ment for the 345-kV transmission line, being 100 feet in width (*i.e.*, the same 100-feet minimum width used by LCRA TSC for poles).

Q. DID LCRA TSC CONSIDER PRESTRESSED CONCRETE POLES FOR THE TRANSMISSION LINE?

A. Yes. LCRA TSC did consider spun concrete poles for tangents and found they are limited by availability and height/strength requirements. Poles for spans over 600 feet are not yet available for this transmission line. Spun concrete poles are comprised of prestressed concrete, steel tendons and reinforcing bars and would be directly embedded into the earth with concrete backfill. These poles would require a 100-feet ROW width, *i.e.,* the same minimum width as LCRA TSC's lattice towers and other poles.

The installed costs for each 600-ft span, spun concrete pole are estimated at $89,000 in sand, $96,000 in limestone, and $120,000 in granite (including $18,000 for poles and out-of-state shipping) and would increase construction costs[1] by $160,000, $287,000 and $422,000 per mile assuming out-of-state manufacture. Poles for 900 feet spans are not yet available. Depending upon the supplier's decision to enlarge capacity, supply, and demand, they might be available at the end of 2010. The installed costs for each 900-ft span pole are estimated at $90,000 in sand, $94,000 in limestone, and $126,000 in granite (including $20,000 for poles) and would increase construction costs by $31,000, $114,000 and $278,000 per mile. Compared to higher costs for more lattice towers in a narrower ROW (*i.e.*, 100 feet), these future concrete poles would increase construction costs by $31,000 in sand, by $114,000 in limestone and $186,000 in granite on a per mile basis. All of this depends upon availability, location, and feasibility.

Q. DID LCRA TSC CONSIDER PROPOSING UNDERGROUND CONSTRUCTION FOR THE TRANSMISSION LINE?

A. The ERCOT CTO Study did not contemplate underground construction, based on its specification of overhead conductors ("1590 ACSR"), reference to lattice towers (e.g.,

[1] *I.e.*, above the costs estimated for lattice towers.

single-circuit, double-circuit-capable 345-kV transmission line using bundled 1590 ACSR conductor on double-circuit towers), and the magnitude of its estimates. LCRA TSC also eliminated underground consideration early in the preliminary screening process for the CREZ 345-kV transmission line primarily due to costs and technical challenges. Underground construction of the CREZ 345-kV transmission line would be very costly and would face severe technical challenges in areas with rugged terrain.

In another recent LCRA TSC CCN project, PUC Docket No. 33978 (Clear Springs to Hutto 345-kV transmission line) with more favorable substrate and topography, the estimated cost for an underground 345-kV line was $30 to $40 million per mile. In this project, the substrate is less favorable because it includes crystalline rocks, hard limestone, and cretaceous limestone and the rugged terrain is not favorable due to high pulling tensions. For these reasons, underground construction for the CREZ 345-kV transmission lines is likely not feasible in many areas. Even where it would be feasible it would be at least an order of magnitude more costly.

Also, underground cable failures that require replacement cables would negatively affect the availability of the line, especially if replacing the cables results in outage durations of weeks or months to fabricate and install the replacement cables.

Because the additional costs and technical difficulties are not reasonable and necessary to provide reliable and adequate electric service for the CREZ 345-kV transmission line, LCRA TSC proposes to construct this project using overhead construction, being a more cost effective and technically feasible means of providing reasonable and adequate electric service.

Q. DOES LCRA TSC HAVE EXPERIENCE WITH CONSTRUCTING THESE TYPES OF STRUCTURES IN THE HILL COUNTRY OF TEXAS?

A. Yes, LCRA TSC owns approximately 184 miles of lattice tower structures and 45 miles of tubular steel poles in the vicinity of this project, in Burnet, Gillespie, Kerr, Lampasas, Llano, San Saba, and Kendall counties. Of those lattice tower miles, LCRA TSC owns approximately 24 miles of 345-kV lattice tower structures near the cities of Boerne and Comfort in Kendall County. LCRA TSC also owns approximately 21 miles of 345-kV tubular steel poles in Kendall County. LCRA TSC found that the construction of these 345-kV tubular steel poles in Kendall County was more expensive than anticipated at that time and presented a variety of construction challenges in rugged terrain.

Also, LCRA TSC owns 138-kV lattice towers near the City of Fredericksburg and in Burnet, Gillespie, Kerr, Lampasas, Llano, San Saba, and Kendall counties, providing additional experience and operating history that helped inform our decisions to propose constructing this project on lattice towers.

The typical conductor-phase spacing for tangent structures of all types will be 28 feet horizontal and 24 feet vertical. The typical shield-to-conductor spacing for lattice towers will be 5 feet horizontal and 27 feet vertical, for tubular steel poles it will be 12 feet horizontal and 11 feet vertical, and for tower poles it will be 5 feet horizontal and 27 feet vertical.

Q. ARE LCRA TSC'S PROPOSED TYPICAL 345-KV DOUBLE-CIRCUIT LATTICE TOWERS TALLER THAN 138-KV LATTICE TOWERS OWNED BY LCRA TSC?

