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SOAH DOCKET NO. 473-10-4398
DOCKET NO. 38230

APPLICATION OF LONE STAR TRANSMISSION, LLC FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE CENTRAL A TO CENTRAL C TO SAM SWITCH/NAVARRO PROPOSED CREZ TRANSMISSION LINE	§ § § § § § § §	BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS

LONE STAR TRANSMISSION LLC'S RESPONSE TO PUC STAFF'S FIRST REQUEST FOR INFORMATION

Lone Star Transmission, LLC ("Lone Star") submits this response to PUC Staff's First Request for Information. The requests were received on June 17, 2010, so these responses are timely filed under Proc. R. 22.144(c)(1) and Order No. 1. These answers may be treated by all parties as if the answers were filed under oath.

Parties wishing to review voluminous responses may make arrangements to do so by contacting Edie Heuss, Brown McCarroll, L.L.P., 111 Congress Ave., Suite 1400, Austin, TX 78701, (512) 479-1132, eheuss@mailbmc.com.

Respectfully Submitted,

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ATTORNEYS FOR LONE STAR
TRANSMISSION, LLC

CERTIFICATE OF SERVICE

It is hereby certified that a copy of the foregoing has been hand delivered or sent via overnight delivery or first class United States mail, postage prepaid, to Commission Staff and all parties of record in this proceeding on this 28th day of June, 2010.

Chris Reeder

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 7, lines 14-15. Please provide a summary of the findings and the information regarding "other various data collection activities."

RESPONSE

Other data collection activities consisted of file and record reviews conducted at various state regulatory agencies (Texas Parks & Wildlife Department, Texas Historical Commission, Texas Archeological Research Laboratory), a review of published literature (see Section 9.0 of the Environmental Assessment and Routing Study), publicly available and for purchase geographic information system (GIS) mapping (i.e. Texas Natural Resources Information Systems, Energy Velocity (existing transmission lines and substations), FCC (communication towers), Railroad Commission of Texas (pipelines and oil/gas wells), Texas General Land Office (various), Texas Water Development Board (water well data), TxDOT (airports, city limits, highways), and U.S. Geological Society (hydrology data)), and frequent review of a variety of maps including recent color aerial photography (SAM, Inc. flown on May 18 and 19, 2009 and NAIP flown in 2008), U.S. Geological Survey (USGS) topographic maps, various roadway maps, and county appraisal district land parcel boundary maps. Please see Page 2-4 of the Environmental Assessment and Routing Study.

Findings of these data collection activities have been documented in various sections and on Figure 3-2 and Figures 3-2A through 3-2B of the Environmental Assessment and Routing Study.

Preparer: Mark Van Dyne	Title: Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne	Title: Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION
<u>The following questions refer to the testimony of Mark A. Van Dyne:</u>

Please refer to page 9, line 3. Please explain if any of the information collected during the helicopter surveys was not included in the Environmental Assessment.

RESPONSE
Yes, there is information that was collected during the helicopter surveys (as well as the numerous other reconnaissnce surveys) that was not included in the Environmental Assessment and Routing Study. This information consists of the various findings and field notes that were taken during all of the reconnaissance surveys. This information can be found in Burns & McDonnell, Box No. 2, Item No. 19 at the voluminous room.

Preparer: Mark Van Dyne Title: Marketing Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne Title: Marketing Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 10, lines 17-20. Did Burns & McDonnell only modify certain route links that were suggested by the attendees to the open house meetings or were apparent property boundaries used as a major criteria for routing?

RESPONSE

No, apparent property boundaries as well as existing compatible rights-of-way, were considered as opportunity areas that could be paralleled and/or utilized by potential alternative routes.

Preparer: Mark Van Dyne Title: Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne Title: Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 14, line 6. Of the 1,116 people, how many attended only one meeting?

RESPONSE

Unknown. The number of people who signed in once can be determined by reviewing the sign-in sheets in Lone Star's voluminous room; however, the number of people who attended more than one meeting but only signed in once cannot be determined.

Preparer: Amy Mullin — Title: Assistant Project Director, Lone Star Transmission, LLC

Sponsor: David K. Turner, P.E. — Title: Project Director, Lone Star Transmission, LLC

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 17, lines 10-12. Did you identify on Figure 3-2 and Figures 3-2A through 3-2F all of the potential to minimally impacts to the golden-checked warbler?

RESPONSE

Yes, based on the findings of helicopter surveys and review of data provided by the Texas Parks & Wildlife Department.

Preparer: Mark Van Dyne   Title: Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne   Title: Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 17, lines 15-19. Please identify the alternative routes and links for which Horizon Environmental Services, Inc. conducted a detailed helicopter survey for endangered species.

RESPONSE

Horizon's helicopter surveys were primarily focused on identifying potential suitable habitat for the golden-cheeked warbler and the black-capped vireo. All route links and alternative routes were evaluated during the helicopter surveys for such habitat.

Although the identification of potential habitat for other threatened or endangered species was not the focus of the Horizon helicopter surveys, the helicopter surveys did provide Horizon personnel with visual confirmation of the land cover and vegetation type crossed by the alternative routes that allowed an informed professional opinion as to the likelihood of encountering other threatened or endangered species or their habitat along the alternative routes (See Section 7.1.4.1, pages 7-4 through7-6 and Section 7.1.6.1, pages 7-7 through 7-13).

Preparer: Mark Van Dyne — Title: Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne — Title: Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION
The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 17. Besides the golden-checked warbler and the black-capped vireos, what other endangered or threatened species did Horizon Environmental Services, Inc. attempt to identify with the helicopter surveys?

RESPONSE
Please see Lone Star's response to Staff's First Set of RFIs, Request No. 1-6.

Preparer: Mark Van Dyne Title: Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne Title: Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 17, lines 21-22. Please describe "appropriate avoidance and/or mitigation measures" that Lone Star would use if actual habitat of endangered species exists on the approved route.

RESPONSE

After the Commission orders a route, if Lone Star determines that actual or occupied endangered species habitat exists (*e.g.*, Golden-cheeked Warbler and Black-capped Vireo) along the ordered route, then Lone Star intends to take "appropriate avoidance and/or mitigation measures" as discussed in Lone Star's responses to Yellowbird Second Set of RFIs, Requests Nos. 2-13, 2-14, 2-16, 2-17, and 2-18 (incorporated herein by reference). Similarly, Lone Star will determine areas of potential stop-over for whooping cranes and Lone Star will mark small diameter wires with bird diverter devices, as discussed in the Direct Testimony of Mr. David K. Turner, P.E., at page 15, line 8 to line 16. Please also refer to Mr. Turner's direct testimony at page 13, line 1 to line 20, and to Mr. Mayers' direct testimony at page 8, line 13 to line 20.

Co-Preparer:	Allan Wynn	Title:	Environmental Manager, NextEra Energy Resources, LLC
Co-Preparer:	David K. Turner, P.E.	Title:	Project Director, Lone Star Transmission, LLC
Co-Sponsor:	Daniel Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC
Co-Sponsor:	David K. Turner, P.E.	Title:	Project Director, Lone Star Transmission, LLC

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please refer to page 18, line 13. Please identify the testimony to which is being referred and please provide the information where the mitigation measures can be found.

RESPONSE

Please refer to Lone Star's response to Staff's First Set of RFIs, Request 1-8. Also, please refer to Lone Star's response to Sara Lew Link, et. al. First Set of RFIs, Request No. 1-3, and to Mr. David Turner's direct testimony at page 14, lines 3 to line 5 for a description of Lone Star's plan to avoid and minimize impacts to land use and landowners.

Co-Preparer:	Allen Wynn	Title: Environmental Manager, NextEra Energy Resources, LLC
Co-Preparer:	David K. Turner, P.E.	Title: Project Director, Lone Star Transmission, LLC
Co-Sponsor:	Daniel Mayers	Title: Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC
Co-Sponsor:	David K. Turner, P.E.	Title: Project Director, Lone Star Transmission, LLC
Co-Sponsor:	Mark Van Dyne	Title: Project Manager, BMcD

QUESTION

The following questions refer to the testimony of Mark A. Van Dyne:

Please provide an Excel Spreadsheet similar to Attachment 8 with two more columns added to the spreadsheet and the data populated for the two columns. The columns are the Route number(s) and the Map ID number(s).

RESPONSE

Per agreement with counsel for the Staff, the requested spreadsheet will be produced on or before July 2, 2010.

Preparer: Mark Van Dyne Title: Director of Environmental Studies & Permitting, Burns & McDonnell

Sponsor: Mark Van Dyne Title: Director of Environmental Studies & Permitting, Burns & McDonnell

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 3, lines 17-18. Please explain when it will be necessary to use a hybrid or steel monopole structure instead of a spun concrete monopole.

RESPONSE

A hybrid or steel pole may be used when a structure is required to be taller than 110' above grade, if the terrain is not suitable for transporting the heavier single piece spun concrete pole, or if the load on the pole is greater than what a spun concrete pole can handle.

Preparer:	Konrad Flemk	Title:	Construction Lead, NextEra Energy Resources, LLC
Sponsor:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 3, lines 17-18. Please define "hybrid" monopole structure and describe the typical size (height and thickness at ground level) of these structures that would be used by Lone Star for this project.

RESPONSE

The hybrid monopole structure referenced in Dan Mayers' testimony on page 3, lines 17-18 is defined as having a single concrete bottom section with multiple steel upper sections to form a single structure. The length of the concrete section will, at a minimum, cover all the setting depth of the pole. Together with the upper steel sections, the hybrid pole will achieve a typical structure above ground height of approximately 110 ft or more if necessary. The estimated pole diameter at the ground line will be approximately 54 inches.

Preparer: Dr. Jerry Wong Title: DHW
Sponsor: Dan Mayers Title: Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 3, lines 17-18. Please describe the typical size (height and thickness at ground level) of the steel monopole structure that would be used by Lone Star for this project.

RESPONSE

The steel monopole structure referenced in Dan Mayers' testimony on page 3, lines 17-18 is a single pole having multiple steel sections. The multiple-piece steel structure will have a typical above ground height of approximately 110 ft or more if necessary. For a direct-embedded steel pole, the estimated pole diameter at the ground line will be approximately 52 inches or more if necessary. At locations where direct-embedment is not suitable, a concrete caisson foundation will be installed.

Preparer: Dr. Jerry Wong Title: DHW
Sponsor: Dan Mayers Title: Director of Trans./Subst. Engineering,
NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Do the cost estimates for each route include an estimate for the use of hybrid or steel monopole structures that would be needed?

RESPONSE

Yes.

Preparer: T.O.Nasby Title: Senior Director / Engineering & Construction, NextEra Energy Resources, LLC

Sponsor: Dan Mayers Title: Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 5, lines 7-8. What is the approximate size in acres of the additional substations that will be required for reactive power devices?

RESPONSE

Based on conceptual layouts, the additional substations required for reactive power devices, known as Romney and Kopperl, will each be approximately seven (7) acres fenced. Additional area outside the substation perimeter fences will be needed for setbacks to property lines, access road development, and other civil engineering and transmission line approach requirements.The total acreage required will be approximately 15 acres.

Preparer: Don Schleicher, P.E. Title: Manager - Construction
Sponsor: Dan Mayers Title: Director of Trans./Subst. Engineering,
NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 6, lines 5-8. When does Lone Star expect to complete the negotiations for the purchase option agreement for the Central C substation location? Please confirm by affidavit when the agreement has been obtained.

RESPONSE

Please refer to Lone Star's responses to BTG First Set of RFIs, Requests Nos. 1-18, 1-19, 1-20, and 1-21.

Co-Preparer:	Larry Clendennen	Title: Manager of Land Services, Lone Star Transmission, LLC:
Co-Preparer:	David K. Turner, P.E.	Title: Project Director, Lone Star Transmission, LLC
Sponsor:	David K. Turner, P.E.	Title: Project Director, Lone Star Transmission, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 6, lines 11-12. Please provide the study that evaluated the several conductors. Please include a summary of the process that was utilized to determine the final conductor.

