



Transmission and Distribution Substation Projects

Operating Company: Entergy Gulf States - Texas

Customer: PID #202

Funding Project Number: F4PPGS0386

Facility Study

for

PID #202 Facility Study for 146 MW

Revision History			
No	Date	Description	Author
A	June 20, 2007	Initial Facility Study	Gabe Munoz
B	June 21, 2007	Incorporation of comments and edits from a Project Team Review. Updated estimates and modified Relay/substation work & added L554 upgrade.	Gabe Munoz
C	June 22, 2007	Incorporate final team review.	Gabe Munoz
ZERO	June 28, 2007	JET Approved Facility Study	Gabe Munoz
ONE	July 3, 2007	ICT Final Review	ICT

EXECUTIVE SUMMARY

This facility study details the project scope and cost estimate associated with the proposed customer's expansion. To accommodate customer's request to integrate an addition of 146 MW of internal generation and the addition of 25 MW of load from Entergy's existing transmission system, Entergy has completed a system impact study and load flow analysis which have identified the need for the following upgrades.

- Upgrade of Kolbs Substation 69 kV breaker # 3505 to a minimum of 63 kA
- Upgrade approximately 2.53 miles of 230 kV Line 591 to 1720 amps
- Upgrade approximately 0.03 miles of 230 kV Line 532 to 1720 amps
- Relocate approximately 0.64 miles of 230 kV Line 554

The estimated cost of these upgrades is \$ 5,430,669 which includes estimated overheads but does not include tax gross up.

Notes:

- 1) **The scope of work detailed in this study is based on the referenced system impact study and load flow analysis. Future studies which incorporate varying system and load scenarios may reveal these upgrades unnecessary or may reveal additional necessary upgrades.**
- 2) **Due to potential violations with confidentiality agreements detailed line item project estimates will not be included in the attachments.**

Table of Contents

1. INTRODUCTION.....	4
2. PROJECT INITIATION	4
3. GENERAL PROJECT DATA.....	4
4. SAFETY.....	6
5. SCOPE.....	7
6. SCHEDULE.....	17
7. ESTIMATES.....	18
8. UPGRADE CLASSIFICATION.....	18
9. ATTACHMENTS.....	19

1. INTRODUCTION

The Facility Study serves as the scope document for an interconnection request to the Entergy Transmission System. Southwest Power Pool, Independent Coordinator of Transmission (ICT) performs functions related to the Generation Interconnection process as outlined in Attachment S to the Entergy Tariff. This Facility Study will include a project scope and a +/- 20% cost estimate for the designated project. Unlike a Project Execution Plan, the Facility Study will omit sections and sub-sections not required for compliance with this request.

2. PROJECT INITIATION

Combined, PID 202, the Project Scoping Plan ("PSP") and the Customer Reimbursement Agreement will serve as the project charter which authorizes the Project Manager to spend financial and human resources to execute the facility study. PID 202 for this project was issued to Entergy's EMCC group for completion on April 5, 2007 by project sponsor Chuck Hughes. The PSP was developed by the Jurisdictional Expert Team ("JET") on June 07, 2007 to validate PID 202 and initiate a plan to scope the project. The Customer Reimbursement Agreement was executed between the ICT, Customer, and Entergy Services on March 20, 2007 to fund the Facility Study Request.

3. GENERAL PROJECT DATA

3.1. Summary

Customer wishes to integrate the addition of 146 MW of internal generation and the addition of 25 MW of load into Entergy's existing transmission system. The purpose of this facility study is to create a scope and estimate the cost of the work associated with the Customer's proposed expansion. The Facility Study will be conducted by internal transmission resources following Entergy's Engineering Management and Capital Construction capital process. No other alternative methods of completing this study were discussed. This is a Customer Initiated project and the requested completion date by the customer is July 3, 2007.

