



TRANSMISSION LINE & SUBSTATION PROJECTS

COMPANY: ENTERGY SERVICES, INC.

CUSTOMER: PID 266

FACILITIES STUDY

EJO NO. F4PPLA0365

PID 266 GENERATOR INTERCONNECTION

Revision:
0

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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 40 MW of solar generation to Entergy System through existing 115kV line between Tallulah and Delhi. 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 266 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 $\pm 20\%$ 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 Tallulah and Delhi and one (1) line connecting to customer's transmission line to the generating station.

1.2.2 Line from Tallulah

One (1) span will be removed on line between Tallulah and Delhi and line from Tallulah end will be routed and terminated into the new substation. New line conductor, jumpers, etc will have the same or greater ampacity as the existing conductor. A fiber optic shield wire will be installed on this line to be used by the protective relaying and for communications to TOC and SOC.

1.2.3 Line from Delhi

One (1) span will be removed on line between Tallulah and Delhi and line from Delhi end will be routed and terminated into the new substation. New line conductor, jumpers, etc will have the same or greater ampacity as the existing conductor. Power line carrier will be reused on this line for the protective relaying. A line trap will be installed on the Delhi line at the new station. Line number 106 will be retained.

1.2.4 Delhi substation

The existing Tallulah Line/Breaker R4620 relaying will be upgraded to be compatible with the new station relaying. The line trap and tuner on the Tallulah line will be reused. Revise oneline diagram showing line going to new substation.

1.2.5 Tallulah substation

The existing Delhi line/breaker R4620 relaying will be upgraded to be compatible with the new station relaying. The line trap and tuner on the Delhi line will be removed since fiber is being installed on this line. 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 266 will be responsible for installing any harmonic filtering to remain within these limits. If these limits are violated, the PID 266 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 266 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 266, 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 266, is operated at unity power factor.

1.4 Cost Summary

The customer has requested a $\pm 20\%$ 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 class 4 estimate (+50%/-30%) has been provided. A 10% contingency has been added to minimize the risk.

The estimated total project cost in 2011 dollars is \$6,496,829. This amount includes AFUDC and should the customer sign a prepaid agreement, the AFUDC amount will be subtracted. This cost does not include Tax Gross Up which may apply. (Tax Gross Up rate at this time is 27.78 %).

The ICT has assigned **\$6,496,829** as Supplemental Upgrade based on Attachment "T" of Entergy's 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, and ground over current settings, and so on. Some obsolete relays may need to be replaced.
- New RTU configurations or revisions will be necessary to 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.
- 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 north of Tallulah, north Louisiana by undertaking the following:

Re-route the Delhi - Tallulah 115kV transmission line (L-106) into the new three breaker ring bus substation; connecting the Delhi and Tallulah substations to the new switchyard.

ROW requirements:

New substation site (200' X 300') would be located east of the intersection of Line L-106 and Highway 80, and the connecting r/w segment would be minimal as the substation is directly north of the line.

New substation would be approximately 18 miles from Delhi Substation and two (2) miles from Tallulah 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 breaker ring bus located north of the transmission line and east of highway 80. The switchyard will be orientated such that the lines will be entering the south side of the substation.

Transmission lines entering the switchyard will be from the south side of the substation as shown on the electrical arrangement drawing – PID 266 Electrical Plan.

Assumptions:

- Site location is the proposed primary site which facilitates T-Line entry from the south 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 300' is required off of highway 80.
- Distribution lines are available for a secondary station service.



NEW 115kV SUBSTATION

Proposed Site Location:

The proposed new 115kV substation site is located west of the customer's site near the intersection of Highway 80 and the transmission line. The size of this property would be approximately seven (7) acres including 200' x 300' substation (fence dimensions) plus additional space outside of the substation fence in order to route the new applicable transmission lines and a 400' access road from Highway 80.

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 266 Electrical Plan and the PID266 ring bus station one line.