RESPONSE

The process that was utilized for comparatively evaluating several conductors and choosing a final conductor is included as noted below and in the attachment to this response.

Summary of Method for Determining and Evaluating Several Conductors

ECI conducted a loss study and estimated cost of construction in order to evaluate conductor candidates for Lone Star's 345kV CREZ line. Lone Star ultimately recommended 1590 42/19 ACSS "Falcon" conductor for its transmission lines although the original CREZ Transmission Optimization Study was based upon 1433 ACSS "Merrimac" conductor. Lone Star's recommendation was provided to ERCOT for evaluation and was deemed cost effective and consistent with the intent of the CTO Study. See Exhibit DM-3 of Mr. Mayers' direct testimony. Below is a summary of the method used to select the conductor, followed by a table (attached) summarizing the life cycle cost of each conductor option.

Conductor Economic Selection

After evaluation of various potential transmission conductors having high thermal-high continuous current capacity, it was determined that ACSS/TW transmission conductors were technically and economically superior to other high temperature conductors for this application. Other alternatives, such as ACCC have equal or better current carrying capacity but are several multiples of cost greater than the selected ACSS/TW. Therefore, the economics of construction for long transmission segments required for the CREZ facilities clearly identified the compact, trapezoidal strand ACSS/TW as the optimum conductor system. High temperature ACSS conductors using round strands were also considered, however, it was determined that the cost savings of approximately $10,000 per mile for double circuit construction or $5,000 per mile for single circuit associated with round strand ACSS was likely to be offset by the smaller diameter of the "size equivalent" ACSS/TW. In addition, the smooth profile of the ACSS/TW will result in superior conductor bundle performance related to conductor vibration and associated long term maintenance costs.

An Economic Conductor Evaluation Study is provided. A summary review of this document shows that a ranking of the ten (10) conductors studied showed that a two (2) bundle 1590 ACSS/TW Falcon is the preferred optimized conductor for all Lone Star line segments.

Equivalent Loading Basis

The entire CREZ system will become part of the interconnected EHV network system in Texas. Real time transfers of energy in transmission line segments will change over time from the initial fully built out system as patterns of new generation and load centers develop. Accordingly, the basis for an "equivalent loading" over a conductor's life for use in economic studies must be predicated on good judgment. This equivalent loading level determined by Lone Star and ECI utilized in our study was 2,800 amperes peak, or 1,673 MVA. Therefore, the economic evaluations contained in the detailed Economic Conductor Evaluation Study for the Lone Star Transmission were predicated on a lifetime average equivalent loading basis of 2,800 amperes.

Conductor Losses

Transmission conductor operating loss analysis included resistive loss based upon 200°C operating temperature for each conductor at the assumed peak equivalent lifetime load level to which an assumed annual load factor of 44.4% was applied. In addition, corona loss in fair weather for each alternative was included in the economic evaluations.

Preparer:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC
Sponsor:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

"Engineering with Distinction"
ELECTRICAL CONSULTANTS, INC.
3521 GABEL ROAD, BILLINGS, MONTANA 59102-4217 • PHONE: 406-259-9933 • FAX: 406-259-1164

July 27, 2009

Mr. Wayne Galli, Director
Lone Star Transmission, LLC
1000 Louisiana Street, Ste 5550
Houston, TX 77002

RE: Lone Star CREZ Project System Design Study and Recommendations

Dear Mr. Galli:

Electrical Consultants, Inc. (ECI) was retained by Lone Star Transmission, LLC as consultant to develop preliminary engineering for the Lone Star CREZ facilities. As a matter of record, it is noted that ECI has been responsible for numerous past system conceptual designs and analysis through 500 kV, and is one of the larger electric utility design consultants to the industry.

The Lone Star Transmission CREZ segments are shown geographically on the attached Transmission Route Map 2-20-2009; the associated switching arrangement for these facilities is depicted on Conceptual Transmission Operating Diagram, also attached to this report.

The Lone Star CREZ segments are located in central Texas, and consist of a double circuit 345 kV transmission line from Central A to Central C. From Central C to Sam Switch, lines are separate circuits on common towers; one circuit terminates at the Sam Switch bus, while the other bypasses Sam Switch and proceeds as a single circuit 345 kV transmission line on to Navarro, using towers that will allow for future double circuit construction. Lone Star Transmission will be responsible for construction of stations at Central C, Sam Switch and Navarro. In addition, the Central C to Sam Switch segment of the system will require Lone Star to construct two (2) series compensation stations to promote power flow on more lengthy segments of the Project. In support of the preliminary engineering for this project, Lone Star Transmission requested that ECI perform the following initial engineering tasks:

- Develop conceptual design criteria for 345 kV double circuit and single circuit line sections, as well as station facilities as a basis for economic and reliability and analysis.
- Perform a detailed conductor economic and thermal loading study for 345 kV transmission segments predicated on the 5000 amp peak continuous rating specified by ERCOT. In addition, supplementary analysis was to be performed for economics and thermal rating of lines having a lower rating of 4000 amps continuous.
- Provide the necessary justification, based upon engineering and economics, with concise and detailed information, as necessary for ERCOT to determine its requirements for economically justified system ratings.

ECI's analysis and study are presented in this letter report under sections titled Assumptions, Engineering and Economic Analysis and Recommendations.

1.0 Assumptions

As a basis for practical system design and defensible technical analysis with economics, Lone Star Transmission and ECI developed the following criteria as a basis for the Project:

a. After evaluation of various potential transmission conductors having high thermal-high continuous current capacity, it was determined that ACSS/TW transmission conductors were technically and economically superior to other high temperature conductors for this application. Other alternatives, such as ACCC have equal or better current carrying capacity but are several multiples of cost greater than the selected ACSS/TW. Therefore, the economics of construction for long transmission segments required for the CREZ facilities clearly identified the compact, trapezoidal strand ACSS/TW as the optimum conductor system. High temperature ACSS conductors using round strands were also considered, however, it was determined that the cost savings of approximately $10,000 per mile for double circuit construction or $5,000 per mile for single circuit was likely to be offset by the smaller diameter of the "size equivalent" ACSS/TW. In addition, it is the smooth profile of the ACSS/TW will result in superior conductor bundle performance related to conductor vibration and associated long term maintenance costs.

b. Experience of other utilities in the industry with high temperature conductors has shown that peak operating temperatures for conductors should be 250°C or less in order to provide long term reliable operation without exceeding the limits of temperature on associated line hardware and insulators.

Environmental and thermal assumptions used in the analysis are shown below in *Table 1*:

Variable	Value
Air Temp	43.3° C
Wind Speed	3.4 ft/sec
Wind Angle to cond	90°
Coefficient of emissivity	0.5
Coefficient of solar absorptivity	0.5
Solar Time	12 Noon
Date	6/21
Latitude	32°N
Conductor orientation	East/West
Atmosphere	Clear
Elevation	2400 ft

Environmental and Thermal Variable Values

Table 1

c. The entire CREZ system will become part of the interconnected EHV system in Texas. Loading in transmission line segments will change over time from the initial fully built out system as patterns of new generation and load centers develop. Accordingly, the basis for an "equivalent loading" over a conductor's life for use in economic studies must be *predicated on good judgment*. This equivalent loading level determined by Lone Star and ECI utilized in our study was 2,800 amperes peak, or 1,673 MVA.

d. The substation bus ratings for 5000 amp and 4000 amp capable of transmission line segments were determined as shown in *Table 2*.

Line Rating	Station Main Bus	Station Bay Bus
5000 amps	7000 amp	5000 amp
4000 amps	6000 amp	4000 amp

Assumed Station Bus Ampacity
Table 2

The preceding ratings were used for a basis for differential cost evaluation in substations; future analysis using anticipated load flow data will be part of the project final engineering.

e. Transmission operating loss analysis included resistive loss based upon actual peak operating temperature for each conductor at the assumed peak equivalent lifetime load level to which an assumed annual load factor of 44.4% was applied. In addition, corona loss in fair weather for each alternative was included in the economic evaluation.

f. Transmission Right of Way and design loading was evaluated for each conductor option assuming a 800 foot ruling span, 1000 foot maximum span, approximate 130 foot tangent tower height, conductors at 18% of ultimate strength final, an ambient temperature of 60 deg. F and conductor temperature of 250 deg. C. An additional 17 feet of horizontal clearance to the edge of the ROW was included with wind at 6 lbs @ 60°F to allow for any structures that may be present along the ROW.

g. Costs estimated in this report do not include, land or ROW, permitting and environmental, regulatory and legal costs, project management, materials procurement and management, construction management and applicable taxes. Therefore, the economic evaluations provided are a professional opinion of *comparative costs* for typical construction based on presently known facts and do not represent specific characteristics of the Project.

It is the opinion of ECI that the assumptions used in our technical and economic evaluation are realistic "normalized values" based upon known system purpose and expectations.

2.0 Economic Evaluation of Net Present Value (NPV)

Economic analysis performed by ECI assumed a 25 year depreciation cycle and 6.4% average finance cost before taxes with year 2013 dollars. The double circuit and parallel single segments are currently estimated to be ~271.4 miles; the single circuit 345 kV line is estimated to be ~35 miles. Line lengths will be corrected as right of way is obtained, variations from the assumed lengths will be germane to the analysis and conclusions.

Using the assumptions stated in the preceding section of this report, a thermal analysis of potential transmission conductor sizes was conducted, assuming applicable environmental conditions, with the SWRate software package. Conductors were evaluated for peak temperature at 4000 amps and 5000 amps continuous operation, as well as the normalized peak lifetime load level temperature that was used for NPV cost analysis. Conductor thermal operating temperature at various load levels in presented in the following *Table 3*.

Cond. Ref.	Conductor	Normalized 2,800 amp Bundle Temp (°C)	4,000 amp Bundle Temp (°C)	5,000 amp Bundle Temp (°C)
A	2156 Bluebird/ACSS/TW	77.1°C	106.2°C	141.5°C
B	1949.6 Athabaska/ACSS/TW	80.9°C	115.1°C	156.9°C
C	1926.9 Cumberland/ACSS/TW	80.8°C	115.8°C	159.5°C
D	1590 Falcon/ACSS/TW	89.2°C	136.2°C	196.3°C
E	1557.4 Potomac/ACSS/TW	91.6°C	142.2°C	207.2°C
F	1433.6 Merrimack/ACSS/TW	94.7°C	150.4°C	222.1°C
G	1351.5 Dipper/ACSS/TW	100.1°C	164.3°C	246.7°C
H	1272 Pheasant/ACSS/TW	102.6°C	171.1°C	N/A
I	1033.5 Curlew/ACSS/TW	117.4°C	205.7°C	N/A
J	954 Rail/ACSS/TW	132.4°C	249.7°C	N/A

Transmission Conductors – Peak Operating Temperature
Table 3

The results of thermal analysis for various conductor systems were compared to criteria established by Lone Star and ECI as stated in the preceding assumptions. As a result, conductors deemed suitable for installation for specified Project ratings are shown in *Table 4*.

Each of the conductors considered has unique characteristics that impact the transmission design evaluation and associated loadings, including weight, diameter and ultimate strength. These characteristics were considered in development of mid-level accuracy estimates for cost of construction of the double circuit and single circuit segments. Allowances were made for variation in loads due to increased conductor wind area, as well as weights of each conductor.

