TRANSMISSION LINE & SUBSTATION PROJECTS

COMPANY: EAI

CUSTOMER: PID 233

FACILITIES STUDY

EJO NO. F4PPAR0475

PID 233 GENERATOR INTERCONNECTION

Revision: 1

Rev	Issue Date	Description of Revision	Prepared By	Approved By
A	4/29/10	Shell for team input	IK	AH
B	5/05/10	Revised for JET vote	IK	AH
0	06/13/10	Finalized with JET and PD comments	IK	AH
0A	06/14/10	Minor Edits	GWR	--
0D	07/21/10	Edits	GWR	--
0E	08/09/10	Cost adjusted per PD	IK	AH
1	9/17/2010	ICT Review and Classification	BEF	JDH

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1. PROJECT SUMMARY

1.1. Background and Project Need

The purpose of this Facilities Study is to determine the availability to connect a new generation facility and provide the transfer capability at the point of interconnection. This facility study will evaluate PID233 request for interconnection of a total of 149.4 MW of wind generation.

Based on available time to complete the facility study and estimates and in light of lack of survey, soil borings, environmental permitting, property owner's issues, etc, the estimates developed for this study should be treated as good faith estimates.

To evaluate this request, a study was performed with the latest available summer peak cases, using PSS/E and MUST software by Power Technologies Incorporated (PTI).

The facilities study will identify the requirements for interconnection of PID233 to Entergy grid as well as required upgrades by Entergy to overcome constraints enabling power transfer from PID233 to Entergy grid.

The customer has requested Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS). No additional upgrades were identified for ERIS other than the line cut-in and switch stations at the point of interconnection.

Entergy has identified the following constraints that were developed with the NRIS study and are required for the interconnection:

A. Install a 2nd 500/230kV autotransformer at McAdams

(McAdams Substation is located near Kosciusko Mississippi)

The McAdams 500/230kV autotransformer overloads for the loss of the Lakeover-Charity Church 230kV transmission line. It is required that a 2nd 500/230kV autotransformer at McAdams be installed. The spare 500/230kV autotransformer that is located in the Hartburg Substation (TX) will be relocated to the McAdams substation to be used as a second autotransformer bank.

The 2nd McAdams 500/230kV autotransformer has been approved in the 2010-2012 Entergy Construction Plan and has an expected in-service date of 2011.

B. Upgrade McAdams-Pickens 230kV transmission line

(Located in Mississippi)

The McAdams-Pickens 230kV transmission line overloads for the loss of the Lakeover-McAdams 500kV transmission line.

The upgrade of the McAdams-Pickens 230kV transmission line has been approved in the 2010-2012 Entergy Construction Plan and has an expected in-service date of 2011.

C. New Twinkletown-Church Road-Getwell 230kV transmission line

(Located in Mississippi)

The Horn Lake-TH Allen 161kV transmission line overloads for the loss of the Horn Lake-Freeport 230kV transmission line. The construction of a new 230kV transmission line from Twinkletown-Church Road-Getwell 230kV will eliminate this constraint.

The new Twinkletown-Church Road 230kV transmission line has been approved in the 2010-2012 Entergy Construction Plan and has an expected in-service date of 2012.

The Church Road-Getwell 230kV transmission line has been proposed in the 2010-2012 Entergy Construction Plan and has an expected in-service date of 2013.

1.2. Customer Facilities

PID 233 intends to install 83 wind turbines on the 161kV Entergy Marshall - Botkinburg line. The total generation would be 149.4 MW. In this study, this facility would be referred to as “Plant”.

For interconnection, Customer would build a 161 kV line of approximately 12 mile length connecting to Entergy’s new substation called Trace Creek.

Data communication from the Plant to Trace Creek substation would be via fiber optic installed on the line as a shield wire. Additional communication between plant and SOC may be required in the form of dedicated phone circuits. In-Service date is 12/31/2013.

1.3. Scope Summary

A. Scope for NRIS: Entergy will construct a new 161 kV, 3 breaker ring bus substation to be called Trace Creek Switch Station. It will be connected to a line cut-in between Marshall and AECC Botkinburg Substations near Marshall, AR. Customer will build a 161 kV line with fiber optic shield wire to this substation from their Plant located near Canann. The line disconnect switch on the line to PID 233 will be the point of interconnection.

Upgrades required for interconnection include the following:

- Addition of second 500/230 kV auto-transformer at McAdams in Mississippi
- Upgrade 230 kV line between Pickens and McAdams in Mississippi

- Construction of new 230 kV line connecting Twinkle Town – Church Road - Getwell in Mississippi

Entergy did not offer any alternatives to the above solutions.

B. Scope for ERIS: Entergy will construct a new 161 kV, 3 breaker ring bus substation to be called Trace Creek. It will be connected to a line cut-in between Marshall and Botkinburg line near Canaan, AR. Customer will build a 161 kV line with fiber optic shield wire to this substation from their Plant. The line disconnect switch on the line to PID 233 will be the point of interconnection.

1.4. Cost Summary

C. For NRIS

- The estimated total project cost is $26.4 Million Full Financial. This cost does not include Tax Gross Up which may apply.
- The ICT has assigned **$19,892,362** as Base Plan upgrades and **$6,490,484** as Supplemental Upgrade based on Attachment "T" of Entergy's ICT (Independent Coordinator of Transmission) filing to the FERC.

D. For ERIS

- The estimated total project cost is $6.5 Million Full Financial. This cost does not include Tax Gross Up which may apply.
- The ICT has assigned **$0** as Base Plan upgrades and **$6,490,484** as Supplemental Upgrade based on Attachment "T" of Entergy's ICT (Independent Coordinator of Transmission) filing to the FERC.

1.5. Schedule Summary (Worst Case)

Based on an assumed start date by 12/31/2010 the estimated completion date of the project is by 12/31/2013 (Interconnection by 10/31/2012 and constraint by 12/31/2013). Estimate work order completions are shown in the table below.

Work Order Name	Requested ISD	Estimated ISD
New line between Church Road and Twinkle Town	12/31/2013	06/01/2011
Line between McAdams and Pickens (upgrade)	12/31/2013	12/31/2011
McAdams Substation (add auto-transformer)		12/31/2011
Hill Top Substation	12/31/2013	10/31/2012
Line cut-in to Trace Creek Substation	12/31/2013	10/31/2012
Quitman Substation	12/31/2013	10/31/2012
Trace Creek Substation	12/31/2013	10/31/2012
New line between Church Road and Getwell	12/31/2013	12/31/2013

Note that the in-service dates (ISDs) are based on a preliminary, un-base lined project schedule. The dates will vary based on potential changes in schedule assumptions such as timing of funding authorizations, outage approvals, ROW/permitting, land acquisition matters, etc.

1.6. Long Lead and Major Material / Equipment

Material Description	Lead Time (Weeks)
Meter Panel	12
RTU – Remote Terminal Unit	12
161 kV Surge Arrestors	14
161kV Line/Breaker Control Panel	15
Line Trap and Tuner	16
161 kV Breakers	20
Steel Structures and poles	20
161kV CCVT	22
161kV Vertical Break Switch	22
Control House	26
161kV CTs / PTs	30

2. SAFETY

Safety is a core value at 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.

