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STANDARD APPLICATION FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY FOR A PROPOSED TRANSMISSION LINE

AND

APPLICATION FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY FOR A PROPOSED TRANSMISSION LINE PURSUANT TO 16 TEX. ADMIN. CODE § 25.174

DOCKET NO. 55365

Submit seven (7) copies of the application and all attachments supporting the application. If the application is being filed pursuant to 16 Tex. Admin. Code § 25.101(b)(3)(D) (TAC) or 16 TAC § 25.174, include in the application all direct testimony. The application and other necessary documents shall be submitted to:

Public Utility Commission of Texas
Attn.: Filing Clerk
1701 North Congress Avenue
Austin, Texas 78711-3326

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DOCKET NO. 55365
APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR A CERTIFICATE OF CONVENIENCE AND NECESSITY FOR A PROPOSED 138 kV TRANSMISSION LINE WITHIN CHAMBERS COUNTY

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Attachments:

1. Environmental Assessment and Alternative Route Analysis for the 138 kV Kilgore Substation Project in Chambers County, Texas
2. Franchise Agreement Between CenterPoint Energy Houston Electric, LLC and the City of Mont Belvieu, Franchise Agreement Between CenterPoint Energy Houston Electric, LLC and the City of Baytown
3. Cost Estimates for Proposed Alternative Routes
4. "New 138 kV Kilgore Substation" Study
5. Schematic of CenterPoint Energy's Existing Transmission System
6. Directly Affected Landowner List Including Habitable Structures and Landowner Map
7. Written Direct Notice to Landowners
8. Written Direct Notice to Electric Utilities Located Within Five Miles
9. Written Direct Notice to Pipeline Owners Paralleled or Crossed
10. Written Direct Notice to County and Municipal Authorities and List of Officials Notified
11. Written Direct Notice to the Office of Public Utility Counsel
12. Written Direct Notice to the Department of Defense Military Aviation and Installation Assurance siting Clearinghouse
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14. Transmittal Letter to Texas Parks and Wildlife Department
15. Affidavit of Bradley J. Diehl

Note: As used herein, the term "joint application" refers to an application for proposed transmission facilities for which ownership will be divided. All applications for such facilities should be filed jointly by the proposed owners of the facilities.

1. **Applicant (Utility) Name: For joint applications, provide all information for each applicant.**

   Name: CenterPoint Energy Houston Electric, LLC ("CenterPoint Energy")
   Certificate Number: 30086
   Street Address: 1111 Louisiana Street, Houston, Texas 77002
   Mailing Address: P.O. Box 1700, Houston, Texas 77251-1700

2. **Please identify all entities that will hold an ownership interest or an investment interest in the proposed project but which are not subject to the Commission's jurisdiction.**

   Response: CenterPoint Energy will hold sole ownership interest in the proposed project. No entities that are not subject to the Public Utility Commission's ("Commission's") jurisdiction will hold an ownership or investment interest in the proposed project.

3. **Person to Contact: For joint applications, provide all information for each applicant.**

   Name: Robert W. Jackson
   Title/Position: Manager, Regulatory & Rates
   Phone Number: 713-207-5584
   Mailing Address: P.O. Box 1700, Houston, Texas 77251-1700
   Email Address: robert.jackson@centerpointenergy.com

   Alternate Contact:
   Name: Peggy Sorum
   Title/Position: Director, Regulatory and Rates
   Phone Number: 713-207-3583
   Mailing Address: P.O. Box 1700, Houston, Texas 77251-1700
   Email Address: peggy.sorum@centerpointenergy.com

Legal Counsel:
Name: Mickey Moon
Phone Number: 713-207-7231
Mailing Address: P.O. Box 1700, Houston, Texas 77251-1700
Email Address: mickey.moon@centerpointenergy.com

4. Project Description:

Name or Designation of Project: 138 kV Kilgore Substation Project

Provide a general description of the project, including the design voltage rating (kV), the operating voltage (kV), the CREZ Zone(s) (if any) where the project is located (all or in part), any substations and/or substation reactive compensation constructed as part of the project, and any series elements such as sectionalizing switching devices, series line compensation, etc. For HVDC transmission lines, the converter stations should be considered to be project components and should be addressed in the project description.

Response: The 138 kV Kilgore Substation Project is a proposal to construct a new 138 kV double circuit line that will loop the existing 138 kV CHEV to LNGSTN ckt 86 in the CenterPoint Energy transmission network and connect it to the new CenterPoint Energy Kilgore substation. There are 20 alternative routes proposed and two alternate substation sites. The 138 kV Kilgore project transmission line design voltage rating and operating voltage rating are both 138 kV and the line is not located in a CREZ zone.

The Kilgore substation proposed to be constructed as part of this project is not expected to require any type of reactive compensation. The only series elements associated with the project are sectionalizing switching devices and other typical in-series substation elements at the new Kilgore substation.

If the project will be owned by more than one party, briefly explain the ownership arrangements between the parties and provide a description of the portion(s) that will be owned by each party. Provide a description of the responsibilities of each party for implementing the project (design, Right-of-Way acquisition, material procurement, construction, etc.).

Response: CenterPoint Energy will own, operate, and maintain all transmission line facilities, including conductors, wires, structures, hardware, and rights-of-way. CenterPoint Energy will own, operate, and maintain the substation facilities. CenterPoint Energy will implement all aspects of the project including design, right-of-way acquisition, material procurement, and construction.

If applicable, identify and explain any deviation in transmission project components from the original transmission specifications as previously approved by the Commission or recommended by a PURA §39.151 organization.

Response: This provision is not applicable to the proposed project because it was not previously approved by the Commission, and it was not required to be submitted to a PURA §39.151 organization pursuant to the Electric Reliability Council of Texas ("ERCOT") Nodal Protocols.

5. Conductor and Structures:

Conductor Size and Type: 959 kcmil ACSS/TW Suwannee (Aluminum Conductor, Steel Supported Trapezoid Wire

Number of conductors per phase: Two

Continuous Summer Static Current Rating (A): 3512

Continuous Summer Static Line Capacity at Operating Voltage (MVA): 838

Continuous Summer Static Line Capacity at Design Voltage (MVA): 838

Type and composition of Structures:

Response: The typical structures for all route segments will predominately be double-circuit steel lattice towers with a vertical phase configuration in an 80-foot-wide ROW for the proposed alternative route segments. Depending on the terrain and other considerations, such as existing CNP structure designs and the length of span between structures and clearance requirements needed to cross waterways, wetlands areas, FAA determinations or utility and roadway crossings, CenterPoint

Energy may require wider ROW and alternative structure types, such as tubular steel poles or concrete poles with a vertical configuration in a 80-foot wide ROW and flat-tap steel structures with a horizontal configuration in a 180-foot wide ROW to approach and dip under existing transmission lines. In the event where a structure is needed to terminate a fiber cable inside the substation, a concrete pole would be considered. The exact location or extent of the different ROW widths or the use of different structure types cannot be determined until a route is approved, surveys are conducted, and more detailed engineering designs are completed.

Height of Typical Structures:

Response: The typical height of a lattice steel tower with a vertical phase configuration can range from approximately 90 to 140 feet tall depending on the terrain and required National Electrical Safety Code ("NESC") clearances.

The typical height of a tubular steel pole with vertical phase configuration can range from approximately 60 to 190 feet tall depending on the terrain and required NESC clearances.

The typical height of a flat-tap steel structure with a horizontal phase configuration to dip under existing transmission lines can range from approximately 35 to 55 feet tall depending on the terrain and required NESC clearances.

The typical height of a concrete fiber only stub pole will be approximately 45 to 70 feet tall depending on the terrain and required NESC clearances.
The exact range of different structure heights cannot be determined until a route is approved, surveys are conducted, and more detailed engineering designs are completed.

Estimated Maximum Height of Structures:

Response: The maximum structure height cannot be determined until a route is approved, surveys are conducted, and more detailed designs are completed.

Explain why these structures were selected; include such factors as landowner preference, engineering considerations, and costs comparisons to alternate

structures that were considered. Provide dimensional drawings of the typical structures to be used in the project.

Response: The structures originally considered include double-circuit vertical lattice and single circuit horizontal lattice steel towers, double-circuit vertical concrete poles, and double-circuit vertical and single circuit horizontal steel poles.

Landowner Preference

When asked on the questionnaire if respondents had a preference for the type of transmission line structure that is being proposed for the Project, of the five respondents, only one stated that they preferred steel poles.

Engineering Considerations

For each alternative structure, the factors considered included the following:

- soil conditions throughout the study area;
- nominal distance between structures (i.e., span length);
- conductor size and tension;
- nominal ROW width;
- construction and maintenance issues;
- live-line maintenance issues;
- existing CenterPoint Energy structure designs;
- potential land-use impacts; and
- costs.

Why typical structures were selected

The alternative structures were evaluated and compared by how each alternative addressed the engineering factors considered.

While the ROW requirements for the lattice steel towers, concrete poles, and tubular steel poles are comparable, there are differences in other respects. Tubular steel poles may require significantly deeper drilled shaft foundations in comparison to lattice steel towers due to the foundation requirements of tubular steel poles. Concrete poles have conductor capacity, manufacturing, and transportation limitations requiring significantly shorter span lengths in comparison to steel lattice towers and tubular steel poles.

Construction of steel poles and concrete poles require less assembly than steel lattice towers, yet as previously mentioned, tubular steel poles may require deeper foundation construction and concrete poles may require larger construction equipment. Live-line maintenance of steel lattice towers, concrete poles, and tubular steel poles is comparable. Potential land-use issues such as collision risks from farm equipment, livestock, and automotive traffic can favor the use of steel poles and concrete poles with smaller footprints. However, a steel pole needs more steel and additional concrete poles would be required, than a comparable steel tower, to achieve the same load carrying capacity in a smaller footprint.

The flat-tap steel structures with a 180-foot wide ROW were selected to dip under the existing transmission lines.

Cost Comparisons

Cost estimates were developed for the proposed project using the three different structure types. A comparison of the costs show that the lowest cost solution utilized predominately double-circuit vertical steel lattice towers. This was the structure type used for the base line of the screening estimates for the review of the primary transmission lines routes. CenterPoint Energy also took a sampling of the primary transmission line routes and developed estimated costs using tubular steel poles and concrete poles with lattice steel tower angle structures. The screening estimates validated that routes using double circuit vertical lattice steel towers were the least cost option. Regardless of structure type, all cost estimates that included a transmission line crossing included the flat-tap steel structures in a 180-foot wide ROW to approach and dip under the existing transmission lines. The primary transmission line routes estimated with tubular steel poles for the entirety were the most expensive at approximately 20% higher cost. The primary transmission line routes estimated with tangent concrete poles and lattice steel tower angle structures were approximately 3.5% higher cost. This cost differential changed depending on the number of angles in the route, but the trend was the same.

Dimensional Drawings

The dimensional drawing for the typical structures to be used are shown in Figures 1-2, 1-3, and 1-4 of the Study, **Attachment 1**, for the proposed project prepared by HALFF.

For joint applications, provide and separately identify the above-required information regarding structures for the portion(s) of the project owned by each applicant.

Response: Not applicable. This is not a joint application.

6. Right-of-way:

Miles of Right-of-Way: 2.27 miles to 5.66 miles
Miles of Circuit: 4.54 miles to 11.32 miles
Width of Right-of-Way: 80 feet to 180 feet
Percent of Right-of-Way Acquired: 0%-56%

The following table (Table 1) contains the miles of ROW required, miles of circuit required, width of ROW required, and percent of ROW acquired for the twenty alternative routes.