It will resemble a double bus double breaker scheme with three (3) nodes.

Three (3) CVT's and (3) three 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 Delhi node to accommodate horizontally mounted line trap in series with the rigid bus and capable of being relocated to any phase. This will require additional conduit to mount the line tuning box on any phase as well. The Tallulah line will require conduit for the fiber installation.

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 included 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
- 2750 tons of limestone
- 1000' of new 7' fence + 1' barbed wire
- 1200' of new access road (800' internal to the station, 400' 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 1200' of 2" PVC conduits
- 4600' - 4/0 copper ground grid (assumes 30' x 30' grid)
- 2700'- 19 #9 Copperweld pigtails (140 @ an average length of 15' for structures, equipment, fence, and cable trough and eight (8) @ 72' for shield wires)
- One (1) – 20' x 36' control house foundation
- Two (2) – 75' shield pole foundation
- Three (3) – 115kV, H-frame dead-end foundations (2 legs/ dead-end)
- 15 – 115kV, single-phase bus support (low bus) foundations
- Seven (7) – 115kV, single-phase bus support (high bus) foundations
- Two (2) – 115kV, 3-phase bus support (low bus) foundations

- Six (6) – 115kV, switch support (low bus) foundations (2 legs/ support)
- One (1) – 115kV, switch support (high bus) foundations (2 legs/ support)
- Nine (9) – 115kV, CCVT support pedestal foundations
- Nine (9) – 115kV, arrester support pedestal foundations
- Three (3) – 115kV, breaker foundations
- One (1) – 115kV, 50kVA SSVT foundations
- Four (4) – yard lighting foundations
- One (1) – station service disconnect switch foundation (similar to L0434F14)

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:

- One (1) – 20' x 36' Control House
- 300' Strain Bus (single 954 ACSR 45/7 for Line Risers)
- 1000' – damping cable & equipment jumpers for CVTs and arresters (954 ACSR (45/7))
- 1400' – 4" Aluminum Tubular Bus Schedule 80
- 400' shield wire (7#7 Alu moweld)
- Two (2) – 75' high shield pole
- Three (3) – 115kV, H-frame Dead-end with 62' pulloff; including
 - Two (2) without bus support for Tallulah and customer line termination per M4918SD2 and M4918SD3
 - One (1) H-frame with high bus support for Delhi line termination per L0407SD10 & L0407SD11.
- 15 – 115kV, single-phase Bus Support (Low Bus)
- Seven (7) – 115kV, single-phase Bus Support (High Bus)
- Two (2) – 115kV, 3-phase Bus Support (Low Bus; 12' phase spacing)
- Six (6) – 115kV, Switch Support (Low Bus – one (1) without BK1 brackets)
- One (1) – 115kV, Switch Support (High Bus – one (1) with BK1 brackets) to be used as line trap support structure, capable of relocating line trap to any phase
- Nine (9) – 115kV, CCVT Support Pedestal

- 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, CCVTs (purchased by relaying)
- Nine (9) –115kV Surge Arresters, polymer, rated 96kV/76kV MCOV; Three (3) 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.
- 96 – 115kV porcelain post insulators for switches
- Nine (9) – 115kV polymer suspension insulators
- Two (2) - 240/120 V, 400A fusible safety switches
- 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,

Qty	Unit	Item
		manually operated
9	ea	Surge Arresters, 115kV system, polymer, rated 96kV/76kV MCOV
1	ea	Station service voltage transformer, 50kVA
9	ea	Structure, pedestal for CVT
1	ea	Structure, pedestal for station service transformer
9	ea	Structure, pedestal for surge arresters
15	ea	Structure, tube, 115kV, single phase bus support, low
7	ea	Structure, tube, 115kV, single phase bus support, high
6	ea	Structure, tube, 115kV, switch support, low
1	ea	Structure, tube, 115kV, switch support, high(for line trap)
2	ea	Structure, tube, 115kV, three phase bus support, low
3	ea	Structure, octagonal, 115kV, H-frame deadend, 62ft pulloff with shield wire termination and spikes, and bus support
2	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
1500	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 (week)*
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
9	Structure, pedestal for CVT	10-12
1	Structure, pedestal for station service transformer	20-22
9	Structure, pedestal for surge arresters	10-12
15	Structure, tube, 115kV, single phase bus support, low	10-12
7	Structure, tube, 115kV, single phase bus support, high	10-12

