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TxDOT and Electric Power Transmission Lines

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16. Abstract Rural areas of Texas are being extensively developed as locations for renewable energy projects and generation facilities. Wind power, solar power, and other renewable energy technologies are viewed by the public as the next economic boom and have been compared to the oil boom of the early twentieth century. However, studies have indicated that the existing transmission network is unable to support significant transmission of electricity from additional wind generation. The Public Utilities Commission of Texas created Competitive Renewable Energy Zones (CREZ) to match renewable resources with needs in pursuit of adequate future transmission. The Texas Department of Transportation (TxDOT) has the potential for a unique and expansive role in the development of future transmission capacity given the authorizations contained in House Bill 3588 that allow the department to build, own, or operate transmission. The purpose of this study was to provide baseline information and case studies to better define TxDOT's role in electric power transmission lines and partnering with public utilities. Technical and legal issues were documented in literature and legal analysis undertaken during the study. Stakeholders in electric power generation and transmission were identified, and researchers interviewed a variety of state agencies, transmission providers, renewable energy non-profit organizations, property rights advocates, independent system operators, public utilities and other state departments of transportation. The researchers conclude that at present, the location of transmission alongside transportation is a reasonable and achievable goal. While there are incongruencies in the comparative planning regimens of TxDOT and transmission developers, none seem to present an unbreachable barrier to successful joint development. There are numerous examples of successful installations around the country. In most cases, these alignments are placed just outside of the highway right of way (ROW) on private land, though in a few cases they have also been placed within the ROW. Avoiding conflict with landowners and preserving landscapes was found to be the primary motivation for co-location. The research offered recommendations that would be required (federally and locally) to encourage utility accommodation within ROW, and enhance TxDOT's role in this process.			
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Chapter One: Literature Review

1.1 Introduction

Texas has tremendous untapped energy resources in the area of clean renewable sources such as solar and wind power. The renewable power-generating ability of rural and offshore areas of Texas has the potential to figure prominently in the energy future of the United States, and to help meet the Obama Administration's goal to generate 25% of energy from renewable sources by 2025. While most of the national focus has been on how and where to generate renewable power, without transmission capacity, new generation cannot be a reliable replacement or supplement for existing power resources. Efficient transmission enhances the potential role of renewable energy in two ways; first it ensures that the average cost per kilowatt or megawatt hour delivered to the customer is as low as possible, and second, integration into the transmission network can raise the ability of renewable power to serve as a "peak" source complementing thermal power sources. The state's ability to install diversified wind and solar capacity in different regions, and to connect these to a transmission network serving the broadest possible range of customers will be central to the acceptance of renewable sources.

Texas has a complex power transmission system developed over several decades and the challenge with new generation sites such as those using renewable energy is that their output has to be tied into the current system. Figure 1.1 and Figure 1.2 on the following page show how wind-generated electricity is linked to 138kV transmission lines, culminating in the current system. Figure 1.1 shows a General Electric 1.5 mega-watt (MW) wind turbine on a wind farm near Matador, Texas with sub-station and 138 kV transmission line, and Figure 1.2 shows a 138 kV transmission line, sub-station and 12.5 kV distribution line near a state highway.



Figure 1.1 General Electric 1.5 MW turbine near Matador, TX



Figure 1.2 2183 kV transmission line, sub-station and 12.5 kV distribution line crossing a state highway

The Texas Department of Transportation (TxDOT) has an important role to play in facilitating new links from a comprehensive network of pre-existing corridors crossing the state. While many states have formed partnerships with power transmission companies to site high voltage transmission conductors in the highway right-of-way (ROW), TxDOT has the potential for a unique and expansive role in the development of future transmission capacity given the authorizations contained in House Bill 3588, which allow the department to build, own, or operate transmission. While the recent drop in energy costs and the economic downturn have greatly slowed the development of major initiatives such as the Pampa Wind Project proposed by T. Boone Pickens, this slowdown can be an opportunity to more carefully examine the options for transmission and proceed in a manner that maximizes economies of scope (Welch 2009). For example, when the Public Utility Commission of Texas (PUCT) approved a transmission plan to connect this new generation to the grid, representatives from Mesa Energy stated the company would likely have to build its own transmission since it could not wait for the publically approved lines to be completed (Galbraith 2008). According to the PUCT, placing high voltage transmission along pre-existing easements would be a way to significantly speed the process of transmission construction. Still, under current procedures, arrangements to acquire land for utility siting are often made ahead of time and only presented to the PUCT once ROW has been secured (PUCT 2006). Thus, while it is a potentially beneficial procedure to involve entities that hold pre-existing linear corridors, this would require involving TxDOT and other agencies at an earlier stage of the process. Finally, in a future where all types of electrified transport systems become feasible, it would be useful to view high voltage transmission not only as a parallel utility that can serve alongside transportation corridors, but also as a potentially integral part of future transportation corridors.

Texas controls all electricity generation and transmission undertaken in the state. The Public Utilities Commission of Texas (PUCT) regulates investor-owned utilities and sets rates for integrated utilities as well as delivery rates for transmission and distribution utilities. It has limited authority over municipal electric companies and cooperative electric companies. Generation companies sell power through bilateral contracts, or through the balanced energy market. In Texas this is administered by the Electric Reliability Council of Texas (ERCOT). ERCOT represents 85 percent of the state's electric load and 75 percent of the Texas land area as shown in the figure below. Texas is also a member of three other energy markets: The Southwest Power Pool (SPP), Southeastern Electric Reliability Council (SERC) and the Western Systems Coordinating Council (WSCC). Figure 1.3 shows the locations of the four markets in the state.

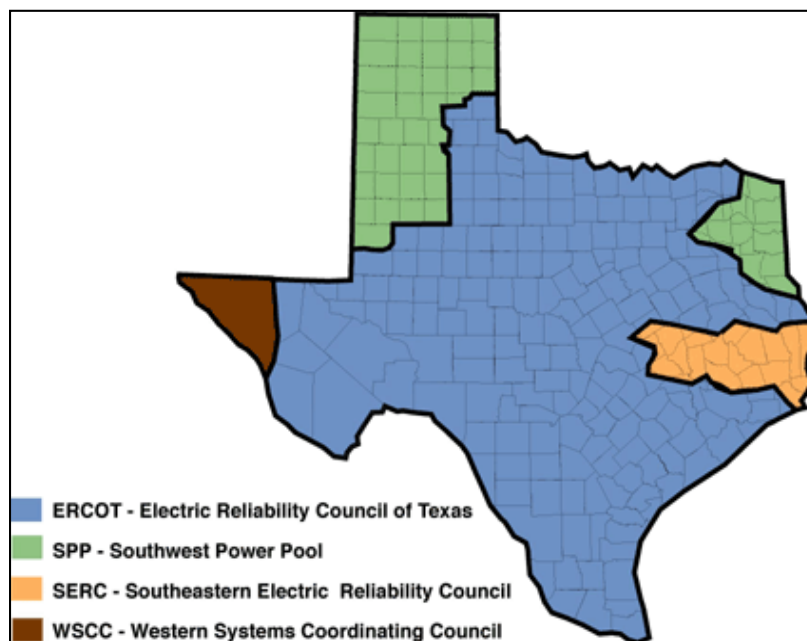


Figure 1.3 Locations of ERCOT, SPP, SERC and WSCC

In 1999, state law changed how electric utilities manage and operate their transmission facilities (LCRA 2009). Utilities are now required to unbundle or separate their electric generation and transmission operations in a deregulated electric market (Smitherman 2009). Many utilities formed affiliates or outsourced parts of their operation to contractors. For example, the Lower Colorado River Authority (LCRA) created LCRA Transmission Services Corporation as a nonprofit affiliate and transferred ownership of its transmission facilities to the affiliate to satisfy the state's unbundling requirement. LCRA has embarked on an expeditious schedule to expand transmission capacity with much of the work involving partnerships with utilities such as American Electric Power, the largest generator of electricity in the United States, and Oncor, the unit of TXU Corporation that is the largest electric transmission provider in Texas. Leading partnerships were interviewed during this research and findings are documented in Chapter 3.

With the ability to build, own, and/or operate power transmission facilities, TxDOT must be aware of design requirements for transmission structures and the associated conductors. Unlike buildings and other structures where design loads are specified in codes and standards, design loads for transmission structures are defined by the owner with minimum loads being legislated by the National Electric Safety Code (NESC 2007). Design requirements for transmission structures are discussed in Section 1.2 of this report. Siting criteria for wind power generation is also discussed in Section 1.2. Current regulations and procedures affecting easements for transmission structures are discussed in Section 1.3. External impacts of transmission such as land use requirements, construction impacts, and the effects on human health and radio frequency interference are discussed in Section 1.4. Finally, an overview of major initiatives and developments in the wind power generation, power transmission is given in Section 1.5.

1.2 Technical Overview

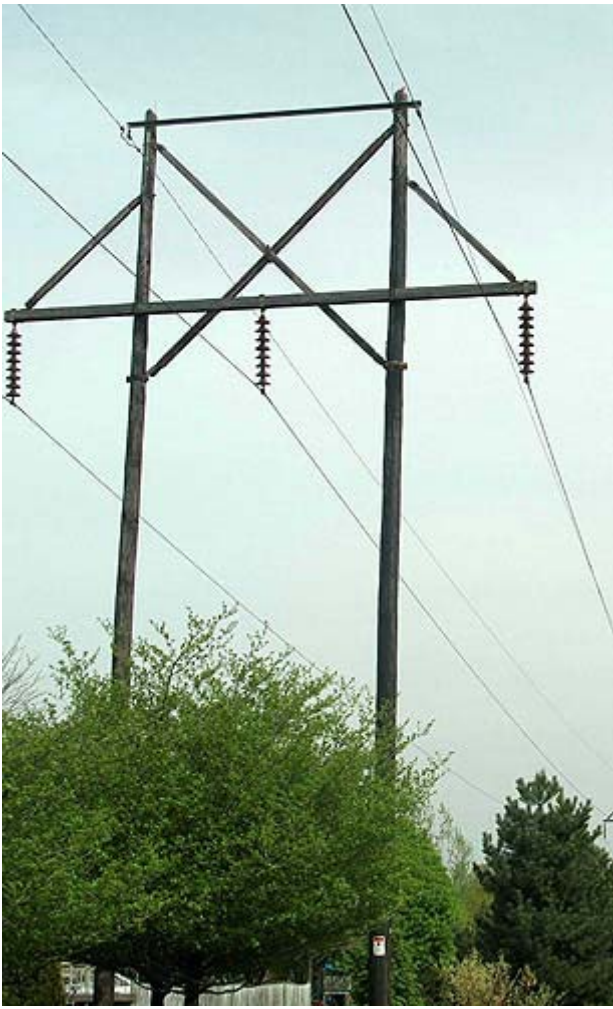
The North American electricity transmission system is comprised of three interconnected systems: the Eastern Interconnection, the Western Interconnection and the Electric Reliability Council of Texas (ERCOT). Although ERCOT manages approximately 75% of the deregulated market in Texas, the Western Interconnection also provides electric power transmission to Texas. The Department of Energy (DOE) report published in 2002 listed the voltage types and total transmission line miles as given in the following Table 1.1 (Spencer 2002).

Electric power can be transmitted as direct current (DC) or alternating current (AC). High Voltage Direct Current (HVDC) transmission can be above ground, below ground, or underwater (ABB 2010). Transmission voltages are usually considered to be 110 kV or above and 345 kV alternating current is the dominant method used in Texas, with 765 kV transmission lines planned in future grid expansions. As shown in Table 1.1, alternating current transmission dominates the industry with only 2.1% using DC transmission.

Table 1.1 US high voltage transmission system (Spencer 2002)

Voltage	Miles of Transmission Line
AC	
230 kV	76,762
345 kV	49,250
500 kV	26,038
765 kV	2,453
Total AC	154,503
DC	
250 – 300 kV	930
400 kV	852
450 kV	192
500 kV	1,333
Total DC	3,307
Total AC and DC	157,810

Transmission structures have several common configurations including single poles or masts, H-frames, rigid frames, masted towers, and space trusses (Cofer 2005). Figure 1.4 shows three of the various structural configurations for transmission structures. These structures can be used for single and double circuit configurations, as shown in Figure 1.5. Design criteria for these towers are discussed in Section 1.2.1. Typical components of an electric power transmission line are shown in Figure 1.6 (Singh, 2009).



H-frame



Lattice Structure



Monopole Structure

Figure 1.4 Structural configurations for transmission towers (ATC 2010)

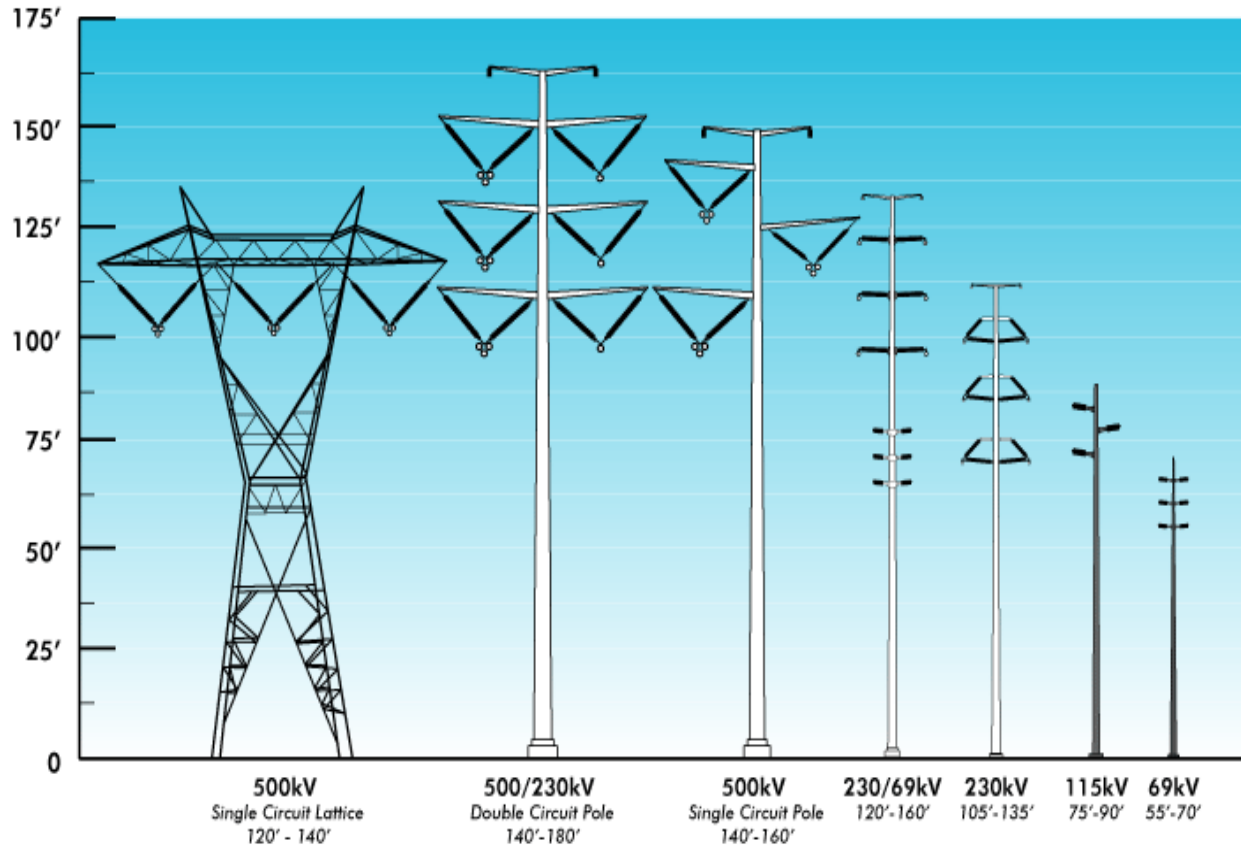


Figure 1.5 Transmission line circuit configurations (SRP 2010)

1.2.1 Transmission

The various components of an electric power transmission system are shown in Figure 1.6.

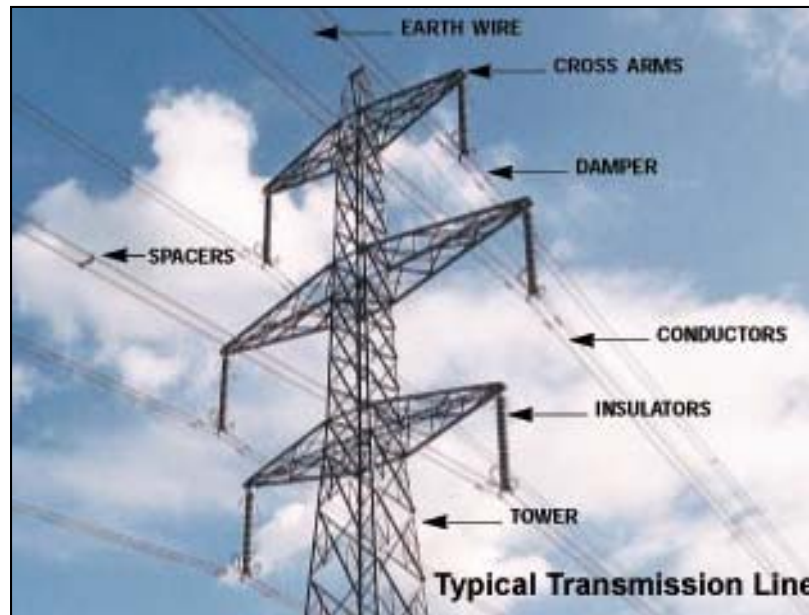


Figure 1.6 Typical components of an electric power transmission line (Singh 2009).

1.2.2 Right of Way Criteria

Vertical and horizontal clearances for transmission lines are governed by the National Electric Safety Code (NESC 2007) provisions given in Section 23, and are applicable to both alternating and direct current applications. These terms are illustrated in Figure 1.7 (NESC, 2007). The height of the structure is governed by the minimum ground clearance, the sag in the conductors, and the required clearances between conductors. Minimum vertical clearance is dependent upon voltage carried by the conductors and elevation above mean sea level (AEP 2009). Minimum horizontal clearances of the supporting structure from streets, roads or highways (Provision 231.B) "... shall be located a sufficient distance ... to avoid contact from ordinary vehicles using and located on the traveled way." Typical widths for ROW are given in Table 1.2. Typical structure widths range between 5% and 10% of the structure height.

Table 1.2 Typical horizontal easement dimensions (AEP 2009)

Voltage	Urban	Typical Width (feet)	Rural
34 kilovolts (kV)	50-100		100
46 kV	50-100		100
69 kV	50-100		100
115 kV	70-100		100
138 kV	70-100		100
161 kV	100-120		120
230 kV	120-150		150
345 kV	150		150
765 kV	200		200

1.2.3 Structural Design Criteria

Structural design loading criteria for transmission line structures are typically specified by the owner/purchaser (ASCE 1997; ASCE 2005b). The principal gravity loads acting on the structure and lines are the dead load and ice load. Wind is the principal lateral load that acts on the structure and the conductors. Design of structural component and systems are governed by standards and codes such as Design of Steel Transmission Pole Structures (ASCE 2005b) and Design of Latticed Steel Transmission Structures (ASCE 1997). Load Resistance and Factor Design (LRFD) is used in current guides to achieve desired reliability levels of the structure. LRFD accounts for the uncertainties in the loads, material strengths, and calculation of load effects, such as axial tension and compression stress, from the loads. The intricacies of the detailed structural analysis and design of these structures is beyond the scope of this work; however, it is necessary that TxDOT understand the underlying precepts used in selecting the loads to be used for design and the reliability of the resulting design.

Structural loading and associated reliability for transmission line structures is discussed in detail in Guidelines for Electrical Transmission Line Structural Loading (ASCE 2010). “Design for loads with a return period of 50 years are considered the basis for transmission line work” (ASCE 2010). This implies that the ultimate limit state load has an annual probability of exceedance of 0.02. Load factors are applied to the loads generated from the 50 year mean recurrence interval (MRI) event to adjust to different mean recurrence intervals.

Table 1.3 provides these load factors for wind loads. For the basic case where the MRI is 50 years, a load factor of 1.0 is applied to the loads to establish the load effects. The relative reliability factor is defined as:

$$\text{Relative Reliability Factor (RRF)} = \frac{[(\text{Probability of failure of a component or structure for a design load of 50 years}) / (\text{Probability of failure of a component or structure for a design load of return period years})].$$

Inspection of the wind load factor in Table 1.3 shows that increasing the wind load by 15% increases by a factor of 2 the RRF. As a point of reference, ordinary structures are designed for

ultimate limit state wind loads associated with approximately a 500 year mean recurrence event in non-hurricane prone regions (ASCE 2005a). Considering the proximity of transmission structures to highways, TxDOT should consider an increase in the basic 50 year MRI load criteria due to an increased risk of loss of life should one of these structures fail onto a roadway.

Table 1.3 Wind load factors to adjust wind loads from 50 year mean recurrence interval (ASCE 2010).

Relative Reliability Factor	Return Period, years	Probability that the load is exceeded in 50 years	Wind Load Factor
0.5	25	0.87	0.85
1	50	0.64	1.00
2	100	0.39	1.15
4	200	0.22	1.30
8	400	0.12	1.45

Table 1.4 Load factors for ice and concurrent wind (ASCE 2010).

Relative Reliability Factor	Return Period, years	Ice Thickness Factor	Concurrent Wind Load Factor
0.5	25	0.80	1.00
1	50	1.00	1.00
2	100	1.25	1.00
4	200	1.50	1.00
8	400	1.85	1.00

1.3 Wind Generation

ERCOT was commissioned by the Public Utilities Commission of Texas (PUCT) to study how it could meet requirements of the Public Utility Regulatory Act of 2005, Section 39.904 (g) (ERCOT 2006). Previous studies indicated that the existing transmission network was unable to support significant transmission of electricity from additional wind generation in West Texas. The study was coordinated with the Southwest Power Pool (SPP), which is recognized as the Regional Transmission Organization for portions of Texas in the Panhandle and in eastern Texas and other areas outside the State of Texas. One goal of the study was to analyze the need and certain costs and benefits of transmission to integrate wind resources into the existing transmission infrastructure. A map of potential wind project sites was developed along with a summary of their location, rated capacity, mean speed, net capacity factor, distance to nearest road and transmission line, and cost of energy. Specific sites were selected as potential sites if they had sufficient available land to support 100 MW of installed wind generation and a capacity factor above a specified minimum value. The capacity factor is the percentage of energy actually produced by a unit compared to the amount it would have produced if it ran at its nameplate rating over an entire year. Selected sites were grouped into 25 zones. The 40 best 100-MW

wind sites in each zone were selected to provide 4,000 MW in each zone. Wind zones selected for transmission analysis are shown in the report. The PUCT of Texas CREZ map released in 2009 is shown in Figure 1.7 on the following page (PUCT 2009). These critical renewable energy zones (CREZ) lie predominantly in the Panhandle, West Texas, and along the coast of Texas.

In February of 2009, the PUCT assigned \$5B in transmission projects to service the CREZ zones (Power 2010). The breakdown by Utility Company is provided in Table 1.5.