ROW		Alternative Route 1	Alternative Route 2	Alternative Route 3	Alternative Route 4	Alternative Route 5	Alternative Route 6	Alternative Route 7	Alternative Route 8	Alternative Route 9	Alternative Route 10
		B1-C1-D2-E3-F2-G2-H1-K1-L2-M12-M13	B1-D3-E1-E2-F3-G3-H2-K2-K3-M2-M11-M13	B1-D3-E3-F1-F3-G3-H2-K2-K3-M2-N21-N23	B1-D3-E3-F2-G1-G3-H2-I1-K4-N31-N33	A1-B2-C2-C1-D1-E2-F3-G4-K1-L2-M12-M13	A1-B2-C3-C4-E4-K5-M5-M41-M42-M3-M2-M11-M13	A1-B2-C3-C4-E4-K5-M5-M41-M42-N31-N33	A2-B3-B5-C4-E4-K5-N5-O31-O33	A2-B3-C5-D5-D4-E4-K5-M5-M41-M42-N31-N33	A2-B3-C5-D5-E5-I3-I2-K4-N31-N33
Required (miles)		3.27	2.93	2.75	3.19	3.08	2.69	2.27	2.55	2.44	2.49
Circuit (miles)		6.54	5.86	5.50	6.38	6.16	5.38	4.54	5.1	4.88	4.98
Width (feet)	New	80	80	80	80	80	80	80	80	80	80
	Existing	0	0	0	0	0	0	0	0	0	0
Acquired (%)		0	0	0	0	0	0	0	0	0	0

ROW		Alternative Route 11	Alternative Route 12	Alternative Route 13	Alternative Route 14	Alternative Route 15	Alternative Route 16	Alternative Route 17	Alternative Route 18	Alternative Route 19	Alternative Route 20
		A2-B3-C5-D5-E5-I3-K5-N5-O31-O33	A2-B3-C5-D5-E5-K6-N5-O31-O33	A2-B4-C6-D6-D5-D4-E4-K5-M5-M41-M42-M3-M2-N21-N23	A2-B4-C7-E6-I4-I3-I2-I1-K2-K3-M2-N21-N23	A3-A4-S3-Q1-P1-P4-N42-N41-M41-M42-M3-M2-N21-N23	A3-A4-S3-Q1-P1-P4-O31-O33	A3-A4-S3-Q1-P1-P4-O31-O33	A3-A4-S3-R2-Q2-P2-P1-P4-O31-O32-N32-N31-M3-M2-N21-N23	A3-A4-S3-R2-Q2-P3-P4-O31-O33	A3-I5-I4-I3-I2-I1-K2-K3-M2-N21-N23
Required (miles)		2.50	2.52	2.99	2.97	5.42	4.43	4.55	5.66	4.63	3.89
Circuit (miles)		5.00	5.04	5.98	5.94	10.84	8.86	9.10	11.32	9.26	7.78
Width (feet)	New	80	80	80	80	80	80	80	80	80	80
	Existing	0	0	0	0	80	80	80	80	80	80
Acquired (%)		0	0	0	0	46%	56%	54%	44%	53%	23%

For joint applications, provide and separately identify the above-required information for each route for the portion(s) of the project owned by each applicant.

Response: Not Applicable. This is not a joint project.

Provide a brief description of the area traversed by the transmission line. Include a description of the general land uses in the area and the type of terrain crossed by the line.

Response: The proposed project will traverse Chambers County. The land uses in this area are diverse, ranging from agricultural and suburban residential to large-scale commercial and industrial. The project is located in the Coastal Prairies, a sub-region of the Gulf Coastal Plains physiographic region. Elevations within the project area range from 40 feet above mean sea level ("amsl") in areas associated with Cedar Point Lateral to 25 feet amsl near surface waters; however, the majority of the project area ranges between 25 feet amsl to 30 feet amsl. **Section 2** and **Section 4** of the Study (**Attachment 1)** describe the potential areas to be traversed by the transmission line in greater detail.

7. Substations or Switching Stations:

List the name of all existing HVDC converter stations, substations or switching stations that will be associated with the new transmission line. Provide documentation showing that the owner(s) of the existing HVDC converter stations, substations and/or switching stations have agreed to the installation of the required project facilities.

Response: There are no existing HVDC converter stations, substations, or switching stations that will be associated with the new transmission line.

List the name of all new HVDC converter stations, substations or switching stations that will be associated with the new transmission line. Provide documentation showing that the owner(s) of the new HVDC converter stations, substations and/or switching stations have agreed to the installation of the required project facilities.

Response: The new Kilgore substation will be constructed in association with the construction of the new 138 kV transmission line. There are no existing HVDC

converter stations or switching stations that will be associated with the new transmission line. Both the Kilgore substation and the new 138 kV transmission line will be owned solely by CenterPoint Energy.

8. Estimated Schedule:

Estimated Dates of:	Start	Completion
Right-of-way and Land Acquisition	March 2024	February 2025
Engineering and Design	March 2024	October 2024
Material and Equipment Procurement	October 2024	October 2025
Construction of Facilities	November 2025	May 2026
Energize Facilities	June 2026	June 2026

9. Counties:

For each route, list all counties in which the route is to be constructed.

Response: The twenty alternative routes are all located within Chambers County.

10. Municipalities:

For each route, list all municipalities in which the route is to be constructed.

Response: All the Alternative Routes originate in the city of Mont Belvieu and terminate in the City of Baytown.

For each applicant, attach a copy of the franchise, permit or other evidence of the city's consent held by the utility, if necessary or applicable. If franchise, permit, or other evidence of the city's consent has been previously filed, provide only the docket number of the application in which the consent was filed. Each applicant should provide this information only for the portion(s) of the project which will be owned by the applicant.

Response: See **Attachment 2**

11. Affected Utilities:

Identify any other electric utility served by or connected to facilities in this application.

Response: The facilities proposed in this Application will not serve another electric utility or connect with facilities owned by another electric utility

Describe how any other electric utility will be affected and the extent of the other utilities' involvement in the construction of this project. Include any other electric utilities whose existing facilities will be utilized for the project (vacant circuit positions, ROW, substation sites and/or equipment, etc.) and provide documentation showing that the owner(s) of the existing facilities have agreed to the installation of the required project facilities.

Response: No other electric utility will be affected by or involved in the construction of the proposed project.

12. Financing:

Describe the method of financing this project. For each applicant that is to be reimbursed for all or a portion of this project, identify the source and amount of the reimbursement (actual amount if known, estimated amount otherwise) and the portion(s) of the project for which the reimbursement will be made.

Response: CenterPoint Energy will finance this project from its general corporate funds.

13. Estimated Costs: Provide cost estimates for each route of the proposed project using the following table. Provide a breakdown of "Other" costs by major cost category and amount. Provide the information for each route in an attachment to this application.

Response: See **Attachment 3**

For joint applications, provide and separately identify the above-required information for the portion(s) of the project owned by each applicant.

Response: Not applicable. This is not a joint application.

14. Need for the Proposed Project:

For a standard application, describe the need for the construction and state how the proposed project will address the need. Describe the existing transmission system and conditions addressed by this application. For projects that are planned to accommodate load growth, provide historical load data and load projections for at least five years. For projects to accommodate load growth or to address reliability issues, provide a description of the steady state load flow analysis that justifies the project. For interconnection projects, provide any documentation from a transmission service customer, generator, transmission service provider, or other entity to establish that the proposed facilities are needed. For projects related to a Competitive Renewable Energy Zone, the foregoing requirements are not necessary; the applicant need only provide a specific reference to the pertinent portion(s) of an appropriate commission order specifying that the facilities are needed. For all projects, provide any documentation of the review and recommendation of a PURA §39.151 organization.

Response: The 138 kV Kilgore Substation Project is needed to provide 138 kV electric transmission service to the new Kilgore Substation. The new distribution substation is needed to support existing customers, area load growth, and multiple commercial and residential developments planned for the area. The substation is needed as well to support two existing 35kV substations and one existing 12kV substation, which are now serving the load in the same general area. Over the last five years (2018-2022), the three existing substations have experienced a 14.25% combined load growth. With the large industrial, commercial, and residential developments planned in the area, the distribution load in this area that is currently served from the three existing substations is forecasted to grow approximately 39 MW between 2023 and 2032, with a combined load increase of almost 20%between 2023 and 2032. With this growth, the existing area substations will not be able to adequately supply electric service to support the new load growth due to their distance from the load center. Locating a new substation closer to the load center will increase circuit capacity to better serve existing and new distribution customers and support the rapid load growth in this fast-growing area. In addition, this new substation will help to reduce distribution overhead feeder exposure, circuit customer counts, and average

feeder loading in the area, which will improve circuit reliability for the distribution customers.

Historical load data and forecast load projection for ten years are provided in **Attachment 4** of this application.

CenterPoint Energy evaluated 138 kV connection alternatives to identify reliable and cost-effective options to serve the new Kilgore substation. The manner in which the proposed project will address the need for the construction as well as a description of the steady state load flow analysis that justifies the project is contained in the CenterPoint Energy "New 138 kV Kilgore Substation" report (**Attachment 4**) of this application. In addition, the existing transmission system and condition addressed are also summarize in the same document.

The proposed transmission line has not been reviewed by ERCOT because it is a Tier 4 "Neutral Project". The ERCOT Nodal Protocols section 3.11.4.3 (f)(vi) states:

"A project shall be considered a neutral project if it consists entirely of:

A project to serve a new Load, unless such project would create a new transmission circuit connection between two stations (other than looping an existing circuit into the new Load-serving station).

The 138 kV Kilgore Substation Project loops the existing 138 kV CHEV – LNGSTN ckt 86 transmission line into a new load serving station; therefore, ERCOT review is unnecessary.

15. Alternatives to Project:

For a standard application, describe alternatives to the construction of this project (not routing options). Include an analysis of distribution alternatives, upgrading voltage or bundling of conductors of existing facilities, adding transformers, and for utilities that have not unbundled, distributed generation as alternatives to the project. Explain how the project overcomes the insufficiencies of the other options that were considered.

Response:

a) **Distribution alternative** – Due to the location of the new developments, none of the existing nearby CenterPoint Energy distribution substations (Jordan, Mont Belvieu, and Trinity Bay) have the capacity to support the expected rapid load growth. Therefore, there is not a distribution alternative available.

b) **Distributed Generation** – CenterPoint Energy is an unbundled utility; therefore, it did not consider distributed generation as an alternative to the proposed project.

c) **Upgrading Voltage/Bundling Conductors/Adding Transformer** – Upgrading voltage or bundling of conductors of existing facilities or adding transformers would not provide the additional capacity necessary to serve projected load growth.

d) **Transmission Alternative** – Four different 138 kV transmission connection options were evaluated to provide electric service to the new Kilgore Substation, and these are detailed in **Attachment 4**. The options represent a geographically diverse route interconnecting to different existing 138 kV transmission circuits. While all four connection options can be constructed while maintaining the reliability of the transmission system, Option 4 needed additional upgrades to satisfy reliability requirements. Option 2 was initially recommended due to its initial lower cost estimate, as discussed in **Attachment 4** where a cost comparison between the four alternatives is presented. However, as discussed in the addendum to Attachment 4, after detailed engineering was performed, it was determined that Option 1 was the lower cost option and is the recommended option as it has similar reliability performance to Option 2.

16. Schematic or Diagram:

For a standard application, provide a schematic or diagram of the applicant's transmission system in the proximate area of the project. Show the location and voltage of existing transmission lines and substations, and the location of the construction. Locate any taps, ties, meter points, or other facilities involving other utilities on the system schematic.

Response: A schematic of CenterPoint Energy's existing transmission system and the proposed construction in the (Jordan/Trinity Bay/Mont Belvieu) area is included as **Attachment 5**.

17. Routing Study:

Provide a brief summary of the routing study that includes a description of the process of selecting the study area, identifying routing constraints, selecting potential line segments, and the selection of the routes. Provide a copy of the complete routing study conducted by the utility or consultant. State which route the applicant believes best addresses the requirements of PURA and P.U.C. Substantive Rules.

Response: The methodologies and assumptions that were used to conduct the Environmental Assessment and Alternative Route Analysis for the 138 kV Kilgore Substation Project are consistent with Section 37.056(c)(4)(A) through (D) of the Texas Utilities Code ("PURA"), P.U.C. Proc. R. 22.52(a)(4), P.U.C. Subst. R. 25.101(b)(3)(B), and the Commission's policy of prudent avoidance. The methodology used to complete the routing study is summarized below.

HALFF developed a base map to delineate the study area boundaries and initiate data collection activities. HALFF, with input from CenterPoint Energy, identified the study area boundaries. The study area was defined based on the locations of the proposed northern tap locations into existing CenterPoint Energy transmission facilities and southern proposed alternative locations for the Kilgore Substation.

The study area was defined to provide an area large enough to develop an adequate set of geographically diverse alternative routes and to minimize potential land use conflicts within the study area. The western boundary of the study area is defined by an existing 345 kV transmission line which is paralleled for a portion of this boundary and is adjacent to the Chambers and Harris County line. The eastern boundary of the study area is defined by State Highway 99; a portion of this boundary parallels the western side of State Highway 99. The northern study boundary is located north of Interstate Highway 10 in the City of Mont Belvieu. The southern study area boundary is located south of Kilgore Parkway.

Initial reconnaissance surveys were conducted, and 52 evaluation criteria were developed. Data were collected pertaining to land use, recreational and park areas, historical and aesthetic values, and environmental integrity. Project scoping letters were sent to federal, state, and local agencies and officials to solicit additional

information. Available 2022 aerial photography and geographic information system ("GIS") coverage with associated metadata were reviewed, and relevant resource data were selected and mapped. HALFF conducted a resource analysis for development of an environmental and land use composite constraints map.

HALFF identified 76 feasible and geographically diverse initial preliminary transmission line segments. A public meeting was conducted in accordance with P.U.C. Proc. R. 22.52 (a)(4). Modifications to the preliminary transmission line segments were completed based on the results of the public meeting, additional agency input, and a reconnaissance survey. Data were then tabulated for the evaluation criteria for each resulting primary transmission line routes and compared. The 20 primary transmission line routes were divided into three geographic families and compared based on the evaluation criteria for the selection of the recommended proposed alternative routes within each primary transmission line route family. CenterPoint Energy analyzed the engineering feasibility and provided an estimated cost analysis for each of the primary transmission line routes. HALFF incorporated these factors into the analysis for the recommendation of the proposed alternative routes. CenterPoint Energy reviewed HALFF's recommendations and concurred that each proposed alternative route was feasible from an engineering, constructability, and cost perspective. An additional comparison between the selected proposed alternative routes from each primary transmission line route family was completed to select the route that best addresses the requirements of PURA and PUC Substantive Rules.