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

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

3. GENERAL ASSUMPTIONS

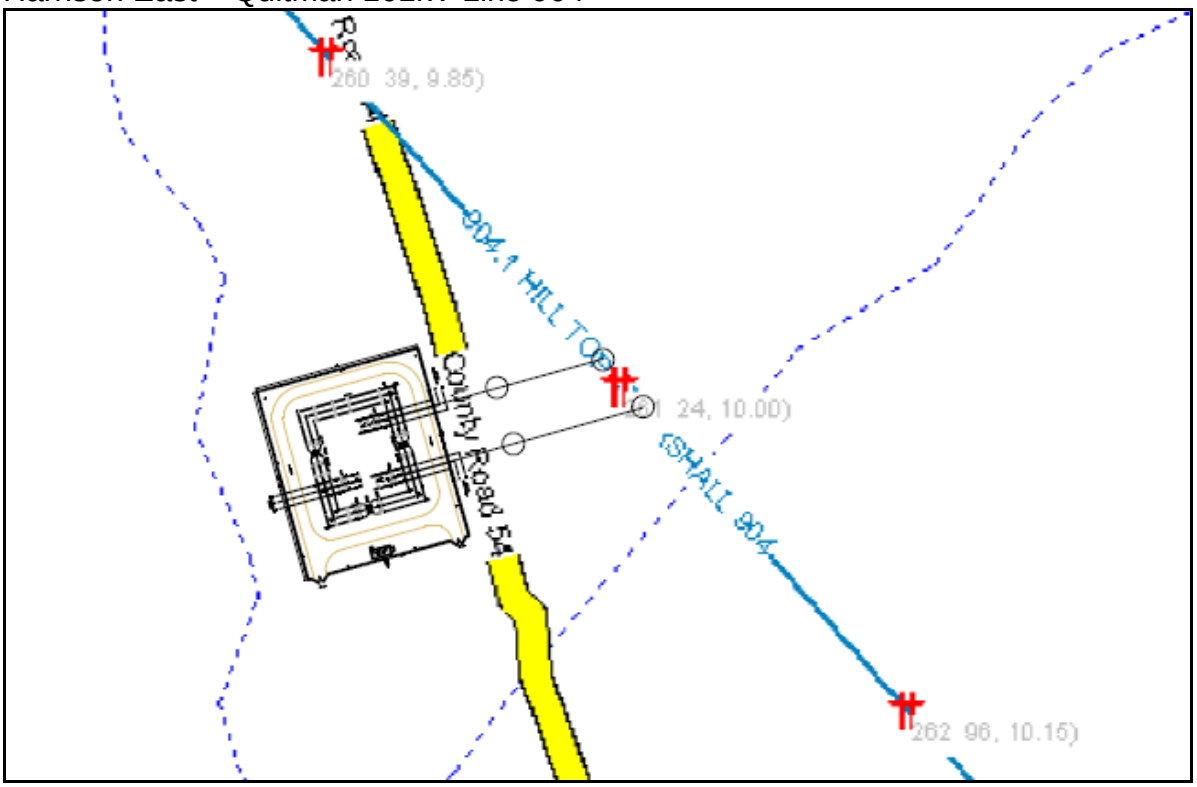
- The connection of the generator must adhere to the latest Generator Interconnection Customer Requirements Standard PM3901.
- Upon receipt of formal approval from customer authorizing design and construction, Entergy will prepare a detailed project execution plan.
- The ROW is known to be swamp for a significant length. ROW wetland mitigation cost will be negotiated during the permitting process.
- All permits will be attainable in a reasonable period
- Due to timing and/or funding constraints, topographic surveys and soil borings were not performed in order to develop this facility study.
- All costs above represent good faith estimates in today's dollars. Price escalation for work in future years has not been included.

4. SCOPE OF WORK

4.1. Interconnection Facilities [common to both ERIS & NRIS]

General: Line 904 number will be retained for section of line between Quitman and Trace Creek. New line number and asset location will be secured for section of line between Trace Creek and Hill Top substation

Harrison East – Quitman 161kV Line 904



Trace Creek Substation Proposed Pole Locations

The proposed substation is to be built adjacent to 161 kV line 904 in Searcy County. The existing line is built in a horizontal configuration on wooden structures. The conductor is 666.6 MCM Flamingo ACSR.

The line will be tapped on either side of existing structure 261, which will be removed.

A new single-pole guyed steel dead-end tap structure will be placed in the T-Line ROW approximately 50 feet north of existing structure 261. From here the line will turn right 110 degrees and slack for 150 ft. at reduced tension to a single-pole tangent prop structure and then slack 150 ft. over County Road 54 to the North substation pull-off tower.

Another new single-pole guyed steel dead-end tap structure will be placed in the T-Line ROW approximately 50 feet south of existing structure 261. From here the

line will turn 70 degrees and slack for 150 ft. to another single-pole tangent prop structure and then slack 150 ft over the road to the south substation pull-off Tower. The NESC Zone used for this project is NESC Heavy, with an Extreme Wind of 100 mph (25.6 PSF), and 1" ice load with a concurrent 30 MPH wind.

Right of Way: Approximately one acre (180 ft wide by 250 ft long) of new right-of-way will be required for the construction of the T-Line cut-in. The two tap structures will be built and guyed on the existing right-of-way. The two prop structures will be between the existing ROW and Searcy Highway 54.
Use of site will require easement to be purchased.

Right of Way Clearing: Minimum clearing

Permitting and Wetland Mitigation: The Storm Water Pollution Prevention Plan (SWPPP) will have to address the construction of the prop structures and the tap structures on the East side of County Highway 54 as there is a branch of the creek in that vicinity.

SWPPP development, BMP installation/maintenance, General Construction Permit and Notices required and weekly inspections – included in line estimates

Structures and Foundations: This project will utilize 4 steel Poles for the 2 dead-end structures and the 2 prop structures. The two dead-end structures will be guyed. Steel poles will be used due to their predictable shipping costs and ease of handling on site.

- The structures will be designed to accommodate a single circuit of 666.6 MCM ACSR Flamingo.
- All steel structures will be fabricated by Valmont/ Newmark.
- All structures will be installed in accordance to Entergy Standards
- It is assumed that all four structures (four poles) can be directly embedded since the tap structures will be guyed.
- Due to the lack of soil information, it is assumed that to achieve adequate bearing capacity, the poles will be embedded in 4 foot diameter holes 15 feet deep and backfilled with concrete.

Conductor: This project will utilize 2300 lbs (2700 ft) of new 666.6 MCM ACSR (Flamingo) conductors. This conductor has a maximum ampacity of 882 amps at 100 deg C.

The two new spans will be installed as reduced tension spans to reduce loading on the structures. This is possible due to the two prop structures that will be installed.

Shield Wire: This project will utilize 1800 ft of 7#7 Alumoweld shield wire

Insulators:

- This project will utilize 18 dead-end insulator assemblies, six braced post insulator assemblies and three jumper line post insulator assemblies.
- All insulators to be installed are polymer 161 kV class insulators.

Removals: The removals for this project consist of the following:

- Structures – One wooden H-Frame structure will be removed. This is comprised of two poles, cross arms and an x-brace.
- Conductor – 300 feet
- Shield Wire – 200 feet
- Insulators – 3

Task/WO Specific Assumptions: None identified

Construction Methodology: The transmission line cut-in will be constructed in a 2-week period. In order to start construction, the Harrison East-Quitman 161kV transmission line must be de-energized. The cut-in should be constructed near the end of the Trace Creek substation construction. The timing is somewhat flexible, but the termination towers inside the Trace Creek substation must be constructed prior to beginning the transmission line cut-in work.

Outage Planning: After project approval, outages will be submitted to TOC. It is anticipated that the transmission line cut-in work will be required to be constructed during spring or fall. The chances of obtaining the line outage approval during extreme cold or hot conditions are minimal.

Safety consideration and risks during construction: All Entergy safety rules will be observed and practiced during construction. EPZ techniques will be required during the entire transmission line construction. Risks associated with the transmission line cut-in include outage submittal and approval, weather conditions, and progress of the substation construction.

4.2. Trace Creek 161kV Substation: [common to both ERIS & NRIS]

Construct new substation with 161 kV, 2000A bus, switches, risers, and breakers with 63 kA fault interrupting capability.

General: Build new 300’ x 350’, 161kV three element breakers Ring Bus rated at 2000A continuous and 63kA interrupting capability.

911 Address is: Will be secured after the project is approved and easement work has commenced.

Site: A new switching substation site will be constructed. The proposed dimensions of the ring bus substation is 300’ x 350’. We will secure 350x350’ (2.812 acres). Minimal vegetation clearance is required. This site can be accessed directly from by installation of culverts across narrow ditch along the road side. Use of this site will also require driveway permit from county.

The site will be developed in accordance the applicable Entergy Design Standards for site design.

