TRANSMISSION LINE & SUBSTATION PROJECTS

COMPANY:ENTERGY SERVICES, INC.

CUSTOMER: PID 268

FACILITIES STUDY

EJO NO. F4PPLA0366

PID 268 GENERATOR INTERCONNECTION

Revision:
0

Rev	Issue Date	Description of Revision	Prepared By	Approved By
A	10/06/11	Shell for team input	Ibrahim Khan	Charles Newell
B	10/19/11	Included all team members input	Ibrahim Khan	Charles Newell
C	10/24/11	Submitted for JET vote	Ibrahim Khan	Charles Newell
D	10/31/11	Submitted to PD	Ibrahim Khan	Charles Newell
E	11/03/11	TPD Approval	Rick Bewley	Brian Warwick
0	11/11/11	ICT Review and Upgrade Classification	English Cook	Ben Roubique

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1. PROJECT SUMMARY

1.1 Background and Project Need

The purpose of this Facilities Study is to identify the requirements necessary to connect 60 MW of solar generation to Entergy System through existing 115kV line between Wisner and Red Gum. The requested completion date is 12/31/2013.

The customer has requested Energy Resource Interconnection Service (ERIS) only. The System Impact Study indicated that under ERIS, the additional generation due to PID 268 generator **does not** cause an unacceptable increase in short circuit current or any stability violations.

The Facilities Study will identify the transmission interconnection requirements, any transmission constraints resulting from the requested power transfer, and includes corresponding cost estimates.

The customer has requested a ±20% estimate. Based on available time to complete the facility study and in light of lack of survey, soil borings, environmental permitting, property owner's issues, etc, a good faith estimate has been provided.

1.2 Scope Summary

The following work is required to connect the generating system to the Entergy system:

1.2.1 New 115kV substation

Entergy will construct a 115kV three breaker ring bus substation in north Louisiana connecting to lines from Wisner and Red Gum and one (1) line connecting to customer's transmission line to the generating station. Approximate coordinates for the substation are provided in the System Impact Study.

1.2.2 Line from Wisner

One (1) span will be removed on line between Wisner and Red Gum and line from Wisner end will be routed and terminated into the new substation. New line conductor, jumpers, etc will be of the same size as they exist on the line. Since there is no fiber optic shield wire on this line, new section of line is not required to install fiber optic shield wire. Power line carrier will be reused on this line for the protective relaying. A line trap will be installed on the Wisner/Winnsboro line at the new station. The line traps will be reused at Winnsboro and LaGen Gilbert.

1.2.3 Line from Red Gum

One span will be removed on line between Wisner and Red Gum and line from Red Gum end will be routed and terminated into the new substation. New line conductor, jumpers, etc will be of the same size as they exist on the line. Since there is no fiber optic shield wire on this line, new section of line is not required to install fiber optic shield wire. Power line carrier will be reused on this line for the protective relaying. A line trap will be installed on

the Red Gum line at the new station. The line trap will be replaced at Red Gum. Line number 122 will be retained.

1.2.4 Red Gum substation

The existing Winnsboro Line/Breaker R6234 relaying will be upgraded to be compatible with the new station relaying. The line trap and tuner on the Winnsboro line will be replaced to be used for power line carrier to the new station. Revise oneline diagram showing line going to new substation

1.2.5 Winnsboro substation

The existing Red Gum Line/Breaker R3462 relaying will be upgraded to be compatible with the new station relaying. The line trap and tuner on the Red Gum line will be reused for power line carrier to the new station. Revise oneline diagram showing line going to new substation.

1.2.6 LaGen Gilbert substation

The existing Line/Breaker R5252 relaying will be upgraded to be compatible with the new station relaying. The line traps the Red Gum and Winnsboro lines will be reused for power line carrier to the new station. Revise oneline diagram showing line going to new substation

1.3 Other Requirements

1.3.1 Harmonic Requirements

IEEE 519 states the limits for current distortion for various voltage levels on the utility system. The values below, taken from IEEE 519-1992 Table 10.4, show the current distortion limits for facilities connected to the 115kV system. Total Demand Distortion (TDD) is the total root-sum-square harmonic current distortion as a percentage of maximum 60Hz current at the point of common coupling (PCC). PID 268 will be responsible for installing any harmonic filtering to remain within these limits. If these limits are violated, the PID 268 facility may be disconnected until proper remedies are taken.

Current Distortion Limits as % of Max 60Hz Current at PCC					
Individual Harmonic Order (Odd Harmonics)					
<11	11≤h<17	17≤h<23	23≤h<35	35≤h	TDD
2.0	1.0	0.75	0.3	0.15	2.5

1.3.2 Flicker Analysis

Entergy uses the General Electric Flicker Limit Curve as a guideline for allowable transmission system voltage fluctuations. The Entergy standard SL1904 “Voltage Fluctuations Operation Guideline” provides additional guidance on voltage fluctuation requirements. If the customer is unable to comply with the standard, additional voltage control measures must be taken to ensure voltage drop is mitigated.

The plant MW output was adjusted from 100% to 40% rating, and the voltage at the POI was monitored for voltage swings. PID 268 generation

does not produce significant voltage fluctuations when operated at unity power factor.

1.3.3 Power Factor Design Criteria

FERC Order 661A describes the power factor design requirements for wind and solar generation plants. A wind or solar generation facility's reactive power requirements are based on the aggregate of all units that feed into a single point on the transmission system. The Transmission Provider's System Impact Study is needed to demonstrate that a specific power factor requirement is necessary to ensure safety or reliability.

The System Impact Study indicated that there were no voltage limitations if the study plant, PID 268, is operated at unity power factor.

1.3.4 Low Voltage Ride Through (LVRT)

One of the interconnection requirements for renewable generation is the ability to stay online during and after a normally cleared three-phase fault. For the proposed interconnections, FERC-661A methodology was adopted to test the fault ride-through performance.

The System Impact Study indicated that there were no voltage related trips if the study plant, PID 268, is operated at unity power factor.

1.4 Cost Summary

The estimated total project cost in 2011 dollars is $8,269,119. This amount includes AFUDC and should the customer sign a prepaid agreement, the AFUDC amount will be subtracted. In addition, the total cost does not include Tax Gross Up which may apply. Please note these are 2011 dollars and do not include tax gross-up if and where applicable (Tax Gross Up rate at this time is 27.78 %).

The ICT has assigned **$8,269,119** as Supplemental Upgrade based on Attachment T of Entergy's Open Access Transmission Tariff ("OATT").

1.5 Schedule Summary

The requested date for the interconnection is December 31, 2013. This date will not be met and based on Entergy project schedules, the construction could be completed by September 2014.

2. SAFETY REQUIREMENTS

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.

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. GENERAL ASSUMPTIONS:

- Sufficient time will be allowed in approving the project enabling to enable Entergy to prepare a Project Execution Plan and be able to complete the

project as per outlined in the schedule described provided below. It is not recommended that the project commence on the basis of only this document. Use of facility study and the associated estimates is not favored to commence an approved project.

- Assumptions have been made in developing estimates without performing site visits, surveys, and soil borings. During Project Execution Plan these tasks will be completed and could have an impact on estimates and schedule.
- All costs above represent good faith estimates in 2011 dollars and are based on existing data and could change considerably after development of a detailed project execution plan. Price escalation for work in future years has not been included.
- System changes will be modeled in ASPEN. Relay Impact Analysis will be performed by a settings engineer during PEP stage to identify requirements for relay/CT replacement and settings revisions at the local and remote stations in the area. For example, affected elements include Z2, Z3, ground over current settings, and so on. Some obsolete relays may need to be replaced.
- Communicate the project and protection coordination with nuclear, generation plants, load customers and other interconnected utilities as appropriate.
- Comply with PRC-001, PRC-023 and relevant procedures, standards and guidelines as appropriate.
- New RTU configurations or revisions will be necessary.
- Facilities Studies are done without the advantage of having relay impact studies.
- Transmission Engineering Services shall coordinate all setting changes in the project with Gen interconnection plant as per PRC-001 (power plant protection and related control elements must be set and configured to prevent unnecessarily tripping the generator prior to any transmission protection and related control systems acting first, unless the generator is in jeopardy by exceeding its design limits due to operating conditions, generator system faults, or other adverse potentially damaging conditions.)

Customer premise:

- Customer will build the line from Entergy substation to their substation and their step down transformer configuration will be star connected towards the transmission line
- Customer will provide line protection, metering, communication to TOC, SOC at their substation meeting with Entergy requirements
- Customer will comply with requirements of Entergy to provide generator data before and after installation of unit(s) and install stabilizer, etc as specified.