Alternative Route 10 was recommended by HALFF as the route that best addresses the requirements of PURA and PUC Substantive Rules based on the following rational:

- Third shortest in overall length of all alternative routes
- 39 habitable structures within 300 feet of which 30 are industrial / commercial buildings
- Crosses no park/recreational areas
- Shortest length across upland forests
- Does not parallel any streams and has the least amount of stream crossings
- Second least distance across a 100-year floodplain

- Second least amount of pipeline crossings and shortest length parallel to pipeline ROW
- Shorter lengths within the foreground visual zone of U.S. and state highways, FM and county roads, and park and recreational areas when compared to all alternative routes
- The alternative route does not cross an area of high archeological/historic site potential
- Crosses no recorded archeological sites
- 53% of length is parallel to apparent features including existing ROW and property lines.

CenterPoint Energy concurred with the selection of Alternative Route 10 as the route that best addresses the requirements of PURA and PUC Substantive Rules. A copy of the Study conducted by HALFF is provided in **Attachment 1**.

18. Public Meeting or Public Open House:

Provide the date and location for each public meeting or public open house that was held in accordance with 16 TAC § 22.52. Provide a summary of each public meeting or public open house including the approximate number of attendants, and a copy of any survey provided to attendants and a summary of the responses received. For each public meeting or public open house provide a description of the method of notice, a copy of any notices, and the number of notices that were mailed and/or published.

Response: A public meeting was held on October 13, 2022, from 5:00 p.m. to 8:00 p.m. at the Baytown Community Center, located at 2407 Market Street, Baytown, TX. A total of 15 people signed in and attended the public meeting. CenterPoint Energy personnel registered visitors and handed out a questionnaire and information packet. The questionnaire solicited comments on citizen concerns as well as an evaluation of the information presented in the public meeting. A copy of the questionnaire can be found in **Appendix B** of the Study, **Attachment 1**. Section 3.6.2 of the Study, **Attachment 1**, includes a detailed description of the public meeting and the responses received to the questionnaire.

CenterPoint Energy also provided two manned GIS computer stations at the meeting. Landowners were provided the opportunity to view their properties or

areas of interest in more detail at the GIS stations. Halff Associates recorded their comments in a digital format and provided an annotated 8.5" X 11" color snapshot of the area of interest for the attendee to take home.

Copies of the direct notice letter and the published newspaper notice can be found in Appendix B of the Study (**Attachment 1**). Individual notification letters announcing the public meeting were directly mailed by CenterPoint Energy to 324 landowners whose property is located within 300 feet of each of the preliminary transmission line segments. An additional 44 notice letters were sent to local officials and government agencies. 320 feet was used to account for any horizontal variation between the aerial photography and the county's parcel shapefile. In addition, CenterPoint Energy publicized the public meeting through a public notice published in a local newspaper, the *Houston Chronical* and *The Baytown Sun* on October 4, 2022.

19. Routing Maps:

Base maps should be a full scale (one inch = not more than one mile) highway map of the county or counties involved, or other maps of comparable scale denoting sufficient cultural and natural features to permit location of all routes in the field. Provide a map (or maps) showing the study area, routing constraints, and all routes or line segments that were considered prior to the selection of the routes. Identify the routes and any existing facilities to be interconnected or coordinated with the project. Identify any taps, ties, meter points, or other facilities involving other utilities on the routing map. Show all existing transmission facilities located in the study area. Include the locations of radio transmitters and other electronic installations, airstrips, irrigated pasture or cropland, parks and recreational areas, historical and archeological sites (subject to the instructions in Question 27), and any environmentally sensitive areas (subject to the instructions in Question 29).

Response: The following maps showing the study area, routing constraints, and alternative routing segments are provided in the Study, included in **Attachment 1** of this application:

- Figure 2-1. Project Area Map
- Figure 3-1. Preliminary Transmission Line Segments
- Figure 3-2. Proposed Alternative Route Line Segments

- Figure 4-1. Habitable Structures and Other Land Use Features in the Vicinity of the Proposed Alternative Routes (Map Pocket).

Provide aerial photographs of the study area displaying the date that the photographs were taken or maps that show (1) the location of each route with each route segment identified, (2) the locations of all major public roads including, as a minimum, all federal and state roadways, (3) the locations of all known habitable structures or groups of habitable structures (see Question 19 below) on properties directly affected by any route, and (4) the boundaries (approximate or estimated according to best available information if required) of all properties directly affected by any route.

Response: Aerial photographs of the study area that show the requested route information, major roadways, habitable structures, and property boundaries are included as Figure 4-1 (Map Pocket) of the Study, **Attachment 1**.

For each route, cross-reference each habitable structure (or group of habitable structures) and directly affected property identified on the maps or photographs with a list of corresponding landowner names and addresses and indicate which route segment affects each structure/group or property.

Response: A cross-reference of each habitable structure and directly affected property identified on the maps or photographs with a list of corresponding landowner names and addresses is included in **Attachment 6**.

20. Permits:

List any and all permits and/or approvals required by other governmental agencies for the construction of the proposed project. Indicate whether each permit has been obtained.

Response: CenterPoint Energy will coordinate with all of the appropriate local, state, and federal agencies with jurisdiction regarding the construction of the transmission facilities associated with this Project. CenterPoint Energy and/or HALFF have initiated contact with and provided information about the Project to various agencies. Some input from these agencies has been incorporated in this application; however, requests for permits and/or approvals will not be submitted

to the appropriate agencies until the final alignment of the approved route is determined. None of the following potential permits, approvals, requirements, easements, or clearances has been obtained.

- Floodplain development permits and road crossing permits might be required by Chambers County, depending on the location of the transmission line structures. Coordination with the local floodplain administrator will be completed as necessary.
- Permits for crossing roads, highways, and/or other properties owned or maintained by the Texas Department of Transportation will be obtained as necessary.
- Cultural resource clearance will be obtained from the Texas Historical Commission for the approved Project right-of-way as necessary.
- A Storm Water Pollution Prevention Plan ("SWPPP") might be required by the Texas Commission on Environmental Quality ("TCEQ"). CenterPoint Energy or its contractor will submit a Notice of Intent to the TCEQ at least 48 hours prior to the beginning of construction and will have the SWPPP on site at the initiation of clearing and construction activities.
- A Miscellaneous Easement from the Texas General Land Office ("GLO") will be obtained as necessary for any right-of-way that crosses a state-owned riverbed or navigable stream.
- After alignments and structure locations/heights are adjusted and set, CenterPoint Energy will make a final determination of the need for Federal Aviation Administration ("FAA") notification, based on structure locations and structure designs. In some areas, if necessary, CenterPoint Energy could use lower-than-typical structure heights or add marking and/or lighting to certain structures.
- Permits or other requirements associated with possible impacts to waters of the United States under the jurisdiction of the U.S. Army Corps of Engineers ("USACE") will be coordinated with the USACE as necessary.
- Permits or other requirements associated with possible impacts to endangered/threatened species will be coordinated with the U.S. Fish and Wildlife Service ("USFWS") as necessary.
- Coordination with Texas Parks & Wildlife Department ("TPWD") might be necessary to determine the need for any surveys, and to avoid or minimize any

potential adverse impacts to sensitive habitats, threatened or endangered species, and other fish and wildlife resources along the approved route.

21. Habitable structures:

For each route list all single-family and multi-family dwellings and related structures, mobile homes, apartment buildings, commercial structures, industrial structures, business structures, churches, hospitals, nursing homes, schools, or other structures normally inhabited by humans or intended to be inhabited by humans on a daily or regular basis within 300 feet of the centerline if the proposed project will be constructed for operation at 230kV or less, or within 500 feet of the centerline if the proposed project will be constructed for operation at greater than 230kV. Provide a general description of each habitable structure and its distance from the centerline of the route. In cities, towns or rural subdivisions, houses can be identified in groups. Provide the number of habitable structures in each group and list the distance from the centerline of the route to the closest and the farthest habitable structure in the group. Locate all listed habitable structures or groups of structures on the routing map.

Response: The number of habitable structures within 300 feet of the alternative route centerlines range from one on Alternative Route 1 to 189 on Alternative Route 20. Table 4-2 in Appendix C of the EA (**Attachment 1**) lists the assigned habitable structure identification number, general description, and approximate distance from the centerline of all habitable located within 300 feet of the alternative routes. The locations of these structures are shown on Figure 4-1 (Map Pocket) in the EA.

The horizontal accuracy of the aerial photograph used to identify habitable structures was calculated at ± 20 feet. To account for this margin of error and to ensure that all habitable structures were properly identified, HALFF included habitable structures within 320 feet of the centerline of each alternative route.

22. Electronic Installations:

For each route, list all commercial AM radio transmitters located within 10,000 feet of the center line of the route, and all FM radio transmitters, microwave relay stations, or other similar electronic installations located within 2,000 of the center

line of the route. Provide a general description of each installation and its distance from the center line of the route. Locate all listed installations on a routing map.

Response: Several communication towers were located within the study area. Communication towers may include a mix of cellular phone communications, microwave towers, and other similar electronic installations located throughout the study area. No AM or FM radio transmitters were identified within the study area. No AM radio transmitters were located within 10,000 feet of the study area. No FM radio transmitters were located within 2,000 feet of the study area. There are two cellular and 13 microwave installations on six communication towers located within the study area A listing, general description, and approximate distance from the centerline for electronic installations along each of the alternative routes are presented in Table 4-4, and in Appendix C to the EA (**Attachment 1**), and the locations of these electronic installations are shown on Figure 4-1 (Map Pocket), in the EA.

23. Airstrips:

For each route, list all known private airstrips within 10,000 feet of the center line of the project. List all airports registered with the Federal Aviation Administration (FAA) with at least one runway more than 3,200 feet in length that are located within 20,000 feet of the center line of any route. For each such airport, indicate whether any transmission structures will exceed a 100:1 horizontal slope (one foot in height for each 100 feet in distance) from the closest point of the closest runway. List all listed airports registered with the FAA having no runway more than 3,200 feet in length that are located within 10,000 feet of the center line of any route. For each such airport, indicate whether any transmission structures will exceed a 50:1 horizontal slope from the closest point of the closest runway. List all heliports located within 5,000 feet of the center line of any route. For each such heliport, indicate whether any transmission structures will exceed a 25:1 horizontal slope from the closest point of the closest landing and takeoff area of the heliport. Provide a general description of each listed private airstrip, registered airport, and heliport; and state the distance of each from the center line of each route. Locate and identify all listed airstrips, airports, and heliports on a routing map.

Response: There are no private airstrips within 10,000 feet of the proposed centerline of any of the alternative routes.

There are no FAA-registered airports with a runway less than 3,200 feet within 10,000 feet of the proposed centerline of any of the alternative routes.

There are four FAA-registered airports with a runway longer than 3,200 feet within 20,000 feet of the proposed centerline of the alternative routes. The number of airports located within 20,000 feet of an alternative route centerline ranges from one (with respect to two of the alternative routes) to three (with respect to six of the alternative routes).

There is one heliport within 5,000 feet of fifteen of the alternative route centerlines.

Table 4-1 within Appendix C of the EA (**Attachment 1**) provides the number of listed facilities for each alternative route. Each facility is listed and described with the approximate distance from the centerline for each of the alternative routes in Table 4-3 within Appendix C of the EA (**Attachment 1**). Table 4-3 also lists those portions of alternative route segments that may exceed the horizontal slope assuming a tower height of 100 feet. Facilities that are within or proximal to the study area are shown on Figure 4-1 (Map Pocket) within **Attachment 1**. Some of the facilities are several miles beyond the map extents.

24. Irrigation Systems:

For each route identify any pasture or cropland irrigated by traveling irrigation systems (rolling or pivot type) that will be traversed by the route. Provide a description of the irrigated land and state how it will be affected by each route (number and type of structures, etc.). Locate any such irrigated pasture or cropland on a routing map.

Response: The alternative routes do not cross any pasture or cropland that utilizes any known, traveling irrigation systems (either rolling or pivot types).

25. Notice:

Notice is to be provided in accordance with 16 TAC § 22.52.

Provide a copy of the written direct notice to owners of directly affected land. Attach a list of the names and addresses of the owners of directly affected land receiving notice.

Response: A copy of the written direct notice to owners of directly affected land is provided in **Attachment 7**. A list of the names and addresses of the landowners receiving notice is provided in **Attachment 6**. In accordance with PUC Proc. R. 22.52(a)(4), CenterPoint Energy mailed notice directly to the owners of land, as stated on the current county tax rolls, who would be directly affected by this Application by having a habitable structure within 300 feet of the centerline or owning land that would be crossed by any of the proposed alternative routes. CenterPoint Energy used 320 feet to account for any horizontal variation between the aerial photography and the county's parcel shapefile

Provide a copy of the written notice to utilities that are located within five miles of the routes.

Response: A copy of the written notice to electric utilities located within five miles of an alternative route is provided in **Attachment 8**. The notice was mailed to the following electric utilities located within five miles of an alternative route: Entergy Texas.