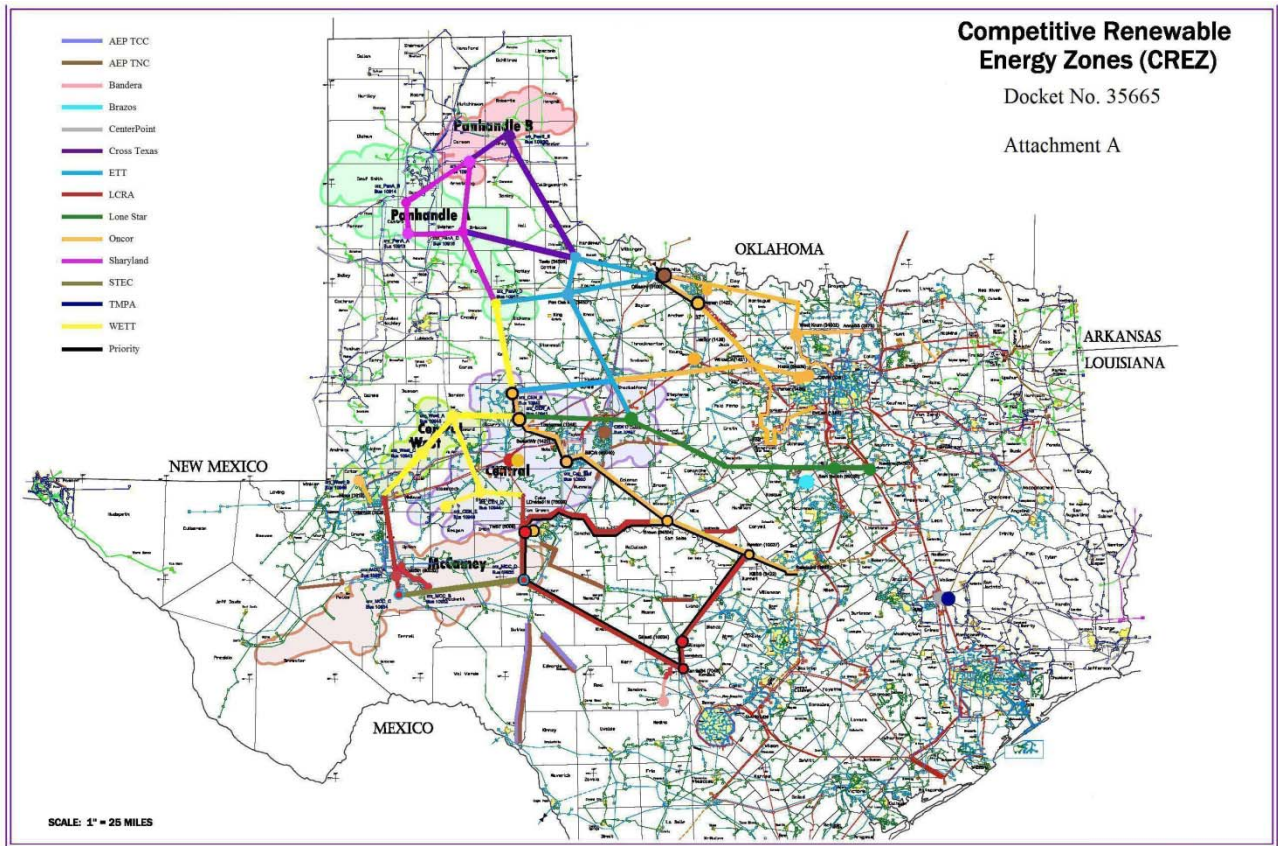


Figure 1.7 Texas Map of Competitive Renewable Energy Zones (CREZ) (PUCT 2009)

Table 1.5 Transmission projects awarded by the PUCT of Texas, February 2010, to support CREZ projects (Power 2010)

Company	Award
Oncor	\$1.34 billion
Electric Transmission Texas	\$789 million
Lower Colorado River Authority	\$750 million
Lone Star Transmission	\$564 million
Wind Energy Transmission Texas	\$402 million
Sharyland Utilities	\$394 million
Cross Texas Transmission	\$390 million

1.4 Current Regulations and Procedures

1.4.1 Right of Way

An information request was submitted to TxDOT from a Texas Senator asking the question “Does Texas have legal requirements for electric transmission lines (the big 345kV type lines) on existing state highway right-of-way? A Public Utility Commission rule provides that the siting of transmission lines utilize or parallel existing compatible rights-of-way and property lines.”

The resulting string of e-mail messages included the following information:

The standard “utility easement” for this type of transmission line is approximately 150 feet across (see Table 1.2) even though the span of the tower arms and lines is only about 75 feet. If the additional “buffer space” beyond the tower/line configuration could be over the existing road ROW, the utility would not have to take as much private property in the process of siting the line. Also, if the utility had to compensate the State for this “buffer space” along the highway it seems that would be good for the state, too.

PUCT Rule 25.101(b)(3)(B) was quoted:

(B) Routing: An application for a new transmission line shall address the criteria in PURA §37.056(c) and considering those criteria, engineering constraints, and costs, the line shall be routed to the extent reasonable to moderate the impact on the affected community and landowners unless grid reliability and security dictate otherwise. The following factors shall be considered in the selection of the utility’s preferred and alternate routes unless a route is agreed to by the utility, the landowners whose property is crossed by the proposed line, and owners of land that contains a habitable structure within 300 feet of the centerline of a transmission project of 230 kV or less, or within 500 feet of the centerline of a transmission project greater than 230 kV, and otherwise conforms to the criteria in PURA §37.056(c):

- (i) whether the routes utilize existing compatible rights-of-way, including the use of vacant positions on existing multiple-circuit transmission lines;

- (ii) whether the routes parallel existing compatible rights-of-ways;
- (iii) whether the routes parallel property lines or other natural or cultural features;
- (iv) whether the routes conform with the policy of prudent avoidance.

1.4.2 Transmission Siting and Approval Process for Federal and State Entities

The siting process for new electric transmission lines is complex and the siting process is currently a state responsibility with the exception of the Tennessee Valley Authority (Meyer and Sedano, 2002). When additional transmission capacity is justified, a utility files a siting proposal to the siting authority, usually the regulatory utility commission. Some states limit the time allowed for the review process. Sometimes the process focuses on the proposal being considered instead of how best to meet the grid need. An environmental assessment is typically required and the utility must file a “certificate of public need” for the transmission facility. The authors list the following commonly used criteria:

- Someone is willing to invest in the project.
- The project is needed to maintain the reliability of the bulk power supply system.
- The project is needed for regional electricity commerce.
- The project is needed to interconnect an approved generator to the grid.

Key difficulties in the siting process are presented in the report. Difficulties inconsistent with public interest can include costs, impacts on electric rates, impacts on the environment, property rights, or protected federal land. Case studies are presented to illustrate difficulties and successes in the siting process. The authors also categorize typical complaints relating to federal land management agency reviews. The categories were listed as follows:

- There is often inconsistency within an agency in the ways local or regional land managers review transmission projects.
- When two (or more) federal agencies are involved, there is frequently inadequate communication and coordination between them.
- Review of transmission proposals does not appear to be important in comparison to the primary mission of the agency.
- Federal agencies frequently wait to conduct their reviews until state reviews are completed and a final route has been selected. This introduces the risk that a federal agency may require a route change, leading to another iteration in the state process.

The report presents several options for improving the review process including making the Federal Energy Regulatory Commission (FERC) the lead agency for coordinating all federal reviews of proposed transmission facilities. FERC issued Order No. 890 directing all transmission providers to develop a transmission planning process and clearly describe their processes in their open access transmission tariff (FERC 2009). The key transmission planning requirements from the order are:

1. Transmission providers must establish a coordinated, transparent and participatory transmission planning process.
2. A transmission provider’s transmission planning process must meet each of FERC’s nine planning principles. These principles are coordination, openness, transparency, information exchange, comparability, dispute resolution, regional participation, economic planning studies, and cost allocation.

3. Transmission Providers must facilitate a meaningful process for stakeholders and customers to provide early input into and help shape transmission plans.
4. Transmission providers must disclose to customers and other stakeholders the basic criteria, assumptions and data that underlie their transmission system plans.
5. Transmission Providers must develop a dispute resolution process to manage disputes that arise from the transmission planning process.
6. Each Transmission Provider must describe its transmission planning process in its tariff and provide it as an attachment to its OATT.

Issues of siting high voltage direct current (HVDC) along active railroad and other transportation right of ways are discussed in a General Accounting Office (GAO) report (GAO 2008). The GAO assessment was in response to a Congressional provision in the Implementing Recommendations of the 9/11 Commission Act of 2007. Points from the assessment were as follows:

- The federal government has historically had a limited role in siting transmission lines.
- State governments approve transmission line siting through public utility commissions and other agencies.
- The Energy Policy Act of 2005 expanded the federal government's role and FERC has authority to approve and issue siting permits for new transmission lines in areas designated by the Department of Energy as National Interest Electric Transmission Corridors (NIETC).
- Some stakeholders are concerned about FERC's expanded authority and the relationship between federal and state agencies.

Five advantages identified by the GAO for adding transmission lines in existing right-of-way are:

1. Decreased congestion and improved reliability by providing access to additional sources of generation and additional paths for electricity
2. Lower costs for consumers
3. Better utilization of existing power plants and more competitive local wholesale electricity markets
4. Facilitated development of new electricity sources located outside population centers
5. Facilitated development of renewable energy sources

When the utility company and the property owner cannot come to an agreement, a three-stage condemnation process is started. The three stages are (Fambrough 2010):

Stage 1. The condemner must attempt to purchase the needed land in lieu of condemnation. Originally the offer was required to be a purchase at fair market value. However, the requirement was modified in 2004 (*Hubenak v. San Jacinto Gas Transmission Co.*) and now a single offer by the condemner meets the requirement regardless of the amount offered. Agreement between the condemner and landowner ends the condemnation process. Otherwise, the parties move to Stage 2.

Stage 2. The condemner petitions the court to appoint three disinterested landowners as commissioners to conduct a hearing and determine the damages incurred by taking the property. Commissioners hear evidence from both parties and post an award. The condemner may post adequate security with the court and begin construction during Stage 2 of the process. Either party may appeal the commissioner's decision, but construction continues.

Stage 3. If either party appeals the matter to court, Stage 3 of the process begins. Recovery of attorney fees and appraiser fees is disallowed as part of the judgment. The process ends when the judicial appeals end. Appeals cannot go beyond the Texas Supreme Court.

1.5 Overview of Major Initiatives and Developments

1.5.1 Wind Energy Development

According to the State Energy Conservation Office (SECO), Texas now leads the nation in wind farm development, and the Texas electric transmission grid has a critical need for expansion. Most of the wind energy production is in remote (from major population centers) areas of the state and this has drastically increased demands on the transmission systems that deliver electricity to users in urban areas (SECO, 2010). Although a wind farm can be built in a year, it can take five years to build the transmission lines to send the power to cities. Some wind energy companies have suggested that without a major expansion of power lines they could abandon plans to build wind farms in Texas (Vaughan 2008).

Senate Bill 20 passed during the 80th (1st called) legislative session in 2007 was an attempt to meet the state's growing transmission needs. It provided for accelerated development of wind energy capacity in Texas. Recent data show that Texas's production of wind energy increased from 180 MW in 1999 to 9410 MW as of December 2009 (American Wind Energy Association 2010). There are more than 4800 commercial wind turbine units on 72 wind farms in Texas's Competitive Renewable Energy Zones (American Wind Energy Association). When a transmission link is determined by the operating entity such as a wind farm, a generation interconnection request must first be formally submitted to state scrutiny and approval.

In 2006 Governor Perry announced commitments of \$10 billion from private companies to increase wind generating capacity in the state by 7,000 megawatts. Increasing the wind generating capacity was contingent on PUCT approving construction of additional transmission capacity to windy areas of the state. The PUCT announced in 2007 its approval for additional transmission lines capable of delivering as much as 25,000 megawatts of wind energy from remote areas in the state to urban centers by 2012. The Governor's Competitiveness Council (GCC) Texas State Energy Report also identified transmission and distribution policy as a current challenge (GCC, 2008). ERCOT has identified 17,000 megawatts of possible wind energy projects. Recently, the PUCT announced a number of awards for new transmission lines in Texas (Power 2010) as shown in Table 1.5. The expansion will add 2,900 miles of new power lines.

The effects of several legislative acts on the renewable energy industry are discussed by Wilson (Wilson 2010). Tax incentives within the American Recovery and Reinvestment Act (ARRA) include more than \$43 billion devoted to energy. From the ARRA, \$4.5 billion will be used by

the Department of Energy to modernize the electric grid. The SMART GRID programs, created in the Energy Independence and Security Act (EISA) will be implemented through a Matching Grant Program. SMART GRID is a plan for transforming the current centralized, producer-controlled network to a less centralized, more consumer-interactive approach using advanced technologies (Litos 2008). Renewable energy technologies are also supported with \$6 billion allocated for the DOE's Innovative Technology Loan Guarantee Program.

The Tres Amigas LLC has the goal of connecting three power grids (Texas Interconnection, Western Interconnection and Eastern Interconnection) to achieve the nation's renewable energy goals (2009). The three asynchronous power grids will be connected through a direct current (DC) hub regulating the power flows between the three grids. The Tres Amigas superstation will be located near Clovis, New Mexico and will incorporate state-of-the-art technologies such as 765 kV DC (HVDC) lines and superconductor lines. The Tres Amigas LLC will help a number of electric power companies in Texas meet the transmission needs created by the Public Utility Commission of Texas approval of 2400 miles of transmission to be constructed in five critical renewable energy zones (CREZ) by 2014.

1.5.2 765 kV Transmission System

An extra high voltage transmission system, whether direct current or alternating current, offers significant advantages in the transmission of electric power. Advocates of interstate electric transmission based upon extra-high-voltage (EHV) 765-kV transmission point out that High-Voltage Direct Current (HVDC) has a lower construction cost than 765-kV alternating current, but the economy of HVDC diminishes for distances less than 100 miles and with intermediate connections. Power losses for 765-kV lines are shown to be substantially lower than 500-kV and 345-kV line (Heyek and Wilcox 2008).

Electric Transmission America, LLC (ETA), American Electric Power (AEP), and MidAmerican Energy Holdings Company to promote high efficiency transmission systems using 765-kV, extra-high voltage (EHV) transmission. Significant advantages to the extra high voltage system include:

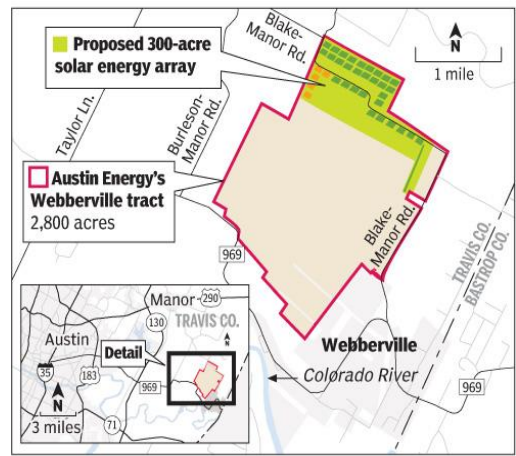
- A single-circuit 765-kV line can carry as much power as three single-circuit 500-kV lines, three double-circuit 345-kV lines, or six single-circuit 345-kV lines, reducing the overall number of lines and rights of way required to deliver equivalent capacity.
- The high capacity of 765-kV can easily facilitate the efficient and economical integration of large-scale renewable generation projects into the nation's transmission grid.
- ETA projects use a minimum right-of-way width of 200 feet for 765-kV construction. Standard industry right-of-way width for 500-kV is also 200 feet, and 150 feet for 345-kV construction. For equivalent power carrying capability, lower voltages require more lines and as a result more right-of-way.
- Typical 765-kV lines have a tower height of approximately 130 – 140 feet. This height is 30 – 40 feet shorter than a typical double-circuit 345-kV tower.
- Power losses in a transmission line decrease as voltage increases. Since 765-kV lines use the highest voltage available in the United States, they experience the least amount of line loss.
- The greater transmission efficiency of 765-kV lines can be attributed mainly to its higher operating voltage (and thus lower current flow) and larger thermal capacity/low

resistance compared to lower voltage lines. This greater transmission efficiency also allows 765-kV lines to carry power over significantly longer distances than lower voltages.

- With up to six conductors per phase, 765-kV lines are virtually free of thermal overload risk, even under severe operating conditions.
- By shifting bulk power transfers from the underlying lower-voltage transmission system to the higher-capacity 765-kV system, overall system losses are reduced significantly.
- New 765-kV designs have line losses of less than one percent, compared to losses as high as nine percent on some existing lines.
- The overlay of a 765-kV system allows for both scheduled and unscheduled outages of parallel lower voltage lines without risk of thermal overloads or increased congestion.
- Use of 765-kV technology allows transmission builders to take advantage of economies of scale. A typical 765-kV line costs approximately \$2.6 million per mile. For equivalent capacity, three 500-kV lines cost \$6.9 million per mile and six 345-kV lines cost \$9.0 million per mile. In other words, 765-kV construction is only 29% of the cost of 345-kV and 38% of the cost of 500-kV for a comparable system.
- Utilizing 765-kV results in a substantial reduction in system losses. For instance, a loss reduction of 250 megawatts equates to saving as much as 200,000 tons of coal, and 500,000 tons of CO₂ emissions on an annual basis.
- The addition of 765-kV systems relieves the stress on underlying, lower voltage transmission systems, postponing the potential need for upgrades of these networks resulting in additional savings for end-use customers over time.

1.5.4 Solar Energy Development

Texas groups are also beginning to look to the power of solar energy as part of the renewable energy mix. For example, Austin Energy recently voted to develop a new solar plant that would generate 30MW of output. This will be a photovoltaic solar plan on 300 acres of property about 25 miles east of Austin. The project will be built and owned by Gemini Solar Development Company; Austin Energy will be the sole client, paying \$10 million per year for 25 years of power generated by the array. The facility is proposed to open in 2010 and is estimated to raise the average monthly electric bill – 1000 kilowatt hours – by about 60 cents (Toohey, 2009). As of October 2010, the development company for this project (Fotowatio Renewable Ventures Group) had submitted the preliminary site plan for the solar plan to the City for permitting review (Price, 2010). This site development process took longer than expected due to environmental concerns, and the developer has proposed moving the site to the southern end of the tract to save wetlands and trees that they wished to conserve (Price, 2010).



Source: Austin Energy Robert Calzada AMERICAN-STATESMAN

Figure 1.8 Solar energy site location

1.5.5 Geothermal Development

Geothermal energy is the third largest source of renewable energy used in the U.S. According to SECO, (SECO, ND) Texas has thousands of wells that have high enough temperatures for geopressed or geothermal resources. This type of geothermal power would be accessed by drilling for water or steam and is a similar process to drilling for oil and gas. There are also hydrothermal resources (hot water and steam) that can be found in fractured or porous rocks and in deep aquifers. The Northern Gulf of Mexico also has hot brine saturated with methane that is found in deep aquifers and could be accessed in the future. Figure 1.2 shows a map of Texas geothermal regions (SECO).

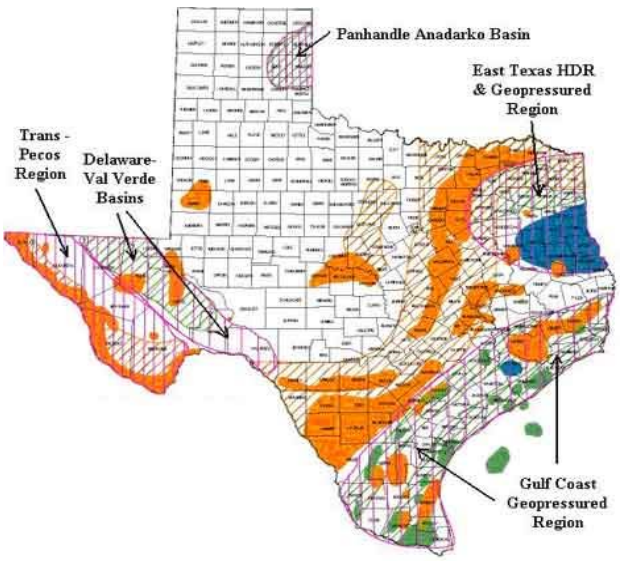


Figure 1.9 Geothermal energy sites

Chapter Two: Legal Review

The research team reviewed and analyzed how TxDOT currently accommodates utilities in its right of way (ROW). The team then turned to review the relevant legal underpinning governing the potential ability of TxDOT to either accommodate higher voltage transmission lines within ROW or purchase ROW adjacent to highway ROW to achieve this task.

2.1 Introduction

Researchers reviewed federal regulations as well as guidance developed over the past twenty years from the Federal Highway Administration (FHWA) and American Association of State Highway and Transportation Officials (AASHTO). In addition, Texas Transportation Code, Texas Administrative Code, Public Utilities Code, Public Utilities Commission Rules and Local Government Code were reviewed along with TxDOT's ROW Manual. The researchers supplemented the information received with the review of regulations by interviewing staffers in the Federal Energy Regulatory Commission, the Public Utilities Commission in Texas, the Attorney General's Office in Texas, and the Office of General Counsel at TxDOT.

Historically, as transmission lines are seen as beneficial to the public good, there has been a long standing practice in the US to accommodate utilities within transportation ROW where feasible. This practice of bundling together transmission of goods and electrons began with placement of the telegraph system within the railroad ROW in the nineteenth century. During the twentieth century multiple utility systems including not only electricity transmission but also oil or gas pipelines, telecommunications, were laid across or adjacent to highway ROW. More recently are often laid longitudinally under the ROW. Thus, the bundling of transportation and utility uses within the same ROW is consistent with longstanding US tradition.

Guidance on the accommodation of utilities in ROW can be found in both federal and state codes, and in the TxDOT ROW manual. At the federal level, Title 23 of the Code of Federal Regulation (CFR) governs utility accommodation policy in Section 645 Utilities at Subpart B, and also in 23 CFR Section 710. The American Association of State Highway Officials (AASHTO) also played a pivotal role in the development of a national policy regarding utility accommodation and installations on freeways throughout the 1950's, 60's and 70's. In Texas, Transportation Code, Utilities Code, and Administrative Code govern how utilities can be accommodated within ROW.

Longitudinal access for utilities on DOT ROW became a more standard practice in the latter part of the twenty century, and both the FHWA and TxDOT developed regulations and guidance for such accommodation. In the past few years, however, requests have begun to come into DOTs to accommodate infrastructure associated with renewable energy technologies, including requests and concepts for longitudinal placement. As a consequence of these requests FHWA

issued guidance in March 2009 on “Longitudinal Accommodation of Utilities from Renewable Energy Facilities” (FHWA, 2009). This can be found in Appendix 1.

The balance of this chapter guides the reader through the various elements of federal and Texas transportation code and makes comments and recommendations, where appropriate, on how TxDOT could facilitate accommodation of renewable energy transmission routes either through accommodation of these facilities within existing ROW or through purchase of ROW for the specific purpose of siting renewable energy transmission. The chapter also outlines the relevant portions of code regarding transmission line development by the various utility entities from Texas Utilities Code. Finally, the chapter provides an overview on case law regarding trespassing onto transmission line towers, with a specific focus on ‘attractive nuisance’ case law and how the courts have handled the liability vis-à-vis children and teenagers.

2.2 Federal Statute Application

2.2.1 Acquisition: 23 CFR Part 1.23 Rights of Way

23 Code of Federal Regulations (CFR) Part 1.23 Rights-of-way delineates the purposes for acquiring ROW for a federal aid highway project. The interest that shall be acquired under 1.23 (a) shall be of such nature and extent *as are adequate for the construction, operation and maintenance* of a project. The use for which ROW is acquired is for *highway purposes*.

The section in paragraph (b) states that except as provided under paragraph (c) of this section, all real property, including air space, within the ROW boundaries of a project shall be *devoted exclusively* to public highway purposes. Paragraph (b) also notes that state highway departments are responsible for preserving such ROW free of all public and private installations, facilities or encroachments, except for those approved under paragraph (c) and those that the Administrator approves as constituting a part of a highway or as necessary for its operation, use, or maintenance for public highway purposes such as information sites established and maintained under §1.35 of the regulations.

The exception that the section lays out in §1.23(c) allows for temporary or permanent occupancy *or use* of the ROW that is approved by the Administrator as either being in the *public interest* and will not impair the highway or interfere with free and safe flow of traffic thereon.

2.2.2 Funding and Reimbursement: 23 CFR Part 710.203 Right of Way and Real Estate

23 CFR Part 710.203 details the conditions under which a state DOT will be funded and reimbursed for ROW acquisition. In general the section requires:

1. the project to have been included in the statewide transportation improvement program,
2. the state has executed a project agreement,
3. NEPA provisions have been complied with, and
4. costs incurred conform with State and Federal law requirements.