The following materials will be required to complete the site work:

- One (1) soil boring
- One (1) topographic survey
- One (1) Environmental Impact Study
- One (1) Ground Grid Analysis
- Permits and Licenses
- 1 Acre of Brush and Tree Removal
- Disposal of Brush and Trees
- 1300 linear feet of new fence
- 2600 cu-yd. of Top Soil removal
- 2000 cu-yd. of Excavation
- 3000 cu-yd of Soil Disposal
- 20000 cu-yd of Structural Fill
- 3 acres of soil sterilization
- 1 acre of seed & mulch
- 4000 tons of limestone (substation pad)
- 1000 tons of limestone (access road)
- 100 ft of 24” culvert

Foundations: Approximately 515 cu yards of concrete will be required to complete the following foundations necessary for the project:

- Three (3) 161kV Dead Tank Breaker Foundations
- Seven (7) 161kV High Switch Stand Foundations
- Four (4) 161kV Low Switch Stand Foundations
- One (1) 50kVA Station Service Voltage Transformer Foundation
- Twenty (20) 161kV High Bus Support Foundations
- Forty (40) 161kV Low Bus Support Foundations
- One (1) 3 Phase Low Bus Support Structure Foundations
- Two (2) 3 Phase High Bus Support Structure Foundations
- Three (3) 161kV Dead-end Tower Foundations
- Ten (10) 161kV CVT Tower Foundations
- Six (6) 161kV CT / PT Tower Foundations
- Two (2) 161kV CVT/Line Trap Combination Tower Foundations
- Nine (9) 161kV Surge Arrester Pedestal Foundation
- Four (4) Shield Mast Foundations
- One (1) 16’ x 32’ Control House
- Eight (8) Yard Light Foundations
- Six (6) Electrical Cable Pull Boxes
- One (1) Customer Demarcation Box
- One (1) Telecommunication Box

- Install approximately 6500 ft of grounding to extend the ground grid to the new fence line and provide ground leads for new structures and equipment.
- Install approximately 5000 ft of conduit for electrical equipment.

Electrical: Build new three element ring bus by purchasing and installing the following equipment, structures and other accessories to support a safe and reliable installation.

- Three (3) 161kV, 2000A, 63kA Dead Tank Breakers
- Six (6) 161kV 2000A Vertical Break Disconnect Switch for Breaker Isolation
- Three (3) 161kV 2000A Motor Operated Vertical Break Disconnect Switch for Line Isolation
- Three (3) 125VDC Motor Operating Device
- One (1) 50kVA Station Service Voltage Transformer
- One (1) 50kVA Station Service Voltage Transformer Equipment Pedestal.
- Seven (7) 161kV High Switch Support Structure
- Four (4) 161kV Low Switch Support Structure
- Twenty (20) High Bus Support Structure
- Forty (40) Low Bus Support Structure
- One (1) 3 Phase Low Bus Support Structure
- Two (2) 3 Phase High Bus Support Structure
- Three (3) Substation Dead-end Structure
- Ten (10) CVT Support Pedestal
- Six (6) 161kV CT / PT Pedestal
- Two (2) CVT/Line Trap Support Structure
- Nine (9) Surge Arresters
- Four (4) Lightning Shield Mast
- One 16’ x 32’ Pre-fabricated Control Building
- One (1) Lot of 4” SPS SHC. 40 Aluminum Tubing
- 954 MCM ACSR Double Bundle conductor with appropriate connectors and fittings.
- Eight (8) 400W Flood Lamp Yard Lights
- Above ground conductor to safety ground the equipment and structures to the ground grid
- Above ground conduit to connect the equipment to the Control House
- One (1) Customer Demarcation Box
- One (1) Telecommunication Box

Relays

Line to Hill Top:

- A blocking line relay protection panel with breaker control functions including synchro-check function (Entergy PM1803 option N) looking

towards Hill Top will be installed. Universal UPLC carrier sets will be installed to facilitate anticipated carrier scheme changes. The scheme will be changed to unblocking. A new carrier frequency will be assigned to this line segment.

- Install line trap and line tuner to match the carrier frequency.
- Install a carrier coupling CCVT connected ahead of the line trap.
- Install a set of three CCVT's on the node of the ring.
- Install junction boxes for the CCVTs

Line to Quitman:

- A blocking line relay protection panel with breaker control functions including synchro-check (Entergy PM1803 option N) will be installed on the node looking towards Quitman. The scheme will remain blocking since AECC sends a blocking signal for transformer low side faults at their AECC Clinton West tapped station.
- Install line trap and line tuner to match the carrier frequency.
- Install a carrier coupling CCVT connected ahead of the line trap.
- Install a set of three CCVT's on the node of the ring.
- Install junction boxes for the CCVTs.

Line to Customer's "Plant":

- On the ring bus node looking towards the customer's Substation at the "Plant" a 87L/POTT/DTT line relay protection panel with breaker control functions including synchro-check (Entergy PM1803 option B2 421/311L) over fiber optic cable will be installed.
- A revenue metering panel will be installed to meter the load flow of this line.
- Install a set of three metering CCVT's on the node of the ring for both metering and relaying purposes.
- Install a CCVT on the line side of the disconnect switch.
- Install three extending range metering CTs.
- Install junction boxes for the CCVTs and CTs

AC/DC Systems:

- Station service will be supplied by bringing in a Distribution feeder using a step down transformer. Back up will be using a Power PT with an automatic transfer system.
- Single battery and charger system will be installed.
- AC and DC systems with corresponding equipment and panels will be installed.

Communication:

- Install an RTU with communication ports to the TOC and SOC.
- Install voice and data telephone circuits.
- Install a communication processor.
- Install a satellite clock.

Relay Settings

Hilltop Line Panel: Model the new transmission line using line impedance data from transmission line design. Provide new power line carrier frequencies for 2 Frequency unblocking scheme using Pulsar UPLC carrier. Provide relay settings for SEL421/SEL311C in a DCUB scheme, 1 breaker control (Option K2-2).

Quitman Line Panel: Model the new transmission line using line impedance data from transmission line design. Check existing power line carrier frequency for use on new transmission line - blocking UPLC carrier. Provide relay settings for SEL421/SEL311C in a DCB scheme, 1 breaker control (Option N2-2).

Wind Farm Line Panel: Model the approximate 12 mile new transmission line using line impedance data from customer. Provide relay settings for SEL421/SEL311L in a POTT scheme, 1 breaker control (Option B2-2).

Wind Farm substation – Trace Creek Line panel: Provide settings/coordination assistance to customer to ensure standard compliance with remote Trace Creek line panel.

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Communications and SCADA: One phone circuit will be installed for house phone with a modem for voice communication and remote interrogation of metering and relaying data.

One dedicated phone circuit each to TOC and SOC Pine Bluff, AR will be provided to control switches and breakers at Trace Creek via RTU and receive metered data and alarms.

Trace Creek - RTU configuration will be required.

TOC - Display of Trace Creek Substation along with status, alarms, and metering data would be developed at TOC and tested before the substation is put in service.

SOC – Generator metering data and generator breaker status will be displayed at SOC. This information will be transmitted from a separate port on RTU at Trace Creek received from PID 233 via a fiber optic link.

General requirements for securing phone circuits are as follows:

Telecom recommends leased lines for providing RTU communication to TOC and SOC as well as one phone line for dial-up access. Windstream Communications is the local phone company and will be responsible for installing the circuits. The

RTU circuits will be installed from Trace Creek to Entergy's Marshall Microwave Site. The RTU circuits will be carried on Entergy's network to the LR TOC and Pine Bluff SOC as required.

SAIC Transport Engineering will order the leased circuits from Windstream Communications. The following information will be required to place the order:

1. 911 address
2. Ground Potential Rise (GPR) data - see attached SW6060A document
3. Charge codes for installation and monthly c of leased circuits.
4. Date that circuits need to be ready.
5. Local contact person for coordinating installation access with telco.

A determination will need to be made on where the point of demarcation is. If it is determined that Windstream Communications should terminate the circuits outside of the substation fence, then a Hoffman box will be required. Typically, Entergy's substation group provides and installs this box. Windstream Communications will install and terminate their circuits in this box. Entergy will be responsible for extending the circuits to the control room and making the proper terminations.

As stated above, the circuit path from Marshall to both the TOC and SOC is on Entergy's network. SAIC Telecom Transport Engineering will need Host Line Assignments from both TOC and SOC for the RTUs. Engineering will use those assignments and provide documentation to Entergy's Field Telecom group to have the circuits installed. Entergy Telecom will complete the circuit installation and notify TOC and SOC contacts when circuits are ready for use.

Metering:

- Standard metering will be provided at Trace Creek substation for local display and transmission to TOC and SOC.
- Instantaneous and accumulated metering data will be received from PID 233 in RTU at Trace Creek and will be transmitted to SOC
- Customer shall complete and submit to Entergy the Transmission Metering Applications Requirements Form per Standard MI0301, latest revision.

