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26185

PUBLIC UTILITY COMMISSION OF TEXAS
1701 N. Congress Avenue
Austin, Texas 78701 (512) 936-7000

APPLICATION OF GUADALUPE VALLEY ELECTRIC COOPERATIVE, INC. FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY (CCN) FOR A 138kV TRANSMISSION LINE IN GUADALUPE COUNTY

1. Guadalupe Valley Electric Cooperative, Inc.

Applicant (Utility Name)

30075 — 830-857-1200

Certificate Number — **Phone Number**

825 East Sarah DeWitt Dr.

Street Address

Gonzales — Texas — 78629

City — **State** — **Zip**

P.O. Box 118

Mailing Address

Gonzales — Texas — 78629

City — **State** — **Zip**

2. Steve Slaughter

Person to Contact

Engineering Division Manager — 830-857-1200

Title/Position — **Phone Number**

P.O. Box 118

Mailing Address

Gonzales — Texas — 78629

City — **State** — **Zip**

Mark Davis — 512-472-1081

Legal Counsel — **Phone Number**

1005 Congress Avenue, Ste. 400

Mailing Address

Austin — Texas — 78701

City — **State** — **Zip**

DESCRIPTION OF FACILITIES

3.

Name or Designation of Segment	Voltage Rating (kV)	Miles of ROW	Miles of Circuit	Conductor Type and Size	Structure Type	Width of ROW (Feet)	Percent of ROW Acquired
**Hickory Forest – New Berlin Breakoff*	*138 kV*	**3.31**	**6.62*	**6x1-795 MCM 26/7 ACSR "Drake"*	** DC Single Pole (Existing)*	*50' – 80'*	*100%*
New Berlin Breakoff – New Berlin	*138 kV*	*11.29*	*11.29*	*3x1-795 MCM 26/7 ACSR "Drake"*	*SC Single Pole*	*80' – 100'*	*0%*

*A single circuit will be installed on existing double circuit structures on existing right-of-way from Hickory Forest to the New Berlin break-off point. Of the 6.62 miles of circuit, 3.31 miles will be installed as part of this project and the other 3.31 miles of circuit will have been previously installed as part of a previously certificated project (Capote-Hickory Forest). Of the 6x1-795 MCM 26/7 ACSR "Drake" conductors, 3 of the 6 conductors will have been previously installed as part of the previously certificated circuit (Capote-Hickory Forest).

4. Is new substation construction included in this project? ____ Yes. _X_ No.

How is the new substation identified?

There is no new substation.

State the distance from the proposed substation to the nearest residence, residential area, subdivision or community.

Not applicable.

5. Provide a schedule for this project:

Estimated Dates of:	**Start**	**Completion**
ROW Acquisition	November 2002	July 2003
Transmission Line Construction	September 2003	December 2003
Substation Construction	Not applicable	Not applicable
Initial Operation	December 2003	

6. List all counties in which facilities are proposed to be constructed.

Guadalupe County.

NEIGHBORING UTILITIES AND MUNICIPALITIES

7. **List all incorporated municipalities in which facilities are proposed.**

None

If franchise, permit or other evidence of consent has previously been submitted by the applicant, provide only the Docket Number.

8. **List all other electric utilities certificated to areas traversed by the proposed facilities.**

Guadalupe Valley Electric Cooperative, Inc. (GVEC) is the only electric utility certificated in the project area.

9. **Have affected utilities agreed to the construction? _____ Yes. _____ No. If yes, attach a copy of the agreements.**

Not applicable.

10. **Identify and describe how any other electric utility will be involved in this project.**

Not applicable.

COST AND FINANCING OF FACILITIES

11. **How will the construction of the proposed facilities be financed?**

Debt financed.

12. **List the estimated cost of the:**

	Transmission Facilities	Substation Facilities
Right-of-way (easement and fee)	**$224,786**	**$0**
Materials and supplies	**$1,457,281**	**$6,000**
Labor and transportation (utility)	**$50,000**	**$25,000**
Labor and transportation (contract)	**$1,045,383**	**$41,000**
Stores	**$0**	**$18,700**
Engineering and Admin. (utility)	**$150,000**	**$0**
Engineering and Consulting (contract)	**$877,650**	**$25,000**
Estimated Total	**$3,805,100**	**$115,700**

13. To each copy of the application, attach the following:

A. Routing map of the county or counties involved in the proposed project.

Please refer to Figure 4-3 (map pocket) of the *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* labeled as "Attachment 1."

B. Routing study report conducted by the utility or consultant.

Please see the *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* labeled as "Attachment 1."

C. Schematic or diagram of the applicants transmission system in the proximate area of the proposed project.

Please refer to Figure 1-1 in Section 1.0 of the *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* labeled as "Attachment 1."

D. Dimensionalized drawings of the typical structures to be used.

Please refer to figures 1-2 and 1-3 in Section 1.0 of the *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* labeled as "Attachment 1."

ADEQUACY OF EXISTING SERVICE AND NEED FOR ADDITIONAL SERVICE

14. State the reason for the proposed project.

The proposed 138 kV transmission line (initially operated at 69 kV and approximately 15 miles in length) between the Hickory Forest Substation and the New Berlin Substation is needed to improve customer delivery point voltages, relieve anticipated line overloads, and enhance transmission system reliability.

Specifically, this project will satisfy the Lower Colorado River Authority (LCRA) and Association of Wholesale Customers (AWC) Transmission Planning Criteria which has the following requirements: (1) maintain 92 percent of nominal voltage for anticipated contingencies; (2) insure that planned transmission line loading will be such that National Electric Safety Code line-to-ground clearances will be maintained for anticipated contingencies; and (3) insure that no more than 20 MW of peak load shall be interrupted for anticipated contingencies. The proposed transmission line, which will be located in Guadalupe County, is recommended to be in service by Summer of 2003.

It is the policy of LCRA to furnish electric service to its wholesale customers at the substation distribution bus and to provide, through ownership or lease, those facilities required to insure a reliable and dependable supply of electric service to each customer

delivery point. Pursuant to LCRA Board Policy, LCRA has the responsibility of planning the transmission facilities to meet the needs of the LCRA wholesale electric customers in accordance with LCRA and AWC Transmission Planning Criteria. As part of this planning process, LCRA receives requests from the customers for new points of delivery or upgrades of facilities serving existing points of delivery and determines the optimum solution for meeting the customer's requirements. Requests for transmission system improvements are reviewed by the Transmission Planning Task Force, which is an advisory committee to the LCRA, prior to the development of the annual LCRA Transmission System Improvements Plan. The purpose of this task force is to include the wholesale customers in the LCRA transmission planning process. Requirements for the quality and level of transmission service are determined using LCRA and AWC Transmission Planning Criteria and the review by the Transmission Planning Task Force. Based on the LCRA and AWC Transmission Planning Criteria, the Transmission Planning Task Force recommended this transmission line addition in the fiscal year 2001-2010 transmission plan.

System Background

Guadalupe Valley Electric Cooperative (GVEC) is a wholesale customer of LCRA, serving approximately 50,000 accounts throughout thirteen counties, primarily in DeWitt, Gonzales, Guadalupe, Lavaca, and Wilson counties, but also serving parts of Bexar, Caldwell, Goliad, Karnes, Victoria, and Jackson counties. The service area extends approximately 120 miles from its western boundary of Cibolo Creek to just southeast of the Ezzell community in Lavaca County. The service area encompasses over 210 miles of 138 kV and 69 kV transmission lines. GVEC operates 7,224 miles of distribution lines and 222 miles of underground distribution lines to supply the end-use customers out of 30 distribution substations. The recent consolidation with DeWitt Electric Cooperative has added over 1,300 square miles to the GVEC service area, making it approximately 3,500 square miles. The total GVEC load reached 261 MW during Summer of 2000, of which 81 MW is classified as an industrial load.

The loads in the southern section of the GVEC service territory are supplied by a 69 kV transmission network, which is comprised of predominantly 4/0 ACSR conductor rated for 47 MVA. One section of the 69 kV transmission network, which follows a southerly route between McQueeney and Gonzales, supplies seven substations (New Berlin, Wilson, Lavernia, GVEC Nixon, Smiley, Cost, and Lakewood). A 69 kV tie to the American Electric Power (AEP) transmission system in the Nixon area also helps support the GVEC load requirements at the substations along this circuit.

The second section of the 69 kV transmission network, which follows a northerly route between Seguin and Gonzales, supplies four substations (Capote, Hickory Forest, Nash Creek, and Ottine). Hickory Forest is a new substation that is presently being developed at a site approximately 8 miles south of the Capote Substation to serve growing loads in the area to the southeast of Seguin.

Collectively, the eleven substations in the southern section of the GVEC service territory

represent approximately 60 MW of peak load, or over 30 percent of the total GVEC non-industrial system load based upon Summer of 2000 loading conditions. The actual KW loads for these eleven substations during the system peak for Summer of 2000 and their forecasted summer loads for the period 2001-2005 are provided below.

Substation	2000	2001	2002	2003	2004	2005
GVEC Nixon	4022	6923	10133	10336	10542	10753
Lavernia	6143	6884	7296	7734	8198	8690
Wilson	7710	8118	8930	9734	10609	11246
New Berlin	14256	15031	19826	20817	21857	22951
Smiley	1633	1663	1696	1730	1764	1800
Cost	4675	5017	5168	5323	5482	4201
Lakewood	1596	2499	2549	2600	2652	2705
Capote	13673	14459	9691	10079	10483	10901
Hickory Forest	0	0	6950	7297	7663	7968
Nash Creek	2112	1789	1842	1898	1955	2013
Ottine	3745	4111	4235	4362	4493	4627
Total (KW)	**59565**	**66496**	**78316**	**81911**	**85698**	**87856**

The large increases in load in 2001 and 2002 are due to the development of new water wells and pumping stations in the area by the Schertz/Seguin Local Government Corporation. New sites under development in the area will be served from the GVEC Nixon and New Berlin Substations. Please refer to Figure 1-1 in Section 1.0 of the "*Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas*" labeled as "Attachment 1" for the configuration of the transmission system and the location of the substations in this area.