Direct eligible costs covered include the cost of property incorporated into the final project and the associated direct costs of acquisition, unless provided otherwise. Participation is provided for

real property acquisition, and services associated with this, including incidental expenses, administrative settlements, and contracting costs for private acquisition services or the use of local public agencies. Relocation assistance and payments are also covered in accordance with 49 CFR Part 24. Damages, for the cost of severance of consequential damage are covered, along with net costs of managing real property prior to and during construction, and payroll related expenses for technical guidance.

Other costs covered include:

- the cost of uneconomic remnants purchased in connection with the acquisition of a partial taking for the project as required by the Uniform Act,
- payment for full or partial control of access on an existing highway (i.e., one not on a new location), based on elements compensable under applicable State law,
- costs to replace operating real property owned by a displaced utility or railroad and conveyed to a state transportation department for a highway project, as provided in 23 CFR part 140, subpart I,
- reimbursement for utility relocations (under 23 CFR part 645, Subpart A) and utility adjustments and reimbursement for railroad highway projects (under 23 CFR part 646, Subpart B)

This section also allows that the following costs may be eligible for reimbursement in the following circumstances, even if they are not incorporated into a project:

- Costs for construction material sites, property acquisitions to a logical boundary, or for eligible transportation enhancement, sites for disposal of hazardous materials, environmental mitigation, environmental banking activities, or last resort housing.
- The cost of acquiring easements outside the ROW for permanent or temporary use.

2.2.3 Property Acquisition Alternatives: Early Acquisition: 23 CFR Part 710.501

The state can initiate early acquisition of real property, subject to compliance with Title VI of the Civil Rights Act 1964 and a determination that the early acquisition has not influenced the environmental assessment for the project including the decision on need to construct the project, consideration of alternatives, and selection of design and location.

2.2.4 Federal Assistance 23 CFR Part 710.603

This subsection covers direct federal acquisition, federal assistance where the state is unable to acquire the required ROW, or the state is unable to obtain possession with sufficient promptness. The provisions, however, are for acquiring any land and/or improvements needed in connection with any project on the interstate system, defense access roads, public lands highways, park roads, and Indian reservation roads.

In order to make the necessary finding to proceed with the acquisition, the Federal Highway Administration (FHWA) requires the state to furnish information including the necessity for acquisition and a statement of the specific interests in lands to be acquired, including the proposed treatment of control of access and the State DOT's intentions regarding acquisition,

subordination, or exclusion of outstanding interests, including utility easements in connection with the acquisition.

For these reasons, a strong rationale would be required for TxDOT to justify requesting assistance connected to the acquisition of ROW for utility purposes.

2.2.5 Accommodation: 23 CFR Parts 645B

The 23 CFR Parts 645B prescribes policies and procedures for accommodating utility facilities and private lines on the ROW of federal aid or direct federal highway projects. Section 645.203 applies to new utility installations, and notes that for private lines, which may be permitted to cross the right of way of a federal project – pursuant to state law and regulations – are done so under the purview of this chapter.

Section 645.205 (a) lays out the policy regarding utility installations, and notes that pursuant to 23 CFR 1.23, it is in the public interest for utility facilities to be accommodated on the ROW of a federal highway provided such use and occupancy of the ROW *does not adversely affect highway or traffic safety or its aesthetic quality*. Section 645.205 (b) notes that by tradition and practice, highway and utility facilities have frequently coexisted within common ROW or along the same corridors, and that it is *essential* that these public service facilities be *compatibly designed and operated*. The section that notes for the design of new highway facilities consideration should be given to utility services needs of the area traversed if the service would be provided from utility facilities on or near the highway. *Joint highway and utility planning is encouraged for such federal highway projects*. However, the section also provides in §645.209 (3) that states are not precluded from adopting more restrictive policies with regard to longitudinal utility installations along ROW. Regarding the provision of private lines under §645.209 (e), state DOTs are required to establish uniform policies for controlling such permitted use and longitudinal installations must conform with 23 CFR §1.23(c). For scenic areas, new utility installations are not permitted on highway ROW or other lands except for a few circumstances which include:

- aerial installations where placement underground is not technically feasible,
- other locations are not available, or are unusually difficult or costly, or are less desirable from the standpoint of aesthetic quality, and
- the proposed installation will be made at a location, and will employ suitable designs and materials which give the greatest weight to the aesthetic qualities of the area being traversed.

Suitable designs include, but are not limited to, self-supporting armless, single-pole construction with vertical configuration of conductors and cable (§645.209 (h) (1 - through iii).

Section 645.211 lays out DOT accommodation policies and requires that consideration be given to the effect of utility installations in regard to safety, aesthetic quality, and costs or difficulty of highway and utility construction and maintenance. Section 645.211 (c) outlines the standards for regulating use and occupancy of ROW. Sub-section (5) provides that a state DOT may deny a utility's request to occupy highway ROW based on state law, regulation, or ordinances or the DOT's utility policy. However, in any case where the provisions of this part are to be cited as

the basis for disapproving a utility's request to use and occupy ROW, measures must be provided *to evaluate the direct and indirect environmental and economic effects of any loss of productive agricultural land or any impairment of the productivity of any agricultural land that would result from the disapproval.* The environmental and economic effects on productive agricultural land together with the possible interference with or impairment of the use of the highway and the effect on highway safety must be considered in the decision to disapprove any proposal by a utility to use such highway right-of-way.

Comment: These sections give TxDOT opportunity to accommodate transmission line development along an existing interstate which already has an amount of development. This could be used to ensure that other pristine locations or productive agricultural lands are not traversed by transmission. This would allow land to be preserved for agricultural or other uses for future generations. The section provides an element of latitude to put utility transmission in ROW from the Competitive Renewable Energy Zones (CREZ) designated in Texas, instead of requiring them to utilize agricultural or scenic property, if TxDOT wanted to follow a more prescriptive policy to accommodate renewable transmission opportunities. This strategy may receive a higher priority focus in light of the PUCT rejection in April 2010 of LCRA's proposed power lines bringing wind energy through the Hill Country. The PUCT, in rejecting LCRA's proposed route, requested that future routes cut through fewer homesteads and have a lesser impact on habitat. The PUCT asked LCRA to consider alternatives which would hug property line and follow existing county roads and other highways.

Section 645.211 (e) requires DOTs to place, within their utility accommodation plan, the detailed procedures, criteria, and standards it will use to evaluate and approve individual applications of utilities on freeways under the provisions of §645.209(c) of this part. State DOTs may develop such procedures, criteria, and standards by class of utility. In defining utility classes, consideration may be given to distinguishing utility services by type, nature, or function and their potential impact on the highway and its user. Section 645.211 (f) notes that the means and authority for enforcing the control of access restrictions applicable to utility use of controlled access highway facilities should be clearly set forth in the DOTs plan.

Under Section 645.215 states are required to submit a statement to FHWA on the authority of utilities to use and occupy ROW; the department's power to regulate this use and identification of any areas, on the federal aid highways where the DOT is without legal authority to regulate use by utilities, and any policies and procedures that the DOT employs to facilitate accommodation of utilities within the ROW of federal aid highways. FHWA then determines that the DOT's policies meet the requirements and satisfies provisions of 23 CFR 1.23 and 1.27, and can then approve their use on federal-aid highway projects in that state.

2.2.6 Utilizing Federal Funds for ROW not considered to be a use for highway purposes – i.e. Reconciling 23 CFR 1.23 and 23 CFR 645 Subpart B.

FHWA's Utility Relocation and Accommodation on Federal-Aid Highway projects (FHWA 2003) notes that utility use of highway ROW is not considered a use for a highway purpose. Therefore, federal-aid highway funds are not eligible for use in purchasing ROW *acquired solely*

for the purposes of accommodating utility facilities in excess of that normally acquired in accordance with standard criteria and procedures.

However, if a state or locality *routinely dedicates* or *permits* a portion of the road or street ROW for use by utilities, according to standard guidance published pursuant to state law or administrative practice, such ROW *may* be considered eligible for Federal-aid reimbursement as an *integral part of the project ROW*. Similarly under the exception that 23 CFR §1.23 (b) and (c) allow, if the utility formed a necessary element of the highway i.e. for its operations, a DOT might be able to purchase extra ROW to accommodate the utility.

Recommendation: TxDOT should review whether it has already been routinely dedicating or permitting portions of the ROW for use by utilities for transmission. If this is already a standard practice, extra ROW purchased (subject to NEPA provisions) could be dedicated for utility use. If TxDOT has not made this an across-the-board practice, the researchers recommend developing guidance within the ROW manual to provide TxDOT with the ability to be able to utilize this exception for future use.

2.2.7 FHWA 2009 Longitudinal Guidance

In 2009 FHWA released guidance on longitudinal accommodation of utilities in the interstate system ROW (FHWA, 2009) which can be found in Appendix 1 of this report. This guidance was a consequence of the emerging interest in the production and distribution of renewable energy and proposals that were coming into the states to locate such facilities in highway ROW. The guidance describes steps to determine whether the accommodation should be conducted under 23 CFR Part 645 Subpart B or 23 CFR Part 710.

The guidance encouraged states to review their accommodation policies and make modifications and updates as necessary based on renewable energy considerations and other items outlined in the memo. The guidance is intended to complement FHWA's 6th Edition of the Program Guide: Utility Relocation and Accommodation on Federal-Aid Highway Projects released in January 2003 (FHWA, 2003), but notes that much of the discussion contained in the document is *considered applicable to other freeways and similar transportation facilities*. The guidance provides steps to determine whether the facility serves the public and meets the definition of utility and can thus be accommodated under 23 CFR 645 Subpart B.

The guidance in reviewing other longitudinal accommodation considerations, notes that other federal policies, laws, regulations and standards may come into play in the decision-making process. One area discussed in the guide is planning. Noting that USC 134, 135, and 23 CFR 450 established FHWA requirements for statewide and metropolitan transportation planning, the guidance goes on to say that while utility interests are not explicitly addressed in the regulations, it is nevertheless *appropriate to include a utility element in the undertaking of a multimodal, systems-level corridor or subarea planning study, or in the development of the long-range statewide and or/metropolitan transportation plan*. Discussions in these documents, the memo concedes, would supplement, rather than supplant, the information contained in utility accommodation policies. FHWA encourages coordination with utility interests in a strategic planning process that identifies roles and responsibilities of the DOT in the accommodation of

longitudinal utility facilities within the ROW of the interstate system. Specific proposals that came in for longitudinal installation along the interstate system could then be evaluated for compatibility with applicable metropolitan or statewide long-range transportation plans.

In this memo FHWA *encourages* DOTs to include in their policies discussion of how utility accommodation can be *better integrated into their transportation planning process at the state, regional and corridor levels*. This focus, FHWA argues, would place states in a better position to handle accommodation questions systematically rather than on a case-by-case basis. The memo also encourages FHWA Division staff to:

- Work with their DOTs to integrate the consideration of utility facilities in their statewide strategic plans, highway system plans, metropolitan transportation plans, and corridor transportation plans.
- Work with their DOTs to conduct a review and assessment of the DOT's utility accommodation plan to ensure it adequately meets current needs.

Recommendation: Given the policy focus of this guidance, there is now greater latitude for states to program for the installation and accommodation of utilities (especially to achieve RPS policies) within their transportation planning activities. The research team recommends TxDOT develop a procedure to include utility development and construction in its transportation planning process. As a first step, it would be advisable for TxDOT ROW and Planning staff to meet with the PUCT and ERCOT to develop initial contacts and gain an enhanced understanding of the transmission siting process and policies that they utilize and authorize, and then to utilize this platform for coordinated planning purposes. Once this has been initiated, the DOT could then set out a process to educate and coordinate with the MPOs to ensure this is included in their planning documents. By undertaking this coordination the DOT can enhance the state's ability to achieve its RPS targets and also effectively program and plan for the state to be able to show in the State Implementation Plan how the state is achieving air quality goals under the Clean Air Act (1990) as amended through coordinated agency and regional planning.

2.3 Texas Statute Application

2.3.1 Texas ROW Acquisition Methods

Texas Transportation Code Chapter 224 provides the mechanism through which the department can acquire right-of-way (ROW). The department can acquire by purchase, gift or eminent domain any ROW *necessary* for the national system of interstate and defense *highways* (§224.001). Section 224.001 allows counties or municipalities to acquire highway ROW requested by the department.

In relation to acquisition by the Commissioners Court, the Commissioners Court of any county may acquire by purchase or eminent domain any real property, including ROW, the commission determines is *necessary* or *convenient* to a state highway to be constructed, reconstructed, maintained, *widened* or *extended* (Section 224.003(a)). In the acquisition of ROW by or for the

department, the cost of relocating or adjusting utility facilities, which cost may be eligible under law, is considered a cost of the acquisition (Section 224.008).

The department is levied with the duty in the development and maintenance of the system to provide for its efficient maintenance, durability, to perfect and extend a correlated system independent of state funds (Section 224.032).

Recommendation: The allocation of ROW for transmission could become part of the duty of the transportation commission and commissioner's courts as part of their planning processes. This would allow TxDOT and local jurisdictions to develop a multi-modal infrastructure network to perfect and extend an integrated system of multimodal infrastructure networks.

2.3.2 Purchasing ROW for Utilities

Currently the only area in which TxDOT has been given authority to purchase ROW specifically for utilities is in the language that was inserted by HB 3588.

However, under Section 224.152 of the Transportation Code the department is authorized, subject to availability of federal and state funds, to *improve air quality and develop innovative techniques to finance transportation projects and enhance the use of existing highways and facilities* in furtherance of the purposes of the US Congress as expressed in 23 U.S.C. Sections 134, 135, 146 and 149. This directive could be interpreted as giving license to the department's participation in a program, such as providing ROW for renewable energy projects that would have measurable improvements to air quality. The case would be more compelling if it was determined that a project could not move forward without DOT participation.

Recommendation: Add a policy preamble into transportation utility code that planning for a multi-modal system will assist the state in enhancing delivery of renewable capacity that would improve air quality. By facilitating and assisting in the development of transmission routes TxDOT could aid the state in developing its renewable energy capacity (which is extensive) to reduce reliability on fossil fuels.

The relevant segments of Chapter 227 useful to utilize and place into other segments of transportation code to facilitate the development of utility corridors, include the following components:

Chapter 227 of Transportation Code provides instructions for development of multi-modal corridors that include public utility development. Under Section 227.001 (7) a "Public utility facility" means:

- a) Water, wastewater, natural gas, or petroleum pipeline or associated equipment
- b) Electric transmission or distribution line or associated equipment.
- c) Telecommunications, information services, or cable television infrastructure or associated equipment, including fiber optic cable, conduit, and wireless communications systems

Section 227.012 requires that the Commission *shall* consider seven specific criteria when selecting segments for a multi-modal corridor, namely:

- (1) current and projected traffic patterns;
- (2) the safety of motorists;
- (3) potential risks to persons from spills or accidents of any kind;
- (4) *environmental effects, including the effect on air quality;*
- (5) *current and projected economic development;*
- (6) *the current and projected need for additional transportation options; and*
- (7) *system connectivity.*

Recommendation: Utilize the last four criteria to aid in development site selection for transmission facilities – this would also tie into FHWA guidance discussed earlier in this chapter. System connectivity could also provide a rationale for interconnection between ERCOT and the Southwestern Power Pool for sale of renewable electricity to surrounding states (New Mexico, Oklahoma, Arkansas, Louisiana, and potentially Mexico utilizing provisions through the North American Free Trade Agreement).

Section 227.014 allows the joint operation of more than one facility if the Commission determines mobility needs could be more efficiently and economically met. The Commission can also combine two or more systems into one system, and can operate additional facilities as an expansion of a system if the addition would *benefit* the system.

Recommendation: Keep this type of language as it provides a rationale for having transmission provide a benefit to the system – economically/financially – especially if TxDOT can lease this component of the facility and generate an ongoing revenue stream.

According to Section 227.015 the department can direct the time and manner of construction of a public utility facility. Section 227.021 (2) provides the department with authority to authorize a governmental or private entity to construct or operate a facility within the multi-modal corridor.

Section 227.021(2)(c) and subject to Section 227.029, stipulates the department shall grant the owner of a public utility facility that is located on a multi-modal corridor reasonable access to operate and maintain the public utility facility. Section 227.021(2)(d) provides that the department may construct or contract for the construction of public utility facilities. However, the department may not directly or indirectly provide water, wastewater, natural gas, petroleum pipeline, electric transmission, electric distribution, telecommunications, information, or cable television services.

The department is authorized under Section 227.026(c) to enter into agreements with a public or private utility or a utility common carrier, for the common use of a public utility facility in a multi-modal corridor if the department has adopted rules requiring each common user to avoid damaging any equipment that the common user does not own or operate.

Under Chapter 227.041 the transportation commission has the same powers and duties relating to the condemnation and acquisition of real property for multi-modal facility component that they have under Transportation Code Chapter 203 for a toll project. Section 227.041 also allows the

commission to purchase an option to purchase property or a property right, including for the construction or operation of a facility that may be located in a contiguous or planned segment or for mitigation of environmental effects.

According to Section 227.045, if the department authorizes another governmental entity to construct or operate a facility or a segment of a facility, that entity has all the powers and duties of the department under this subchapter, except that the entity:

- (1) may only construct or operate a facility that is located in the geographic area within which that entity is authorized to operate; and
- (2) may not file a declaration of taking and obtain early possession of real property.

Section 227.081 allows the department to charge a fee (including a governmental or private entity) as a condition of using any part of a multi-modal corridor. Fees can be set at varying levels, including a percentage of revenue, or use, or throughput. The commission can also establish joint fees or the division of fees. The commission is required to consider five criteria if it establishes fees including:

- (1) the acquisition cost of the property being used;
- (2) if applicable, the value of the property being transported, or of the service being offered;
- (3) any cost to the department or public occasioned by the use, including environmental effects;
- (4) comparable fees set by the competitive marketplace; and
- (5) the *desirable effects of full use* of a multi-modal Corridor on the *state's economy* and its residents.

The department is precluded from requiring a public utility facility to pay a fee as a condition of crossing the multi-modal corridor and cannot require the owner of a public utility facility to pay a fee for placing a facility along or within the corridor specifically to provide service to customers within the corridor pursuant to an obligation as a provider of last resort. The department may not require payment of a fee for use of the corridor by a public utility facility in existence before the establishment of the corridor or for use by a facility that replaces a facility in existence before the establishment of the corridor unless the owner of the existing public utility facility relocates the public utility facility into the corridor of its own volition. For use of the corridor by a public utility facility whose owner places the facility in the corridor of its own volition, the department may charge the owner a fee as negotiated between the department and the owner. The fee shall be competitively neutral and nondiscriminatory among similarly situated owners of public utility facilities.

Recommendation: Add the utility corridor language to Transportation Code Chapter 224. Also amend Chapter 365 Road District Toll Roads, Chapter 366 Regional Tollway Authorities, Chapter 370 Regional Mobility Authorities, Chapter 431 Texas Transportation Corporations and Chapter 441 Road Utility Districts by adding in the utility corridor language. This would allow these entities to also be able to effectively plan and develop transmission development siting within or adjacent to their ROW.

2.3.3 Control of Transportation Assets

TxDOT is given the authorization to maintain state highways which includes the sale, exchange, or return of highway property no longer needed (Transportation Code Chapter 202). The department, under Section 202.024, can exchange an interest in property acquired but not needed for highway purposes as whole or partial consideration for an interest in property needed for highway purposes.

Under Section 202.052 of the Transportation Code, TxDOT can also lease a highway asset, or airspace above or underground space below the highway system if it determines that the interest to be leased will not be needed for highway purposes during the term of the lease and under 202.052(b) is not for a purpose inconsistent with applicable highway use. Under Sub-section 202.052(d)(1) the department may authorize an exception to charges for the fair market value for this leased asset, to a public utility provider, or if the lease is for a social, environmental, or economic mitigation purpose.

Recommendation: Two recommendations emerge from these provisions, bearing in mind other recommendations made earlier in this chapter. First, once a planning process is in place, TxDOT could review its property portfolio to assess how much real-estate it could theoretically utilize for the provision of utility development. If real-estate was available in sufficient quantities, TXDOT could create a program in concert with its utility partners to exchange property, possibly acquiring property held by transmission developers for highway development purposes. TXDOT could also utilize the sub-section (d)(1)'s exception clauses to justify such swaps as part of a program to facilitate and enhance state RSP goals, and bring renewable energy into the identified megapolitan growth areas of the state within the identified megaregion of the Texas Triangle.

2.4 Utilities Code

This section outlines the rules and regulations for utilities regarding development of transmission lines. Utilities are considered to fall within the definition of critical infrastructure under Section 421.001 of the Government Code. This classification authorizes the utility to take private property through the use of eminent domain if it is deemed to be in the public interest.

2.4.1 PUCT Guidance

The PUCT rules encourage utilities to use a parallel corridor, such as alongside a transportation corridor or a rail corridor whenever possible. This rule is filed under §25.101(PUC, 2003).

In determining the success of an application, the PUCT specifically considers the number of miles or number of feet an applicant was able to successfully use for utility development as criteria in the selection process. There is no specific weighting given to this criterion, yet it can make a difference if the corridor is competing against another option with similar attributes.

2.4.2 Public Utility Regulatory Act

The Public Utility Regulatory Act was enacted to protect the public interest in the rates and service of electric utilities. The purpose was to establish a comprehensive and adequate regulatory system for electric utilities to assure rates, operations, and services that are just and reasonable to consumers and electric utilities (Section 31.001).

2.4.3 Definition of Utility

Chapter 11 Section 11.004 of the Utilities Act defines a utility in Subtitle A, "public utility" or "utility" means:

- (1) an electric utility, as that term is defined by Section 31.002; or
- (2) a public utility or utility, as those terms are defined by Section 51.002 for telecommunications utilities.

Section 31.002 (6)(ii) of the Public Utilities Code defines an electric utility as ‘that owning or operating equipment or facilities to produce, generate or *transmit, distribute or sell* electric energy to an electric utility.’ The PUCT has exclusive original jurisdiction over the rates, operations, and services of an electric utility in areas outside a municipality and areas inside a municipality that surrenders its jurisdiction to the commission.

Section 32.052 allows certain river authorities to construct improvements, including acquiring, finance constructing, rebuilding, and use of new or existing transmission lines or other assets to sell electricity exclusively at wholesale to San Saba, Llano, Burnet, Travis, Bastrop, Blanco, Colorado or Fayette County or an area already served by a river authority on January 1, 1975.

Section 37.051 requires that an electric utility (other other person) may not directly or indirectly provide service to the public under a franchise or permit unless the utility first obtains a certificate that states that the public convenience and necessity requires or will require the installation, operation, or extension of the service.

Section 38.004 of Utilities Code requires a minimum clearance standard. Notwithstanding any other law, a transmission distribution line owned by an electric utility or cooperative must be constructed, operated, and maintained as to clearances in the manner described in the National Electrical Safety Code Standard ANSI (c) (2) as adopted by the American National Safety Institute and in effect at the time of construction.

Utilities Code governs the four entities authorized to produce and provide electricity, including development and utilization of transmission lines. These are: Electric Cooperatives, Joint Powers Agencies, and Utility Corporations including Municipal Power Agencies and Gas and Electric Corporations. These would be potential partners that TxDOT could work with if transportation code was amended to allow the purchase of ROW for transmission line development.

2.4.4 Electric Cooperatives

Electric cooperatives can acquire own, maintain, use, and exchange an interest in property which includes transmission and distribution lines or systems that are *necessary, convenient or useful*

(Utilities Code Section 161.121). Section 161.123 outlines the powers relating to provision of electric energy and an electric cooperative can transmit, distribute, and dispose of electric energy to its members only. Electric cooperatives may exercise the power of eminent domain in the manner provided by state law for acquiring private property for public use. The power, however, does not apply to state property or property of a political subdivision (Section 161.125).