Distribution Line – backup for Station Service: Approximately 1000' of Distribution feeder would have to be built from the nearby Distribution line. It would be rated to supply 50 KVA. It will serve as a back up to main station service provided from a Station Service Voltage Transformer (161kV/120 – 240V). Automatic transfer switch will be used to transfer station service from Voltage Transformer to Distribution feeder.

Construction Methodology: The Trace Creek 161kV substation will be constructed in the following phases: (1) site work, (2) foundation, underground conduit, and ground grid work, (3) electrical work, and (4) relay work. Electrical work and relay work will be worked somewhat in parallel. The majority of the substation can be constructed at any time without the need for outages.

Outage Planning: Outages will not be required for substation construction. As discussed previously for the transmission line work, the line cut-in will require outage submittal and approval.

Safety consideration and risks during construction: All Entergy safety rules will be followed during construction. Risks associated with construction revolve around weather conditions.

4.3. Hill Top Substation: [common to both ERIS & NRIS]

Substation: Revise one line diagram showing line destination and breaker numbers for Trace Creek

Relay: Replace existing RFL carrier set with Universal UPLC carrier sets to be compatible with carrier scheme at Trace Creek.

Relay Settings:

- Provide revised relay settings for existing (old Quitman) relay line panel for the new termination to Trace Creek Substation. Upgrade relays to standard version, provide unblocking logic and revised setting data. Provide settings for new Pulsar UPLC carrier.
- Provide setting revisions to remote substation line panels (Harrison East, Dardanelle Dam and Bull Shoals) to coordinate zone2, zone 3 reaches. Coordinate Dardanelle Dam and Bull Shoals with SWPA

Construction Methodology: Relay work only is required for the Hill Top substation. The relay work should be worked during the later phases of the Trace Creek substation construction.

Outage Planning: To replace the carrier sets, a one-week outage will be required on the transmission line. After project approval, an outage request will be submitted. This work should be completed during the spring or fall to reduce the possibility of issues with obtaining the outage.

Safety consideration and risks during construction: All Entergy safety rules must be followed during construction. Risks associated with this work are outage approval or disapproval and weather conditions.

4.4. Quitman Substation: [common to both ERIS & NRIS]

Substation: Revise one line diagram showing line destination and breaker numbers for Trace Creek

Relay: Replace existing RFL carrier set with Universal UPLC carrier sets to be compatible with carrier scheme at Trace Creek.

Relay Settings:

- Provide relay settings for new (old Hilltop) relay line panel for the new termination to Trace Creek Substation utilizing a blocking scheme (Option N2-1). Provide settings for new Pulsar UPLC carrier.
- Provide setting revisions to remote substation line panels (Pleasant Hill, Greer's Ferry and Sylvan Hills/Conway 3 terminal) to coordinate zone2, zone 3 reaches. Coordinate Greer's Ferry with SWPA

Construction Methodology: Relay work only is required for the Quitman substation. The relay work should be worked during the later phases of the Trace Creek substation construction.

Outage Planning: To replace the carrier sets, a one-week outage will be required on the transmission line. After project approval, an outage request will be submitted. This work should be completed during the spring or fall to reduce the possibility of issues with obtaining the outage.

Safety consideration and risks during construction: All Entergy safety rules must be followed during construction. Risks associated with this work are outage approval or disapproval and weather conditions.

4.5. Customer's Substation at the "Plant": [common to both ERIS & NRIS]

- Relaying shall be designed, installed and set as per Entergy specification matching with relaying installed at Trace Creek Substation. Use of Fiber Optic communication will be made. Relay Settings will be coordinated with standard relay settings being installed at Trace Creek (SEL421/SEL311L POTT scheme).
- Metering and status of generator breaker(s) at PID 233 will be transmitted to RTU at Trace Creek via OPGW link.
- Specification of substation equipment including apparatus, relaying, metering and RTU and substation design drawings/settings/configuration shall be reviewed and consented by Entergy and prior to energizing the line to Trace Creek.
- Entergy Construction would inspect (participate in testing of relays if required) the facility to ensure compliance with the design.
  Switching and tagging procedures to connect and isolate PID 233 to Entergy system have to be developed jointly and approved prior to energizing the line. Formal arrangement with Entergy will have to be made for injecting power into Entergy system for generator testing purposes. An hourly schedule will have to be submitted and permission secured with Entergy Operations.

Customer's Generator Data: Customer is required to provide metering data and generator breaker status to the SOC in Arkansas via a dedicated communication circuit. Use of OPGW to Trace Creek RTU can be made or a dedicated phone circuit could be installed to SOC located in Pine Bluff, Arkansas.

Customer will provide generator modeling data to Entergy before and after the generators are commissioned and tested.

Customer will adhere to all Entergy requirements per agreement relating to under/over frequency relay settings, installation of stabilizer, etc.

SOC will develop one line diagrams for the SCADA system for the generating station showing breaker and metered quantities. Use of Trace Creek Substation Work Order will be used and the estimate for Trace Creek Substation will include estimate for this work.

4.6. McAdams – Install second 500/230 kV auto-transformer: [NRIS only]

The construction of this substation is being undertaken by Entergy for an expected completion date of December 2011. Therefore, scope details and estimates are not being reported.

4.7. Upgrade McAdams to Pickens 230 kV line: [NRIS only]

The construction of this line is being undertaken by Entergy for an expected completion date of December 2011. Therefore, scope details and estimates are not being reported.

4.8. New line between Church Road & Twinkle Town: [NRIS only]

The construction of this line and upgrade at substations is being undertaken by Entergy for an expected completion date of June 2011. Therefore, scope details and estimates are not being reported.

4.9. New line between Church Road & Getwell: [NRIS only]

General

This project is being developed by Entergy and is in preliminary stages of scoping and estimate. Planned completion date is June 2013. The following is taken from Project Scoping Plan recently completed and should be considered good faith based on the judgment of experienced professionals without hard data. Detailed work on scope and estimates will commence in the near future.

The scope of this project is to build a new 230kV line from Getwell to Church Road with a rating of least 500MVA. Once this line is in service, the 230/161kV auto transformer at Horn Lake can be closed in without any additional overloads.

Getwell Substation:

Site/Electrical: Add one new 230 kV bay on west side of station. The new line will exit the station to the North. Minimal grading is required

Relaying: One new line panel and a breaker panel are required. Evaluate existing battery & RTU capacity and available space in control house. Relay communications will be fiber.

Construction: Bus and Line outage will be required

Church Road Substation

Add one new 230 KV bay on north side of station. This line will exit the station to the west turning south down Tulane road to become double-circuit with the Twinkletown-Church Road line for several structures.
Minimal grading is required.

Relaying: Assumed - new station to be built prior to this project. Need to verify RTU capacity, batteries, etc. Church Road fiber is planned to be used for voice communication.

Twinkletown Substation

Twinkletown Substation is connected to the fiber backbone. The overall scheme is to connect Getwell to the fiber backbone via the new line coming from Twinkletown. This will allow digital protection from Getwell to Twinkletown and Getwell to Horn Lake. To accomplish this Communication equipment will need to be installed at Getwell. The existing panels at Twinkletown are digital (Primary & Backup), last years standard, but the new standard has a dual scheme (Primary1 & Primary2).

Settings:

Getwell

Settings will be required for line protection

Church Road

No relaying at Church Road

Twinkletown

New Settings, and new line panel will be required when Church Road Getwell line is built.

Review fiber communication plan from Telecommunications to determine impact on other stations. Relay impact study to verify other equipment requirements. Evaluate fault current impacts.

RTU configurations: Revise alarm and status at all three substations as required

New Line between Church Road and Getwell:

Build a new 230 kV line from Church Road to Getwell (estimated 11 miles) with a rating of least 500MVA. Some ROW is already owned in this area, but not the complete route.

At Church Road structures #75-79 will be double-circuit with Twinkletown-Church Road 230 kV line.

Consider installing dead-ends outside Church Road during construction of Twinkletown-Church Road line.

ROW: Some ROW is owned in this area (3.3 miles ROW owned out of a ~11 mile assumed route). Assume t-line will follow Tulane Road, but new ROW requirements will depend on final route selected. Consider a route study if a new route is required.

Permits: Highway crossing permit required for I-55. Need to determine future route of I-69 and if additional Hwy crossing permit is required (now or in future).