Qty	Item	Lead Time (week)*
6	Structure, tube, 115kV, switch support, low	10-12
1	Structure, tube, 115kV, switch support, high(for line trap)	10-12
2	Structure, tube, 115kV, three phase bus support, low	10-12
3	Structure, octagonal, 115kV, H-frame deadend, 62ft pulloff with shield wire termination and spikes, and bus support	18-24
2	Structure, octagonal, shield pole, 75' high	18-24
1	Control House, 20' x 36'	14-16
104	Insulator, station post, porcelain	10-12
18	Insulator, suspension, polymer	10-12
1500 ft	Buswork (conductor & fittings)	10-12
1300 ft	4" Aluminum Tubular Bus Schedule 80 & 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 (POTT/DTT Dual Channel Fiber via two SEL relays) with the proper 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 (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 communication 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 Delhi line to be used for line relaying. The frequency on this line will be reused. It is assumed that the line trap and tuner must be installed on the "A" phase (same phase that the line trap and tuner was installed on at Tallulah). However, due to transmission line transpositions, the trap and tuner may have to be moved to another phase during construction if it does not work correctly on the "A" phase. Substation design will make provisions in the station design to allow the trap and tuner to be moved to any phase.
- Fibers will be installed on the line between Entergy's new station and Tallulah to be used for line relaying and communications to TOC and SOC.
- Per relay settings group input, it will be assumed that dual primary relaying is not required for the power line carrier on the Delhi line.
- 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
 - Two (2) standard PM1803 option C2 line only panels (POTT/DTT Dual Channel Fiber via two (2) SEL relays) for Tallallah line and customer's line
 - One (1) standard PM1803 option L2 line only panel (DCUB PLC via Pulsar UPLC 2F [assume 2F - no DTT per settings group]) for Delhi line
 - Three (3) standard PM0501 option A breaker control panels
 - One (1) line trap for the Delhi line
 - One (1) line tuner for the Delhi 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 with line sharing switch
 - GPS antenna
 - SEL cables
 - Relay fiber optic jumpers and associated orange innerduct
 - Control cables

Long Lead Items:

Qty	Description	Delivery time (weeks)*	Comment
9	CCVT	20-32	
1	Line Trap	16-20	
1	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 new station looking towards Tallulah 115kV line with relays per Entergy Standard PM1803 Option C2.
- Develop new relay settings for new station looking towards Customer 115kV line with relays per Entergy Standard PM1803 Option C2.
- Develop new relay settings for new station looking towards Delhi 115kV line with SEL relay per Entergy standard PM1803 Option L and SEL relay per Entergy standard PM1803 Option F. Identify the frequency at PEP stage.
- Develop new relay settings for three breaker control panels per Entergy Standard PM0501 Option A with SEL relays.

Communications and SCADA:

Develop new RTU configuration and program TOC/SOC. Telecom will purchase and install equipment to accommodate the new fiber path to Tallulah.

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 cutin, final commissioning of the new station will take place.

4.2 Delhi Substation

Foundation:

Install new conduit to breaker R4620.