Cond. Ref.	4000 Amp Bundle Acceptable Conductors	5000 Amp Bundle Acceptable Conductors
A	Bluebird ACSS/TW	Bluebird ACSS/TW
B	Athabaska ACSS/TW	Athabaska ACSS/TW
C	Cumberland ACSS/TW	Cumberland ACSS/TW
D	Falcon ACSS/TW	Falcon ACSS/TW
E	Potomac ACSS/TW	Potomac ACSS/TW
F	Merrimack ACSS/TW	Merrimack ACSS/TW
G	Dipper ACSS/TW	Dipper ACSS/TW
H	Pheasant ACSS/TW	
I	Curlew ACSS/TW	
J	Rail ACSS/TW	

Transmission Conductors Selected for Study
Table 4

It is noted that a complete evaluation of comparative transmission systems and conductors must also consider characteristics of the right of way, exclusion locations for poles or matching of spans where parallel to other lines, issues that are presently unknown. *Therefore, we will evaluate conductor options predicated on basic costs and NPV and then discuss the advantages of each in regard to right of way and sag characteristics.* Due to current U.S. finance market conditions, ECI chose not to attempt to forecast escalation of labor and material to the 2013 in service date; therefore, current 2009 indices were used as a basis for costing. This initial cost of construction for transmission line segments is presented below in *Table* 5.

Conductor Size	Bundle	Type	Dbl. Ckt 345 kV Cost Per Mile ($)	Dbl. Ckt 345 kV Total Cost ($)	Single Ckt 345 kV Cost Per Mile ($)	Single Ckt 345 kV Total Cost ($)
954 Rail	(2) Each	ACSS/TW	**$1,123,550**	**$304,931,497**	**$702,219**	**$24,647,880**
1033.5 Curlew	(2) Each	ACSS/TW	**$1,460,615**	**$396,410,946**	**$912,884**	**$32,042,244**
1272 Pheasant	(2) Each	ACSS/TW	**$1,614,991**	**$438,308,534**	**$1,009,369**	**$35,428,863**
1351.5 Dipper	(2) Each	ACSS/TW	**$1,566,341**	**$425,105,000**	**$978,963**	**$34,361,610**
1433.6 Merrimack	(2) Each	ACSS/TW	**$1,902,058**	**$516,218,531**	**$1,188,786**	**$41,726,397**
1557.4 Potomac	(2) Each	ACSS/TW	**$1,718,470**	**$466,392,725**	**$1,074,044**	**$37,698,933**
1590 Falcon	(2) Each	ACSS/TW	**$1,997,538**	**$542,131,714**	**$1,248,461**	**$43,820,982**
1926.9 Cumberland	(2) Each	ACSS/TW	**$2,522,146**	**$684,510,433**	**$1,576,341**	**$55,329,579**
1949.6 Athabaska	(2) Each	ACSS/TW	**$2,244,516**	**$609,161,652**	**$1,402,823**	**$49,239,070**
2156 Bluebird	(2) Each	ACSS/TW	**$2,567,057**	**$696,699,206**	**$1,604,410**	**$56,314,808**

Transmission Conductors Selected for Study
Table 5

Clearly, initial cost of construction is an important factor to establish budgetary and financing requirements. However, true economic analysis must consider a lifetime cost of operation of facilities on the basis of the present worth or net present value. Each conductor system listed in the preceding table was evaluated for its NPV, assuming an in-service date of 2013, as well as assumptions previously defined. The results of our lifetime cost evaluation for sections of the Project are presented in the following *Table 6*. Total initial cost of construction and total NPV for double and single circuit segments combined are shown in *Table 7*.

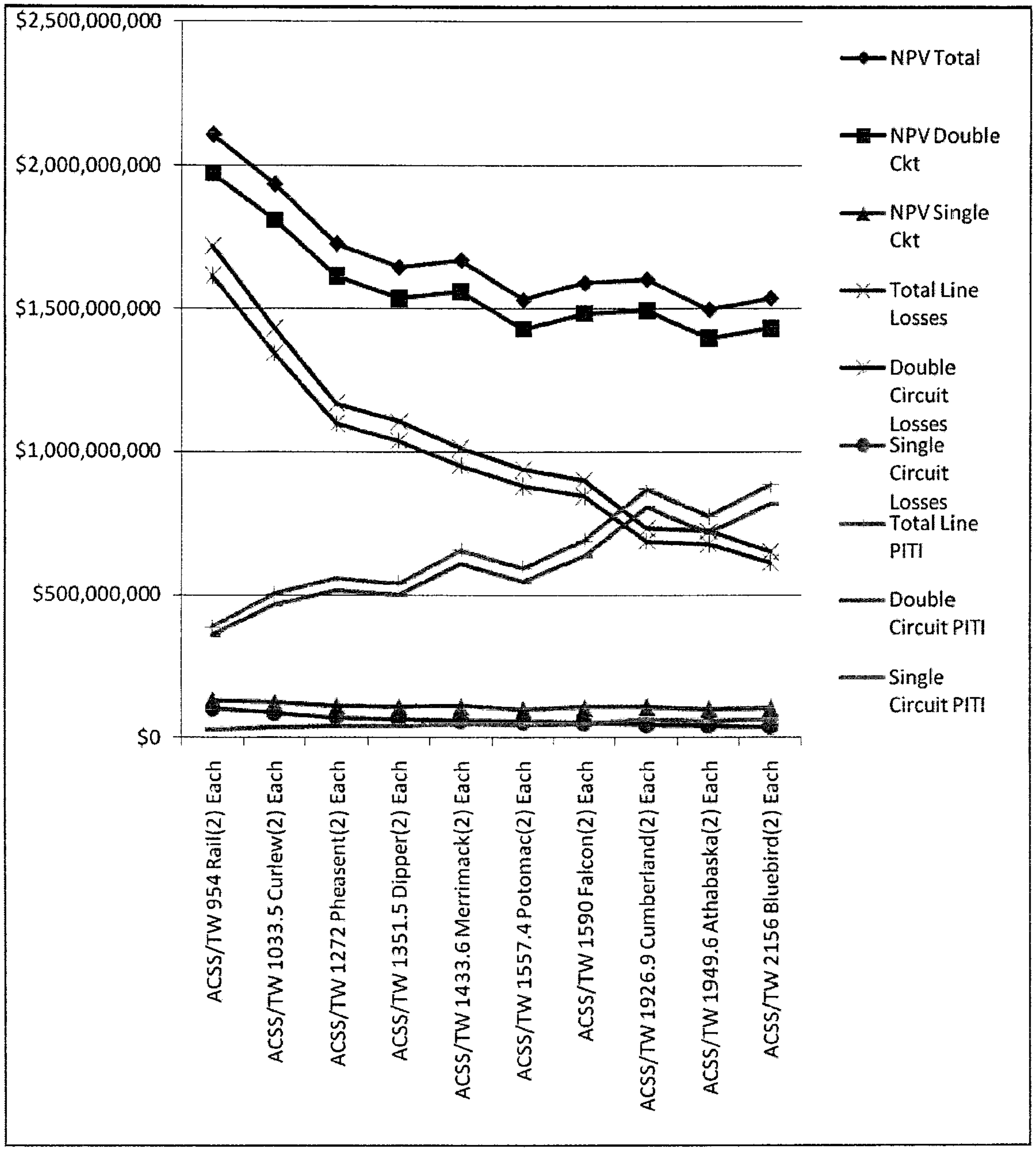
Conductor Size	Bundle	Type	Dbl. Circuit (271.4 Mi.) Net Present Value (2013 $)	Single Circuit (35.1 Mi.) Net Present Value (2013 $)
954 Rail	(2) Each	ACSS/TW	$1,972,917,108	$133,375,422
1033.5 Curlew	(2) Each	ACSS/TW	$1,810,387,410	$124,604,686
1272 Pheasant	(2) Each	ACSS/TW	$1,614,164,288	$112,712,529
1351.5 Dipper	(2) Each	ACSS/TW	$1,537,014,946	$107,472,665
1433.6 Merrimack	(2) Each	ACSS/TW	$1,558,954,859	$110,623,645
1557.4 Potomac	(2) Each	ACSS/TW	$1,429,761,939	$101,322,140
1590 Falcon	(2) Each	ACSS/TW	$1,484,047,876	$106,272,466
1926.9 Cumberland	(2) Each	ACSS/TW	$1,493,453,868	$109,587,591
1949.6 Athabaska	(2) Each	ACSS/TW	$1,395,894,895	$101,846,446
2156 Bluebird	(2) Each	ACSS/TW	$1,431,582,285	$105,818,415

Transmission Construction Options – Lifetime NPV by Segment
Table 6

Conductor Size	Bundle	Type	Total Transmission (306.5 Mi.) PITI Construction Cost (2013 $)	Total Transmission (306.5 Mi.) Net Present Value (2013 $)
954 Rail	(2) Each	ACSS/TW	$329,579,377	$2,106,292,531
1033.5 Curlew	(2) Each	ACSS/TW	$428,453,191	$1,934,992,095
1272 Pheasant	(2) Each	ACSS/TW	$473,737,397	$1,726,876,817
1351.5 Dipper	(2) Each	ACSS/TW	$459,466,610	$1,644,487,611
1433.6 Merrimack	(2) Each	ACSS/TW	$557,994,928	$1,669,578,503
1557.4 Potomac	(2) Each	ACSS/TW	$504,091,658	$1,531,084,079
1590 Falcon	(2) Each	ACSS/TW	$585,952,696	$1,590,320,341
1926.9 Cumberland	(2) Each	ACSS/TW	$739,840,011	$1,603,041,459
1949.6 Athabaska	(2) Each	ACSS/TW	$658,400,722	$1,497,741,341
2156 Bluebird	(2) Each	ACSS/TW	$753,104,014	$1,537,400,701

Transmission Construction Options –Total Capital Cost & Lifetime NPV
Table 7

The information presented in tabular form above is also being presented graphically in *Chart 1*, included below.



<u>Transmission Construction Options – Lifetime NPV, Losses & PITI</u>
Chart 1

As previously noted, an additional consideration in the selection of the optimum transmission line construction is the comparative sag and associated right of way requirements between conductor options. Conductors having a higher stringing tension and less sag have the potential to reduce structure height and cost. Also, although the cost of right of way is not currently represented in our basis economics, it is prudent to that these additional characteristics be strongly considered in the final recommendations. These characteristics for the conductor options are presented in the following *Table 8* at the maximum assumed 1000 foot span. Other assumptions used in this analysis are stated in Section 1.0 Item f.

Conductor Size	Bundle	Type	Maximum Temp. @ 5000A Capacity	Sag at 5000A Capacity (Ft.)	Right of Way Required (Ft.)
2156 Bluebird	(2) Each	ACSS/TW	141.5 °C	38.69	92.6
1949.6 Athabaska	(2) Each	ACSS/TW	156.9 °C	49.02	96.7
1926.9 Cumberland	(2) Each	ACSS/TW	159.5 °C	36.21	87.0
1590 Falcon	(2) Each	ACSS/TW	196.3 °C	37.48	89.0
1557.4 Potomac	(2) Each	ACSS/TW	207.2 °C	51.16	100.4
1433.6 Merrimack	(2) Each	ACSS/TW	222.1 °C	37.78	90.3
1351.5 Dipper	(2) Each	ACSS/TW	246.7 °C	51.24	102.4
1272 Pheasant	(2) Each	ACSS/TW	258.0 °C	38.69	91.7

Transmission Construction Options –Sag and ROW Comparisons
Table 8

It is noted that all of the above conductors are basically suitable for construction on a right of way having a median width of 100 feet, which includes the allowance previously noted to horizontal structures that may be present at the edge of the permitted route. *However, Dipper, Potomac and to a somewhat lesser degree, Athabaska will unquestionably result in higher structures and greater difficulty in longer spans, or in matching spans of up to 1200 feet in other existing lines.*

The final component of the project that required economic evaluation was the additional cost for construction of stations to accommodate a 5000 amp capacity per line termination. Again, good judgment and intuition leads us to understand that an individual line segment may carry peak loading during a N-1 system contingency (including double circuit lines), however, other line segments terminating at a given substation will potentially not be as impacted. For example, as stated in Section 1.0 Item d., we have assumed that individual lines rated 5000 amps terminating in a breaker and one-half yard will never result in the main bus ampacity requirements being in excess of 7000 amps continuous. Main bus and bay ratings and sizes required for both 5000 and 4000 amp capability were presented in *Table 1*. As previously noted, the split of load flow at station busses and their require ratings will be determined in the final design based upon best available load flow scenarios.