Five contingencies are critical to the performance of the transmission system in this area in terms of delivery point voltages, transmission line loading levels, and system reliability. These outages are: (1) the loss of the McQueeney-New Berlin 69 kV line; (2) the loss of the Seguin-Capote 69 kV line; (3) the loss of Nixon-GVEC Nixon 69 kV line; (4) the loss of the New Berlin-Wilson Tap 69 kV line, and (5) the loss of the New Berlin-McQueeney/Wilson Tap 69 kV double circuit. Each of these independent contingencies causes violations of the LCRA and AWC Transmission Planning Criteria.

McQueeney-New Berlin Line Outage

During the loss of the 8.2-mile McQueeney-New Berlin 69 kV line, the loads at the GVEC Nixon, Lavernia, Wilson, and New Berlin Substations are supplied radially from the AEP Nixon tie and its upstream connection back to Gonzales. By 2003, the combined load at these four substations is expected to reach 48.6 MW. During this outage, the line distance between the AEP Nixon tie and the New Berlin Substation is 32.5 miles.

During this contingency, the voltages at the four substations along this radial line are expected to decay to less than acceptable levels. The voltages at the GVEC Nixon, Lavernia, Wilson, and New Berlin Substations are expected to deteriorate to 90.5 percent (62.4 kV),

79.5 percent (54.9 kV), 76.5 percent (52.8 kV), and 75.8 percent (52.3 kV) respectively during this outage. These levels are below the 92 percent of nominal voltage for anticipated contingencies, which is considered acceptable.

During this contingency, loading on the transmission line immediately out of the AEP Nixon tie also becomes a system performance concern. The load on the 2.0-mile 69 kV transmission line between the AEP Nixon tie and the GVEC Nixon Substation is expected to reach 62.1 MVA, or 132.2 percent of the full rating of this line section. In addition, the load on the 17.6-mile 69 kV transmission line between the GVEC Nixon and Lavernia Substations is expected to reach 50.9 MVA, or 108.4 percent of the full rating of this line section. These excessive loads will cause the circuit conductors to sag to levels which will violate the acceptable line-to-ground clearance standards as governed by the National Electric Safety Code. This inadequate line-to-ground clearance will pose a threat to public safety and property, and if not corrected could over time permanently damage the mechanical integrity of nearly 20 miles of transmission conductor between the AEP Nixon tie and the Lavernia Substation.

As the loads in the area continue to grow over the years, the impact of the McQueeney-New Berlin contingency on system performance becomes even more severe. Within two years, low voltage problems in the area will spread to include the Smiley Substation, as the voltage at this substation will fall to 90.2 percent (62.2 kV). Line overloads will also become more widespread as area loads increase. Within two years, the 5.7-mile 69 kV transmission line between the Lavernia Substation and Wilson Tap will also experience an overload condition, as the load on this line will reach 54.3 MVA, or 115.5 percent of the full rating of this line section.

Seguin-Capote Line Outage

During the loss of the 5.7-mile Seguin-Capote 69 kV line, the loads at the Ottine, Nash Creek, Capote, and Hickory Forest Substations are supplied radially from the Gonzales Substation. By 2003, the combined load at these four substations is expected to reach 23.6 MW. During this outage, the line distance between the Gonzales and Hickory Forest Substations is 45.3 miles.

During this contingency, the voltages at two of the four substations along this radial line are expected to decay to less than acceptable levels. The voltages at the Capote and Hickory Forest Substations are expected to deteriorate to 89.9 percent (62.0 kV) and 89.5 percent (61.7 kV) respectively during this outage. These levels are below the 92 percent of nominal voltage for anticipated contingencies, which is considered acceptable.

As the loads in the area continue to grow over the years, the impact of the Seguin-Capote contingency on system performance becomes even more severe. Within two years, low voltage problems in the area will spread to include the Nash Creek Substation, as the voltage at this substation will fall to 91.3 percent (63.0 kV).

Nixon-GVEC Nixon Line Outage

During the loss of the 2.0-mile Nixon-GVEC Nixon 69 kV line, the loads at the New Berlin, Wilson, Lavernia, and GVEC Nixon Substations are supplied radially from the McQueeney Substation. By 2003, the combined load at these four substations is expected to reach 48.6 MW. During this outage, the line distance between the McQueeney and GVEC Nixon Substations is 38.7 miles.

During this contingency, loading on the transmission line immediately out of McQueeney becomes a system performance concern. The load on the 8.2-mile 69 kV transmission line between the McQueeney and New Berlin Substations is expected to reach 51.6 MVA, or 109.7 percent of the full rating of this line section. This excessive load will cause the circuit conductors to sag to levels which will violate the acceptable line-to-ground clearance standards as governed by the National Electric Safety Code. This inadequate line-to-ground clearance will pose a threat to public safety and property, and if not corrected could over time permanently damage the mechanical integrity of over 8 miles of transmission conductor between the McQueeney and New Berlin Substations.

As the loads in the area continue to grow over the years, the impact of the Nixon-GVEC Nixon contingency on system performance becomes even more severe. Within two years, low voltage problems in the area will surface to include the GVEC Nixon Substation, as the voltage at this substation will fall to 91.1 percent (62.9 kV).

New Berlin-Wilson Tap Line Outage

During the loss of the 7.2-mile New Berlin-Wilson Tap 69 kV line, the loads at the GVEC Nixon, Lavernia, and Wilson Substations are supplied radially from the AEP Nixon tie and its upstream connection back to Gonzales. By 2003, the combined load at these three substations is expected to reach 27.8 MW. During this outage, the line distance between the AEP Nixon tie and the Wilson Substation is 32.8 miles.

During this contingency, the voltage at one of the four substations along this radial line is expected to decay to less than acceptable levels. The voltage at the Wilson Substation is expected to deteriorate to 90.8 percent (62.7 kV) during this outage. This level is below the 92 percent of nominal voltage for anticipated contingencies, which is considered acceptable.

As the loads in the area continue to grow over the years, the impact of the New Berlin-Wilson Tap contingency on system performance becomes even more severe. Within two years, low voltage problems in the area will spread to include the Lavernia Substation, as the voltage at this substation will fall to 90.6 percent (62.5 kV).

New Berlin-McQueeney/Wilson Tap Double Circuit Line Outage

The New Berlin Substation is supplied from McQueeney and Wilson Tap by 69 kV transmission circuits that are constructed on common line structures for a distance of

approximately 1.3 miles immediately west of the substation site. The length of this double circuit exceeds the 0.5-mile length criteria that ERCOT has established as the minimum length for multiple circuit outages. Considering the loss of this double circuit as a single contingency results in the total interruption of electric service to New Berlin and all of the customers that are supplied from this substation. The maximum to-date peak load supplied by the New Berlin Substation is 17.4 MW. With the continuation of new development in the area including the Schertz/Seguin Local Government Corporation loads, the load supplied by this substation is projected to reach a peak level of 22 MW in 2003. This load will exceed the 20 MW load limit that is regarded as the maximum amount of load at a radial substation which can be allowed to be interrupted during a contingency before that substation is considered for looping.

Summary

The proposed 138 kV transmission line (initially operated at 69 kV) between the Hickory Forest Substation and the New Berlin Substation is needed to satisfy the LCRA and AWC Transmission Planning Criteria which has the following requirements: (1) maintain 92 percent of nominal voltage for anticipated contingencies; (2) insure that planned transmission line loading will be such that National Electric Safety Code line-to-ground clearances will be maintained for anticipated contingencies; and (3) insure that no more than 20 MW of peak load shall be interrupted for anticipated contingencies.

By 2003, anticipated contingency conditions will cause voltages at six of the eleven substations in the southern section of the GVEC service territory to deteriorate to levels that violate the 92 percent of nominal voltage criteria.

In terms of line loading, approximately 28 miles of existing 69 kV transmission lines in the southern portion of the GVEC service territory will be subjected to severe overloading and the risk of permanent mechanical damage leading to failure.

It should be noted that the proposed transmission line between Hickory Forest and New Berlin will be initially operated at 69 kV; however, it will be constructed for ultimate operation at 138 kV. Constructing this new line to operate at the higher voltage level will accommodate ongoing requirements throughout the LCRA and wholesale customer systems to convert 69 kV transmission facilities to 138 kV operation. Long-term plans in the area anticipate that some of the 69 kV substations and transmission circuits in the area will require conversion to 138 kV operation in the future to reduce loading levels on the existing auto-transformers which now supply the local 69 kV system. Facility upgrades to 138 kV in this area will also coordinate well with the possible development of: (1) a new 138 kV transmission tie line to the south in Wilson County and (2) a new 138 kV transmission tie line to the Cushman Substation in Seguin.

A number of improvements have been implemented over the last eight years on the southerly 69 kV network between McQueeney and Seguin in an attempt to provide immediate relief for low voltage concerns in this area of the GVEC system. For example, capacitor banks have

been added to the 69 kV network at both New Berlin and Nixon. These capacitor banks have provided an immediate but nevertheless very short-term improvement to system performance in this area during contingency conditions. Beyond these capacitor bank additions, the 69 kV tie to the AEP transmission system in the Nixon area was also constructed within the last several years in a direct attempt to maximize the use of existing facilities in the area for needed voltage support.

Without the proposed transmission line between Hickory Forest and New Berlin in service, contingencies in this area will continue to threaten the integrity of the transmission system and its ability to provide a stable and acceptable voltage to growing loads in the GVEC system. Beyond this, if the transmission system is allowed to operate in its present condition, public safety and property will be at risk due to inadequate line-to-ground clearances due to excessive overloading. Over the long-term, a continuation of excessive conductor loading could lead to irreversible damage to transmission circuits in the area, and lead to extended customer service interruptions due to equipment failure. Finally, continued development in the area will place more customers at risk of an extended power interruption due to an outage on the common structure double circuit transmission line that now supplies the New Berlin Substation.

15. List the options that were considered and the reasons for rejecting them.

Alternative 1: Develop the distribution system infrastructure sufficient to transfer load from the problem areas to neighboring substations at McQueeney and Geronimo.