Electrical:

None

Relay:

- The Tallulah Line/Breaker R4620 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 Tallulah line will be reused. 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.
- 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.
- Due to limited or no ports available on the existing communications processor, we will add a RTU to the existing communications rack or other location 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
1	RTU	12-14

Relay settings:

- Develop new relay settings for Delhi station looking towards new station 115kV with relay per Entergy standard PM1803 Option K-1 and relay per Standard PM1803 Option E-1. Check if DTT is required at the PEP stage and correspondingly modify the standard option as necessary.
- Revise Z2, Z3 and GOC settings
 - Sterlington – Delhi line relay settings

Communications and SCADA:

- Develop new RTU configuration 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 Delhi - Tallulah 115kV line section will be required to upgrade the relaying equipment and panels. This outage will be coordinated with the outage required to cutin the new substation.

4.3 Tallulah Substation

Foundation:

- Install new conduit to breaker R4620.
- Install conduit for fiber.

Electrical:

- Remove line trap and replace with bus work.

Relay:

- The Delhi line/breaker relaying will be replaced with Entergy’s standard PM1803 option B2 line/breaker panel with electronic relays.
- The line trap and tuner for the Delhi line will be removed.
- 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.
- We will add a RTU communications processor to the existing communications rack or other location 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
1	RTU	12-14

*As of 11/7/11

Relay settings:

- Develop new relay settings for Tallulah station looking towards new station 115kV with relays per Entergy standard PM1803 Option B2-1.
- Revise Z2, Z3 and GOC
 - Baxter Wilson – Tallulah line relay settings
 - Oak grove – Tallulah line relay settings

Communications and SCADA:

Develop New RTU configuration and program TOC/SOC. Telecom will purchase and install additional equipment in the existing communications racks to accommodate the new fiber path to the new station.

Metering:

N/A

Construction methodology:

Below grade conduit work will installed without any outages required. An outage on the Delhi - Tallulah 115kV line section will be required to upgrade the relaying equipment and panels. This outage will be coordinated with the outage required to cutin the new substation.

4.4 New 115kV line cut-in to New Substation from Tallulah



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

The Tallulah to new switching station 115kV line data:

Line Data	MVA
Existing line rating	77 MVA
Line rating with new section	77 MVA
Line length from Tallulah to point of line cut-in	2.0 mi
Line length from NSS to point of line cut-in	200 ft

Line route:

The existing line is built with wood H-frame construction. The existing conductor is 4/0 ACSR. There are two (2) shield wires; both are 3#6 Alumoweld.

The new substation will be located approximately 2.0 miles from the Tallulah substation, near State Highway 80.

The new substation will abut the existing transmission ROW, thus no new ROW will be required.

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

Fiber will be run from the new substation back to Tallulah substation.

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

Structures and Foundations:

- Install one (1) 3-pole self-supported base-plated steel dead-end in existing ROW.
- Install three (3) drilled pier foundations approximately 20'in depth.

Conductor and Insulators:

- The line will require the installation of approximately nine (9) insulator assemblies.
- The line will require the installation of approximately 1200 lbs 336 ACSR "Linnet" conductor.
- 7#7 will be used as the shield wire on all spans except the span receiving fiber. Approximately 500' will be installed.
- The line will require approximately 2.0 miles of fiber optic shield wire from the new switching station to the Tallulah substation.

ROW:

The new line will require no new right of way.

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:

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.

- Assume the site selected to be north, northwest of Tallulah, LA. This is at a location near the intersection of US Hwy 80 and the Delhi-Tallulah transmission line.

- Assume that the proposed substation site will be approximately 500' X 500' (~5.73 ac.) and will abut the existing Delhi-Tallulah 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 upon desk-top analysis and existing wetland maps, the proposed area in Louisiana has been identified as upland habitat with predominantly cultivated land use for farming and does not indicate any impacts to mapped jurisdictional wetlands or streams. 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 surface area to be impacted is relatively minimal and previously disturbed 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 primarily for wintering waterfowl.
- 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.