3.2. Planning and Impact Studies

- 3.2.1. A System Impact Study was conducted to identify applicable upgrades necessary to the system to accommodate Customer's expansions. The study was based on the assumption there would be no export of the additional generation into Entergy's Transmission system. The study revealed the addition of the Customer's expansion would only cause one breaker at Kolbs Substation to be underrated under certain specific events and would therefore need to be upgraded.
- 3.2.2. A Load Flow analysis was performed by Entergy's Transmission Planning to identify upgrades necessary to the system to accommodate Customer's additional 25 MW of load. The planning study showed the need to upgrade 230 kV Line 591 and 230 kV Line 532 in order to serve the additional 25 MW of load.

3.3. Key assumptions

- 3.3.1. This study assumes funding will be handled by the execution of the reimbursement agreement and will not burden the 2007 Texas Jurisdictional budget.
- 3.3.2. This study assumes outages will not be unreasonably restrictive due to additional new projects, load growth or weather
- 3.3.3. This study assumes there are no different or abnormal conditions at the substation or transmission line ROW that have occurred since the upgraded assets were first installed.

3.4. Strategy for Facility Study Execution

The project team is to meet and complete their departmental input by June 20, 2007. A Scope review will be initiated through e-room voting. The Facility Study will then be processed for approval by the JET team in e-room voting. The result of a JET team approved study will be delivered to the ICT, at which time the identified upgrades will be classified as base plan or supplemental as defined in Attachment T to the Entergy Tariff.

3.5. Risk

The Facility Study will make no attempt to create a risk plan. Risk planning will be addressed by the assigned project team if and when the project associated with this Facility Study is approved. The project team will define cost, impact and mitigation strategies in the risk plan.

3.6. Construction

The facility study does not define a construction and outage plan. If and when this is an approved project the assigned project team will create a construction plan detailing contracting strategy, outage specifics and work sequences.

4. SAFETY

A detailed safety plan will be created by the assigned project team if and when this project is approved and funded. At the approval of this project the Project Manager will assign a Construction Engineer to create and follow the project safety plan & develop a safety audit form. The Construction Engineer will use appropriate departmental safety tracking forms to audit project incidents & statistical data. All team members will reference the Entergy Safety Manual.

4.1. Site Observations and Special Considerations

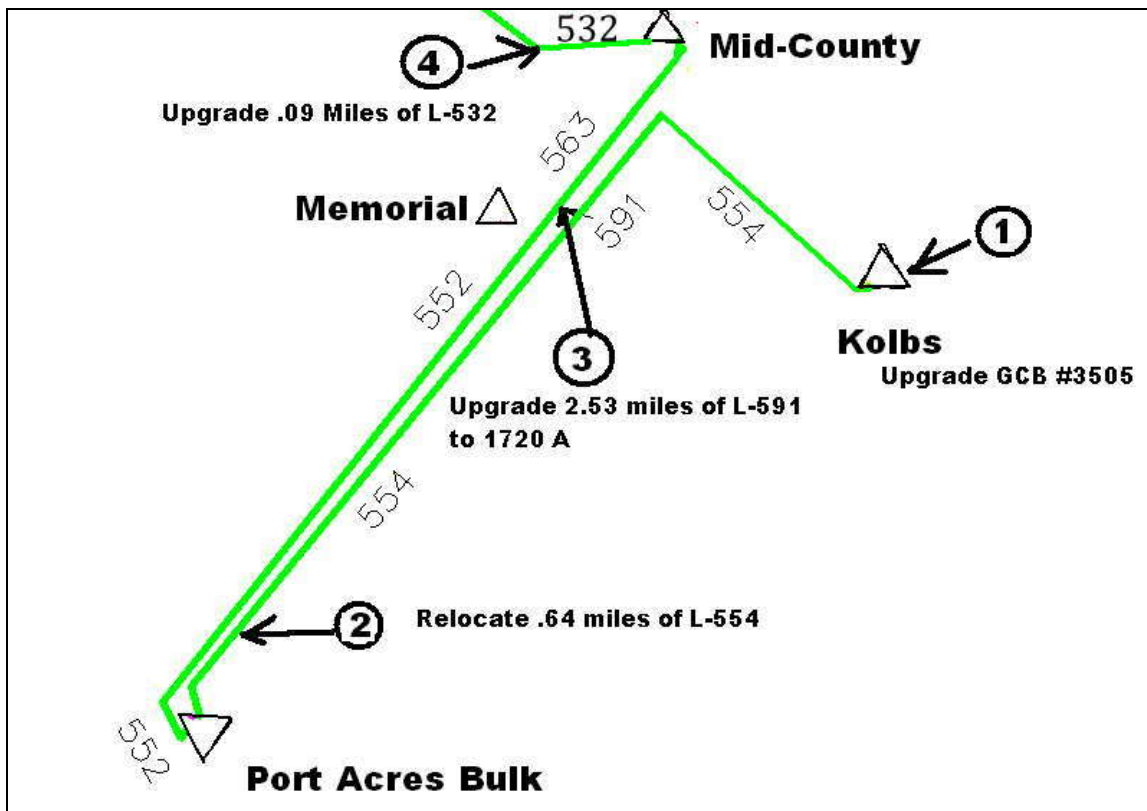
All site visits by EMCC personnel are to be documented with a site visit check list to be archived in eRoom. The following is a preliminary list of observed safety concerns