A. In general, yes. The typical difference is due to wire spacing and configuration at different voltages. As alluded to above, LCRA TSC has both 138-kV and 345-kV lattice tower transmission lines in our system, with the 345-kV towers generally being the taller. However, two of the tallest lattice towers in LCRA TSC's system are 138-kV single-circuit towers at 232 feet above grade, crossing Lake Travis, west of the City of Austin in Travis County. These 138-kV lattice towers west of the City of Austin exceed the heights of the 345-kV lattice towers near the City of Boerne in Kendall County.

Q. WHAT DID LCRA TSC DETERMINE FROM ITS COMPARISON OF INDIVIDUAL STRUCTURE WEIGHTS AND COSTS FOR THE TRANSMISSION LINE?

A. In terms of weights and costs, LCRA TSC determined that lattice towers would be significantly lighter and significantly less expensive than tubular steel poles and tower poles and spun concrete poles.

LCRA TSC compiled a cost summary for representative alternative structures for this project, included as Exhibit CDS-1. This cost information for installed costs for the alternative structure types (lattice, tower pole, steel pole, spun concrete pole) indicates the differences in cost for structure types in the geology types anticipated on this project. This information may also provide a quick reference to assess the impact of minor route adjustments that include adding structures or exchanging tangent structures for angles and/or deadends.

In addition, LCRA TSC prepared more detailed comparative estimates for Preferred Route GN11 to quantify the impact to the project should the Commission order a change to tubular steel poles or tower poles. The resulting costs are summarized in the following table.

Preferred Route GN11 – Total Costs for Alternative Steel Structure Types

Structure Types (Tangent / Angle / Deadend)	Total Cost ($millions)	Cost per Mile ($millions/mi)	Total Tons of Steel	Cost Difference Compared to Lattice ($ millions)
Lattice / Lattice / Lattice	$161.9	$1.90	5,900	-
Tower Pole / Lattice / Lattice	$201.4	$2.36	10,200	$40

Steel Pole / Lattice / Lattice	$211.6	$2.48	11,200	$50
Tower Pole / Steel Pole / Steel Pole	$219.6	$2.57	12,900	$58
Steel Pole / Steel Pole / Steel Pole	$229.7	$2.69	13,900	$68

The following conclusions can be drawn by reviewing this table and Exhibit CDS-1R.

First, lattice towers represent the most efficient use of resources among steel structure types and is the most cost effective structure type.

Second, steel poles are least efficient use of resources (requiring 8,000 tons of additional steel) and is the least cost effective structure type. The conversion of this project from lattice towers to steel poles would result in a 42% increase in project costs for Preferred Route GN11 from $161.9 million to $229.7 million.

Third, tower poles and steel poles are less efficient and these and concrete poles are more costly than lattice towers. It should also be noted that virtually all public comment related to structure type was the desire to have poles as an alternative to lattice towers. Even though tower poles were displayed as a potential alternative at open houses, little public comment was received directly related to tower poles.

Q. HAS LCRA TSC BEGUN ORDERING 345-KV LATTICE TOWERS FOR THE TRANSMISSION LINE AND OTHER CREZ 345-KV TRANSMISSION LINES? IF SO, HOW MANY AND WHY?

A. Yes. To complete this project by November 2012, and all of LCRA TSC's CREZ projects by the end of 2013, in a cost efficient manner (as discussed elsewhere in my testimony), LCRA TSC began ordering lattice steel for all of LCRA TSC's CREZ 345-kV transmission lines in June 2009. LCRA TSC continues to evaluate schedules, evaluate material needs, and intends to place orders on a bi-monthly basis until all project needs are met.

LCRA TSC began ordering in June 2009, and at the end of October 2009, LCRA TSC's orders account for approximately one third of the total needs for all of LCRA TSC's CREZ projects. At the end of April 2010, LCRA TSC's orders would account for most of the total needs for this project.

Thus, if the Commission orders LCRA TSC to use steel poles in certain areas, the amount of lattice towers allocated to other LCRA TSC 345-kV CREZ transmission lines may increase and potentially restrict structure type decisions on future projects.

V. COSTS AND SCHEDULES

Q. DID LCRA TSC ESTIMATE COSTS FOR ALL OF THE ROUTES INCLUDED IN THE APPLICATION FOR THE TRANSMISSION LINE?

A. Yes. LCRA TSC's estimated costs for the preferred route and alternative routes for the Gillespie to Newton project are tabulated in Attachment 3 to the application.

Q. WHAT COSTS DO NOT VARY SIGNIFICANTLY IN LCRA TSC'S ESTIMATED COSTS AMONG THE ROUTES FOR THE TRANSMISSION LINE?

A. LCRA TSC's estimated per mile costs to procure materials and construct the transmission line do not vary significantly among the routes for the transmission line, with a range of less than 10% above or below the average cost. These costs include vegetation removal, existing LCRA TSC facility removal, foundation installation, structure installation, wire installation, other construction-related costs, overheads, and capitalized interest. Of course, construction costs in different portions of each route are affected by differing geological conditions, differing terrain factors, whether the portion would be constructed on new ROW, or whether the portion would be constructed on existing ROW with removal costs and/or restringing costs for the existing facilities. However, despite these differences, the overall average per mile materials and construction costs vary less than 10% above or below the average cost.

