated in estimating document. Station security is required and is estimated. Following are estimated time period for some construction activities:

Site preparation will require approximately two weeks.
Foundation, grounding and conduits will require approximately four weeks.
Installation of electrical equipment will require approximately six weeks.
Installation of relay equipment, termination, testing and commissioning will require approximately six weeks

4.1.15.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
2	230kV 3000A 40kA gas circuit breaker	26
6	230kV 2000A vertical break disconnect switch	18
3	230kV CVT support	24
3	230kV lightning arrester support	24
1	230kV H-frame dead end	24
32	230kV single phase bus support	24
8	230kV switch support	24
Lot	Bus, conductor, & fittings	14
3	Panels	18

3	230kV PTs	26

4.1.15.9 Assumptions:

None reported

4.1.16 Mt. Olive 500 kV Substation:

The new XYZ 500 kV switching station will be located on the existing Mount Olive to Hartburg 500 kV line.

4.1.16.1 Site and Foundation
None

4.1.16.2 Foundation
None

4.1.16.3 Electrical
None

4.1.16.4 Relay

The new XYZ substation line panel will be modified to match the existing relaying scheme at Mt. Olive. Assumptions will be that the new frequency used will be in the range of the existing traps and tuners.

4.1.16.5 Relay Settings

Relay setting will be required in the following panels:

- 2 – Existing line panels (Primary #1 & Primary #2)

4.1.16.6 SCADA and communications
None

4.1.16.7 Construction Strategy and timing of outages:

Apply relay settings

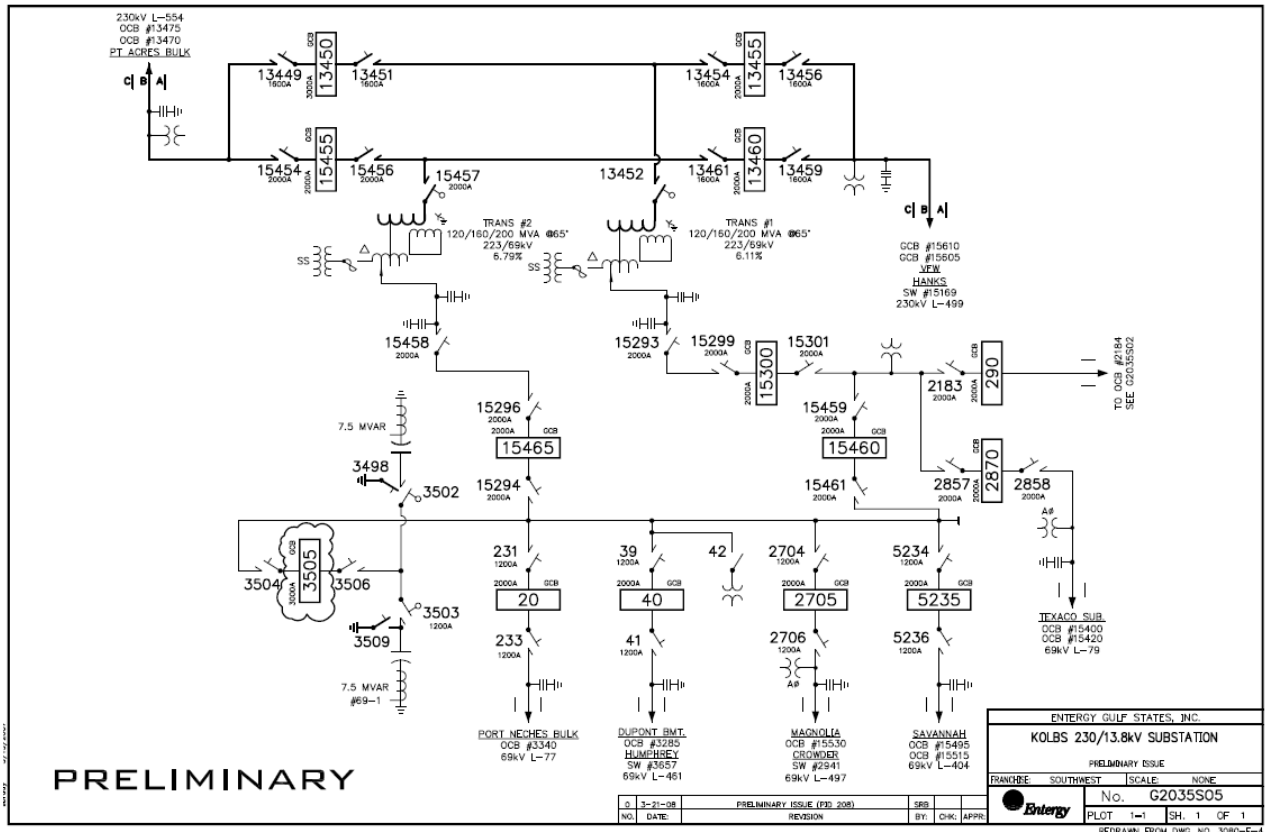
4.1.16.8 Substation long delivery items: None

4.1.16.9 Assumptions: None

4.1.17 Kolbs 69 kV Substation: This is scheduled to be replaced in 2009/2010 under PID 202

The system Impact Study (without priors) identified one breaker to be replaced with a breaker having a higher fault interrupting rating. This breaker is #3505.

This breaker has a fault interrupting capability of 40,000 Amps. The study requires that this breaker have an interrupting capability of at least 40,454 Amps.



4.1.17.1 Site and Foundation

- There will be minimal site work associated with this project. Only back fill and dressing of excavated soil and limestone from conduit and miscellaneous foundation installations. It is assumed that approximately 500 tons of limestone will be required.

4.1.17.2 Foundation

- The existing foundation is not large enough to accommodate the new circuit breaker. Civil design will be required to modify the existing foundation to accommodate the new circuit breaker.
- Install four (4) new Hilti anchor bolts to secure the new gas circuit breaker. Civil design will be required for proper Hilti anchor bolt sizing.
- Install two (2) new 4/0 copper below-ground pigtails for the new circuit breaker installation.
- Install six (6) 2” PVC conduits from the existing cable trough to each of the following six circuit breakers: #20, #40, #2705, #5235, #15465, & #15460. This document assumes that

there is sufficient room in the existing cable trough to run this new control cable from the new bus differential panel to the identified circuit breakers.

4.1.17.3 Electrical

- Disconnect, remove and scrape the existing gas circuit breaker (Bkr. # 3505) and the jumpers connected to the existing disconnect switches (#3504 & #3506). Cut off the protruding portion of the existing anchor bolts.
- Purchase and Install one (1) new 145kV, 3000A, 63kA, 3-cycles interrupting time, 125VDC control voltage, gas circuit breaker. 69kV circuit breakers are not available with a 63kA interrupting rating; therefore, a 145kV class circuit breaker must be used for this application. Care must be taken to ensure that no minimum substation electrical clearances are violated once the new breaker has been installed. Preliminary engineering has determined that there is sufficient clearance between the breaker terminal pads and the 69kV lattice steel for the installation.
- The new circuit breaker will be oriented with bushings 2-4-6 in the West direction. The circuit breaker's control cabinet will be oriented in the North direction.
- Purchase and Install new 500 MCM conductor and terminal pads to replace the existing jumpers from the disconnect switches to the new circuit breaker bushings.
- Purchase and install six (6) new 2" flex conduits that will be run from the new replaced breaker (position #3505) to the existing circuit breaker junction box.
- Install and connect new 4/0 copper ground leads from the two appropriate circuit breaker legs to the existing station ground grid.
- The existing circuit breaker disconnect switches will not be replaced. A standard momentary rating of 69kV switches is 44kA which is adequate for the new installation.

4.1.17.4 Relay

- Replace GCB 3505 with a new 145kV, 3000A, 63kA, 3-cycles interrupting time, 125VDC control voltage, mixed CT's turn ratio gas circuit breaker. 69kV circuit breakers are not available with a 63kA interrupting rating; therefore, a 145kV class circuit breaker must be used for this application.
- Coordination between relay design and substation design is required to ensure that the 'Y' set of CTs on bushings 1, 3, & 5 of the breaker are ordered as 2000:5 Amp at full ratio with Rating Factor (RF) = 2 in order to match the full winding ratios of all other breakers tied to 69kV bus #2 PVD scheme. This action eliminates open end CT issues associated with mismatched ratio CTs in PVD schemes and retains bus #2 existing PVD relaying. A review of the settings sheets for bus #2 found that all 2000:5 CTs are tapped at 1200:5. This is contrary to PVD bus differential application standards. All CTs on bus #2 will be tapped at full ratio of 2000:5.
  Reference Entergy HV Circuit Breaker Purchase Specification SD020204

  The existing current, control, supply and SCADA circuits shall be reused and the new breaker wired to facilitate the existing circuits. New cables shall be pulled as needed from the breakers to the control house to maintain all existing circuits and new alarm points. New cables will be run through flexible conduit to the new breaker cabinet. Existing capacitor bank relaying will be reused. New breaker CTs have tap ratios available that match existing ratios if relay settings will not be modified. Reference the existing breaker connection and panel wiring prints

- There is an existing Basic D20 RTU. A new status card will be required. Reference RTU Edit Sheets from TOC.

4.1.17.5 Relay Settings

- Due to the replacement of OCB 3505 with 69kV, 3000A gas circuit breakers (GCB) with 63kA fault duty:
  - System modeling verification will be required and settings for Bus #2 high impedance differential will need generated.
  - Perform ground over current study in the immediate area.

4.1.17.6 SCADA and communications

- No RTU configuration will be required by Technology Delivery Group at this station because the existing RTU is a Basic. The work for the RTU will be done by the field personnel.

4.1.17.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 230kV facilities require a 3-6 months advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the foundation installations including all associated conduit and grounding installations, Steel and Electrical, as well as Protection & Control installations will commence. The actual sequence of the Substation outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several days in duration. The durations are dependant on the final designs, and system constraints.

Foundation, grounding and conduits will require approximately one week.
Removal of old breaker and installation of the new breaker and other electrical equipment will require approximately two weeks.
Installation of relay equipment, termination, testing and commissioning will require approximately one week.