Currently, ECI is aware of only one manufacturer of 5000 amp dead tank circuit breakers in the industry. Therefore, meeting this continuous current operating rating was assumed to require use of more common live tank circuit breakers and associated oil filled instrument transformers and air switches. ECI used pricing from suppliers of this equipment, in addition to the cost for physical and electrical construction of yards using both live tank and dead tank switching, to determine the *cost differential* between design options. For the 5000 amp live tank option, main busses are 8 inch schedule 80 AL and bay busses are 6 inch schedule 80 AL. For the 4000 amp dead tank option, main and bay busses were 8 inch schedule 40 and 5 inch schedule 80, respectively. Possible aluminum bus selections and their respective ampacities at the target operation temperature of 100°C are shown in *Table 9* below.

Bus Description	Ampacity at 90 Deg C	Ampacity at 100 Deg C
5" Schedule 40 Aluminum Bus	3530	3939
5" Schedule 80 Aluminum Bus	4208	4685
6" Schedule 40 Aluminum Bus	4256	4746
6" Schedule 80 Aluminum Bus	5221	5823
8" Schedule 40 Aluminum Bus	5689	6362
8" Schedule 80 Aluminum Bus	7011	7841

Aluminum Tube Bus Ampacities
Table 9

Live tank breakers add cost for foundations and structures. In addition, conduit and trench systems must be placed at sufficient distance from the large oil-filled CTs so that a catastrophic event will not have potential to damage or burn groups of control cables in surface laid trenches. Cost differential between 5000 and 4000 amp options is tabulated in the following *Table 10*.

Substation / Switchyard	Complete Bays	Partial Bays	Adjustments*	Total Inc Cost
Central C Switchyard	3	0	0	$1,296,857
SC #1	0	1	-$20,000	$302,286
SC #2	0	1	-$20,000	$302,286
Sam Switch Switchyard	0	5	0	$1,611,428
Navarro Switchyard	3	3	0	$2,263,714
Total Incremental Cost				**$5,776,570**

*Delete 2 switches each bay

Substation and Switchyard Incremental Cost Addition for 5000A Bay Positions
Table 10

Use of the work "Bay" in the above table applies to a full 3-position breaker and one-half bay having three breakers and six air disconnect switches. A "Partial Bay" included all six air disconnect switches but only two 345 kV breakers.

Table 10 includes similar costs for bus, switches and breaker terminals to be rated 5000 amps continuous, however, no incremental cost differential for the series capacitors is included. Refer to the Recommendations Section for additional explanation.

3.0 Recommendations

The economic evaluation of conductors contained in this report show that use of conductors larger than the minimum required to carry either 5000 or 4000 amps continuously is justified. This is intuitively obvious from inspection of *Chart 1 – Transmission Construction Options – Lifetime NPV, Losses and PITI.* It is noted that the "low asymptote" point indicates that conductors as large as Athabaska can be justified based on the assumed cost of energy associated with losses; however, the larger Bluebird bundle is not. In addition to the NPV analysis contained in this report, more subjective yet important results can be drawn as follows:

- Use of conductors above 1500 kCM (Falcon, Cumberland, Athabaska and Bluebird) would not utilize the true capability of high temperature conductors to extend the range of continuous current under contingency conditions as intended in our initial assumptions. Conductors larger than the Cumberland would operate at less than 160°C at the 5000 amp load level, a considerable variation from the design criteria original intent. It is ECI's opinion that these larger conductors will be difficult to justify when considering that higher initial capital costs of construction and embedded rate base costs that are *assumed to be* recoverable through reduced losses at future line loading levels that cannot be predicted and could arguably be overstated in our assumptions.

- Change of one or more of several assumptions made in the analysis, including cost / kWH assigned to energy loss, ability to achieve acceptable voltage regulation on long SC lines, average annual load factor and the availability of certain equipment for operation at 5000 amps may change the basis for selection of conductors.

- Cumberland, Falcon and Merrimack conductors have superior right of way and sag characteristics that will be a benefit in reducing cost of a ROW suitable for construction and maintenance, as well as potentially reducing the average tangent structure height. However, these conductors have generally higher tensions for equivalent spans of comparative conductors, resulting in larger deadend and angle structure loads and weights. Common requirements of ERCOT or permitting agencies that may require matching spans of 1000 to 1200 feet to existing parallel lines would require very tall structures for conductor systems having greater sag at equivalent rated tension.

ECI did not evaluate conductors larger than Bluebird, as they are not economically justified and have undesirable impacts on visual impacts and right of way. Also, standard ACSS was not evaluated as it is our opinion that it has no cost advantage over the ACSS/TW as explained in Section 1.0 Item a. It is our opinion that the range of conductors considered is more than adequate for the conceptual design and conductor selection process, however, additional conductors can be investigated at the request of ERCOT or as otherwise deemed advisable.

Proceeding from the basis established immediately above and the Tables contained in Section 2.0, the following matrix of attributes summarizes the salient advantages of each conductor system for discussion; rank of alternatives ranges from 1=Best to 8=Worst.

Conductor Size	Bundle	Type	Conductor Operating Temp. Ranking	Superior ROW / SAG Ranking	Capital Cost Ranking (2013 $)	Life Time NPV Ranking (2013 $)
2156 Bluebird	(2) Each	ACSS/TW	1	5	8	3
1949.6 Athabaska	(2) Each	ACSS/TW	2	6	6	1
1926.9 Cumberland	(2) Each	ACSS/TW	3	2	7	5
1590 Falcon	(2) Each	ACSS/TW	4	1	5	4
1557.4 Potomac	(2) Each	ACSS/TW	5	7	3	2
1433.6 Merrimack	(2) Each	ACSS/TW	6	3	4	7
1351.5 Dipper	(2) Each	ACSS/TW	7	8	1	6
1272 Pheasant	(2) Each	ACSS/TW	8	4	2	8

Conductor Evaluation Matrix for 5000 Amp System
Table 11

Clearly, the four factors that have been used to rank conductors in *Table 10* are not all equal, and therefore, we would benefit from knowledge that is presently not available, including characteristics of the final right of way corridor in regard to numbers of angle and deadend structures, final requirements for visual impacts (structure height), knowledge of how generation development in west and central Texas will affect load flow and losses, as well as other factors. Since these factors cannot be accurately forecast, good judgment must once again be applied in selection of what is believed to be the optimum conductor system for the Project.

Aside from criteria that may drive the Project to be constructed based solely on NPV criteria, it seems prudent that each of the ranking factors have impact on the final selection. On this basis, we would first eliminate conductors that are at the bottom of any category, shown in gray shading in *Table 11* (Pheasant, Dipper and Bluebird). This reduction can be further reviewed in light of ECI's opinion that sag and ROW optimization will become critical issues for this project, dictating that conductors having higher rated strength will be necessary to meet siting and design requirements. Athabaska and Potomac, shown hatched in *Table 11*, have considerably less attractive sag characteristics and would thus be removed from consideration.

Our selection criteria leave Cumberland, Falcon and Merrimack as preferred conductors for the Lone Star system, considering all criteria. A comparison of PITI, NPV and conductor tensions is provided in *Table 12*.

Conductor Bundle (2) ACSS/TW	Capital Cost Percent of PITI ($) Conductor vs. Merrimack	Percent of NPV Conductor vs. Merrimack	Final Tension per Conductor (lbs)
Cumberland	132%	96.0%	9288
Falcon	105%	95.3%	7668
Merrimack	---	---	6912

Finalist Conductor – Comparative Data
Table 12

Clearly, Cumberland shows a significantly greater initial cost of construction than either Falcon or Merrimack/TW, while the NPV of Cumberland/TW and Falcon/TW remain relatively equal. This conclusion is supported by review of the stringing tension for Cumberland; the 21% greater tension and 1.5 foot greater average sag shown in *Table 8* will result in significantly greater costs of construction. *This PITI cost for use of the Cumberland/TW conductor has been estimated to be almost $154 million greater than the equivalent construction using Falcon/TW.* On this basis, ECI believes there is highest value in either the Merrimack/TW or Falcon/TW for the Lone Star Project transmission lines.

Construction with Falcon/TW is estimated to have an initial cost of $28M or 5% more than Merrimack, however, the NPV for Falcon/TW is estimated to save $79M over its service life. From all other perspectives, including maintenance and optimization of ROW, these two conductors are judged to be relatively equal.

It will be recalled that the base tangent tower used in the analysis was approximately 130 feet in height. *Table 8* shows that Falcon/TW *may potentially use a two foot shorter average tangent structure* compared to Merrimack/TW for the span assumed in this comparison. Falcon/TW will have greater initial tension *that will result in a somewhat higher cost for deadend structures*. Our EHV line design approach will use shorter spans into deadends where possible to keep the profile and overturning loads for these deadends to the minimum possible. In summary, the characteristics of these two conductors are so close to one another, and the unknowns related to the ROW so significant, that subjective analysis still supports the analytical conclusions of this report.

If reducing the lifetime value of losses is the priority of Lone Star, then Falcon/TW is recommended for the CREZ 345 kV system. However, if we hedge on our assumptions that cannot be verified and choose to construct at the lowest cost that still gives an optimized system, then the (2) bundle Merrimack ACSS/TW conductor is optimum for use on the Project.

It is noted that our selection of either Falcon/TW or Merrimack/TW for Project transmission lines is *somewhat* independent of whether it is intended to operate at 4000 or 5000 amps peak current due to the fact that other 4000 amp capable conductors considered (Curlew/TW and Rail/TW) have NPVs and other characteristics that are inferior to our recommended final options. Either 4000 or 5000 amp bundles require use of high temperature hardware. Operation at 4000 amps as compared to the current directive to design for the larger current results in a reduced sag of approximately 3.6 feet in the Merrimack conductor bundle. Assuming 6.5 tangents per mile, and a typical tangent structure material cost of $60,000 each for double circuit and $40,000 each for single circuit, the savings in structure cost at 4000 amps operation is approximately $825,000 for <u>each foot</u> savings in tangent structure average height. Using this criteria, the saving in line construction for 4000 amp Project transmission lines is $2,970,000.

Currently, our investigation has determined that 5000 amp rated series compensation (SC) equipment at 345 kV is not available. Industry standard SC equipment rated 3000 amps continuous does have short time capability of operation at 4000 amps. Since use of SC equipment is essential at peak current levels, this fact may make both rating and operation of long SC sections of the Project impractical at 5000 amps, baring the advent of new technology in the near future. In addition, we caution that detailed evaluation of the voltage regulation (rise) across SC stations be made; in other similar projects, ECI has determined that highly compensated EHV lines operated near surge impedance loading levels have unacceptable ramp and step voltage regulation over the desired range of operating currents.

In summary, the incremental cost to increase rating on the Lone Star Project components will be limited to the $2,970,000 savings in line cost from noted above, added to the $5,776,570 savings in stations from Table 10, **resulting in a total savings of $8,746,570 for the Lone Star CREZ project station and transmission line facilities if constructed for the lower 4000 amp rating.** Aside from economics, ECI suggests that the final determination for station design also consider the technical feasibility of operating longer series compensated lines.

4.0 Closing Comments

ECI acknowledges the complex nature and scope of the CREZ plan, as well as the coordination that will be required with the fifteen participating utilities. Obviously, not all of the criteria that have been used in this report may be applicable to segments to be constructed by other parties, however, it is our belief that our analysis is representative of systems required by most utilities.