Q. WHAT COSTS VARY SIGNIFICANTLY IN LCRA TSC'S ESTIMATED COSTS AMONG THE ROUTES FOR THE TRANSMISSION LINE?

A. LCRA TSC's estimated costs for Preferred Route GN11 and alternative routes are summarized in Attachment 3 to the application. The most significant cost variances among the routes estimated for the transmission line are in the ROW acquisition costs and other costs for potential habitat mitigation. Of course, length also affects the routes differently. Routes which utilize significant amounts of existing ROW tend to have lower ROW acquisition costs and lower potential endangered species habitat mitigation costs because of the reduced amount of vegetation removal.

Q. WHAT ARE LCRA TSC'S ESTIMATED COSTS FOR THE TRANSMISSION LINE?

A. LCRA TSC's estimated cost for Preferred Route GN11 is $161.9 million. LCRA TSC's estimated costs for all routes range from $161.0 million to $207.1 million. LCRA TSC's estimated costs for Preferred Route GN11 and other alternative routes are found in Attachment 3 to the application.

Q. HOW DO LCRA TSC'S ESTIMATES FOR THE TRANSMISSION LINE COMPARE WITH THOSE PREPARED BY THE ELECTRIC RELIABILITY COUNCIL OF TEXAS (ERCOT)?

A. ERCOT estimated the "overnight" cost for Gillespie to Newton at $136.5 million and 105 miles in length. LCRA TSC's estimated cost for Preferred Route GN11 is $161.9 million and LCRA TSC's estimated costs for all routes range from $161.0 million to $207.1 million, including costs not contemplated by ERCOT, such as capitalized interest and other costs for mitigation of cleared potential endangered species habitat. Further, LCRA TSC's estimated construction costs are higher due to the difficulties associated with maneuvering equipment in rugged terrain and drilling foundations in harder geologic substrates (cretaceous limestone, crystalline rocks and hard limestone). In addition, LCRA TSC's estimated ROW acquisition costs could be higher in the

Texas Hill Country compared to what LCRA TSC would estimate for ROW acquisition in some other areas.

A summary of estimated costs and estimated costs that may be consider to be comparable to the ERCOT CTO costs is included as Exhibit CDS-2.
Absent capitalized interest and other costs for mitigation of potential endangered species habitat, LCRA TSC's comparable estimated costs for Preferred Route GN11 is $131.2 million and alternative routes GN6, GN7, GN8, and GN10 range from $129.6 million to $137.3 million. Thus, the comparable costs for Preferred Route GN11 and alternative routes GN6, GN7, GN8, and GN10 are actually lower than the ERCOT CTO "overnight" estimate at $136.5, despite LCRA TSC's higher estimated construction costs in rugged terrain and harder geologic substrates (i.e., crystalline rocks and hard limestone) and LCRA TSC's higher estimated ROW acquisition costs in the Texas Hill Country. Although greater than the ERCOT CTO "overnight" estimate, comparable costs for alternative routes GN1, GN2, GN3, GN4, GN5, and GN9 range from $143.6 million to $171.2 million.

In addition to the previously mentioned estimated mitigation costs for potential endangered species habitat, ROW acquisition costs are a significant driver which pushes LCRA TSC's estimates toward or even beyond the ERCOT estimates, since ROW acquisition costs for all routes exceed $400,000 per mile and some exceed $800,000 per mile. Of course, all things being equal, routes using more existing ROW would have lower ROW costs compared to other routes. Notably, LCRA TSC's Preferred Route GN11 uses a significant amount of existing ROW which results in Preferred Route GN11 being among the routes with lower costs for both ROW acquisition and mitigation for potential endangered species habitat. Even so, ROW acquisition costs for LCRA TSC's Preferred Route GN11 and other alternative routes are significant in this case.

I do not consider LCRA TSC's projected costs an unreasonable variation from the ERCOT estimates, since the ERCOT estimates seem to be more generalized and do not account for project specific information, endangered species issues, and certain topographic and geological challenges on this project that were likely unknown to ERCOT at the time of its estimates.

Q. ARE THERE ANY OTHER FACTORS THAT COULD AFFECT THE COSTS FOR THE TRANSMISSION LINE?

A. Yes, changes in market conditions, including construction labor, cost of metals, and costs of other natural resources could increase or decrease costs above or below the estimates contained in the application. As time moves forward, these and other factors could change, resulting in increased or decreased costs.

Q. HAS LCRA TSC DEVELOPED A SCHEDULE FOR THE TRANSMISSION LINE?

A. Yes. Transmission line construction is scheduled to be complete by November 2012. A more detailed schedule can be found in the application.