4.1.17.8 Substation long delivery items:

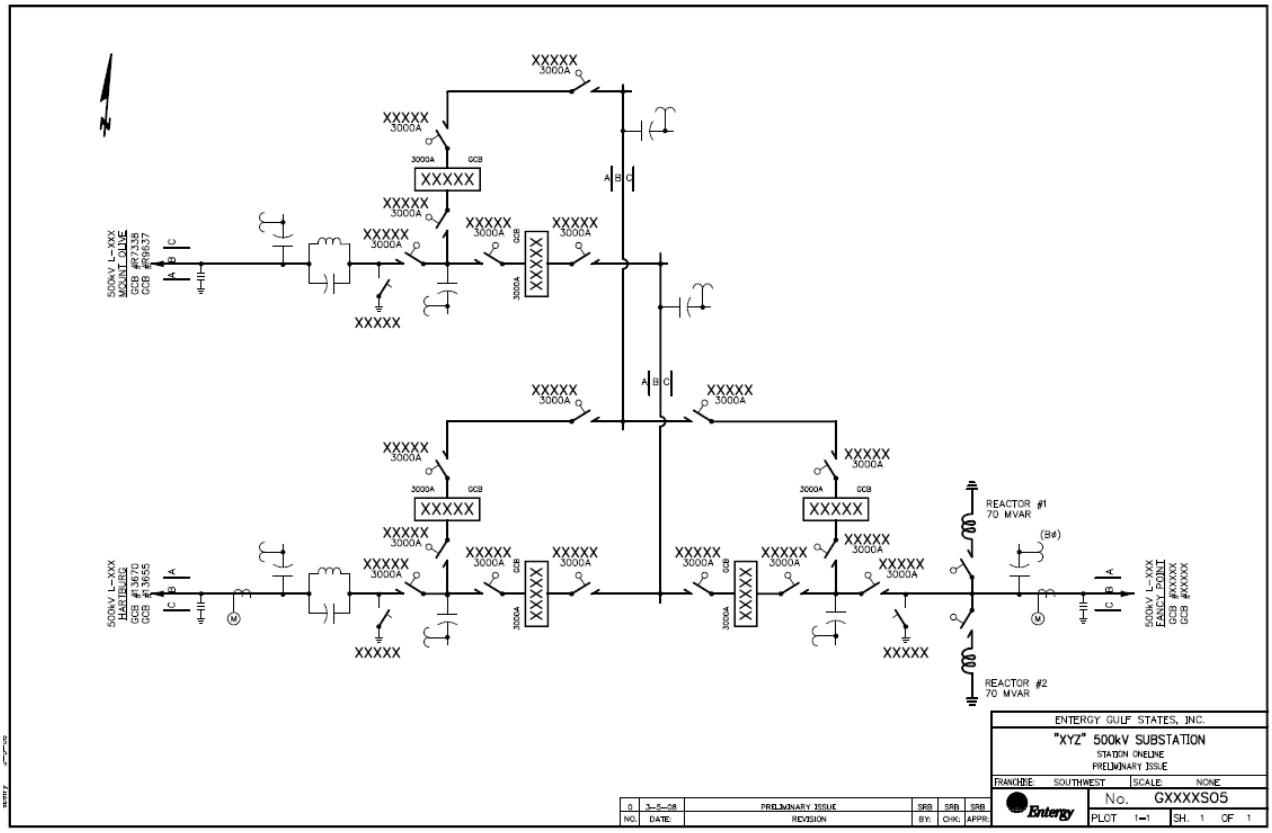
Quantity	Material Description	*Lead Time (weeks)
1	145kV 3000A 63kA gas circuit breaker	26

4.1.17.9 Assumptions:

None reported

4.1.18 New Nachitoches (XYZ) 500 kV Substation:

A new 500kV transmission line will be constructed from Fancy Point Substation to a point on the 500kV transmission line 559 from Hartburg Substation to Mount Olive Substation. A new 500kV substation will be constructed at the intersection point. The new substation will be a double breaker double bus arrangement with future expansion to a breaker and a half arrangement.



4.1.18.1 Site and Foundation

- The site of the proposed station will be 1050’ x 1260’. Topographic, boundary, and underground obstruction surveys are required to perform all necessary civil design. This information has not been provided prior to completing the scope and the following quantities will be based off of assumptions made about the approximate location of the site. This scope assumes that the proposed station will be located in the vicinity of the proposed intersection of the new 500kV line from Fancy Point and the existing 500kV Line 559.

- Soil borings will be required for foundation design. These borings have not been taken. This scope assumes drilled pier foundations for structures and pad without piles for breakers and control house. All appropriate permits and licenses will need to be obtained prior to construction.

- The site will be approximately 35 acres. A SWPPP will be required. This work should be contracted out to the qualified contractor. The project manager shall ensure this work is

completed prior to the start of the bid process. This will allow the contractors bidding on the site work to understand and plan for Entergy expectations.

- It is assumed that the site is heavily wooded. Grubbing and de-stumping will be needed in order to properly prepare the site.

(1) EA Topographic and boundary survey
(5) EA Soil borings including soil resistivity test
(1) EA Environmental impact study, permits and licenses
(1) EA SWPPP
(1) EA Soil Testing
(28,000 CYD) Stripping, grubbing and de-stumping
(35) ACRE Wooded area (Grubbing and De-stumping)
(35) ACRE Wooded area (Disposal)
(64) EA Catch Basins
(8200) FT 18" R.C.P. Culvert
(175000) CYD Structural fill (Raise site 2.0 feet above existing elevation)
(35) ACRE Soil Sterilization
(7000) FT Access Roadways
(56,000) TON Limestone surface
(5000) FT 7' fence with 1' of barb wire
(35) ACRE Seed and mulch

4.1.18.2 Foundation

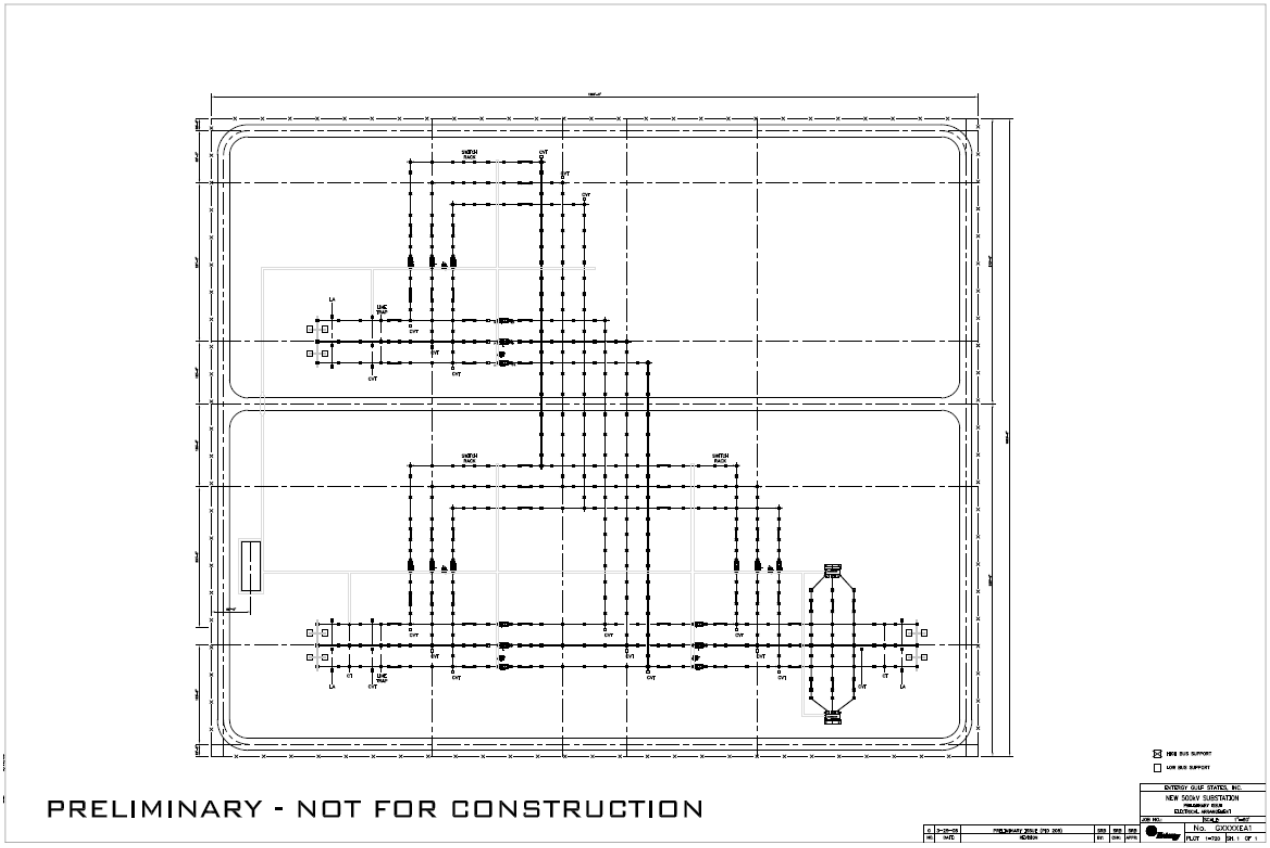
The following foundations will be required for the new construction:
(2) 500kV 70MVAR reactor foundation with oil containment
(3) 500kV A-frame dead end foundation
NOTE: each dead end foundation will consist of four footers
(6) 500kV gas circuit breaker foundation
(6) 500kV high bus switch support foundation
(15) 500kV low bus switch support foundation
(22) 500kV CVT support foundation
(6) 500kV CT support foundation
(6) 500kV line trap support foundation
(9) 500kV lightning arrester support foundation
(15) 500kV 125' static mast foundation
(1) 20' x 80' site erected control house foundation
(150) 500kV high bus single phase bus support foundation
(159) 500kV low bus single phase bus support foundation
(2300') pre-cast cable trench

- All necessary underground and aboveground conduit and fittings to be installed as per Entergy conduit standards.

- A ground grid analysis will be performed during detailed design to determine the layout of the proposed ground grid and the exact amount of 4/0 copper required for the new construction. A soil resistivity test will be required for the ground grid design. All structures

will be tied to the proposed ground grid with 4/0 copper conductor as per Entergy standards.

4.1.18.3 Electrical



- A new 500kV substation will be installed at the intersection point of the new 500kV transmission line from Fancy Point and the existing 500kV transmission Line 559. The new station will be configured as a folded breaker and a half station but only two breakers will be installed per bay. Therefore, the station will electrically be a double breaker double bus configuration with potential expansion opportunities. Low profile construction will be used for the proposed construction. The new station will require two independent sources of station service provided from local distribution feeders. Additionally, two banks of 70MVAR shunt reactors will be installed on the Fancy Point line.
- Please see the attached preliminary one-line diagram and preliminary electrical arrangement.

The following material will be installed as part of the electrical construction:
(2) 500kV 70MVAR Reactor
(3) 500kV A-frame dead end
(6) 500kV 3000A 63kA gas circuit breaker
(20) 500kV 3000A vertical break disconnect switch
(3) 500kV ground switch attachment
(9) 500kV station class lightning arrester
(8) 500kV high bus switch support
(15) 500kV low bus switch support
(6) 500kV line trap support

(22) 500kV CVT support
(6) 500kV CT support
(9) 500kV lightning arrester support
(15) 500kV 125’ static mast
(1) 20’ x 80’ site erected control house
(162) 500kV high bus single phase bus support
(164) 500kV low bus single phase bus support
(Lot) Bus, conductor, and necessary fittings

4.1.18.4 Relay

Control House General Equipment:

- Size, purchase and install two (2) 125VDC Lead Acid Battery sets including 2 step rack rated for proper seismic zone. Reference Entergy Standard PM0203 current revision. Perform battery sizing assessment to determine battery requirements. Size battery maintenance panel accordingly.

- Size, purchase and install two (2) 130V battery chargers. Reference Entergy Standard PM0302, latest revision, for sizing guidelines.

- Purchase, design and install two (2) battery switch panels per Entergy Standard PN0103, latest revision.

- Purchase and install one (1) AC switching panel (flip flop).

- Purchase, design and install one (1) stand alone AC panel per Entergy Standard PM0101, latest revision.

- Purchase, design and install two (2) stand alone DC panels per Entergy Standard PM0101, latest revision.

- Purchase and install two (2) battery monitoring devices.

- Size, purchase, and install one (1) digital fault recorder. Interface the digital fault recorder with all devices in the substation.

- Size, purchase and install one (1) large GE Harris D20 Remote Terminal Unit per Entergy Standard PM3002 current revision.

- Redundant Telecommunication circuits and equipment will be needed for installation of one TOC data circuit, one SOC data circuit, one EMO data circuit, and one POTS voice circuit.

- Purchase and install one 19” Communications Rack containing two SEL 2032 communications processors, one Teltone port switcher and mounting bracket, one SEL 2407 satellite linked clock, and one Starcomm modem model number 240-0199 w/ AC adapter. Cables will be needed for relay communications and will connect the SEL 2032s to the SEL 2407 and all IEDs in the substation control house.

- Purchase and install one (1) Three MOS control panel for the three bus located motor operated switches. Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated line switches will be required.