A total load reduction of approximately 41 MW at the end of ten years is necessary to cap the area loads at levels that do not result in overloading and voltage problems during contingency conditions. This level of distribution load reduction is equivalent to the total transfer of the New Berlin load (14.3 MW in 2000) to the McQueeney Substation, and the total transfer of the Capote load (13.7 MW in 2000) to the Geronimo Substation. Effectively, this alternative would abandon the existing delivery points at New Berlin and Capote and transfer these loads to neighboring substations that are supplied from the 138 kV transmission network located outside of the problem area. In each of these cases, the distribution system would have to support the transfer of large blocks of load from their existing points of interconnect on the system at New Berlin and Capote to their new sources at the McQueeney and Geronimo Substations respectively. Because of the remote location of the McQueeney and Geronimo Substations relative to the existing service territories of the distribution systems now supplied out of New Berlin and Capote, this type of alternative is not considered feasible. The distribution system needed to supply these loads from remote substations would require the development of: 1) two 24.9 kV 795 ACSR express feeders (total circuit length of 20 miles) between McQueeney and New Berlin, and 2) two 24.9 kV 477 ACSR express feeders (total circuit length of 22 miles) between Geronimo and Capote. The estimated capital cost of this alternative is $9,362,000. The cost of this alternative is more than two-times more expensive than the recommended alternative. Severe degradation of power quality due to increased losses over longer feeders, and the dramatic worsening of

distribution system reliability due to increased line exposure would be a direct consequence of such a distribution alternative. In this instance, the distribution alternative does not eliminate the problem; rather it would shift the problem from one area to another and create a new set of reliability, cost, and efficiency problems. Because this alternative is cost-prohibitive and contains inherent weaknesses, it was rejected.

Alternative 2: Deploy distributed generation at the New Berlin and Hickory Forest Substations.

To alleviate overloading and voltage problems over the next ten years between GVEC Nixon and New Berlin during contingency conditions, a generation resource totaling 30.9 MW would be required at a site in this area. To improve voltages between Capote and Hickory Forest over the next ten years during contingency conditions, a generation resource totaling 10.1 MW would be required at a site in this area. To maximize the benefit of a distributed generation alternative, the New Berlin and Hickory Forest Substations are the preferred sites for locating new generation resources since they are the last substations on the radial systems during the worst contingencies. The estimated capital cost for diesel generators at these two substation sites is $14,350,000 based upon a per unit cost of $350 per KW. The cost of this alternative is more than three-times more expensive than the cost of the recommended alternative. The application of distributed generation in the form of diesel units at these substation sites is cost prohibitive, and was therefore rejected. From a renewable resource perspective, neither wind turbines nor photovoltaics are feasible. In terms of wind technology, a class 5 or class 6 wind regime is preferred from the standpoint of an initial economic evaluation. Because wind regimes in this area are only in the class 3 range, the deployment of wind turbines was rejected. In terms of photovoltaic technology, this type of application is best suited where load reduction requirements are in the 50-200 KW range. Because the required load reduction is much higher in this situation, the use of photovoltaic technology was also rejected.

Alternative 3: Construct a new 69 kV transmission line (approximately 17 miles in length) between the Hickory Forest and Lavernia Substations. Continue to operate the existing 69 kV capacitor bank at New Berlin.

This alternative will improve the voltages at the GVEC Nixon, Lavernia, Wilson, and New Berlin Substations to 98.6 percent (68.0 kV), 96.6 percent (66.7 kV), 94.8 percent (65.4 kV), and 94.9 percent (65.5 kV) respectively during the loss of the McQueeney-New Berlin 69 kV line. During this same contingency, this alternative will reduce the load on the 69 kV transmission line between the AEP Nixon tie and the GVEC Nixon Substation to 32.4 MVA, or 69.0 percent of the full rating of this line section.

This alternative will improve the voltages at the Capote and Hickory Forest Substations to 95.7 percent (66.1 kV) and 96.4 percent (66.5 kV) respectively during the loss of the Seguin-Capote 69 kV line.

This alternative will reduce the load on the 69 kV transmission line between the McQueeney

and New Berlin Substations to 38.9 MVA, or 82.7 percent of the full rating of this line section during the loss of the Nixon-GVEC Nixon 69 kV line.

This alternative will improve the voltage at the Wilson Substation to 96.0 percent (66.2 kV) during the loss of the New Berlin-Wilson Tap 69 kV line.

This alternative does not provide a new transmission source into the New Berlin Substation to safeguard against the loss of the New Berlin-McQueeney/Wilson Tap double circuit and the total loss transmission support at this substation.

The estimated capital cost of this alternative is $4,352,000. With this alternative, the New Berlin Substation will still be at risk of a total interruption of electric service in the event of the loss of the common structure double circuit that now supplies this substation. Because the affects of this contingency are not mitigated, this alternative was rejected.

Alternative 4: Construct a new 69 kV transmission line (approximately 16 miles in length) between the Hickory Forest Substation and Wilson Tap. Continue to operate the existing 69 kV capacitor bank at New Berlin.

This alternative will improve the voltages at the GVEC Nixon, Lavernia, Wilson, and New Berlin Substations to 98.8 percent (68.2 kV), 97.2 percent (67.1 kV), 96.7 percent (66.7 kV), and 97.0 percent (66.9 kV) respectively during the loss of the McQueeney-New Berlin 69 kV line. During this same contingency, this alternative will reduce the load on the 69 kV transmission line between the AEP Nixon tie and the GVEC Nixon Substation to 30.5 MVA, or 64.9 percent of the full rating of this line section.

This alternative will improve the voltages at the Capote and Hickory Forest Substations to 96.1 percent (66.3 kV) and 96.8 percent (66.8 kV) respectively during the loss of the Seguin-Capote 69 kV line.

This alternative will reduce the load on the 69 kV transmission line between the McQueeney and New Berlin Substations to 39.4 MVA, or 83.9 percent of the full rating of this line section during the loss of the Nixon-GVEC Nixon 69 kV line.

This alternative will improve the voltage at the Wilson Substation to 96.9 percent (66.9 kV) during the loss of the New Berlin-Wilson Tap 69 kV line.

This alternative does not provide a new transmission source into the New Berlin Substation to safeguard against the loss of the New Berlin-McQueeney/Wilson Tap double circuit and the total loss transmission support at this substation.

The estimated capital cost of this alternative is $4,986,000. With this alternative, the New Berlin Substation will still be at risk of a total interruption of electric service in the event of the loss of the common structure double circuit that now supplies this substation. Because the affects of this contingency are not mitigated, this alternative was rejected.

Alternative 5: Construct a new 69 kV transmission line (approximately 15 miles in length) between the Hickory Forest and New Berlin Substations. Relocate the 69 kV capacitor bank from New Berlin to Lavernia.

This alternative will improve the voltages at the GVEC Nixon, Lavernia, Wilson, and New Berlin Substations to 99.6 percent (68.7 kV), 98.8 percent (68.2 kV), 97.1 percent (67.0 kV), and 97.2 percent (67.1 kV) respectively during the loss of the McQueeney-New Berlin 69 kV line. During this same contingency, this alternative will reduce the load on the 69 kV transmission line between the AEP Nixon tie and the GVEC Nixon Substation to 30.3 MVA, or 64.5 percent of the full rating of this line section.

This alternative will improve the voltages at the Capote and Hickory Forest Substations to 96.9 percent (66.9 kV) and 97.8 percent (67.5 kV) respectively during the loss of the Seguin-Capote 69 kV line.

This alternative will reduce the load on the 69 kV transmission line between the McQueeney and New Berlin Substations to 41.9 MVA, or 89.1 percent of the full rating of this line section during the loss of the Nixon-GVEC Nixon 69 kV line.

This alternative will improve voltage levels at the Wilson Substation. By moving the capacitor bank from the New Berlin Substation to the Lavernia Substation the voltage at the Wilson Substation will improve to 99.6 percent (68.7 kV) during the loss of the New Berlin-Wilson Tap 69 kV line.

This alternative will provide a new transmission source into the New Berlin Substation from the east to safeguard against the loss of the New Berlin-McQueeney/Wilson Tap double circuit and the total loss transmission support at this substation.

The estimated capital cost of this alternative, which includes the substation and transmission line costs, is $3,920,800. In addition, the cost to relocate the capacitor bank from New Berlin to Lavernia is estimated at $420,000. This alternative provides the greatest benefit to the transmission system in terms of addressing all of the violations of the LCRA and AWC Transmission Planning Criteria. With this alternative, a new transmission source will be developed into the New Berlin Substation. This new transmission line will provide a third source to this substation, thereby lessening the substation's dependence upon the common structure double circuit that now supplies this substation. Because this option provides the greatest enhancement to transmission system performance, and its cost is comparable to the other viable transmission options that were considered, it is the recommended alternative.

COMMUNITY VALUES

16. List any permits or approvals required by other governmental agencies for the construction of the proposed project. Indicate whether or not permits have been obtained.

A. TxDOT Permit No. 1023 (Notice of proposed installation for utility construction on controlled access highways)
B. Clearance from the State Historic Preservation Officer (SHPO) will be required prior to construction

These permits / approvals will be obtained following PUCT approval of a transmission line route, and prior to initiating construction.

17. Provide a general description of the area traversed by the proposed project.

The proposed route originates at a point along the recently certificated Capote to Hickory Forest 138 kV transmission line (approved on February 12, 2001, PUCT Docket No. 23360) on Farm-to-Market Road 1117, approximately 7 miles southeast of Seguin, in Guadalupe County Texas. The area traversed by the proposed 11.98 mile long route is primarily rural and agricultural, but is experiencing increased residential development due to its proximity to San Antonio to the west and Seguin to the north. State Highway (SH) 123 splits the proposed route into two roughly equal halves; east and west. Generally, the eastern half is slightly lower in elevation, more wooded, and has a greater number of scattered, rural subdivisions. In this area the proposed route primarily follows property lines and fencelines. West of SH 123, the land along the route is slightly higher, more open, and has less development. Here, the proposed route parallels county roads, property lines, and an existing 345-kV transmission line, before terminating at the existing New Berlin Substation. The New Berlin Substation is located in pastureland along Sweet Home Road, approximately 3 ¾ miles northeast of the City of New Berlin.

18. List all residences, businesses, schools, churches, cemeteries, hospitals, nursing homes or other habitable structures within 200 feet of the center line of the proposed transmission line.

Five (5) habitable structures are located within 200 ft of the centerline of the proposed route. A description of these structures, as well as their distance from the centerline, can be found in Table 6-4 in Section 6.0 of the *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* labeled as "Attachment 1." The locations of each structure are shown on Figure 6-1 (map pocket) in the *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* labeled as "Attachment 1."