VI. MITIGATING THE IMPACT OF CONSTRUCTION

Q. DID LCRA TSC RECEIVE AND EVALUATE REQUESTS FOR ROUTING ADJUSTMENTS FROM LANDOWNERS PRIOR TO FILING THE CCN APPLICATION FOR THE TRANSMISSION LINE?

A. Yes. LCRA TSC received and evaluated requests for routing adjustments from the following landowners prior to filing the CCN application for the transmission line. My department, Transmission Line Design, participated in those reviews, which are summarized in the EA (Attachment 1 to the application) and in testimony by Mr. Dennis Palafox.

Q. WERE ANY ENGINEERING FACTORS IMPORTANT WHEN LCRA TSC EVALUATED THESE ROUTING ADJUSTMENTS, PROPOSED BY LAND-

OWNERS PRIOR TO FILING THE CCN APPLICATIONS FOR THE TRANSMISSION LINE?

A. Yes. LCRA TSC considered cost an important engineering factor when LCRA TSC evaluated routing adjustments proposed by landowners prior to filing the CCN application for the transmission line. For example, based on the cost summary for representative alternative structures for this project (Exhibit CDS-1), turning one angle less than 25 degrees in cretaceous limestone would add approximately $102,000 using lattice towers. Turning a large angle greater than 30 degrees and up to 60 degrees in cretaceous limestone would add approximately $233,000 using lattice towers. As stated elsewhere in my testimony, the costs would be even greater for other structures types, including tubular steel poles. In another example, adding length adds costs attributable to materials and construction, as well as ROW acquisition and mitigation for removal of vegetation in potential endangered species habitat.

Q. DOES LCRA TSC HAVE RECENT EXPERIENCE WITH MINOR ROUTE ADJUSTMENTS (POST CCN FINAL ORDER) ON A NEW 345-KV TRANSMISSION LINE?

A. Yes. In a recent 345-kV line that exceeded eighty (80) miles in length (LCRA TSC's Clear Springs to Hutto 345-kV transmission line, PUC Docket No. 33978), LCRA TSC received numerous landowner requests for minor route adjustments. Since, among other requirements, the final order required that significant costs not be added in order to implement landowner-requested minor route adjustments, LCRA TSC asked landowners to make up the differences in cost. Turning angles in a 345-kV line can be very expensive. For example, turning just a few angles in this previous line (and in the line in this application) can add a million dollars or more. LCRA TSC would have been willing to incorporate these minor route adjustments if it was cost neutral to ERCOT transmission customers. However, in all of these cases the landowners were unwilling to make up the large differences in cost, and LCRA TSC was unable to make any landowner-suggested minor route adjustments for the recent new 345-kV transmission line.

Q. DOES LCRA TSC EXPECT THAT A SIGNIFICANT NUMBER OF MINOR ROUTE DEVIATIONS OR ADJUSTMENTS (POST CCN FINAL ORDER) WILL BE IMPLEMENTED IN THE NEW 345-KV TRANSMISSION LINE?

A. No. Based on LCRA TSC's experience and the accelerated project schedule, LCRA TSC expects that only to a very limited degree will any minor route adjustments (post CCN final order) be incorporated in the new 345-kV transmission line. LCRA TSC does not expect, and is skeptical, that a significant number of minor route adjustments will be implemented in the new 345-kV transmission line.

Q. WHAT CAN LCRA TSC DO TO HELP MITIGATE THE IMPACT OF CONSTRUCTION OF TRANSMISSION FACILITIES ON AFFECTED LANDOWNERS' PROPERTIES AND TO ADDRESS PUBLIC CONCERNS REGARDING TRANSMISSION FACILITIES?

A. LCRA TSC has several strategies to mitigate for impacts related to construction and maintenance of a new transmission line as discussed in section 1.5 of the Environmental Assessment (Attachment 1 to the application) and as discussed below.

LCRA TSC will implement erosion control measures as appropriate. LCRA TSC will return each affected landowner's property to its original contours and grades except to the extent necessary to establish appropriate ROW, structure sites, setup sites, and access for the transmission line.

In the event, LCRA TSC or its contractors encounter any previously un-assessed artifacts or other cultural resources during project construction, then construction will cease in the immediate area of the discovery and LCRA TSC will report that discovery to LCRA Archeological Services. As discussed earlier in my testimony, LCRA TSC may adjust alignments to go around sites, adjust structure locations/heights to span sites, and/or discuss the specific circumstances with the Texas Historical Commission

(THC). After addressing the issues and analyzing its options, LCRA TSC will determine the appropriate actions to take in each instance.

LCRA TSC will follow the procedures described in the latest publications for protecting raptors from Avian Power Line Interaction Committee (APLIC).

LCRA TSC will minimize the amount of flora and fauna disturbed during construction of the transmission line, except to the extent necessary to establish appropriate ROW clearance for the transmission line. In addition, after construction of the transmission line, LCRA TSC will determine if any reseeding of the ROW in herbaceous species or a cover of forage crop would be useful and practical to facilitate erosion control and LCRA TSC will consider landowner preferences in doing so. Furthermore, to the extent practical, LCRA TSC will avoid or mitigate adverse environmental impacts to sensitive plant and animal species and their habitats as identified by Texas Parks and Wildlife Department and FWS.