2.4.5 Joint Powers Agencies including Utility Corporations and Municipal Power Agencies

Chapter 163 of Utilities Code governs utility corporations and other providers. An electric facility is defined as a facility necessary or incidental to generating or transmitting electric power and energy and includes transmission lines and a right of way or other right relating to a facility (163.001). Public and private entities can jointly plan, finance, acquire, construct, own, operate and maintain electric facilities to (i) achieve economies of scale in providing electric energy to the public; (ii) promote economic development of the state; and (iii) meet the state's future power needs (163.012). Under section 163.013 these entities may use means and assets to plan, acquire, construct, own, operate, and maintain its interest in an electric facility. They can acquire for the use and benefit of each participating entity, land easements, and property for an electric facility by purchase or by exercising the power of eminent domain. The use of eminent domain is provided in Section 163.014. These entities are granted the same authority as municipalities in an eminent domain proceeding. Eminent domain cannot be used to acquire an interest in an electric facility that belongs to another entity.

Subchapter C of Utilities Code Section 163 governs the authority of municipal power agencies, who can be engaged in generation, transmission and sale or exchange of electric energy (Section 163.060). They can issue revenue bonds to accomplish the purposes of the agency (Section 163.064).

Recommendation: The existing language provides a strong justification for accommodation of utilities in ROW and for potential purchase of extra ROW to accommodate future longitudinal higher voltage transmission lines from renewable energy areas of the state. This should be inserted into utility transmission line language that TxDOT recommends to the legislature to be inserted into regular transportation code

2.4.6 Gas and Electric Corporations

Chapter 181 of Utilities Codes governs gas and electric corporations. They have the right under Section 181.004 to enter on, condemn, and appropriate the land, right-of-way, easement, or other property of any person or corporation. They can hold, or use land or a ROW easement as necessary for the purpose of the corporation (Section 181.007). They can generate, make, manufacture, transport, and sell electric current and power to an individual, the public, or a municipality (Section 181.008). Section 181.08 (b)(2) provides that a gas or electric corporation may construct, maintain, and operate power plants and substations and any machinery, apparatus, pipe, pole, wire, device, or arrangement as necessary to operate its lines in this state.

Further provisions are defined within Chapter 181 Subchapter C relating to electric utilities regarding the construction of transmission lines including safety. Under Section 181.041 an electric utility includes an (i) electric cooperative organized under Chapter 161 (ii) a corporation or river authority created by a statute of the state that generates, transmits, or distributes electric energy in this state and whose operations are subject to the judicial and legislative processes of this state; and (iii) a municipal electric utility which is a municipality in this state that owns and operates an electric generating plant or that operates electric transmission lines or an electric distribution system.

Under Section 181.042, electric utilities are granted the authority to construct, maintain, and operate lines over, under, across, on, or along a state highway, a county road, a municipal street or alley, or other public property in a municipality. If they are proposing to construct a line along the ROW of a state highway or country road, not in a municipality, they are required to give notice of the proposal to the Transportation Commission if it relates to a state highway (Section 181.044(a)(1)). The Transportation Commission may designate the location along the right-of-way where the electric utility may construct the line (Section 181.044 (b)).

Section 181.045 (a) requires that a municipal electric utility shall construct, operate, and maintain its lines for the transmission and distribution of electric energy along highways and at other places in accordance with the national electrical safety code. With regard to clearances, an electric utility that is not a municipal electric utility shall construct, operate, and maintain its lines for the transmission and distribution of electric energy along highways and at other places in accordance with the national electrical safety code.

Under Section 181.045 (b) the electric utility, regardless of Subsection (a) shall:

- (1) use single pole construction for a line along a highway or county road;
- (2) construct a transmission line that crosses a highway or road so that the line is at least 22 feet above the surface of the traffic lane; and
- (3) construct a line that is above a railroad track or railroad siding so that the line is at least 22 feet above the surface of the track or siding.

Section 181.045 (c) notes that Subsection (a) does not apply to a line in a municipality to the extent an ordinance or regulation applying in the municipality provides differently than the national electrical safety code. The national electrical safety code means the National Electrical Safety Code, as published in March 1948 by the National Bureau of Standards, Handbook 30, as revised by Handbook 81, published by the National Bureau of Standards in November 1961.

Chapter 186 of the Utilities Code lays out provisions to ensure the reliability and integrity of utility service. A public utility within this subchapter is defined to include a private corporation that does business in the state and has the right of eminent domain, a municipality, or a state agency, authority or subdivision that is engaged in the business of generating, transmitting, or distributing electric energy to the public. The subchapter lays out policy that notes that continuous service by a public utility is essential to the life, health and safety of the public. Within this subchapter a utility or energy transporter may acquire an easement by eminent domain along, over, under, or across a railroad or railroad right of way to maintain, operate or

upgrade its facilities consisting with preexisting licenses or agreements (Section 186.054). Such activities may not unreasonably interfere with railroad operations.

As a conservation district, the Lower Colorado River Authority's (LCRA) decisions in how it plans transmission developments differ from that of private power provider. The LCRA builds transmission lines at the direction of the PUCT (LCRA, 2010).

2.5 Liability and Nuisance Issues to Consider in Transmission Line Development

One area that may cause concern for TxDOT in crafting policies for an enhanced utility policy within or adjacent to ROW, is that of the liability and duty of care that may accrue in regard to trespassers or invitees on this facility. A long line of jurisprudence exists within Texas regarding the duty of care owed by a property owner to invitees, lessees and trespassers. Within this line of cases, the courts have also carved out an area of law known as the theory of attractive nuisance for young children who enter upon premises.

2.5.1 Premises Liability and Duty of Care

The only duty a premises owner or occupier owes a trespasser is not to injure him willfully, wantonly, or through gross negligence (*Burton Constr. & Shipbuilding Co. V. Broussard*, 154 Texas. 50, 273 S.W.2d 598, 602 (Tex. 1954)). As to invitees, a premises owner or occupier must use ordinary care to reduce or eliminate an unreasonable risk of harm created by a condition of which the owners is or reasonably should be aware (*State Dept. of Highways & Public Transp. v. Payne*, 838 S.W.2d 235, 237 (Tex. 1992)).

The research team also reviewed a series of cases since 1920 utilizing the key-words *duty of care* and *electricity* to discern how case law had treated or changed the duty-of-care owed to trespassers versus invitees (see Table 2.1).

Table 2.1 Sample cases involving electricity and duty of care

Case Name, Year & Citation	Case Name, Year & Citation
Denison Light & Power Company v. B. B. Patton. 105 Tex. 621; 154 S.W. 540; (1913, Tex. App)	Texas Utilities Electric Company v. Gold Kist, Inc. 817 S.W.2d 749 (1991 Tex. App)
McCoy v. Texas Power & Light Co. 229 S.W. 623; (1920 Tex. App)	Central Power & Light Company v. Oscar R. Romero. 948 S.W.2d 764 (1996 Tex. App.)
West Texas Utilities co. V. Renner, 53 S.W2d 451 (Tex. Comm’n App. 1932)	Hoechst-Celanese Corp. v. Mendez, 967 S.W.2d 354, (41 Tex. Sup. Ct. J. 458 (Tex 1998)
American General Ins. Co. et al. v. Southwestern Gas & Electric Co. 115 F.2d 706; 1940 U.S. App	Clayton W. Williams, Jr., Inc. v. Olivo, 952 S.W.2d 523, 528, 40 Tex. Sup. Ct. J. 887, 41 Tex. Sup. Ct. J. 19 (Tex. 1997).
Houston Lighting & Power Co. V. Henry Alton Brooks et al. 161 Tex. 32; 336 S.W.2d 603 (1960 Tex)	Victor Andres, v. DT Construction. 205 S.W. 3d 3; (2006 Tex. App)
Wendell v. Central Power and Light Company, 677 S.W.2d 610 (Tex. App. – 1984)	Carl Johannes v. Ace Transportation Inc and El Paso Electric Company. 2009 Tex. App. LEXIS 2956
Neal Sisson & Daryl & Rosan Sisson v. Texas New Mexico Power Company. 722 S.W. 2d 260 (Tex. App. 1986)	

Most of these cases were regarding appellants who were injured while accessing or working close to, or physically upon, telephone and electric poles. The courts through the 80+ years of jurisprudence have taken an extremely strong ‘public-policy’ perspective in assessing liability and the duty of care owed, and in many cases refused to stretch that duty any further than is absolutely necessary. In McCoy v Texas Power & Light Co. Justice Buck quoted Justice Gains in Railroad Co. V. Edwards (Tex. Sup.) 36 S.W. 430, 32 L.R. A. 825 “*we believe that the doctrine upon which the Turntable Cases¹ have been sustained goes to the limit of the law, and sound public policy forbids that it be further extended*”. The Texas Commission of Appeals in Wendell v. Central Power & Light Co in 1984 stated “*...the duty is imposed, in a case like this, not only to warn, but to use at least **ordinary** care to have the premises in a **reasonably safe condition**; the degree of care required must be commensurate with the danger.*”

In Texas Utilities Electric Company v. Gold Kist Inc. the court noted “*A company maintaining electrical wires over which a high voltage of electricity is conveyed, rendering them highly dangerous to others, is under the duty of using the necessary care and prudence at places where others may have the right to go, either for work, business, or pleasure to prevent injury.*”

¹ A series of cases that arose in the late 19th century and early 20th century regarding the turntables that railroads used to move engines onto different tracks. These were extremely attractive to children to climb upon and turn-around as they looked and behaved like a merry-go-round that would be found in a children’s playground.

The court in *West Texas Utilities Co. v. Renner*, 53 S.W.2d 451 (Tex. Comm'n App. 1932) found that the meaning of the common-law rule of ordinary care is considered by the courts to be 'elastic enough' to meet all emergencies; the amount of care must be such as a person or ordinary prudence would exercise under like circumstances.

As regards to sub-contractors, the Texas Supreme Court has stated that safety requirements imposed on subcontractors give rise to at most a narrow duty of care, *Hoechst-Celanese Corp v Mendez* (Tex. 1998). The Texas Supreme Court has also emphasized that, for the general contractor to be liable for negligence, its supervisory control must relate to the condition or activity that caused the injury. *Hoechst v. Mendez*, [967 S.W.2d at 357](#); and *Clayton W. Williams, Jr., Inc. v. Olivo*, [952 S.W.2d 523, 528, 40 Tex. Sup. Ct. J. 887, 41 Tex. Sup. Ct. J. 19 \(Tex. 1997\)](#).

As regards contributory negligence and components of proximate cause, the components of proximate cause are cause in fact and foreseeability. Neither element can be satisfied by mere conjecture, guess, or speculation. Cause in fact is established when the act or omission was a substantial factor in bringing about the injuries, and without it, the harm would not have occurred. Cause in fact is not shown if the defendant's negligence did no more than furnish a condition which made the injury possible. The evidence must show that the negligence was the proximate, as opposed to a remote, cause of the resulting injuries. It must justify the conclusion that the injury was the natural and probable result. Even if the injury would not have happened but for the defendant's conduct, the connection between the negligent act and the injury may be too attenuated to constitute legal cause. *Carl A Johannes v. Ace Transportation Inc, and El Paso Electric Company*, 2009 Tex. App. (court of appeals, eight district El Paso).

If TxDOT chooses to pursue a more aggressive policy, vis-à-vis development of transmission lines upon ROW that it owns, it will obviously have to ensure that agreements with transmission line developers are structured to ensure that TxDOT will not be liable if a trespasser is injured. Where feasible, TxDOT may need to develop an operational policy to ensure that warning signs and other barricades to stop trespass are adequately inspected and maintained.

2.5.2 Attractive Nuisance

If a child of *tender years* comes upon the premises because of an unusual attractiveness, the legal effect is that of an implied invitation to do so. This is known as the doctrine of attractive nuisance. The doctrine originally developed from the 'turntable cases' where children were injured playing on railroad turntables which seemed to be especially attractive playgrounds, but whose dangers children did not appreciate (*Sioux City & Pac. Railroad Co. v. Stout*, 84 U.S. (17 Wall.) 657 21 L.Ed. 745 (1873)). The doctrine was expanded to other situations over time and the Texas Supreme Court in *Banker* (which adopted the statement of attractive nuisance found in Section 339 of the Restatement of Torts) explained:

“The theory of liability under the attractive nuisance doctrine is that, where the owner maintains a device or machinery on his premises of such an unusually attractive nature as to be especially alluring to children of tender years, *he thereby impliedly invites such children to come upon his premises*, and, *by reason of such invitation, they are relieved from being classed as trespassers, but are in the attitude of being rightfully on the*

premises. Under such circumstances, the law places upon the owner of such machinery or device the *duty of exercising ordinary care* to keep such machinery in reasonably safe condition for their protection, if the *facts are such as to raise the issue that the owner knew, or in the exercise of ordinary care ought to have known, that such children were likely or would probably be attracted by the machinery, and thus be drawn to the premises by such attraction.*”

Today the Restatement (Second) of Torts (which has changed only slightly from its predecessor) states the doctrine as follows:

“A possessor of land is subject to liability for physical harm to children trespassing thereon caused by an artificial condition upon the land if:

- (a) the place where the condition exists is one upon which the possessor knows or [*194] has reason to know that children are likely to trespass, and
- (b) the condition is one of which the possessor knows or has reason to know and which he realizes or should realize will involve an unreasonable risk of death or serious bodily harm to such children, and
- (c) the children because of their youth do not discover the condition or realize the risk involved in intermeddling with it or in coming within the area made dangerous by it, and
- (d) the utility to the possessor of maintaining the condition and the burden of eliminating the danger are slight as compared with the risk to children involved, and
- (e) the possessor fails to exercise reasonable care to eliminate the danger or otherwise to protect the children.” (Torts §333 (1965))

When the doctrine of attractive nuisance applies, the owner or occupier of the premises owes a trespassing child the same duty as an invitee. However, in the large majority of cases where attractive nuisance has been applied the child has been not more than twelve years of age.

2.5.2.1 Electric Transmission Tower Case Law Regarding Attractive Nuisance

In most of the case law reviewed regarding children climbing transmission towers the courts have rarely held that the doctrine applies when the child was over the age of 12 years. The exceptions have been rare, and the courts have noted that these were ‘*exceptional cases where unusual and highly deceptive instrumentalities were present*’ Massie, 233 S.W.2d at 453. Table 2.2 on the following page lists cases reviewed.

Reviewing the case law is instructive to understand how the courts perceive and discuss the different facts that may play-out – and which are often tragic – especially regarding safety features surrounding transmission towers. This includes posted notices and other shielding and security apparatus that may or may not be in good repair. This review provides the state of knowledge attributed to the general public, children, and teenagers regarding the dangers surrounding close proximity to transmission towers and electric lines, and the arguments that have found strength to overturn an allegation of attractive nuisance.

Table 2.2 Attractive Nuisance cases reviewed

Case Name, Year and Citation	Case Name, Year and Citation
McCoy v. Texas Power & Light Co., 239 S.W. 1105 (Tex. Comm'n App. 1922)	Jackie Byrum Timmons v. Texas Utilities Electric Company, 917 S.W.2d 84 (1996 Tex. App)
Johns v. Fort Worth Power & Light Com 30 S.W.2d 549 (Tex. Civ App. – Fort Worth 1930, writ ref'd)	Texas Utilities Electric Company, v. Jackie Byrum Timmons, 947 S.W.2d 191; (1997 Tex.)
Texas Power & Light Co. v. Burt, 104 S.W.2d 941 (Tex. Civ. App – Waco 1937)	Entergy Gulf States Inc. v. Ken Isom, 143 S.W.3d 486 (2004 Tex. App)
Massie v. Copeland, 149 Tex. 319 233 S.W.2d 449 (Tex 1950)	Audrey Manuel et al, v. Pacific Gas and Electric Co. 173 Cal. App. 4 th 927; (2009 Cal. App)

2.6.2.2 Guy Wires and Structural Supports

In *Entergy v. Isom* the court held that the doctrine of attractive nuisance did not apply to a boy who was two weeks shy of his fourteenth birthday. In this case Shane Isom was riding on an all terrain vehicle with friends on Entergy's property. The driver of the ATV (Shane's friend) was trying to avoid ruts in the center of the right of way and in doing so drove under an anchored guy wire. The anchored guy wire had a broken guy wire looped around it and it was this broken wire hanging loose that knocked Shane off the ATV and caused neck and head injuries that resulted in his death. The looped wire around the guy wire had been broken for approximately a year before the accident. In reviewing the gross negligence cause in this case, two elements had to be provided based upon *Transportation Ins. Co v. Moriel*, 879 S.W.2d 10, 23, 37 Tex. Sup. Ct. J. 883 (Tex. 1994):

- i. viewed objectively, from Entergy's standpoint the act or omission must involve an extreme degree of risk, considering the probability and magnitude of the potential harm to others; and
- ii. Entergy must have had actual, subjective awareness of the risk involved, and nevertheless proceed in conscious indifference to the rights, safety or welfare of others

Entergy argued successfully that there was no evidence that they had actual, subjective awareness of the risk involved, and no evidence that they proceeded with conscious indifference to the rights, safety or welfare of others. The court found that the second prong of the test was not proved and therefore Entergy was not liable under the gross negligence claim.

2.6.2.3 The Dangers of Arcing

Texas Utilities v. Timmons concerned the case of a 14-year-old boy who had climbed a 90-foot electric tower despite a physical barrier, warning sign, and verbal warnings after spending an evening drinking alcohol. He was electrocuted by approaching wires that were close enough for the electricity to arc into him. The tower had four vertical sides which were crisscrossed by

metal braces which formed 'X' patterns from the ground to the top, and carried a 69kV transmission line. There was no ladder on the tower, but it could be climbed by using the diagonal braces. The utility had placed a barricade around the tower twelve and a half feet above the ground which had steel braces protruding approximately 17 inches at each corner of the tower at a ninety-degree angle and held strands of barbed wire. The barbed wire was also stretched across the interior of the tower. A ten- by-three inch warning sign was posted on one corner of the tower - although portions of this were faded and illegible – stating Danger Keep Away and that noted the wires were heavily electrified.

The Supreme Court of Texas found that the appellant had realized that climbing the tower was dangerous and that *'anyone as old as Billy is charged with the knowledge that electric wires are ordinarily dangerous; that they should be avoided wherever possible, and that it is dangerous to come in close proximity to them'*. The court in this case refused to apply the doctrine of attractive nuisance noting that the court *'like several others, has refused to apply the doctrine to a young person injured by electric arcing who realized the risk of being near electrical wires even if he was not aware of arcing'*. The court held that ignorance of arcing is not enough to satisfy the third element of the attractive nuisance doctrine, under Section 339 (c) of the Restatement if the child is aware of the dangers of electricity generally. The doctrine requires only that the child realize the risk *'in coming within the area made dangerous by the condition'*.

2.6.2.4 Cases finding Attractive Nuisance in children older than 12

Two cases can be found where the court held that the doctrine of attractive nuisance could apply to children older than 12 years of age. However, both these cases have specific facts where the courts acknowledged that there were *'unusual and highly deceptive instrumentalities present'*. In *Johns v. Fort Worth Power & Light Co*, the doctrine was applied to a 15-year-old boy who had climbed a 75-foot electric tower and was killed when he either touched or came near a high voltage line. However, the specific facts of this case showed that the tower had a ladder from the ground to the top that was made of spikes extending out from a corner of the tower with no signs posted, or guards placed around the tower to warn children of the danger. Similar facts were seen in *McCoy v. Texas Power & Light Co*, where a 14-year-old boy climbed a tower using the same kind of ladder seen in *Johns*. Again, no notices, signs or barricades were present to warn children of the dangers or to discourage ascent.

As noted earlier, if TxDOT opts to pursue a more aggressive transmission line development policy it must require the utility to ensure that any lattice type towers or other structures are strictly monitored to ensure that children cannot access them. To a certain degree, the changing technology utilized in the industry may negate some of the trespassing incidents seen historically. The greater use of monopoles for higher voltage lines has reduced the number of lattice and other structures that may resemble children's climbing frames, and the use of monopoles has reduced ladder like structures that were also easily accessible by those of tender years.

2.7 Conclusions and Recommendations

Currently TxDOT can purchase ROW for highway uses; however the purchase of extra ROW for utility accommodation has not hitherto been specifically authorized within the context of the federal highway system. Texas, in 2003, passed legislation that started to change this dynamic from a state perspective when it introduced House Bill 3588. The bill authorized the planning, development, and construction of the Trans Texas Corridor (TTC) which TTC was envisioned as a multimodal corridor included within its provision utility corridors including electricity and pipeline within the same ROW (HB 3588, 2003, Texas Transportation Code Chapter 227). However, after the TTC's roll-out, its popularity faded and in January 2009 TxDOT announced that the TTC concept was dead. In late 2009 the FHWA authorized the no-build recommendation that the Environmental Impact Assessment recommended. During the 2009 legislative session bills were put forward to abolish the TTC, but none of these were enacted into law. As a result, the legislation that authorized the TTC's vision of transmission alongside transportation corridors is still active despite the fact that the principle infrastructure project that spurred its enactment is no longer being pursued. There are many areas of the law which lend support to the principal of utilizing TxDOT ROW for transmission provided that the location of transmission can be shown in aiding improved air quality or diversifying the financial basis for TxDOT.

Recommendations

23CFR §1.23 is explicit in its directions for acquiring ROW for a federal highway project, and the exceptions thereto. Providing that the interest that shall be acquired shall be of such nature and extent *as are adequate for the construction, operation and maintenance* of a project and denoting that the use for which ROW is acquired is for *highway purposes*. Similarly, Texas Transportation Code Chapter 224 (§224.001) provides that TXDOT can acquire any ROW *necessary* for the national system of interstate and defense highways. ROW can only be purchased for use for transmission corridor development under Texas Transportation Code Chapter 227.

There is one exception that 23 C.F.R §1.23 carves out for use or occupancy of existing ROW that may assist TxDOT in utilizing its existing ROW for transmission line development. However, FHWA in March 2009, issued guidance on longitudinal accommodation of utilities in the interstate system right of way because of requests being made by DOTs regarding accommodation of renewable energy transmission lines in ROW. The guidance also recommended that DOTs and MPOs begin to more effectively plan within their planning cycles for transmission line accommodation, in light of State Renewable Programs that were expanded and because of the potential of forthcoming climate change/carbon legislation being developed by the U.S. Congress.

Based upon the review of federal and state legislation, FHWA guidance and TxDOT practices the following recommendations are made:

Recommendation 1: Given the policy focus of the 2009 longitudinal guidance, there is now greater latitude for the states to program for the installation and accommodation of utilities (especially to achieve RPS policies) within their transportation planning activities. The research team would recommend TxDOT develops a procedure to include utility development and construction in its transportation planning process. As a first step it would be advisable for

TxDOT ROW and Planning staff to meet with the PUCT and ERCOT to develop initial contacts, and gain an enhanced understanding of the transmission siting process and policies that they utilize and authorize, and then to utilize this platform for coordinated planning purposes. Once this has been initiated the DOT could then set out a process to educate, and then coordinate with the MPOs to ensure this is included in their planning documents. By undertaking this coordination the DOT can enhance the state's ability to achieve its RPS targets and also effectively program and plan for the state to be able to show in the State Implementation Plan how the state is achieving air quality goals under the Clean Air Act (1990) as amended through coordinated agency and regional planning.

Recommendation 2: In light of the FHWA's 2009 guidance, and given the high political profile of the TTC, and the possibility that state legislators may repeal the legislation in the upcoming 2011 legislative session, the researchers recommend that TxDOT should request the legislature to place within regular transportation code within Chapter 224 the language regarding purchase of ROW for utility development from Chapter 227.

Recommendation 3: If recommendation 2 proves problematic, the researchers recommend inserting more 'policy' and 'definitional' guidance regarding the definition for highway use. As an example researchers would recommend Texas Transportation Code utilized the nomenclature 'transportation-use' instead of 'highway-use'. Transmission could therefore be considered a 'transportation-use' transporting goods and services, and this could provide a rationale for transmission line development.