19. **List all commercial AM radio transmitters located within 10,000 feet of the center line of the proposed project; and all FM radio transmitters, microwave relay stations or other similar electronic installations located within 2,000 feet of the center line of the proposed project.**

No commercial AM radio transmitters are located within 10,000 ft of the proposed route centerline. No FM radio, microwave, or other similar electronic installations are located within 2,000 ft of the proposed route center line.

20. **List all airstrips registered with the Federal Aviation Administration located within 10,000 feet of the center line of the project. Will the construction of this project require notice to the Federal Aviation Administration? _____ Yes. ___X___ No.**

No FAA-registered airstrips are located within 10,000 ft of the center line of the Project.

21. **Identify any pasture or cropland irrigated by traveling irrigation systems (rolling or pivot type) that will be traversed by the proposed project.**

The proposed route crosses no pasture or cropland irrigated by traveling irrigation systems (either rolling or pivot type).

22. **List the newspapers that will publish the notice for this application. Attach a copy of the notice that is to be published.**

The *Seguin Gazette-Enterprise* will publish notification of this application. Please see the prepared copy labeled as "Attachment 2". Notices to affected landowners and public officials are provided in "Attachment 3" and "Attachment 4" respectively. Notices to affected landowners, utilities and county governments will be mailed contemporaneous with the filing of this application.

PARKS AND RECREATION AREAS

23. **List all parks and recreational areas owned by a governmental body or an organized group, club or church located within 1,000 feet of the center line of the project.**

Based on a review of U.S. Geological Survey topographic maps, TxDOT county highway maps, the Texas Parks and Wildlife Department's "Texas Outdoor Recreation Inventory", recent aerial photography, and a limited field reconnaissance, PBS&J found no parks or recreation areas located within 1,000 ft of the project center line.

HISTORICAL AND ARCHEOLOGICAL VALUES

24. List all historical and archeological sites known to be within 1,000 feet of the center line of the proposed project.

There are no recorded historical or archaeological sites located within 1,000 ft of the proposed route center line. This information was obtained as a result of a literature review and records search at the Texas Historical Commission and the Texas Archaeological Research Laboratory at the University of Texas at Austin. This search also revealed no State Archaeological Landmarks located within 1,000 ft of the proposed route centerline.

ENVIRONMENTAL INTEGRITY

25. Is the proposed project located, either in whole or in part, within the coastal management program boundary as defined in 31 T.A.C. §503.1?

No.

If yes:

(a) Is any part of the proposed facilities seaward of the Coastal Facilities Designation Line as defined in 31 T.A.C. §19.2(a)(21)?

(b) Identify the type(s) of Coastal Natural Resource Area(s) using the designations in 31 T.A.C. §501.3(b) impacted by any part of the proposed facilities.

26. Provide copies of any environmental impact studies or assessments of the project.

Seven (7) copies of the environmental assessment report prepared by PBS&J titled *"Environmental Assessment and Alternative Route Study for the Proposed Hickory Forest to New Berlin 138 kV Transmission Line Project, Guadalupe County, Texas"* are provided as "Attachment 1" to this application.

OATH

STATE OF TEXAS

COUNTY OF GONZALES

I, Steve Slaughter, being duly sworn, file this application as Engineering Division Manager of Applicant; that, in such capacity, I am qualified and authorized to file and verify such application, am personally familiar with the maps and exhibits filed with this application, and have complied with all the requirements contained in the application; and that all statements made and matters set forth herein and all attached thereto are true and correct. I further state that the application is made in good faith, that notice of its filing was given to all neighboring utilities, and that this application does not duplicate any filing presently before the Commission.

Guadalupe Valley Electric Cooperative, Inc.

AFFIANT: Steve Slaughter
Engineering Division Manager

SUBSCRIBED AND SWORN TO BEFORE ME, a Notary Public in and for the State of Texas, this, the 28th day of June, 2002.

Susan Wilkerson
Notary Public

My Commission Expires: 8-4-03

SUSAN WILKERSON NOTARY PUBLIC STATE OF TEXAS EXPIRES 08/04/2003

ENVIRONMENTAL ASSESSMENT AND ALTERNATIVE ROUTE STUDY FOR THE PROPOSED HICKORY FOREST TO NEW BERLIN 138-KV TRANSMISSION LINE PROJECT GUADALUPE COUNTY, TEXAS

PBS&J

An employee-owned company

Document No. 010314
PBS&J Job No. 440700

ENVIRONMENTAL ASSESSMENT AND ALTERNATIVE ROUTE STUDY FOR THE PROPOSED HICKORY FOREST TO NEW BERLIN 138-KV TRANSMISSION LINE PROJECT GUADALUPE COUNTY, TEXAS

Prepared for:

Guadalupe Valley Electric Cooperative
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206 Wild Basin Road
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Austin, Texas 78746-3343

June 2002

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1.0 PROJECT DESCRIPTION

1.0 DESCRIPTION OF THE PROPOSED PROJECT

1.1 SCOPE OF THE PROJECT

To meet system load-flow needs, the Guadalupe Valley Electric Cooperative, Inc. (GVEC), with assistance from the Lower Colorado River Authority (LCRA), will construct additions and modifications to its transmission system. A new 138-kilovolt (kV) circuit will be constructed on new single-pole structures from GVEC's existing Hickory Forest Substation, located in Guadalupe County, to the existing New Berlin Substation, also located in Guadalupe County. All facilities will be located in Guadalupe County. Figure 1-1 shows the electrical system in the general area of the proposed project.

The new transmission line facilities will be designed as follows:

- 138-kV design and 69-kV initial operating voltage
- 3x1-795 MCM 26/7 aluminum conductor, steel-reinforced (ACSR) "Drake" conductors
- 920 ampere capacity, 220 megavolt-amperes (MVA)
- One (1) 3/8" 7-strand high-strength steel shield wire installed initially
- Concrete and/or steel structures will be designed to accommodate future fiber optic shield wire installation

1.2 PURPOSE AND NEED

The proposed 138-kV transmission line (initially operated at 69 kV and approximately 15 miles in length) between the Hickory Forest Substation and the New Berlin Substation is needed to improve customer delivery point voltages, relieve anticipated line overloads, and enhance transmission system reliability.

Specifically, this project will satisfy the LCRA and Association of Wholesale Customers (AWC) Transmission Planning Criteria, which have the following requirements: (1) maintain 92 percent (%) of nominal voltage for anticipated contingencies; (2) ensure that planned transmission line loading will be such that National Electric Safety Code (NESC) line-to-ground clearances will be maintained for anticipated contingencies; and (3) ensure that no more than 20 megawatts (MW) of peak load shall be interrupted for anticipated contingencies. The proposed transmission line, which will be located in Guadalupe County, is recommended to be in service by summer 2003.

It is the policy of LCRA to furnish electric service to its wholesale customers at the substation distribution bus and to provide, through ownership or lease, those facilities required to insure a reliable and dependable supply of electric service to each customer delivery point. Pursuant to LCRA Board Policy, LCRA has the responsibility of planning the transmission facilities to meet the needs of the LCRA wholesale electric customers in accordance with LCRA and AWC Transmission Planning

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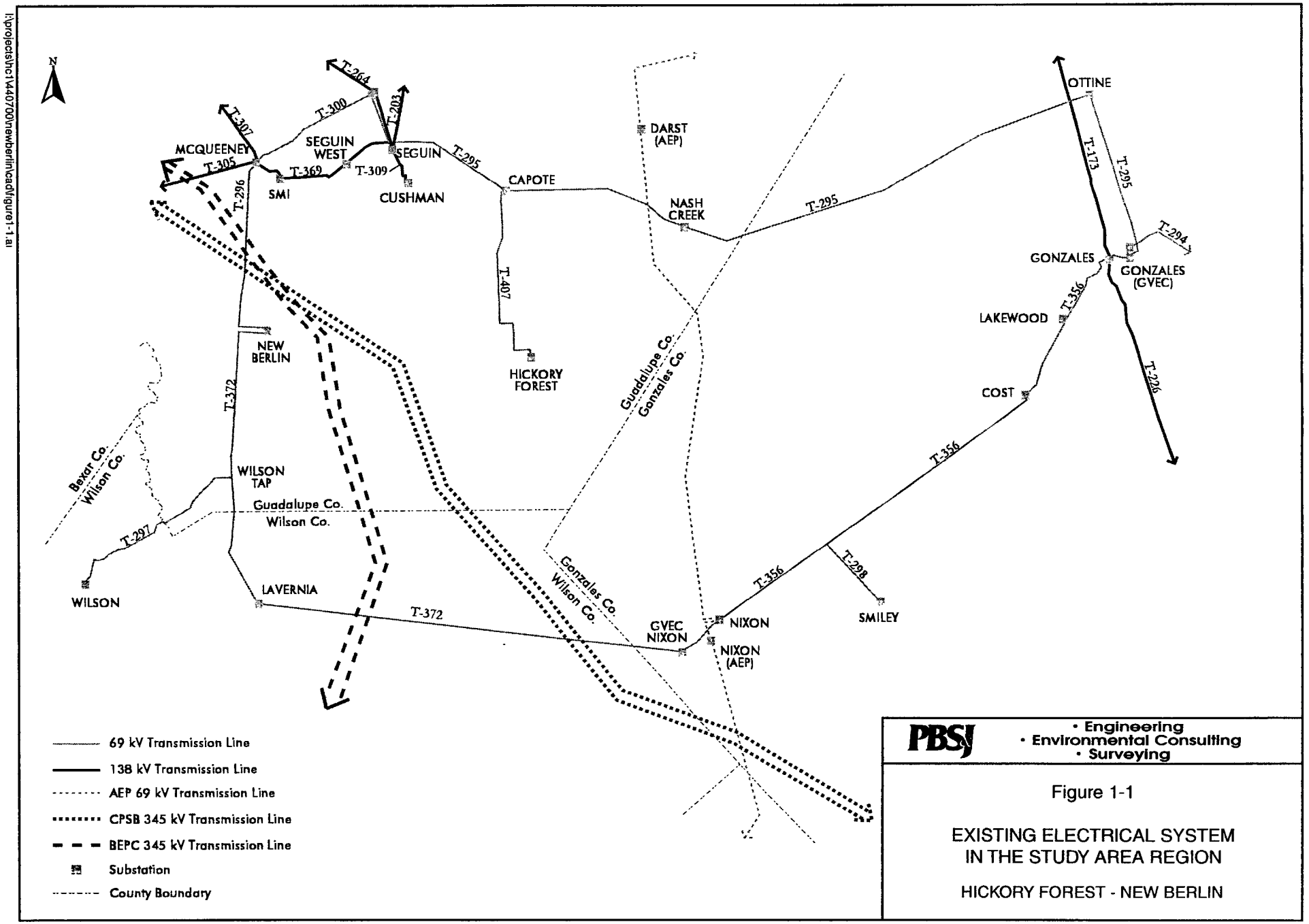

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Criteria. As part of this planning process, LCRA receives requests from the customers for new points of delivery or upgrades of facilities serving existing points of delivery and determines the optimum solution for meeting the customer's requirements. Requests for transmission system improvements are reviewed by the Transmission Planning Task Force, which is an advisory committee to the LCRA, prior to the development of the annual LCRA Transmission System Improvements Plan. The purpose of this task force is to include the wholesale customers in the LCRA transmission planning process. Requirements for the quality and level of transmission service are determined using LCRA and AWC Transmission Planning Criteria and the review by the Transmission Planning Task Force.