In addition to notifying electric utilities located within five miles of an alternative route, CenterPoint Energy also mailed written notice to owners of pipelines with facilities paralleled or crossed by an alternative route. A copy of the written notice to such pipeline owners is provided as **Attachment 9**.

Provide a copy of the written notice to county and municipal authorities, and the Department of Defense Siting Clearinghouse. Notice to the DoD Siting Clearinghouse should be provided at the email address found at http://www.acq.osd.mil/dodsc/.

Response: A copy of the written notice to county and municipal authorities and a list of officials notified are provided as **Attachment 10**. A copy of the written notice to the Office of Public Utility Counsel is provided as **Attachment 11**. A copy of the written notice to the Department of Defense Military Aviation and

Installation Assurance Siting Clearinghouse is provided as **Attachment 12** and will also be sent to the applicable email address.

Provide a copy of the notice that is to be published in newspapers of general circulation in the counties in which the facilities are to be constructed. Attach a list of the newspapers that will publish the notice for this application. After the notice is published, provide the publisher's affidavits and tear sheets.

Response: Copies of the notice to be published in the Houston Chronicle and The Baytown Sun, newspapers of general circulation in Chambers County, are provided as **Attachment 13**. Publisher's affidavits and tear sheets will be provided after the notice is published and the affidavits are received.

For a CREZ application, in addition to the requirements of 16 TAC § 22.52 the applicant shall, not less than twenty-one (21) days before the filing of the application, submit to the Commission staff a "generic" copy of each type of alternative published and written notice for review. Staff's comments, if any, regarding the alternative notices will be provided to the applicant not later than seven days after receipt by Staff of the alternative notices, Applicant may take into consideration any comments made by Commission staff before the notices are published or sent by mail.

Response: This provision is not applicable to the proposed project, because it is not a CREZ project.

26. Parks and Recreation Areas:

For each route, list all parks and recreational areas owned by a governmental body or an organized group, club, or church and located within 1,000 feet of the center line of the route. Provide a general description of each area and its distance from the center line. Identify the owner of the park or recreational area (public agency, church, club, etc.). List the sources used to identify the parks and recreational areas. Locate the listed sites on a routing map.

Response: HALFF performed a review of federal and state databases, and county and local maps to identify parks and/or recreational areas within the Study Area.

Reconnaissance surveys were also conducted to identify any additional park or recreational areas that are located within the study area.

Three of the proposed alternative routes cross a park or recreation area. The length of route across parks or recreation areas ranges from zero for Proposed Alternative Routes 1 through 4 and 8 through 20, to approximately 315 feet for Proposed Alternative Routes 5 through 7. The number of additional parks or recreation areas that are located within 1,000 feet of proposed alternative route centerline ranges from zero for Proposed Alternative Routes 5 through 20, to one for Proposed Alternative Routes 1 through 4. Refer to Table 4-1 (Appendix C) for the number of parks or recreation areas crossed and located within 1,000 feet of the proposed alternative routes.

General descriptions of parks and recreational areas are provided in Section 2.2 and Section 4.2 of the EA. Table 4-5 in Appendix C of the EA (Attachment 1) lists the distances from the centerline of the alternative routes. The location of McLeod Park is shown in Figure 4-1 (Map Pocket) in the EA.

27. Historical and Archeological Sites:

For each route, list all historical and archeological sites known to be within 1,000 feet of the center line of the route. Include a description of each site and its distance from the center line. List the sources (national, state or local commission or societies) used to identify the sites. Locate all historical sites on a routing map. For the protection of the sites, archeological sites need not be shown on maps.

Response: To identify historical and archeological sites in the study area, HALFF researched available records and literature at the Texas Archeological Research Laboratory at the University of Texas at Austin. In addition, the Texas Historical Commission`s Archeological Sites Atlas (TASA) files were used to identify listed and eligible National Register of Historical Places (NRHP) properties and sites, NRHP districts, cemeteries, Official Texas Historical Markers, State Archeological Landmarks, and any other potential cultural resources such as National Historic Landmarks, National Monuments, National Memorials, National Historic Sites, and National Historical Parks to ensure the completeness of the study. To identify

areas with a high probability for the occurrence of cultural resources, HALFF used 7.5-minute topographic maps and aerial photography.

No National Register of Historical Places (NRHP) properties and sites, NRHP districts, cemeteries, State Archeological Landmarks, or any other potential cultural resources such as National Historic Landmarks, National Monuments, National Memorials, National Historic Sites, and National Historical Parks were identified within 1,000 feet of any alternative route. One Official Texas Historical Marker and three recorded archaeological sites were identified within 1,000 feet of alternative routes. One of the three recorded archaeological sites are crossed by alternative routes 15 through 19.

General descriptions of the historical and archeological resources are provided in Section 2.3 and Section 4.3 of the EA. Table 4-6 in Appendix C of the EA (**Attachment 1**) lists the distances from the centerline of the alternative routes. For the protection of the sites, archeological sites are not shown on the maps.

28. Coastal Management Program:

For each route, indicate whether the route is located, either in whole or in part, within the coastal management program boundary as defined in 31 TAC §503.1. If any route is, either in whole or in part, within the coastal management program boundary, indicate whether any part of the route is seaward of the Coastal Facilities Designation Line as defined in 31 TAC §19.2(a)(21). Using the designations in 31 TAC §501.3(b), identify the type(s) of Coastal Natural Resource Area(s) impacted by any part of the route and/or facilities.

Response: All 20 alternative routes are located either wholly within or partially within the coastal management program boundary as defined in 31 TAC §503.1. Alternative Routes 1 through 12 are partially located within the coastal management program boundary, ranging from 1.24 miles for Alternative Route 3 to 2.51 miles for Alternative Route 12. Alternative Routes 13 through 20 are located wholly within the coastal management program boundary, ranging from 2.97 miles for Alternative Route 14 to 5.66 miles for Alternative Route 18. All the alternative routes are located wholly or partially seaward of the Coastal Facilities Designation Line as defined in 31 TAC §19.2(a)(21).

The proposed alternative routes are not anticipated to cross any known designated Submerged Aquatic Vegetation, Tidal Sand or Mud Flats. These coastal natural resource areas typically occur within the coastal estuarine and marine areas located south of and wholly outside of the study area. Coastal Natural Resource Areas potentially impacted by alternative routes include coastal wetlands (NWI mapped freshwater emergent wetlands) and special hazard areas (FEMA mapped floodplains). Alternative Routes 8 through 20 will cross special hazard areas within the coastal management program boundary; however, no construction activities are anticipated that would impede the flow of water within watersheds or floodplains. Alternative Routes 2, 3, and 9 through 20 likely cross coastal wetlands (NWI mapped freshwater emergent wetlands). Additionally see the table below for lengths of possible impacts for each proposed alternative route to Coastal Natural Resource Areas.

Alternative Route	Length Crossing NWI Mapped Wetlands (feet)	Length Crossing Special Hazard Areas: FEMA Mapped Floodplains (feet)
1	None	None
2	223	None
3	223	None
4	None	None
5	None	None
6	None	None
7	None	None
8	None	75
9	225	75
10	232	75
11	232	75
12	439	75
13	237	101
14	1,022	101
15	191	3,800
16	191	3,800
17	191	3,800
18	722	5,484
19	722	5,484
20	414	2,955

All 20 alternative routes likely cross waters under tidal influence within the coastal management program boundary. CenterPoint Energy proposes to span all surface waters to the extent feasible. Additionally, the implementation of a SWPP and BMPs, if required, will also minimize potential impacts. Therefore, no significant adverse impacts are anticipated to any coastal wetlands, state submerged lands, coastal shore areas, and waters under tidal influence crossed by any of the alternative routes.

29. Environmental Impact:

Provide copies of any and all environmental impact studies and/or assessments of the project. If no formal study was conducted for this project, explain how the routing and construction of this project will impact the environment. List the sources used to identify the existence or absence of sensitive environmental areas. Locate any environmentally sensitive areas on a routing map. In some instances, the location of the environmentally sensitive areas or the location of protected or endangered species should not be included on maps to ensure preservation of the areas or species. Within seven days after filing the application for the project, provide a copy of each environmental impact study and/or assessment to the Texas Parks and Wildlife Department (TPWD) for its review at the address below. Include with this application a copy of the letter of transmittal with which the studies/assessments were or will be sent to the TPWD.

Wildlife Habitat Assessment Program Wildlife Division
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744

The applicant shall file an affidavit confirming that the letter of transmittal and studies/assessments were sent to TPWD.

Response: CenterPoint Energy contracted with Halff Associates to evaluate the environmental impact of the proposed project. A copy of the EA prepared by HALFF is included as **Attachment 1** to this application. The EA includes environmental sources, routing maps with environmentally-sensitive areas identified, and information on protected and endangered species within or near the study area.

CenterPoint Energy will provide a copy of the EA to TPWD within seven days after the application is filed. A copy of the letter of transmittal to TPWD is provided as **Attachment 14** to this application. An affidavit from Alice Hart confirming that the letter of transmittal and a copy of the EA were sent to TPWD will be sent to the PUC.

30. Affidavit

Attach a sworn affidavit from a qualified individual authorized by the applicant to verify and affirm that, to the best of their knowledge, all information provided, statements made, and matters set forth in this application and attachments are true and correct.

Response: An affidavit from Bradley J. Diehl is provided as **Attachment 15**.

ATTACHMENT 1

Environmental Assessment and Alternative Route Analysis for the 138 kV Kilgore Substation Project in Chambers County, Texas

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August 2023

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

Kilgore Substation 138 kV Transmission Line Project

Environmental Assessment and Alternative Route Analysis

Chambers County, Texas

Docket No. 55365

HALFF INTERNAL PROJECT NUMBER:
52121.001

PROJECT CONTACT:
Chris Sanderson
EMAIL:
csanderson@halff.com
PHONE:
(214) 346-6259

HALFF

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Kilgore Substation 138 kV Transmission Line Project

Environmental Assessment and Alternative Route Analysis

PREPARED FOR: CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PREPARED BY: HALFF ASSOCIATES, INC.
RICHARDSON, TEXAS

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EXECUTIVE SUMMARY

CenterPoint Energy Houston Electric, LLC (CenterPoint Energy) proposes to construct a new double-circuit 138 kilovolt (kV) transmission line south of the City of Mont Belvieu and located between Cedar Bayou and the Grand Parkway in Chambers County, Texas. The proposed new transmission line will provide a connection from the transmission grid to a proposed distribution substation identified as Kilgore Substation. The new transmission line will originate from one of the existing transmission circuits located in the existing east-west transmission corridor that crosses State Highway (SH) 146, approximately one-half mile north of Interstate Highway (IH) 10, to one of two potential Kilgore Substation sites located in the vicinity of Kilgore Parkway. The first potential site for the proposed Kilgore Substation is within a tract of land located immediately northeast of the intersection of Kilgore Parkway and Needlepoint Road (29.808599, -94.868389 NAD83), while the second potential site is located within a tract of land north of Kilgore Parkway and approximately 3,600 feet west of the first potential site (29.806782, -94.880784 NAD 83). CenterPoint Energy retained Halff Associates, Inc. (Halff) to prepare this Environmental Assessment (EA) and Alternative Route Analysis to support the Public Utility Commission of Texas (PUCT) application for a Certificate of Convenience and Necessity (CCN) for the proposed project.

Halff, with input from CenterPoint Energy, identified the study area boundaries utilizing the two proposed substation sites as endpoints, in addition to potential paralleling features and constraints. CenterPoint Energy provided the location of existing 138 kV and 345 kV transmission line corridors. Data collection was conducted to identify the environmental and land use constraints within the study area that were pertinent to the identification of preliminary transmission line segments. Data collection activities included a review of readily available data, coordination with federal and state regulatory agencies and local officials, and reconnaissance surveys from public viewpoints. Halff and CenterPoint Energy initially identified 76 geographically diverse initial preliminary transmission line segments. Input received from local agencies and reconnaissance surveys in conjunction with consideration of the project objectives, including geographic diversity, and input from the public meeting resulted in the identification of 20 proposed alternative routes.

The potential environmental and land use impacts for each proposed alternative route were tabulated by Halff for each evaluation criteria. CenterPoint Energy provided the engineering review and estimated construction cost for each proposed alternative route. Halff compared 20 proposed alternative routes and determined that Proposed Alternative Route 10 is the proposed alternative route that best addresses the requirements of the Public Utility Regulatory Act (PURA) and the PUCT Substantive Rules. CenterPoint Energy provided input and review throughout the routing study process and agreed that Proposed Alternative Route 10 is the proposed alternative route that best addresses the requirements of the PURA and the PUCT Substantive Rules.