- Kolbs Substation is located near residential neighborhoods. Diligence is required in keeping the substation gate secured.
- Kolbs Substation has been vandalized several times. Precaution and due diligence will need to be executed regarding the inspection of equipment grounding.
- Precautions need to be taken working near energized equipment.
- A security service will be employed during construction while materials and equipment are in the field. The security service will remain outside of energized areas and will be required to have "Substation Awareness" training if stationed in a substation site.

5. SCOPE

To accommodate Customer's request to integrate an addition of 146 MW of internal generation and the addition of 25 MW of load from Entergy's existing transmission system, Entergy has completed a system impact study and load flow analysis which have identified the need for the following upgrades.

- Upgrade of Kolbs Substation GCB # 3505 to a minimum of 63 kA
- Upgrade approximately 2.53 miles of 230 kV Line 591 to 1720 amps
- Upgrade approximately 0.03 miles 230 kV Line 532 to 1720 amps
- Relocation of approximately 0.64 miles of 230 kV Line 554



This facility study has been requested to be completed by July 3, 2007 with a +/- 20% cost estimate. The estimated cost of these upgrades is \$ 5,430,669 which includes estimated overheads but does not include tax gross up.

5.1. Scope Details Kolbs Substation

The only identified upgrade at Kolbs Substation is GCB # 3505. Upgrade to a minimum of 63 kA is required. The estimated cost of these upgrades is \$ 507,640 which includes estimated overheads but does not include tax gross up.

5.1.1. Site Work

- Minimal site work will need to be performed (back fill and dressing of excavated soil and limestone from conduit and miscellaneous foundation installation).

5.1.2. Foundation Work

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

NOTE:

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

5.1.3. Electrical Work

- Disconnect, remove and scrape the existing gas circuit breaker (Breaker # 3505) and the jumpers connected to the existing disconnect switches (#3504 & #3506). Cut off the protruding portion of the existing anchor bolts.
- Purchase and Install one (1) new 145 kV, 3000A, 63 kA, 3-cycles interrupting time, 125 VDC control voltage, gas circuit breaker. 69 kV circuit breakers are not available with a 63 kA interrupting rating; therefore, a 145 kV class circuit breaker must be used for this application.

Care must be taken to ensure that no minimum substation electrical clearances are violated once the new breaker has been installed. Preliminary engineering has determined that there is sufficient clearance between the breaker terminal pads and the 69 kV lattice steel for the installation.