- Purchase and install one (1) HV Metering Panel per Entergy Standards PI0401 and PI0501, latest revisions. This panel will include metering for both Hartburg and Fancy Point Lines.

Relaying for Line XXX to Fancy Point

- Design, purchase and install one (1) Dual Primary Line Panel referencing Entergy Standard PM1803, latest revision and the Line 345 Webre to Wells panel located at Webre Substation in GSU-LA. This panel uses a 311L Current Differential relay for Primary #1 protection and a SEL 421 Distance Relay for Primary #2 protection. The panel includes a Pulsar carrier set which will not be needed for this project. This application will use redundant multiplexed communications circuits.
- Design, purchase, and install two (2) 500kV Breaker Control Panels referencing Entergy standard PM0501, latest revision. This panel uses a SEL 351 relay for all breaker protection and control functions. Each panel will control one breaker associated with the 500kV line to Fancy Point. These panels shall also contain the controls for the 500kV motor operated breaker disconnect switches associated with each breaker.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new 500kV circuit breakers will be required.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated line switch will be required.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated breaker disconnect switches will be required.
- Purchase and install four (4) relaying accuracy capacitive voltage transformers (CVT's) for bus and line potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes. Three CVT's will be installed on the line node and one will be installed on the line.
- Purchase and install one (1) three phase CVT junction box per Entergy Standard PM2402, latest revision.
- Purchase and install one (1) single phase CVT junction box.
- Purchase and install three (3) relaying accuracy current transformers (CT's) for metering per Entergy Standard PN0301, latest revision.
- Purchase and install one (1) three phase metering junction box.
- Establish two protective relay telecommunications circuits between XYZ Switchyard and Fancy Point Substation for Line XXX.
- Design, purchase, and install two (2) 500kV Reactor Differential Panels. The reactors will provide voltage limiting control for the 500kV line to Fancy Point. Each panel protect the reactors, functioning as primary and backup reactor differential protection schemes.

Relaying for line XXX to Hartburg

- Design, purchase, and install two (2) Line Panels with Blocking Carrier using the SEL-421 as the line protection relay and an approved, compatible power line carrier set as its communication medium. These panels will provide Dual Primary protection and dual transfer

trip protection for the Hartburg 500kV Line. These new panels will be replacing the existing primary and backup line relaying for the Mt. Olive to Hartburg 500kV Line. One of the panels shall also contain the controls for the 500kV motor operated line disconnect switch. This design will reference Entergy Standard PM1803, latest revision.

- Design, purchase, and install two (2) 500kV Breaker Control Panels referencing Entergy standard PM0501, latest revision. This panel uses a SEL 351 relay for all breaker protection and control functions. Each panel will control one breaker associated with the 500kV line to Hartburg. These panels shall also contain the controls for the 500kV motor operated breaker disconnect switches associated with each breaker.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new 500kV circuit breakers will be required.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated line switch will be required.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated breaker disconnect switches will be required.
- Purchase and install six (6) relaying accuracy capacitive voltage transformers (CVT's) for bus and line potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes. Three CVT's will be installed on the line and three will be installed on the line node.
- Purchase and install two (2) three phase CVT junction box per Entergy Standard PM2402, latest revision.
- Purchase and install three (3) relaying accuracy current transformers (CT's) for metering per Entergy Standard PN0301, latest revision.
- Purchase and install one (1) three phase metering junction box.
- Purchase and install three (3) 500kV, 3000A Single Frequency Line Traps.
- Purchase and install three (3) Single Frequency Line Tuners.

Relaying for line XXX to Mt. Olive

- Design, purchase, and install two (2) Line Panels with Blocking Carrier using the SEL-421 as the line protection relay and an approved, compatible power line carrier set as its communication medium. These panels will provide Dual Primary protection and dual transfer trip protection for the Mt. Olive 500kV Line. These new panels will be replacing the existing primary and backup line relaying for the Hartburg to Mt. Olive 500kV Line. One of the panels shall also contain the controls for the 500kV motor operated line disconnect switch. This design will reference Entergy Standard PM1803, latest revision.
- Design, purchase, and install two (2) 500kV Breaker Control Panels referencing Entergy standard PM0501, latest revision. This panel uses a SEL 351 relay for all breaker protection and control functions. Each panel will control one breaker associated with the 500kV line to Mt. Olive. These panels shall also contain the controls for the 500kV motor operated breaker disconnect switches associated with each breaker.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the new 500kV circuit breakers will be required.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated line switch will be required.
- Complete design of the AC and DC control schematics as well as the monitoring alarms for the 500kV motor operated breaker disconnect switches will be required.

- Purchase and install six (6) relaying accuracy capacitive voltage transformers (CVT's) for bus and line potential per Entergy Standard PN0201, latest revision. All CVT's to be purchased with carrier accessories for coordination and ease of construction purposes. Three CVT's will be installed on the line and three will be installed on the line node.
- Purchase and install two (2) three phase CVT junction boxes per Entergy Standard PM2402, latest revision.
- Purchase and install three (3) 500kV, 3000A Single Frequency Line Traps.
- Purchase and install three (3) Single Frequency Line Tuners.

500kV Bus Differentials

- Purchase and install four (4) HV Bus Differential Protection Panels per Entergy Standards PM0602, latest revision. Two protection panels will be installed on each bus, functioning as primary and backup bus differential protection schemes.
- The new circuit breakers installed adjacent to the 500kV Busses will need to be incorporated into their respective 500kV Bus protection schemes.
- Purchase and install six (6) 500kV relaying accuracy CVT units for bus potential. Three CVT's will be installed on each bus.
- Purchase and install two (2) three phase CVT junction boxes per Entergy Standard PM2402, latest revision. One box to be installed on each bus.

SCADA - by Entergy

- A new SCADA display will need to be generated for this station, as well as, line display changes.

4.1.18.5 Relay Settings

All new and affected relays will require settings

4.1.18.6 SCADA and communications

Require configuration for all new devices for status, alarm and control

4.1.18.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The normal process would be to perform all of the site, foundation, grounding, and conduit work with a single source. Dependant on the final design a determination will be made to

address any system outages that may be required to perform the installations of any proposed foundations. Efforts will be made to utilize low profile excavation equipment as part of the installation process for any foundations that will be under, near, adjacent too, or in close proximity of energized conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a 1-2 years advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules.

Upon completion of the site and foundation installations including all associated conduit and grounding installations, Steel and Electrical, as well as Protection & Control installations will commence. Upon completion of all Steel and Electrical components and substantial completion of the required Protection & Control components the installation of the proposed T-Line components will be to terminate, the Hartburg ,Mt. Olive 500kV and Fancy point T-Line. The actual sequence of the 500kV Substation and T-Line outages will have to be determined at a later time in order to coincide with system constraints at that point in time. Each respective component will require an outage consisting of possibly several days in duration. The durations are dependant on the final designs, and system constraints.

SWPPP implementation, monitoring and removal is required and estimated in estimating document. Station security is required and is estimated. Following are estimated time period for some construction activities:

Site preparation require approximately four months
Foundation, grounding and conduits will require approximately 3.5 months.
Installation of electrical equipment will require approximately 4.5 months.
Installation of relay equipment, termination, testing and commissioning will require approximately three months.

4.1.18.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
3	500kV A-frame dead end	24
6	500kV 3000A 63kA gas circuit breaker	26
18	500kV 3000A vertical break disconnect switch	18
3	500kV ground switch attachment	18
9	500kV station class lightning arrester	16
2	500kV 70MVAR shunt reactor	72
6	500kV high bus switch support	24
15	500kV low bus switch support	24
6	500kV line trap support	24
22	500kV CVT support	24
6	500kV CT support	24

9	500kV lightning arrester support	24
15	500kV 125’ static mast	24
150	500kV high bus single phase bus support	24
159	500kV low bus single phase bus support	24
Lot	Bus, conductor, and necessary fittings	14
15	Panels	18
18	500kV CVTs	36
6	500 kV line traps	18
6	500 kV line tuners	14
2	Control house battery sets	25
2	Communications circuits	16

4.1.18.9 Assumptions:

None reported

4.1.19 McKnight 500kV Substation:

Replace relaying on Fancy Point 500kV line.

4.1.19.1 Site and Foundation

None

4.1.19.2 Foundation

None

4.1.19.3 Electrical

None

4.1.19.4 Relay

Mcknight 500kV substation

- Replace fancy point relaying
  - (1) – primary #1 line panel (unblocking carrier)
  - (1) – primary #2 line panel (microwave)
  - Keep existing line trap, line tuner & CVTs
  - Microwave equipment (digital)
  - (1) – lot control cable
  - (1) – lot shielded control cable

4.1.19.5 Relay Settings

Relay setting will be required in the following panels:

- 2 – Line panels (Primary #1 & Primary #2)

4.1.19.6 SCADA and communications

None

4.1.19.7 Construction Strategy and timing of outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

No site, foundation or grounding work will be required for this panel replacement. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations. At a minimum, an outage will be required to upgrade the relay on the Fancy Point 500kV line. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules.

4.1.19.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
2	Panels (line)	18

4.1.19.9 Assumptions:

None reported

4.1.20 Sterlington 500 kV Substation:

4.1.20.1 Site

The area required for the expansion of the 500kV yard is approximately 5.4 acre. Due to the poor soil conditions, geotextile fabric is required across the entire site. In addition approximately 3-5 ft of fill will be required to bring the new portion of the site up to the elevation of the existing 500kV substation. It is assumed that the site is heavily wooded and approximately 2' of soil will need to be excavated to ensure the removal of all tree stumps and roots. Approximately 10,000 tons of limestone and 50,000 cu. yards of fill will be required for site prep.

4.1.20.2 Foundation

1000' Cable trough – poured in place
1000' 2" PVC Conduit
15,000ft of grounding
Foundations for the following equipment will use similar to existing designs.
(1) auto-transformer w/oil containment
(2) dead-tank breakers
(1) Full tension dead-end structure
(1) Autotransformer dead-end structure
(53) Low bus support
(42) High bus support
(24) Low switch support
(27) High switch support
(12) Equipment pedestals (CCVT or surge arrester)
(4) Shield wire structures
(14) Yard lights
1320ft of pile driving for autotransformer foundation

4.1.20.3 Electrical

Add a second 500/115kV, 396/492/616 MVA, 7.92% impedance autotransformer with buried tertiary in the new 500 kV outdoor 500 kV substation for paralleling with the existing unit.
To add the new autotransformer it is necessary to expand the ring bus towards Old Sterlington Road to add one more node and relocate Perryville line 2 to prevent autotransformer #3 & #4 from sharing a breaker

The 115 kV will tie via overhead line to the 115kV yard. A separate line WO will be used.

Electrical Equipment:
(1) 500/115kV autotransformer
(2) 500kV breakers
(6) 500kV Switches 3000A with motor operator
(2) 500kV Ground Switches
(1) Full tension dead-end structure
(1) Autotransformer dead-end structure
(53) Low bus support
(42) High bus support
(24) Low switch supports
(27) High switch supports
(12) Equipment Pedestals (CCVT or Surge Arrester)
(4) Shield wire structures
165 Post insulators
6200ft 500kV aluminum bus with damper conductor
3000ft Shield wire
(12) Yard lights

4.1.20.4 Relay

500/115kV Autotransformer #4 Protection

- Dual SEL-387 transformer Differential relays with CT inputs from the high-side breakers and the autotransformer low side will be used for Auto #4 Differential protection. A SEL 311L will be used to protect the low side of Auto #4.
- 500/115kV Perryville #2 Line Protection; CT inputs from the new breakers will need to be wired to the existing Perryville 2 line panel.
- The existing bus Differential scheme will not need revision.
- 500kV Breaker Control & Protection (Qty =2)
  Breaker failure, reclosing, and sync will be handled a by SEL-351relay.
- The supervisory control switches (43SUPV) are not needed on the relay panels, since this function is handled centrally near the RTU.
- 500kV Motor Operated Switch Control (Qty=5) Interlocks (52b contacts) from associated breakers are required.