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TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

§	Section
A.D.	*anno Domini* ("the year of our Lord")
AM	Amplitude modulation (e.g., AM Tower)
APLIC	Avian Power Line Interaction Committee
B.C.	Before Christ
BEG	Bureau of Economic Geology
BMP	Best Management Practice
B.P.	Before Present
C	Candidate
CCN	Certificate of Convenience and Necessity
CFR	Code of Federal Regulations
CMP	Texas Coastal Management Program
CMZ	Coastal Management Zone
CNRAs	Coastal Natural Resource Areas
Cornell	Cornell Lab of Ornithology
CR	County Road (e.g., CR 506)
CWA	Clean Water Act
DM	Recovered, Delisted, and Being Monitored
DoD	United States Department of Defense
E	State Listed Endangered Species
EA	Environmental Assessment
e.g.,	*exempli gratia* (for example)
EMST	Ecological Mapping Systems of Texas
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
et al.	*et alia* (and others)
etc.	*et cetera* (and the rest or and so forth)
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FM	Farm-to-Market Road (e.g., FM 565)
FM	Frequency Modulation (e.g., FM Tower)
GIS	Geographic Information System
GLO	Texas General Land Office
Halff	Halff Associates, Inc.
HPA	High Probability Area
i.e.,	*id est* (that is)
IH	Interstate Highway
ISD	Independent School District
IUCN	International Union for Conservation of Nature and Natural Resources
kV	kilovolt (1,000 volts)
LE	Federally Listed Endangered Species
LRR	Land Resource Region
LT	Federally Listed Threatened Species
ME	Miscellaneous Easement
MLRA	Major Land Resource Area
NEPA	National Environmental Policy Act
NHD	National Hydrology Dataset

NRCS	Natural Resources Conservation Service (an agency of the USDA)
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
NWP	Nationwide Permit
OTHM	Official Texas Historical Markers
PEM	Palustrine Emergent
PCN	Pre-construction Notification
PFO	Palustrine Forested
PSS	Palustrine Scrub-Shrub
PT	Proposed Threatened
PUCT	Public Utility Commission of Texas
PURA	Public Utility Regulatory Act
ROW	Right-of-Way
RRC	Railroad Commission of Texas
SAL	State Antiquities Landmarks
SCS	Soil Conservation Service (agency was renamed NRCS, see above)
Section 404	Section 404 of the Clean Water Act
SH	State Highway
sp.	Species
spp.	Species (plural)
subsp.	Subspecies
SWPPP	Storm Water Pollution Prevention Plan
T	State Listed Threatened Species
TAC	Texas Administrative Code
TARL	Texas Archeological Research Laboratory
TASA	Texas Archeological Sites Atlas
TDC	Texas Demographic Center
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
U.S.	United States
US	United States Highway
USACE	United States Army Corps of Engineers
U.S.C	United States Code
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USNPS	United States National Park Service
WOTUS	Waters of the United States

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1.0 DESCRIPTION OF THE PROPOSED PROJECT

1.1 SCOPE OF THE PROJECT

CenterPoint Energy proposes to construct a new double-circuit 138 kilovolt (kV) transmission line south of the City of Mont Belvieu and located between Cedar Bayou and the Grand Parkway in Chambers County, Texas. See **Figure 1-1** for a map of the project vicinity. The proposed new transmission line will provide a connection from the transmission grid to a proposed CenterPoint Energy owned distribution substation identified as Kilgore Substation. The new transmission line will originate from one of the existing transmission circuits located in the existing east-west transmission corridor that crosses SH 146, approximately one half mile north of IH 10, to one of two potential Kilgore Substation sites located in the vicinity of Kilgore Parkway. The first potential site for the proposed Kilgore Substation is within a tract of land located immediately northeast of the intersection of Kilgore Parkway and Needlepoint Road (29.808599, -94.868389 NAD83), while the second potential site is located within a tract of land north of Kilgore Parkway and approximately 3,600 feet west of the first potential site (29.806782, -94.880784 NAD 83).

CenterPoint Energy retained Halff to prepare this EA and Alternative Route Analysis to support the application for a CCN for the project. This EA discusses the environmental and land use constraints identified within the study area, documents routing methodologies and public involvement, and provides an evaluation of proposed alternative routes. This document provides information in compliance with the requirements of Section 37.056(c)(4)(A)-(D) of PURA, the PUCT CCN application form, and 16 Texas Administrative Code (TAC) Section (§) 22.52 and § 25.101. The EA may also be used to support any additional local, state, or federal permitting activities that may be required for construction of the Project.

To assist Halff with the evaluation of the Project, CenterPoint Energy provided Halff with the project endpoints, information regarding the need for the project, and CenterPoint Energy's construction practices and right-of-way (ROW) requirements. CenterPoint Energy also provided information regarding engineering and design requirements, in addition to estimated cost information associated with the proposed alternative routes.

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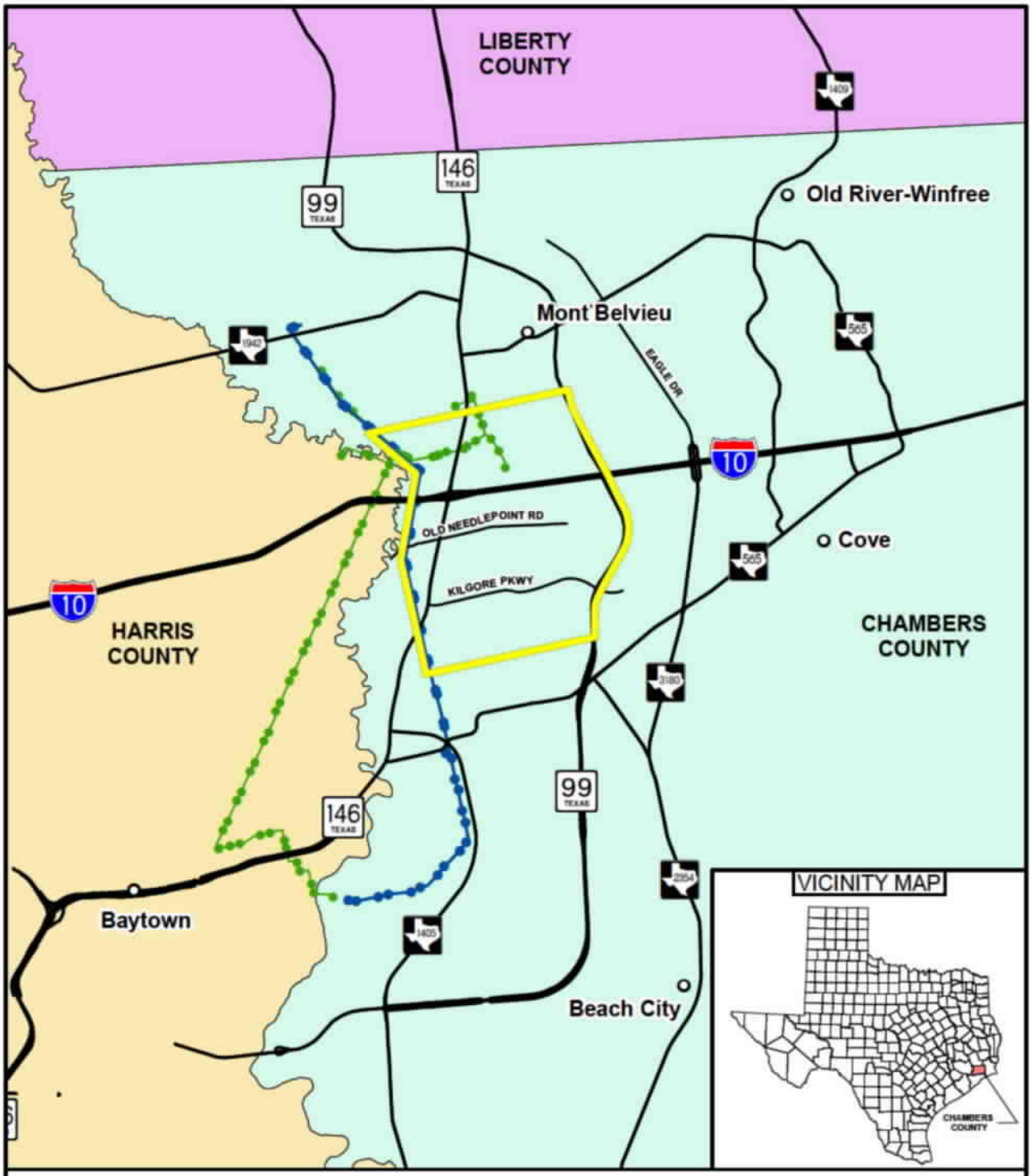

FIGURE 1-1. PROJECT LOCATION MAP

KILGORE SUBSTATION

138 kV TRANSMISSION LINE PROJECT

ROADWAY | EXISTING 345Kv TRANSMISSION LINE | EXISTING 138Kv TRANSMISSION LINE | STUDY AREA

0 1 2 4

SCALE IN MILES

BASE MAP: TEXAS NATURAL RESOURCES INFORMATION SYSTEM (TNRIS), 2022

CenterPoint Energy

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1.2 AGENCY ACTIONS

Numerous federal, state, and local regulatory agencies have rules and regulations regarding the routing process and potential impact assessment associated with construction of high voltage electrical transmission lines. This section describes the major regulatory agencies and issues that are involved in planning and permitting of transmission lines within the state of Texas. Halff solicited project scoping comments from various regulatory agencies during the development of the EA. Records of correspondence are provided in **Appendix A**.

1.2.1 Public Utility Commission of Texas

The PUCT regulates the routing of transmission lines in Texas under Section 37.056(c)(4)(A)-(D) of PURA. The PUCT regulatory guidelines for routing transmission lines in Texas include:

- 16 TAC § 25.101(b)(3)(B);
- 16 TAC § 22.52(a);
- Policy of prudent avoidance; and
- Certificate of Convenience and Necessity (CCN) application requirements.

This environmental assessment (EA) has been prepared by Halff in support of CenterPoint Energy's CCN application for this project to be filed at the PUCT for its consideration.

1.2.2 U.S. Army Corps of Engineers

The United States Army Corps of Engineers (USACE) has been directed by Congress to administer Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 United States Code [U.S.C.] § 403) and Section 404 of the Clean Water Act (Section 404) (33 U.S.C. § 1344). Under Section 10 of the RHA, the USACE regulates all work or structures in or affecting the course, condition, or capacity of navigable waters of the United States (WOTUS). The intent of this law is to protect the navigable capacity of waters important to interstate commerce. Under Section 404, the USACE regulates the discharge of dredge and fill material into WOTUS, including associated wetlands. The purpose of Section 404 is to protect the nation's waters from indiscriminate discharge and to minimize the potential adverse impacts and degradation of the WOTUS and aquatic ecosystems.

The project is located within the Galveston District of the USACE. Although the USACE-Galveston District does not publish a list of designated Section 10 (navigable) surface waters, based on Halff's permitting experience with the USACE-Galveston District, Cedar Point Lateral is

the only feature that could be considered a Section 10 surface water. The official designation of Cedar Point Lateral, if necessary, will rest with the USACE-Galveston District, who has the final authority on jurisdictional status for aquatic features within the study area. A review of the National Wetland Inventory (NWI) maps indicated numerous emergent, scrub/shrub, forested/shrub wetlands, freshwater ponds, lakes, and rivers, which may be considered jurisdictional by the USACE, occur throughout the study area.

Upon PUCT approval of a route, additional coordination, jurisdictional wetland verifications, and permitting with the USACE-Galveston District for a Section 404 permit may be required if the approved route is to be constructed within potential jurisdictional areas. If the facilities are constructed within jurisdictional areas, the construction of the proposed project may meet the conditions of Nationwide Permit (NWP) No. 57 – Electric Utility Line and Telecommunications Activities. NWP 57 authorizes activities for the construction, repair and removal of utility lines and associated facilities (i.e., substations, foundations, and access roads) in WOTUS, provided the general and regional conditions of the permit are met.

1.2.3 U.S. Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) is charged with the responsibility of enforcement of federal wildlife laws and providing comments on proposed construction projects with a federal nexus under the National Environmental Policy Act (NEPA), within the framework of several federal laws including the Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). Halff reviewed the USFWS listed species for Chambers County. No known populations of any species protected under the ESA were identified within the study area. The lack of data does not indicate the absence of any listed species or potential habitats within the study area. Bald eagles (Haliaeetus leucocephalus) may occur within the study area. Although no longer protected under the ESA, bald eagles are still afforded protection by the BGEPA and MBTA. Upon PUCT approval of a route, CenterPoint Environmental will assess the need for bald eagle nest surveys.

1.2.4 Federal Aviation Administration

According to Federal Aviation Administration (FAA) regulations, Title 14 Code of Federal Regulations (CFR) Part 77.9, the construction of a transmission line requires FAA notification if a transmission tower structure height will exceed 200 feet or the height of an imaginary surface extending outward and upward at one of the following slopes:

- A 100:1 slope for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport described in 14 CFR Part 77.9 (d) having at least one runway longer than 3,200 feet, excluding heliports.

- A 50:1 slope for a horizontal distance of 10,000 feet from the nearest runway of a public or military airport described in 14 CFR Part 77.9 (d) where its longest runway is no longer than 3,200 feet in length, excluding heliports.

- A 25:1 slope for a horizontal distance of 5,000 feet for heliport described in 14 CFR Part 77.9 (d).

14 CFR Part 77.9 (d) includes public-use airports listed in the Airport/Facility Directory (currently the Chart Supplement), public-use or military airports under construction, airports operated by a federal agency or United States (U.S.) Department of Defense (DoD), or an airport or heliport with at least one FAA-approved instrument approach procedure.