Based on the LCRA and AWC Transmission Planning Criteria, the Transmission Planning Task Force recommended this transmission line addition in the fiscal year 2001-2010 transmission plan.

1.2.1 System Background

GVEC is a wholesale customer of LCRA, serving approximately 50,000 accounts throughout 13 counties, primarily in DeWitt, Gonzales, Guadalupe, Lavaca and Wilson counties, but also serving parts of Bexar, Caldwell, Goliad, Karnes, Victoria and Jackson. The GVEC service area extends approximately 120 miles from its western boundary of Cibolo Creek to just southeast of the Ezzell community in Lavaca County. The service area encompasses over 210 miles of 138-kV and 69-kV transmission lines. GVEC operates 7,224 miles of distribution lines and 222 miles of underground distribution lines to supply the end-use customers out of 30 distribution substations. The recent consolidation with DeWitt Electric Cooperative has added over 1,300 square miles to the GVEC service area, making it approximately 3,500 square miles. The total GVEC load reached 261 MW during summer 2000, of which 81 MW is classified as an industrial load.

The loads in the southern section of the GVEC service territory are supplied by a 69-kV transmission network which is comprised of predominantly 4/0 ACSR conductor rated for 47 MVA. One section of the 69-kV transmission network, which follows a southerly route between McQueeney and Gonzales, supplies seven substations (New Berlin, Wilson, Lavernia, GVEC Nixon, Smiley, Cost, and Lakewood). A 69-kV tie to the American Electric Power (AEP) transmission system in the Nixon area also helps support the GVEC load requirements at the substations along this circuit.

The second section of the 69-kV transmission network, which follows a northerly route between Seguin and Gonzales, supplies four substations (Capote, Hickory Forest, Nash Creek, and Ottine). Hickory Forest is a new substation that is presently being developed at a site approximately 8 miles south of the Capote Substation to serve growing loads in the area southeast of Seguin.

Collectively, the eleven substations in the southern section of the GVEC service territory represent approximately 60 MW of peak load, or over 30% of the total GVEC non-industrial system load

based on summer 2000 loading conditions. The actual kilowatt (kW) loads for these eleven substations during the system peak for summer 2000 and their forecasted summer loads for the period 2001-2005 are provided in Table 1-1.

The large increases in load in 2001 and 2002 are due to the development of new water wells and pumping stations in the area by the Schertz/Seguin Local Government Corporation. New sites under development in the area will be served from GVEC's Nixon and New Berlin substations. Figure 1-1 (page 1-3) illustrates the configuration of the transmission system and the location of the substations in this area.

Five contingencies are critical to the performance of the transmission system in this area in terms of delivery point voltages, transmission line loading levels, and system reliability. These outages are: (1) the loss of the McQueeney-New Berlin 69-kV line; (2) the loss of the Seguin-Capote 69-kV line; (3) the loss of Nixon-GVEC Nixon 69-kV line; (4) the loss of the New Berlin-Wilson Tap 69-kV line, and (5) the loss of the New Berlin-McQueeney/Wilson Tap 69-kV double circuit. Each of these independent contingencies causes violations of the LCRA and AWC Transmission Planning Criteria.

McQueeney-New Berlin Line Outage

During the loss of the 8.2-mile McQueeney-New Berlin 69-kV line, the loads at GVEC's Nixon, Lavernia, Wilson, and New Berlin substations are supplied radially from the AEP Nixon tie and its upstream connection back to Gonzales. By 2003, the combined load at these four substations is expected to reach 48.6 MW. During this outage, the line distance between the AEP Nixon tie and the New Berlin Substation is 32.5 miles.

During this contingency, the voltages at the four substations along this radial line are expected to decay to less than acceptable levels. The voltages at GVEC's Nixon, Lavernia, Wilson, and New Berlin substations are expected to deteriorate to 90.5% (62.4 kV), 79.5% (54.9 kV), 76.5% (52.8 kV), and 75.8% (52.3 kV), respectively, during this outage. These levels are below the 92% of nominal voltage for anticipated contingencies, which is considered acceptable.

During this contingency, loading on the transmission line immediately out of the AEP Nixon tie also becomes a system performance concern. The load on the 2.0-mile 69-kV transmission line between the AEP Nixon tie and GVEC's Nixon Substation is expected to reach 62.1 MVA, or 132.2% of the full rating of this line section. In addition, the load on the 17.6-mile 69-kV transmission line between GVEC's Nixon and Lavernia substations is expected to reach 50.9 MVA, or 108.4% of the full rating of this line section. These excessive loads will cause the circuit conductors to sag to levels which will

TABLE 1-1

ACTUAL AND FORECAST SYSTEM PEAK LOADS

Substation	2000	2001	2002	2003	2004	2005
GVEC Nixon	4022	6923	10133	10336	10542	10753
Lavernia	6143	6884	7296	7734	8198	8690
Wilson	7710	8118	8930	9734	10609	11246
New Berlin	14256	15031	19826	20817	21857	22951
Smiley	1633	1663	1696	1730	1764	1800
Cost	4675	5017	5168	5323	5482	4201
Lakewood	1596	2499	2549	2600	2652	2705
Capote	13673	14459	9691	10079	10483	10901
Hickory Forest	0	0	6950	7297	7663	7968
Nash Creek	2112	1789	1842	1898	1955	2013
Ottine	3745	4111	4235	4362	4493	4627
Total	59565	66496	78316	81911	85698	87856

Source: LCRA, 2001.

Note: All values in kilowatts (kW).

violate the acceptable line-to-ground clearance standards as governed by the NESC. This inadequate line-to-ground clearance will pose a threat to public safety and property, and if not corrected could, over time, permanently damage the mechanical integrity of nearly 20 miles of transmission conductor between the AEP Nixon tie and the Lavernia Substation.

As the loads in the area continue to grow over the years, the impact of the McQueeney-New Berlin contingency on system performance becomes even more severe. Within 2 years, low-voltage problems in the area will spread to include the Smiley Substation, as the voltage at this substation will fall to 90.2% (62.2 kV). Line overloads will also become more widespread as area loads increase. Within 2 years, the 5.7-mile 69-kV transmission line between the Lavernia Substation and Wilson Tap will also experience an overload condition, as the load on this line will reach 54.3 MVA, or 115.5% of the full rating of this line section.

Seguin-Capote Line Outage

During the loss of the 5.7-mile Seguin-Capote 69-kV line, the loads at the Ottine, Nash Creek, Capote, and Hickory Forest substations are supplied radially from the Gonzales Substation. By 2003, the combined load at these four substations is expected to reach 23.6 MW. During this outage, the line distance between the Gonzales and Hickory Forest substations is 45.3 miles.

During this contingency, the voltages at two of the four substations along this radial line are expected to decay to less than acceptable levels. The voltages at the Capote and Hickory Forest substations are expected to deteriorate to 89.9% (62.0 kV) and 89.5% (61.7 kV), respectively, during this outage. These levels are below the 92% of nominal voltage for anticipated contingencies, which is considered acceptable.

As the loads in the area continue to grow over the years, the impact of the Seguin-Capote contingency on system performance becomes even more severe. Within 2 years, low-voltage problems in the area will spread to include the Nash Creek Substation, as the voltage at this substation will fall to 91.3% (63.0 kV).

Nixon-GVEC Nixon Line Outage

During the loss of the 2.0-mile Nixon-GVEC Nixon 69-kV line, the loads at the New Berlin, Wilson, Lavernia, and GVEC Nixon substations are supplied radially from the McQueeney Substation. By 2003 the combined load at these four substations is expected to reach 48.6 MW. During this outage, the line distance between the McQueeney and GVEC Nixon substations is 38.7 miles.

During this contingency, loading on the transmission line immediately out of McQueeney becomes a system performance concern. The load on the 8.2-mile 69-kV transmission line

between the McQueeney and New Berlin substations is expected to reach 51.6 MVA, or 109.7% of the full rating of this line section. This excessive load will cause the circuit conductors to sag to levels which will violate the acceptable line-to-ground clearance standards as governed by the NESC. This inadequate line-to-ground clearance will pose a threat to public safety and property, and if not corrected could, over time, permanently damage the mechanical integrity of over 8 miles of transmission conductor between the McQueeney and New Berlin substations.

As the loads in the area continue to grow over the years, the impact of the Nixon-GVEC Nixon contingency on system performance becomes even more severe. Within 2 years, low-voltage problems in the area will surface to include the GVEC Nixon Substation, as the voltage at this substation will fall to 91.1% (62.9 kV).

New Berlin-Wilson Tap Line Outage

During the loss of the 7.2-mile New Berlin-Wilson Tap 69-kV line, the loads at GVEC's Nixon, Lavernia, and Wilson substations are supplied radially from the AEP Nixon tie and its upstream connection back to Gonzales. By 2003 the combined load at these three substations is expected to reach 27.8 MW. During this outage, the line distance between the AEP Nixon tie and the Wilson Substation is 32.8 miles.

During this contingency, the voltage at one of the four substations along this radial line is expected to decay to less than acceptable levels. The voltage at the Wilson Substation is expected to deteriorate to 90.8% (62.7 kV) during this outage. This level is below the 92% of nominal voltage for anticipated contingencies, which is considered acceptable.