- The supervisory control switch (43SUPV) is not needed on the relay panels, since this function is handled centrally near the RTU. These controls will be centrally located on a single panel.
- 500kV Instrument Transformers - Three (3) Perryville 2 line CCVTs will be relocated to reflect the line movement. The Auto #4 CCVT will be installed.

Relay Communications

- Two (2) fiber-optic ADSS cables, enclosed in inner-duct, routed in existing cable Trenches are required between Sterlington 500kV and 115kV switchyard control houses.
- Two (2) SEL-2506 fiber-optic remote I/O modules are required to dually transmit/receive trip, breaker failure initiate, and lockout for the breakers associated with the 500/115kV Autotransformer #4.
- One (1) SEL-2032 will be required to support Communications (dialup, SCADA, etc.) with the new relays.

4.1.20.5 Relay Settings

- New Relaying to set
  SEL-387 Transformer Protection (2)
  SEL-311L Low side of Auto #4 (1)
  SEL-351 Breaker Control (2)

- Existing Relaying to set

A study must be done to determine what relaying at remote stations will be affected

4.1.20.6 SCADA

An RTU configuration will be required at this station. There is also a configuration required for the SEL2032 being installed at this station.

4.1.20.7 Construction Strategy and timing of outages:

The substation will have to be expanded on the south end. The substation addition that was installed two years ago required extensive work on the substation pad requiring the installation of two types of filter fabric to help stabilize the soil. Also an iron ore type fill was used to help strengthen the fill materials. This will require a little more time on the site grading work but should not cause any unforeseen problems. The foundation work may require some concrete to be poured utilizing slurry materials. This will most likely be limited to the deeper piers used for shield wire and dead end structures. Oil containment will be provided underneath the autotransformer. Outages will be required on two points on the ring bus during foundation construction. Electrical and relay work will require some non outage construction work

followed by outages on the ring bus. The Perryville No. 2 line will be relocated to a different node on the ring bus and will require a outage. Also an outage on Autotransformer No. 3 will be required to tie in the new construction. All work will be coordinated with work in the 115 kV yard. Work will likely take approximately one year to complete from grading work to commissioning of new facilities.

4.1.20.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
1	500/115kV Autotransformer	104 - 116
2	500kV Breaker	26
6	500kV Switch	26
3	surge arresters	18
1 lot	500kV Steel Structures	20
1 lot	500kV insulators	20
1 lot	EHV buswork	20
2	500 KV Brk cntl panel	16
1	500 kV CCVT	16
2	MOS Panel	10
2	Auto Differential panel	16

4.1.20.9 ASSUMPTIONS:

None provided by the team

4.1.21 STERLINGTON 115 KV:

4.1.21.1 Site
The area required for the expansion of the 115kV yard is approximately 1 acre. Due to the poor soil conditions, geotextile fabric is required across the entire site. In addition approximately 3-5 ft of fill will be required to bring the new portion of the site up to the elevation of the existing 115kV substation. Approximately 1,900 tons of limestone and 7,500 cu. yards of fill will be required for site prep.

4.1.21.2 Foundation

1000ft of 2” PVC conduit
3500ft of grounding conductor
Foundations for the 2-level dead end will be a new design; all others will be similar to existing foundations already installed:
(4) Circuit breaker dead-tank
(9) CCVT pedestal
(12) High bus support
(69) Low bus support
(4) CE switch support
(1) Full tension two-level Dead-end structure
(3) Reduced tension Dead-end structure

4.1.21.3 Electrical

BUS SPLIT
It is required that the Sterlington 115kV bus be split in order to place the existing 4th Sterlington autotransformer in-service. The bus needs to be physically cut between bays 5 and 6 (bay numbering per drawing L0090EA2); tie breaker is not required. See table below for final configuration.

SPLIT BUS #1	**SPLIT BUS #2**
Walnut Grove (Swartz)	Downsville
Oak Ridge	Marion
IPCO	Meridian
Selman	N. Crossett
Drew (Frostkraft),	Walnut Grove (Monroe)
500/115kV Autotransformer #3	500/115kV Autotransformer #1
500/115kV Autotransformer #4	500/115kV Autotransformer #2

RELOCATE WALNUT GROVE (MONROE) T-LINE
Relocate this line from bay 13 to bay 4 by building bus from the transmission dead-end structure to a new dead-end located in front of bay 4. The existing T-line dead end will remain in place and taps will connect line conductor to bus below. Work in Bay 4 includes new equipment and structures to tie the line to both north and south buses.
The substation WO will allocate the bus work required for the line relocation and the transmission line WO will cover removal from existing bay, termination of line on to bus using a flying tap and termination from dead-end to the new bay.

RELOCATE DREW (FROSTKRAFT) T-LINE
Replace line trap, relocate CCVT pedestal to C phase and terminate line.

AUTOTRANSFORMER #4 TIE BAY
Bay 7 will tie the new 500/115kV autotransformer with a new 2-level dead-end structure to terminate the Bastrop line on top and transformer tie on bottom. Work includes new equipment and structures to tie the autotransformer to both north and south buses.

The relay room will be expanded to accommodate additional panels.

Electrical Equipment:
(4) 115kV breakers 3000A 63kA
(4) Switches 115kV 2000A
(4) Switches 115kV 3000A
(2) Ground Switches 115kV
(3) AX2E DE structure
(8) CE Switch support
(69) 115kV low bus supports
(12) 115kV high bus supports
(8) E pedestals

(1) Dead-end structure two-level
(165) 115kV post insulators
2500 ft of rigid bus
1000 square ft control house extension

4.1.21.4 Relay

500/115kV Autotransformer #4 Low side Protection

- Primary protection will be a SEL-311L line current differential relay.
- Backup protection will be a SEL-421 line distance relay. The supervisory control switches (43SUPV) for these breakers are not needed on the relay panel, since this function is handled centrally near the RTU.
- Install one (1) CVT on the with junction Box

Bus 115kv Split Control:

- Install one (1) Bus Potential transfer panel
- Install Bus Differential Protection for the both North Bus #2 & South Bus #2 utilizing the SEL-487
- Install three (3) CVT on the North Bus#2 with junction Box
- Install three (3) CVT on the South Bus #2 with junction Box
- Existing North Bus #1 & South Bus #1 bus differential scheme rework.

Breaker Control:

- Install four (4) Breaker Control Panel The panel will use an SEL 351 for sync, re-close, and breaker failure. Breaker failure, reclosing, and synch will be handled by a SEL-351 relay.

Walnut Grove to new bay – 115 kV at Sterlington

- Install one (1) Line Relay Panel 28". The panel will use an SEL421 for primary digital and an SEL311-C for digital backup step distance protection.
- Install one (1) CVT on the with junction Box

.Frostkraft line to bus #1 (bay 13)

- Rework existing Monroe "Walnut Grove" Line panel. The panel uses an SEL421 for primary and an SEL311-C for backup step distance protection. Install Pulars to for PLC.
- Install one (1) CVT on the with junction Box
- Install one (1) Line Trap the with Tuner
- Install one (1) Orion Com Processor to support communications
- Install one (1) SEL2032 for RTU IED

- Install two (2) Fiber Optic ADSS, 24-Fiber
- One Lot of Control Cable

Long Delivery items with lead times:

Equipment	Quantity	Lead
115KV Brk cntl panel	4	16 weeks
115KV Bus Diff panel	2	16 weeks
Potential Transfer Panel	2	10 weeks
115KV Line panel	1	16 weeks

Relay Communications

Two (2) fiber-optic ADSS cables enclosed inner duct routed in existing cable trench are required between Sterlington 500kV and 115kV switchyard control houses
Two (2) SEL-2506 fiber-optic remote I/O modules are required to dually transmit/receive trip, breaker failure initiate, and lockout Commands for the breakers associated with the 500/115kV Autotransformer #4.

4.1.21.5 Relay Settings

New relaying to set

Existing relaying to set

A study must be done to determine what relaying at remote stations will be affected

4.1.21.6 SCADA

A configuration for the RTU will be required. There will also be a configuration required for the SEL2032 being installed at this station.

4.1.21.7 Construction Strategy and timing of outages:

A small amount of grading work and fence relocation will be required to relocate Walnut Grove/Monroe 115 kV line. Outages will likely be required on South Bus No. 1 & No. 2 and North Bus No. 1 & No. 2 in order to perform foundation work. Control house is expected to be enlarged and should not require any outages. Electrical and relay work will require some non outage construction work followed by an outage on the North & South Busses to install new PT's needed to split the bus. Also outages will be required on each of the busses to connect in new construction. An outage will be required to tie in the relocated bus work on the Walnut Grove/Monroe 115 kV line. Relay testing and checkout will be required on the new Walnut Grove/Monroe line terminal, new bus differential, new autotransformer connection and all other associated breakers, equipment, etc. All work will be coordinated with work in the 500 kV yard

which will drive the duration of this project. Work will likely take approximately one year to complete from grading work to commissioning of new facilities.

4.1.21.8 Substation long delivery items:

Quantity	Material Description	*Lead Time (weeks)
4	115kV circuit breaker	22
8	115kV disconnect switch	18
165	115kV insulators	14
1 lot	Steel structures	20
1 lot	115kV buswork	14
2	115 KV Brk cntl panel	16
2	Bus Differential panel	16
1	Potential transfer panel	16

4.1.21.9 Assumptions:

None provided by the team

4.2 Transmission lines

4.2.1 Fancy Point to Richard – 500 kV

4.2.1.1 Scope:

Build approximately 86 miles of new 500kV line using tubular H-frame tangent structures and 3 pole angle and dead-end structures.
180' Right of Way required for entire length. H-frames will use vibratory socket pile foundations for 64 miles. The H-Frames for the other 22 miles going through the Atchafalaya basin will use base plated pile foundations. The 3 pole angle and deadend structures will use base plated pile foundations. 2 lattice towers and their foundations for the Mississippi river crossing will need to be installed, and 2 lattice towers and their foundations for the Atchafalaya river crossing will also need to be installed.

Triple bundled 954 ACSR 45/7 "Rail" conductor. Two Fiber optic (24) OPGW shield wires used, one per peak for entire line length.

Quantity	Material Description	*Lead Time (weeks)
1088	Steel Poles	18
1088	Vibratory Steel Caissons	18
4,612,885 Lbs	954 ACSR "Rail" Conductor	20
290,648 meters	24 fiber OPGW	24
1779	Insulators	18

4	Lattice Towers River Crossing	30
158,514 Lbs	3070 kcmil 140/91 for River Crossing	36

4.2.1.2 Environmental permitting issues and basis for cost estimates:

Please see attachment in eroom

4.2.1.3 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details, a competitive bid process to award the work to an Entergy approved contractor will be performed.

The normal process would be to identify all hazards, identify all rights of access and egress, install stormwater pollution prevention controls, perform all of the clearing, establish strategically located laydown yards, receive the materials and equipment, install foundations & structures, and then subsequently perform the wire stringing. These components could be contracted between multiple sources for execution. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of all proposed facilities. Efforts will be made to utilize low profile equipment where reasonable and practical as part of the installation process for the facilities to be installed that will be under, near, adjacent too, or in close proximity of energized facilities/conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules. Also for a T-Line construction of this magnitude there could/would be the possibility that other Utilities, Cooperatives, Municipalities, etc… may have multiple facilities that may have to be modified, such as the removal, or retrofitting of shield wires, structures, conductors, etc…. During the definition phase of the Transmission Business's (EMCC) process these facilities should be identified, and subsequently the appropriate request will be made through the proper channels to have these obstacles addressed on an as needed basis. These types of activities would/could require outages that are yet to be identified.