Long Delivery Items:

Quantity	Material Description	Lead Time (weeks)*
1ea	3-pole Steel Self Supporting Structures	20
1200lbs	336ACSR Linnet Conductor	24
9	Insulators	12
11,916ft	Fiber Optic Shield wire	18

*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 Tallulah - Delhi 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 Tallulah - Delhi 115kV transmission line can be de-energized for the duration needed to complete the slack span cut-in and to complete relay modifications at Tallulah and Delhi. This outage could last anywhere from three to ten 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.

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



The above drawing shows the location of the new 115kV substation along with the proposed new line from Delhi.

The Delhi to new substation 115kV line data:

Line Data	MVA
Existing line rating	77 MVA
Line rating with new section	77 MVA
line length from Delhi to point of line cut-in	18.5 mi
line length from new substation to point of line cut-in	200 ft

Line route:

The existing line is built with wood H-frame construction. The existing conductor is 4/0 ACSR. There are two (2) shield wires; both are 3#6 Alumoweld.

The new substation will be located approximately 18.5 miles from the Delhi Substation, near State Highway 80. The new substation will abut the existing ROW, thus no new ROW will be required.

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

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

Structures and Foundations:

- Install one (1) 3-pole self-supported base-plated steel dead-end in existing ROW.
- Install three (3) drilled pier foundations approximately 20’ in depth.

Conductor and Insulators:

- The line will require the installation of approximately nine (9) insulator assemblies.
- The will require the installation of approximately 1205 lbs 336 ACSR “Linnet” conductor.
- 7#7 will be used as the shield wire on all spans. Approximately 500 will be installed.

ROW:

The new line will require NO new right of way.

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) *
1ea	3-pole Steel Self Supporting Structures	20
1205lbs	336ACSR Linnet Conductor	24
9ea	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 Tallulah - Delhi 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 Tallulah - Delhi 115kV transmission line can be de-energized for the duration needed to complete the slack span cut-in and to complete relay modifications at Tallulah and Delhi. This outage could last anywhere from three (3) to 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.

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	\$ 132,426	\$ 1,585,764	\$ 2,798,292	\$ 4,516,482
4.2 Delhi SS	\$ 24,298	\$ 120,441	\$ 200,002	\$ 344,740
4.3 Tallulah SS	\$ 24,298	\$ 174,795	\$ 248,327	\$ 447,420
4.4/4.5 New 115kV line cut-in to New Substation	\$ 106,154	\$ 408,252	\$ 673,781	\$ 1,188,187
Total	\$ 287,176	\$ 2,289,252	\$ 3,920,402	\$ 6,496,829

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.

Task	Total Cost	Base Plan	Supplemental	Reference
New Substation	\$4,516,482		\$4,516,482	4.1
Delhi Substation	\$344,740		\$344,740	4.2
Tallulah Substation	\$447,420		\$447,420	4.3
New 115kV line cut-in to New Substation	\$1,188,187		\$1,188,187	4.4/4.5
Total	\$6,496,829		\$6,496,829	

7. SCHEDULE

A detailed schedule will be prepared subsequent to customer approval to proceed with the project. Based on the Task duration schedules listed below, the overall project in-service date is projected to be 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 SS	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 SS 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