We understand the essence of time in finalizing design criteria; ECI will be available on a priority basis to support additional requests of Lone Star for revised analysis or to meet with ERCOT in support of the Project. Please advise us of how we can best continue to support this effort.

Respectfully Submitted,

R.L. McComish, P.E., Principal Engineer
Texas P.E. No. 94457

and

Ladd Wilhelm, P.E., Engineering Mgr.

CC: Kevin Dunn
ECI Project Team

RLM:pm

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 6, lines 20-23, and page 16, line 3. Please explain how ECI developed cost estimates for the reactive equipment without the results of the reactive study being performed by ABB. Please provide all information regarding the reactive power needs and the detailed cost estimates for accommodating the need including the equipment requirements that is included in the Application.

RESPONSE

ECI's methodology for preliminary and conceptual estimating of the reactive equipment is included in the attachments to this response and was based on ERCOT's CREZ Transmission Optimization Study of April 2, 2008. The CREZ Transmission Optimization Study (Scenerio 2) required Lone Star to estimate the need for 150 MVAR of reactive compensation at Central C substation and 50% series compensation on the Central C to Sam Switch/Navarro 345kV lines. Subsequent to ECI's preparation of the preliminary estimate for reactive equipment, further analysis was performed (and continues to be performed) by ERCOT through their consultant (ABB), resulting in a modification to the reactive assumptions used in Lone Star's preliminary estimate. Namely, the 150 MVAR of shunt reactors at Central C in the preliminary estimate was modified to reflect a total of 200 MVAR of shunt reactors and 200 MVAR of shunt capacitor banks. Assumed series capacitor requirements at Romney and Kopperl remained unchanged. Please see Highly Sensitive Attachment 1 for the preliminary cost estimates for the Central C substation and the Romney and Kopperl series capacitor bank yards that were included in Lone Star's CCN application. The attachment to this request contains highly sensitive protected information that will be provided under seal.

Preparer:	Don Schleicher, P.E	Title:	Manager - Construction, NextEra Energy Resources, LLC
Sponsor:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 7, lines 6-9. Please identify the locations where additional right-of-way (ROW) width will be required. Do the cost estimates reflect the additional cost of the ROW and associated facilities, and what are the additional costs?

RESPONSE

Lone Star will make determinations concerning specific locations where additional ROW width will be required after the Commission orders a route, Lone Star gains access to properties, and conducts surveys and line design. However, in general additional ROW width will be required at all line angles and dead-ends over 8 degrees (guying), spans longer than approximately 940' (due to blow out) and when construction access is limited by terrain features. Please refer to Lone Star's response to BTG First Set of RFIs, Request No. 1-57 for Lone Star's ROW costs for the preferred route that accounts for the additional ROW acquisition.

Preparer:	Konrad Flemk	Title:	Construction Lead, NextEra Energy Resources, LLC
Sponsor:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

QUESTION

The following questions refer to the testimony of Dan Mayers:

Please refer to page 11, lines 23-24. Please provide the cost analysis that determines that spun concrete monopole structures are the most cost-effective and efficient structure for the Texas market. Provide any cost comparisons that were developed or relied upon to demonstrate that spun concrete monopole structures are the most cost-effective.

RESPONSE

Lone Star did not state in the referenced testimony that "spun concrete monopole structures are the most cost-effective and efficient structure for the Texas market" but rather that they "will result in a cost-effective and efficient CREZ transmission project."

See Attachment No. 1 filed with Lone Star's CTP Proposal on September 12, 2009. See Attachment No. 2 which contains supporting documents for Attachment No. 1.

Preparer:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC
Sponsor:	Dan Mayers	Title:	Director of Trans./Subst. Engineering, NextEra Energy Resources, LLC

Star Transmission, LLC
Docket No. 38230
Staff's RFI Set No. 1
Question No. 1-21, Attachment No. 1
Page 1 of 1

CREZ SCENERIO 2 - FPLE TRANSMISSION COST ESTIMATES

Attachment B to CTP Proposal of Lone Star Transmission

Assumes CCN permission to start in March 2010, ROW & permits available
Assume - 15 miles / month - best case for large projects
Assumes clearances if necessary are available when required
Development cost not included (land acquisition,permitting,environmental)
Assume engineering and labor resources are available
Engineering & Procurement time will add 5 months to total construction time
Costs are in 2008 dollars

		Cost ($M/mile)
Lattice	Cost dckt =	$1.46
Lattice	Cost sckt =	$1.18
Concrete	Cost dckt =	$1.37
Concrete	Cost sckt =	$1.07
Monopole	Cost dckt =	$1.90
Monopole	Cost sckt =	$1.56

			Construction	ERCOT	FPLE	FPLE	FPLE
			Time for		Lattice	Concrete	Steel monopole
Transmission Line Description	Structure miles	Ckt miles	T-line	Cost ($M)	Cost ($M)	Cost ($M)	Cost ($M)
Oklaunion to West Krum double circuit 345 kV line	106	212	12	$199.28	$154.27	$145.22	$200.95
West Krum to Anna double circuit 345 kV line	43	86	6	$80.84	$62.58	$58.91	$81.52
Willow Creek to Hicks double circuit 345 kV line	31	62	4	$58.28	$45.12	$42.47	$58.77
Central B to Central A double circuit 345 kV line	12	24	2	$22.56	$17.46	$16.44	$22.75
Central A to Central C double circuit 345 kV line	75	150	9	$141.00	$109.15	$102.75	$142.18
Central B to Willow Creek double circuit 345 kV line	168	336	19	$315.84	$244.50	$230.16	$318.49
Central C to Navarro/Sam Switch double circuit 345 kV line	168/148	336/296	18	$308.24	$238.94	$224.07	$311.76
Central D to Divide single circuit, double circuit capable	6	6	2	$8.40	$7.06	$6.39	$9.36
Central E to Central D single circuit, double circuit capable	27	27	3	$37.80	$31.79	$28.77	$42.11
McCamey C to McCamey D single circuit, double circuit capable	75	75	5	$105.00	$88.31	$79.92	$116.97
McCamey A to Odessa single circuit, double circuit capable	50	50	3	$70.00	$58.87	$53.28	$77.98
McCamey C to McCamey A single circuit, double circuit capable	12	12	2	$16.80	$14.13	$12.79	$18.71
McCamey D to Kendall double circuit 345 kV line	137	274	16	$257.56	$199.38	$187.69	$259.72
McCamey D to Twin Butte single circuit, double circuit capable	31	31	3	$46.50	$36.50	$33.03	$48.35
West A to Central D single circuit, double circuit capable	50	50	3	$70.00	$58.87	$53.28	$77.98
West A to West C single circuit, double circuit capable	25	25	2	$35.00	$29.44	$26.64	$38.99
West C to Odessa single circuit, double circuit capable	43	43	4	$60.20	$50.63	$45.82	$67.06
West A to Central A double circuit 345 kV line[1]	55	110	6	$103.40	$80.04	$75.35	$104.27
Total structure miles of CREZ scenerio #2 Transmission lines	1104						
Total circuit miles of CREZ scenerio #2 Transmission lines		1889					
Total Cost CREZ Scenerio #2 circuit miles				$1,936.70	$1,527.04	$1,422.99	$1,997.91

000003

CREZ AREA						
Panhandle	149	298	$280.12	$216.85	$204.13	$282.47
Central	444	888	$845.92	$655.17	$615.89	$853.95
McCamey	511	703	$810.66	$655.03	$602.97	$861.49
			$1,936.70	$1,527.04	$1,422.99	$1,997.91

Double circuit 345kV line on Lattice Towers

Generated: [ ] MW Delivered: [ ] MW

2X Bundled Lapwing

Item	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
MAIN OVH T-LINE - MATERIAL (Owner)	106 Mi.				
MAIN T-LINE ENGR.:					
Prelim. Design & Review of:	T-Line Design & Tech Support; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Route Survey AKA: Plan & Profile; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Transmission Route Geotechnical information	1	Lt.	75,000	$75,000
T-LINE: STRUCTURES	Height Ft. / Mat'l / Type / Span Ft.				
Tangent Structures	130 / Steel / Lattice / 900; 5.87 Ea. Strc's/mi.:	571	Ea.	43,500	$24,838,500
Angled Structures	varies / Steel / Lattice	15	Ea.	76,500	$1,147,500
In-Line D.E. Structures	varies / Steel / Lattice	15	Ea.	105,000	$1,575,000
Angled D.E. Structures	varies / Steel / Lattice	21	Ea.	112,500	$2,362,500
Special Structures	1.20% of Structures	7	Ea.	120,000	$840,000
T-LINE CONDUCTOR:					
Conductor Mat'l	2 Bundled; 1590 Lapwing; Sag & Waste Allowance: 2.00%; $3.39 / Ft. "AVE."; $20.36 /Ckt Ft.	217	Mi.	107,507	$23,328,911
OPGW + OHGW		109	Mi.	12,144	$1,323,696
Fiber Repeater Stations	Number of Miles Between Stations: 60 mi.	2	Ea.	50,000	$100,000
Balance of T-Line Mat'l & Misc.	Percent Adder for Balance of Mat'l 6.0%	217	Mi.	31,424	$6,819,054
					$62,510,161
MAIN OVH T-LINE - CONSTRUCTION (Contractor)	Assues 175 Ft. ROW				
MAIN OVH T-LINE					
T-Line: Engineering and Design	Responsibility With: Contractor Engr.	106	Mi.	19,890	$2,108,287
T-Line: Route Survey AKA: Plan & Profile	Responsibility With: Contractor Engr.	106	Mi.	10,000	$1,060,000
T-Line: Geotechnical information for Route	Based on obtaining data for 17.0% of structure locations	106	Mi.	2,094	$222,006
T-LINE: CONSTRUCTION					
Mob/Demob T-Line crews and Equipment	25885.44	1	Lt.	480,000	$480,000
Material Management	$1.10	7	Mo.	178,017	$1,257,989
T-LINE: STRUCTURES	Mat'l / labor @ $1.1/lb				
Erec: Tangent Structures	Includes, gnding; $500.00 / $31,900.00	571	Ea.	32,400	$18,500,400
Erec: Angled Structures	Includes, gnding; $500.00 / $56,100.00	15	Ea.	56,600	$849,000
Erec: In-Line D.E. Structures	Includes, gnding; $500.00 / $77,000.00	15	Ea.	77,500	$1,162,500
Erec: Angled D.E. Structures	Includes, gnding; $500.00 / $82,500.00	21	Ea.	83,000	$1,743,000
Erec: Special Structures	Includes, gnding; $500.00 / $88,000.00	7	Ea.	88,500	$619,500
T-LINE: CONDUCTOR, CABLE & FIBER					
Install: Conductor		217	Mi.	70,076	$15,206,469
Install: OVH Static Ground Wire		106	Mi.	6,577	$697,140
Install: OVH Fiber Optic		106	Mi.	13,033	$1,381,497
Supply / Install: Spacers, Dampers	$150.00 / $240.00 / 1.0 Ea. Per Bundle, spaced at 200.0 Ft.	16,791	Ea.	390.00	$6,548,490
Install: Insulators, Clamps, etc.			Ea.		$0
T-LINE: CIVIL WORK					
Foundations for Tangent Structures		2,284	Ea.	3,400	$7,765,600