4.2.1.4 Assumptions:

No major environmental issues
No problems with crossing permits
ROW will be attainable for $10,000/acre
900' average spans used in estimate
Estimated route length is 86 miles
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.2 Fancy Point to new Nachitoches (XYZ) 500 kV Substation:

4.2.2.1 Scope:

Build approximately 148 miles of new 500kV line using tubular H-frame tangent structures and 3 pole angle and dead-end structures.
180' Right of Way required for entire length. H-frames will use vibratory socket pile foundations for 135 miles. The H-Frames for the other 13 miles going through the Atchafalaya basin will use base plated pile foundations. The 3 pole angle and deadend structures will use base plated pile foundations. 2 lattice towers and their foundations for the Mississippi river crossing will need to be installed, 2 lattice towers and their foundations for the Atchafalaya river crossing will need to be installed, and 4 lattice towers and their foundations for two Red river crossings will also need to be installed.
Triple bundled 954 ACSR 45/7 "Rail" conductor. Two Fiber optic (24) OPGW shield wires used, one per peak for entire line length.

Quantity	Material Description	*Lead Time (weeks)
1860	Steel Poles	18
1860	Vibratory Steel Caissons	18
7,938,454 Lbs	954 ACSR "Rail" Conductor	20
500,184 meters	24 fiber OPGW	24
3027	Insulators	18
8	Lattice Towers River Crossing	30
309,7329 Lbs	3070 kcmil 140/91 for River Crossing	36

4.2.2.2 Environmental permitting issues and basis for cost estimates:

Please see attachment in eroom

4.2.2.3 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details, a competitive bid process to award the work to an Entergy approved contractor will be performed.

The normal process would be to identify all hazards, identify all rights of access and egress, install storm water pollution prevention controls, perform all of the clearing, establish strategically located lay down yards, receive the materials and equipment, install foundations & structures, and then subsequently perform the wire stringing. These components could be contracted between multiple sources for execution. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of all proposed facilities. Efforts will be made to utilize low profile equipment where reasonable and practical as part of the installation process for the facilities to be

installed that will be under, near, adjacent too, or in close proximity of energized facilities/conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules. Also for a T-Line construction of this magnitude there could/would be the possibility that other Utilities, Cooperatives, Municipalities, etc… may have multiple facilities that may have to be modified, such as the removal, or retrofitting of shield wires, structures, conductors, etc…. During the definition phase of the Transmission Business's (EMCC) process these facilities should be identified, and subsequently the appropriate request will be made through the proper channels to have these obstacles addressed on an as needed basis. These types of activities would/could require outages that are yet to be identified.

4.2.2.3 Assumptions:

No major environmental issues
No problems with crossing permits
ROW will be attainable for $10,000/acre
900' average spans used in estimate
Estimated route length is 148 miles
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.3 Richard to Webre – 500 kV

4.2.3.1 Scope:

Build approximately 56 miles of new 500kV line using tubular H-frame tangent structures and 3 pole angle and dead-end structures.
180' Right of Way required for entire length. H-frames will use vibratory socket pile foundations for 34 miles. The H-Frames for the other 22 miles going through the Atchafalaya basin will use base plated pile foundations. The 3 pole angle and deadend structures will use base plated pile foundations. 2 lattice towers and their foundations for the Atchafalaya river crossing will need to be installed.
Triple bundled 954 ACSR 45/7 "Rail" conductor. Two Fiber optic (24) OPGW shield wires used, one per peak for entire line length.

Quantity	Material Description	*Lead Time (weeks)
721	Steel Poles	18
721	Vibratory Steel Caissons	18
3,003,739 Lbs	954 ACSR "Rail" Conductor	20
189,259 meters	24 fiber OPGW	24
1173	Insulators	18
2	Lattice Towers River Crossing	30
75,609 Lbs	3070 kcmil 140/91 for River Crossing	36

4.2.3.2 Environmental permitting issues and basis for cost estimates:

Please see attachment in eroom

4.2.3.3 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details, a competitive bid process to award the work to an Entergy approved contractor will be performed.

The normal process would be to identify all hazards, identify all rights of access and egress, install storm water pollution prevention controls, perform all of the clearing, establish strategically located lay down yards, receive the materials and equipment, install foundations & structures, and then subsequently perform the wire stringing. These components could be contracted between multiple sources for execution. Dependant on the final design a determination will be made to address any system outages that may be required to perform the installations of all proposed facilities. Efforts will be made to utilize low profile equipment where reasonable and practical as part of the installation process for the facilities to be installed that will be under, near, adjacent too, or in close proximity of energized facilities/conductors that could be determined to be a safety risk. In the instances that this is not attainable, outages will be required. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that said outage will be granted at the time requested. This poses risk to all schedules. Also for a T-Line construction of this magnitude there could/would be the possibility that other Utilities, Cooperatives, Municipalities, etc… may have multiple facilities that may have to be modified, such as the removal, or retrofitting of shield wires, structures, conductors, etc…. During the definition phase of the Transmission Business's (EMCC) process these facilities should be identified, and subsequently the appropriate request will be made through the proper channels to have these obstacles addressed on an as needed basis. These types of activities would/could require outages that are yet to be identified, and could also impact the construction and installations of the new proposed Richard/Webre 500kV T-Line, and/or any required modifications to collateral facilities due to system constraints. This too poses risk to all schedules.

<u>Required Outages:</u>

New Webre 500kV (4) Breaker Ring Bus Station: Section of the 500kV Ring Bus where the new Webre/Richard 500kV T-Line will terminate.
Richard 500kV Substation: Section of the Ring Bus where the new Webre/Richard 500kV T-Line will terminate.
The possibility and probability exists that multiple unidentified outages on other circuits, and or facilities "To Be Determined" will be required. This would include but not be limited to other Utilities, Cooperatives, Municipalities, etc….

4.2.3.4 Assumptions:

No major environmental issues
No problems with crossing permits
ROW will be attainable for $10,000/acre
850' average spans used in estimate
Estimated route length is 56 miles
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.4 Sabine to Hartburg 230 kV:

4.2.4.1 Scope:

Project Description

Design a new 230kV Transmission line connecting Hartburg Substation in Newton County to the Sabine Substation in Orange County, TX. Project will need to be designed to avoid regulatory conflicts and should attempt to meet the developed stipulations of the community that will arise during the public meeting process.

Geotechnical Report (Soil Borings)

Geotechnical reports including the boring logs and the laboratory data are required to properly design and size the foundations for the transmission line structures. It is estimated that the 24.5 mile route will require 25 soil borings.

Survey and Plan & Profile Drawings

A topographical survey of the T-line alignment will be required. Drafting services will be required to complete the Plan & Profile drawings and Phasing diagrams. Estimated costs are provided on the estimate sheet.

Line Route

The proposed line route for this project parallels several existing corridors that are presently located in the areas between the Hartburg Substation and the Sabine Substation. The new line is proposed to start at the Hartburg Substation and parallel transmission line 195 for 14 miles to its intersection with transmission line 572. It will then parallel line 572 for 10.5 miles to the existing Sabine Substation. It is estimated that approximately half of the proposed corridor will not have to be cleared for construction. It is also assumed from discussions with the operations coordinator that approximately 50% if the project will require matting for construction of the line and foundations.

Right of Way (ROW)

Approximately 24.5 miles of ROW will have to be purchased between Hartburg Substation and Sabine Substation site. Since the route is located adjacent to several existing transmission corridors, an 80 foot wide track is needed to accommodate the single pole, single circuited (bundled) arrangement. If it is deemed necessary to choose a route that is not adjacent to the existing corridor, a 100' wide corridor would be required. For estimating purposes, the worst case of 100' has been used in the estimate

Permits (SWPPP, Waterway, Road, Highway and Railroad Crossings)

- Storm Water Pollution Prevention Planning (SWPPP) design, field consultation, and monitoring will be required for the project
- Wetland Determination/Permitting will be required for the project.
- It is also anticipated that highway crossing permits will be required at up to 18 locations along the route, and at least three railroad crossing permits will be required.

Design

The transmission line will be designed in accordance with the Entergy 230 kV standards. The NESC Zone used for this project (Orange County) is NESC Light, with an Extreme Wind of 125 mph (40.0 PSF), and 0.5" ice Load.

The Project Scoping Plan calls for the line to be designed for the 230 kV capabilities with single-circuit, bundled 1272 ACSR "Bittern" conductor.

The design will be a single pole, single-circuited arrangement. Dead ends and angle structures will be single pole guyed structures where soil allows and self-supporting foundations structures where guying is not feasible.

Foundations

It has been assumed that all structures will require socket foundations costing. This covers all guyed dead end, guyed angle structures and tangent structures. If self-supporting structures are required in areas that are not suitable for guyed structures, foundations for those structures will be substantially larger and the cost per foundation will be significantly higher per foundation. For estimating purposes, they have bee assumed to be $30,000 each and 6 will be required for the project.

Structures

Based on the geometry of the existing alignment and the conductor used, it is estimated that the line will require 152 new structures. This estimate was developed assuming half of the line could be constructed using concrete structures and half using steel

structures because of the terrain and access. Where soil conditions do not allow guying of dead ends or angle structures, self supporting steel structures will be installed. All steel structures will be fabricated by Thomas and Betts. The socket length for all poles requiring vibratory piles will be specified after design.

Contingencies for poles have been calculated based on a rate of 10% of base cost for both material and contract labor based on the Transmission Lines Additional Expense Rates Sheet.

Conductor

The structures will be designed to accommodate a single circuit of bundled 1272.0 kcmil ACSR "Bittern" conductor operating at 230 kV.

Sag and tension charts for the full tension ruling spans and slack spans will be included in the "Sag & Tension Data" sections of the design package.

Deadends are bolted type connections to accommodate the ACSR Conductor.

Contingencies for conductor have been calculated based on a rate of 10% for material and contract labor based on the Transmission Lines Additional Expense Rates Sheet.

Shield Wire

OPTGW and 7#7 Alumoweld wire will be used as the shield wire for this project. The shield wire and conductor will be slack spans between the substation deadend bay and the deadend transmission Structures. Sag and tension charts for the full tension ruling span and the slack spans will be included in the "Sag & Tension Data" sections of the design package. Deadends are bolted type connections.

Insulators

All insulators installed are polymer 230 kV class insulators. All insulators and conductor hardware shown on the MacLean Insulator Assembly Drawings are provided by MacLean.
Contingencies for insulators have been calculated based on a rate of 10% for material and contract labor based on the Transmission Lines Additional Expense Rates Sheet. It is estimated that approximately 560 insulators will be required for the project.

Grounding

Concrete structures socketed into steel vibratory caissons (piles) do not require a driven ground rod but must have the pole grounded (electrically connected) to the steel

caisson. Refer to Grounding Drawings and Specifications TO0104, TO0105 and TO0109 for complete grounding requirements.

Quantity	Material Description	*Lead Time (weeks)
154	Steel Poles	18
154	Vibratory Steel Caissons	18
1,147,000 lbs	1272 ACSR “Bittern” Conductor	24
39,430 m	24 fiber OPGW	18
588	Insulators	14

4.2.4.2 Line Construction and outages:

The line construction will cover approximately 25 miles. The SWPPP mitigation for this project was based on 60% wetlands, which was the percentage that was factored in for the matting as well. All new ROW will need to be acquired and cleared. The line route will parallel Line 573 ROW from Sabine to Oilla and parallel Line 172 ROW from Oilla to Line 195 ROW. Major road crossings involve spanning 1442 twice and I-10 once. Approximately one week of outages will be need at both Sabine and Hartburg to tie the line in.