Notification is not required for structures that will be shielded by existing structures of a permanent and substantial nature or by natural terrain or topographic features of equal or greater height and will be located in a congested area of a city, town, or settlement where the shielded structure will not adversely affect safety in air navigation.

If any of the FAA notification criteria are met for the route approved for construction, a Notice of Proposed Construction or Alteration, FAA Form 7460-1, will be completed and submitted to the FAA Southwest Regional Office in Fort Worth, Texas, at least 30 days prior to construction. The result of this notification, and any subsequent coordination with the FAA, could include changes in line design and/or potential requirements to mark and/or light the structures.

1.2.5 Military Aviation and Installation Assurance Siting Clearinghouse

The U.S. DoD Military Aviation and Installation Assurance Siting Clearinghouse (previously the U.S. DoD Siting Clearinghouse) works with industry to overcome risks to national security while promoting compatible domestic energy development. Energy production facilities and transmission projects involving tall structures, such as electrical transmission towers, may degrade military testing and training operations. The electromagnetic interference from electricity transmission lines can impact critical DoD testing activities. Title 16 TAC § 22.52 states that upon filing of the application, the DoD shall be notified and an affidavit attesting to the notification shall

also be provided with the application. The DoD shall also be provided written notice of the public meeting. If a public meeting is not held, the DoD shall be noticed of the planned filing of the application prior to the completion of the routing study.

1.2.6 Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department (TPWD) is the state agency with the primary responsibility of protecting the state's fish and wildlife resources in accordance with the TPWD Code Section 12.0011(b), 64.003, 68.015 and 1.011. Halff solicited comments from the TPWD during the scoping phase of the project, and a copy of this EA will be submitted to TPWD when the CCN application is filed with the PUCT. Halff also reviewed the Texas Natural Diversity Database (TXNDD) records of state-listed species occurrences and rare vegetation communities. Halff considered these during the route development process. Once the PUCT approves a route, CenterPoint Energy will complete a field review of the proposed ROW to determine potential impacts to any state-listed species prior to construction. Based on these results, additional coordination with TPWD may be necessary to determine avoidance measures to state-listed threatened or endangered species, and other state regulated fish and wildlife resources.

1.2.7 Floodplain Management

Flood Insurance Rate Maps (FIRM), published by the Federal Emergency Management Agency (FEMA), were reviewed to determine floodplain boundaries within the study area (FEMA, 2022). The mapped 100-year floodplains are associated with the larger creeks and streams or rivers within the study area. The 100-year floodplain represents a flood event that has a one percent chance of being equaled or exceeded for any given year. Construction of the proposed transmission line is not anticipated to create any significant changes in the existing topographical grades and is not anticipated to significantly alter existing flow regimes within the floodplain. Coordination with the Chambers County floodplain administrator will be completed after the PUCT route approval to determine if any permits are necessary.

1.2.8 Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ) is the state agency with the primary responsibility for protecting the state's water quality. The construction of the project may require a Texas Pollution Discharge Elimination System General Construction Permit (TXR150000) as implemented by the TCEQ under the provisions of Section 402 of the Clean Water Act (CWA) and Chapter 26 of the Texas Water Code. Construction activities will be compliant with the

general construction permit conditions. Best Management Practices (BMPs) will be used, as required, to minimize erosion and sedimentation resulting from the construction.

1.2.9 Texas Historical Commission

Cultural resources are protected by federal and state laws if they have some level of significance under the criteria of the National Register of Historic Places (NRHP) (36 CFR Part 60) or under state guidance (13 TAC § 2.26 (7-8). Chapter 26 of the TAC requires state agencies and political subdivisions of the state to notify the Texas Historical Commission (THC) of ground-disturbing activity on public land. Halff contacted the THC to identify known cultural resources within the study area boundary. Halff also reviewed Texas Archeological Research Laboratory (TARL) records for known locations of archeological sites and the THC's online, restricted-access Texas Archeological Sites Atlas (TASA) and the Texas Historical Sites Atlas for the locations of recorded cemeteries, NRHP properties, State Antiquities Landmarks (SALs) and Official Texas Historical Markers (OTHMs). Once a route is approved by the PUCT, depending on a state or federal nexus, additional coordination with the THC will occur, if required, to determine the need for cultural resource surveys or additional permitting requirements. CenterPoint Energy will implement an unanticipated discovery procedure during construction activities. If artifacts are discovered during construction, activities will cease in the area of discovery and CenterPoint Energy will notify the State Historic Preservation Office for additional consultation.

1.2.10 Texas Department of Transportation

The Texas Department of Transportation (TxDOT) has been notified of the Project. If the route approved by the PUCT crosses TxDOT roadways, the Project will be constructed in accordance with the rules, regulations, policies, and expansion plans of TxDOT. Revegetation will occur within existing TxDOT ROWs as required under the "Revegetation Special Provisions" contained in TxDOT Form 1023 (Rev. 9-93). Traffic control measures will comply with applicable portions of the Texas Manual of Uniform Traffic Control Devices.

1.2.11 Texas General Land Office

The Texas General Land Office (GLO) requires a miscellaneous easement (ME) for ROWs within any state-owned riverbeds and navigable streams (non-tidal). A ME will be required if the approved project ROW crosses areas meeting these criteria. After PUCT route approval, additional coordination with the Texas GLO may be required to determine the need for any MEs.

The Texas GLO administers the Texas Coastal Management Program (CMP) which intends to help ensure the environmental and economic well-being of the Texas coast within the CMP boundary through proper management of coastal natural resource areas. The CMP boundary, as defined by 31 TAC § 503.1, delineates the coastal zone of Texas. The Texas CMP has federal and state project and permit action review processes to evaluate consistency with the program. The Project is located within the coastal management zone (CMZ; GLO, 2022a; 2022b).

1.3 DESCRIPTION OF PROPOSED DESIGN AND CONSTRUCTION

1.3.1 Structure Design

CenterPoint Energy proposes to predominantly use 138 kV double-circuit steel lattice towers in a vertical configuration in an 80-foot-wide ROW for all of the proposed alternative routes (**Figure 1-2**). Depending on the terrain and other considerations, such as existing CNP structure designs and the length of span between structures and clearance requirements needed to cross waterways, wetlands areas, FAA determinations or utility and roadway crossings, CenterPoint Energy may require wider ROW widths and alternative structure types, such as tubular steel poles or concrete poles in a vertical configuration in a 80-foot wide ROW and flat-tap steel structure in a horizontal configuration in a 180-foot wide ROW to approach and dip under existing transmission lines (**Figures 1-3 and 1-5**). In the event where a structure is needed to terminate a fiber cable inside the substation, a concrete pole would be considered. The exact location or extent of the different ROW widths or the use of different structure types cannot be determined until a route is approved, surveys are conducted, and more detailed engineering designs are completed.

Construction of steel lattice towers will require drilled pier foundations made of steel-reinforced concrete. The span length between steel lattice towers will be approximately 600 to 800 feet. Typical lattice tower height in a vertical configuration will have a height range of approximately 90 to 140 feet depending on terrain and required National Electrical Safety Code (NESC) clearances (**Figure 1-2**).

Construction of tubular steel poles will require drilled shaft foundations made of steel-reinforced concrete. Typical tubular steel poles in a vertical configuration will have a height range of approximately 60 to 190 feet tall depending on the terrain and required NESC clearances and have a span length between 600 and 800 feet (**Figure 1-5**).

Construction of concrete poles will not require a drilled shaft foundation and instead would be direct embedded. Typical concrete poles in a vertical configuration will have a height range of approximately 90 to 120 feet tall depending on the terrain and required NESC clearances and have a span length between 250 and 350 feet (**Figure 1-3**).

Construction of flat-tap steel structures would be considered when crossing under existing transmission lines. Construction of flat-tap steel structures will require drilled shaft foundations made of steel reinforced concrete. Typical flat-tap steel structures in a horizontal configuration will have a height range of approximately 35 to 55 feet tall depending on the terrain and required NESC clearances and have a span length between 150 and 400 feet (**Figure 1-4**).

The exact range of different structure heights cannot be determined until a route is approved, surveys are conducted, and more detailed engineering designs are completed.

1.3.2 Surveying

Surveying of the transmission line ROW is required to locate the centerline, the structure locations, obstacles above and below ground, and the edges of both new and existing ROW. Surveying will be conducted after the PUCT approves a route.

1.3.3 Clearing

All brush and undergrowth within the ROW will be removed and maintained. Mechanized cutters and hand tools will be used to remove vegetation to ground level. For areas requiring hand-clearing, vegetation will be cut level with the ground. No stump exceeding 2 inches above the ground will remain. Any tree located in a fence line having a diameter greater than 4 inches will be cut even with the top of the fence. Stumps located on hillsides or uneven ground will be cut where a mowing machine can pass over the ROW without striking any stumps, roots, or snags. If a Storm Water Pollution Prevention Plan (SWPPP) is required, it will be implemented along the approved route prior to the start of clearing.

1.3.4 Structure Placement

Specialized wide-track vehicles, tractor trailers, and line trucks with trailers will be used to transport construction materials along the ROW to the structure locations. Typically, the concrete foundations will be installed several weeks before the steel lattice towers, flat-tap steel structures,

and tubular steel poles are erected to allow the foundations to cure and reach their maximum strength. Concrete poles will be delivered to the site location shortly before the poles are ready to be set. A large crane would then set the concrete pole directly into an excavated hole. The hole will be backfilled with crushed limestone. The steel lattice towers will be delivered in bundles and set next to the proposed structure location shortly before structure erection. The steel lattice towers will be assembled on-site, and a crane will be used to set the sections into place onto the previously installed foundations.

1.3.5 Conductor and Static Wire Installation

Once the structures have been erected, the stringing and clipping-in of conductors and static wires will begin. Outages are not anticipated during the conductor and static wire installation. Each road crossing will have temporary guard structures and/or conductor shields installed for public and laborer protection while stringing in the new conductors. Existing transmission and distribution circuits will have temporary guard structures and/or conductor shields installed for public and laborer protection while stringing in the new conductors.

1.3.6 Cleanup

Cleanup operations will be performed as construction activities are completed. Cleanup includes removal of debris, unused materials, and trash. Any necessary soil stabilization and reestablishing of vegetation cover will also occur during cleanup, following the procedures dictated in the SWPPP, if required. Grade will be restored to pre-construction contours following the completion of construction.