Double circuit 345kV line on Lattice Towers

Generated: [ ] MW Delivered: [ ] MW

2X Bundled Lapwing

Item							QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Foundations for Special Structures							232	Ea.	8,200	$1,902,400
Install 12' wide access road							27,984	Lf.	15.00	$419,760
Supply / Install: Fencing	Type: 5-Strane Barb Wire with 10' space T-Post Stake (No Chain-Link)							Lf.		$0
Supply / Install: Gates - Permanent	Type: 36' Opening with one 18' swing Gates						200	Ea.	2,910	$581,900
Supply / Install: Cattle Guards	Type: Typical is 16 Ft. opening, PIP Conc., Installed level & stable.							Ea.		$0
R.O.W Clearing							106	Mi.	60,480	$6,410,880
Install Crane Pads							571	Ea.	700	$399,700
Restoration of R.O.W.							106	Mi.	14,000	$1,484,000
Construction Laydown Yards	10 Ac. Cleared, grubbed, rocked & Fenced	One Yard Every: 30 Mi.					4	Ea.	442,750	$1,771,000
OTHER T-LINE COST & IMPACTS										
T-Line: Inspection, Testing & Commissiong							106	Mi.	10,000	$1,060,000
T-Line: Other describe if used							0	Lt.		$0
Owner GENERAL M&A										$73,631,519
Owner - FIELD / SITE PERSONNEL	**People**	**Truck**	**Trips**	**Sub**	**Start**	**Finish**				
Owner: Project Manager	1	Yes	Yes	Yes	04/01/10	12/01/10	9.0	Mo.	14,250	$128,250
Owner: Construction Manager	1	Yes	Yes	Yes	04/02/10	12/02/10	9.0	Mo.	13,300	$119,700
Owner: Civil Superintendent	1	Yes	Yes	Yes	04/03/10	12/03/10	9.0	Mo.	11,400	$102,600
Owner: Electrical Superintendent	1	Yes	Yes	Yes	04/04/10	12/04/10	9.0	Mo.	11,400	$102,600
Owner: Interconn. Coordinator	1	No	Yes	No	04/05/10	12/05/10	9.0	Mo.	15,200	$136,800
Owner: T-Line Superintendent	2	Yes	Yes	Yes	04/06/10	12/06/10	9.0	Mo.	12,250	$110,250
Owner: Mat'l/Logistics Coordinator	1	Yes	Yes	Yes	04/07/10	12/07/10	9.0	Mo.	10,450	$94,050
Owner: Site/Prj. Coordinator	1	Yes	Yes	Yes	04/08/10	12/08/10	9.0	Mo.	10,450	$94,050
Owner: QA/QC Inspector	2	Yes	Yes	Yes	04/09/10	12/09/10	9.0	Mo.	10,450	$94,050
Owner: Safety & Enviommental	1	No	Yes	Yes	04/10/10	12/10/10	9.0	Mo.	10,450	$94,050
Owner - FIELD / SITE EXPENDITURES										
Prj. Vehicle's: Owner - Truck's		10 Ea.					81.0	Mo.	950	$76,950
Prj. Vehicle's: Insurance		$560	Per/Veh./Yr		10.0	Ea.	1	Lt.	33,600	$33,600
Subsistence for Field Personnel (lodging, meals, etc.)			7.0	Days Per Wk		81.00 mo.	2,438	Dy	125	$304,763
Travel (Air Fares, Vendor Inspections, Etc.)			3.5	Wks Per Trip		90.00 mo.	110.6	Ea.	875	$96,750
Home Office Support - Owner										
Owner - OTHER (If Not Carried By Contractor)										
Field Office Trailers - Owner		3 Ea.			03/01/10	01/01/11	31.0	Mo.	4,500	$139,500
Facilities & Infrastructure (sanitary, trash,etc.)					03/02/10	01/02/11	11.0	Mo.	8,000	$88,000
Misc. Field Office G&A (Office setup,etc.)					03/03/10	01/03/11	11.0	Mo.	18,500	$203,500
Communications to Field Facilities							1.0	Ea.	125,000	$125,000
Safety & Public Relations							1.0	Ea.	100,000	$100,000
										$2,244,463
PROJECT EXPOSURES: R/E/C										

Double circuit 345kV line on Lattice Towers

Generated: [ ] MW   Delivered: [ ] MW

2X Bundled Lapwing

		Set At				QTY's	UoM	$'s/UOM	TOTAL EST. $'S
RISK COSTS									
Builders All- Risk Insurance		2.75%	of EPC	Estimate Keith Kennedy is comfortable with, as a market would have to be created.		1.0	Lt.	$2,024,867	$2,024,867
Performance Bonds / Letters of Credit		1.60%	of EPC	Yeager SWAG		1.0	Lt.	$1,178,104	$1,178,104
General Liability Insurance Premium		$41.939	Per Mw		MW	1.0	Lt.	$0	$0
Construction Insurance		$425	Per Mw		MW	1.0	Lt.	$0	$0
DSU Insurance (Delayed Start-Up)		$0.252	Per $100 value			0.0	Lt.	$18,555,143	$0
Sales Tax (Non-Generation)	Cost carried by PV	6.50%	of EPC			0.0	Lt.	$4,786,049	$0
ESCALATION									
Substation: (Mat'l Only)		3.50%	Per Year for	0.33	Years	1.0	Ea.	0	$0
Main OVH T-Line: (Mat'l Only)		3.50%	Per Year for	0.33	Years	1.0	Ea.	2,187,856	$2,187,856
For Escalation:	Estimate Cost Based on:	06/03/08	Award EPC:	10/01/08					
CONTINGENCY									
Substation - Material (Owner)						3.00%	Pct.	0	$0
Substation Construction - (Contractor)						5.00%	Pct.	0	$0
Main OVH T-Line - Material (Owner)						5.00%	Pct.	62,510,161	$3,125,508
Main OVH T-Line - Construction (Contractor)						10.00%	Pct.	73,631,519	$7,363,152
T-Line: Construction			Construction Productivity Adj.	0%		106	Mi.	0	$0
						0.0	Lt.	0	$0
								21.6%	**$15,879,487**

ALL-IN Total Project Cost: **$154,265,629**

Cost per Mile: **$1,460,000**

Double circuit (1-Ckt Build) 345kV line on Lattice Towers

Generated: [ ] **MW** **Delivered:** [ ] **MW**

2X Bundled Lapwing

Item	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
MAIN OVH T-LINE - MATERIAL (Owner)	106 Mi.				
MAIN T-LINE ENGR.:					
Prelim. Design & Review of:	T-Line Design & Tech Support; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Route Survey AKA: Plan & Profile; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Transmission Route Geotechnical information	1	Lt.	75,000	$75,000
T-LINE: STRUCTURES	Height Ft. / Mat'l / Type / Span Ft.				
Tangent Structures	130 / Steel / Lattice / 900; 5.87 Ea. Strc's/mi.:	571	Ea.	43,500	$24,838,500
Angled Structures	varies / Steel / Lattice	15	Ea.	76,500	$1,147,500
In-Line D.E. Structures	varies / Steel / Lattice	15	Ea.	105,000	$1,575,000
Angled D.E. Structures	varies / Steel / Lattice	21	Ea.	112,500	$2,362,500
Special Structures	1.20% of Structures	7	Ea.	120,000	$840,000
T-LINE CONDUCTOR:					
Conductor Mat'l	2 Bundled; 1590 Lapwing; Sag & Waste Allowance: 2.00%; $3.39 / Ft. "AVE."; $20.36 /Ckt Ft.	109	Mi.	107,507	$11,718,209
OPGW + OHGW		109	Mi.	12,144	$1,323,696
Fiber Repeater Stations	Number of Miles Between Stations: 60 mi.	2	Ea.	50,000	$100,000
Balance of T-Line Mat'l & Misc.	Percent Adder for Balance of Mat'l 6.0%	109	Mi.	24,852	$2,708,881
					$46,789,285
MAIN OVH T-LINE - CONSTRUCTION (Contractor)	Assues 175 Ft. ROW				
MAIN OVH T-LINE					
T-Line: Engineering and Design	Responsibility With: Contractor Engr.	106	Mi.	19,890	$2,108,287
T-Line: Route Survey AKA: Plan & Profile	Responsibility With: Contractor Engr.	106	Mi.	10,000	$1,060,000
T-Line: Geotechnical information for Route	Based on obtaining data for 17.0% of structure locations	106	Mi.	2,094	$222,006
T-LINE: CONSTRUCTION					
Mob/Demob T-Line crews and Equipment	25885.44	1	Lt.	480,000	$480,000
Material Management	$1.10	7	Mo.	178,017	$1,257,989
T-LINE: STRUCTURES	Mat'l / labor @ $1.1/lb				
Erec: Tangent Structures	Includes, gnding; $500.00 / $31,900.00	571	Ea.	32,400	$18,500,400
Erec: Angled Structures	Includes, gnding; $500.00 / $56,100.00	15	Ea.	56,600	$849,000
Erec: In-Line D.E. Structures	Includes, gnding; $500.00 / $77,000.00	15	Ea.	77,500	$1,162,500
Erec: Angled D.E. Structures	Includes, gnding; $500.00 / $82,500.00	21	Ea.	83,000	$1,743,000
Erec: Special Structures	Includes, gnding; $500.00 / $88,000.00	7	Ea.	88,500	$619,500
T-LINE: CONDUCTOR, CABLE & FIBER					
Install: Conductor		109	Mi.	70,076	$7,638,273
Install: OVH Static Ground Wire		106	Mi.	6,577	$697,140
Install: OVH Fiber Optic		106	Mi.	13,033	$1,381,497
Supply / Install: Spacers, Dampers	$150.00; $240.00; 1.0 Ea. Per Bundle, spaced at 200.0 Ft.	8,396	Ea.	390.00	$3,274,440
Install: Insulators, Clamps, etc.			Ea.		$0
T-LINE: CIVIL WORK					
Foundations for Tangent Structures		2,284	Ea.	3,400	$7,765,600

Double circuit (1-Ckt Build) 345kV line on Lattice Towers

Generated: ______ **MW** **Delivered:** ______ **MW**

2X Bundled Lapwing

Item	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Foundations for Special Structures		232	Ea.	8,200	$1,902,400
Install 12' wide access road		27,984	Lf.	15.00	$419,760
Supply / Install: Fencing	Type: 5-Strane Barb Wire with 10' space T-Post Stake (No Chain-Link)		Lf.		$0
Supply / Install: Gates - Permanent	Type: 36' Opening with one 18' swing Gates	200	Ea.	2,910	$581,900
Supply / Install: Cattle Guards	Type: Typical is 16 Ft. opening, PIP Conc., Installed level & stable.		Ea.		$0
R.O.W Clearing		106	Mi.	60,480	$6,410,880
Install Crane Pads		571	Ea.	700	$399,700
Restoration of R.O.W.		106	Mi.	14,000	$1,484,000
Construction Laydown Yards	10 Ac. Cleared, grubbed, rocked & FenceOne Yard Every: 30 Mi.	4	Ea.	442,750	$1,771,000
OTHER T-LINE COST & IMPACTS					
T-Line: Inspection, Testing & Commissiong		106	Mi.	10,000	$1,060,000
T-Line: Other describe if used		0	Lt.		$0
					$62,789,272

Owner GENERAL M&A

Owner - FIELD / SITE PERSONNEL	People	Truck	Trips	Sub	Start	Finish	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Owner: Project Manager	1	Yes	Yes	Yes	04/01/10	12/01/10	9.0	Mo.	14,250	$128,250
Owner: Construction Manager	1	Yes	Yes	Yes	04/02/10	12/02/10	9.0	Mo.	13,300	$119,700
Owner: Civil Superintendent	1	Yes	Yes	Yes	04/03/10	12/03/10	9.0	Mo.	11,400	$102,600
Owner: Electrical Superintendent	1	Yes	Yes	Yes	04/04/10	12/04/10	9.0	Mo.	11,400	$102,600
Owner: Interconn. Coordinator	1	No	Yes	No	04/05/10	12/05/10	9.0	Mo.	15,200	$136,800
Owner: T-Line Superintendent	2	Yes	Yes	Yes	04/06/10	12/06/10	9.0	Mo.	12,250	$110,250
Owner: Mat'l/Logistics Coordinator	1	Yes	Yes	Yes	04/07/10	12/07/10	9.0	Mo.	10,450	$94,050
Owner: Site/Prj. Coordinator	1	Yes	Yes	Yes	04/08/10	12/08/10	9.0	Mo.	10,450	$94,050
Owner: QA/QC Inspector	2	Yes	Yes	Yes	04/09/10	12/09/10	9.0	Mo.	10,450	$94,050
Owner: Safety & Enviornmental	1	No	Yes	Yes	04/10/10	12/10/10	9.0	Mo.	10,450	$94,050