4. SCOPE OF WORK

4.1 New Substation (NSS) – 115 kV

Build a new 115kV three breaker ring bus substation in north Louisiana by re-routing the Red Gum - Wisner 115kV transmission line (L-122) into the new three breaker ring bus substation; connecting the Red Gum and Wisner substations to the new switchyard

ROW requirements:

New substation site (200' X 300') would be located between Lines #122 and LA State Highway 15, and the connecting r/w segment would be approximately 200' in width and 1000' in length.

New substation would be approximately 10 miles from Red Gum substation and 13 miles from Wisner substation.

Environmental Permitting:

Wetlands delineation will need to be performed and a permit application submitted to the USACE. In addition, it is assumed that the entire new substation along with line cut-ins will require mitigation. A SWPPP will be required for the entire project area. Soil sampling will be required in order to allow for disposal of any dirt that may be removed from the site.

Permitting and SWPPP preparation will need to be worked in conjunction with current site permitting and SWPPP plan.

Wetland delineation and permitting will include both substation and line work.

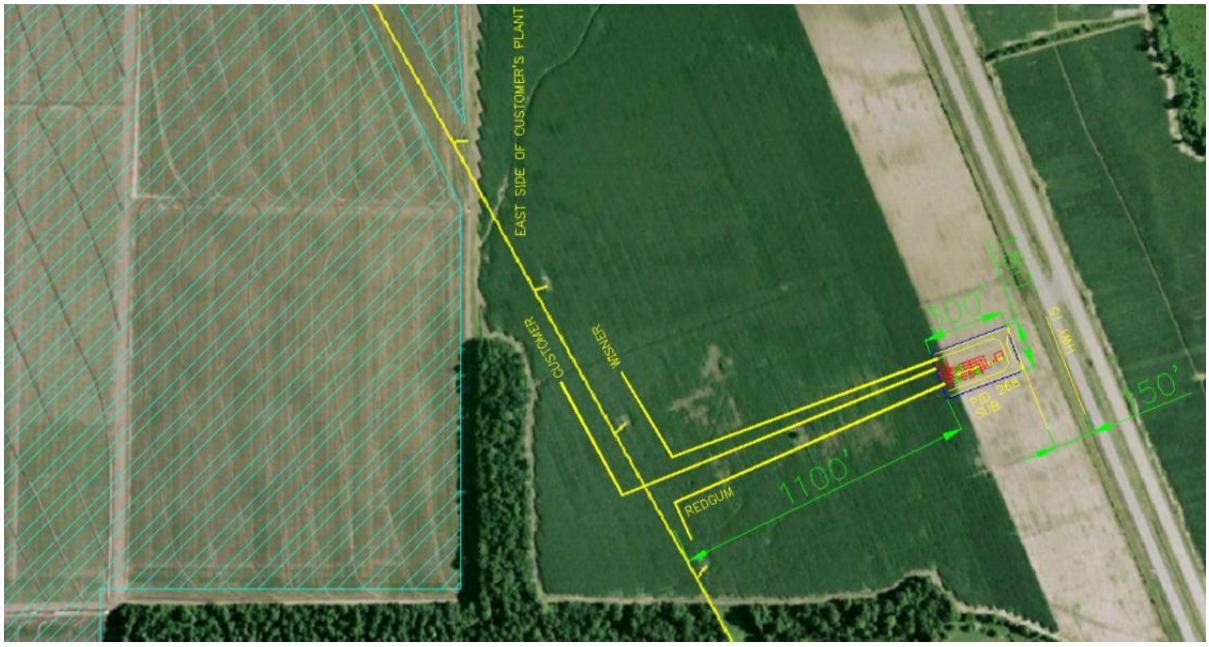
General Info:

The new substation will initially be designed as a three element ring bus located east of the transmission line and west of Highway 15. The switchyard will be orientated such that the lines will be entering the west side of the substation.

Transmission lines entering the switchyard will be from as shown on the electrical arrangement drawing – PID 268 Electrical Plan.

Assumptions:

- Site location is the proposed primary site which facilitates T-Line entry from west side of the substation.
- The switchyard ground grid is designed for 40kA fault currents and 63kA breakers are not required.
- Substation bus is rated 2000A-(4" Schedule 80 Aluminum Tubing)
- Soil Resistivity is such that a 30' x 30' ground grid is sufficient.
- Road Access of 150' is required off of highway 15.
- Distribution lines are available for a secondary station service.



NEW 115kV SUBSTATION

Proposed Site Location:

The proposed new 115kV substation site is located on the east side of the customer's plant where the transmission line exits the customer's plant, near Highway 15. The size of this property would be 200' x 300' substation (fence dimensions) plus additional space outside of the substation fence in order to route the new applicable transmission lines. A topographic survey has not been performed at the time of this study.

The station will be configured in three position ring bus as shown on PID 268 Electrical Plan and the PID268 ring bus station oneline. It will resemble a double-bus double-breaker scheme with three (3) nodes. Three (3) CVT's and three (3) arresters will be installed at each node with arresters located as close as possible to the breakers. Additional lead-in bus work and structures will be installed at the Wisner and Red Gum nodes to accommodate horizontally mounted line traps in series with the rigid bus. This will require strung bus between the two (2) H-frame structures in the Red Gum bay with the line connecting to the east 115kV bus near the control house.

Site Work:

The proposed site for the substation is currently being utilized as farm land. For purposes of this scope, the land is assumed to be flat. Site work will include stripping 1' of topsoil and adding 2' of fill for a net elevation change of 1' above existing grade. The dimensions of the substation fence will be 300'x 200'. Overall dimensions of the site work will be 318'x218' (5' on either side for ground grid and an additional 4' on either side to slope back to natural grade at a slope not to exceed 4h:1v.) Site will include crowned roadways and subsurface drainage as per Entergy standards. Environmental permitting and an SWPP plan will be needed as this site exceeds the one (1) acre limit. For purposes of this estimate, it is assumed that the stripped topsoil will need to be disposed of at an approved landfill. The following materials will be needed to complete the site work:

- 1.5 acres of soil sterilization
- 3600 cu yds of stripping
- 3600 cu yds of soil disposal
- 7200 cu yds of compacted fill
- 700’ of 18” RCP
- Four (4) catch basins
- 2650 tons of limestone
- 1000’ of new 7’ fence + 1’ barbed wire
- 1000’ of new access road (800’ internal to the station, 200’ from main road to substation)
- One (1) site survey
- Two (2) soil borings
- One (1) soil resistivity study

The Site shall be built in accordance with the Site Package Design drawings and the following Entergy Standards:

- SL 1201, Ground Covering and Access Road Design Guidelines
- SL 1202, Substation Site Preparation (Earthwork) Standard
- SL 1204, Initial Treatment and Control for Vegetation Management
- SL 0701, Chain Link Substation Fence Design Specifications
- SL 1301, Entergy Substation & Switchyard Signs Standards
- SL 1302, Substation Sign & Roadway Marker Application Guide

Foundation Work:

- 200’ Cable Trough, poured in place
- Approximately 1500’ of 2” PVC Conduits
- 4600’ - 4/0 copper ground grid (assumes 30’ x 30’ grid)
- 2850’- 19 #9 Copperweld pigtails (145 @ an average length of 15’ for structures, equipment, fence, and cable trough and Nine (9) @ 72’ for shield wires)
- One (1) – 20’ x 36’ Control House foundation
- One (1) – 75’ shield pole foundation
- Four (4) – 115kV, H-frame Dead-end foundations (two (2) legs/ dead-end)
- 16 – 115kV, single-phase Bus Support (Low Bus) foundations
- 10 – 115kV, single-phase Bus Support (High Bus) foundations
- Two (2) – 115kV, 3-phase Bus Support (Low Bus) foundations(two (2) legs/ support)

- Six (6) – 115kV, Switch Support (Low Bus) foundations (two (2) legs/ support)
- Nine (9) – 115kV, CCVT Support Pedestal foundations
- Nine (9) – 115kV, Arrester Support Pedestal foundations
- Two (2) – 115kV, Line Trap Support Pedestal foundation
- Three (3) – 115kV, Breaker foundations
- One (1) – 115kV, 50kVA SSVT foundations
- One (1) – station service disconnect switch foundation (similar to L0434F14)
- Four (4) – Yard Lighting foundations
- One (1) – Phone Demarcation box foundation

The Foundation work shall be built in accordance with the Foundation Package Design drawings and the following Entergy Standards:

- SF0202, Substation Grounding Spec & Design Guide
- SL0205, Conduits and Duct banks Construction Guide

Electrical Work:

Install a three-position ring bus consisting of two bays and a double bus.