4.2.4.3 Assumptions:

None reported

4.2.5 Cypress to Jacinto 230 kV:

4.2.5.1 Scope:

Project Description
Design a new 55 mile 230kV Transmission line connecting Cypress Substation to Jacinto Substation, spanning Liberty and Hardin County, TX. The line parallels existing L-187 & L-887. It will have a 2250 amp capacity.

Geotechnical Report (Soil Borings)
Geotechnical reports including the boring logs and the laboratory data are required to

properly design and size the foundations for the transmission line structures. It is

estimated that the 55 mile route will require 55 soil borings.

Survey and Plan & Profile Drawings

A topographical survey of the T-line alignment will be required. Drafting services will be required to complete the Plan & Profile drawings and Phasing diagrams. Estimated costs are provided on the estimate sheet.

Line Route

A 55 mile route was chosen based on logistics and cost of sharing existing right of way L-187 & L-887. This route does contain railroad crossings and sections that will likely need to be double circuited with existing lines because of surrounding development.

Right of Way (ROW)
Approximately 55 miles of ROW will have to be purchased between Cypress and Jacinto Substation. Since the route is located adjacent to several existing transmission corridors, an 80 foot wide track is needed to accommodate the single pole, single circuited arrangement. If it is deemed necessary to choose a route that is not adjacent to the existing corridor, a 100' wide corridor would be required. For estimating purposes, the worst case of 100' has been used in the estimate.

Permits (SWPPP, Waterway, Road, Highway and Railroad Crossings)

This project will require the design, implementation and monitoring of a Storm water Pollution Prevention Plan. The cost of this plan was estimated from the Transmission Lines Additional Expense Rate Sheet.

The line will cross the Trinity River. The exact number of waterway, highway and railroad crossing permits that will be needed will be determined at a later date after a route is selected.

Design

The transmission line will be designed in accordance with the Entergy 230 kV standards. The NESC Zone used for this project (Liberty and Hardin County) is NESC Light, with an Extreme Wind of 125 mph (40 PSF), and a Heavy Ice Load of 0.5 in.

The design will be a single pole, single-circuited, delta braced post arrangement. Dead ends and angle structures will have three poles and use guys.

Foundations

Vibratory piles and direct embed with concrete backfill foundations will be used on this project. For the estimate, a socketed length of 9 ft. with 4 ft. reveal was assumed. The first 46 miles from Beaumont will use vibratory piles. During the last 9 miles to Jacinto, all steel poles and concrete dead ends use vibratory piles. The rest of the concrete tangents in this section are direct embedded 15'. All vibratory piles are assumed to be steel 46" x 30'.

Structures

Based on the geometry of the alignment and the conductor used, it is estimated that the line will require 502 new structures. This estimate was developed using steel and concrete structures. The steel structures were chosen in areas believed to have poor soil conditions and difficult access.

All steel structures will be will be fabricated by Thomas and Betts and all concrete structures will be fabricated by Valmont. The socket length for all poles requiring vibratory piles was assumed to be 9 ft. with 4 ft. reveal for the estimate but will be specified after design.

Contingencies for poles have been calculated based on a rate of 10% of base cost for both material and contract labor based on the Transmission Lines Additional Expense Rates Sheet.

Conductor

The Project Scoping Plan calls for the line to be designed for 230 kV capability with single circuit, Lapwing 1590 kcmil ACSS operating at 175C (347°F).

The conductor will be slack span between the substation deadend bay and the deadend transmission Structures. Sag and tension charts for the full tension ruling spans and slack spans were not created for the estimate but will be included in the “Sag & Tension Data” sections of the design package.

Dead ends are compression type connections to accommodate the ACSS Conductor.

Stringing and sag allowances were estimated at 3% of line length. Contingencies for conductor have been calculated based on a rate of 10% for material and contract labor based on the Transmission Lines Additional Expense Rates Sheet.

Shield Wire

OPGW will be used as the shield wire for this project. The shield wire will be slack span between the substation deadend bay and the deadend transmission Structures. Sag and tension charts for the full tension ruling span and the slack spans were not included with the estimate but will be included in the “Sag & Tension Data” sections of the design package. Deadends are bolted type connections.

Insulators

All insulators installed are polymer 230 kV class insulators. All insulators and conductor hardware shown on the MacLean Insulator Assembly Drawings are provided by MacLean.

Contingencies for insulators have been calculated based on a rate of 10% for material and contract labor based on the Transmission Lines Additional Expense Rates Sheet.

Grounding

Concrete structures socketed into steel vibratory caissons (piles) do not require a driven ground rod but must have the pole grounded (electrically connected) to the steel caisson. Refer to Grounding Drawings and Specifications TO0104, TO0105 and TO0109 for complete grounding requirements. There are then three options for grounding the direct buried concrete pole. These are: (1) Connect ground wire to pancake at pole bottom. (2) Extend ground wire from pancake to ground rod. (3) Connect ground wire from terminal directly to the ground rod. Ground wire should be run continuous (no splices). For concrete pole set in steel pile, the ground wire should be extended from the bottom lug and bonded to the pile. Refer to Std Dwgs. TMD293, TMD294, TMD298 and TMD301 for details.

Steel poles socketed into steel piles must be bonded to the steel pile. The pile is then considered as an effective grounding rod. Refer to Std. Dwgs. TMD295, TMD296, TMD297 and TMD301 for details.

Quantity	Material Description	*Lead Time (weeks)
126	Steel Poles	18
376	Concrete Poles	12
585	Vibratory Steel Caissons	18
1,590,739 lbs	1590 ACSS “Lapwing” Conductor	24
87,660 m	24 fiber OPGW	18
2197	Insulators	14

4.2.5.2 Line Construction and outages:

This line will parallel the line between Cypress and Jacinto. It will be built using single pole 230kV construction. The ROW will need additional clearing to accommodate this line on the existing ROW. There are several areas where the line will need to be taken out of the ROW because of several housing areas and bodies of water. The line route has been flown several times to locate any obstructions that will need to be addressed during construction, as well as wetland and environmentally protected areas. We have also communicated to design the wet

or hard to access areas where we would like to use steel poles as apposed to concrete. This line will cross a number of property lines along the way where gates must be installed to progress down the ROW for construction.
Approximately one week of outages will be required at both Cypress and Jacinto to tie the line in.

4.2.5.3 Assumptions:

None reported

4.2.6 New 500 kV line between Fancy Point and Generator Transformer at Power Plant:

4.2.6.1 Scope:

Build approximately 1 miles of new 500kV line using tubular H-frame tangent structures and 3 pole angle and dead-end structures.
180' Right of Way required for entire length. H-frames will use vibratory socket pile foundations. The 3 pole angle and deadend structures will use base plated pile foundations. Triple bundled 954 ACSR 45/7 "Rail" conductor. Two Fiber optic (24) OPGW shield wires used, one per peak for entire line length.

Quantity	Material Description	*Lead Time (weeks)
18	Steel Poles	18
18	Vibratory Steel Caissons	18
53,638 Lbs	954 ACSR "Rail" Conductor	20
3,380 meters	24 fiber OPGW	24
39	Insulators	18

4.2.6.2 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The scope of this portion of the project will be to build approximately 1 mile of new 500kV line between Fancy Point substation and River Bends generator transformer. This work will be contracted to an Entergy approved transmission line contractor. The approach will be to construction the line within the new 180' Right of Way. Upon completion of this portion of the construction, the system tie-in can be scheduled. The required outages will require coordination with the TOC as well as River Bend. Normally outages on 500kV facilities require

a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules.

4.2.6.3 Assumptions:

No major environmental issues
No problems with crossing permits
800' average spans used in estimate
Estimated route length is 1 miles
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.7 New 500 kV line between Fancy Point and Generator Station Service Transformer at Power Plant:

4.2.7.1 Scope:

Build approximately 1 miles of new 500kV line using tubular H-frame tangent structures and 3 pole angle and dead-end structures.
180' Right of Way required for entire length. H-frames will use vibratory socket pile foundations. The 3 pole angle and deadend structures will use base plated pile foundations. Triple bundled 954 ACSR 45/7 "Rail" conductor. Two Fiber optic (24) OPGW shield wires used, one per peak for entire line length.

Quantity	Material Description	*Lead Time (weeks)
18	Steel Poles	18
18	Vibratory Steel Caissons	18
53,638 Lbs	954 ACSR "Rail" Conductor	20
3,380 meters	24 fiber OPGW	24
39	Insulators	18

4.2.7.2 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The scope of this portion of the project will be to build approximately 1 mile of new 500kV line between Fancy Point and the generator station service transformer at the power plant. This work will be contracted to an Entergy approved transmission line contractor. The approach will be to construction the line within the new 180' Right of Way. Upon completion of this portion of the construction, the system tie-in can be scheduled. The required outages will require

coordination with the TOC as well as River Bend. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules

4.2.7.3 Assumptions:

No major environmental issues
No problems with crossing permits
800' average spans used in estimate
Estimated route length is 1 miles
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.8 Fancy Point Expansion Reroute Big Cajun 500 kV line at Fancy Point.

4.2.8.1 Scope:

Reroute approximately 0.25 miles of the Big Cajun 500kV line using tubular 3 pole angle and dead-end structures.
180' Right of Way required for entire length. The 3 pole angle and deadend structures will use base plated pile foundations.
Triple bundled 954 ACSR 45/7 "Rail" conductor. Two Fiber optic (24) OPGW shield wires used, one per peak for entire line length.

Quantity	Material Description	*Lead Time (weeks)
6	Steel Poles	18
6	Vibratory Steel Caissons	18
13,410 Lbs	954 ACSR "Rail" Conductor	20
845 meters	24 fiber OPGW	24
12	Insulators	18

4.2.8.2 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The scope of this portion of the project will be to reroute the Big Cajun line near Fancy Point. This work will be contracted to an Entergy approved transmission line contractor. Upon completion of this portion of the construction, the system tie-in can be scheduled. The required outages will require coordination with the TOC as well as River Bend and Big Cajun. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules

4.2.8.3 Assumptions:
No major environmental issues
No problems with crossing permits
800' average spans used in estimate
Estimated route length is 0.25 miles
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.9 Fancy Point Expansion Raise 230kV lines over 500kV Bus at Fancy Point.

4.2.9.1 Scope:

To meet clearance requirements over rigid bus extension through the Fancy Point 230kV yard to the McKnight deadend structure, three 230kV lines shall be raised. This includes re-terminating both of the Port Hudson 230kV lines entering the south side of the 230kV switchyard to a higher position on the existing substation dead-ends. Install one prop structure to raise the Enjay 230kV line, also entering the south side of the 230kV switchyard
Install H-frame tangent structure on Enjay 230kV at Fancy Point. H-frame will use vibratory socket pile foundations.

Quantity	Material Description	*Lead Time (weeks)
2	Steel Poles	18
2	Vibratory Steel Caissons	18
15	Insulators	18

4.2.9.2 Line Construction and outages:

If this project is approved and enters the Transmission Business's (EMCC) process for executing projects, there will be constructability reviews performed during the definition phase. These reviews will try to incorporate any known hazards from a safety perspective, as well as any obstacles that could/would be experienced during the construction and installation process. After receipt of the final design drawings and details for each discipline of work, a determination will be made to either perform a competitive bid process to award the work to an Entergy approved contractor, or, to allow internal Entergy Resources to perform the work.