- The new circuit breaker will be oriented with bushings 2-4-6 in the West direction. The circuit breaker's control cabinet will be oriented in the North direction.
- Purchase and Install new 500 MCM conductor and terminal pads to replace the existing jumpers from the disconnect switches to the new circuit breaker bushings.
- Purchase and install six (6) new 2" flex conduits that will be run from the new replaced breaker (position #3505) to the existing circuit breaker junction box.
- Install and connect new 4/0 copper ground leads from the two appropriate circuit breaker legs to the existing station ground grid.
- The existing circuit breaker disconnect switches will not be replaced. Standard momentary ratings of 69 kV switches is 44 kA which is adequate for the new installation

5.1.4. Kolbs Substation Relay Work

The relaying for Bus #2 consists of PVD High Impedance Relaying with 2000:5A CT ratios tapped at 1200:5. It has been determined that the Bus relays cannot be properly set for this application due to the high fault current present. The 69 kV Bus #2 relays must be replaced. Both the 69 kV Bus differential schemes #1 and #2 are located on the same panel. Consequently, the panel is extremely congested and there is limited space for the retrofit installation. For this reason, a new bus #2 differential panel will be installed if there is adequate space in the control house. Any cables wired directly to the bus differential panel from any breaker tied to bus #2 must be replaced with a new cable. Current Entergy standard calls for installation of a low impedance bus differential scheme.

- Replace GCB 3505 with a new 145 kV, 3000A, 63 kA, 3-cycles interrupting time, 125 VDC control voltage, gas circuit breaker. 69 kV circuit breakers are not available with a 63 kA interrupting rating; therefore, a 145 kV class circuit breaker must be used for this application.
- Purchase, design and install one (1) Bus Differential Panel referencing Entergy standard PM0602, option E. However, the panel layout will need to be the 28" GSU wing-wall design.

These drawings have not been created and are not currently listed in the ESI Standards in the AM Meridian database. Contact standards engineer Mark Allen for drawings.

Reference Entergy HV Circuit Breaker Purchase Specification SD020204, Entergy Bus Differential Panel Design Standard PM0602 option E, current revision.

- The existing current, control, supply and SCADA circuits shall be reused and the new breaker wired to facilitate the existing circuits. New cables shall be pulled as needed from the breakers to the control house to maintain all existing circuits and new alarm points. A breaker junction box may be required to minimize any requirement for new cable. Existing control cables will be reused and terminated at the breaker junction box. New cables will be run through flexible conduit to the new breaker cabinet. Existing capacitor bank relaying will be reused. New breaker CTs have tap ratios available that match existing ratios if relay settings will not be modified. Reference the existing breaker connection and panel wiring prints
- There is an existing Basic D20 RTU. A new status card will be required. Reference RTU Edit Sheets from TOC.

5.1.5. Settings

Due to the replacement of OCB 3505 with 69 kV, 3000A GCB with 63 kA fault duty:

- System modeling verification will be required and settings for Bus #2 low impedance differential will need generated.
- Perform ground over current study in the immediate area

5.1.6. RTU

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

5.1.7. SCADA

Kolbs Substation SCADA details will need to reflect modified breaker rating.

5.2. Scope Details Transmission Line Work

5.2.1. Line 591 - Port Acres Bulk – Mid County

5.2.1.1. Transmission Line

Existing 230 kV Line 591 is approximately 4.93 miles of transmission line that extends from Mid County to Port Acres Bulk in Jefferson County, Texas. The existing rating for this line is 1260 amps and the majority of this line is bundled 395 ACAR. During Hurricane Rita a majority of this line was damaged. During the restoration construction rebuilt the damaged section with single steel poles and single 1272 kcmil ACSR conductor. The new rating for these sections is 1304 amps for approximately 2.40 miles from structures 19 to 45. The upgraded transmission line will be re-conducted to single 1272 kcmil ACSS code name "Bittern" conductor rated 2037 amps at 175°C. The area that was rebuilt was from structures 19 to 45. The 2.53 miles that were not damaged were left at a rated 1260 amps. The load requirements for the upgraded Line 591 is 1720 amps, and a single 1272 kcmil ACSS code name "Bittern" conductor has been selected by Entergy for the operation of this line. The estimated cost of these upgrades is \$4,023,024 which includes estimated overheads but does not include tax gross up