A CCN was acquired for Getwell-Arkabutla in 2004. A second CCN was acquired for Church Road – Getwell as part of the CCN to build Twinkletown-Church Road line.

Normal environmental assessments will be required for t-line and substation site work as required.

5. COST

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

The costs shown in the table include all applicable overheads but do not include tax gross up. Entergy incurs a tax liability proportional to the amount of customer contributions; therefore, tax gross up may be applied to the customer's costs. The current TGU rate in Entergy Arkansas is 27.35% and is subject to change.

Estimated Task Costs

Task	2010	2011	2012	2013	Total
Line cut-in for Trace Creek	$5,452	$86,183	$441,121	--	$532,756
Trace Creek Substation	$7,791	$162,485	$5,613,071	--	$5,783,347
Quitman Substation	$1,217	$3,918	$83,455	--	$88,590
Hill Top Substation	$1,217	$3,918	$80,656	--	$85,791
Subtotal ERIS	$15,677	$256,504	$6,218,303	--	$6,490,484

McAdams Substation+	N/A	N/A		--	N/A
McAdams to Pickens line+	N/A	N/A		--	N/A
Church Road to Twinkle Town line+	N/A	N/A		--	N/A
Church Road to Getwell line+	$17,980+	$1,292,176+	$1,034,329+	$17,547,878+	$19,892,362+
Subtotal NRIS	$17,980+	1,292,176+	1,034,329+	$17,547,878+	$19,892,362+
Total	***$33,657***+	***$1,548,680***+	***$7,252,632***+	***$17,547,878***+	***$26,382,846***+

+ Projects being constructed by Entergy

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
Line cut-in for Trace Creek	*$532,756*	--	$532,756	Section 4.2
Trace Creek Substation	*$5,783,347*	--	$5,783,347	Section 4.2
Hill Top Substation	*$85,791*	--	$85,791	Section 4.3
Quitman Substation	*$88,590*	--	$88,590	Section 4.4
McAdams Substation	N/A	N/A	--	Section 4.6
McAdams to Pickens line	N/A	N/A	--	Section 4.7
Church Road to Twinkle Town line	N/A	N/A	--	Section 4.8
Church Road to Getwell line	*$19,892,362*	$19,892,362+	--	Section 4.9
TOTAL	***$26,382,846***	**$19,892,362**+	**$6,490,484**	

+ Projects being constructed by Entergy

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 10/31/2012. This is based on an assumed customer approval date of 12/17/2010, the following are approximate schedule dates:

Task Name	Estimated Start Date	Estimated ISD/Completion
Church Road to Twinkle Town line	Underway	June 2011
McAdams Substation	Underway	12/31/2011

McAdams to Pickens line	Underway	12/31/2011
Trace Creek Substation	12/31/2010	10/31/2012
Quitman Substation	12/31/2010	10/31/2012
Hill Top Substation	12/31/2010	10/31/2012
Line to Hill Top	12/31/ 2010	10/31/2012
Church Road to Getwell line	Initiated	12/31/2013

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

Notes to Duration Schedules:

- All construction work requiring outages will be performed during acceptable periods of system condition to ensure reliable operation of the system which most often is the off-peak load season. Line outages will be discussed with the SOC and TOC and the assumption is made that line outages will be executed as planned. However, an evolving system condition may result in cancellation of approved outages by the SOC/TOC and may also result in additional schedule delay.
- Substation construction will be coordinated with the transmission line outages when possible.
- Construction resources are available when required.
- Transmission Line and Substation projects will begin subsequent to Definition phase Project Execution Plan.
- This schedule does not account for non-typical adverse weather conditions.
- Schedule durations are high level estimates at this time. A detailed schedule will be prepared upon project approval.

- Scheduling assumption and completion dates for Trace Creek and line cut-in:
- Submission to ICT by 07/15/10
- Approval to proceed with the project – 150 days = 12/17/10
- Funding Project (FP)/Work Order approvals – 1 month = 01/14/11
- Initiation – Project Scoping Plan – 01/21/11
- Definition phase – completion of Project Execution Plan/Estimates - 04/29/11
  Approval from customer to proceed with the project by 05/27/11
  Revised FP approved by 06/10/11
  Commence Engineering, order material, ROW easement, environmental permitting, etc
  Secure ROW and permits by December 2011
- Issue design packages for Trace Creek and line cut-in by December 2011
  Order material by September 2011 for delivery by March 2012
  Construct Substation and line cut-in by October 2012. Assumed outage of line in last 2 weeks of October 2012 is granted to connect the line to Trace Creek Substation

8. INTERCONNECTION STANDARDS

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

9. RISK ASSESSMENT

Risk	Comment	Impact
Underground site issues (Pipelines, wells, containments)	Unknown underground factors will add mitigation costs and may impact schedule	***
Material transportation could affect cost/schedule	Large transformers(other equipment) may require special transport to substation site	**
Material costs steel & Equipment	Rising steel, copper, fuel and other market conditions could greatly affect estimated cost.	****
Lay-down areas	Cost to be determined during detailed scoping.	*
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 (Transformer, Poles)	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.	***
T-Line ROW Acquisition	Cost and duration may change due to land owner issues.	***
T-Line Structures Count can change	Scope based on preliminary structure count.	***
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.	**
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 impact to cost.

10. CONFIRMED RESERVATIONS

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

- Non-Firm IPPs within the local region of the study generator were turned off and other non-firm IPPs outside the local area were increased to make up the difference.
- Confirmed firm transmission reservations were modeled.
- Approved transmission reliability upgrades for 2010 – 2012 were included in the base case. These upgrades can be found at Entergy's OASIS web page, http://www.oatioasis.com/EES/EESDocs/INFO.htm under the Transmission Studies table link "ICT Planning Studies and Related Documents" .

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

PID	Substation	MW	In-Service Date
PID 221	Wolf Creek	875	In-Service
PID 223	PID-223 Tap	125	10/1/2010
PID 224	PID-224 Tap	100	12/1/2009
PID 228	PID-228 Tap	115	4/30/2011

Prior transmission service requests that were included in this study:

OASIS #		PSE	MW	Begin	End
1668165		Entergy Services (SPO)	600	1/1/2013	1/1/2043

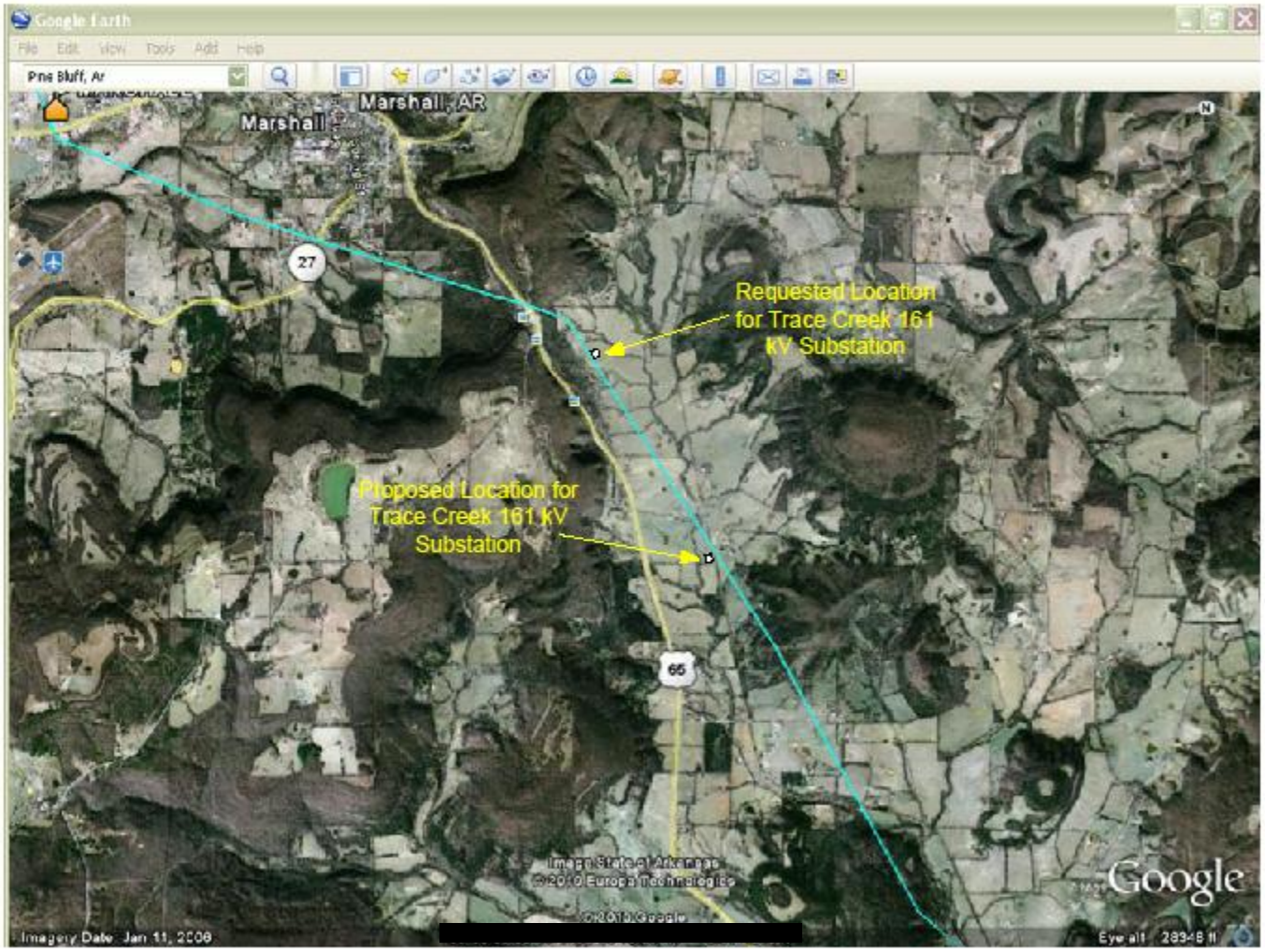
11. ATTACHMENTS

A. Table of Acronyms

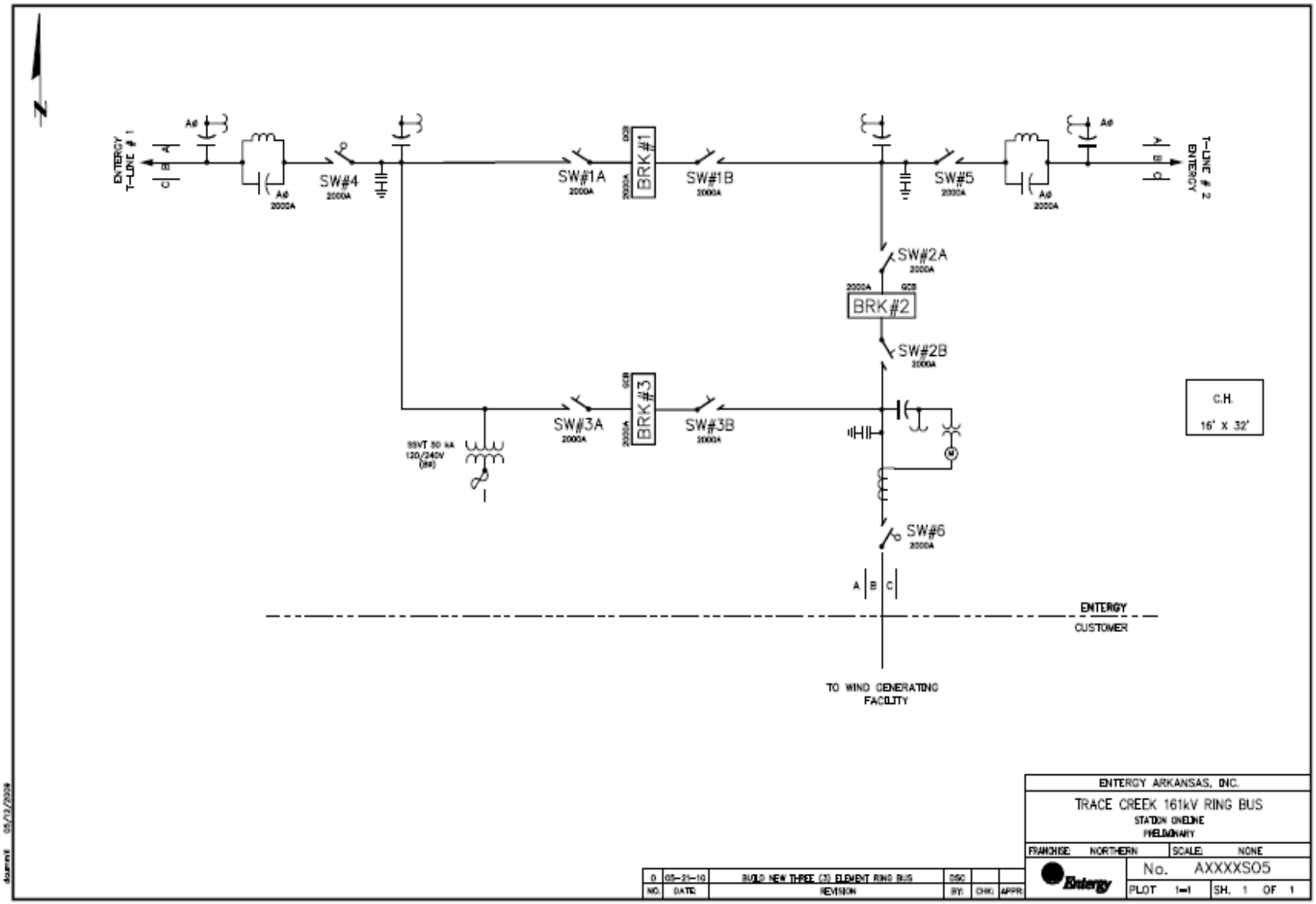
ACSR	Aluminum Conductor Steel Reinforced
ACSS	Aluminum Conductor Steel Supported
ADEQ	Arkansas Department of Environmental Quality
AFUDC	Allowance for Funds Used During Construction
ATC	Available Transfer Capability
BMP	Best Management Practice
CCN	Certificate of Compliance and Need
CCVT	Coupling Capacitor Voltage Transformer
CVT	Capacitor Voltage Transformer
EES	Entergy Control Area
EHV	Extra-High Voltage
ERIS	Energy Resource Interconnection Service
ICT	Independent Coordinator of Transmission
LIDAR	Light detection and ranging
kV	Kilo-Volt
MCM	(M) Thousand Circular Mils
MVA	Mega-Volt Amp
MW	Mega-Watt
NESC	National Electric Safety Code
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
PT	Potential Transformer
ROW	Right of Way
RTU	Remote Terminal Unit
SAIC	Science Applications International Corporation
SES	Steam Electric Station
SOC	System Operations Center
SHV	Super High Voltage
SW	Switch Station
TOC	Transmission Operations Center