As the loads in the area continue to grow over the years, the impact of the New Berlin-Wilson Tap contingency on system performance becomes even more severe. Within 2 years, low-voltage problems in the area will spread to include the Lavernia Substation, as the voltage at this substation will fall to 90.6% (62.5 kV).

New Berlin-McQueeney/Wilson Tap Double-Circuit Line Outage

The New Berlin Substation is supplied from McQueeney and Wilson Tap by 69-kV transmission circuits that are constructed on common line structures for a distance of approximately 1.3 miles, immediately west of the substation site. The length of this double-circuit exceeds the 0.5-mile length criteria that the Electric Reliability Council of Texas (ERCOT) has established as the minimum length for multiple-circuit outages. Considering the loss of this double-circuit as a single contingency results in the total interruption of electric service to New Berlin and all of the customers that are supplied from this substation. The maximum to-date peak load supplied by the New Berlin Substation is 17.4 MW. With the continuation of new development in the area including the Schertz/Seguin Local

Government Corporation loads, the load supplied by this substation is projected to reach a peak level of 22 MW in 2003. This load will exceed the 20-MW load limit that is regarded as the maximum amount of load at a radial substation which can be allowed to be interrupted during a contingency before that substation is considered for looping.

1.2.2 Summary

The proposed 69-kV transmission line between the Hickory Forest Substation and the New Berlin Substation is needed to satisfy the LCRA obligation to: (1) maintain 92% of nominal voltage for anticipated contingencies; (2) ensure that planned transmission line loading will be such that NESC line-to-ground clearances will be maintained for anticipated contingencies; and (3) ensure that no more than 20 MW of peak load shall be interrupted for anticipated contingencies.

By 2003, anticipated contingency conditions will cause voltages at six of the eleven substations in the southern section of the GVEC service territory to deteriorate to levels that violate the 92% of nominal voltage criteria.

In terms of line loading, approximately 28 miles of existing 69-kV transmission lines in the southern portion of the GVEC service territory will be subjected to severe overloading and the risk of permanent mechanical damage leading to failure.

It should be noted that the proposed transmission line between Hickory Forest and New Berlin will be initially operated at 69 kV; however, it will be constructed for ultimate operation at 138 kV. Constructing this new line to operate at the higher voltage level will accommodate ongoing efforts throughout the LCRA system to convert 69-kV transmission facilities to 138-kV operation. Long-term plans in the area anticipate that some of the 69-kV substations and transmission circuits in the area will be converted to 138-kV operation in the future to reduce loading levels on the existing autotransformers which now supply the local 69-kV system. Facility upgrades to 138 kV in this area will also coordinate well with the possible development of: (1) a new 138-kV transmission tie line to the south in Wilson County, and (2) a new 138-kV transmission tie line to loop the Cushman Substation in Seguin.

A number of improvements have been implemented over the last 8 years on the southerly 69-kV network between McQueeney and Seguin in an attempt to provide immediate relief for low-voltage concerns in this area of the GVEC system. For example, capacitor banks have been added to the 69-kV network at both New Berlin and Nixon. These capacitor banks have provided an immediate, but nevertheless very short-term, improvement to system performance in this area during contingency conditions. Beyond these capacitor bank additions, the 69-kV tie to the AEP transmission system in the Nixon area was also constructed within the last several years in a direct attempt to maximize the use of existing facilities in the area for needed voltage support.

Without the proposed transmission line between Hickory Forest and New Berlin in service, contingencies in this area will continue to threaten the integrity of the transmission system and its ability to provide a stable and acceptable voltage to growing loads in the GVEC system. Beyond this, if the transmission system is allowed to operate in its present condition, public safety and property will be at risk due to inadequate line-to-ground clearances due to excessive overloading. Over the long term, a continuation of excessive conductor loading could lead to irreversible damage to transmission circuits in the area, and lead to extended customer service interruptions due to equipment failure. Finally, continued development in the area will place more customers at risk of an extended power interruption due to an outage on the common structure, double-circuit transmission line that now supplies the New Berlin Substation.

1.2.3 Alternatives to the Project

Alternative 1: Develop the distribution system infrastructure sufficient to transfer load from the problem areas to neighboring substations at McQueeney and Geronimo.

A total load reduction of approximately 41 MW at the end of 10 years is necessary to cap the area loads at levels that do not result in overloading and voltage problems during contingency conditions. This level of distribution load reduction is equivalent to the total transfer of the New Berlin load (14.3 MW in 2000) to the McQueeney Substation, and the total transfer of the Capote load (13.7 MW in 2000) to the Geronimo Substation. Effectively, this alternative would abandon the existing delivery points at New Berlin and Capote and transfer these loads to neighboring substations that are supplied from the 138-kV transmission network located outside of the problem area. In each of these cases, the distribution system would have to support the transfer of large blocks of load over a distance of approximately 8 miles from their existing points of interconnection on the system at New Berlin and Capote, to their new sources at the McQueeney and Geronimo substations, respectively. Because of the remote location of the McQueeney and Geronimo substations relative to the existing service territories of the distribution systems now supplied out of New Berlin and Capote, this type of alternative is not considered feasible. The distribution system needed to supply these loads from remote substations would require the development of: 1) two 24.9-kV, 795 ACSR express feeders (total circuit length of 20 miles) between McQueeney and New Berlin, and 2) two 24.9-kV, 477 ACSR express feeders (total circuit length of 22 miles) between Geronimo and Capote. The estimated capital cost of this alternative is $9,362,000. The cost of this alternative is more than two times more expensive than the recommended alternative. Severe degradation of power quality due to increased losses over longer feeders, and the dramatic worsening of distribution system reliability due to increased line exposure would be a direct consequence of such a distribution alternative. In this instance, the distribution alternative does not eliminate the problem; rather it would shift the problem from one area to another while creating a new set of reliability, cost, and efficiency problems. Because of the inherent weaknesses of a distribution solution, this option was rejected.

Alternative 2: Deploy distributed generation at the New Berlin and Hickory Forest substations.

To alleviate overloading and voltage problems over the next 10 years between GVEC Nixon and New Berlin during contingency conditions, a generation resource totaling 30.9 MW would be required at a site in this area. To improve voltages between Capote and Hickory Forest over the next 10 years during contingency conditions, a generation resource totaling 10.1 MW would be required at a site in this area. To maximize the benefit of a distributed generation alternative, the New Berlin and Hickory Forest substations are the preferred sites for locating new generation resources since they are the last substations on the radial systems during the worst contingencies. The estimated capital cost for diesel generators at these two substation sites is $14,350,000, based upon a per-unit cost of $350 per kW. The cost of this alternative is over three times more expensive than the cost of the recommended alternative. The application of distributed generation in the form of diesel units at these substation sites is cost prohibitive, and was therefore rejected. From a renewable resource perspective, neither wind turbines nor photovoltaics are feasible. In terms of wind technology, a class 5 or class 6 wind regime is preferred from the standpoint of an initial economic evaluation. Because wind regimes in this area are only in the class 3 range, the deployment of wind turbines was rejected. In terms of photovoltaic technology, this type of application is best suited where load reduction requirements are in the 50-200 kW range. Because the required load reduction is much higher in this situation, the use of photovoltaic technology was also rejected.

Alternative 3: Construct a new 69-kV transmission line (approximately 17 miles in length) between the Hickory Forest and Lavernia substations. Continue to operate the existing 69-kV capacitor bank at New Berlin.

This alternative will improve the voltages at the GVEC Nixon, Lavernia, Wilson, and New Berlin substations to 98.6% (68.0 kV), 96.6% (66.7 kV), 94.8% (65.4 kV), and 94.9% (65.5 kV), respectively, during the loss of the McQueeney-New Berlin 69-kV line. During this same contingency, this alternative will reduce the load on the 69-kV transmission line between the AEP Nixon tie and GVEC's Nixon Substation to 32.4 MVA, or 69.0% of the full rating of this line section.

This alternative will improve the voltages at the Capote and Hickory Forest substations to 95.7% (66.1 kV) and 96.4% (66.5 kV), respectively, during the loss of the Seguin-Capote 69-kV line.

This alternative will reduce the load on the 69-kV transmission line between the McQueeney and New Berlin substations to 38.9 MVA, or 82.7% of the full rating of this line section during the loss of the Nixon-GVEC Nixon 69-kV line.

This alternative will improve the voltage at the Wilson Substation to 96.0% (66.2 kV) during the loss of the New Berlin-Wilson Tap 69-kV line.

This alternative does not provide a new transmission source into the New Berlin Substation to safeguard against the loss of the New Berlin-McQueeney/Wilson Tap double-circuit and the total-loss transmission support at this substation.

The estimated capital cost of this alternative is $4,352,000. With this alternative, the New Berlin Substation will still be at risk of a total interruption of electric service in the event of the loss of the common structure, double-circuit line that now supplies this substation. Because the effects of this contingency are not mitigated, this alternative was rejected.

Alternative 4: Construct a new 69-kV transmission line (approximately 16 miles in length) between the Hickory Forest Substation and Wilson Tap. Continue to operate the existing 69-kV capacitor bank at New Berlin.

This alternative will improve the voltages at GVEC's Nixon, Lavernia, Wilson, and New Berlin substations to 98.8% (68.2 kV), 97.2% (67.1 kV), 96.7% (66.7 kV), and 97.0% (66.9 kV), respectively, during the loss of the McQueeney-New Berlin 69-kV line. During this same contingency, this alternative will reduce the load on the 69-kV transmission line between the AEP Nixon tie and GVEC's Nixon Substation to 30.5 MVA, or 64.9% of the full rating of this line section.

This alternative will improve the voltages at the Capote and Hickory Forest substations to 96.1% (66.3 kV) and 96.8% (66.8 kV), respectively, during the loss of the Seguin-Capote 69-kV line.

This alternative will reduce the load on the 69-kV transmission line between the McQueeney and New Berlin substations to 39.4 MVA, or 83.9% of the full rating of this line section during the loss of the Nixon-GVEC Nixon 69-kV line.

This alternative will improve the voltage at the Wilson Substation to 96.9% (66.9 kV) during the loss of the New Berlin-Wilson Tap 69-kV line.

This alternative does not provide a new transmission source into the New Berlin Substation to safeguard against the loss of the New Berlin-McQueeney/Wilson Tap double-circuit and the total-loss transmission support at this substation.