5.2.1.1.1. Line 591 Removal (2.53 Miles)

- Entergy will remove 17,040 feet of existing shield wire 5/16" EHS and replace with 7 #7 Alumoweld conductor.
- Entergy will remove thirty-four (34) existing wood structures, bundle 2x395 kcmil ACAR conductor and all associated hardware.
- Entergy will remove 36,700 lbs. of existing bundle 2x395 kcmil ACAR conductor and all associated hardware.
- Entergy will remove nine (9) x-arms
- Entergy will remove seven (7) x-Braces
- Entergy will remove nine-teen (19) grounds

5.2.1.1.2. Line 591 Installation (2.53 Miles)

Entergy will install the following:

- Thirty (30) 230 kV single poles steel structures.
- 59,845 lbs. single 1272 kcmil ACSR code name "Bittern" conductor and associated hardware.
- One hundred seventeen (117) 230 kV polymer braced post, and 230 kV dead-end polymer insulators that will be sized for a single 1272 kcmil ACSS code name "Bittern" conductor
 - Topographic surveys for the substation sites are also required.
 - All new structures will embed 20 feet for 230 kV. The structures will be self-supporting or guyed poles, and will utilize either vibratory socket caisson or vibratory base plated caisson however, foundations will be determined when design is finalized.
 - Three road crossing permits have been identified at this time; Highway 69, W. Port Arthur Road and 60th Street in Port Arthur. It has not yet been determined whether these permits are required or existed. Permits for these crossings will be needed and it is assumed that the design duration of our current design schedule will not be impacted.

5.2.1.1.3. Assumptions

- Foundations will be designed based off of the information provided by the Surveying, and soil borings. This scope is only based on site visits, and conversations with construction.
- Special clearances for State Highway and road crossing etc... will be determined in the design phase. Communication with the TX DOT is required to identify their requirements for each crossing.
- Assumption was made that there would not be any distribution under-build, or any pipeline underground built near to the transmission line structures.

- Assumption was made that the surveys and soil borings would not perform at this time. This scope is only based on site visits, and conversations with construction.
- Assumption was made that the existing soil conditions would allow for 20 feet embedded to be used on all new transmission structures that are installed. Once the soil borings are completed and final analysis is done on the soil data and if it is determined that the existing soil condition will not support 20 feet embedded on the transmission line structures then vibratory steel pile foundations will be used. The use of vibratory steel pile foundations will increase the cost of this estimate.
- Assumption was made that all local permits will be filed 60 days before start of construction.
- Assumption was made that all Environmental Permits will be approved 60 days before start of Construction.
- Assumption was made that the quantities of materials listed in this document are approximate and could change with completion of detail design.

5.2.1.2. Relaying

- Line relaying at Port Acres Bulk uses SEL 421 with a POTT/transfer trip scheme via type 40 tone and a SEL 311C distance backup. A relay impact study will identify any relay work that is required.
- Line relaying at Mid County uses SEL 421 with a POTT/transfer trip scheme via type 40 tone and a SEL 321 distance backup. A relay impact study will identify any relay work that is required.

5.2.2. Line 532 Mid County – Sabine

5.2.2.1. Transmission Line

Existing Line 532 is approximately 16.58 miles that extends from Sabine Substation in Orange County to Mid County Bulk in Jefferson County, Texas. The existing load for Line

532 is rated 1720 amps. The existing load for Line 532 from lattice tower #134 to the substation dead-end approximately 0.03 mile Transmission Line rated 1420 amps. The load requirements for the upgraded the segment of Line 532 is 1720 amps with a bundled 666.6 kcmil ACSR conductor code name "Flamingo" has been selected to replace the existing conductor by Entergy for the operation of this line. The estimated cost of these upgrades is \$ 322,506 which includes estimated overheads but does not include tax gross up

5.2.2.1.1. Line 532 Removal (0.03 Miles)

- Entergy will remove 435 feet single 1033 kcmil AA conductor and some associated hardware.
- Entergy will remove six (6) of existing insulators and all associated hardware.