Recommendation 4: Under FHWA guidance from 2003 (FHWA 2003) the guidance notes that if a state or locality *routinely dedicates* or *permits* a portion of the road or street ROW for use by utilities, according to standard guidance published pursuant to state law or administrative practice, such ROW *may* be considered eligible for Federal-aid reimbursement as an *integral part of the project ROW*. Therefore TxDOT should review whether it has already been routinely dedicating or permitting portions of the ROW for use by utilities for transmission. If this has been an across the board practice extra ROW purchased (subject to NEPA provisions) could be dedicated for utility use. If TxDOT has not made this an across-the-board practice the researchers recommend developing guidance within the ROW manual to provide TxDOT with the ability to be able to utilize this exception for future use.

Recommendation 5: TxDOT already has a highly developed and well articulated utility accommodation manual and process for utility accommodation. The researchers would recommend that this is updated to reflect the FHWA 2009 guidance on longitudinal accommodation. This would also set the stage for continued collaboration between renewable energy transmission line developers, TxDOT and continued planning to achieve the state's renewable production standard's and air quality goals.

Recommendation 6: Utilize the exception carved out in 23 C.F.R. 1.23 (c) which allows other use or occupancy – that is both temporary and permanent – to utilize ROW, including airspace for a non-highway purposes. This exception allows occupancy, if the use is in the *public interest* and does not impair the highway or cause safety issues. Clearly transmission line development falls within this exception, is without doubt in the public interest, and if properly developed,

maintained and takes advantage of new technologies to assure safety would provide the requisite level of comfort to both the transmission line developer and TxDOT.

Chapter Three: Stakeholder Interviews

3.1 Introduction

Many parties have a stake in ensuring that the process for planning and constructing transmission lines conforms to an equitable balance between holding down the cost of delivering renewable power to customers, and reducing the impact on land and other natural resources. While the construction of power lines is considered a private sector activity, the process involves many public regulatory agencies and organizations representing private landowners. The following chapter provides a summary of key findings from stakeholder interviews to illustrate the viewpoints and experience of parties that are part of this process.

The interviews come from the following categories:

- (1) Texas State Agencies, with the Public Utility Commission (PUCT) serving as the principal agency in determining how lines are planned and constructed
- (2) Transmission providers
- (3) Non-profit organizations involved in the renewable energy industry
- (4) Property rights advocates
- (5) Independent System Operators (i.e. Electric Reliability Council of Texas (ERCOT))
and
- (6) Public utilities.

The interviews bear out the central role played by the PUCT over essentially all aspects of transmission development in the state. They also show the importance that has been placed on fully developing the Competitive Renewable Energy Zones (CREZ) projects in order to meet Texas's renewable energy goals. Finally, the interviews show that the siting of transmission is an emerging issue that is growing in complexity as more lines are constructed. The rapid pace of the CREZ master plan implementation has been impressive, yet has placed a predictable strain on the ability of transmission providers to locate ROW for several new projects through the same general area. For this reason, the possibility of routing alongside transportation corridors was viewed favorably by stakeholders, provided that logistical complications can be overcome. There were a few potential pitfalls mentioned repeatedly by respondents. These include (1) the potential liability for relocation of transmission infrastructure in cases where the placement is actually inside the transportation ROW (2) inherent conflict between the PUCT's policy of prudent avoidance of habitable structures with the fact that transportation corridors are magnets for habitable structures (3) the view that transmission towers are a visual blight that should be placed outside of the travelling public's field of vision and (4) marked differences in the planning schedules and planning horizons of all entities involved.

3.2 Interviews Summary

3.2.1 Positions on Joint Planning

Interviews with major stakeholders revealed that several power providers were attracted to the concept of building power lines along transportation corridors. American Electric Power (AEP) will consider paralleling existing highway rights-of-way in the routing design, but strongly prefer to acquire their own ROW just outside of the highway ROW. Lower Colorado River Authority (LCRA) reported that the best way for parallel siting to occur is to use greenfield sites where negotiation of highway and transmission line easement be done at the same time. Oncor officials stated that they are less often inclined to run alongside transportation corridors, partly due to concerns for public safety. Smaller companies such as Golden Spread expressed the opinion that routing new transmission lines along highway ROWs was a “good idea” particularly for the CREZ lines. Xcel would consider using an existing highway ROW if their line was going the same direction as the highway and if Xcel could be assured that, if the highway were widened, they would not be left with the full cost of moving their transmission structures.

The transmission developers emphasized that the Public Utility Commission has the ultimate authority to select or not select a certain route. Therefore, if running alongside a transportation corridor is a priority for the PUCT, the transmission companies will adhere to this policy.

In the view of the Public Utility Commission, parallel alignments should be sought given that their rules explicitly call on developers to parallel existing corridors or property lines whenever possible. The issue that sometimes holds back additional development of transmission lines along transportation corridors is the fact that transmission developers have to meet several criteria in order to get their route approved. While one of these factors is alignment with pre-existing corridors, it often comes into conflict with other stated goals. Nevertheless, there is no explicit scoring that tells the developer which criteria are most important in an individual context, rather the developer must gauge the comparative importance of factors based on their outreach activities to affected communities or industries.

In reviewing the PUCT’s procedures, it is very important for the developer to demonstrate that they have considered multiple options for a route, and are not viewed as imposing their version of the route. When multiple routes are presented, it quickly becomes apparent that no route option is ideal, nevertheless a route that might have appeared less preferable on paper may face less opposition from landowners and surrounding businesses and therefore may ultimately be determined to be the best choice.

The Texas Public Utility Commission (PUCT) Substantive Rules encourage routes parallel to existing rights-of-way. See excerpt below from Chapter 25 section E of the Texas PUCT Substantive Rules:

- (B) Routing: An application for a new transmission line shall address the criteria in PURA §37.056(c) and considering those criteria, engineering constraints, and costs, the line shall be routed to the extent reasonable to moderate the impact on the affected community and landowners unless grid reliability and security dictate otherwise. The following factors shall be considered in the selection of the utility’s preferred and alternate routes unless a route is agreed to by the utility, the landowners whose property is crossed by the proposed line, and owners of land that contains a habitable structure within 300 feet of the centerline of a

transmission project of 230 kV or less, or within 500 feet of the centerline of a transmission project greater than 230 kV, and otherwise conforms to the criteria in PURA §37.056(c):

- (i) whether the routes utilize existing compatible rights-of-way, including the use of vacant positions on existing multiple-circuit transmission lines;
- (ii) whether the routes parallel existing compatible rights-of-way;
- (iii) whether the routes parallel property lines or other natural or cultural features; and
- (iv) whether the routes conform with the policy of prudent avoidance.

Another party with an advisory role in how lines are sited is the Electric Reliability Council of Texas (ERCOT). ERCOT representatives stated that, while they do not directly decide on the routing of lines, they do participate in determining the most logical starting points, end points, and nodes of lines. ERCOT has not directly discussed strategies for joint planning efforts with TxDOT in the past. Southwest Power Pool (SPP) gave strong support to the concept of joint planning efforts with the DOT and stated that planners in the Midwest (MISO area) have considered co-locating transmission lines with high speed rail corridors. SPP suggests that a national high speed rail system and national electric grid could be excellent candidates for co-location in the ROW.

3.2.2. Planning Horizons

The planning and permitting process for transmission companies is generally much shorter than the equivalent schedules for transportation projects, which can be very long in some areas of the country. A notable example by AEP was a 20-year effort required to complete AEP's Wyoming to Jackson Ferry transmission line in West Virginia. Adding in the need for coordination with DOT planning would likely increase complexity. LCRA uses a 5-year planning horizon for future projects, which is far shorter than the planning horizon used by transportation planners. LCRA officials stated that some projects take longer than five years to realize, but on average the timeframe is far shorter, in part because the construction of towers is a less intrusive use of land when compared to building a road and because transmission construction can be performed far more quickly than road construction. Also, some reliability-driven projects are required to be completed rapidly in order to maintain the integrity of the grid and prevent blackouts. In consideration of partnering with TxDOT in the future, Oncor noted that their planning horizon runs from between 5 to 10 years into the future, yet it is difficult to plan further ahead due to the rapid changes in the electricity market. This would make substantial partnering with TxDOT very difficult in Oncor's view.

ERCOT recently received funding from the Department of Energy (DOE) for the purpose of increasing their planning horizon. This may lead to future coordination with TxDOT. According to a recent ERCOT white paper, "ERCOT will use a planning horizon for its activities that is sufficiently long so as to identify any system improvement that has an implementation lead time requiring initiation of the improvement in the current year, including adequate time to determine whether the market will respond to correct the identified problem. (ERCOT).

Despite the short term focus for planning and constructing individual lines, Southwest Power Pool runs electrical planning models for 20 years, and runs financial models on transmission line

justification out to 40 years, so these long-term plans could align with the DOT planning horizon. Furthermore, SPP has drawn attention to the need for a national “Transmission Superhighway” that would echo the scope of the interstate highway system. Such a system would necessarily be a longer term planning venture and would require substantial coordination not only with state DOTs but between agencies in different states (Southwest Power Pool 2009).

3.2.3 Preferred Technologies

The technology used for transporting electricity has been changing, with the most significant and visible change in recent years being the widespread adoption of monopole towers replacing traditional lattice structures in many markets. Interviewees were queried as to how changes in technology are impacted their planning processes. AEP stated that they have largely shifted to monopoles as the standard technology for high voltage lines. LCRA and Oncor tend to rely on lattice structures unless they are building through a populated area in which case they will often use monopoles. All transmission companies agreed that the role for other forms of transmission, such as DC or underground cables will be extremely limited for the foreseeable future.

LCRA believed that the opportunities for burying transmission are few because the process is expensive, and line losses increase due to heat resistance. For 148kV line, the cost per foot underground was estimated at \$5M per mile. This is about 2 ½ times the rate for overhead lines. The cost currently is \$1.88M per mile for a double circuit 345 KV, according to ERCOT. Oncor noted that to put 345kV underground can cost up to 25 times the cost of above ground i.e. \$50M per mile. Technology is also a factor when older lines are upgraded or replaced. Smaller utilities such as Pedernales rarely build new lines, however they have been replacing older wood or H-frame structures with monopoles. Concrete is the preferred construction material due to cost and durability. Other technological upgrades will change the course of transmission development. For example, Oncor is installing “smart meters” to monitor energy consumption every 15 minutes. This will allow retailers to give time-dependent rates based on times when consumption levels are high; the widespread adoption of such technologies may mean that some reliability driven projects that are currently in the conceptual planning stage will no longer be necessary. Some other major issues Oncor has predicted for the future will be how successful utilities integrate renewable energy into the grid, given the variability of wind.

3.2.4 Views of Other Stakeholders

Numerous other stakeholders are potentially impacted by decisions on how transmission infrastructure will be built in the future. Power lines do not “consume” as much land as do roads, largely because the major structures are elevated. However, precisely for this reason transmission towers are visible from a great distance and their putative area of impact is in some ways greater than that of a highway. Another factor to be considered is that the connection between power line construction and the public good is more obscure than it is with highways. One power company stated how their lines are always seen as a form of blight, whereas highways may be viewed favorably by at least a certain percentage of the population, particularly if they are seen as generating employment and services. The connection between the wind industry and power lines has started to shift this paradigm to a certain extent, yet the areas that benefit most directly from wind power jobs are often not the places where the siting of transmission has been problematic.

Property rights advocates have expressed particular concern regarding the CREZ lines because they are so numerous and run through areas that have not seen the same scale of high voltage development in the past.

There are a number of instances when the environmental damage that can occur from developing a new corridor would far outweigh the aesthetic considerations of aligning with a pre-existing corridor. For example, an Austin property rights attorney stated that the environmental impact on constructing lines through east Texas forests are particularly damaging and should be avoided as these lines destroy habitats and leave native animals vulnerable to predators. With well publicized concerns as to the aesthetic impacts of power lines on the Texas Hill Country as well as other sensitive environments, the public may be more receptive to the concept of aligning transmission along existing corridors. The enduring concept that the ‘visual foreground’ of highways should be free from obstruction is running up against the desire to preserve the state’s unspoiled areas, even if they are seen by few human eyes.

Beyond aesthetics, concerns were expressed as to the impact of continued transmission development on displacing viable farmland. Nevertheless, the vitality that wind farms have brought to rural communities is substantial. For example, the Texas Department of Rural Affairs has strongly supported the development of wind power in the state and for this reason has supported the CREZ projects, provided the CREZ goal is to choose alignments that do not undermine farming or ranching activity.

The Texas Railroad commission expressed interest in keeping new power line construction away from wells that may have been abandoned. Therefore, alignment along existing established corridors was, in their view, preferable to alignments stretching through vacant lands that might contain unmarked well activity.

Finally, there are a number of parties who advocate for renewable energy and as such, would like to see transmission developed in whatever manner proves to be feasible and cost effective so that a lack of transmission does not choke further wind or other renewable power development.

3.2.5 Conclusions

In summary, the concept of running high voltage transmission alongside transportation corridors was not a new idea from the perspective of the transmission companies. Because the Public Utility Commission encourages developers to: a) develop many potential route options for each proposed new project; and b) run alongside existing corridors when feasible, transmission companies consider and evaluate theoretical routes running alongside highways frequently even if these options are chosen significantly less frequently. The principal point expressed by all interviewed parties from the transmission industry is that, while parallel alignments are possible and even sometimes desirable, the placement of structures in the ROW produces a number of risks that do not occur when the structures are located on private land just outside of the ROW. Therefore, there would have to be a compelling reason to use the ROW, such as the unavailability of private land for a transmission company, to consider this as a preferred option. On the other hand, the risks seen by transmission companies in placing structures on DOT ROW are primarily political in nature and could be changed with a change in policy. Furthermore, the

ability of transmission developers to rely on acquiring easements from private landowners may be deteriorating as public resistance to more high voltage lines increases. Therefore, at some point the risks of placing structures within the ROW may equalize with the risks of trying to acquire additional private land, particularly if the process will involve condemnation.

Southwest Power Pool pointed out that joint use of ROWs also mitigates potential habitat fragmentation issues for wildlife, such as prairie chicken populations found in New Mexico, Oklahoma, and the Texas Panhandle. In their view, it was better to minimize fragmentation by having one ROW crossing potential habitat areas than multiple ROWs. As a long-term solution, the LCRA suggested the creation of an impartial entity to buy the ROW and then allow others to utilize this ROW for various public uses. This would get around the problem of corridors developed exclusively for transportation or transmission use and would instead develop them for whatever purpose best suited the public need. This method would also need very specific administrative code rules to define how the ROW can be used, by whom, at what costs, and who is responsible for operation and maintenance. This would also require the Transportation Commission, the PUCT, and the Railroad Commission to work together.

Chapter Four: Case Studies

4.1 Texas Case Study: Clear Springs to Hutto

The TxDOT Project Monitoring Committee for this project called on the researchers to identify cases from Texas that could provide useful lessons as to the challenges of building high voltage transmission in close proximity to highway ROW. The researchers selected the State Highway 130 Clear Springs to Hutto line as a case study because it reflected one of the most straightforward examples of highway and transmission ROW developing in parallel.

4.1.1 Background

The construction of SH 130 presented a unique example of a Greenfield corridor, in which many of the complications that have historically hindered joint development of transmission and transportation were minimized. Furthermore, the original plans for the SH 130 corridor called for multimodal development that might include uses other than surface transportation. Under its final alignment, the two structures only run parallel to each other for part of the route. Despite the original appeal and interest from both parties of running the two uses alongside one another, the projects were largely developed separately due to differences in the planning cycles and required changes in the route of both SH 130 and the Clear Springs to Hutto line that occurred midway through the process.

The Public Utility Docket for this project reflects various discussions that were held in connection to SH 130 and the role that the highway's construction would have on the proposed transmission project. The utility commission, for example, notes that the construction of SH 130 has spurred, "rapid and widespread urban and suburban growth" that led to more habitable structures being impacted by the transmission line than would have been affected had the transmission line been constructed prior to the development of SH 130. In fact, the completion of SH 130 had a profound effect on nearby communities, transforming the town of Hutto from a population of slightly over 1000 residents in 2000 to a small city of 17,000 by 2008. LCRA examined routes running to the east or to the west of SH 130 but ultimately settled on a route that runs east of SH 130 connecting a substation in Hutto to another substation in Gilliland Creek. It then runs alongside SH 130 for approximately 23 miles, breaks off again from the main SH 130 alignment before terminating at the Clear Springs substation, a substantial distance from the SH 130 route. The City of Hutto strongly opposed portions of the intended transmission line route and suggested an alternative routing "within SH 130 right-of-way (ROW) between Hutto and Pflugerville to a point just to the west of the Gilliland Creek Station" that was ultimately not chosen. Shortly after the LCRA started its public outreach process in early 2006, a Hutto citizens group unsuccessfully lobbied to bury the portions of the line that would run through the city (Lorenz 2009). In total, the LCRA developed 24 different routing options. "Route 24", LCRA's preferred route "has the fewest habitable structures located within 500 feet of the route centerline and it is the shortest route among the 24 routes put forth by LCRA as part of its application." This combination of minimal distance and minimal impact was important in driving the route's

ultimate selection over routes that would more closely parallel ROW but would be longer and more circuitous.

4.1.2 Area of Impact

The 345-kV transmission line will be located in Central Texas from Clear Springs up to Hutto. The line will travel approximately 85-miles through Caldwell, Guadalupe, Hays, Travis, and Williamson counties just east of the IH-35 corridor. The terrain is mostly flat farmland and is located in the Blackland Prairie of Texas. The line will traverse an area undergoing widespread growth due in part to the recent construction of SH 130 located near the transmission line.

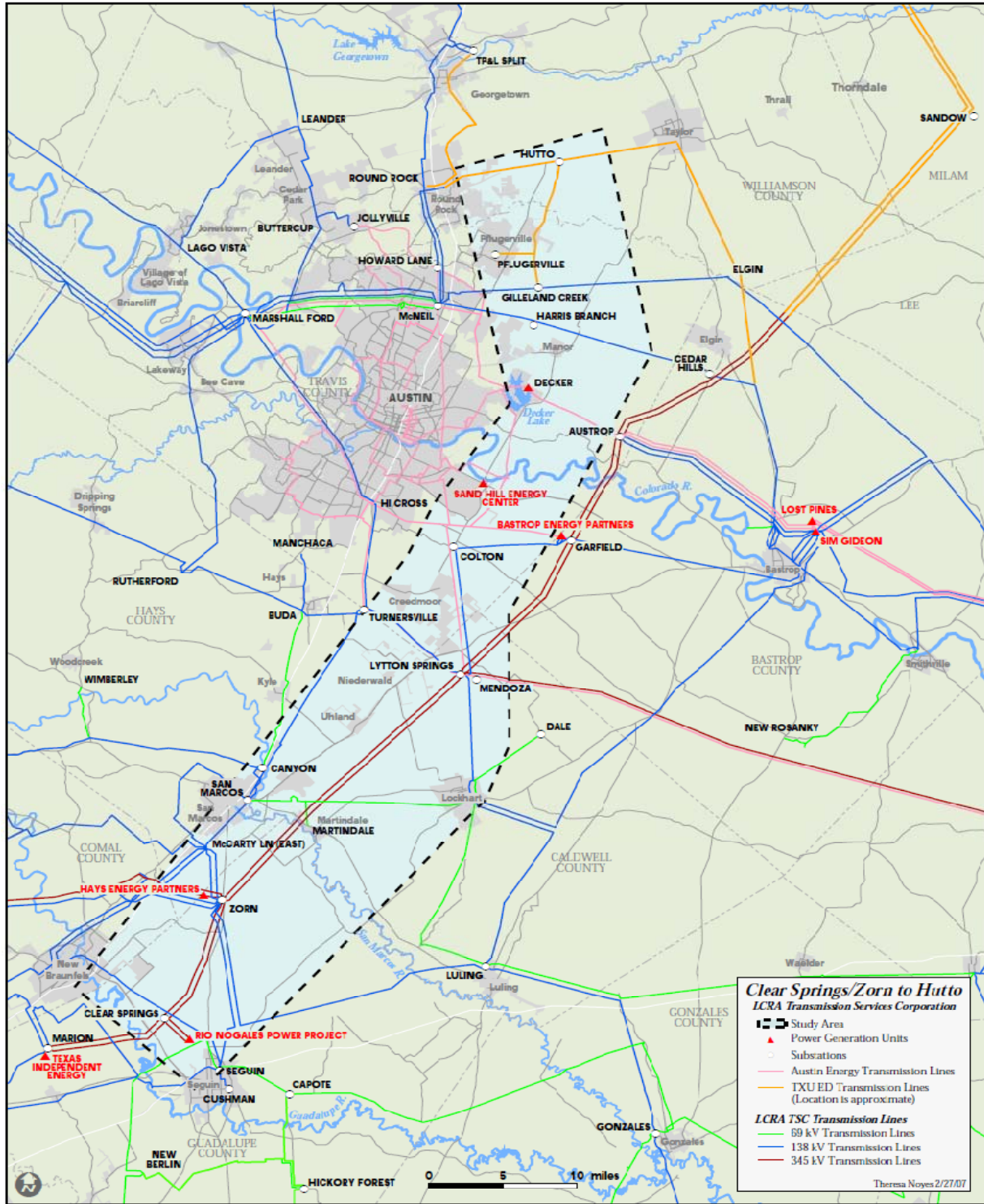


Figure 4.1 Map Taken from the Application of LCRA to Amend Its Certificate of Convenience and Necessity Attachment No. 7 (LCRA 2010)

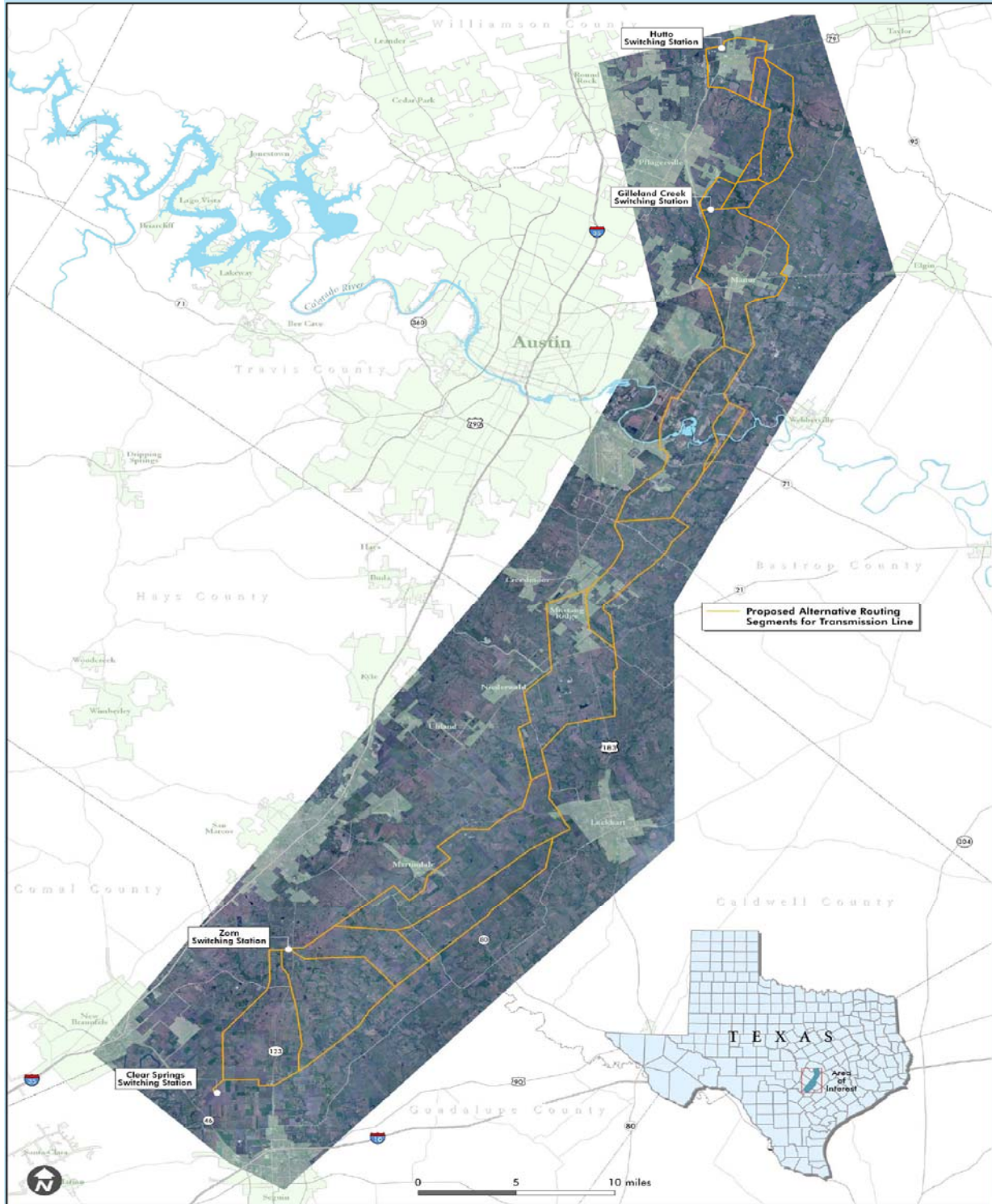


Figure 4.2 Proposed Routes Adapted from LCRA's Managing Increased Electrical Load Growth in Central Texas (LCRA 2010)