Electrical Work will include installation of the following:

- One (1) – 20’ x 36’ Control House
- 600’ Strain Bus (single 954 ACSR (45/7) for Line Risers and Strung Bus)
- 1200’ – damping cable & equipment jumpers for CVT’s and arresters (954 ACSR (45/7)
- 1500’ – 4” Aluminum Tubular Bus Schedule 80
- 400’ shield wire (7#7 Alumoweld)
- One (1) – 75’ high shield pole
- Four (4) – 115kV, H-frame Dead-end with 62’ pulloff; including
    - Two (2) without bus support for per M4918SD2 and M4918SD3 for customer line termination and Red Gum line intermediate support of stung bus
    - One (1) with high bus support for Wisner line termination per L0407SD10 & L0407SD11
    - One (1) with low bus support for Red Gum line termination per L0407SD6 & L0407SD7.
- 16 – 115kV, single-phase Bus Support (Low Bus)
- 10 – 115kV, single-phase Bus Support (High Bus)
- Six (6) – 115kV, Switch Support (Low Bus – one (1) without BK1 brackets)

- Two (2) – 115kV, 3-phase Bus Support (Low Bus; 12’ phase spacing)
- Nine (9) – 115kV, CCVT Support Pedestal
- Two (2) – 115kV, Line Trap Support Pedestal (designed to mount line trap horizontally)
- Nine (9) – 115kV, Arrester Support Pedestal
- One (1) – 115kV, 50KVA SSVT Support structures
- One (1) – 115kV, 50kVA SSVT’s
- Three (3) – 115kV, 3000A, 40kA, Gas Circuit Breaker (the blanket price of a 3000A will be less than 2000A unit)
- Three (3) – 115kV, 2000A, GOAB Switch
- Three (3) – 115kV, 2000A, GOAB Switch w/Ground Switch
- Nine (9) – 115kV, CCVT’s (purchased by relaying)
- Two (2) – 115kV, Line Traps (purchased by relaying)
- Nine (9) –115kV Surge Arresters, polymer, rated 96kV/76kV; Three are installed at each node of the ring bus, as close to the breakers as possible
- Seven (7) – Yard Lights – Three (3) installed on the switch structures, one (1) near each breaker cabinet. Four (4) free standing lights around the perimeter for general lighting.
- 104 – 115kV porcelain post insulators for switches
- 18 – 115kV polymer suspension insulators
- Two (2) - 240/120 V, 400A fusible safety switches(one (1) mounted on the SSVT pedestal and one (1) for the secondary station service)
- One (1) – 50kVA station service transformer (for secondary source from distribution line)

  One (1) – station service disconnect switch support structure (similar to L0434F14) for secondary source

The Electrical work shall be built in accordance with the Electrical Package Design drawings and the following Entergy Standards:

- AL1021, General Contractor Requirements for Major Substation Construction
- AL1201, General Contractor Requirements for Minor Substation Construction
- SF0202, Substation Grounding Spec & Design Guide
- SL0205, Conduits and Duct banks Construction Guide
- SL0206, High Voltage Electrical Connections
- SL0201, Substation Steel Structure Erection Guidelines

- SB0701, Substation Minimum Clearances

List of Major Equipment:

Qty	Unit	Item
3	ea	Breaker, 115kV, 3000A, 40kA
3	ea	Disconnect Switch, 115kV, 2000A, manually operated
3	ea	Disconnect Switch with ground switch, 115kV, 2000A, manually operated
9	ea	Surge Arresters, 115kV system, polymer, rated 96kV/76kV MCOV
1	ea	Station service voltage transformer, 50kVA
2	ea	Structure, pedestal for line trap
9	ea	Structure, pedestal for CVT
1	ea	Structure, pedestal for station service transformer (SSVT)
9	ea	Structure, pedestal for surge arresters
16	ea	Structure, tube, 115kV, single phase bus support, low
10	ea	Structure, tube, 115kV, single phase bus support, high
6	ea	Structure, tube, 115kV, switch support, low
2	ea	Structure, tube, 115kV, three phase bus support, low
4	ea	Structure, octagonal, 115kV, H-frame deadend, 62ft pulloff with shield wire termination and spikes, and bus support
1	ea	Structure, octagonal, shield pole, 75' high
1	ea	Control House, 20' x 36'
104	ea	Insulator, station post, porcelain
18	ea	Insulator, suspension, polymer
3300	ft	Buswork (conductor & fittings)
400	ft	Shield wire, 7#7 Alumoweld
7	ea	Yard lighting
2	ea	240/120 V, 400A fusible safety switches
1	ea	50kVA station service transformer (secondary source)
1	ea	station service disconnect switch support structure (similar to L0434F14)

Long Lead Items:

Qty	Item	Lead Time (weeks)*
1300	4" Aluminum Tubular Bus Schedule 80 & fittings	10-12
3	Breaker, 115kV, 3000A, 40kA	14-16
3	Disconnect Switch, 115kV, 2000A, manually operated	14-16
3	Disconnect Switch with ground switch, 115kV, 2000A, manually operated	14-16
9	Surge Arresters, 115kV system, polymer, rated 96kV/76kV MCOV	14-16
1	Station service voltage transformer, 50kVA	48-52
2	Structure, pedestal for line trap	20-22
9	Structure, pedestal for CVT	10-12
1	Structure, pedestal for station service transformer	20-22
9	Structure, pedestal for surge arresters	10-12
16	Structure, tube, 115kV, single phase bus support, low	10-12
10	Structure, tube, 115kV, single phase bus support, high	10-12
6	Structure, tube, 115kV, switch support, low	10-12
2	Structure, tube, 115kV, three phase bus support, low	10-12
4	Structure, octagonal, 115kV, H-frame deadend, 62ft pulloff with shield wire termination and spikes, and bus support	18-24
1	Structure, octagonal, shield pole, 75' high	18-24
1	Control House, 20' x 36'	14-16

Qty	Item	Lead Time (weeks)*
104	Insulator, station post, porcelain	10-12
18	Insulator, suspension, polymer	10-12
1	Buswork conductor & fittings	10-12
400	Shieldwire, 7#7 Alumoweld	13-17
7	Yard lighting	10-12
2	240/120 V, 400A fusible safety switches	10-12
1	50kVA station service transformer (secondary source)	10-12
1	station service disconnect switch support structure (similar to L0434F14)	10-12

*As of 11/7/11

Relay:

- Customer will purchase and install Entergy's standard PM1803 option B2 line/breaker panel with relays at their station. It will be assumed that this panel will be installed in an air conditioned control house.
- Customer will purchase and install Entergy's standard metering panel at their station. Entergy will purchase the meter. It will be assumed that this panel will be installed in an air conditioned control house.
- Customer will purchase and install at least 16 fibers on their 115kV transmission line to be used by Entergy for protective relaying (10 fibers), metering data (two (2) fibers), and customer line relaying (including breaker status) data (four (4) fibers, two (2) for each line relay). Entergy's standard is to install 48 fibers.
- Customer will purchase and install a phone line and dial-up modem at their station for Entergy to dial-up and access the meter from Entergy's MV-90 system.
- Customer's 115/34.5kV transformer is assumed to be delta/grounded wye configuration with the grounded wye being on the 115kV side.
- Entergy's new station will require a line trap and tuner to be installed on the Wisner/Winnsboro line to be used for line relaying. The power line carrier frequency on this line will be reused.
- Entergy's new station will require a line trap and tuner to be installed on the Red Gum line to be used for line relaying. A different frequency is required on the power line carrier for this line.
- Per relay settings group input, it will be assumed that dual primary relaying is not required for this power line carrier application.
- Entergy's new station relay equipment to be installed consists of the following:
    - Nine (9) CCVTs
    - Three (3) outdoor CCVT junction boxes
    - Three (3) indoor potential distribution boxes
    - One (1) standard PM1803 option C2 line only panel for customer's line

- One (1) standard PM1803 option L2 line only panel for Red Gum line
- One (1) standard PM1803 option O2 line only panel for the Wisner/Winnsboro line
- Three (3) standard PM0501 option A breaker control panels
- Two (2) line traps for the Red Gum line and Wisner/Winnsboro line
- Two (2) line tuners for the Red Gum line and Wisner/Winnsboro line
- Batteries and battery rack
- Battery charger
- DC switching panel
- Automatic transfer switch
- Stand-alone AC panel
- Stand-alone DC panel
- RTU (LP&L design)
- Communications panel
- T1 demarcation box
- GPS antenna
- SEL cables
- Control cables

Long Lead Items:

Qty	Description	Delivery time (weeks)*	Comment
9	CCVT	20-32	
2	Line Trap	16-20	
2	Line Tuner	12-14	
1	Meter Panel	10-14	Meter panel to be installed at customer's station.
7	Relay Panel	10-14	One relay panel to be installed at customer's station.
1	RTU	12-14	
1	Communications Rack	10-12	
1	AC Panel	10-12	
1	DC Panel	10-12	

*As of 11/7/11

Relay settings:

- Develop new relay settings for (1) new Station looking towards Red gum 115kV line relay panel per Entergy Standard PM1803, Option L for required relays and Option F for required relays.
- Develop new relay settings for (1) new station looking towards Winnsboro 115kV line per Entergy standard PM1803 Option O2 for required relays and

Option F for required relays. Standard option will need to modify as there is a tap line on the Winnsboro-new station line with breaker at Gilbert going to Ft. Necessity.