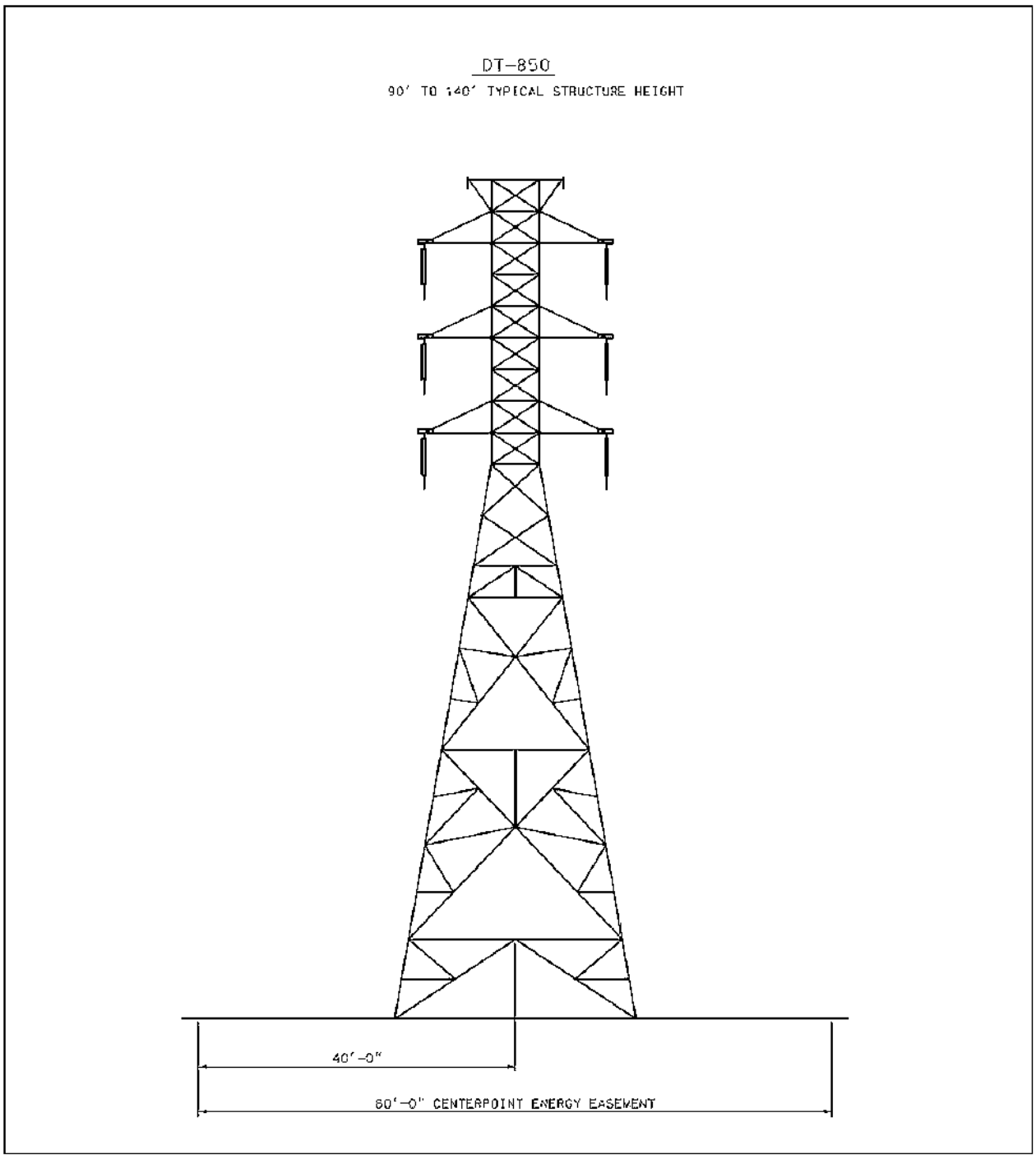

Figure 1-2. 138 kV DT-850

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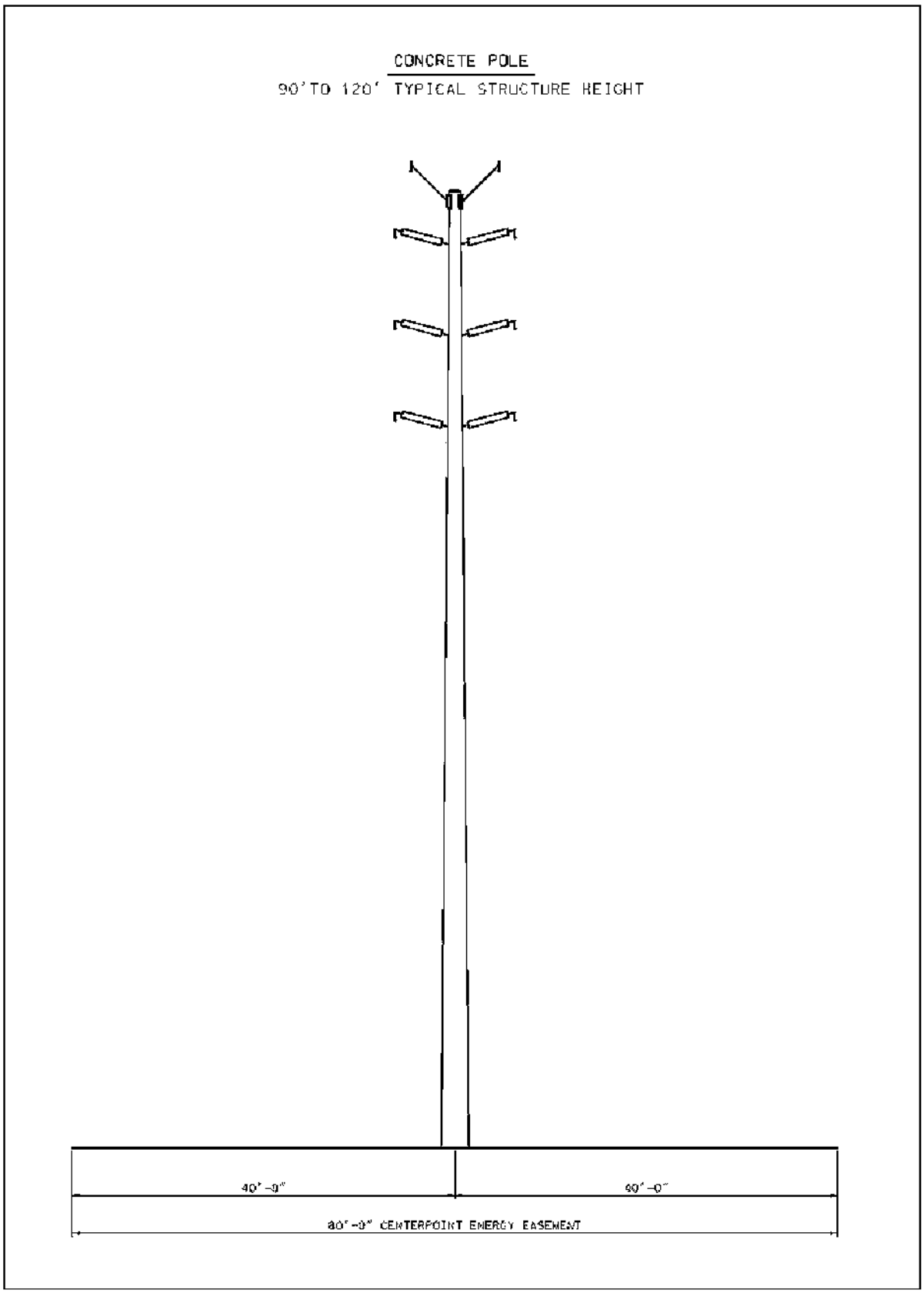

Figure 1-3. 138 kV Concrete Pole

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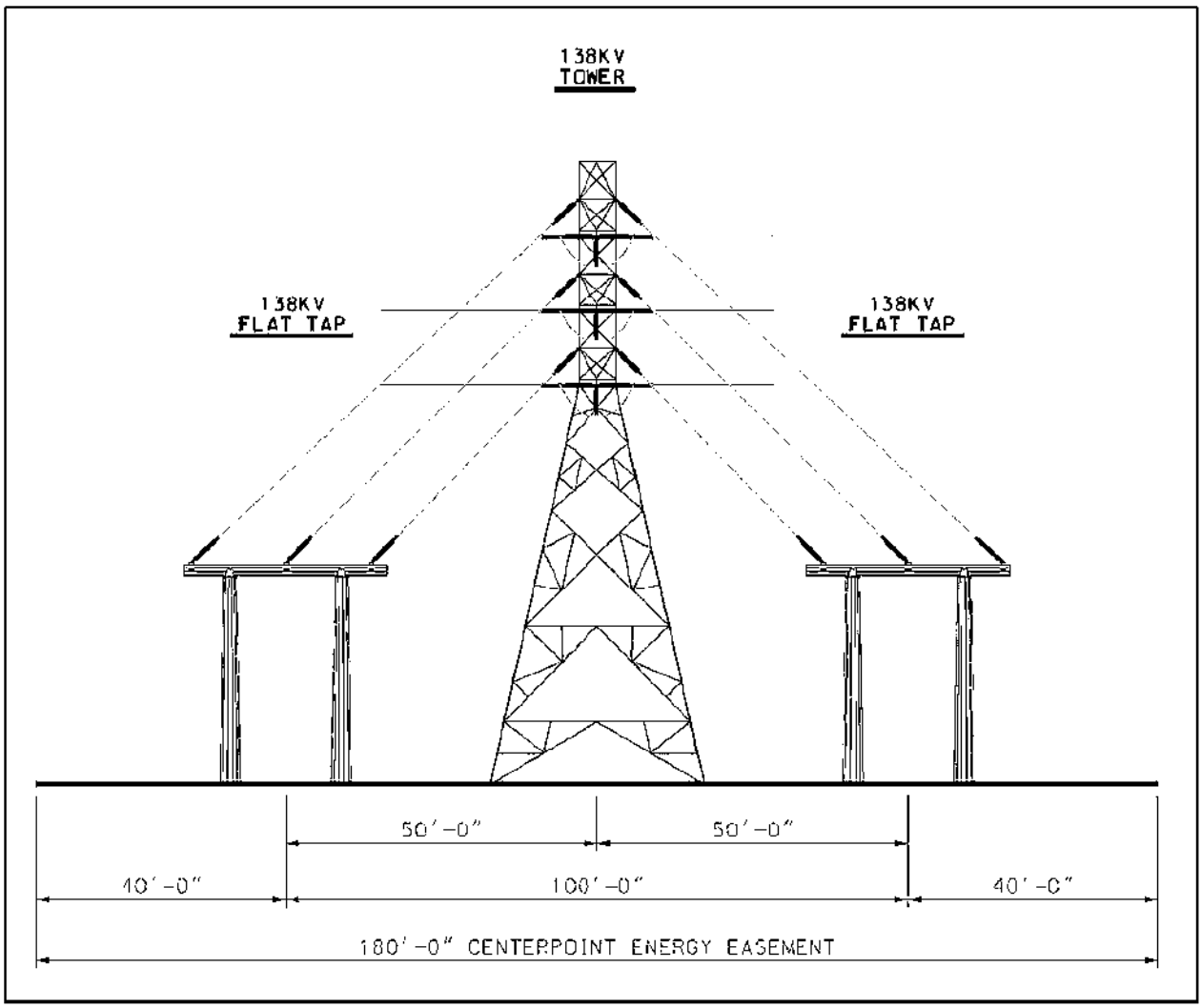

Figure 1-4. 138 kV Flat Tap and RM90 ISO

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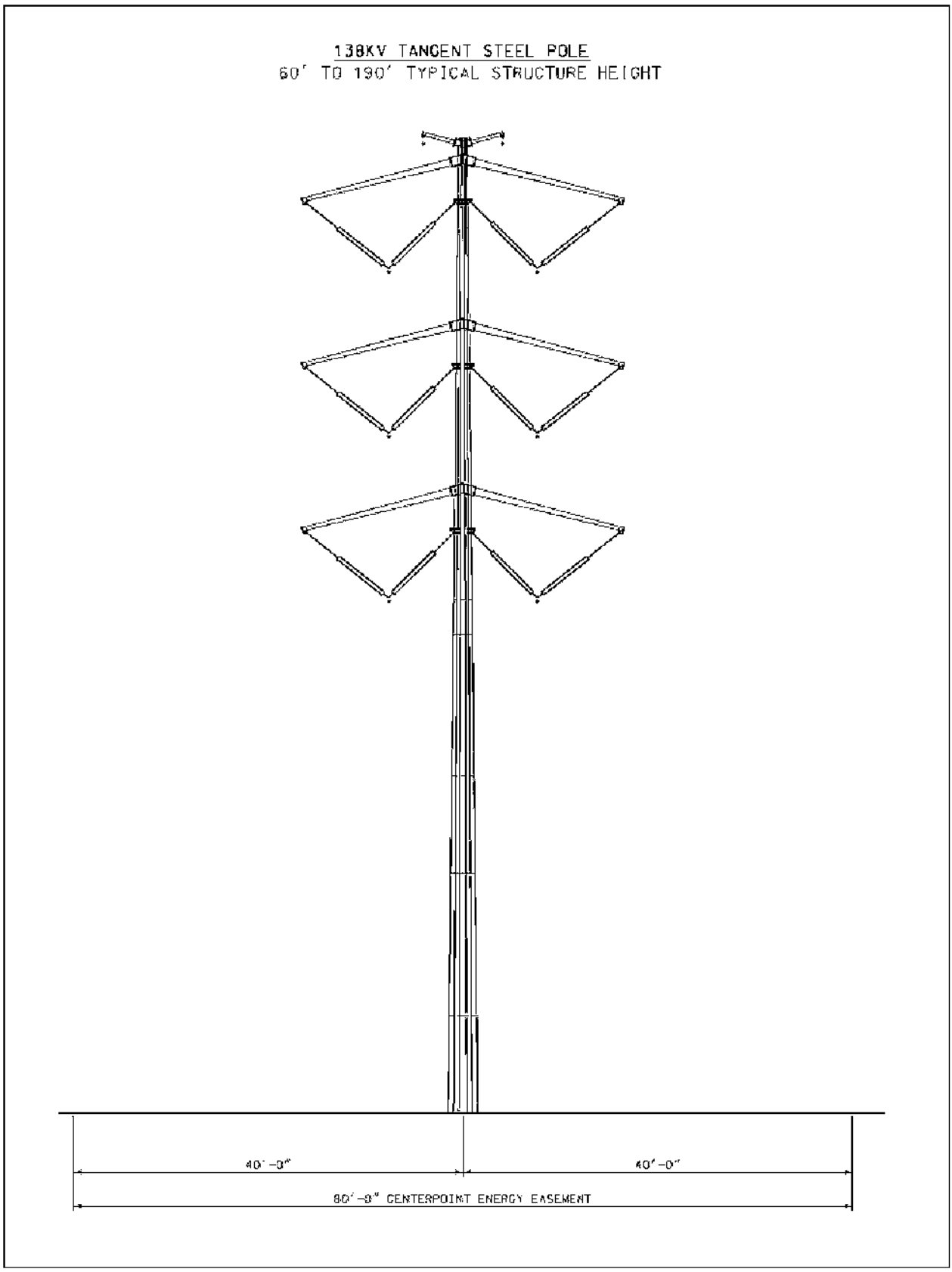

Figure 1-5. 138 kV Tangent Steel Pole

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2.0 DESCRIPTION OF THE STUDY AREA

Halff identified the study area boundary, considering the planned Kilgore Substation endpoints and origin points. The study area boundary is depicted in **Figure 2-1**.