LCRA will exercise extreme care to avoid affecting non-targeted vegetation or animal life when using chemical herbicides to control vegetation within the ROW.

LCRA TSC will cooperate with directly affected landowners immediately after the application's approval for a period of three months to evaluate minor route deviations in the approved route to minimize the impact of the proposed project. LCRA will only implement technically feasible, minor route deviations or alternative line configurations (adjustments) that will not add significant costs to the project, that will not lengthen the project schedule, and that will not introduce or directly affect (as defined by the Commission's notice rules) landowners not previously noticed in this CCN proceeding who have not otherwise agreed to a waiver of notice. All landowners affected by the proposed deviation or adjustment must consent and agree or stipulate to total compensation for ROW to ensure that significant costs will not be added to the project.

VII. SUMMARY AND CONCLUSIONS

Q. PLEASE SUMMARIZE THE DESCRIPTION OF THE TRANSMISSION LINE.

A. LCRA TSC proposes to construct a new 345-kV transmission line from the expanded Gillespie Station, located in central Gillespie County to the designated Oncor Newton Station, in southeastern Lampasas County. LCRA TSC will initially install one 345-kV circuit on the double-circuit-capable transmission line, consisting of bundled 1590 kcmil ACSR "Falcon"conductors. LCRA TSC will own, operate, and maintain all transmission line facilities including conductors, wires, structures, hardware, and easements. In terms of its transmission line components, this project does not deviate from how it was presented in the ERCOT CTO Study.

Q. PLEASE SUMMARIZE THE ROW AND EASEMENTS REQUIRED FOR THE TRANSMISSION LINE.

A. In general, new ROW utilizing easements, typically 100-160-feet in width, will be required to construct, operate, and maintain the new transmission line. Some portions of certain routes can be constructed upon existing LCRA TSC easements. Notably, LCRA TSC's Preferred Route GN11 and some other alternative routes use a significant amount of existing easements. Also, some portions of some routes can be constructed parallel to existing transmission lines.

Q. PLEASE SUMMARIZE HOW OTHER UTILITIES WILL BE INVOLVED IN THIS TRANSMISSION LINE PROJECT.

A. The Gillespie to Newton transmission line will connect the LCRA TSC Gillespie Station to the designated Oncor Newton Station, and portions of the transmission line could cross and/or parallel transmission and distribution lines owned by other utilities.

Q. PLEASE SUMMARIZE WHY LCRA TSC SELECTED LATTICE TOWERS AS THE PROPOSED TYPICAL STRUCTURE TYPE.

A. Lattice towers were selected as the proposed typical structure type based primarily on cost and efficiency. This is consistent with LCRA TSC's CTP proposal upon which the PUC assigned LCRA TSC this and other transmission lines. Other structure types could be used in limited situations.

Q. PLEASE SUMMARIZE THE IMPACT ON COST AND EFFICIENCY, SHOULD THE COMMISSION ORDER LCRA TSC TO CONSTRUCT OTHER STRUCTURE TYPES.

A. Costs and efficiency (*i.e.*, weights) would be adversely affected if the Commission orders LCRA TSC to use tubular steel poles and/or tower poles as typical structures. The impact to cost and weight of raw materials required is dramatic on this project, so the widespread use of tower poles or steel poles will result in higher consumption of raw materials and substantially increase the project costs. Similarly, costs would also be adversely affected if the Commission orders LCRA TSC to use spun concrete poles.

The limited use of poles, if ordered by the Commission, will primarily impact cost. Since such impact is dependent on the specific circumstances, its cost impact must be assessed on a case by case basis.

Q. WHAT DOES LCRA TSC CONCLUDE FROM ITS EVALUATION OF COSTS?

A. LCRA TSC's estimated cost for Preferred Route GN11 is $161.9 million, with estimated costs for all evaluated routes ranging from $161.0 million to $207.1 million, as summarized in Attachment 3 to the application.

LCRA TSC's estimated costs include costs not contemplated by ERCOT, such as capitalized interest and other costs for mitigation of cleared potential endangered species habitat. Further, LCRA TSC's estimated construction costs are higher due to the project specific information likely unknown by ERCOT, including higher ROW cost, rugged terrain, and challenging geologic substrates present on this project. Despite the project specific challenges, absent capitalized interest and other costs for mitigation of potential endangered species habitat, LCRA TSC's comparable estimated costs for

Preferred Route GN11 and alternative routes GN6, GN8, and GN10 are less than the ERCOT CTO "overnight" estimate.

Q. DO YOU FIND THE COSTS CONTAINED IN THE APPLICATION TO BE REASONABLE?

A. Yes, I do. I examined the components of the transmission line structure cost estimates and found them to be reasonable and consistent with engineering practices, market conditions in effect on the filing date, and construction in the terrain and geologic substrates found in the project area. Changes in market conditions could increase or decrease costs above or below the estimates contained in the application.