The estimated capital cost of this alternative is $4,986,000. With this alternative, the New Berlin Substation will still be at risk of a total interruption of electric service in the event of the loss of the common structure, double-circuit line that now supplies this substation. Because the effects of this contingency are not mitigated, this alternative was rejected.

Alternative 5: Construct a new 69-kV transmission line (approximately 15 miles in length) between the Hickory Forest and New Berlin substations. Relocate the 69-kV capacitor bank from New Berlin to Lavernia.

This alternative will improve the voltages at GVEC's Nixon, Lavernia, Wilson, and New Berlin substations to 99.6% (68.7 kV), 98.8% (68.2 kV), 97.1% (67.0 kV), and 97.2% (67.1 kV), respectively, during the loss of the McQueeney-New Berlin 69-kV line. During this same contingency, this alternative will reduce the load on the 69-kV transmission line between the AEP Nixon tie and GVEC's Nixon Substation to 30.3 MVA, or 64.5% of the full rating of this line section.

This alternative will improve the voltages at the Capote and Hickory Forest substations to 96.9% (66.9 kV) and 97.8% (67.5 kV), respectively, during the loss of the Seguin-Capote 69-kV line.

This alternative will reduce the load on the 69-kV transmission line between the McQueeney and New Berlin substations to 41.9 MVA, or 89.1% of the full rating of this line section during the loss of the Nixon-GVEC Nixon 69-kV line.

This alternative will improve voltage levels at the Wilson Substation. By moving the capacitor bank from the New Berlin Substation to the Lavernia Substation the voltage at the Wilson Substation will improve to 99.6% (68.7 kV) during the loss of the New Berlin-Wilson Tap 69-kV line.

This alternative will provide a new transmission source into the New Berlin Substation from the east to safeguard against the loss of the New Berlin-McQueeney/Wilson Tap double-circuit and the total-loss transmission support at this substation.

The estimated capital cost of this alternative is $3,920,800. In addition, the cost to relocate the capacitor bank from New Berlin to Lavernia is estimated at $420,000. This alternative provides the greatest benefit to the transmission system in terms of addressing all of the violations of the LCRA and AWC Transmission Planning Criteria. With this alternative, a new transmission source will be developed into the New Berlin Substation. This new transmission line will provide a third source to this substation, thereby lessening the substation's dependence upon the common structure, double-circuit line that now supplies this substation. Because this option provides the greatest enhancement to transmission system performance, and its cost is comparable to the other viable transmission options that were considered, it is the recommended alternative.

1.3 AGENCY ACTIONS

This environmental assessment has been prepared by PBS&J in support of GVEC's application for a Certificate of Convenience and Necessity (CCN) from the Public Utility Commission of Texas (PUCT). This document is intended to provide information on certain environmental and land use factors contained in Section 37.056(c)(4) of the Texas Utilities Code, as well as address relevant

questions in the PUCT's CCN application. This report may also be used in support of any other local, state, or federal permitting requirements, if necessary.

If the proposed transmission line is located within or across any state-maintained road or highway, GVEC will obtain a road crossing permit from the Texas Department of Transportation (TxDOT).

Since more than five (5) acres will be cleared or disturbed, a Storm Water Pollution Prevention Plan (SWPPP) will be prepared and a Notice of Intent (NOI) will be submitted by GVEC to the Environmental Protection Agency (EPA). The SWPPP will be monitored in the field.

Public Utility Commission of Texas: GVEC will report the transmission line project to the PUCT on GVEC's Monthly Construction Status Report at least 30 days prior to construction.

Following the identification of all environmental, right-of-way (ROW), and engineering concerns, appropriate measures will be taken to accommodate those concerns. Construction documents, specifications, or other instructions will indicate any special provisions. Following completion of the design, a pre-construction conference will be held to review these provisions. A similar post-construction conference will also be held, following a physical inspection of the project, to assure all appropriate measures have been taken.

1.4 DESCRIPTION OF PROPOSED DESIGN

1.4.1 Loading, Weather Data, and Design Criteria

All newly installed facilities will be designed using:

- 2002 National Electrical Safety Code (NESC): Heavy District Loading
- 2002 NESC: Light District Loading
- Extreme wind: one hundred (100) miles per hour
- Minimum temperature: minus 10 degrees Fahrenheit (°F)
- Average conductor temperature of 93.33 degrees Celsius (°C) (200°F)
- Coefficients of emissivity and absorptivity of 0.5; ambient air temperature of 40.55°C (105°F); an elevation of 600 ft above sea level; north-south line orientation, 30 degrees latitude, 2:00 pm solar conditions; clear atmosphere; and a wind velocity of 2 ft per second normal to the conductor.

This transmission line is located in the American National Standards Institute (ANSI) NESC light-loading zone. However, experience and successful historical performance has been obtained in this and other areas of central Texas with facilities that have been designed using NESC heavy loading

conditions. This includes designing the structures to withstand extreme wind pressures generated by 100-mph winds at 60°F with no ice.

All structural components, conductors, and overhead ground wires will be designed using the appropriate overload capacity factors, strength reduction factors, and tension limits given in ANSI C2-2002 and the manufacturer's recommended strength ratings for hardware, etc., when applicable. Where ANSI C2-2002 is silent, engineering judgment will be used with guidance from Rural Electrification Administration (REA) Bulletin 1724E-200. The NESC heavy and light loading district design factors will be utilized to determine tension limits and sags for all wires.

1.4.2 Easements

New, single-circuit transmission facilities will be constructed on new 80-ft and 100-ft wide easements and existing substation property. Adding a second circuit of existing facilities will be accomplished on a nominal 80-ft wide ROW (50 ft along roadways).

1.4.3 Telecommunications

There will be no fiber optic shield wire installed during the initial construction. Structures will be designed to accommodate fiber optic shield wire for future communication requirements.

1.4.4 Substations

A new transmission line termination bay will be placed at the New Berlin Substation. An A-Frame for the new circuit was built during construction of the Hickory Forest Substation.

1.4.5 Structures

All structures will be designed to support conductors and shield wires as specified above. The configuration of the conductor and shield wires will provide adequate clearance for operation at 138 kV considering icing and extreme wind conditions. Single-pole delta configuration structures will be used predominantly for single-circuit tangent and angle structures. Single-pole vertical configuration structures will be used for double-circuit applications. The geometry of typical single-pole tangent structures is shown in figures 1-2 and 1-3. It is likely that portions of the new transmission circuit will be overbuilt on existing distribution circuits along the proposed route. Two of the proposed routes cross the intersection of two existing 345-kV transmission lines owned by other utilities. In order to facilitate the crossing, if one of these alternatives is selected, it is GVEC's intent to convey the phases for the proposed transmission line beneath the existing 345-kV line(s) via a rigid bus, in a fenced facility.