Owner - FIELD / SITE EXPENDITURES	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Prj. Vehicle's: Owner - Truck's	10 Ea.	81.0	Mo.	950	$76,950
Prj. Vehicle's: Insurance	$560 Per/Veh./Yr; 10.0 Ea.	1	Lt.	33,600	$33,600
Subsistence for Field Personnel (lodging, meals, etc.)	7.0 Days Per Wk; 81.00 mo.	2,438	Dy	125	$304,763
Travel (Air Fares, Vendor Inspections, Etc.)	3.5 Wks Per Trip; 90.00 mo.	110.6	Ea.	875	$96,750
Home Office Support - Owner					
Owner - OTHER (If Not Carried By Contractor)					
Field Office Trailers - Owner	3 Ea.; 03/01/10 – 01/01/11	31.0	Mo.	4,500	$139,500
Facilities & Infrastructure (sanitary, trash,etc.)	03/02/10 – 01/02/11	11.0	Mo.	8,000	$88,000
Misc. Field Office G&A (Office setup,etc.)	03/03/10 – 01/03/11	11.0	Mo.	18,500	$203,500
Communications to Field Facilities		1.0	Ea.	125,000	$125,000
Safety & Public Relations		1.0	Ea.	100,000	$100,000
					$2,244,463

PROJECT EXPOSURES: R/E/C

Double circuit (1-Ckt Build) 345kV line on Lattice Towers

Generated: ______ **MW** **Delivered:** ______ **MW**

2X Bundled Lapwing

Item		Set At		Notes		QTY's	UoM	$'s/UOM	TOTAL EST. $'S
RISK COSTS									
Builders All- Risk Insurance		2.75%	of EPC	Estimate Keith Kennedy is comfortable with, as a market would have to be created.		1.0	Lt.	$1,726,705	$1,726,705
Performance Bonds / Letters of Credit		1.60%	of EPC	Yeager SWAG		1.0	Lt.	$1,004,628	$1,004,628
General Liability Insurance Premium		$41.939	Per Mw		MW	1.0	Lt.	$0	$0
Construction Insurance		$425	Per Mw		MW	1.0	Lt.	$0	$0
DSU Insurance (Delayed Start-Up)		$0.252	Per $100 value			0.0	Lt.	$15,822,897	$0
Sales Tax (Non-Generation)	Cost carried by PV	6.50%	of EPC			0.0	Lt.	$4,081,303	$0
ESCALATION									
Substation: (Mat'l Only)		3.50%	Per Year for	0.33	Years	1.0	Ea.	0	$0
Main OVH T-Line: (Mat'l Only)		3.50%	Per Year for	0.33	Years	1.0	Ea.	1,637,625	$1,637,625
For Escalation:	Estimate Cost Based on:	06/03/08		Award EPC: 10/01/08					
CONTINGENCY									
Substation - Material (Owner)						3.00%	Pct.	0	$0
Substation Construction - (Contractor)						5.00%	Pct.	0	$0
Main OVH T-Line - Material (Owner)						5.00%	Pct.	46,789,285	$2,339,464
Main OVH T-Line - Construction (Contractor)						10.00%	Pct.	62,789,272	$6,278,927
T-Line: Construction			Construction Productivity Adj.	0%		106	Mi.	0	$0
						0.0	Lt.	0	$0
								20.7%	$12,987,350

ALL-IN Total Project Cost: **$124,810,370**

Cost per Mile: **$1,180,000**

Double circuit 345kV line on concrete structures

Generated: [ ] MW Delivered: [ ] MW

Item	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
MAIN OVH T-LINE - MATERIAL (Owner)	106 Mi.				
MAIN T-LINE ENGR.:					
Prelim. Design & Review of:	T-Line Design & Tech Support; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Route Survey AKA: Plan & Profile; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Transmission Route Geotechnical information	1	Lt.	75,000	$75,000
T-LINE: STRUCTURES	Height Ft. / Mat'l / Type / Span Ft.				
Tangent Structures	120 / Concrete / Round spun / 700; 7.54 Ea. Strc's/mi.:	749	Ea.	36,000	$26,964,000
Angled Structures	varies / Steel / monopole	15	Ea.	121,196	$1,817,940
In-Line D.E. Structures	varies / Steel / monopole	15	Ea.	131,732	$1,975,987
Angled D.E. Structures	varies / Steel / monopole	21	Ea.	142,708	$2,996,864
Special Structures	varies / Steel / monopole; 1.20% of Structures	9	Ea.	154,122	$1,387,099
T-LINE CONDUCTOR:					
Conductor Mat'l	2 Bundled / 1590 Lapwing; Sag & Waste Allowance: 2.00%; $3.39 / Ft. "AVE."; $20.36 /Ckt Ft.	217	Mi.	107,507	$23,328,911
OPGW + OPGW		109	Mi.	12,144	$1,323,696
Fiber Repeater Stations	Number of Miles Between Stations: 60 mi.	2	Ea.	50,000	$100,000
Balance of T-Line Mat'l & Misc.	Percent Adder for Balance of Mat'l 7.75%	217	Mi.	43,791	$9,502,601
					$69,572,097
MAIN OVH T-LINE - CONSTRUCTION (Contractor)	Assues 175 Ft. ROW				
MAIN OVH T-LINE					
T-Line: Engineering and Design	Responsibility With: Contractor Engr.	106	Mi.	19,890	$2,108,287
T-Line: Route Survey AKA: Plan & Profile	Responsibility With: Contractor Engr.	106	Mi.	10,000	$1,060,000
T-Line: Geotechnical information for Route	Based on obtaining data for 13.5% of structure locations	106	Mi.	2,138	$226,670
T-LINE: CONSTRUCTION					
Mob/Demob T-Line crews and Equipment		1	Lt.	480,000	$480,000
Material Management		7	Mo.	178,017	$1,257,989
T-LINE: STRUCTURES	Mat'l / Labor				
Erec: Tangent Structures	Includes, gnding; $500.00 / $18,000.00	749	Ea.	18,500	$13,856,500
Erec: Angled Structures	Includes, gnding; $500.00 / $16,675.00	15	Ea.	17,175	$257,625
Erec: In-Line D.E. Structures	Includes, gnding; $500.00 / $17,508.75	15	Ea.	18,009	$270,131
Erec: Angled D.E. Structures	Includes, gnding; $500.00 / $17,508.75	21	Ea.	18,009	$378,184
Erec: Special Structures	Includes, gnding; $500.00 / $20,000.00	9	Ea.	20,500	$184,500
T-LINE: CONDUCTOR, CABLE & FIBER					
Install: Conductor		212	Mi.	70,076	$14,856,090
Install: OVH Fiber Optic		106	Mi.	6,577	$697,162
Install: OVH Fiber Optic		106	Mi.	13,033	$1,381,498
Supply / Install: Spacers, Dampers	$150.00 / $240.00 / 1.0 Ea. Per Bundle, spaced a 200.0 Ft.	16,791	Ea.	390.00	$6,548,490
Install: Insulators, Clamps, etc.			Ea.		$0
T-LINE: CIVIL WORK					
Foundations for Tangent Structures		0	Ea.	5,000	$0

Double circuit 345kV line on concrete structures

Generated: [ ] MW   Delivered: [ ] MW

Item	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Foundations for Special Structures		60	Ea.	48,300	$2,898,000
Install 20' wide access road		27,984	Lf.	15.00	$419,760
Supply / Install: Fencing	Type: 5-Strane Barb Wire with 10' space T-Post Stake (No Chain-Link)		Lf.		$0
Supply / Install: Gates - Permanent	Type: 36' Opening with one 18' swing Gates	200	Ea.	2,910	$581,900
Supply / Install: Cattle Guards	Type: Typical is 16 Ft. opening, PIP Conc., Installed level & stable.		Ea.		$0
R.O.W Clearing and access road build		106	Mi.	60,480	$6,410,880
Install Crane Pads		749	Ea.	700	$524,300
Restoration of R.O.W.		106	Mi.	14,000	$1,484,000
Construction Laydown Yards	10 Ac. Cleared, grubbed, rocked & FenceOne Yard Every: 30 Mi.	4	Ea.	442,750	$1,771,000
OTHER T-LINE COST & IMPACTS					
T-Line: Inspection, Testing & Commissiong		106	Mi.	10,000	$1,060,000
T-Line: Other describe if used		0	Lt.		$0
					$58,712,967

Owner GENERAL M&A

Owner - FIELD / SITE PERSONNEL	People	Truck	Trips	Sub	Start	Finish	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Owner: Project Manager	1	Yes	Yes	Yes	04/01/10	12/01/10	9.0	Mo.	14,250	$128,250
Owner: Construction Manager	1	Yes	Yes	Yes	04/02/10	12/02/10	9.0	Mo.	13,300	$119,700
Owner: Civil Superintendent	1	Yes	Yes	Yes	04/03/10	12/03/10	9.0	Mo.	11,400	$102,600
Owner: Electrical Superintendent	1	Yes	Yes	Yes	04/04/10	12/04/10	9.0	Mo.	11,400	$102,600
Owner: Interconn. Coordinator	1	No	Yes	No	04/05/10	12/05/10	9.0	Mo.	15,200	$136,800
Owner: T-Line Superintendent	2	Yes	Yes	Yes	04/06/10	12/06/10	9.0	Mo.	12,250	$110,250
Owner: Mat'l/Logistics Coordinator	1	Yes	Yes	Yes	04/07/10	12/07/10	9.0	Mo.	10,450	$94,050
Owner: Site/Prj. Coordinator	1	Yes	Yes	Yes	04/08/10	12/08/10	9.0	Mo.	10,450	$94,050
Owner: QA/QC Inspector	2	Yes	Yes	Yes	04/09/10	12/09/10	9.0	Mo.	10,450	$94,050
Owner: Safety & Enviornmental	1	No	Yes	Yes	04/10/10	12/10/10	9.0	Mo.	10,450	$94,050

Owner - FIELD / SITE EXPENDITURES	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Prj. Vehicle's: Owner - Truck's	10 Ea.	81.0	Mo.	950	$76,950
Prj. Vehicle's: Insurance	$560 Per/Veh./Yr; 10.0 Ea.	1	Lt.	33,600	$33,600
Subsistence for Field Personnel (lodging, meals, etc.)	7.0 Days Per Wk; 81.00 mo.	2,438	Dy	125	$304,763
Travel (Air Fares, Vendor Inspections, Etc.)	3.5 Wks Per Trip; 90.00 mo.	110.6	Ea.	875	$96,750
Home Office Support - Owner					
Owner - OTHER (If Not Carried By Contractor)					
Field Office Trailers - Owner	3 Ea.; 03/01/10 – 01/01/11	31.0	Mo.	4,500	$139,500
Facilities & Infrastructure (sanitary, trash,etc.)	03/02/10 – 01/02/11	11.0	Mo.	8,000	$88,000
Misc. Field Office G&A (Office setup,etc.)	03/03/10 – 01/03/11	11.0	Mo.	18,500	$203,500
Communications to Field Facilities		1.0	Ea.	125,000	$125,000
Safety & Public Relations		1.0	Ea.	100,000	$100,000
					$2,244,463