Q. PLEASE SUMMARIZE LCRA TSC'S SCHEDULE FOR THE TRANSMISSION LINE.

A. Transmission line construction is scheduled to be completed by November 2012.

Q. PLEASE SUMMARIZE HOW, TO THE EXTENT PRACTICAL, LCRA TSC WILL HELP MITIGATE THE IMPACT OF CONSTRUCTION OF TRANSMISSION FACILITIES ON AFFECTED LANDOWNERS' PROPERTIES AND WILL ADDRESS PUBLIC CONCERNS REGARDING TRANSMISSION FACILITIES.

A. LCRA TSC will to the extent practical take actions to help mitigate construction impacts by appropriately addressing the following: erosion control measures, returning property to original contours and grades, impact to cultural and natural resources, reseeding of the ROW, impacts to sensitive plant and animal species and their habitats, and requests from directly affected landowners for minor deviations in the approved route to minimize the impact of the proposed project.

Q. WHAT ENGINEERING FACTORS WERE IMPORTANT WHEN LCRA TSC SELECTED THE PREFERRED ROUTE FOR THE GILLESPIE TO NEWTON TRANSMISSION LINE?

A. In addition to habitable structures, environmental, cultural, land use, public input, and other factors considered by both PBS&J and LCRA TSC, LCRA TSC also considered the following engineering factors when selecting Route GN11 as its preferred route. Preferred Route GN11 is one of the least cost routes and uses a significant amount of existing ROW which results in reduced costs for ROW acquisition and reduced costs for mitigation of potential endangered species habitat.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

EXHIBIT CDS-1R

Estimated Installed Cost of Typical Structures for the Gillespie to Newton 345-kV Transmission Line Project

(Cost listed by Structure Type and Soil Type)

10/28/2009 (Revised 12/30/09)

Total Costs w/G&A, Cap I ($ X $1000)

Structure Type	Height to Bottom Conductor	Lattice Tower Type	Soil Type	Lattice Tower Cost ($ x 1000)	Equiv Steel Pole Cost ($ x 1000)	Equiv Tower Pole Cost ($ x 1000)	Structure Cost ($ x 1000)	Typical Span[1] (FT)	Tangent Structures[1] (per Mile)	Cost/mi[1] ($ x 1000)	Approx. ROW (FT)
Concrete 130', 600' Span[2,6]	51	n/a	Sand	n/a	n/a	n/a	$ 89	650	8.1	$ 723	100
Concrete 130', 600' Span[3,6]	51	n/a	Sand	n/a	n/a	n/a	$ 83	650	8.1	$ 674	100
Concrete 140', 800' Span[4,6]	60	n/a	Sand	n/a	n/a	n/a	$ 90	800	6.6	$ 594	100
Tower for 100' ROW [5]	75	F2.075	Sand	n/a	n/a	n/a	$ 112	1050	5.0	$ 563	100
Short Tangent (0 deg.)	70'	F2.070	Sand	$ 110	$ 204	$ 181	$ 110	1000	5.3	$ 581	100
Medium Tangent (0 deg.)	90'	F2.090	Sand	$ 117	$ 236	$ 203	$ 117	1300	4.1	$ 475	>100
Tall Tangent (0 deg.)	110'	F2.110	Sand	$ 132	$ 261	$ 224	$ 132	1500	3.5	$ 465	>100
Small Angle (<10 deg.)	70'	F3.070	Sand	$ 152	$ 453	N/A					
Medium Angle (<25 deg)	70'	F4.070	Sand	$ 253	$ 506	N/A					
Deadend (<60 deg.)	70'	F5.070	Sand	$ 465	$ 804	N/A					
Deadend (<90 deg.)	70'	F6.070	Sand	$ 608	$ 1,256	N/A					
Concrete 130', 600' Span[2,6]	56	n/a	Limestone	n/a	n/a	n/a	$ 96	700	7.5	$ 724	100
Concrete 130', 600' Span[3,6]	56	n/a	Limestone	n/a	n/a	n/a	$ 90	700	7.5	$ 679	100
Concrete 140', 800' Span[4,6]	65	n/a	Limestone	n/a	n/a	n/a	$ 94	900	5.9	$ 551	100
Tower for 100' ROW [5]	75	F2.075	Limestone	n/a	n/a	n/a	$ 87	1050	5.0	$ 437	100
Short Tangent (0 deg.)	70'	F2.070	Limestone	$ 85	$ 173	$ 166	$ 88	1000	5.3	$ 465	100
Medium Tangent (0 deg.)	90'	F2.090	Limestone	$ 93	$ 203	$ 186	$ 85	1300	4.1	$ 345	>100
Tall Tangent (0 deg.)	110'	F2.110	Limestone	$ 107	$ 234	$ 213	$ 93	1500	3.5	$ 327	>100
Small Angle (<10 deg.)	70'	F3.070	Limestone	$ 128	$ 283	N/A					
Medium Angle (<25 deg)	70'	F4.070	Limestone	$ 187	$ 439	N/A					
Deadend (<60 deg.)	70'	F5.070	Limestone	$ 318	$ 728	N/A					
Deadend (<90 deg.)	70'	F6.070	Limestone	$ 375	$ 1,057	N/A					
Concrete 130', 600' Span[2,6]	57	n/a	Granite	n/a	n/a	n/a	$ 120	650	8.1	$ 975	100
Concrete 130', 600' Span[3,6]	57	n/a	Granite	n/a	n/a	n/a	$ 114	650	8.1	$ 926	100
Concrete 140', 800' Span[4,6]	67	n/a	Granite	n/a	n/a	n/a	$ 126	900	5.9	$ 739	100
Tower for 100' ROW [5]	75	F2.075	Granite	n/a	n/a	n/a	$ 110	1050	5.0	$ 553	100
Short Tangent (0 deg.)	70'	F2.070	Granite	$ 108	$ 244	$ 238	$ 126	1000	5.3	$ 665	100
Medium Tangent (0 deg.)	90'	F2.090	Granite	$ 115	$ 277	$ 260	$ 110	1300	4.1	$ 447	>100
Tall Tangent (0 deg.)	110'	F2.110	Granite	$ 130	$ 322	$ 303	$ 108	1500	3.5	$ 380	>100
Small Angle (<10 deg.)	70'	F3.070	Granite	$ 151	$ 430	N/A					
Medium Angle (<25 deg)	70'	F4.070	Granite	$ 217	$ 662	N/A					
Deadend (<60 deg.)	70'	F5.070	Granite	$ 357	$ 1,166	N/A					
Deadend (<90 deg.)	70'	F6.070	Granite	$ 418	$ 1,731	N/A					