The scope of this portion of the project will be to raise three 230kV lines to meet clearance requirements over the rigid bus extension through the Fancy Point 230kV yard to the McKnight dead-end structure. This includes re-terminating both of the Port Hudson 230kV lines entering the south side of the 230kV switchyard to a higher position on the existing substation dead-ends. Install one prop structure to raise the Enjay 230kV line, also entering the south side of the 230kV switchyard. An H-frame tangent structure on the Enjay 230kV at Fancy Point will also be installed.

This work will be contracted to an Entergy approved transmission line contractor. This work will require 230kV and 500kV outages. The required outages will require coordination with the

TOC as well as River Bend. Normally outages on 500kV facilities require a year's advanced notice, with no guarantees that the outage will be granted at the time requested. This poses risk to all schedules

4.2.9.3 Assumptions:
No major environmental issues
No problems with crossing permits
Estimated material costs are based on today's costs. Material adjustments may need to be made in the future as costs of steel, aluminum, and other components vary.

4.2.10 Sterlington – Drew

Line from Sterlington – Drew will be rebuilt using 1590 ACSR conductor. All structures, wire, and insulators will be replaced.

T-Line Long Lead Items

Quantity	Material Description	*Lead Time (weeks)
90	Steel Poles	18
40	Vibratory Steel Caissons	18
56161 ft	7#7 Shield Wire	14
301583 lbs	1590 ACSR "Lapwing" Conductor	20
17,122 m	24 fiber OPGW	24
321	Insulators	18

Line Construction and Outages:

Take a crippling outage on the Sterlington-Drew 115kV line, replace existing structures with new single pole steel structures, and replace the conductor and shield wires as outlined above. Estimated outage length to allow for rebuilding the line section will be approximately 21 weeks.

Assumptions

1. River Crossing Towers can be reused using "custom" conductor
2. Approximately 60% of tangents and all DE structures require a vibe pile or drilled pier foundation respectively
3. Existing adjacent Double Ckt conductors can be reused and transferred to new structures
4. Outages are available to facilitate construction of the most economical replacement structures
5. No ROW accessibility issues

4.2.11 Drew – Cheniere

The line from Drew to Cheniere will be rebuilt using 1272 ACRS “Bittern” conductor. All structures, wire, and insulators will be replaced.

T-Line Long Lead Items

Quantity	Material Description	*Lead Time (weeks)
26	Steel Poles	18
10	Vibratory Steel Caissons	18
68973 lbs	1272 ACSR “Bittern” Conductor	20
4902 m	24 fiber OPGW	24
16078 ft	7#7 Shield Wire	14
102	Insulators	18

Line Construction and Outages:

Take a crippling outage on the Drew-Cheniere 115kV line, replace existing structures with new single pole steel structures, and replace the conductor and shield wires as outlined above. Estimated outage length to allow for rebuilding the line section will be approximately 11 weeks.

Assumptions

1. 50% of the tangent structures will require vibe pile foundations
2. DE structures will be self supported on drilled piers with long anchor bolts
3. Outages are available to facilitate construction of most economical structure replacements
4. No ROW accessibility issues

4.2.12 Cheniere – Riser 115kV Line

T-line wire data and sag criteria indicate that the line between Cheniere and Riser is good for 227 MVA based on 1033.5 ACSR conductor and 212° F sag data. No line upgrade is required. 185 MVA rating may be in error.

4.2.13 Riser – Froskraft 115kV Line

T-line wire data and sag criteria indicate that the line between Riser and Froskraft is good for 227 MVA based on 1033.5 ACSR conductor and 212° F sag data. No line upgrade is required. 185 MVA rating may be in error.

4.2.14 Tie Line between New 500kV Auto #4 and 115 kV Yard

A new line using 954 ACSS "Cardinal" conductor will be built between the new Autotransformer #4 and the 115kV Bus in the Sterlington yard. After the first few spans from the new transformer deadend, the new line will run generally parallel to the existing Tie line from Auto #3.

T-Line Long Lead Items

Quantity	Material Description	*Lead Time (weeks)
10	Steel Poles	18
42	Insulators	18
13265 lbs	954 ACSS "Cardinal" Conductor	20
1098 m	24 fiber OPGW	24

Line Construction and Outages:

This will be new construction to install poles and string wire. Outages on substation bus and/or adjacent transmission lines (if required) will be determined at a latter date after preliminary design has been done.

Assumptions

1. Line can be routed parallel and adjacent to existing Tie line from Auto #3.
2. Direct embedded tangents can be used.
3. Drilled pier foundations required for deadends.
4. Necessary outages to allow for construction are obtainable.

No equipment accessibility issues

4.2.15 Reroute Froskraft to Bus Split #1

The existing termination point of the Froskraft line on the 115kV Sterlington bus (new split bus 2) will be relocated in a new position on the bus (new split bus 1).

T-Line Long Lead Items:

Quantity	Material Description	*Lead Time (weeks)
3	Steel Poles	18
15	Insulators	18
3101 lbs	1272 ACSR “Bittern” Conductor	20
220 m	24 fiber OPGW	24

Line Construction and Outages:

To be determined during project scoping

Assumptions

1. No major underground obstructions in the Sterlington yard that would impede embedding structure(s) or constructing drilled piers.
2. Necessary outages to allow for construction are obtainable.
3. No equipment accessibility issues.

5. COSTS

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 overheads and AFUDC, but do not include tax gross up that may apply to the project. The costs shown are considered to be accurate to within +/-20%. Costs shown in the tables below are in 2008 dollars and do not reflect inflation.

Projected Costs in 2008 dollars “With Priors” w/o escalation

Lines / Substations	Direct Cost 2008 $	Indirect cost with assumed 40% OH 2008 $	Total Amount 2008 $
4.1.1 Fancy Point 500/230 kV substation expansion	$46,105,345	$18,442,138	$64,547,483
4.1.2. Fancy Point 230 kV breaker upgrade	$9,496,555	$3,798,622	$13,295,177
4.1.3. Big Cajun #2 500 kV Substation (Owned by LAGen)	$3,645,202	$1,458,081	$5,103,283
4.1.4. Cleco Acadia 138 kV Substation (Owned by Cleco)	N/A	N/A	N/A
4.1.5. Coly 138 kV Substation	N/A	N/A	N/A
4.1.6. Repapco 138 kV Substation	$681,255	$272,502	$953,757
4.1.7. Richard 138 kV – IPO breakers (non- IPO $9,629,782) – see note below	N/A	N/A	N/A
4.1.8. Richard 500 kV Substation (add breaker for line to Webre)	N/A	N/A	N/A
4.1.9. Richard 500 kV Substation (add breaker for line to Fancy Point)	N/A	N/A	N/A
4.1.10. Sabine 230 kV Substation	$3,351,229	$1,340,492	$4,691,721
4.1.11. Willow Glen 138 kV Substation	$3,516,421	$1,406,568	$4,922,989

4.1.12. Webre 500 kV Substation	N/A	N/A	N/A
4.1.13. Hartburg 500/230 kV Substation	$15,683,211	$6,273,284	$21,956,495
4.1.14. Cypress 230 kV Substation	$979,621	$391,848	$1,371,469
4.1.15. Jacinto 230 kV Substation	$1,739,434	$695,774	$2,435,208
4.1.16. Mount Olive 500 kV Substation	$23,635	$9,454	$33,089
4.1.17. Kolbs 69 kV Substation	$274,647	$109,859	$384,506
4.1.18. Nachitoches Substation (XYZ)	$31,074,996	$12,429,998	$43,504,994
4.1.19. McKnight 500 kV Substation	$402,947	$161,179	$564,126
4.1.20. Sterlington 500 kV Substation	$13,384,015	$5,353,606	$18,737,621
4.1.21. Sterlington 115 kV Substation	$3,069,843	$1,227,937	$4,297,780
4.2.1. Line – Fancy Point to Richard – 500 kV – 86 miles	N/A	N/A	N/A
4.2.2. Line – Fancy Point to (Nachitoches) XYZ S/S – 500 kV – 148 miles	$392,352,573	$156,941,029	$549,293,602
4.2.3. Line – Webre to Richard – 500 kV – 56 miles	N/A	N/A	N/A
4.2.4. Line – Hartburg to Sabine S/S – 230 kV – 25 miles	$48,234,074	$19,293,630	$67,527,704
4.2.5. Line – Cypress to Jacinto S/S – 230 kV – 55 miles	$108,472,661	$43,389,064	$151,861,725
4.2.6. 500 kV line to Generator XFMR at Power plant	$1,168,646	$467,458	$1,636,104
4.2.7. 500 kV line to Stn Service XFMR at Power plant	$1,168,646	$467,458	$1,636,104
4.2.8. At Fancy Point reroute Big Cajun 500 kV line	$428,623	$171,449	$600,072
4.2.9. At Fancy Point raise 230 kV lines over 500 kV	$191,368	$76,547	$267,915
4.2.10. Sterlington to Drew 115 kV line upgrade	$6,859,482	$2,743,793	$9,603,275
4.2.11. Drew – Cheniere 115 kV line upgrade	$2,438,278	$975,311	$3,413,589
4.2.12. Cheniere – Riser 115kV Line upgrade	$0	$0	$0
4.2.13. Riser – Froskraft 115kV Line upgrade	$0	$0	$0
4.2.14. Tie Line between new 500kV Auto #4 and 115 kV Yard at Sterlington	$806,013	$322,405	$1,128,418
4.2.15. Reroute Froskraft to Bus Split #1 at Sterlington for bus split	$335,281	$134,112	$469,393
Total	**$695,884,001**	**$278,353,600**	**$974,237,601**

*Note: Planning requested scope and estimates of both IPO and non-IPO for Richard breaker replacement. Higher of the two costs is included in the estimate and the other is given as a reference

Projected Costs in 2008 dollars "W/O Priors" w/o escalation

Lines / Substations	Direct Cost 2008 $	Indirect cost with assumed 40% OH 2008 $	Total Amount 2008 $
4.1.1 Fancy Point 500/230 kV substation expansion	N/A	N/A	N/A
4.1.2. Fancy Point 230 kV breaker upgrade	$9,496,555	$3,798,622	$13,295,177
4.1.3. Big Cajun #2 500 kV Substation (Owned by LAGen)	$3,645,202	$1,458,081	$5,103,283
4.1.4. Cleco Acadia 138 kV Substation (Owned by Cleco)	$7,211,631	$2,884,652	$10,096,283
4.1.5. Coly 138 kV Substation	N/A	N/A	N/A
4.1.6. Repapco 138 kV Substation	$681,255	$272,502	$953,757
4.1.7. Richard 138 kV – IPO breakers (non- IPO $9,629,782) – see note below	$9,860,267	$3,944,107	$13,804,374
4.1.8. Richard 500 kV Substation (add breaker for line to Webre)	$5,281,326	$2,112,530	$7,393,856
4.1.9. Richard 500 kV Substation (add breaker for line to Fancy Point)	$6,893,270	$2,757,308	$9,650,578