5.2.2.1.2. Line 532 Installation (0.03 Miles)

Entergy will install the following:

- Six (6) 230 kV dead-end polymer insulators that will be sized for bundled 666.6 kcmil ACSR conductor code name "Flamingo".
- New bundled 666.6 kcmil ACSR conductor code name "Flamingo".

5.2.2.1.3. Assumptions

- Assumption was made that there would not be any distribution under-build, or any pipeline underground built near to the transmission line structures.
- Assumption was made that all local permits will be filed 60 days before start of construction.
- Assumption was made that all Environmental Permits will be approved 60 days before start of Construction.

5.2.2.2. Relaying

- Line relaying at Mid County uses SEL 421 with a POTT/transfer trip scheme via type 40 tone and a SEL 311C distance backup. A relay impact study will identify any relay work that is required.
- Line relaying at Sabine uses KD-4 primary relays with a POTT/transfer trip scheme via type 40 tone and a KD-4 distance backup. A relay impact study will identify any relay work that is required.

5.2.3. Line 554 Kolbs – Port Acres Bulk

5.2.3.1. Transmission Line

Existing 230 kV Line 554 is approximately 6.17 miles that extends from Kolbs Substation to Port Acres Bulk Substation in Jefferson County, Texas. The upgrade to Line 591 necessitates the relocation of structures 76 to the substation dead-end which is approximately 0.07 miles and carries 954 kcmil ACSR conductor. Additionally the replacement of the existing wood frame structures 66 to 71, which is approximately 0.57 miles with a rating of 1260 amps, is equipped with a single 1272 kcmil ACSR conductor will also need to be relocated. The estimated cost of the relocations is \$ 577,319 which includes estimated overheads but does not include tax gross up.

5.2.3.1.1. Line 554 Removal (0.64 Miles)

- Entergy will remove 7,524 pounds of bundled 395 kcmil ACAR conductor and all hardware associate with it.
- Entergy will transfer 3,380 feet of existing fiber optic wire to new poles and some hardware associate with it
- Entergy will remove twenty seven (27) of existing insulators and all hardware associate with it.
- Entergy will remove six (6) wood poles and one steel pole with socket caisson
- Entergy will remove six (6) x-arms
- Entergy will remove three (3) x-braces

- Entergy will remove six (6) grounds

5.2.3.1.2. Line 554 Installation (0.64 Miles)

Entergy will install the following:

- Six (6) single 230 kV poles steel structures, with two (2) steel poles with socket caisson foundation
- Six (6) 230 kV dead-end polymer insulators that will be sized for 1272 kcmil ACSR conductor code name "Bitterns".
- Eight-teen (18) 230 kV polymer braced post insulators that will be sized for 1272 kcmil ACSR conductor code name "Bitterns".
- Three (3) 230 kV post polymer insulators that will be sized for 1272 kcmil ACSR conductor code name "Bitterns".
- New 1272 kcmil ACSR conductor code name "Bitterns".
- Six (6) 230 kV dead-end polymer insulators that will be sized for a single 954 kcmil ACSR conductor code name "Cardinal".
- Three (3) 230 kV post polymer insulators that will be sized for single 954 kcmil ACSR conductor code name "Cardinal".
- New single 954 kcmil ACSR conductor code name "Cardinal".

5.2.3.1.3. Assumptions

- Foundations will be designed based off of the information provided by the Surveying, and soil borings. This scope is only based on site visits, and conversations with construction.
- Special clearances for State Highway and road crossing etc... will be determined in the design phase. Communication with the TxDOT is required to identify their requirements for each crossing.
- Assumption was made that there would not be any distribution under-build, or any pipeline underground built near to the transmission line structures.