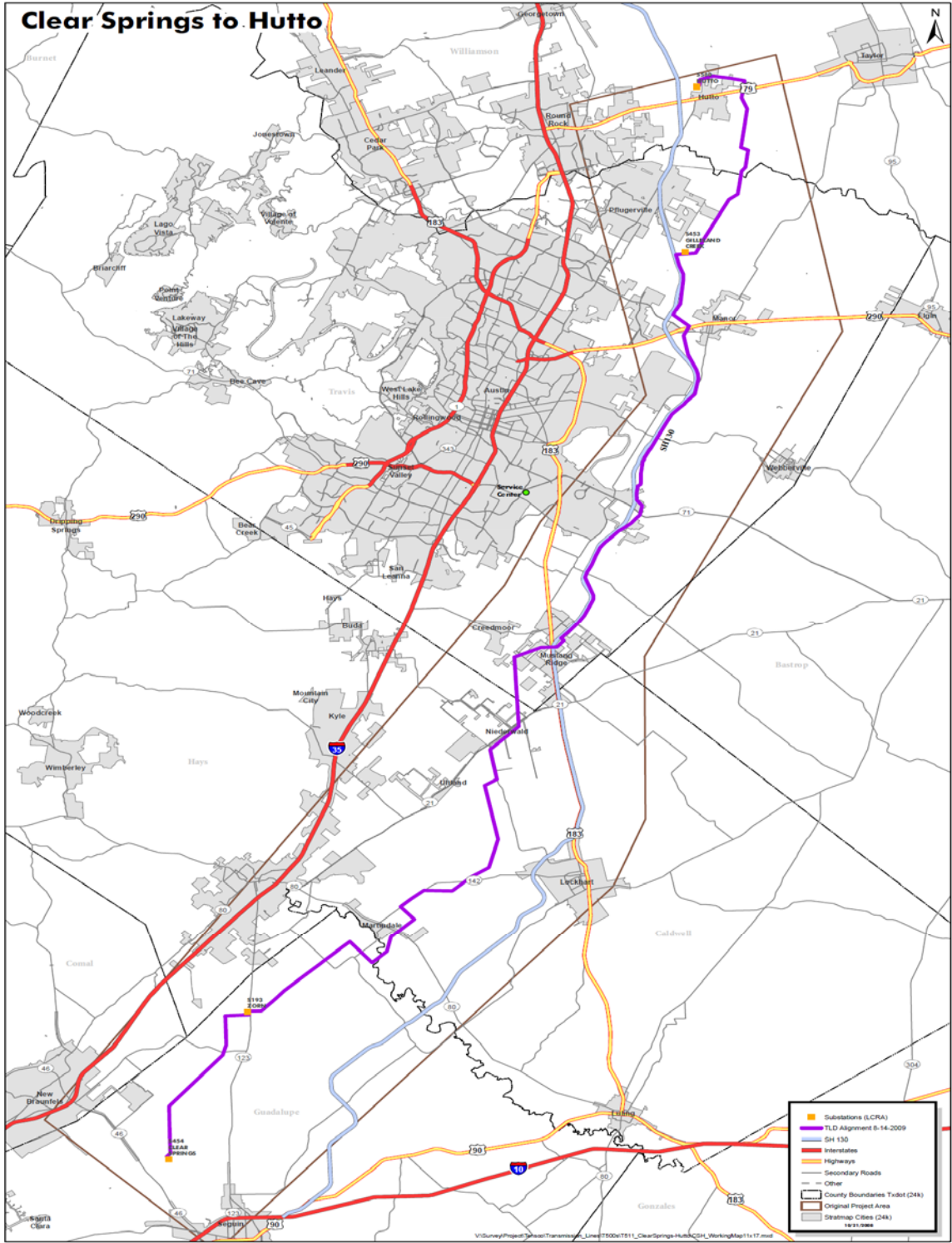


Figure 4.3 Final Alignment (LCRA 2010)

4.1.3 Equipment Specs

(Taken From Application of LCRA Transmission Services Corporation to Amend Its Certificate of Convenience and Necessity for a 345-kV Transmission Line in Caldwell, Guadalupe, Hays, Travis and Williamson Counties DOCKET NO. 33978)

The conductor of the line will be a double-circuit, bundled 959.6 kcmil aluminum conductor steel supported/trapezoidal wire (ACSS/TW), type 16, 22/7-strand “Suwannee” conductors with one 7-#8 alumoweld overhead shield wire per circuit. The structures will mainly consist of double-circuit steel lattice towers. Some other special structures will be used as well, such as H-frames, single-pole, and multi-pole structures for locations where lines may be crossing other lines and other special cases. Monopoles will be used from the Hutto substation to the Travis county line. Approximately 10 percent of the structures will be monopoles. The structures range from 115 feet to 185 feet above the ground surface in height. The minimum right-of-way width is 100 feet and the maximum easement width is 160 feet. The average easement width is 130 feet.

4.1.4 Demonstrated Need

The following was the original justification for the combined Oncor and LCRA project given in the *ERCOT Independent Review of the Clear Springs to Salado 345-kV Project Report*, November 2004. Oncor has constructed the connection between Salado and Hutto while, LCRA is spearheading the connection to Clear Springs.

Several factors support the construction of the Clear Springs to Salado (CSS) project. The project should not be viewed solely as a reliability driven or an economically driven project, but rather as a combination of both. The major factors contributing to the justification of this project are listed below:

- The CSS project eliminates or delays the need for approximately \$47.5 million dollars of reliability-driven transmission projects. These mitigated projects would have to be constructed in place of the Clear Springs – Salado project order to meet the minimum reliability standards defined in Section 7 of the ERCOT Operating Guides. *(The initial project report estimated the cost of the mitigated projects to be \$214 million. This estimate included projects that exceeded the minimum reliability standards defined in the ERCOT Operating Guides as well as projects addressing reliability concerns that could not wait until 2010 to be solved. The initial in-service date for the CSS project was 2008. It is now targeted for 2010.)*
- The CSS project results in approximately \$49 million of production cost savings annually. With a 7% discount rate this is estimated to be \$368 million over ten years. *(The initial project report indicated a 10-year production cost savings of \$47 million. The large increase in production cost savings can be attributed to the decrease in the number of mitigated projects used in ERCOT’s independent analysis.)*

- The project eliminates transmission congestion that has limited production from relatively inexpensive generation in the Central Texas Area including the mothballed Hayes plant.
- The Harris Branch switching station and the planned 345/138-kV 480-MVA autotransformer at this site will provide support to developing AE loads in the northern and eastern sections of Austin. By 2008, the total load in Travis County is projected to be 2934 MW, a 328-MW increase over the 2003 total. Securing new autotransformer capacity at the Harris Branch site will also enhance transmission support to LCRA loads in western Travis County.
- The Hutto switching station and the planned 345/138-kV 600-MVA autotransformer at this site will provide support to developing loads in Williamson County. By 2008, the total load in Williamson County is projected to be 1081 MW, a 301-MW increase above the 2003 total. Continuing load growth in the Round Rock, Pflugerville, and Georgetown areas is rapidly exhausting the ability of the existing 138-kV transmission network to provide reliable transmission system support in this area.
- The Project provides a second source to a future 345/138-kV autotransformer and associated 138-kV lines at Salado that will provide much needed support to load in western Bell County which includes the city of Killeen and Fort Hood army base. Bell County load growth is projected to have a 5.5% annual load growth from 2003 through 2009.
- Over the two-year period from June 1, 2002, to May 31, 2004, Balancing Energy costs for the South to North transfers reached \$13,116,443 from over 2500 congestion management incidents. This project would mitigate these costs.
- The project dramatically reduces the cost of taking regular transmission maintenance outages along the 345-kV corridor between Dallas and San Antonio. These costs are listed below in Table 1. The difference in the cost of the outage between the CSS Project Case and the Mitigated Project Case is the average dollars per day that would be saved for that outage during peak conditions if the CSS project is built.

Table 4.1 Production Cost Savings for the Project with Outages Considered Taken From *ERCOT Independent Review of the Clear Springs to Salado 345-kV Project Report*, November 2004.

Production Cost Analysis for Common Outages		\$/day during 2010 peak	
Outage Name	Mitigated Project Case	CSS Project Case	Difference
Zorn Austrop & Zorn/Lytton	\$77,769	\$24,319	\$53,451
Zorn/Austrop & Lytton/Garfield	\$43,286	\$9,121	\$34,165
Zorn/Austrop & Garfield/Austrop	\$35,681	\$2,462	\$33,220
Austrop/Sandow & Austrop/Sandow	\$61,857	\$46,044	\$15,813
Sandow/Temple & Sandow/Temple	\$34,516	\$15,824	\$18,692
STP/Dow & STP/Dow	\$130,176	\$88,989	\$41,187
Sandow/Temple	\$8,637	\$2,527	\$6,110
Decker/McNeil & Daffin/Dessau & Decker/Sprinkle	\$31,549	\$1,077	\$30,473
Killeen Auto	\$2,897,890	\$2,706,879	\$191,011
RR/McNeil & RR South/Howard	\$1,723,022	\$399,121	\$1,323,901
Temple/Lake Creek & Temple/Lake Creek	\$40,209	\$13,352	\$26,857

Table 4.2 contains a summary of the cost and benefits of constructing the CSS project. No estimate was made as to the amount of savings for planned outages.

Table 4.2 Summary of Cost and Benefits Taken From *ERCOT Independent Review of the Clear Springs to Salado 345-kV Project Report*, November 2004.

<u>Description</u>	<u>(-) Cost</u> <u>(+) Benefit</u>
Transmission improvements that will not have to be made if the CSS project is completed (mitigated projects)	+\$47.5 million
10-year production cost savings (2009-2018) with a 7% discount rate (this includes a reduction in balancing energy costs)	+\$368 million
Capital cost for the construction of the project	-\$141 million

4.1.5 Summary of Stakeholders

(Adapted from the *Application of LCRA Transmission Services Corporation to Amend Its Certificate of Convenience and Necessity for a 345-kV Transmission Line in Caldwell, Guadalupe, Hays, Travis and Williamson Counties DOCKET NO. 33978*, and from summary of stakeholder comments submitted to the PUCT)

This line was a highly contested line with several interveners and a hearing that lasted over nine days.

Property owners that will be affected by the line feel the following factors, in order of importance, should be considered when routing the transmission line:

- 1) maximize the distance from residences,
- 2) use/parallel existing compatible ROW,
- 3) minimize visibility of lines,
- 4) parallel property lines where possible,
- 5) minimize environmental impacts,
- 6) maintain reliable electric service,
- 7) maximize distance from historic sites or areas and,
- 8) maximize distance from commercial buildings.

88 percent of stakeholders preferred single-pole structures for the line, 7 percent preferred H-frame, and 5 percent preferred lattice towers as the primary structure. Nevertheless, LCRA selected lattice structures for the vast majority of structures based on cost considerations despite the contrary views expressed by the public (LCRA 2008).

The main concern of stakeholders was the aesthetics of the line and how the structures will affect the landscape and scenery. There was a large consensus among landowners that the line should

parallel the SH 130 right-of-way whenever possible. Furthermore, landowners wanted the line to run along property or existing ROW lines as much as possible so the line would minimally affect farming and ranching activities.

4.1.6 Level of Completion

This line is currently under construction and around 10 percent complete. The estimated timeline below is from the LCRA application to the PUCT for the transmission line.

Table 4.3 Estimated Timeline Taken From LCRA Application

<u>Estimated Date of:</u>	<u>Start</u>	<u>Completion</u>
Right-of-way acquisition	May 2008	March 2010
Construction of facilities	March 2010	August 2011
Energize Facilities		August 2011

4.1.7 Reasons for Choosing or Not Choosing Shared Corridor

Around 23.19 miles and 27 percent of the chosen route will parallel existing rights-of-way. Primarily sections of the SH 130 right-of-way will be paralleled. Paralleling the highway right-of-way has no additional cost compared to not paralleling the right-of-way and is preferred by the public. By routing the line along ROWs when possible, the line will not cut through areas that are not already affected by the highway or other infrastructure that has previously been built. This seems to be the ideal situation and is supported by the public.

There is only one section of the line that is actually alongside the highway ROW. This is due to the fact that the SH 130 ROW extends a little too wide into the path of the transmission line. Highway ROWs were not seriously considered for the placement because the LCRA believes there are ultimately conflicting interests between the highway and LCRA. For example, staying out of the ROW allows the highway to expand in width if needed without conflict with the transmission lines. LCRA tries to always acquire their own ROW but has no problem with running parallel to existing ones.

The originally proposed routes would have paralleled up to 71.48 miles of existing ROW but were thrown out due to other factors. The selected route best balances cost, length, and distance from habitable structures (according to the PUCT) and was chosen for that reason. Ultimately the routes that paralleled the existing right-of-way the most would have been longer, more expensive to build, and even cross more habitable structures than the chosen route.

Certain interveners wanted to avoid placing the line in or near the SH 130 ROW because they felt this would alter the skyline and scenic view from the highway. Other groups, such as the City of Hutto, wanted to utilize the existing ROW so the line would have as little impact as possible on landowners and also not disrupt development within the city. Intervenors proposed five additional routes using links that had previously been studied but had not been part of the original application filed by LCRA. The interveners’ proposed routes came into proximity of

more habitable structures than the preferred LCRA route. This contributed to the decision not to use these routes.

Engineering firm PBS&J evaluated the environmental impacts of the proposed routes. All routes would cross the San Marcos and Colorado Rivers and should only cause short-term impacts on the water, soil, and ecological resources. No federally listed endangered or threatened species would be affected by any of these routes. There were no significant environmental differences between the routes however the preferred route would have less of an effect on vegetation when crossing the San Marcos River than the interveners' proposed routes. Also, the preferred route would cut across less woodland than the proposed alternative routes.

4.1.8 Summary of Findings

This was a highly contested line due to the fact that it crossed several landowners and municipalities. The Certificate of Convenience and Necessity hearing lasted 9.5 days due to all the interveners. The largest challenge of this project was to find an alignment that satisfied the concerns of the public and met the requirements of LCRA. The main concern from landowners were the aesthetics of the line and the effect the line would have on their day-to-day operations, i.e. farming and ranching activities. Municipalities were concerned if the line was placed through their towns this would impede future development plans of the cities. Since there were no major engineering or environmental issues with this line, LCRA's main focus was on selecting the most cost effective route that would be approved by the PUCT and accepted by the public.

After submitting several alignments and then 24 alternative alignments, an agreement was made and the final alignment was approved by the PUCT. The final alignment will run from Clear Springs to Zorn substations up to the Hutto substation. The southern portion of the line south of Mustang Ridge does not parallel the SH 130 right-of-way. There are two main reasons for this.

The first reason is Clear Springs and Zorn substations must be connected initially. The line will be a single-circuit line with double-circuit capabilities in the future. While the line remains single-circuit it must stay connected to the Zorn substation. In the future when the second circuit is added the line will only pass the Zorn substation and will not actually be connected.

The second reason for not paralleling the SH 130 right-of-way on the south end of the line is that turning after the Zorn substation to parallel the SH 130 right-of-way will be a more expensive route. Land near the highway will be appraised at a higher value and turning the line adds length ultimately increasing the overall cost of the line.

4.1.9 Conclusions and Recommendations

Given that the City of Hutto had tried repeatedly to alter the draft alignment and shift it to highway ROW without success, the researchers interviewed City Manager Edward Broussard to learn more about the city's experience. Mr. Broussard stated that the city had, from the time it first learned of the project in late 2005, proposed to shift the alignment to an existing transportation corridor (Broussard 2010).

Most prominently, the city suggested placing a part of the route alongside SH 130, either within the median or alongside the ROW. When this option did not garner support from the LCRA, the city also proposed other transportation ROW, such as county roads that would not need to be

expanded in the foreseeable future and therefore not evoke the concern that the transmission company would need to pay for a future relocation.

In the view of the City of Hutto government, much of the contention arose from miscommunications, including miscommunications between LCRA and TxDOT. As for the City of Hutto, part of the issue had been that at the time this line was originally planned, the town was hardly on the map. When the time came for construction, however, it was already a significant and rapidly growing city – one that needed essentially all the land it had to expand residential and commercial developments.

TxDOT communicated to the PUCT that it could, theoretically, accommodate the portion of the line near to Hutto within the SH 130 corridor. This option was not actively considered, however, for the line near Pflugerville due to excessive development constraints. As such, even if the line were to run on the SH 130 corridor through Hutto, it would at some point diverge from SH 130 near Pflugerville and loop around the city, thereby complicating the ability of the transmission company to truly use the 130 corridor as a cost efficient route.

The question of structure type may have exacerbated the conflict between the City of Hutto and the LCRA. As originally proposed, LCRA proposed using lattice towers for the entire length of the route including those sections that ran through the City of Hutto. This plan angered local citizens groups. One representative stated ““Downtown Hutto would look like it had been invaded by giant, industrial robots” (Maldonado, 2008). While the LCRA eventually relented and agreed to build the downtown sections of the lines as monopoles, this battle over structure type might have been prevented had the LCRA presented monopole construction as the preferred alternative from the beginning.

The need for earlier notification and collaboration of affected towns is one of the key recommendations that emerge from this study. The City of Hutto felt that by the time they learned of the project, the transmission developer had already settled on a preferred route and was intent on pushing it through. Too often, Mr. Broussard mentioned, the draft alignment simply becomes the final alignment. From the LCRA’s perspective, they did not have a fundamental commitment to any one line, however, they felt that going within the TxDOT ROW carried risks and would only be a logical option if TxDOT fully endorsed and supported the plan. LCRA however got the impression that TxDOT would prefer to not have the line within the ROW as this may complicate future expansion plans, including the possibility of placing transit or relocated freight rail within the corridor. What was clearly lacking in the arrangement was an overarching directive that would instruct both TxDOT and the PUCT to collaborate in sharing ROW and corridor alignment whenever possible and only consider separate corridors if the first option is impossible. The LCRA received several pieces of guidance from the public and the PUCT that could be interpreted as encouraging development along existing ROW, yet other directives such as maximizing the distance from residents and minimizing the visual impact of the line, seemed to discourage a placement alongside heavily trafficked roadways. Greater representation by TxDOT officials at the PUCT would likely be an avenue for crafting a jointly endorsed set of directives.

4.2 Virginia Case Study: Pleasant View to Hamilton

4.2.1 Background

The State of Virginia has recent and relevant experience in placing high voltage transmission ROW in close proximity to and in some cases within an active highway ROW. Like Texas, Virginia is in the midst of major effort to improve its high voltage grid network. Rapid population growth, particularly in Northern Virginia is driving most of the demand. Furthermore Virginia is attempting to improve the reliability of the grid to prevent blackouts and provide the infrastructure necessary to develop a smart grid system.

Dominion is one of the largest providers of power in the States of Virginia and North Carolina. Its portfolio of assets includes 6000 miles of transmission lines. At present, Dominion has several high voltage transmission projects under planning or construction within the State of Virginia. Dominion projects an increase in power demand of 28 percent during the next decade. Given that the majority of the demand is driven by the heavily populated and historical Washington, DC area, finding adequate ROW is a constant challenge. Perhaps no line presented more unique challenges than the topic of this case study – a 230 KV line running between Pleasant View and Hamilton, VA. The concentration of historical sites, fixed infrastructure, and recreational assets greatly restricted the ability of Dominion, in coordination with the Virginia State Corporation Commission, to find a suitable alignment for the route. The proposed route along the Leesburg Pike had been suggested as an option by Dominion but was ultimately selected on the recommendation of the State Corporation Commission. Dominion initially filed for approval of the route in 2005, submitting five proposed alternative routes. The final order was issued on February 15, 2008.

As a historical highway, the Leesburg Pike is not very wide and, in the relevant section west of Leesburg, not very straight. Thus, had an acceptable alternative route been found, the line would likely not have been built along the highway. Prior to the route's selection, Dominion had assembled an alternative route that was substantially less direct than the highway alignment yet did not pose the same engineering and mitigation challenges posed by the highway placement. Nevertheless, the State Corporation Commission supported the highway ROW alternative because this option would result in the least intrusive land use.

The Pleasant View to Hamilton project was the first time the Virginia Department of Transportation established such an extensive relationship with a private transmission developer. The effort required extensive coordination and communication over the course of a four-year period. The project greatly benefitted from the fact that the same small group of individuals was able to see the project through from planning until completion.

As part of the process of monitoring the project's progress, the transmission developer (Dominion) regularly conducted site inspections that included representatives from the Virginia DOT. A CTR researcher participated in a site inspection visit on 7/20/10, which was one of the final inspections prior to the planned electrification of the project in October 2010. Other participants in the site visit were John Baily and Les Olson of Dominion Transmission, Emmet Heltzel from the VDOT central office in Richmond, and Imad Salous from the regional VDOT office in Leesburg.

Figure 4.4 shows an overview map of the alignment of the transmission line connecting two substations. The green dots represent the placement of poles, which in some cases are physically

within VDOT ROW and are sometimes just outside. As can be seen, the line goes through the middle of town and must make several sharp turns.

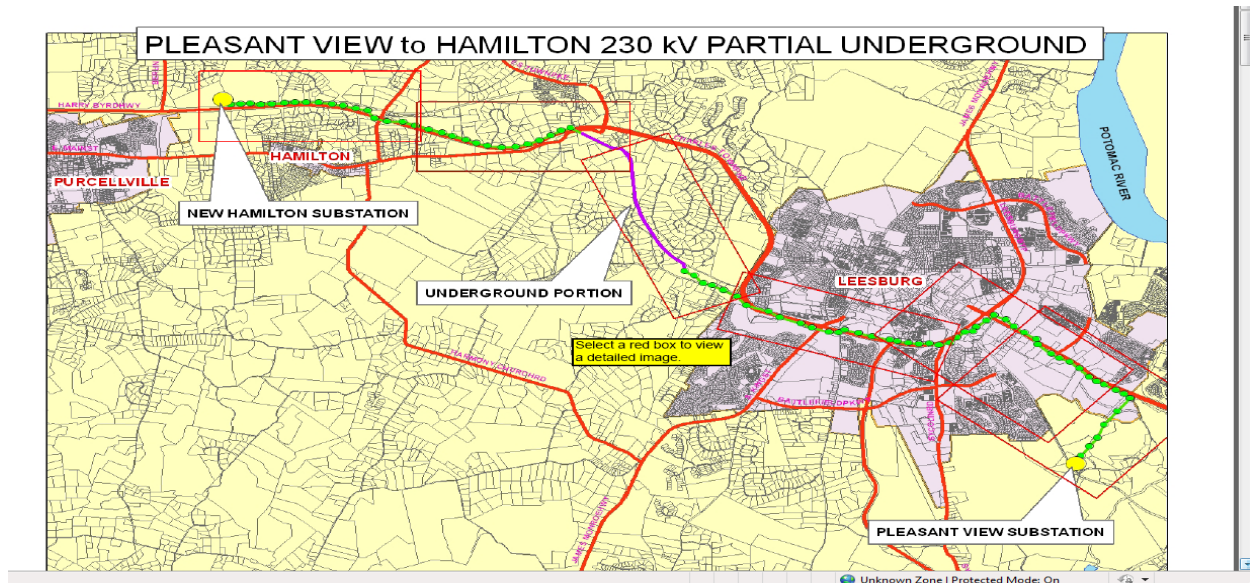


Figure 4.4 Alignment of the Pleasant View to Hamilton line (Dominion 2010)

4.2.2 Area of Impact/ History of the Corridor

Dominion purchased ROW from a defunct short line railroad (W&OD) in 1968 with the intention of eventually building high voltage transmission along the entire route. However, while the eastern portion closer to Washington, DC was constructed in the 1970s, the seven mile portion connecting Leesburg and Hamilton was never constructed due to a lack of demand. The Northern Virginia Regional Park Authority acquired access to the ROW for a bike trail in 1977. Dominion retained overhead rights. The park authority built a bike trail, now called the W&OD trail that became incredibly popular in the region.