- Develop new relay settings for (1) new station looking towards customer's line per Entergy standard PM1803 Option C2 with relays.
- Review the customers line settings looking into the new substation.
- Develop three (3) new relay settings for breaker control panels per Entergy Standard PM0501 Option A.

Communications and SCADA:

Develop new RTU configuration and program TOC/SOC.

A leased T1 line will be acquired from the local telephone company to be used for communications to TOC and SOC. A T1 demarcation box will be installed at the station. Telecom will purchase and install equipment in the control house to accommodate the T1 circuit. Standard communication software will be used for this station for the TOC and SOC since there is enough bandwidth on the microwave from Wisner to West Monroe.

Metering:

Revenue metering will be installed at customer's station as described above.

Construction methodology:

New substation will be constructed per provided design drawings. Storm Water plans will be submitted to Louisiana DEQ for approvals. Grading, foundation, electrical, and relay installation portions of this project will mostly likely be constructed with contract labor. All work should be completed without any required outages to the Entergy system except for the final cut-in to energize the new facilities. When the new line is cut-in, final commissioning of the new station will take place.

4.2 Red Gum Substation

Foundation:

Install new conduit to breaker R3462.

Electrical:

Replace line trap

Relay:

- The Wisner/Winnsboro Line/Breaker R3462 relaying will be replaced with Entergy's standard PM1803 option K2 line/breaker panel. Per relay settings group input, it will be assumed that dual primary relaying is not required for this power line carrier application.
- The line trap and tuner for the Wisner/Winnsboro line will be replaced.
- It will be assumed that new control cables will be installed to the panel.

- Until control house space can be confirmed, it will be assumed that the new panel can fit into the existing panel space in the control house, and/or that there is enough space in the control house for this panel to be installed.
- Due to the limited status points available on the RTU, a status card will be added to the RTU. It is assumed that there is enough space in the RTU cabinet for this new status card.
- The existing communications processor has spare ports for the new relays.
- Until the AC and DC panels can be field verified, it is assumed that the AC and DC panels have spare breakers for the new panel.

Long Lead Items:

Quantity	Description	Delivery time (weeks)*
1	Relay Panel	10-14

*As of 11/7/11

Relay settings:

- Develop new relay settings for Red Gum station looking towards new station 115kV line per Entergy Standard PM1803 Option K-1 for relays and Option E-1 for relay. Identify the frequency during PEP.
- Revise Z2, Z3 and GOC
  - Natchez SES – Red Gum line relay settings
  - Plantation – Red Gum line relay settings
  - Standard – Red Gum line relay settings

Communications and SCADA:

Develop new RTU and communication processor configurations and program TOC/SOC. No additional communications equipment is required for this station.

Metering:

N/A

Construction methodology:

Below grade conduit work will installed without any outages required. An outage on the Red Gum – Metropolis 115kV line section will be required to upgrade the relaying equipment and panels.

4.3 Winnsboro Substation

Foundation:

Install new conduit to breaker R6234.

Electrical:

None

Relay:

- The Red Gum Line/Breaker R6234 relaying will be replaced with Entergy's standard PM1803 option N2 line/breaker panel. Per relay settings group input, it will be assumed that dual primary relaying is not required for this power line carrier application.
- The line trap and tuner for the Red Gum line will be reused for power line carrier to the new station. According to the settings group, the frequency can remain the same.
- It will be assumed that new control cables will be installed to the panel.
- Until control house space can be confirmed, it will be assumed that the new panel can fit into the existing panel space in the control house, and/or that there is enough space in the control house for this panel to be installed.
- It is assumed that the RTU has spare points available for the additional alarms.
- The existing communications processor has spare ports for the new relays.
- Until the AC and DC panels can be field verified, it is assumed that the AC and DC panels have spare breakers for the new panel.

Long Lead Items:

Quantity	Description	Delivery time (weeks)*
1	Relay Panel	10-14

*As of 11/7/11

Relay settings:

- Develop new relay settings for Winnsboro station looking towards new station 115kV per Entergy Standard PM1803 Option N2-1 for relays and Option E-1 for relays. Check if DTT is required during PEP development and modify the standard option if necessary. Standard option will need to modify as there is a tap line on the Winnsboro-new station line with breaker at Gilbert going to Ft. Necessity. We can use existing frequency for the carrier, other frequency need to be identified based on the scheme if it changes from 1F to 2F.
- At LaGen Gilbert, breaker R5252 feeds the 115kV Ft. Necessity line, and relays at Winnsboro and new station will also look into this tap line, so Gilbert should send a blocking signal to prevent false tripping of Winnsboro or new station for the faults on Gilbert to Ft. Necessity line. Obtain the existing settings through LAGEN for Gilbert to Ft. Necessity during PEP work.
- As new substation – Winnsboro has a tap line with a breaker, standard setting scheme will need to be modified to suit to the project need. During PEP, Identify if there were any go-by schemes available.
- Revise Z2, Z3 and GOC
    - At Swartz – Winnsboro 115kV line relay settings

Communications and SCADA:

Develop new RTU and communication processor configurations and program TOC/SOC. No additional communications equipment is required for this station.

Metering:

N/A

Construction methodology:

Below grade conduit work will installed without any outages required. An outage on the Winnsboro – LaGen Gilbert 115kV line section will be required to upgrade the relaying equipment and panels.

4.4 LaGen Gilbert & Nelpco Substation

Foundation:

Install new conduit to breaker R5252. Assume that 1000' of 2" conduit is required at each substation.

Electrical:

None

Relay:

- It will be assumed that the relaying and carrier set for Ft. Necessity line/ breaker R5252 at LaGen Gilbert is not compatible with Entergy's standard line relaying and carrier sets that will be used at the new station and at Winnsboro. Therefore, it will be assumed that Entergy can get the customer to replace this relaying with Entergy's standard PM1803 option N2 line/breaker panel. It will be assumed that this panel will be installed in an air conditioned control house. Until control house space can be confirmed, it will be assumed that the new panel can fit into the existing panel space in the control house, and/or that there is enough space in the control house for this panel to be installed. Per relay settings group input, it will be assumed that dual primary relaying is not required for this power line carrier application.
- The line traps and tuners for Red Gum and Winnsboro lines will be reused. According to the settings group, the frequency can remain the same between Winnsboro and the new station.
- It will be assumed that new control cables will be installed to the panel.
- It is assumed that the station has an RTU that does not need to be upgraded and that has spare points available for additional alarms.
- It is assumed that this station has a communications processor that is compatible with Entergy's relays and that has spare ports available for the new relays.
- It is assumed that the AC and DC panels at this station have spare breakers for the new panel.

Long Lead Items:

Quantity	Description	Delivery time (weeks)*
1	Relay Panel	10-14

*As of 11/7/11

Relay settings:

Review the line settings of Gilbert-Ft. Necessity. Assumed the settings development will be done by the customer.

Communications and SCADA:

Develop new RTU and communication processor configurations and program TOC/SOC. No additional communications equipment is required for this station.

Metering:

N/A

Construction methodology:

This is a customer owned substation and relay upgrade work will be required in order for the customer relay equipment to be compatible with Entergy equipment. Further coordination and outage requirements will have to be better defined with customer.

4.5 New 115 kV line cut-in to New Substation from Wisner

The above drawing shows the location of the new 115kV sub along with the proposed new line to the customer. New line number will be assigned to this line.

The Wisner to new substation 115 kV line data:

Line Data	MVA
Existing line rating	115 MVA
Line rating with new section	115 MVA
line length from Wisner to point of line cut-in	14 mi
line length from New SS to point of line cut-in	1,100 ft

Line route:

The existing line is built with wood H-frame construction. The existing conductor is 336.4 ACSR Linnet. There are two (2) shield wires; both are 3/8" C/W.