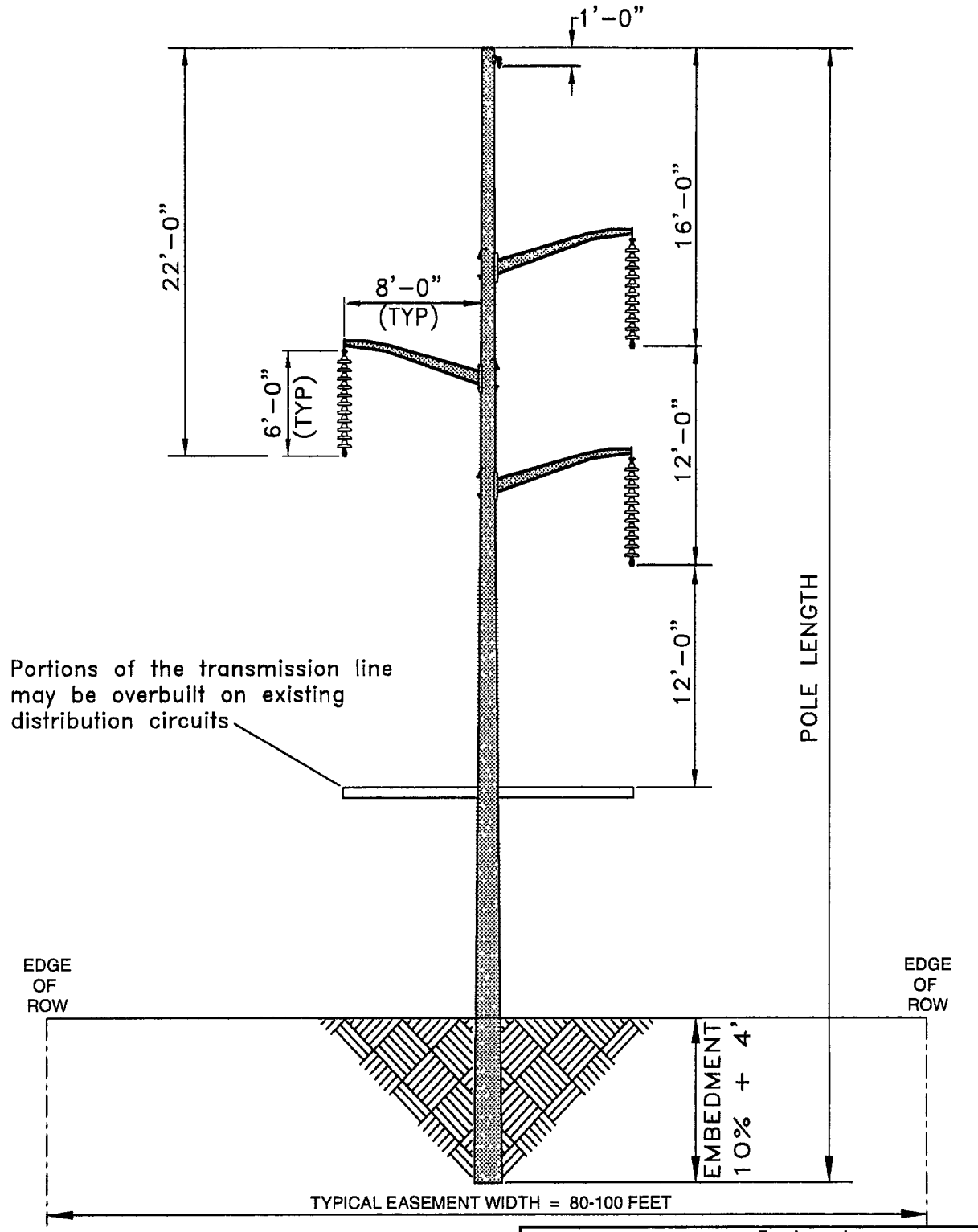

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Figure 1-2

TYPICAL SINGLE-CIRCUIT
138-KV SINGLE-POLE
TANGENT STRUCTURE

HICKORY FOREST - NEW BERLIN

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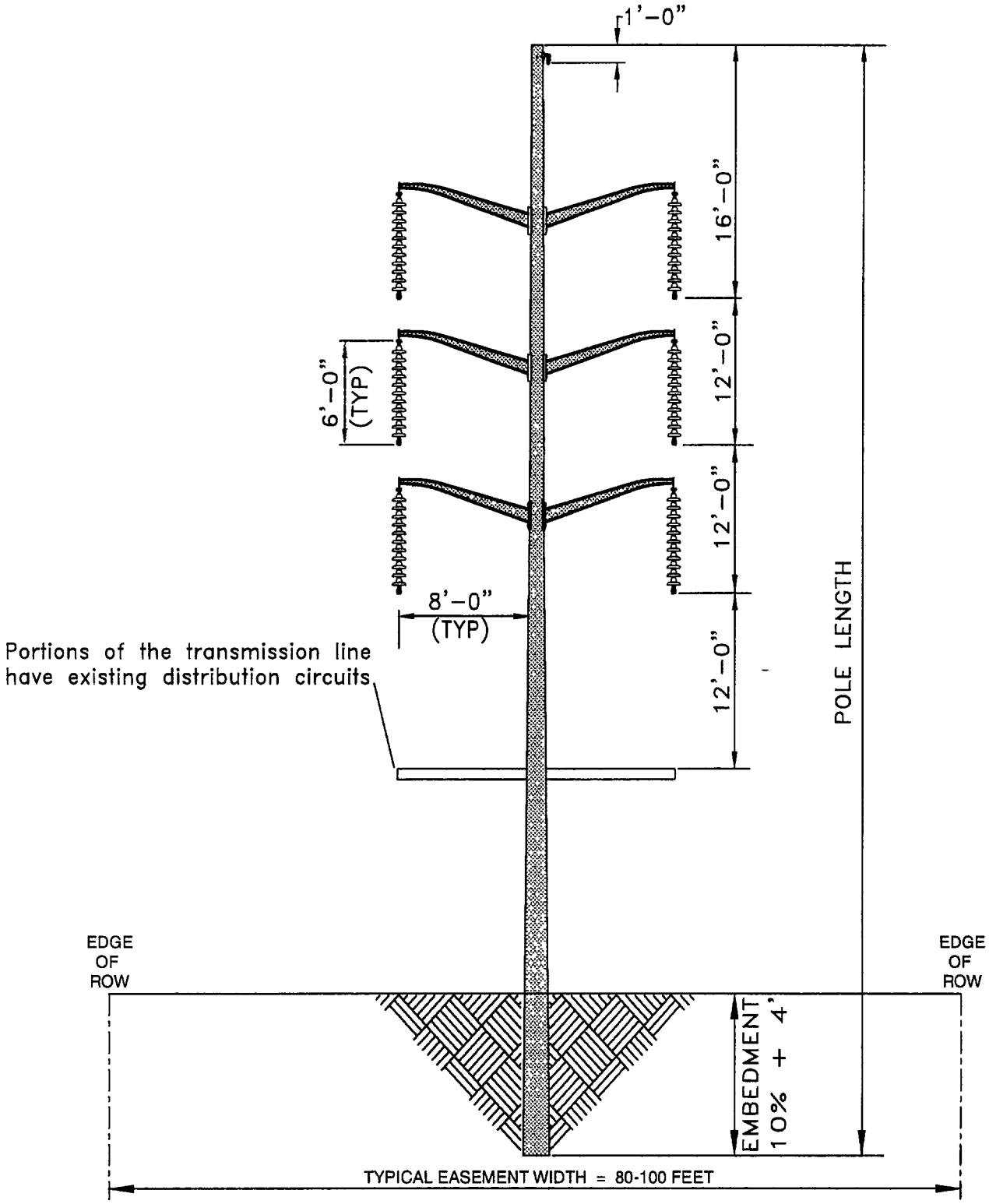

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Figure 1-3

TYPICAL DOUBLE-CIRCUIT
138-KV SINGLE-POLE
TANGENT STRUCTURE
HICKORY FOREST - NEW BERLIN

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1.4.6 Geotechnical Considerations

Soil borings and in situ soils testing will be required to provide the parameters for foundation design and/or the embedment depth required for new structures. It is anticipated that all structures will be direct embedded or set on foundations with custom designed, circular-shaped, cast-in-place, reinforced concrete footings. The diameter of each footing varies according to the structure loading and soil conditions at the individual site.

1.4.7 Insulation, Lightning Performance, and Grounding

Porcelain and/or polymer insulator assemblies will be used. Porcelain insulators will be used for the deadend assemblies and porcelain or polymer insulators will be used for the angle and tangent suspension assemblies. The only atmospheric corrosion and/or contamination issue known at this time is dust (in times of drought). The insulator assemblies may be power washed, should it become necessary, to remove contamination due to dust.

To reduce the likelihood of circuit outages due to lightning strikes contacting the phase conductors, overhead ground wire (OHGW) will be used, as specified in Section 1.1 above. Grounding will be accomplished with external ground rods or counterpoise. Structures located within switchyards and substations will be connected to the substation ground grid.

1.4.8 Clearance

Clearances will be checked using a maximum conductor operating temperature of 200°F. The conductor operating temperature is predicated on a 105°F ambient temperature, 2-ft-per-second wind perpendicular to the line, 2:00 p.m. solar conditions, 30° latitude, and 600 ft above mean sea level (msl) elevation. Design clearances will be based on ANSI C2-2002 (NESC) with a nominal line-to-ground clearance of 30 ft. This allows for greater distribution flexibility as well as reducing electric and magnetic fields. Using a 30-ft clearance and allowing for a 2-ft tolerance (1 ft for ground elevation accuracy and 1 ft for construction tolerance) will result in a 28-ft nominal ground clearance, which will be maintained for the 138-kV phases at 200°F. In areas where this clearance is difficult to achieve, a ground clearance of 25-ft minimum (23-ft nominal) will be maintained. Refer to Table 1-2 for minimum clearances recommended by the NESC and those used for design. Clearances apply at all operating temperatures and/or ice conditions.

When crossing other electric transmission/distribution lines, clearance will be checked for a) upper conductor at 32°F w/ice versus lower conductor at 32°F w/no ice; and b) upper conductor at maximum operating temperature vs. lower conductor at 105°F.

TABLE 1-2

MINIMUM VERTICAL LINE CLEARANCES – 138 kV
BASED ON 2002 EDITION OF THE NATIONAL ELECTRIC SAFETY CODE
AT ALTITUDES BELOW 3,300 FEET MEAN SEA LEVEL

Obstruction	NESC Minimum	Project Minimum	Project Design
Railroads	28.6	30	35
Highways, Streets, Roads	20.6	23	23
Residential Driveways	20.6	23	23
Cultivated Fields	20.6	23	23
Areas Accessible to Pedestrians	16.6	23	23
Buildings			
Roofs w/o access by pedestrians	14.6	20	25
Roofs w/ access by pedestrians	15.6	22	25
Roofs w/ access by vehicles	20.6	23	28
Signs, billboards	10.1	15	20
Water Areas w/o sailboats	19.1	23	25
Water Areas w/ sailboats			
Less than 20 acres	22.6	24	25
20 to 200 acres	30.6	32	33
Over 200 to 2000 acres	36.6	38	39
Over 2000 acres	42.6	44	45
Telephone Lines	8.1	10	12
Distribution Lines	4.1	7	10
Transmission Lines			
69 kV	4.7	8	10
138 kV	6.2	10	12
345 kV	10.3	15	17
Shield wire, guy wire, neutrals	6.1	8	10

- All values in feet (ft).
- Clearances apply at all operating temperatures and/or ice conditions.
- Maximum operating temperature is based on 105°F ambient temperature, 2:00 pm, clear atmosphere, 2 fps wind $\perp$ line, and expected maximum loadflow.
- Maximum operating voltage is 5% over nominal 138 kV = 145 kV.
- When crossing other electric transmission/distribution lines, check:
  Upper conductor @ 32°F w/ice vs. lower conductor @ 32°F w/no ice
  Upper conductor @ max. oper. temp. vs. lower conductor at 105°F

1.4.9 Design Considerations

To minimize any adverse effects to natural and human resources, where practical, the following factors may be used in the design and placement of structures:

1. Structures may be strategically located to make maximum use of topography and vegetation for screening.

2. Coloring of transmission line structures to blend with the landscape may be desirable where they must be located in or near areas of high scenic value.

3. At road crossings of two or more circuits, at severe angles, and where only a portion of the line is visible from the highway, the use of multiple-circuit structures may be effective in minimizing the visual impact of the lines at that point. However, multiple structures may be better in cases where height is a visual problem.

4. Where ROWs cross major highways or in scenic areas, the transmission line structures may be strategically located for minimum visibility.

5. Where lines are adjacent to highways, guyed structures may be avoided whenever possible. Guyed structures may be used on small angle structures where possible.

6. Deadend structures will generally be free-standing and un-guyed.

7. In situations where the minimum visibility sought in items 2, 3, and 4 conflicts with air safety regulations, the safety regulations shall govern. These regulations are outlined in Part 77, Federal Aviation Administration (FAA) Regulations "Objects Affecting Navigable Air Space" (FAA, 1975).

1.5 ELECTRICAL CONSIDERATIONS

Electric and magnetic field calculations are based on predicted electrical loads of 43 and 31 amps per phase at 69 kV (transmission) and loads of 330 amps per phase at 24.9 kV (distribution underbuild). Using a minimum ground clearance of 23 ft and a typical clearance of 28 ft, calculations were made in the manner prescribed by the NESC concerning magnetic field strengths, electric field strengths, and electrostatic effects on objects based on the typical structure configuration. These calculations determined a range for the induced short-circuited current on a large tractor-trailer and a range for the allowable length of a fence paralleling the transmission line. The results of these calculations are shown in tables 1-3 and 1-4, which correspond to the typical structures shown in figures 1-2 and 1-3.