4.1.10. Sabine 230 kV Substation	$3,351,229	$1,340,492	$4,691,721
4.1.11. Willow Glen 138 kV Substation	N/A	N/A	N/A
4.1.12. Webre 500 kV Substation	$13,653,010	$5,461,204	$19,114,214
4.1.13. Hartburg 500/230 kV Substation	N/A	N/A	N/A
4.1.14. Cypress 230 kV Substation	N/A	N/A	N/A
4.1.15. Jacinto 230 kV Substation	N/A	N/A	N/A
4.1.16. Mount Olive 500 kV Substation	N/A	N/A	N/A
4.1.17. Kolbs 69 kV Substation	$274,647	$109,859	$384,506
4.1.18. Nachitoches Substation (XYZ)	N/A	N/A	N/A
4.1.19. McKnight 500 kV Substation	N/A	N/A	N/A
4.1.20. Sterlington 500 kV Substation	N/A	N/A	N/A
4.1.21. Sterlington 115 kV Substation	N/A	N/A	N/A
4.2.1. Line – Fancy Point to Richard – 500 kV – 86 miles	$299,401,465	$119,760,586	$419,162,051
4.2.2. Line – Fancy Point to (Nachitoches) XYZ S/S – 500 kV – 148 miles	N/A	N/A	N/A
4.2.3. Line – Webre to Richard – 500 kV – 56 miles	$229,336,266	$91,734,506	$321,070,772
4.2.4. Line – Hartburg to Sabine S/S – 230 kV – 25 miles	N/A	N/A	N/A
4.2.5. Line – Cypress to Jacinto S/S – 230 kV – 55 miles	N/A	N/A	N/A
4.2.6. 500 kV line to Generator XFMR at Power plant	N/A	N/A	N/A
4.2.7. 500 kV line to Stn Service XFMR at Power plant	N/A	N/A	N/A
4.2.8. At Fancy Point reroute Big Cajun 500 kV line	N/A	N/A	N/A
4.2.9. At Fancy Point raise 230 kV lines over 500 kV	N/A	N/A	N/A
4.2.10. Sterlington to Drew 115 kV line upgrade	N/A	N/A	N/A
4.2.11. Drew – Cheniere 115 kV line upgrade	N/A	N/A	N/A
4.2.12. Cheniere – Riser 115kV Line upgrade	N/A	N/A	N/A
4.2.13. Riser – Froskraft 115kV Line upgrade	N/A	N/A	N/A
4.2.14. Tie Line between new 500kV Auto #4 and 115 kV	N/A	N/A	N/A
4.2.15. Reroute Froskraft to Bus Split #1 at Sterlington for bus split	N/A	N/A	N/A
Total	**$589,086,123**	**$235,634,449**	**$824,720,572**

*Note: Planning requested scope and estimates of both IPO and non-IPO for Richard breaker replacement. Higher of the two costs is included in the estimate and the other is given as a reference

6. UPGRADE CLASSIFICATION

The ICT has reviewed the projects identified and have determined that all projects are classified as Supplemental Upgrades. For more information on cost responsibility for Base Plan and Supplemental Upgrades, see Attachment T to Entergy's OATT.

Projected Costs in 2008 dollars "With Priors" w/o escalation

Lines / Substations	Base Plan	Supplemental Upgrades
4.1.1 Fancy Point 500/230 kV substation expansion	N/A	$64,547,483
4.1.2. Fancy Point 230 kV breaker upgrade	N/A	$13,295,177
4.1.3. Big Cajun #2 500 kV Substation (Owned by LAGen)	N/A	$5,103,283

4.1.4. Cleco Acadia 138 kV Substation (Owned by Cleco)	N/A	N/A
4.1.5. Coly 138 kV Substation	N/A	N/A
4.1.6. Repapco 138 kV Substation	N/A	$953,757
4.1.7. Richard 138 kV – IPO breakers (non- IPO $9,629,782) – see note below	N/A	N/A
4.1.8. Richard 500 kV Substation (add breaker for line to Webre)	N/A	N/A
4.1.9. Richard 500 kV Substation (add breaker for line to Fancy Point)	N/A	N/A
4.1.10. Sabine 230 kV Substation	N/A	$4,691,721
4.1.11. Willow Glen 138 kV Substation	N/A	$4,922,989
4.1.12. Webre 500 kV Substation	N/A	N/A
4.1.13. Hartburg 500/230 kV Substation	N/A	$21,956,495
4.1.14. Cypress 230 kV Substation	$1,371,469	
4.1.15. Jacinto 230 kV Substation	$2,435,208	
4.1.16. Mount Olive 500 kV Substation	N/A	$33,089
4.1.17. Kolbs 69 kV Substation	N/A	$384,506
4.1.18. Nachitoches Substation (XYZ)	N/A	$43,504,994
4.1.19. McKnight 500 kV Substation	N/A	$564,126
4.1.20. Sterlington 500 kV Substation	N/A	$18,737,621
4.1.21. Sterlington 115 kV Substation	N/A	$4,297,780
4.2.1. Line – Fancy Point to Richard – 500 kV – 86 miles	N/A	N/A
4.2.2. Line – Fancy Point to (Nachitoches) XYZ S/S – 500 kV – 148 miles	N/A	$549,293,602
4.2.3. Line – Webre to Richard – 500 kV – 56 miles	N/A	N/A
4.2.4. Line – Hartburg to Sabine S/S – 230 kV – 25 miles	N/A	$67,527,704
4.2.5. Line – Cypress to Jacinto S/S – 230 kV – 55 miles	$151,861,725	
4.2.6. 500 kV line to Generator XFMR at Power plant	N/A	$1,636,104
4.2.7. 500 kV line to Stn Service XFMR at Power plant	N/A	$1,636,104
4.2.8. At Fancy Point reroute Big Cajun 500 kV line	N/A	$600,072
4.2.9. At Fancy Point raise 230 kV lines over 500 kV	N/A	$267,915
4.2.10. Sterlington to Drew 115 kV line upgrade	N/A	$9,603,275
4.2.11. Drew – Cheniere 115 kV line upgrade	N/A	$3,413,589
4.2.12. Cheniere – Riser 115kV Line upgrade	N/A	$0
4.2.13. Riser – Froskraft 115kV Line upgrade	N/A	$0
4.2.14. Tie Line between new 500kV Auto #4 and 115 kV Yard at Sterlington	N/A	$1,128,418
4.2.15. Reroute Froskraft to Bus Split #1 at Sterlington for bus split	N/A	$469,393
Total	**$155,668,402**	**$818,569,197**

Projected Costs in 2008 dollars "W/O Priors" w/o escalation

Lines / Substations	Base Plan	Supplemental Upgrades
4.1.1 Fancy Point 500/230 kV substation expansion	N/A	N/A
4.1.2. Fancy Point 230 kV breaker upgrade	N/A	$13,295,177
4.1.3. Big Cajun #2 500 kV Substation (Owned by LAGen)	N/A	$5,103,283
4.1.4. Cleco Acadia 138 kV Substation (Owned by Cleco)	N/A	$10,096,283
4.1.5. Coly 138 kV Substation	N/A	N/A
4.1.6. Repapco 138 kV Substation	N/A	$953,757
4.1.7. Richard 138 kV – IPO breakers (non- IPO $9,629,782) – see note below	N/A	$13,804,374
4.1.8. Richard 500 kV Substation (add breaker for line to Webre)	N/A	$7,393,856
4.1.9. Richard 500 kV Substation (add breaker for line to Fancy Point)	N/A	$9,650,578
4.1.10. Sabine 230 kV Substation	N/A	$4,691,721
4.1.11. Willow Glen 138 kV Substation	N/A	N/A
4.1.12. Webre 500 kV Substation	N/A	$19,114,214
4.1.13. Hartburg 500/230 kV Substation	N/A	N/A
4.1.14. Cypress 230 kV Substation	N/A	N/A
4.1.15. Jacinto 230 kV Substation	N/A	N/A
4.1.16. Mount Olive 500 kV Substation	N/A	N/A
4.1.17. Kolbs 69 kV Substation	N/A	$384,506
4.1.18. Nachitoches Substation (XYZ)	N/A	N/A
4.1.19. McKnight 500 kV Substation	N/A	N/A
4.1.20. Sterlington 500 kV Substation	N/A	N/A
4.1.21. Sterlington 115 kV Substation	N/A	N/A
4.2.1. Line – Fancy Point to Richard – 500 kV – 86 miles	N/A	$419,162,051
4.2.2. Line – Fancy Point to (Nachitoches) XYZ S/S – 500 kV – 148 miles	N/A	N/A
4.2.3. Line – Webre to Richard – 500 kV – 56 miles	N/A	$321,070,772
4.2.4. Line – Hartburg to Sabine S/S – 230 kV – 25 miles	N/A	N/A
4.2.5. Line – Cypress to Jacinto S/S – 230 kV – 55 miles	N/A	N/A
4.2.6. 500 kV line to Generator XFMR at Power plant	N/A	N/A
4.2.7. 500 kV line to Stn Service XFMR at Power plant	N/A	N/A
4.2.8. At Fancy Point reroute Big Cajun 500 kV line	N/A	N/A
4.2.9. At Fancy Point raise 230 kV lines over 500 kV	N/A	N/A
4.2.10. Sterlington to Drew 115 kV line upgrade	N/A	N/A
4.2.11. Drew – Cheniere 115 kV line upgrade	N/A	N/A
4.2.12. Cheniere – Riser 115kV Line upgrade	N/A	N/A
4.2.13. Riser – Froskraft 115kV Line upgrade	N/A	N/A
4.2.14. Tie Line between new 500kV Auto #4 and 115 kV	N/A	N/A
4.2.15. Reroute Froskraft to Bus Split #1 at Sterlington for bus split	N/A	N/A
Total		**$824,720,572**

7. SCHEDULE

1) Definition phase and development of PEP/Estimates – 24 months:

A detailed schedule will be prepared subsequent to completion of a detailed scope and study called Project Execution Plan (PEP). It will involve route selection for lines, site selection for substations, ROW analysis and identification of potential issues and duration it will take for purchase of properties from owners or through courts, also environmental assessment will be done with identification and time and cost for routing lines. In addition, survey and soil borings will be done depending on cooperation of property owners and some cases assumptions would have to be made if the owners won't give permission to go on their properties. The result this work will be finalization of approach to design, selection of equipment, identification of risks and mitigation methodology, identification of alternatives should the preferred plan not work, etc. The documents would be good for commencing engineering by Entergy team or for bidding outsiders to perform engineering, procurement and Construction. The duration of this study would be 24 months.

Most of this time would be for completing the property acquisition and getting permits and there is no assurance that it could go even longer should Entergy need to go through courts to secure properties or line route involves any complicated environmental issues.

2) Design / procurement phase: 24 months

Subsequent to definition phase should the funding be approved to move into the design and procurement phase, depending on availability of data for secured line routes and substation sites, and availability of survey and soil data, the design and delivery of material would take 24 months. The 500 kV transformers are the longest delivery items.

3) Construction phase: 36 months

Assuming that all permits and ownership of properties has been completed, and certainty of material arriving to site has been secured, the longest line work in LA will take approximately 100 weeks. It is assumed that work on other lines in MS will be simultaneously progressing and the contract labor is available to simultaneously work on all lines (with a shift of few months depending on the schedule).

Total duration = 7 years

Recommendations:

1) Commence line and substation route selection in 2008
2) Subsequent to agreement to the selected route and substation sites, commence purchase or easement of properties and complete it as soon as possible
3) Immediately after securing the properties, perform survey and soil borings and commence environmental assessment and permit procedures
4) Perform a detailed scope and estimate (PEP) immediately after having some degree of certainty about the routes, permitting, etc and having received survey and soil boring data

5) Decide what portion of work should be done inside Entergy and what should be sent to outside companies for engineering, procuring and construction (EPC) and accordingly get the quotes and finalize the decision
6) Develop a schedule that will cater for available construction contract labor so that all work does not have to be done simultaneously. Take into consideration that even a bigger project is being planned **(Grand Gulf generation addition)** for same in-service date in 2015. If not planned properly, the cost will go up and there may not be right number of contract labor available for working simultaneously on two projects.
7) Complete all line and substation work one to two years before the new generating unit comes on line providing contingency for work that could be running behind for completion as well as providing operation experience of the newly installed system. Should problems be discovered there would be enough time to model the system and come up with remedies and yet have some time to apply the solutions such as building a section of line or adding an element to a substation or two.

8. ATTACHMENTS

Remaining one line diagrams, write-ups, estimates, etc are filed in eroom