The new substation will be located approximately 14.0 miles from the Wisner Substation, just off State Highway 15.

The new substation will be approximately 1,100' from the existing transmission ROW. New ROW will be required.

Customer is responsible for their line from generator step down transformer substation to that of Entergy's new substation.

Customer is responsible for their right of way to get from the Entergy substation to the customer substation.

Dead-ends are assumed to be steel and self supporting on drilled pier foundations.

Tangents are assumed to be steel self supporting with direct embedded foundations.

Structures and Foundations:

- Install two (2) 3-pole self-supported base plated steel dead-ends
- Install one (1) single-pole tangent structure with direct embedment as foundation
- Install six (6) drilled pier foundations approximately 20' in depth

Conductor and Insulators:

- The line will require the installation of approximately 21 insulator assemblies.
- The will require the installation of approximately 2,004 lbs 336 ACSR "Linnet" conductor.
- 7#7 will be used as the shield wire on all spans.
- No fiber optic wire will be installed with this project.

ROW:

Right of way (ROW) will be required and is assumed to be 1,100' long by 500' wide. The assumed ROW will provide a corridor for the two Entergy lines coming into the substation and the single customer line leaving the station and heading to the customer substation.

Customer is responsible for the ROW to get from the Entergy substation to their substation.

Permits:

Based on provided information related to potential site selection, proposed construction efforts and desk-top analyses, the following efforts for environmental permitting, related activities and associated costing are provided. A minimum of six (6) months duration is required for securing permits.

- Assume the site selected to be between the towns of Foules and Clayton, LA. This site is situated between approximately 150' west of US Hwy 425/LA 15 and the Wisner-Red Gum transmission line.
- Assume that the proposed substation site will be approximately 500' X 500' (~5.73 ac.) with an abutting 1100' X 500' (~ 12.6 ac.) area between the proposed substation site and the Wisner-Red Gum transmission line. Assume that the customer will be responsible for constructing all facilities needed to deliver generation to the Point of Interconnection (POI).
- At a minimum perform Transaction Screen Environmental Site Assessment (ESA) in accordance with standards developed and published by American Society of Testing Materials (ASTM) International as ASTM Transaction Screen Standards (Designation E 1528-06). This should be conducted prior to purchase of the property necessary to construct the proposed substation to determine if the real property is subject to "recognized environmental conditions" (RECs). This will not satisfy all appropriate inquiries for Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for Landowner Liability Protections (LLPs) and is intended only for limited environmental due diligence. It is assumed that any fill utilized for the substation site preparation will be from a reputable source and documented contamination free.
- Based on existing wetland maps, the proposed area in Louisiana has been identified as predominantly upland habitat with cultivated land use for farming. Close proximity of the proposed site to mapped jurisdictional wetlands and/or streams offer a consideration for possible impacts. The Tensas River is approximately 500 yd. east of the proposed site on the opposite side of US Hwy 425/LA 15. The United States Army Corps of Engineers (USACE) has a nationwide permit (NW-12) available for utility line activities that includes utility line substations and foundations for overhead utility line towers, poles and anchors. The nature of the proposed work should fall within one of the nationwide permits if required. Regardless of the findings, a written report will be prepared and a request for concurrence to the USACE.
- A Section 106 review, consultation and concurrence will be required in accordance with the state of Louisiana Office of Cultural Development. While the footprint to be impacted is relatively small and localized with previous disturbance from years of agricultural practices, concerns exist due to the intrusion at-depth related to direct pole placements and/or associated caissons. If any concerns were revealed, then a Cultural

Resource Study would be required prior to construction and/or a survey during the construction effort.

- Interagency consultation relative to the subject property with the U.S. Fish and Wildlife Service (USFWS) regarding any federally listed, endangered, threatened or candidate species and the Louisiana Department of Wildlife and Fisheries (LDWF) regarding any species of special concern for critical habitat that may be found on the property should be conducted.
- Natural Resource Conservation Service (NRCS) should be contacted regarding the presence of any government programs and/or prime farmland soils located on the property.
- Louisiana Department of Environmental Quality (LDEQ) requires compliance with applicable regulations for coverage under the Construction Storm Water General NPDES Permit. It includes the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) to provide a site-specific description of the best management practices to prevent contamination of the site storm flows from potential pollutants associated with construction activities. The plan also outlines implementation, inspection and maintenance requirements.
- 18-week SWPPP inspection period for entire construction time and continued monitoring after construction until the site is stabilized.
- Installation of Best Management Practices (BMPs) in accordance with SWPPP.
- Migratory Bird Treaty Act protection covers most bird species found in the project area. Construction to (Avian Powerline Interaction Committee (APLIC) standards as described in Entergy's Avian Protection Plan. Review of the area indicates concerns for wintering waterfowl and other water birds utilizing the habitats associated with the Tensas River.
- Louisiana Department of Transportation (LADOT) requires a crossing permit for any utilities that are to be installed across a highway right-of-way. The permit must be applied for prior to construction activities entering the right-of-way of a state highway. No highway crossings were noted for this proposed substation site location. No cost projected.
- Assume that no NEPA triggers exist that would require preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS). If required, due to some unforeseen federal connection, hopefully a Finding of No Significant Impact (FONSI) would be determined.

Environmental Permits:

A storm water pollution prevention plan will be required.

Long Delivery Items:

Quantity	Material Description	Lead Time (weeks)*
3ea	Two (2) - 3-pole Steel Self Supporting Structures and One (1) single pole Tangent Structure	20

Quantity	Material Description	Lead Time (weeks)*
2004lbs	336ACSR Linnet Conductor	24
21	Insulators	12

*As of 11/7/11

Construction methodology for new line construction:

Refer to the preliminary project schedule for details on the proposed construction activities. Additional details will be included in the schedule after design phase begins and the contracting/construction strategy is finalized. The overall proposed construction sequence, and associated issues/assumptions, can be summarized as follows:

Dead-end structures will need to be installed which will allow the line to be cut in to new structures with minimal structural impact to the existing line. The work will consist of removing the jumpers between the existing towers and reconfiguring them to the bus work installed as part of the substation.

Take an outage on the Wisner – Red Gum 115kV transmission line. Remove the conductor span between the two towers and install jumpers down to substation bus for in & out cut-in into the new ELL substation. This outage will be coordinated with any remaining substation work that could not be completed with the 115kV line energized and with any relay modification and check out activities.

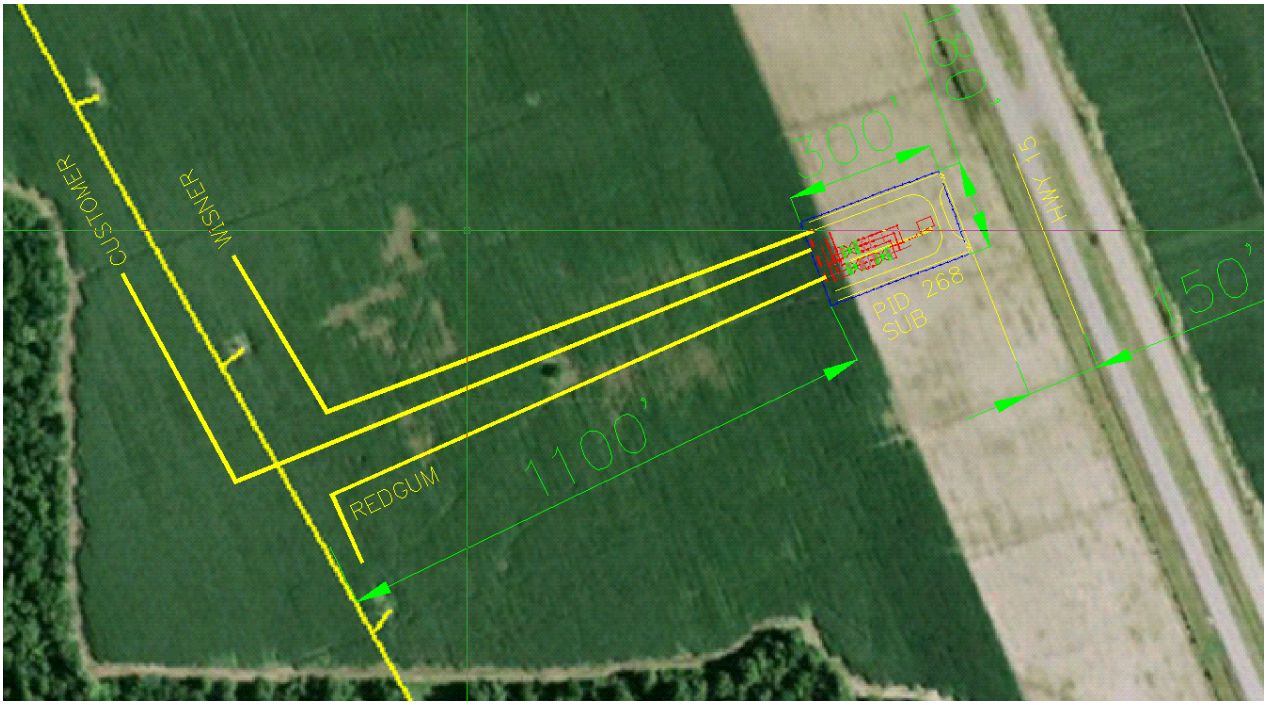
Outage Planning:

The Wisner – Red Gum 115kV transmission line can be de-energized for the duration needed to complete the slack span cut-in and to complete relay modifications at Wisner and Red Gum. This outage could last anywhere from three (3) to ten (10) days depending upon final design. Outage time will be dependent upon having adequate electrical work clearances underneath the existing line to install all required bus work prior to the line outage. No more than three (3) days are anticipated for this outage.