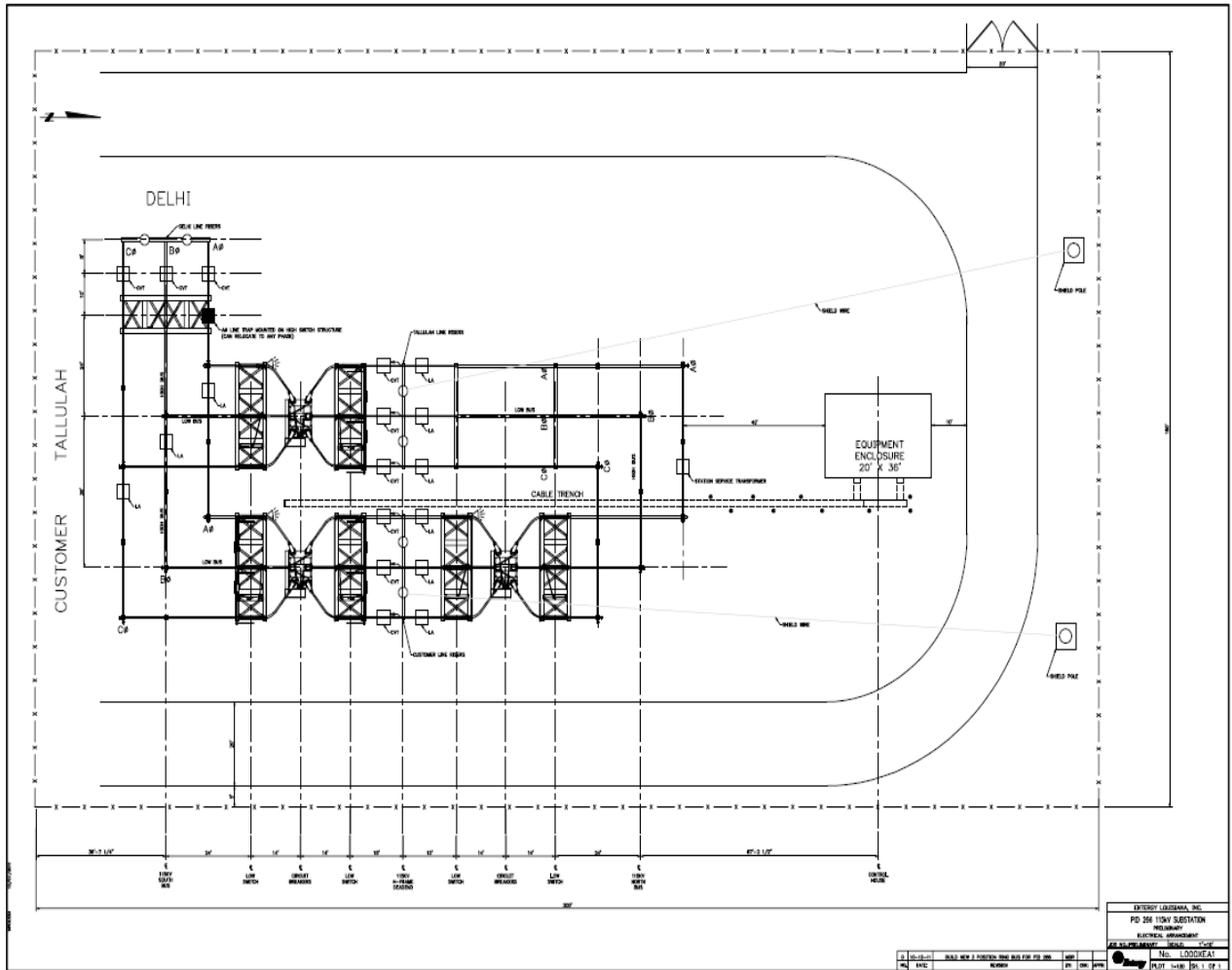
10. ATTACHMENTS

10.1 A Table of Acronyms

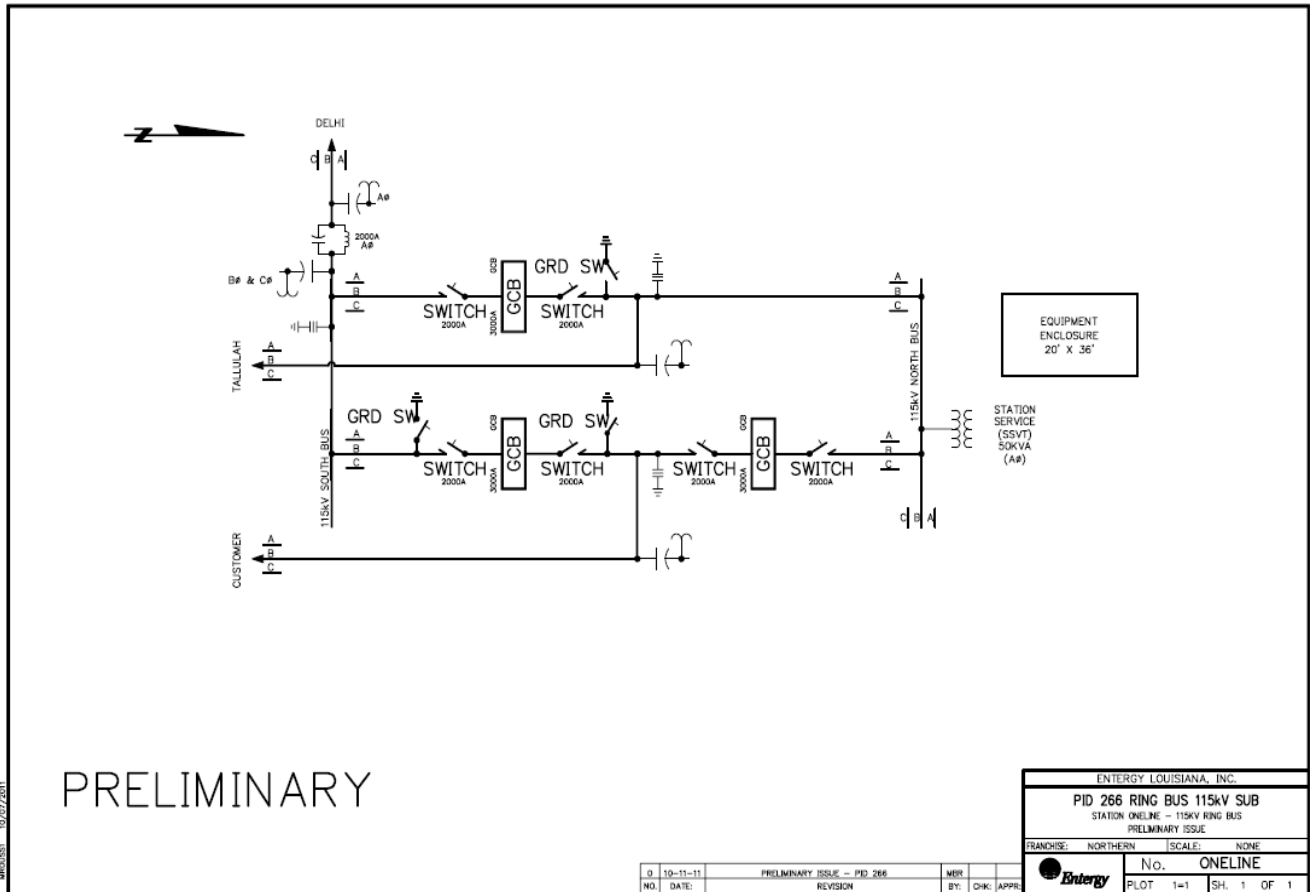
ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
ADEQ	Arkansas Department of Environmental Quality
AFUDC	Allowance for Funds Used During Construction
ATC	Available Transfer Capability
EES	Entergy Control Area
EHV	Extra-High Voltage
ERIS	Energy Resource Interconnection 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 266 Electrical Plan