When the time came to build the last stretch over the W&OD trail, public resistance was too great so alternative routes had to be found. Dominion determined, and the State Corporation Commission concurred, that going underground for the entire stretch of the bike trail would be too costly to ratepayers and thus developed alternative solutions. The VDOT ROW alternative was the most direct route that did not interfere with the W&OD trail. The only complication was a two-mile stretch in which the bike trail was the only feasible route. For this portion, Dominion agreed to bury the line directly under the bike path, creating an alternative bypass route during the construction period and repaving the path once construction of the transmission line had been completed. Figure 4.5 shows the laying of underground cable, and Figure 4.6 shows the completed bike path.



Figure 4.5 Laying of Underground HV Cable

The underground portion of the line was spurred in part by a specific legislative action, H.B. 1319 “to underground certain high voltage transmission lines within the Commonwealth”. The project was selected as a pilot under this legislation (Dominion 2008). Under the legislation, the line selected for the pilot project could not be at a voltage higher than 230kV. (See Table 1.1)



Figure 4.6 Mitigation - Detour Bike Trail Paved by Dominion

Thus, in addition to the obvious difficulties of building through a dense area, the project had to be handled carefully due to the historic nature of the area. The highway itself is considered a historical monument as the route served as a dividing line between North and South during the Civil War. When the line diverges from the main highway to reach substations on either end, a different set of challenges was encountered as it enters into a very scenic and historic farming area. Here, the transmission provider had to engage in a myriad of mitigation activities to ensure that the line was as unobtrusive as possible and the residents who were impacted by the line's placement near their property were remediated. Figure 4.7 shows the construction of the new Hamilton substation.



Figure 4.7 Hamilton Substation Construction Site

Another challenge in constructing this particular line was ensuring that the transmission company would have access to the ROW in order to perform maintenance activities. The need to perform maintenance is one reason why the required footprint of a line is greater than its physical appearance may suggest and is another reason why state DOTs are often cautious in allowing transmission companies to build in such close proximity to the highway that maintenance activities could result in lane blockages. The largest impact on traffic was during the construction itself. Close coordination between VDOT and Dominion was required to determine when Dominion would need to block traffic in order to construct the towers and string the power lines. In total the power line crosses over the Leesburg Pike (Route 7) 15 times. After agreeing with Dominion as to the periods of time when lane blockages could occur, VDOT sent out press releases to neighboring counties warning them of expected or potential interference with normal traffic operations (VDOT 2010). In some cases, Dominion had to purchase private homes in suburban Leesburg in order to gain access to a particular structure for construction and maintenance.

Once VDOT agreed to partner with Dominion, it assigned Emmett Heltzel, with VDOT's Location and Design Division, as a permanent liaison for the company in 2004. Given that VDOT inspectors, who were private contractors, were required to ensure that the various pole positions would not compromise the safety of the highway operation, Dominion set up an account to which these inspectors could directly bill their time. Dominion, however, did not directly compensate VDOT staff.

The project team of VDOT and Dominion held monthly meetings for several years during project planning and completion. Other responsibilities that fell to VDOT during the course of the project were to testify on behalf of the project's progress before the State Corporation Commission and handle inquiries from the public regarding the impact of the project. Ultimately, the site of each pole had to be signed off on by both Dominion and VDOT. (Figure 4.8 shows an example of a pole that is on VDOT ROW). In order to accommodate the narrow dimensions of the corridor, Dominion reduced the footprint of its ROW from 120 ft, as would commonly be required for a line of this voltage, down to 80 ft.



Figure 4.8 Dominion Transmission Pole located on VDOT ROW

4.2.3 Construction Schedule

Once the painstaking work of citing poles had been completed, construction of the line was rapid. Property owners were notified of the pending construction in mid 2009. Construction began in late 2009 beginning with tree clearance and foundations for poles. At the time of this writing construction of transition stations, where the line transitions from overhead to underground, were completed, as were overhead lines. Additional work to be done at specific pole locations was scheduled and expected to be complete by November 2010 (Dominion 2010).

4.2.4 Findings from Leesburg Case Study

The multiple complexities that had to be accommodated over the course of the planning and construction process make the Hamilton to Pleasant View line one of the most intricate examples of coordination between a DOT and transmission provider in the United States. The project is

also notable in that it involves buried high voltage transmission – a rarity in the US outside of major cities. The project was a high priority for Dominion and for this reason the company was willing to agree to several modifications that drove up the per mile cost of the construction, the most significant of which was the two mile section of underground cable. Other less tangible costs included the time investment made by Dominion and VDOT staff in ensuring that the two uses of the corridor did not conflict with each other. Yet, despite these additional costs, the project clearly demonstrates that joint use of a ROW can lead to a much less intrusive alignment of transmission infrastructure. The project was facilitated by a specific order from the Virginia Corporation Commission, an upfront commitment from VDOT to support the project’s location within VDOT ROW given the commission’s finding that the alignment was in the public’s interest, and finally by the long-term working relationship between VDOT and Dominion staff that allowed many critical decisions to be made rapidly without delaying construction or leading to excessive construction related road closures.

4.3 Texas Case Study: Gillespie to Newton

4.3.1 Background

The Lower Colorado River Authority (LCRA) intended to develop the Gillespie to Newton Competitive Renewable Energy Zone (CREZ) 345kV transmission line project. The project was identified by the Electric Reliability Council of Texas (ERCOT) in its CREZ Optimization Study (CTO Study), and subsequently assigned to LCRA to construct as a “Priority Project” in Docket No. 35665. LCRA was to install one 345kV circuit on the double-circuit capable transmission line. No new stations were needed for the project, but LCRA planned to expand its Gillespie Station to accommodate this project as well as other CREZ priority projects (Application CCN).

On April 26, 2010, the Public Utility Commission of Texas (PUCT) issued its final order to not approve LCRA Transmission Services Corporation’s Gillespie-to-Newton CREZ Certificate of Convenience and Necessity (CCN) application. LCRA reviewed the final order and the comments of PUCT commissioners made at an April 23, 2010 open meeting and filed four motions of rehearing with the PUCT. The motions were denied and the PUCT requested that ERCOT re-evaluate the need for this project. (LCRA Press release).

4.3.2 Location

The LCRA Gillespie to Newton Project was to be located in the Hill Country of Central Texas, spanning Gillespie, Burnet, Llano, and Lampasas counties. The proposed transmission line would traverse portions of rugged terrain through the Hill Country, including several river crossings. The land involved was mostly undeveloped ranchland except for some rural residential developments and small towns. The proposed transmission line was intended to connect the expanded LCRA Gillespie Station, located in central Gillespie County, to the designated Oncor Electric Delivery Newton Station, located in southeastern Lampasas County. (Final order CCN) Figure 4.9 shows the area of impact.

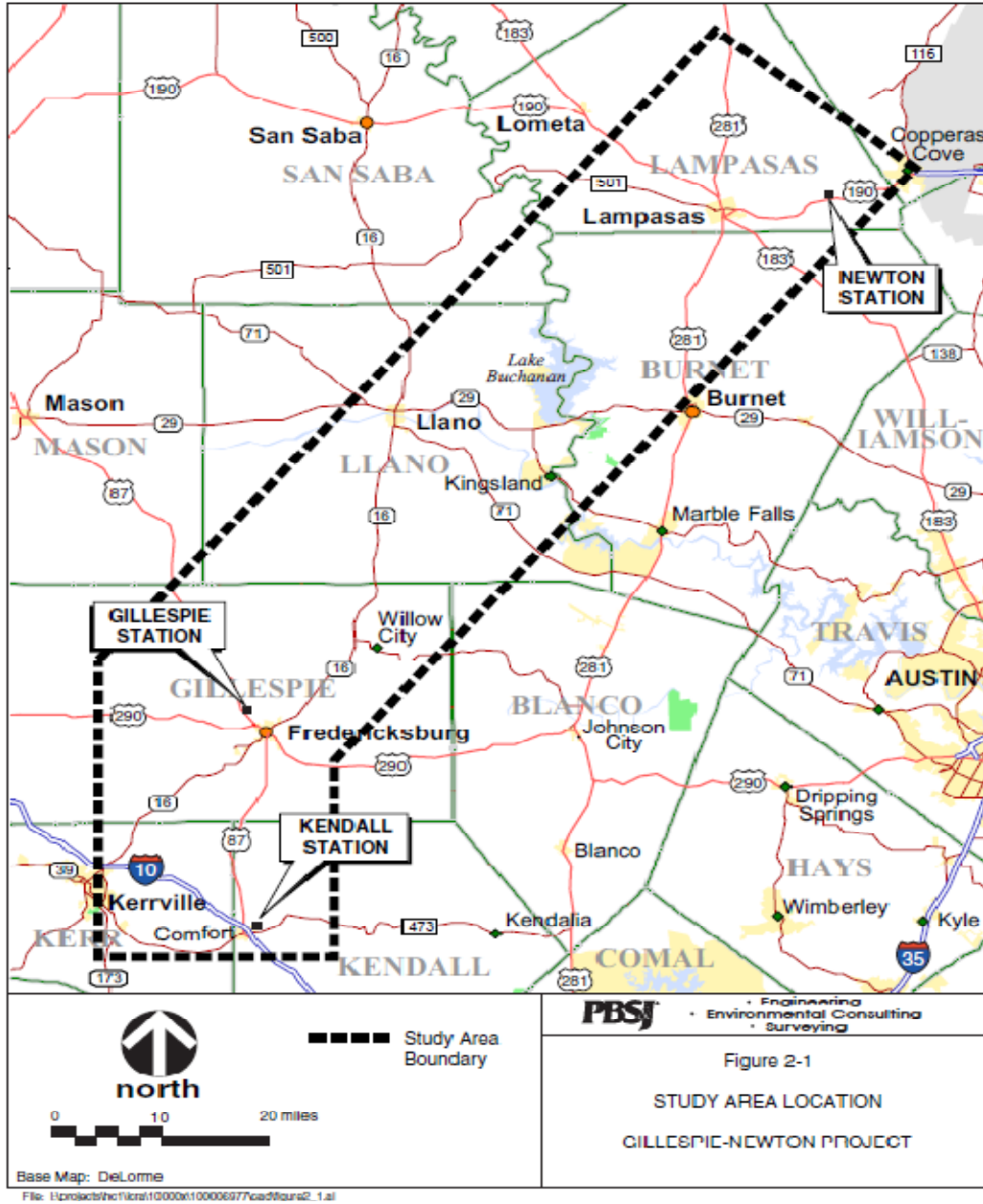


Figure 4.9 Gillespie to Newton Area of Impact (LCRA 2010)

4.3.3 Alignment

LCRA formulated its 11 proposed routes through a series of links that could be combined to form as many as 27 different routes. The preferred route was designated GN-11 and followed nodes: C1 - C3 - C5 - C9 - C11 - C12 - C13 - C16 - C22 - C26 - C27 - C28 - C30.

Alternate Routes (not listed in any order of priority)

GN1 = C1 - C2 - C7 - C12 - C13 - C15 - C20 - C23- C31 - C31a

GN2 = C1 – C2 – C7 – C12 – C13 – C16 – C22 – C25 – C31 – C31a
GN3 = C1 – C2 – C7 – C12 – C13 – C16 – C22 – C26 – C27 – C29 – C31a
GN4 = C1 – C3 – C4 – C8 – C11 – C12 – C13 – C16 – C22 – C25 – C31 – C31a
GN5 = C1 – C3 – C5 – C9 – C11 – C12 – C13 – C16 – C22 – C25 – C31 – C31a
GN6 = C1 – C3 – C5 – C9 – C11 – C12 – C14 – C17 – C18 – C27 – C29 – C31a
GN7 = C1 – C3 – C5 – C10 – C17 – C18 – C27 – C29 – C31a
GN8 = C1 – C3 – C5 – C10 – C17 – C19 – C30
GN9 = C1 – C3 – C5 – C9 – C11 – C12 – C13 – C15 – C20 – C24 – C25 – C31 – C31a
GN10 = C1 – C3 – C5 – C9 – C11 – C12 – C13 – C15 – C20 – C24 – C26 – C27 – C28 – C30
(Application CCN)

Figure 4.10 is a map of the area of impact with nodes connected to form the routes listed above. The LCRA preferred route is in bold.

4.3.4 Equipment Specifications

LCRA proposed to construct a new double-circuit-capable 345-kilovolt (kv) transmission line. LCRA planned to initially install one 345-kv circuit on the transmission line, and reserve the double circuit capability for future upgrades. The predominant and typical tangent, angle, and dead-end structures were double-circuit-capable lattice towers. Lattice towers were selected as the typical structures based on cost and efficiency. Tubular poles and tower poles were secondary options and were designated for limited use. The lattice towers proposed ranged in height from 120-180 feet above the ground surface depending on location. Underground construction was determined to not be a feasible option for this project based on the fact that the substrate included crystalline rocks, hard limestone, and cretaceous limestone. Furthermore, the rugged topography along much of this line made underground construction unfavorable.

No new substations were planned for this project but upgrades to existing facilities were identified. At the Gillespie Station, LCRA planned to install equipment to accommodate the termination of the new single circuit to Oncor's Newton Station. The line termination equipment included the required circuit breakers for protection of the new line, as well as high voltage air switches, wave traps, coupling capacitor voltage transformers, steel structures, foundations, insulators, protective relay panel and control equipment. This project contained no High Voltage Direct Current (HVDC) terminals, sectionalizing devices or series line compensations. The only series elements were those described above. (Application CCN).

4.3.5 Project Costs

LCRA proposed eleven (11) route alternatives, each with varying constraints that contributed to overall costs. The costs of these alternatives ranged from approximately 1.81 to 2.24 million dollars per mile. LCRA's preferred route (GN-11) as well as the Administrative Land Judge (ALJ) approved route (GN-6) traversed 85 miles with a total cost of approximately 161.9 million and 161.5 million respectively; resulting in a cost of approximately 1.90 million per mile. Table 4.4 shows the respective costs associated with each routing alternative as well as the total estimated construction cost.

Table 4.4 Projected Costs of Routing Options

Total Costs (\$ 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	\$81.9	\$7.6	\$2.3	\$27.1	\$0.0	\$62.5	\$24.3	\$205.7
GN2	91	\$80.8	\$7.5	\$2.3	\$27.0	\$0.0	\$60.6	\$27.3	\$205.5
GN3	86	\$70.9	\$7.4	\$2.3	\$26.3	\$0.0	\$58.3	\$25.0	\$190.2
GN4	89	\$75.2	\$7.5	\$2.3	\$27.2	\$0.0	\$61.8	\$33.2	\$207.2
GN5	90	\$52.2	\$7.5	\$2.3	\$27.1	\$0.0	\$62.9	\$24.2	\$176.2
GN6	85	\$39.3	\$7.3	\$2.3	\$27.1	\$0.0	\$62.5	\$23.0	\$161.5
GN7	81	\$52.0	\$11.9	\$2.2	\$23.3	\$0.0	\$53.8	\$34.7	\$177.9
GN8	79	\$49.5	\$11.4	\$2.2	\$21.7	\$0.0	\$50.3	\$36.9	\$172.0
GN9	93	\$54.1	\$7.6	\$2.4	\$27.6	\$0.0	\$62.7	\$20.2	\$174.6
GN10	89	\$45.0	\$7.4	\$2.3	\$26.6	\$0.0	\$60.8	\$18.9	\$161.0
GN11	85	\$43.1	\$7.3	\$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

4.3.6 Demonstrated Need

The project was identified by ERCOT in its CTO Study, and subsequently assigned to LCRA to construct as a priority project. The proposed project was designated by the CTO study to deliver renewable energy generated in the CREZ to the load centers of Central Texas. The proposed project was intended to help minimize existing congestion, and improve reliability west of Austin. (Final Order CCN)

4.3.7 Summary of Stakeholders

LCRA contacted stakeholders by direct written notice, mailed written notice, and published notices in newspapers. The notices informed concerned parties of the location, date, time, and purpose of the open house meetings to be held. LCRA held five public open houses in which approximately 730 stakeholders attended. Approximately 600 questionnaires were received by LCRA during the open houses and later by fax, e-mail, and mail. Generally, the most important factors concerning transmission line routing were:

- Maximize distance from residences
- Use or parallel existing electric transmission line ROW
- Parallel other existing compatible ROW
- Minimize environmental impacts
- Minimize visibility of the lines
- Maintain reliable electric service

Other common concerns expressed by the public included impacts to property values, health, property development, scenic views, environment, hunting, ranching, recreation, and tourism. (Application CCN)

4.3.8 Level of Completion

In April 2010 the PUCT ruled that, “LCRA is not entitled to approval of the [CCN] application” (Final order CCN). The PUCT then requested that ERCOT re-evaluate the need for this project. As a result of the ERCOT request LCRA put on hold the development of the Gillespie to Newton Project until a final PUCT review of ERCOT’s recommendations are completed. (LCRA Press release)

4.3.9 Feasibility of Shared ROW

LCRA contracted PBS&J to prepare an environmental and routing analysis for this project. The objective of this analysis was to recommend a preferred route as well as alternate routes that were feasible from an engineering, environmental, land use, and economic standpoint. The study area delineation performed by PBS&J, according to the sworn testimony of Mr. Rob R. Reid, Senior Vice President and Principal Project Director for PBS&J, included the location of physical and geographic constraints, as well as existing and compatible ROWs. Further testimony given by Mr. Reid stated that, “in accordance with P.U.C. SUBST. R. 25.101(b)(3)(B) and PURA &37.056 the route evaluation and selection process considered utilizing and paralleling existing compatible ROW and property boundaries were practical and reasonable” (Application CCN). Approximately 41% of LCRA’s preferred route utilized existing transmission line ROW and 1% paralleled existing compatible ROW. Habitable structures along the roadways as well as the significant use of existing transmission line ROW precluded the paralleling of features considered to provide existing compatible ROW. (Application CCN)

4.3.10 Reasons for Application Denial

On March 18, 2010, the State Office of Administrative Hearings’ (SOAH) administrative law judge issued a proposal for decision recommending that LCRA’s application be granted. The administrative law judge (ALJ) recommended the PUCT adopt LCRA’s alternative Gillespie to Newton route (route GN-6) because the length of existing transmission line ROW paralleled, lower cost, and lesser environmental impact. (Final order CCN) Figure 4.11 shows the ALJ approved route. The ALJ approved route was similar to LCRA’s preferred route except the ALJ route passed South of Lake Buchanan while the preferred route traversed the North side. Although the ALJ approved a route, based upon the factors set out in P.U.C. SUBST. R. 25.101(b)(3)(B) and PURA &37.056, the PUCT determined that no route met the requisite statutory and regulatory requirements. (Final order CCN) LCRA filed four motions of rehearing with the PUCT and all motions were subsequently denied. In a letter to ERCOT, the PUCT requested that the need for this line be thoroughly reevaluated. In September, ERCOT testified that the line remained necessary for realizing Texas’ renewable energy goals.

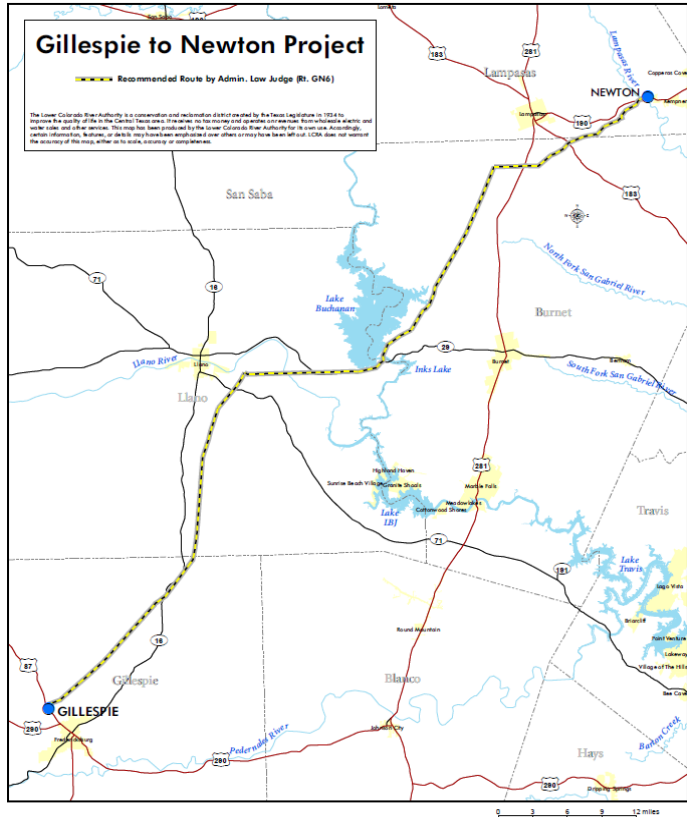


Figure 4.11 ALJ Approved Route (LCRA 2010)

Chapter Five: Conclusions and Recommendations

5.1 Conclusions

Currently TxDOT can purchase ROW for highway uses; however, the purchase of extra ROW for utility accommodation has not hitherto been specifically authorized within the context of the federal highway system. In 2003 Texas passed legislation that started to change this dynamic from a state perspective when it introduced House Bill 3588, which included a provision that would permit utility corridors including electricity and pipeline within the same ROW in certain instances (HB 3588, 2003, Texas Transportation Code Chapter 227). There are many areas of the law which lend support to the principle of utilizing TxDOT ROW for transmission, provided the location of transmission can be shown as aiding improved air quality or diversifying the financial base for TxDOT.

This report reviewed the technical, legal, and political considerations of shifting more transmission development into the ROW or along highway corridors. The report illustrates the technical challenges of co-location and also the perceived benefits in terms of increasing land utilization, reducing environmental impacts from transmission construction and reducing conflicts with private landowners. Researchers also examined the current state of technological trends for transmission development and explored the policies that have been enacted in other states to spur or enable transmission development alongside transportation corridors.

The researchers conclude that at present, the location of transmission alongside transportation is a reasonable and achievable goal. While there are *incongruencies* in the comparative planning regimens of TxDOT and transmission developers, none seem to present an unbreachable barrier to successful joint development. There are numerous examples of successful installations around the country. In most cases, these alignments are placed just outside of the highway right of way on private land, though in a few cases they have also been placed within the ROW. Avoiding conflict with landowners and preserving landscapes was found to be the primary motivation for co-location.

5.2 Recommendations

If the DOT wants to take a stronger role regarding transmission line development, three main elements would be required before the DOT could shift to purchasing ROW and effectively and efficiently developing transmission lines within ROW. These are:

1. Federal and state codes would need revising if the DOT wanted to purchase extra ROW to accommodate utilities.
2. Relationships with the utility developers, PUC, ERCOT, and other groups will need to be developed so that the DOT can develop internal mechanisms for facilitating utility development.
3. Safety, engineering, and other liability elements would need to be reviewed to develop administrative and other in-house guidance for both the DOT and utility entities.