Safety consideration during construction:

Multiple parallel lines with multiple crossings, requiring guard structures and discussion of EPZ and proper grounding requirements.

4. 6 New 115 kV line cut-in to New Substation from Red Gum



The above drawing shows the location of the new 115kV sub along with the proposed new line to the customer.

The Red Gum to new substation 115 kV line data:

Line Data	MVA
Existing line rating	115 MVA
Line rating with new section	115 MVA
line length from Red Gum to point of line cut-in	11.25 mi
line length from New substation to point of line cut-in	1,100 ft

Line route:

The existing line is built with wood H-frame construction. The existing conductor is 336.4 ACSR Linnet. There are two (2) shield wires; both are 3/8" C/W.

The new substation will be located approximately 11.25 miles from the Wisner substation, just off State Highway 15. The new substation will be approximately 1,100' from the existing transmission right of way (ROW). New ROW will be required.

Customer is responsible for their line from generator step down transformer substation to that of Entergy's new substation.

Customer is responsible for their right of way to get from the Entergy substation to the Customer substation.

Dead-ends are assumed to be steel and self supporting on drilled pier foundations.

Tangents are assumed to be steel self supporting with direct embedded foundations.

Structures and Foundations:

- Install two (2) 3-pole self-supported base-plated steel dead-ends
- Install one (1) single pole tangent structure with direct embedment as foundation
- Install six (6) drilled pier foundations approximately 20’ in depth

Conductor and Insulators:

- The line will require the installation of approximately 21 insulator assemblies.
- The will require the installation of approximately 2,004 lbs 336 ACSR “Linnet” conductor.
- 7#7 will be used as the shield wire on all spans.
- No fiber optic wire will be installed with this project.

ROW:

Right of way (ROW) will be required and is assumed to be 1,100’ long by 500’ wide. The assumed ROW will provide a corridor for the two (2) Entergy lines coming into the substation and the single customer line leaving the station and heading to the customer substation.

Customer is responsible for the ROW to get from the Entergy substation to their substation.

Permits:

The time allowed for r/w agent to coordinate updating ownership, notify impacted landowners, securing permits would be approximately three (3) or four (4) months from time the permit sketches are received from our Design Department.

Environmental Permits:

A storm water pollution prevention plan will be required.

Long Delivery Items:

Quantity	Material Description	*Lead Time (weeks)
3ea	Two (2) - 3-pole Steel Self Supporting Structures and One (1) single pole Tangent Structure	20
2004lbs	336ACSR Linnet Conductor	24
21	Insulators	12

Construction methodology for new line construction:

Refer to the preliminary project schedule for details on the proposed construction activities. Additional details will be included in the schedule after design phase begins and the contracting/construction strategy is finalized. The overall proposed construction sequence, and associated issues/assumptions, can be summarized as follows:

Dead-end structures will need to be installed which will allow the line to be cut in to new structures with minimal structural impact to the existing line. The work will consist of removing the jumpers between the existing towers and re configuring them to the bus work installed as part of the substation.

Take an outage on the Wisner – Red Gum 115kV transmission line. Remove the conductor span between the two (2) towers and install jumpers down to substation bus for in & out cut-in into the new ELL substation. This outage will be coordinated with any remaining substation work that could not be completed with the 115kV line energized and with any relay modification and check out activities.

Outage Planning:

The Wisner – Red Gum 115kV transmission line can be de-energized for the duration needed to complete the slack span cut-in and to complete relay modifications at Wisner and Red Gum. This outage could last anywhere from three (3) to ten (10) days depending upon final design. Outage time will be dependent upon having adequate electrical work clearances underneath the existing line to install all required bus work prior to the line outage. No more than three (3) days are anticipated for this outage.

Safety consideration during construction:

Multiple parallel lines with multiple crossings, requiring guard structures and discussion of EPZ and proper grounding requirements.

5. COST

The costs shown in the table include all applicable overheads but do not include tax gross up. Entergy incurs a tax liability proportional to the amount of customer contributions.

Estimated Task Costs

	2012	2013	2014	Total
4.1 New Substation	$ 37,081	$ 2,160,884	$ 2,887,390	$ 5,085,354
4.2 Red Gum SS	$ 14,532	$ 153,659	$ 246,026	$ 414,217
4.3 Winnsboro SS	$ 14,532	$ 119,185	$ 220,839	$ 354,556
4.4 Gilbert & Nelpco Substations (LAGen)	$ 14,532	$ 112,891	$ 175,789	$ 303,212
4.5/4.6 New 115 kV line cut-in to New Substation	$ 170,579	$ 751,140	$ 1,190,061	$ 2,111,780
Total	**$ 251,255**	**$ 3,297,760**	**$ 4,720,105**	**$ 8,269,119**

6. UPGRADE CLASSIFICATION

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

Cost Analysis

Task	Total Cost	Base Plan	Supplemental	Reference
4.1 New Substation	$5,085,354		$5,085,354	4.1
4.2 Red Gum substation	$414,217		$414,217	4.2
4.3 Winnsboro substation	$354,556		$354,556	4.3
4.4 Gilbert & Nelpco Substations (LAGen)	$303,212		$ 303,212	4.4
4.5/4.6 New 115 kV line cut-in to New Substation	$2,111,780		$ 2,111,780	4.5/4.6
Total	**$8,269,119**		**$8,269,119**	

7. SCHEDULE

A detailed schedule will be prepared subsequent to customer approval to proceed A detailed schedule will be prepared subsequent to customer approval to proceed with the project. Based on the Task duration schedules listed below, the overall project in-service date is projected to be September 2014. This is based on assumption that customer would render approval to commence project April 2012 and ROW would be secured in 12 months or lesser.

Summary	Completed by end of
Submit facility Study	11/1/2011
Customer + FP/WOs Approval	4/1/2012
Complete PEP	10/30/2012
Customer approval + Revised FP approval	11/1/2012
commence design/ROW/environmental	12/31/2012
Order material	2/28/2013
Issue design for construction	6/1/2013
Receive material	9/30/2013
Complete securing environmental permits / easement/purchase for ROWs	12/31/2013
Start Construction	1/31/2014
Complete Construction	9/30/2014
Note - larger duration for construction is to cater for extra time needed for securing line ROW (if it requires more than 12 months)	

Notes to Duration Schedules:

- Pre-existing scheduled line outages may prevent the commencement of work. Scheduled outages cannot be confirmed until a firm construction schedule is submitted.
- All construction work requiring outages will be performed during off-peak load season. Line outages will be discussed with the SOC and TOC and the assumption is made that line outages will be executed as planned. However, last minute denial of outages by the SOC/TOC along with resulting schedule delay is possible.
- Line outage to install fiber optic would be available during January to March 2014.
- Design and Construction resources are available when required.
- Different resource is used for each design, so all designs start at same time.
- Transmission Line and substation projects will begin subsequent to completion of Definition phase preparing Project Execution Plan and having customer approval to proceed with the design/procurement and construction.
- This schedule does not account for adverse weather conditions.

- Schedule durations are high level estimates at this time. A detailed schedule will be prepared upon project approval.
- From environmental specialist learned that the land may be cultivated farm land and assume not much of clearing is required.
- Scheduling assumption and completion dates for the project:
    - Assumed duration for securing ROW and environmental assessment and permits would not take longer
- Property would be available for easement or purchase to build the line cut-in and new substation

Additional assumptions made by construction:

- Methodology in document based on satellite photos and existing onelines - no field or site visits performed. Durations based on conventional durations per mile or typical device replacement undertaken.
- All wood structures will be disposed of by either awarding to landowners or disposed of as regular creosote waste-no specially treated wood.
- ROW is accessible by conventional means, no specialty equipment or extensive matting. ROW is maintained to the extent clearing is not necessary and no reseeding will be warranted.
- Baseline or preferential contractors will be used eliminating the time required to competitively bid.