PROJECT EXPOSURES: R/E/C

Double circuit 345kV line on concrete structures

Generated: [ ] MW   Delivered: [ ] MW

Item	Note	Set At	Basis	Comment		QTY's	UoM	$'s/UOM	TOTAL EST. $'S
RISK COSTS									
Builders All- Risk Insurance		2.75%	of EPC	Estimate Keith Kennedy is comfortable with, as a market would have to be created.		1.0	Lt.	$1,614,607	$1,614,607
Performance Bonds / Letters of Credit		1.60%	of EPC	Yeager SWAG		1.0	Lt.	$939,407	$939,407
General Liability Insurance Premium		$41.939	Per Mw		MW	1.0	Lt.	$0	$0
Construction Insurance		$425	Per Mw		MW	1.0	Lt.	$0	$0
DSU Insurance (Delayed Start-Up)		$0.252	Per $100 value			0.0	Lt.	$14,795,668	$0
Sales Tax (Non-Generation)	Cost carried by PV	6.50%	of EPC			0.0	Lt.	$3,816,343	$0
ESCALATION									
Substation: (Mat'l Only)		3.50%	Per Year for	0.33	Years	1.0	Ea.	0	$0
Main OVH T-Line: (Mat'l Only)		3.50%	Per Year for	0.33	Years	1.0	Ea.	2,435,023	$2,435,023
For Escalation:	Estimate Cost Based on:	06/03/08	Award EPC:	10/01/08					
CONTINGENCY									
Substation - Material (Owner)						3.00%	Pct.	0	$0
Substation Construction - (Contractor)						5.00%	Pct.	0	$0
Main OVH T-Line - Material (Owner)						5.00%	Pct.	69,572,097	$3,478,605
Main OVH T-Line - Construction (Contractor)						10.00%	Pct.	58,712,967	$5,871,297
T-Line: Construction			Construction Productivity Adj.	0%		106	Mi.	0	$0
						0.0	Lt.	0	$0
								24.4%	$14,338,939

ALL-IN Total Project Cost: **$144,868,466**

Cost per Mile: **$1,370,000**

Double circuit (1-Ckt Build) 345kV line on concrete structures

Generated: ______ MW **Delivered:** ______ MW

Item	Details	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
MAIN OVH T-LINE - MATERIAL (Owner)	106 Mi.				
MAIN T-LINE ENGR.:					
Prelim. Design & Review of:	T-Line Design & Tech Support; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Route Survey AKA: Plan & Profile; Responsibility With: Owner Engr.	1	Lt.	50,000	$50,000
Prelim. Design & Review of:	Transmission Route Geotechnical information	1	Lt.	75,000	$75,000
T-LINE: STRUCTURES	Height Ft. / Mat'l / Type / Span Ft.				
Tangent Structures	120 / Concrete / Round spun / 700; 7.54 Ea. Strc's/mi.:	749	Ea.	36,000	$26,964,000
Angled Structures	varies / Steel / monopole	15	Ea.	121,196	$1,817,940
In-Line D.E. Structures	varies / Steel / monopole	15	Ea.	131,732	$1,975,987
Angled D.E. Structures	varies / Steel / monopole	21	Ea.	142,708	$2,996,864
Special Structures	varies / Steel / monopole; 1.20% of Structures	9	Ea.	154,122	$1,387,099
T-LINE CONDUCTOR:					
Conductor Mat'l	2 Bundled; 1590 Lapwing; Sag & Waste Allowance: 2.00%; $3.39 / Ft. "AVE." $20.36 /Ckt Ft.	109	Mi.	107,507	$11,718,209
OPGW + OPGW		109	Mi.	12,144	$1,323,696
Fiber Repeater Stations	Number of Miles Between Stations: 60 mi.	2	Ea.	50,000	$100,000
Balance of T-Line Mat'l & Misc.	Percent Adder for Balance of Mat'l 6.00%	109	Mi.	27,330	$2,979,019
					$51,437,813
MAIN OVH T-LINE - CONSTRUCTION (Contractor)	Assues 175 Ft. ROW				
MAIN OVH T-LINE					
T-Line: Engineering and Design	Responsibility With: Contractor Engr.	106	Mi.	19,890	$2,108,287
T-Line: Route Survey AKA: Plan & Profile	Responsibility With: Contractor Engr.	106	Mi.	10,000	$1,060,000
T-Line: Geotechnical information for Route	Based on obtaining data for 13.5% of structure locations	106	Mi.	2,138	$226,670
T-LINE: CONSTRUCTION					
Mob/Demob T-Line crews and Equipment		1	Lt.	480,000	$480,000
Material Management		7	Mo.	178,017	$1,257,989
T-LINE: STRUCTURES	Mat'l / Labor				
Erec: Tangent Structures	Includes, gnding; $500.00 / $18,000.00	749	Ea.	18,500	$13,856,500
Erec: Angled Structures	Includes, gnding; $500.00 / $16,675.00	15	Ea.	17,175	$257,625
Erec: In-Line D.E. Structures	Includes, gnding; $500.00 / $17,508.75	15	Ea.	18,009	$270,131
Erec: Angled D.E. Structures	Includes, gnding; $500.00 / $17,508.75	21	Ea.	18,009	$378,184
Erec: Special Structures	Includes, gnding; $500.00 / $20,000.00	9	Ea.	20,500	$184,500
T-LINE: CONDUCTOR, CABLE & FIBER					
Install: Conductor		106	Mi.	70,076	$7,428,045
Install: OVH 7/16" EHS		106	Mi.	6,577	$697,162
Install: OVH Fiber Optic		106	Mi.	13,033	$1,381,498
Supply / Install: Spacers, Dampers	$150.00 / $240.00 / 1.0 Ea. Per Bundle, spaced at 200.0 Ft.	8,396	Ea.	390.00	$3,274,440
Install: Insulators, Clamps, etc.			Ea.		$0
T-LINE: CIVIL WORK					
Foundations for Tangent Structures		0	Ea.	5,000	$0
Foundations for Special Structures		60	Ea.	48,300	$2,898,000

Double circuit (1-Ckt Build) 345kV line on concrete structures

Generated: ______ MW **Delivered:** ______ MW

Item	Detail	People	Truck	Trips	Sub	Start	Finish	QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Install 20' wide access road								27,984	Lf.	15.00	$419,760
Supply / Install: Fencing	Type: 5-Strane Barb Wire with 10' space T-Post Stake (No Chain-Link)								Lf.		$0
Supply / Install: Gates - Permanent	Type: 36' Opening with one 18' swing Gates							200	Ea.	2,910	$581,900
Supply / Install: Cattle Guards	Type: Typical is 16 Ft. opening, PIP Conc., Installed level & stable.								Ea.		$0
R.O.W Clearing and access road build								106	Mi.	60,480	$6,410,880
Install Crane Pads								749	Ea.	700	$524,300
Restoration of R.O.W.								106	Mi.	14,000	$1,484,000
Construction Laydown Yards	10 Ac. Cleared, grubbed, rocked & Fence One Yard Every: 30 Mi.							4	Ea.	442,750	$1,771,000
OTHER T-LINE COST & IMPACTS											
T-Line: Inspection, Testing & Commissiong								106	Mi.	10,000	$1,060,000
T-Line: Other describe if used								0	Lt.		$0
											$48,010,872
Owner GENERAL M&A											
Owner - FIELD / SITE PERSONNEL		**People**	**Truck**	**Trips**	**Sub**	**Start**	**Finish**				
Owner: Project Manager		1	Yes	Yes	Yes	04/01/10	12/01/10	9.0	Mo.	14,250	$128,250
Owner: Construction Manager		1	Yes	Yes	Yes	04/02/10	12/02/10	9.0	Mo.	13,300	$119,700
Owner: Civil Superintendent		1	Yes	Yes	Yes	04/03/10	12/03/10	9.0	Mo.	11,400	$102,600
Owner: Electrical Superintendent		1	Yes	Yes	Yes	04/04/10	12/04/10	9.0	Mo.	11,400	$102,600
Owner: Interconn. Coordinator		1	No	Yes	No	04/05/10	12/05/10	9.0	Mo.	15,200	$136,800
Owner: T-Line Superintendent		2	Yes	Yes	Yes	04/06/10	12/06/10	9.0	Mo.	12,250	$110,250
Owner: Mat'l/Logistics Coordinator		1	Yes	Yes	Yes	04/07/10	12/07/10	9.0	Mo.	10,450	$94,050
Owner: Site/Prj. Coordinator		1	Yes	Yes	Yes	04/08/10	12/08/10	9.0	Mo.	10,450	$94,050
Owner: QA/QC Inspector		2	Yes	Yes	Yes	04/09/10	12/09/10	9.0	Mo.	10,450	$94,050
Owner: Safety & Enviormental		1	No	Yes	Yes	04/10/10	12/10/10	9.0	Mo.	10,450	$94,050
Owner - FIELD / SITE EXPENDITURES											
Prj. Vehicle's: Owner - Truck's			10 Ea.					81.0	Mo.	950	$76,950
Prj. Vehicle's: Insurance			$560	Per/Veh./Yr		10.0	Ea.	1	Lt.	33,600	$33,600
Subsistence for Field Personnel (lodging, meals, etc.)				7.0	Days Per Wk		81.00 mo.	2,438	Dy	125	$304,763
Travel (Air Fares, Vendor Inspections, Etc.)				3.5	Wks Per Trip		90.00 mo.	110.6	Ea.	875	$96,750
Home Office Support - Owner											
Owner - OTHER (If Not Carried By Contractor)											
Field Office Trailers - Owner			3 Ea.			03/01/10	01/01/11	31.0	Mo.	4,500	$139,500
Facilities & Infrastructure (sanitary, trash,etc.)						03/02/10	01/02/11	11.0	Mo.	8,000	$88,000
Misc. Field Office G&A (Office setup,etc.)						03/03/10	01/03/11	11.0	Mo.	18,500	$203,500
Communications to Field Facilities								1.0	Ea.	125,000	$125,000
Safety & Public Relations								1.0	Ea.	100,000	$100,000
											$2,244,463
PROJECT EXPOSURES: R/E/C											
RISK COSTS				Set At							

Double circuit (1-Ckt Build) 345kV line on concrete structures

Generated: MW   Delivered: MW

							QTY's	UoM	$'s/UOM	TOTAL EST. $'S
Builders All- Risk Insurance		2.75%	of EPC	Estimate Keith Kennedy is comfortable with, as a market would have to be created.			1.0	Lt.	$1,320,299	$1,320,299
Performance Bonds / Letters of Credit		1.60%	of EPC	Yeager SWAG			1.0	Lt.	$768,174	$768,174
General Liability Insurance Premium		$41.939	Per Mw			MW	1.0	Lt.	$0	$0
Construction Insurance		$425	Per Mw			MW	1.0	Lt.	$0	$0
DSU Insurance (Delayed Start-Up)		$0.252	Per $100 value				0.0	Lt.	$12,098,740	$0
Sales Tax (Non-Generation)	Cost carried by PV	6.50%	of EPC				0.0	Lt.	$3,120,707	$0
ESCALATION										
Substation: (Mat'l Only)		3.50%	Per Year for		0.33	Years	1.0	Ea.	0	$0
Main OVH T-Line: (Mat'l Only)		3.50%	Per Year for		0.33	Years	1.0	Ea.	1,800,323	$1,800,323
For Escalation:	Estimate Cost Based on:	06/03/08		Award EPC:	10/01/08					
CONTINGENCY										
Substation - Material (Owner)							3.00%	Pct.	0	$0
Substation Construction - (Contractor)							5.00%	Pct.	0	$0
Main OVH T-Line - Material (Owner)							5.00%	Pct.	51,437,813	$2,571,891
Main OVH T-Line - Construction (Contractor)							10.00%	Pct.	48,010,872	$4,801,087
T-Line: Construction				Construction Productivity Adj.	0%		106	Mi.	0	$0
							0.0	Lt.	0	$0
									23.5%	$11,261,774

ALL-IN Total Project Cost: **$112,954,922**

Cost per Mile: $1,070,000