B. Area Map showing line cut-in and location of Trace Creek

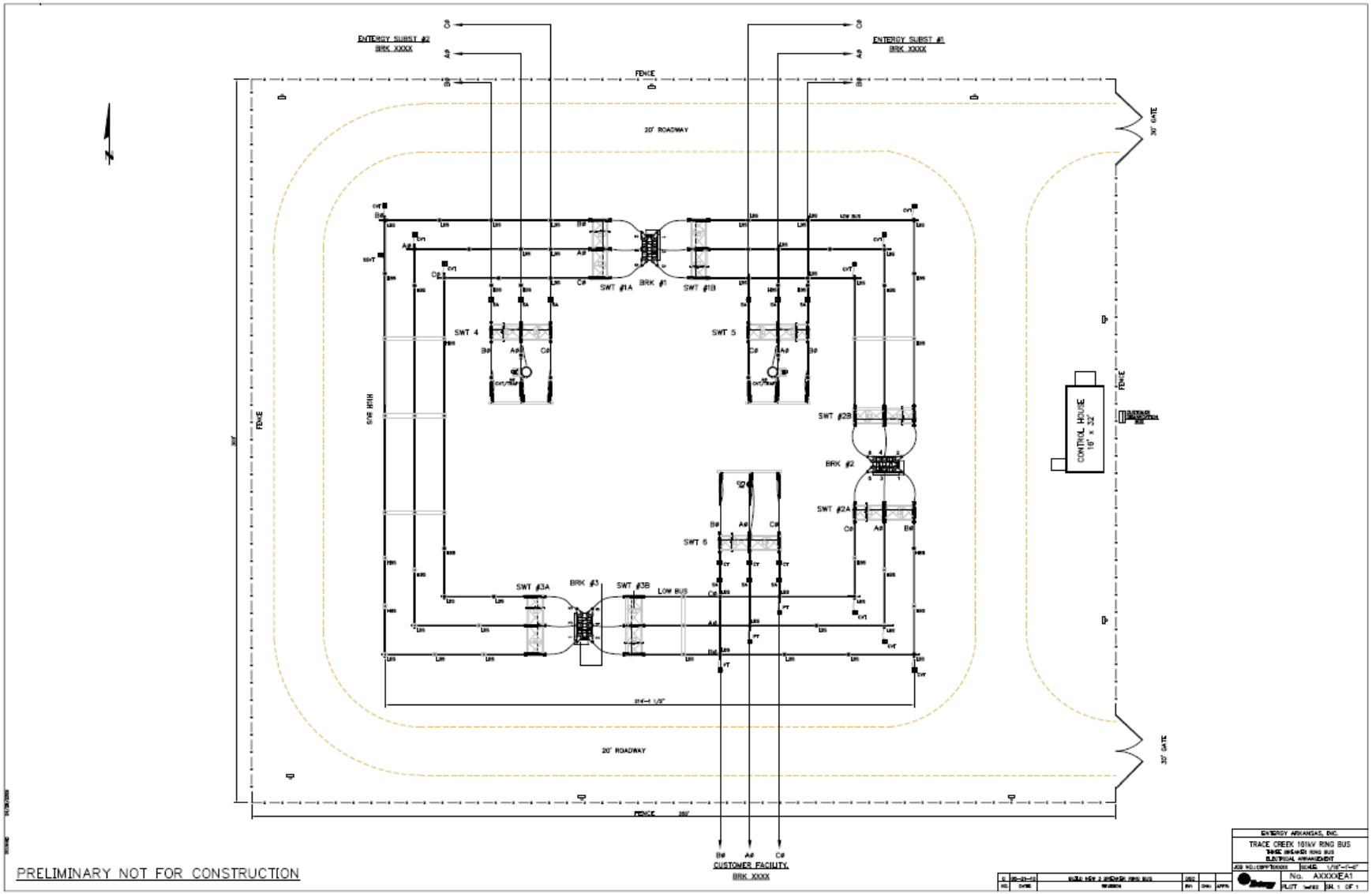
PID 233
Proposed Point of Interconnection



C. One Line Diagram
Trace Creek Substation

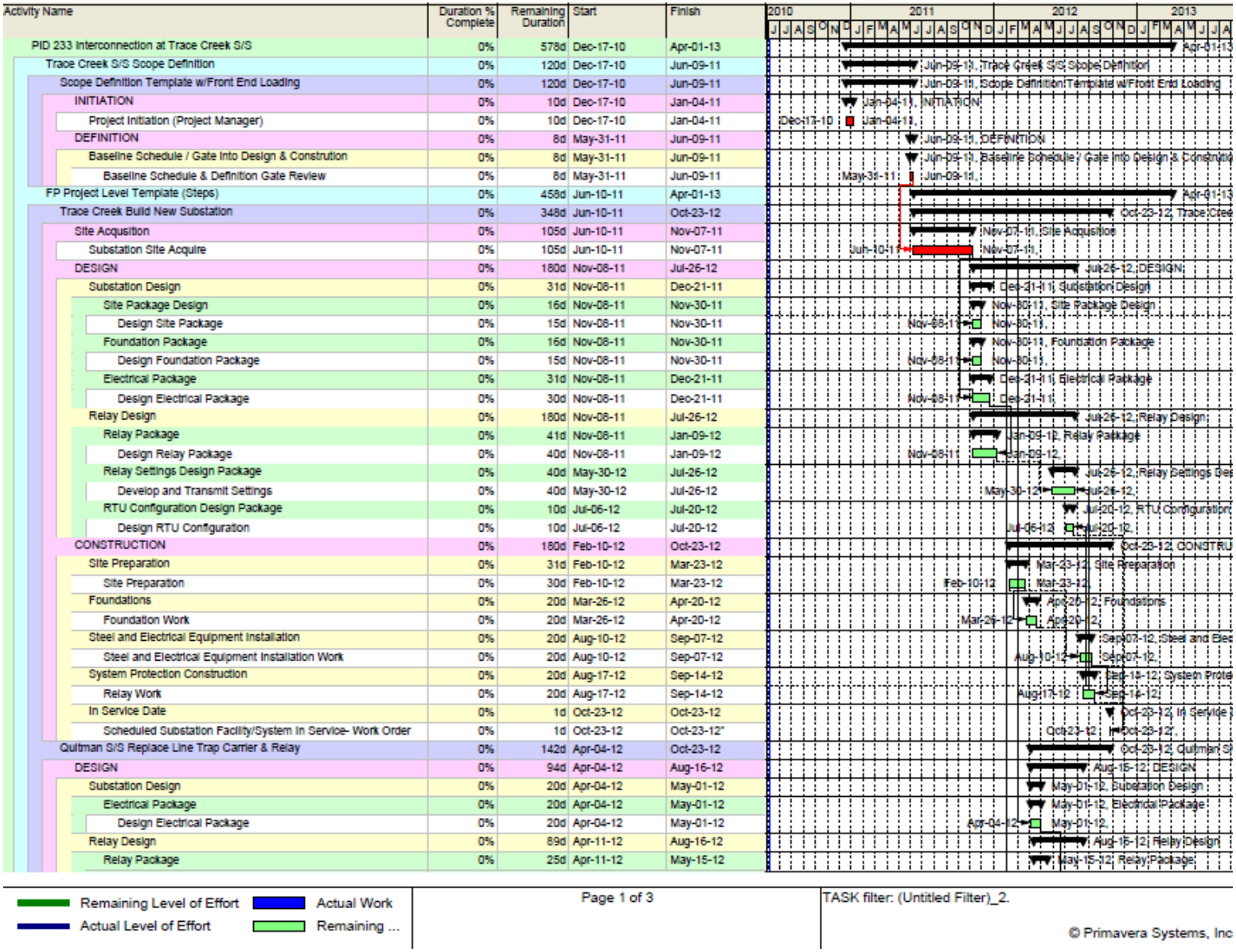


D. Electrical Arrangement



E. Duration Schedule

PID 233 Interconnection at Trace Creek S/S As of Jun-06-10



Activity Name	Duration % Complete	Remaining Duration	Start	Finish
PID 233 Interconnection at Trace Creek S/S	0%	578d	Dec-17-10	Apr-01-13
Trace Creek S/S Scope Definition	0%	120d	Dec-17-10	Jun-09-11
Scope Definition Template w/Front End Loading	0%	120d	Dec-17-10	Jun-09-11
INITIATION	0%	10d	Dec-17-10	Jan-04-11
Project Initiation (Project Manager)	0%	10d	Dec-17-10	Jan-04-11
DEFINITION	0%	8d	May-31-11	Jun-09-11
Baseline Schedule / Gate into Design & Constrution	0%	8d	May-31-11	Jun-09-11
Baseline Schedule & Definition Gate Review	0%	8d	May-31-11	Jun-09-11
FP Project Level Template (Steps)	0%	458d	Jun-10-11	Apr-01-13
Trace Creek Build New Substation	0%	348d	Jun-10-11	Oct-23-12
Site Acqusition	0%	105d	Jun-10-11	Nov-07-11
Substation Site Acquire	0%	105d	Jun-10-11	Nov-07-11
DESIGN	0%	180d	Nov-08-11	Jul-26-12
Substation Design	0%	31d	Nov-08-11	Dec-21-11
Site Package Design	0%	16d	Nov-08-11	Nov-30-11
Design Site Package	0%	15d	Nov-08-11	Nov-30-11
Foundation Package	0%	16d	Nov-08-11	Nov-30-11
Design Foundation Package	0%	15d	Nov-08-11	Nov-30-11
Electrical Package	0%	31d	Nov-08-11	Dec-21-11
Design Electrical Package	0%	30d	Nov-08-11	Dec-21-11
Relay Design	0%	180d	Nov-08-11	Jul-26-12
Relay Package	0%	41d	Nov-08-11	Jan-09-12
Design Relay Package	0%	40d	Nov-08-11	Jan-09-12
Relay Settings Design Package	0%	40d	May-30-12	Jul-26-12
Develop and Transmit Settings	0%	40d	May-30-12	Jul-26-12
RTU Configuration Design Package	0%	10d	Jul-06-12	Jul-20-12
Design RTU Configuration	0%	10d	Jul-06-12	Jul-20-12
CONSTRUCTION	0%	180d	Feb-10-12	Oct-23-12
Site Preparation	0%	31d	Feb-10-12	Mar-23-12
Site Preparation	0%	30d	Feb-10-12	Mar-23-12
Foundations	0%	20d	Mar-26-12	Apr-20-12
Foundation Work	0%	20d	Mar-26-12	Apr-20-12
Steel and Electrical Equipment Installation	0%	20d	Aug-10-12	Sep-07-12
Steel and Electrical Equipment Installation Work	0%	20d	Aug-10-12	Sep-07-12
System Protection Construction	0%	20d	Aug-17-12	Sep-14-12
Relay Work	0%	20d	Aug-17-12	Sep-14-12
In Service Date	0%	1d	Oct-23-12	Oct-23-12
Scheduled Substation Facility/System In Service- Work Order	0%	1d	Oct-23-12	Oct-23-12"
Quitman S/S Replace Line Trap Carrier & Relay	0%	142d	Apr-04-12	Oct-23-12
DESIGN	0%	94d	Apr-04-12	Aug-16-12
Substation Design	0%	20d	Apr-04-12	May-01-12
Electrical Package	0%	20d	Apr-04-12	May-01-12
Design Electrical Package	0%	20d	Apr-04-12	May-01-12
Relay Design	0%	89d	Apr-11-12	Aug-16-12
Relay Package	0%	25d	Apr-11-12	May-15-12

Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining ...

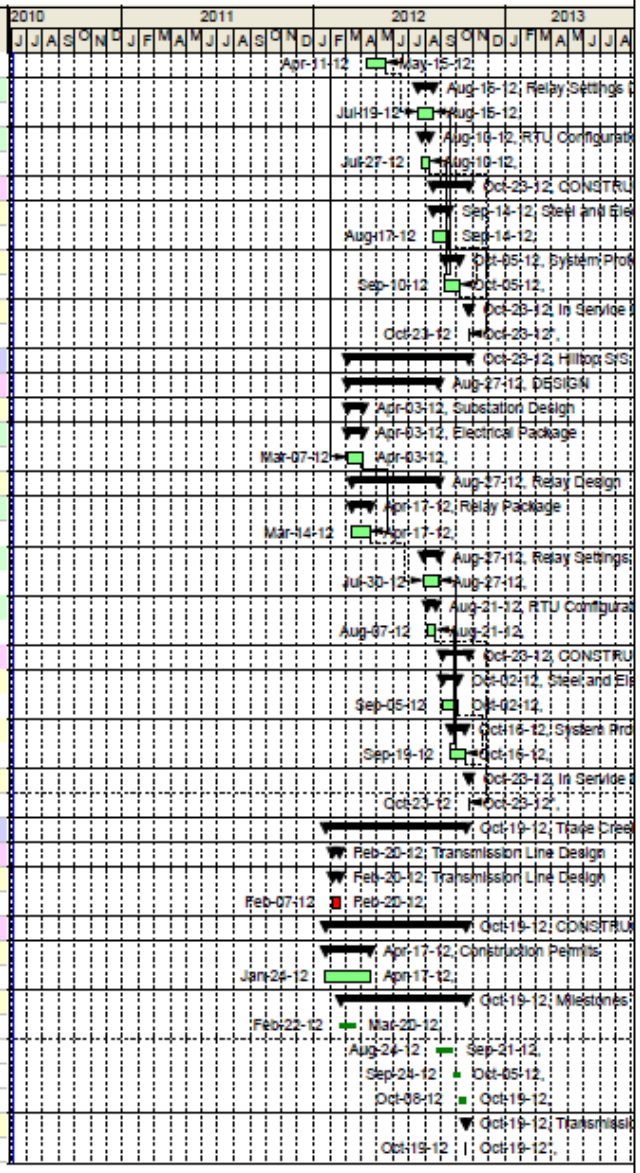
Page 1 of 3

TASK filter: (Untitled Filter)_2.

PID 233 Interconnection at Trace Creek S/S

As of Jun-06-10

Activity Name	Duration % Complete	Remaining Duration	Start	Finish
Design Relay Package	0%	25d	Apr-11-12	May-15-12
Relay Settings Design Package	0%	20d	Jul-19-12	Aug-16-12
Develop and Transmit Settings	0%	20d	Jul-19-12	Aug-16-12
RTU Configuration Design Package	0%	10d	Jul-27-12	Aug-10-12
Design RTU Configuration	0%	10d	Jul-27-12	Aug-10-12
CONSTRUCTION	0%	47d	Aug-17-12	Oct-23-12
Steel and Electrical Equipment Installation	0%	20d	Aug-17-12	Sep-14-12
Steel and Electrical Equipment Installation Work	0%	20d	Aug-17-12	Sep-14-12
System Protection Construction	0%	20d	Sep-10-12	Oct-05-12
Relay Work	0%	20d	Sep-10-12	Oct-05-12
In Service Date	0%	1d	Oct-23-12	Oct-23-12
Scheduled Substation Facility/System In Service- Work Order	0%	1d	Oct-23-12	Oct-23-12*
Hilltop S/S Replace Line Trap Carrier & Relay	0%	162d	Mar-07-12	Oct-23-12
DESIGN	0%	121d	Mar-07-12	Aug-27-12
Substation Design	0%	20d	Mar-07-12	Apr-03-12
Electrical Package	0%	20d	Mar-07-12	Apr-03-12
Design Electrical Package	0%	20d	Mar-07-12	Apr-03-12
Relay Design	0%	116d	Mar-14-12	Aug-27-12
Relay Package	0%	25d	Mar-14-12	Apr-17-12
Design Relay Package	0%	25d	Mar-14-12	Apr-17-12
Relay Settings Design Package	0%	20d	Jul-30-12	Aug-27-12
Develop and Transmit Settings	0%	20d	Jul-30-12	Aug-27-12
RTU Configuration Design Package	0%	10d	Aug-07-12	Aug-21-12
Design RTU Configuration	0%	10d	Aug-07-12	Aug-21-12
CONSTRUCTION	0%	35d	Sep-05-12	Oct-23-12
Steel and Electrical Equipment Installation	0%	20d	Sep-05-12	Oct-02-12
Steel and Electrical Equipment Installation Work	0%	20d	Sep-05-12	Oct-02-12
System Protection Construction	0%	20d	Sep-19-12	Oct-16-12
Relay Work	0%	20d	Sep-19-12	Oct-16-12
In Service Date	0%	1d	Oct-23-12	Oct-23-12
Scheduled Substation Facility/System In Service- Work Order	0%	1d	Oct-23-12	Oct-23-12*
Trace Creek S/S Line Cut-In	0%	190d	Jan-24-12	Oct-19-12
Transmission Line Design	0%	10d	Feb-07-12	Feb-20-12
Transmission Line Design	0%	10d	Feb-07-12	Feb-20-12
Finalize T-Line Construction Package and Incorporate Revisions	0%	10d	Feb-07-12	Feb-20-12
CONSTRUCTION	0%	190d	Jan-24-12	Oct-19-12
Construction Permits	0%	60d	Jan-24-12	Apr-17-12
Obtain Permits (Highway Crossing,SWPPP,Rail Road Crossing	0%	60d	Jan-24-12	Apr-17-12
Milestones Transmission Line Construction	0%	170d	Feb-22-12	Oct-19-12
Milestone-ROW Clearing	0%	20d	Feb-22-12	Mar-20-12
Milestone-T-Line Foundation Construction	0%	20d	Aug-24-12	Sep-21-12
Milestone-Pole/Structure Construction	0%	10d	Sep-24-12	Oct-05-12
Milestone-Conductor Construction	0%	10d	Oct-08-12	Oct-19-12
Transmission Line In Service Date	0%	1d	Oct-19-12	Oct-19-12
Scheduled Transmission Line Energized/In Service- Work Order	0%	1d	Oct-19-12	Oct-19-12*



Remaining Level of Effort | Actual Work
Actual Level of Effort | Remaining ...

TASK filter: (Untitled Filter)_2.

PID 233 Interconnection at Trace Creek S/S As of Jun-06-10