8. INTERCONNECTION STANDARDS

The interconnection standards are detailed at the link shown below.

http://entergy.com/energydelivery/facility_requirements.aspx

9. RISK ASSESSMENT

Risk	Comment	Impact
ROW and Permits	Scope and estimate for new ROW is based on limited knowledge of individuals using the aerial views, etc on the internet and could vary considerably	****
Material costs steel & Equipment	Rising steel, copper, fuel and other market conditions could greatly affect estimated cost.	****
Storm-water plan implementation	Best guess on SWPPP creation, implementation and monitoring can vary greatly dependant on outcome of environmental study.	**
Weather & Equipment Lead Times	Unexpected delays on material lead times, unusually inclement weather will impact schedule but might impact AFUDC costs as well.	**
Wetland mitigation	Undetermined until environmental analysis is complete.	***
Outages may not be available	Preliminary schedule only considers general outage constraints. Specific project schedule may be delayed by days, weeks or months dependant on system conditions. Delays of months = increased project costs.	**
Uncertainty of ability to secure substation site and line cut-in Row for new substation	The selected site may not be available by the time easement or purchase of substation site is required. A new site may have to be picked impacting on the cost of substation site, line cut-in ROW and increased length of Hartburg line. Cost impact can not be determined at this time	***
CCN and other permitting could take longer than assumed in developing schedule	Need revision to schedule	*
Scope based on design assumptions which may change	Varied impact on cost and schedule.	***

*-low impact to cost, ** - moderate impact to cost, ***- high impact to cost, **** - very high

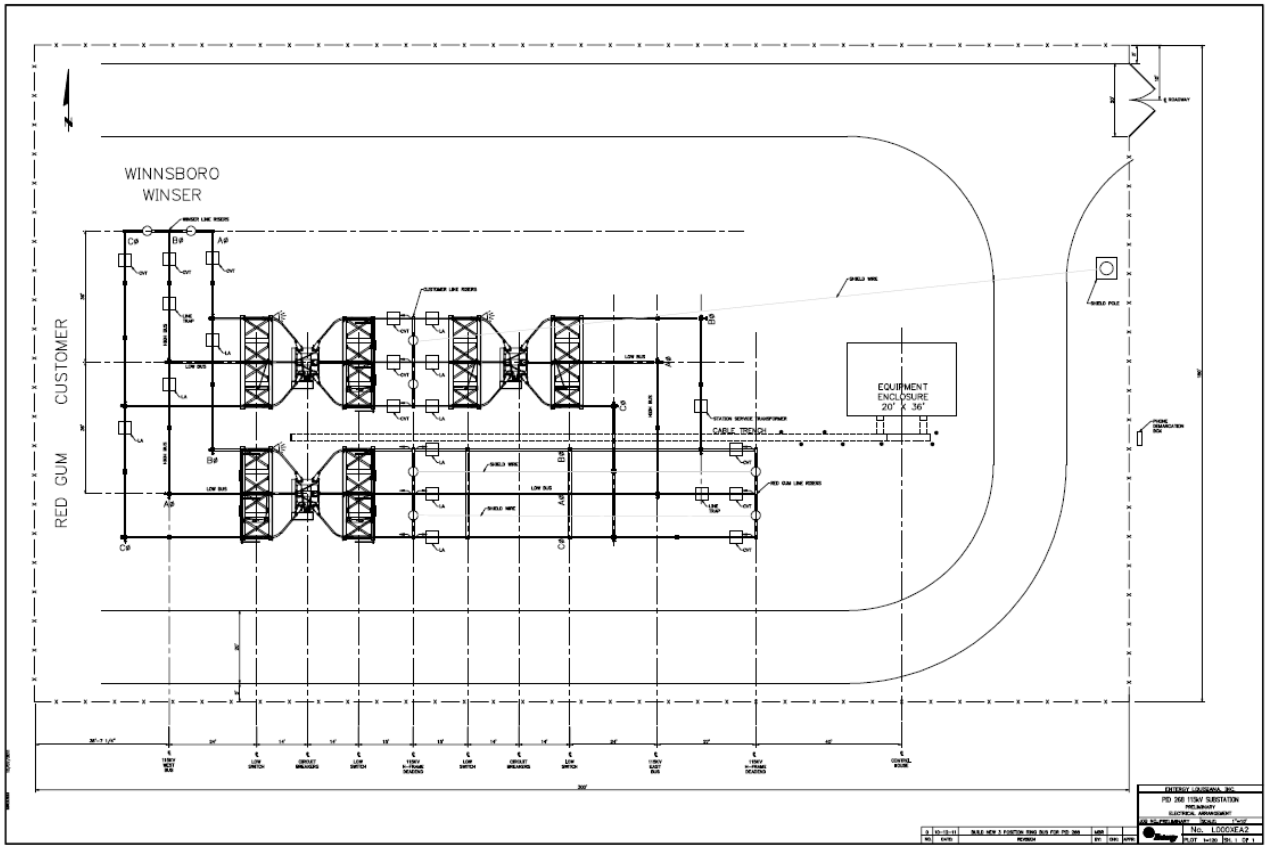
10. ATTACHMENTS

10.1 A Table of Acronyms

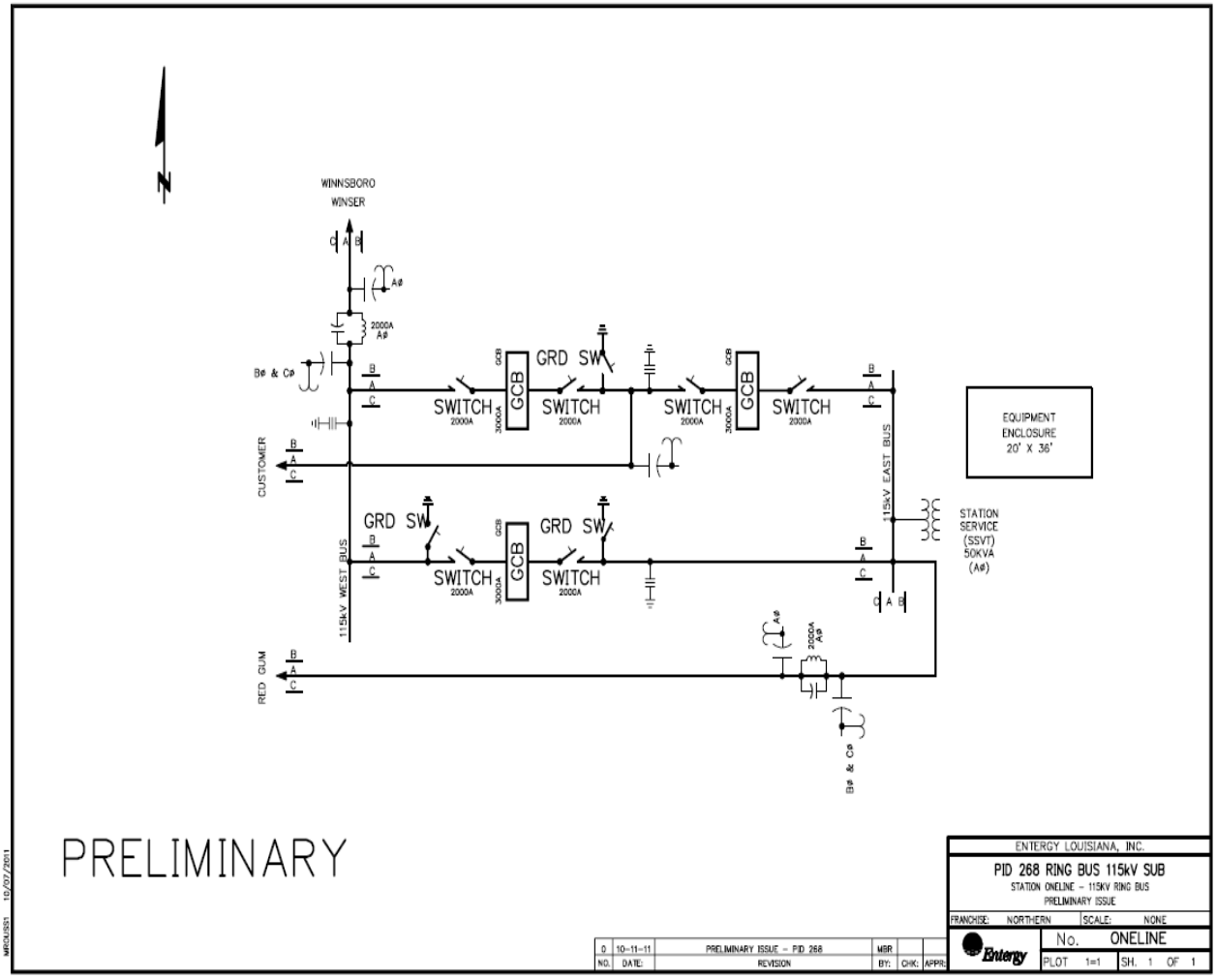
ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
ADEQ	Arkansas Department of Environmental Quality
AFUDC	Allowance for Funds Used During Construction
ATC	Available Transfer Capability
EES	Entergy Control Area
EHV	Extra-High Voltage
ERIS	Energy Resource Interconnection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