- Assumption was made that the surveys and soil borings would not perform at this time. This scope is only based on site visits, and conversations with construction.
- Assumption was made that the existing soil conditions would allow for 20 feet embedded to be used on all new transmission structures that are installed. Once the soil borings are completed and final analysis is done on the soil data and if it is determined that the existing soil condition will not support 20 feet embedded on the transmission line structures then vibratory steel pile foundations will be used. The use of vibratory steel pile foundations will increase the cost of this estimate.
- Assumption was made that all local permits will be filed 60 days before start of construction.
- Assumption was made that all Environmental Permits will be approved 60 days before start of Construction.
- Assumption was made that the quantities of materials listed in this document are approximate and could change with completion of detail design.

6. SCHEDULE

A detailed project schedule will be created, baselined and maintained if and when the project associated with this Facility Study is approved. The following are rough durations. Assuming L-591 and L-532 cannot both be in the same construction or design step but either L591 or L532 can parallel Kolbs substation the duration of the entire project is estimated to be 84 weeks.

6.1. Kolbs Substation total = 40 weeks

- 6.1.1. Initiation through definition 12 weeks
- 6.1.2. Design & Procurement 24 weeks (lead time breaker = 20 weeks)
- 6.1.3. Construction & Closeout 4 weeks

6.2. Line 591 total = 72 weeks

- 6.2.1. Initiation through definition 16 weeks
- 6.2.2. Design & Procurement 40 weeks (lead time conductor = 22 weeks)
- 6.2.3. Construction & Closeout 16 weeks

6.3. Line 554 = 52 weeks

6.3.1. Initiation through definition 10 weeks

6.3.2. Design & Procurement 40 weeks (lead time conductor = 22 weeks)

6.3.3. Construction & Closeout 2 weeks

6.4. Line 532 = 52 weeks

6.4.1. Initiation through definition 10 weeks

6.4.2. Design & Procurement 40 weeks (lead time conductor = 22 weeks)

6.4.3. Construction & Closeout 2 weeks









7. ESTIMATES

Project	Material	Internal Labor	Contract Labor	Expense	Direct Subtotal	Estimated OH (38%)	Total Cost
L-532	\$ 4,700	\$ 75,000	\$ 150,000	\$ 4,000	\$ 233,700	\$ 88,806	\$ 322,506
L-591	\$ 1,014,366	\$ 136,000	\$1,750,000	\$ 15,000	\$ 2,915,366	\$ 1,107,839	\$ 4,023,204
L-554	\$ 209,718	\$ 26,000	\$ 173,629	\$ 9,000	\$ 418,347	\$ 158,972	\$ 577,319
Kolbs	\$ 113,940	\$ 128,053	\$ 120,862	\$ 5,000	\$ 367,855	\$ 139,785	\$ 507,640
Totals	\$ 1,342,723	\$ 365,053	\$2,194,491	\$ 33,000	\$ 3,935,267	\$ 1,495,402	\$ 5,430,669

8. UPGRADE CLASSIFICATION

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

9. Attachments

PSP	→	 C:\Motiva\Motiva PSP Rev B May 15 20
Facility Study Agreement	→	 C:\Motiva\202 FSA Attachment B Data.PI
Kolbs Estimate	→	 C:\Motiva\Motiva - Kolbs Substation Estir
Line 532 Estimate	→	 C:\Motiva\Estimate 1 L-532 101606.xls
Line 591 Estimate	→	 C:\Motiva\Estimate 3 L-591 101606.xls
Line 554 Estimate	→	 C:\Motiva\Estimate 2 L-554 101806.xls
System Impact Study	→	 C:\Motiva\PID-202 SIS Report1.pdf
Load Flow Analysis	→	 C:\Motiva\Motiva 230kV Load Flow Sum