Notes: 1 - Absent terrain impacts, ROW cost, and habitat mitigation cost.
2 - Includes premium for out-of-state shipping.
3 - Assumes in-state manufacture, no premium for out-of-state shipping.
4 - Assumes future availability for 140' concrete poles.
5 - Comparable lattice tower for 100' ROW absent terrain impacts.
6 - Assumes that concrete poles are deliverable to the structure location.

Typical Structure Weight and Height Comparison for Gillespie to Newton 345-kV Transmission Line Project (Rounded to 1000 lbs)

Height to Bottom Conductor (ft)	Lattice Tower Type	Lattice Tower Wt (lbs)	Lattice Str Ht (ft)	Equiv Stl Pole Wt (lbs)	Stl Pole Str Ht (ft)	Equiv Tower Pole Wt (lbs)	Twr Pole Str Ht (ft)	Concrete Pole Wt (lbs)
Concrete 130', 600' Span	n/a							51,000
Concrete 140', 800' Span	n/a							74,000
Tower for 100' ROW	F2.075	23,000	150	55,000	150	50,000	159	
70'	F2.070	22,000	145	51,000	140	45,000	149	
90'	F2.090	25,000	165	62,000	160	54,000	169	
110'	F2.110	30,000	185	71,000	180	63,000	189	
70'	F3.070	37,000	140	79,000	140	N/A	N/A	
70'	F4.070	49,000	139	128,000	140	N/A	N/A	
70'	F5.070	75,000	134	166,000	135	N/A	N/A	
70'	F6.070	90,000	134	231,000	135	N/A	N/A	

Exhibit CDS-2R (Updated 11/20/2009)

Estimated Cost Comparisons for Gillespie to Newton 345-kV Transmission Line

Total Cost ($ x 1,000,000) including Capitalized Interest and Other costs for mitigation of potential endangered species habitat

Route	Approx. Miles	Right-of-way and Land Acquisition	Engineering and Design (Utility)	Engineering and Design (Contract)	Procurement of Material and Equipment (including stores)	Construction of Facilities (Utility)	Construction of Facilities (Contract)	Other (all costs not included in the above categories)	Estimated Total Cost
GN1	92	$81.1	$8.3	$2.3	$27.1	$0.0	$62.5	$24.3	$205.6
GN2	91	$80.0	$8.3	$2.3	$27.0	$0.0	$60.6	$27.3	$205.5
GN3	86	$70.1	$8.1	$2.3	$26.3	$0.0	$58.3	$25.0	$190.1
GN4	89	$74.4	$8.2	$2.3	$27.2	$0.0	$61.8	$33.2	$207.1
GN5	90	$51.5	$8.3	$2.3	$27.1	$0.0	$62.9	$24.2	$176.3
GN6	85	$38.2	$8.1	$2.3	$27.1	$0.0	$63.7	$23.0	$162.4
GN7	81	$51.8	$8.0	$2.3	$25.3	$0.0	$58.2	$35.4	$181.0
GN8	79	$49.3	$7.9	$2.3	$23.6	$0.0	$54.4	$37.6	$175.1
GN9	93	$53.4	$8.4	$2.4	$27.6	$0.0	$63.9	$20.2	$175.9
GN10	89	$44.2	$8.2	$2.3	$26.6	$0.0	$60.8	$18.9	$161.0
GN11	85	$42.3	$8.1	$2.3	$26.4	$0.0	$60.0	$22.8	$161.9
Substation		$0.0	$0.2	$0.0	$0.8	$0.4	$0.0	$0.0	$1.4