10.2 One line & Substation Layout Drawing

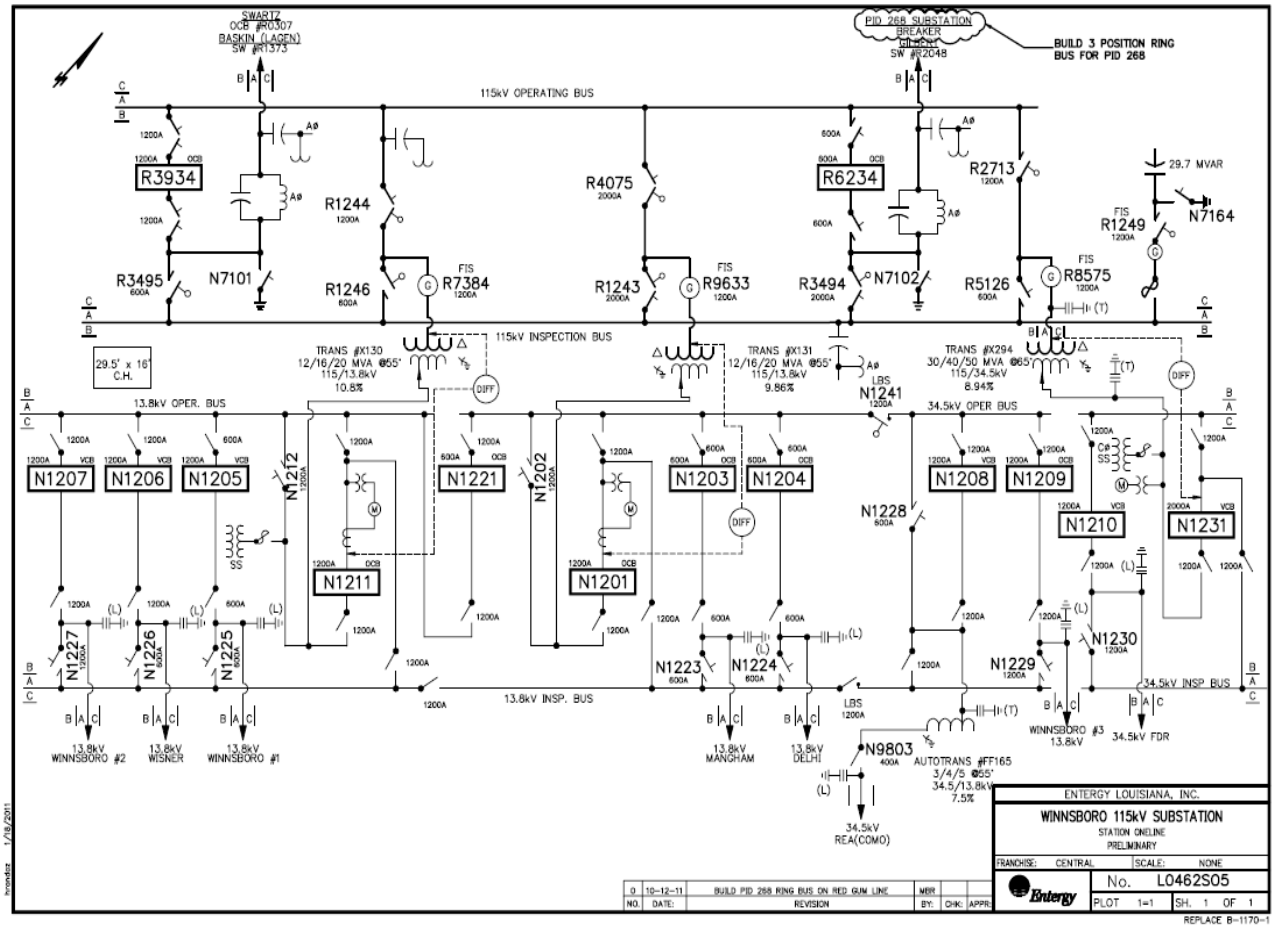
PID 268 Electrical Plan



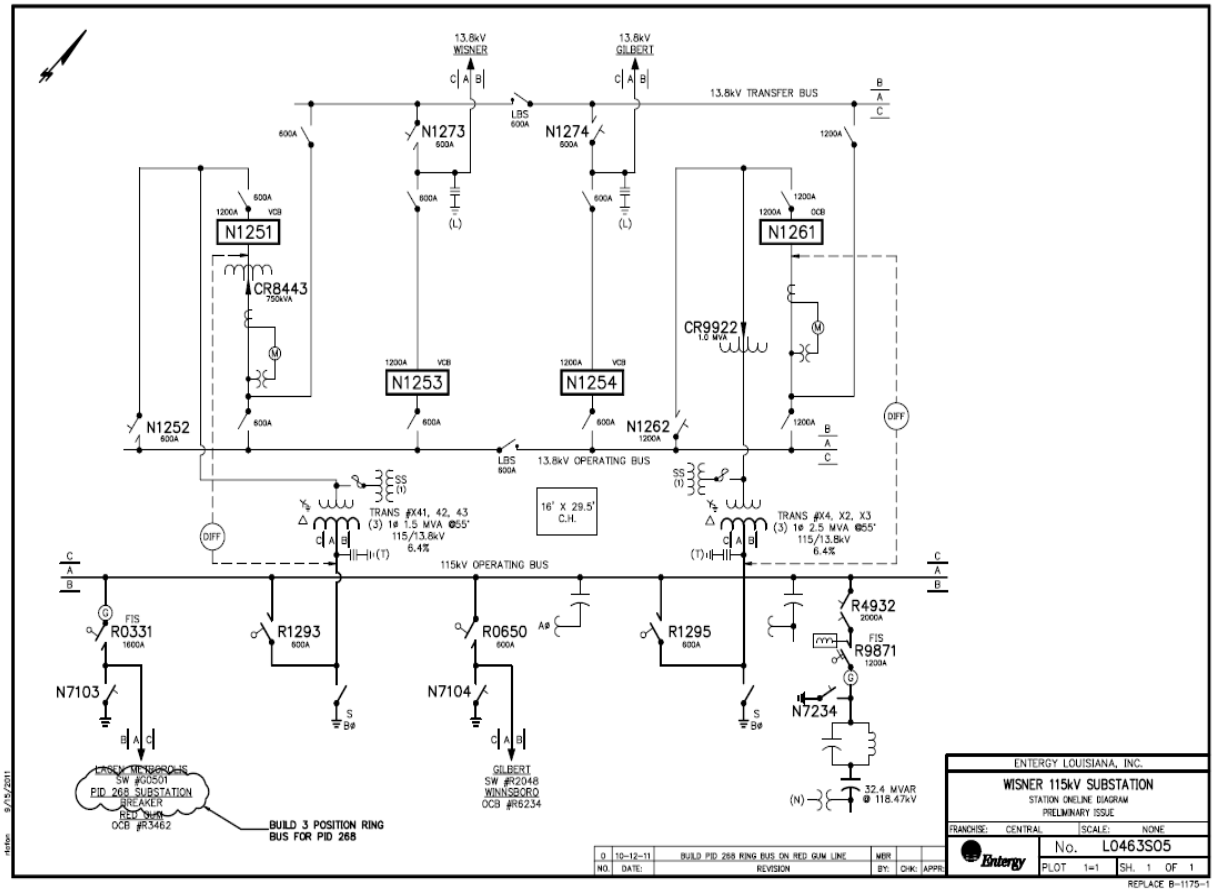
PID 268 Oneline



Winnsboro Oneline



Wisner Oneline



Red Gum Oneline