5.2.1 Changing Federal and State Legislation

23CFR §1.23 is explicit in its directions for acquiring ROW for a federal highway project, and the exceptions thereto. Providing that the interest acquired shall be of such nature and extent *as are adequate for the construction, operation and maintenance* of a project and denoting that the use for which ROW is acquired is for *highway purposes*. However, an exception that could allow the DOT to acquire ROW for transmission is contained in 23 C.F.R §1.23, which carves out authority for use or occupancy of existing ROW that may assist TxDOT in utilizing its existing ROW for transmission line development. Texas Transportation Code Chapter 224 (§224.001) provides that TXDOT can acquire any ROW *necessary* for the national system of interstate and defense highways. ROW can only be purchased for use for transmission corridor development under Texas Transportation Code Chapter 227.

Because of requests by DOTs regarding accommodation of renewable energy transmission lines in ROW, FHWA issued guidance in March 2009 on longitudinal accommodation of utilities in the interstate system ROW. The guidance also recommended that DOTs and MPOs begin to more effectively plan within their planning cycles for transmission line accommodation, in light of State Renewable Programs that were expanded and because of the potential of forthcoming climate change/carbon legislation being developed by the U.S. Congress.

Based upon the review of federal and state legislation, FHWA guidance, and TxDOT practices, researchers make the following five recommendations:

Recommendation 1: Given the policy focus of the FHWA 2009 longitudinal guidance, there is now greater latitude for states to program for the installation and accommodation of utilities (especially to achieve RPS policies) within their transportation planning activities. The research team recommends TxDOT develop a procedure to include utility development and construction in its transportation planning process.

Recommendation 2: In light of the FHWA's 2009 guidance, researchers recommend that TxDOT request the legislature to place within regular transportation code in Chapter 224 the language regarding purchase of ROW for utility development that is currently found in Chapter 227 of the Texas Transportation Code.

The allocation of ROW for transmission would then become part of the duty of the transportation commission and commissioner's courts as part of their planning processes. This would allow TxDOT and local jurisdictions to develop a multi-modal infrastructure network to perfect and extend an integrated system of multimodal infrastructure networks.

Chapter 227 of the Transportation Code provides instructions for development of multi-modal corridors that include public utility development. Under Section 227.001 (7) a "Public utility facility" means:

- d) Water, wastewater, natural gas, or petroleum pipeline or associated equipment

- e) Electric transmission or distribution line or associated equipment.
- f) Telecommunications, information services, or cable television infrastructure or associated equipment, including fiber optic cable, conduit, and wireless communications systems

Section 227.012 requires that the Commission *shall* consider seven specific criteria when selecting segments for a multi-modal corridor, namely:

- (1) current and projected traffic patterns;
- (2) the safety of motorists;
- (3) potential risks to persons from spills or accidents of any kind;
- (4) *environmental effects, including the effect on air quality;*
- (5) *current and projected economic development;*
- (6) *the current and projected need for additional transportation options; and*
- (7) *system connectivity.*

Researchers also recommend amending Chapter 365 Road District Toll Roads, Chapter 366 Regional Tollway Authorities, Chapter 370 Regional Mobility Authorities, Chapter 431 Texas Transportation Corporations and Chapter 441 Road Utility Districts by adding in the utility corridor language. This amendment would allow these entities to also be able to effectively plan and develop transmission development siting within or adjacent to their ROW.

Further, the researchers recommend inserting more policy and definitional guidance regarding the definition for highway use. As an example, researchers recommend Texas Transportation Code utilize the nomenclature ‘transportation-use’ instead of ‘highway-use’. Transmission could be considered a ‘transportation-use’ transporting goods and services, and this could provide a rationale for transmission line development.

Recommendation 3: TxDOT already has a highly developed and well articulated utility accommodation manual and process for utility accommodation. This should be updated to reflect the FHWA 2009 guidance on longitudinal accommodation. This would also set the stage for continued collaboration between renewable energy transmission line developers, TxDOT and continued planning to achieve the state’s renewable production standards and air quality goals.

Recommendation 4: Utilize the exception carved out in 23 CFR.1.23 (c) which allows other use or occupancy – that is both temporary and permanent – to utilize ROW, including airspace for a non-highway purposes. This exception allows occupancy, if the use is in the *public interest* and does not impair the highway or cause safety issues. Clearly transmission line development falls within this exception, is without doubt in the public interest, and if properly developed, maintained and takes advantage of new technologies to assure safety, would provide the requisite level of comfort to both the transmission line developer and TxDOT.

Recommendation 5: Add a policy preamble into transportation utility code that planning for a multi-modal system could assist the state in enhancing delivery of renewable capacity that would improve air quality. By facilitating and assisting in the development of transmission routes, TxDOT could aid the state in developing its renewable energy capacity (which is extensive) to reduce reliability on fossil fuels.

5.2.2 Develop Relationships with the PUC, ERCOT, and Utility providers

The researchers recommend that TxDOT begin to structure a process to start dialogue with the various utility groups in Texas. TxDOT could host, for example, a series of briefing meetings to discuss potential partnering opportunities. These meetings would also be a good forum to discuss current issues faced by these groups. These issue meetings could be utilized to develop internal guidance materials for the various groups.

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APPENDIX A

INFORMATION: Guidance on Utilization of Highway Right-of-Way

Longitudinal Accommodation of Utilities in the Interstate System Right-of-way

Purpose

The purpose of this guidance is to discuss the FHWA's interests regarding the longitudinal accommodation of utility facilities within the right-of-way of the Interstate System. This document identifies the existing laws, regulations, policies and guidance applicable to the longitudinal installation and accommodation of public and private utility facilities and clarifies their application on a case-by-case basis.

This guidance is intended to complement the FHWA's "Program Guide: Utility Relocation and Accommodation on Federal-Aid Highway Projects" (6th edition, January 2003) (<http://www.fhwa.dot.gov/reports/utilguid/index.htm>) (Program Guide) and provide expanded discussion of how 23 CFR Part 645 and 23 CFR Part 710 are applicable to utility accommodation proposals based on the classification of the facility's intended use. This classification is of continued importance based on an increasing number of proposals to use the Interstate System right-of-way to accommodate infrastructure that supports renewable energy sources. It should be noted that although the focus of this guidance is with the Interstate System, much of the discussion contained in this document is considered applicable to other freeways and similar transportation facilities.

While this document is intended to be a convenient desk top resource primarily for both FHWA and State Department of Transportation (DOT) decision makers and Right-of-Way and Utility professionals when addressing issues pertaining to longitudinal accommodation of utilities within the rights-of-way of the Interstate system, this guidance also offers a series of recommendations on how both FHWA and DOTs can successfully address relocation/accommodation considerations in a proactive, longer-term, programmatic fashion.

Background & Key Issues

The FHWA has determined that the use of highway rights-of-way to accommodate public utility facilities is in the public interest (23 CFR Part 645.205 (a)). Non-highway use of Interstate right-of-way is subject to the airspace leasing requirements of 23 CFR 710.405, with the purpose of ensuring that the non-highway use does not impact the DOT's ability to maintain and operate the highway in a safe manner. However, 23 CFR 710.405 (a)(2) specifically states that Subpart D (of 23 CFR 710) does not apply to "...public utilities which cross or otherwise occupy Federal-aid highway right-of-way," which is addressed in 23 CFR 645 Subpart B. These regulations define utility facilities to be "in the public interest" and provide a process which public utilities must follow in order to be permitted to longitudinally occupy the right-of-way in a manner that is safe for the traveling public. This accommodation process also provides the requirements which must be satisfied to ensure the utility facility does not "...impair the highway or interfere with the free and safe flow of traffic thereon" (23 CFR 1.23(c)).

Prior to 1988, the FHWA historically prohibited the installation of new utility facilities within the rights-of-way of access-controlled freeways except in some extraordinary cases. This prohibition was consistent with the AASHTO policies for longitudinal accommodation. However, with a 1988 amendment to the FHWA regulations, the FHWA's policy changed to allow each state to decide whether to permit new utility facilities within these rights-of-way, or continue to adhere to the stricter AASHTO policies.

This regulatory update provided each State with the flexibility to address utility accommodation in the Interstate system as follows:

- States may decide if they want to allow longitudinal utility installations on freeways and, if so, to what extent and under what conditions.
- Whatever a state decides to do in this regard must be documented in its utility accommodation policy and approved by the FHWA. Exceptions or changes must be approved by the FHWA Division Administrator.
- A State may permit certain utilities and exclude others. If a State so chooses, it can prohibit any longitudinal utility installation.
- Fees charged for utility use are at a State's discretion and may be used as the State sees fit. The FHWA does, however, encourage States to use generated revenues for transportation purposes.

The passage by Congress of the Telecommunications Act (TCA) in January 1996 posed a potential impact to the FHWA accommodation policies. The TCA called for open competition between utility providers, specifically in the communications arena (cable, telephone). Each state now had the right to enter into agreements with communications providers; however, to do so, the state was required to provide the opportunity to all interested providers. In October 1996, the FHWA issued guidance on the anticipated effects of the TCA on utility accommodations, indicating that the TCA did not affect the FHWA's established policies regarding longitudinal installation in freeway right-of-way.

In addition to the telecommunication industry's impacts on the use of Interstate System right-of-way, the rapid development over the past decade of technologies which have greatly improved methods for efficiently and effectively generating and distributing electricity have led to some States pursuing ways to accommodate longitudinal installations of new facilities in a manner that has not been previously explored. Two examples of these emerging technologies and utility facilities are wind turbines and solar panels.

In recent years, the use of photovoltaic (PV) technology for the environmentally friendly generation and distribution of electricity has been accommodated within the highway rights-of-way in several European countries, and there are efforts currently underway with the first American installation of solar panels in the right-of-way of Interstate 5 just south of Portland, Oregon.

Wind turbines that connect the kinetic energy of wind to mechanical energy are another form of technology now being considered for accommodation within the Interstate right-of-way. For example, see the attached guidance issued in response to a 2007 Massachusetts Turnpike Authority proposal to install wind turbines (as well as solar panels) along the right-of-way of Interstate 90, the Massachusetts Turnpike.

The preceding discussion indicates that a clear distinction exists between when a non-highway use of Interstate right-of-way requires an airspace lease under 23 CFR 710.405, and when a facility can be accommodated under 23 CFR 645 Subpart B. Furthermore, it is clear that the current Federal regulations provide each State with flexibility regarding utility accommodation. However, the emergence of the new forms of utility services and technologies described above can blur the distinction between uses. Moreover, these facilities may not be explicitly addressed in the states' current accommodation policies. As a result, a careful review and assessment of the proposed use of the facility and how the facilities would be defined is crucial.

Determination of Public or Private Utility Facilities

As noted above, the FHWA has determined that the use of highway rights-of-way to accommodate public utility facilities is in the public interest. To the extent that any such facilities serve "the public", they can be accommodated under the DOT's approved Utility Accommodation Policy Manual or Plan. If the use of such facilities is to serve a private or proprietary interest, they might still be accommodated; however, they would have to be approved under the airspace leasing requirements of 23 CFR 710 Subpart D. Thus, the distinction between a public or private use will determine which regulations apply.

FHWA's Program Guide describes several factors that help determine whether the facility is deemed a "public" or a "private line". The key consideration is how the State defines the facility under its laws or regulations. If, for example, a utility facility is regulated by the State and/or local government and the party which owns and manages the facility meets the definition of a "utility" as defined in 23 CFR 645.207, accommodation under 23 CFR 645 Subpart B is appropriate. If, however, a recognized public utility places a new or untried technology within the highway right-of-way but that technology is not a regulated utility service, the service may not be considered a public utility and the application of 23 CFR 710 may be the appropriate means of allowing such a facility within the right-of-way. In the event that there are questions concerning whether the proponent is a public utility, a legal opinion from the State may be necessary to establish the status of the facility.

There are additional considerations that help determine the applicability of these regulations. For accommodation under 23 CFR 645 Subpart B, rather than 23 CFR 710.405, the facility must meet the regulatory definition of a "utility," and it must serve a public, rather than a proprietary, interest.

1. Is the facility a "utility"? As defined in 23 CFR 645.207, a "utility" is "...a privately, publicly, or cooperatively owned line, facility or system for producing, transmitting, or distributing communications, cable television, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, storm water not connected with highway drainage, or any other similar commodity, including any fire or police signal system or street lighting system, which directly or indirectly serves the public." While this definition may predate fiber optic and alternative energy technologies, a close reading of this definition should enable most technologies, even those of most recent vintage, to be clearly identified either as a utility or not.

The definition of "utility" in 23 CFR 645.207 is broad enough to include solar and wind generated energy facilities. Solar panels and wind turbines constitute a "facility or system" for producing, transmitting, and distributing electricity and/or heat. Similarly, other more recent forms of technology, such as fiber optics, meet this test if they produce, transmit, and/or distribute any of the defined forms of utility service, such as communications. Consequently, such facilities meet the first test as a "utility".

2. Is the facility a "public" utility? The second test for determining applicability for accommodation under 23 CFR 645 Subpart B is met when the utility is found also to be "public." While the term itself has a common-sense meaning, for purposes of the accommodation test we again refer to the definition of a "utility" in 23 CFR 645.207.

Since the first part of the definition (privately, publicly, or cooperatively owned) is broad enough to encompass most utility ownership scenarios a State DOT might encounter, the FHWA looks at the latter phrase (which directly or indirectly serves the public) to confirm whether the utility meets the criteria for "public" utilities. The Program Guide referenced above provides three illustrative examples for distinguishing between a "utility facility" (i.e., a "public" utility) and a private line. The key distinction, in reviewing these examples, is that a facility is "private" if it serves a limited proprietary use; for example, a utility facility that provides direct, dedicated service to a corporation) would be proprietary in nature and not meet the test as a "public" use. Similarly, a telecommunications company that proposes to place a line within the highway ROW to serve a select group of users on a lease arrangement basis would normally be considered "private" rather than "public". In contrast, a small utility company servicing a small community or limited number of neighborhoods would normally be considered a "public" use, if it is

generally available to any occupants within the service area.

Because many possible scenarios could exist, each would require evaluation on a case-by-case basis, utilizing the definition of "utility" in 23 CFR 645.207. If a utility service is determined to meet both tests for accommodation, then the DOT may proceed with such action in accordance with an FHWA-approved Utility Accommodation Manual or Plan.

In either case (i.e., public or private), some form of written agreement is required. The DOT must ensure that the form of written agreement used to permit such facilities within the Interstate right-of-way is adequate to protect the highway and clearly defines the responsibilities and authorities of the parties. The appropriate agreement document required for actions subject to 23 CFR 710.405 is an airspace lease. For the accommodation of public utilities subject to 23 CFR 645 Subpart B, many DOTs use a Special Use Permit or similar document.

Agreements. Either form of agreement must be in writing and clearly address applicable terms and conditions including but not limited to:

1. The rights and interests being conveyed or permitted.
2. The terms of the agreement (i.e., the value of the conveyed/permited interests and the time frame in which those interests will be maintained).
3. The roles and responsibilities of the parties to the lease or permit, both in terms of their relationship to each other and their responsibilities for preserving and protecting the highway facility.

Finally, the form of written agreement used by the DOT to permit non-highway uses in the right-of-way must comply with 23 U.S.C. 156 regarding fair market value and the use of the Federal share of income derived from the use of right-of-way. The requirement reads, in part: "...a State shall charge, at a minimum, fair market value for the sale, use, lease, or lease renewal (other than for utility use and occupancy or for a transportation project eligible for assistance under this title) of real property acquired with Federal assistance ...".

The requirement for charging fair market rent is also addressed in 23 CFR 710.403(d), although public utilities are exempt from this requirement. However, if the State does charge a public utility for occupying right-of-way, whether at fair market rent or a lesser amount, the Federal share of the net income shall be used by the State for activities eligible for funding under Title 23 of the U.S. Code. The regulations do provide an exception to charging fair market rent if the State DOT shows, and the FHWA approves, that such an exception is in the overall public interest for social, environmental, or economic purposes. This exception may be appropriate for activities that positively address climate change, contribute to improvements in air quality, and similar environmental initiatives.

Other Longitudinal Accommodation Considerations

Although the regulations found in 23 CFR 645 and 23 CFR 710 are those principally referenced regarding longitudinal accommodation of utilities, a review of any proposed accommodation requests, and any final decisions made regarding accommodation should consider the provisions established for standards (as specified in 23 U.S.C. 109), use and access (as specified in 23 CFR 1.23 (b) and 23 U.S.C. 111), and maintenance (as specified in 23 U.S.C. 116) of the Interstate System. Other applicable laws, regulations, policies and standards that should be considered include, but are not limited to:

- AASHTO *Policy on Geometric Design of Highways and Streets*;
- AASHTO *Roadside Design Guide*;
- AASHTO *Guide to Highway Vulnerability for Critical Asset Identification and Protection*;
- Manual on Uniform Traffic Control Devices (MUTCD); and

- The Highway Beautification Act (23 USC 131).

Other legislation, regulation, policy and guidance exist regarding issues that both the State DOT and the FHWA should consider in a review and assessment of any longitudinal accommodation proposal. Although more detailed information regarding these topics is available elsewhere, the following provides general considerations:

Planning. 23 USC 134 and 135 and 23 CFR 450 establish the FHWA requirements for Statewide and Metropolitan transportation planning and programming. Although utility interests are not explicitly addressed in the regulations, it is nevertheless appropriate to include a utility element in the undertaking of a multimodal, systems-level corridor or subarea planning study (23 CFR 450.212 or 450.318) or the development of the long-range statewide and/or metropolitan transportation plan (23 CFR 450.214 and/or 23 CFR 450.322). Discussions in these documents would supplement, rather than supplant, the information contained in the Utility Accommodation Policies.

It is encouraged that coordination with utility interests be conducted in adherence to a strategic planning process that identifies the roles and responsibilities of the State DOT in the accommodation of longitudinal utility facilities within the right-of-way of the Interstate system. Any specific proposal for longitudinal installation along Interstate System right-of-way could therefore be evaluated for compatibility with the applicable Metropolitan or Statewide long-range transportation plan and planning strategies that address the future needs of the State's highway system. As an example, with enhanced consideration during the planning process, it could be easily determined whether the proposed installations conflict with future expansion or use of the Interstate facility.

Safety, Traffic Operations and Maintenance. The State DOT must ensure that a use does not impair the highway or interfere with the free and safe flow of traffic. This is well stated in 23 CFR 645.205(c):

"...it is necessary that such use and occupancy, where authorized, be regulated by transportation departments in a manner which preserves the operational safety and the functional and aesthetic quality of the highway facility."

Regardless of the type of facility to be placed within the highway right-of-way, the State DOT must follow the applicable regulations and policies which are intended to ensure the safety of the highway user and adjacent property owners.

Related to the safety of the Interstate facility is the safe and proper maintenance of the feature proposed to be installed in the right-of-way, including consideration of how the feature is to be accessed to safely conduct maintenance activities.

Environment.

The State must submit environmental documentation on the proposed use of the highway right-of-way to the FHWA Division office, as specified in 23 CFR Part 771. This proposed use may require a federal action for approval, although the environmental review of such a proposal would be conducted in compliance with the National Environmental Policy Act (NEPA), and would be dependent on the existing environment within and in proximity to the right-of-way and the level of impacts to environmental resources. Where the proposed impacts are minor, the required level of documentation will consist of a categorical exclusion (CE). However, when sensitive environmental resources (e.g. wetlands, threatened and endangered species, historic sites) will be impacted, the required level of analysis, mitigation and documentation may necessitate the development of a higher level of environmental document [i.e., an Environmental Assessment (EA) or Environmental Impact Statement (EIS)]. In areas where right-of-way determinations may impact Section 4(f) resources (i.e. historic sites, public parks, recreation areas, and wildlife / waterfowl refuges), the State must submit documentation as specified in 23 CFR Part 774.

When considering placement of utilities, such as solar panels and wind turbines, within highway rights-of-way, visual impacts to resources must be evaluated.

Recommended Actions

The utilization of Interstate System right-of-way for the installation, operation and maintenance of utility facilities can present challenges to the DOTs and the FHWA in their roles as effective stewards of the public right-of-way. Given the noted development of more effective technologies available to generate and transmit energy, and given the existing legislative and regulatory frameworks, both entities have opportunities to successfully achieve their respective stewardship roles.

DOTs: DOT's are encouraged to conduct a review of their current Utility Accommodation Policies and other pertinent State legislation, regulation and guidance, and make modifications and updates as necessary. If this review process is conducted in a proactive manner, the DOTs will be better prepared to address a variety of future accommodation issues including those described in this document. Key focal points when conducting a review of the Utility Accommodation Policies should include, but not be limited to:

- Identifying gaps between the State's legal definition of "utility" and current technologies.
- Reviewing and analyzing other State laws having relevance to utility accommodation issues.
- Analyzing whether the language in the accommodation policies that address environmental, security, highway safety, highway capacity, and maintenance issues adequately meet current considerations.
- Determining compliance with latest editions of relevant AASHTO and MUTCD guidance.

The DOTs are also encouraged to include in their policies a discussion of how utility accommodation can be better integrated into their transportation planning process at the State, regional and corridor levels. Ultimately, this focus would place the States in a better position to handle accommodation questions systematically rather than on a case-by-case basis.

FHWA Division Offices: FHWA Division offices also have opportunities to proactively address utility accommodation issues by adequately considering right-of-way and utility issues when conducting their annual Risk Assessments. This process may lead to conducting further process or program reviews dealing specifically with right-of-way or utility accommodation issues. Division offices are also encouraged to collaborate as much as practicable with the DOTs should they choose to conduct a review of their Utility Accommodation Policies.

As is the case with the DOTs, the Division offices are also encouraged to foster an enhanced consideration of right-of-way and utility accommodation interests in the statewide, regional and corridor transportation planning processes.

Conclusion and Summary

The key points of this guidance are summarized as follows:

- **23 CFR 710.405** and the **DOTs' approved Right-of-Way Manual** regulate the use of Interstate air rights (airspace) for **non-highway purposes** other than public utilities, railroads, bikeways, and pedestrian walkways.
- The proper form of written agreement for a non-highway use other than a public utility is an **airspace lease**, which should address applicable terms and conditions including but not limited to the rights and interests being conveyed, the terms of the conveyance, and the roles and responsibilities of the parties.

- **23 CFR 645 Subpart B** and the **DOTs' approved Utility Accommodation Manual or Plan** (as approved by the FHWA) regulate the use of Interstate air rights (airspace) for facilities defined as **public utilities**. Accommodation of a facility as a public utility is determined by how a State views the facility under its own laws and regulations, as well as by that facility meeting the definition established in 23 CFR 645.207.
- The proper form of written agreement or permit for a public utility is **established in the Utility Accommodation Manual or Plan** and addresses the applicable terms and conditions including but not limited to the rights and interests being permitted, the terms of the agreement, and the roles and responsibilities of the parties. (See 23 CFR 1.23(c)).
- Agreements to install and/or accommodate utilities longitudinally must contain the necessary provisions and controls to ensure the safe and free flow of traffic (as specified in 23 CFR 1.23(c)).
- All actions in highway right-of-way that can be classified as a Federal action or have a Federal handle must comply with 23 CFR Part 771 (National Environmental Policy Act) and 23 CFR Part 774 (Section 4(f)).
- Division Realty and Utility Professionals are encouraged to work with their DOTs to conduct a review and assessment of their DOT's Utility Accommodation Policy Manual or Plan to ensure it is consistent with 23 CFR 645 Subpart B and adequately meets current needs.
- Division staff are encouraged to work with their DOTs to identify opportunities to integrate the consideration of utility facilities in their statewide strategic plans, freeway or highway system plans, metropolitan Transportation Plans, and corridor transportation plans.

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