PID 266 Oneline

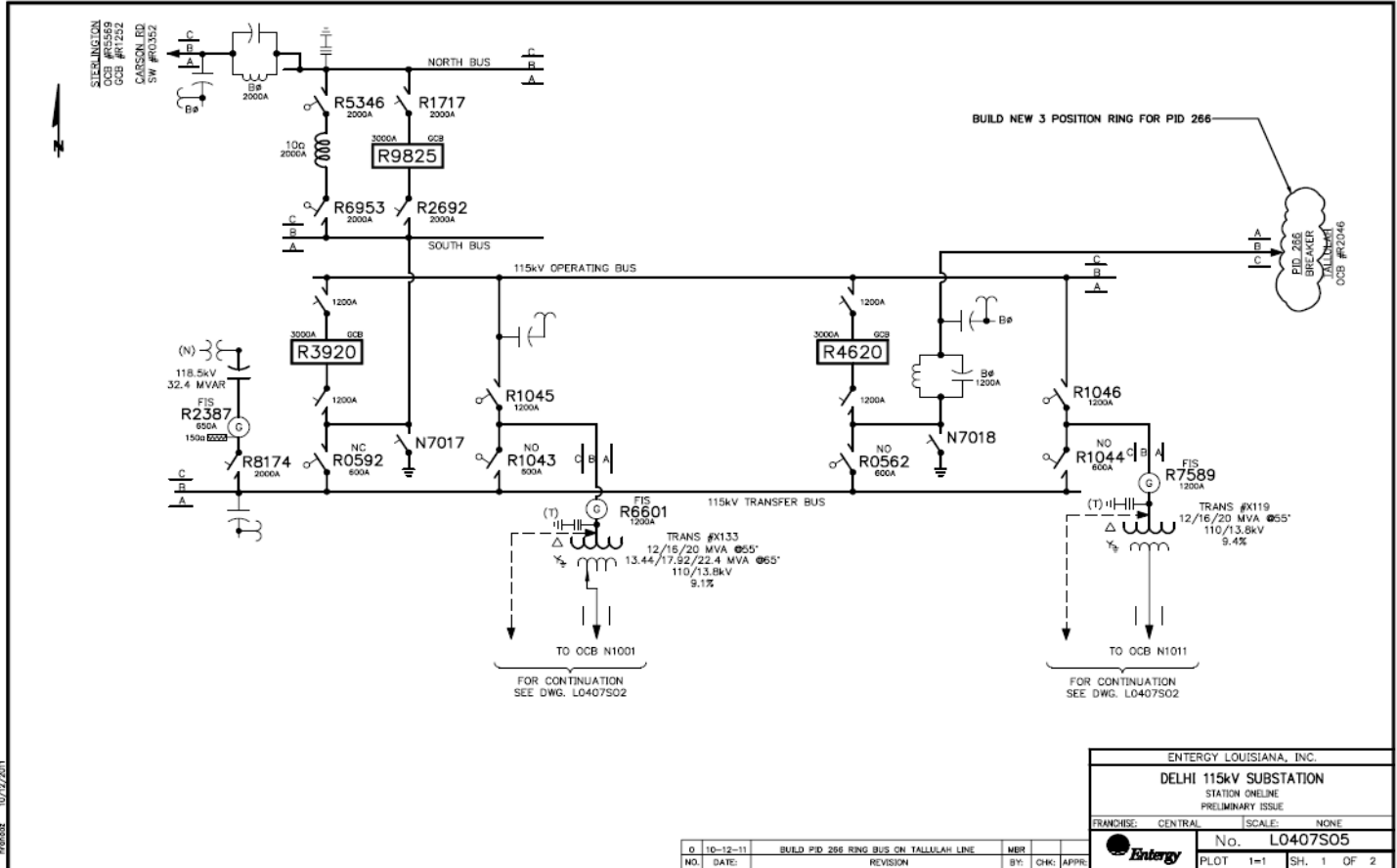


MWD/STL 10/27/2011

ENTERGY LOUISIANA, INC.	
PID 266 RING BUS 115kV SUB	
STATION ONELINE - 115KV RING BUS	
PRELIMINARY ISSUE	
FRANCHISE: NORTHERN	SCALE: NONE
No. ONLINE	
PLOT 1=1	SH. 1 OF 1

0	10-11-11	PRELIMINARY ISSUE - PID 266	MER		
NO.	DATE:	REVISION	BY:	CHK:	APPR:

Delhi Oonline



Tallulah Oneline