Total Cost Per Mile ($ x 1,000,000) including Capitalized Interest and Other costs for mitigation of potential endangered species habitat

Route	Approx. Miles	Right-of-way and Land Acquisition	Engineering and Design (Utility)	Engineering and Design (Contract)	Procurement of Material and Equipment (including stores)	Construction of Facilities (Utility)	Construction of Facilities (Contract)	Other (all costs not included in the above categories)	Estimated Total Cost Per Mile
GN1	92	$0.88	$0.09	$0.03	$0.29	$0.00	$0.68	$0.26	$2.23
GN2	91	$0.88	$0.09	$0.03	$0.30	$0.00	$0.67	$0.30	$2.26
GN3	86	$0.82	$0.09	$0.03	$0.31	$0.00	$0.68	$0.29	$2.21
GN4	89	$0.84	$0.09	$0.03	$0.31	$0.00	$0.69	$0.37	$2.33
GN5	90	$0.57	$0.09	$0.03	$0.30	$0.00	$0.70	$0.27	$1.96
GN6	85	$0.45	$0.10	$0.03	$0.32	$0.00	$0.75	$0.27	$1.91
GN7	81	$0.64	$0.10	$0.03	$0.31	$0.00	$0.72	$0.44	$2.23
GN8	79	$0.62	$0.10	$0.03	$0.30	$0.00	$0.69	$0.48	$2.22
GN9	93	$0.57	$0.09	$0.03	$0.30	$0.00	$0.69	$0.22	$1.89
GN10	89	$0.50	$0.09	$0.03	$0.30	$0.00	$0.68	$0.21	$1.81
GN11	85	$0.50	$0.10	$0.03	$0.31	$0.00	$0.71	$0.27	$1.90

ERCOT CTO Comparable Cost ($ x 1,000,000)

Route	Approx. Miles	Right-of-way and Land Acquisition	Engineering and Design (Utility)	Engineering and Design (Contract)	Procurement of Material and Equipment (including stores)	Construction of Facilities (Utility)	Construction of Facilities (Contract)	Other (all costs not included in the above categories)	Estimated Total Cost
GN1	92	$76.6	$7.9	$2.2	$25.5	$0.0	$59.0	$0.0	$171.2
GN2	91	$75.5	$7.8	$2.2	$25.5	$0.0	$57.2	$0.0	$168.3
GN3	86	$66.2	$7.7	$2.2	$24.8	$0.0	$55.0	$0.0	$155.9
GN4	89	$70.2	$7.8	$2.2	$25.6	$0.0	$58.3	$0.0	$164.1
GN5	90	$48.6	$7.8	$2.2	$25.6	$0.0	$59.4	$0.0	$143.6
GN6	85	$36.0	$7.6	$2.2	$25.6	$0.0	$60.1	$0.0	$131.5
GN7	81	$48.9	$7.5	$2.1	$23.9	$0.0	$54.9	$0.0	$137.3
GN8	79	$46.5	$7.4	$2.1	$22.2	$0.0	$51.3	$0.0	$129.6
GN9	93	$50.4	$7.9	$2.2	$26.1	$0.0	$60.3	$0.0	$146.8
GN10	89	$41.7	$7.8	$2.2	$25.1	$0.0	$57.4	$0.0	$134.1
GN11	85	$39.9	$7.7	$2.2	$24.9	$0.0	$56.6	$0.0	$131.2

ERCOT CTO Comparable Cost Per Mile ($ x 1,000,000)

Route	Approx. Miles	Right-of-way and Land Acquisition	Engineering and Design (Utility)	Engineering and Design (Contract)	Procurement of Material and Equipment (including stores)	Construction of Facilities (Utility)	Construction of Facilities (Contract)	Other (all costs not included in the above categories)	Estimated Total Cost Per Mile
GN1	92	$0.83	$0.09	$0.02	$0.28	$0.00	$0.64	$0.00	$1.86
GN2	91	$0.83	$0.09	$0.02	$0.28	$0.00	$0.63	$0.00	$1.85
GN3	86	$0.77	$0.09	$0.03	$0.29	$0.00	$0.64	$0.00	$1.81
GN4	89	$0.79	$0.09	$0.02	$0.29	$0.00	$0.65	$0.00	$1.84
GN5	90	$0.54	$0.09	$0.02	$0.28	$0.00	$0.66	$0.00	$1.60
GN6	85	$0.42	$0.09	$0.03	$0.30	$0.00	$0.71	$0.00	$1.55
GN7	81	$0.60	$0.09	$0.03	$0.29	$0.00	$0.68	$0.00	$1.70
GN8	79	$0.59	$0.09	$0.03	$0.28	$0.00	$0.65	$0.00	$1.64
GN9	93	$0.54	$0.08	$0.02	$0.28	$0.00	$0.65	$0.00	$1.58
GN10	89	$0.47	$0.09	$0.02	$0.28	$0.00	$0.64	$0.00	$1.51
GN11	85	$0.47	$0.09	$0.03	$0.29	$0.00	$0.67	$0.00	$1.54