The study area was defined to provide an area large enough to develop an adequate set of geographically diverse alternative routes and to minimize potential land use conflicts within the study area. The western boundary of the study area is defined by an existing 345 kV transmission line which is paralleled for a portion of this boundary and is adjacent to the Chambers and Harris County line. The eastern boundary of the study area is defined by SH 99; a portion of this boundary parallels the western side of SH 99. The northern study area boundary is located north of IH 10 in the City of Mont Belvieu. The southern study area boundary is located south of Kilgore Parkway. To describe the environmental setting of the study area, land use and environmental resource data was collected for community values and environmental integrity.

2.1 COMMUNITY VALUES

The term "community values" is included for the consideration of transmission line certification under Section 37.056(c)(4) of the Texas Utilities Code. The PUCT CCN application requires an assessment of values and resources important to the local community. At times, community values and resources could include the following:

- habitable structure locations;
- AM, FM, microwave, and other electronic installations in the study area;
- FAA-registered airstrips, private airstrips, and heliports located in the study area;
- irrigated pasture or croplands utilizing center-pivot or other traveling irrigation systems;
- approvals or permits required from other governmental agencies;
- brief description of the area traversed; and
- comments received from community leaders and members of the public.

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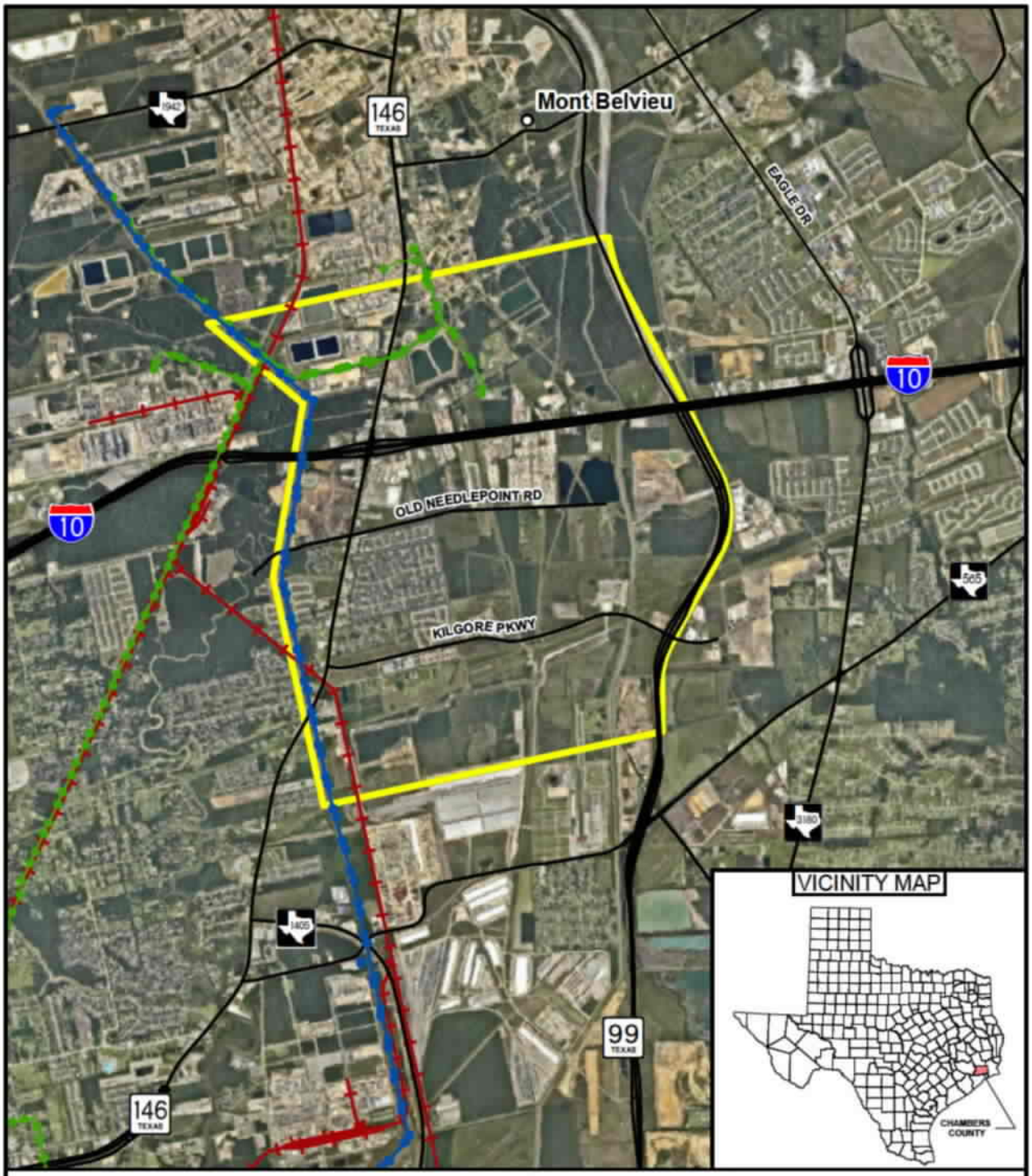

FIGURE 2-1. PROJECT AREA MAP
KILGORE SUBSTATION
138 kV TRANSMISSION LINE PROJECT

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In addition to the above-listed items, Halff evaluated the proposed project for community resources that may not be listed by the PUCT, but that may also be important to particular communities as a whole. Halff defines the term "community resources" to be areas or other natural resources recognized by a national, regional, or local community. Examples of community resources would be parks, recreation areas, historical or archeological sites, or a scenic vista. As discussed in **Section 2.2.1**, Halff mailed consultation letters to elected and appointed officials within the study area and collected information regarding community values and community resources. The above-listed values and resources important to the local community are discussed in the appropriate sections of this document.

2.1.1 Land Use

Land jurisdiction is defined as the control maintained by major landholders or land managers. Jurisdiction does not necessarily represent ownership. Potential conflicts could arise from crossing jurisdictional boundaries that were evaluated in this study. For example, a 138 kV transmission line crossing publicly held land may cause a conflict with ongoing planning processes or a land management plan. Land jurisdictions were identified and delineated primarily from geographic information system (GIS) metadata (NearMap, 2023).

Existing land data collected included urban and residential areas, agriculture, oil, and gas facilities, planned land use, transportation, aviation, utilities, and communication towers. The primary sources of land use information were obtained from interpretation of aerial photographs, United States Geological Survey (USGS) topographical maps and field reconnaissance surveys. In addition, the economic and demographic characteristics within the study area counties were gathered and are further discussed under Socioeconomics in **Section 2.1.2**.

2.1.1.1 Urban and Residential Areas

The study area is located in Chambers County, Texas. The City of Mont Belvieu and the City of Baytown are incorporated cities with boundaries extending into the study area. Portions of the study area consists of undeveloped land (e.g., agriculture/pastureland).

Schools

The study area is located within both the Barbers Hill Independent School District (ISD) and Goose Creek Consolidated ISD. No schools were identified within the study area.

2.1.1.2 Planned Land Use

The planned land use component identifies objectives and policies regarding land use goals and plans, including conservation easements, managed lands, and proposed developments. Cities and counties typically prepare comprehensive land use plans to provide strategic direction for an individual city or county. The website of Chambers County was reviewed, and correspondence was submitted to county officials to identify any planned land use conflicts. No comprehensive land use plans were identified within the study area. Following the review of available county land use plans, the websites for City of Mont Belvieu and City of Baytown were reviewed for future land use planning within the study area.

The City of Mont Belvieu, which occupies areas north of IH 10 within the study area, has classified the zoning districts within the study area as mixed use, freeway commercial, rural, and suburban residential. The area zoned as suburban residential, from review of recent aerial imagery, has been developed for industrial use which contradicts the future land use plan. The majority of land within the study area is zoned as either freeway commercial or mixed use.

The City of Baytown, which occupies areas south of IH 10 within the study area, in their future land use plan shows that the majority of the study area is zoned for industrial or large-scale commercial, with areas located between Old Needlepoint Road and Kilgore Parkway zoned for low density residential.

A conservation easement is a restriction that property owners voluntarily place on specified uses of their property to protect natural, productive, or cultural features. The property owner retains legal title to the property and determines the types of uses to allow or restrict. The property can still be bought, sold, and inherited, but the conservation easement is tied to the land and binds all present and future owners to its terms and restrictions. Conservation easement language will vary as to the individual property owner's allowances for additional developments on the land. The land trusts facilitate the easement and ensure compliance with specified terms and conditions. No conservation easements were identified to exist within the study area.

2.1.1.3 Agriculture

Agriculture in the region is represented primarily as ranchland and pastureland, as indicated by representative agricultural statistics from the United States Department of Agriculture (USDA) 2019 Census of Agriculture (USDA, 2019) shown in **Table 2-1**. The 2019 Census of Agriculture

identified cattle as the primary livestock and rice as the primary crop in Chambers County. In terms of statewide significance, Chambers County ranks significant on grain sales relative to other Texas counties. Chambers County livestock inventory does not rank substantially among other Texas counties for these categories.

Table 2-1. Agricultural Statistics for Chambers County

STATISTICAL CATEGORY	CHAMBERS COUNTY
Market Value of Products Sold (in $ millions)	
Crop Sales	$11.1M
Livestock Sales	$8.2M
TOTAL SALES	$19.3M
Top Crop Types and Livestock Inventory	
1st Crop Type and Acreage	Rice - 17,898 acres
2nd Crop Type and Acreage	Forage (hay/haylage) - 13,129 acres
3rd Crop Type and Acreage	Soybeans for beans - 600 acres
4th Crop Type and Acreage	Wheat for grain - 300 acres
1st Livestock Type and Number of Animals	Cattle and calves - 23,700
2nd Livestock Type and Number of Animals	Layers - 1,273
3rd Livestock Type and Number of Animals	Horses and ponies - 833
4th Livestock Type and Number of Animals	Goats - 559
SOURCE: USDA, 2019.	

2.1.1.4 Oil and Gas Facilities

Oil and natural gas production are prominent in Chambers County. There are approximately 16,000 well records in Chambers County, of which approximately 250 are within the study area. There are approximately 150 large pipelines (diameters greater than 8 inches) and approximately 70 small pipelines (diameters less than 8 inches) within the study area (Railroad Commission of Texas [RRC], 2022a).

2.1.1.5 Transportation/Aviation/Utility Features

An extensive network of Interstate Highways (IH), State Highways (SH), Farm-to-Market Roads (FM), County Roads (CR), and public/private residential roads facilitate transportation throughout the study area (TxDOT, 2022a). Federal and state highways and relevant CR include the following:

- IH 10 – located in the northern half, bisecting the study area generally in an easterly to westerly direction, and extends between the City of Cove (east of the study area), the City of Mont Belvieu, and the City of Baytown.
- SH 146 – located in the western half of the study area, bisecting in a generally northerly to southerly direction, and extends between the City of Mont Belvieu and the City of Baytown.
- SH 99 – located along the eastern boundary of the study area, traversing generally in a northerly to southerly direction. SH 99 extends between the City of Mont Belvieu and the City of Beach City (south of the study area).
- CR 506 – also known as Old Needlepoint Road, located in the middle of the study area in a generally easterly to westerly direction that originates within the study area west of Cedar Point Lateral and proceeds westerly beyond SH 146 towards the City of Baytown.
- CR 561 – also known as Kilgore Parkway, located in the southern half of the study area, originating at a junction with SH 146 and proceeds easterly beyond SH 99.

The Union Pacific Railroad crosses the northwestern and southwestern corners of the study area extending between the City of Mont Belvieu and the City of Baytown (RRC, 2022a).

A review of the FAA Southwest Region Airport Directory (FAA, 2022), TxDOT Airport Directory (TxDOT, 2022b), AirNav (2022), and USGS topographic maps (USGS, 1961-1977) identified six aircraft facilities within 20,000 feet of the study area, one of which is within the study area. **Table 2-2** lists aircraft facilities either within or near the study area. The following summarizes the types of aircraft facilities described in **Table 2-2**:

- FAA registered airports with a runway greater than 3,200 feet: four airports located outside of the study area (two public and two private);
- FAA registered airports with a runway less than 3,200 feet: none;
- Non-registered aircraft landing strips with all runways less than 3,200 feet: none; and
- FAA registered heliports: two heliports, one within the study area and one outside of the study area (private).

Table 2-2. Aircraft Landing Facilities in or Near the Study Area

FACILITY NAME[1]	FAA ID[2]	FACILITY USE	COUNTY	RELATIVE LOCATION
FAA Registered Airport with Runway Greater than 3,200 Feet				
RWJ Airpark	54T	Public	Chambers	Southeast of the study area in Beach City to the west of Dutton Lake.
Baytown	HPY	Public	Harris	West of the study area in the City of Baytown.
Ferris	25TA	Private	Harris	Northwest of the study area in the City of Baytown.
Slack	4TX0	Private	Chambers	Northeast of the study area in the City of Mont Belvieu.
FAA Registered Airport with Runway Less than 3,200 Feet				
--	--	--	--	--
Non-Registered Landing Strip				
--	--	--	--	--
Heliports				
Chevron Chemical Company	TA98	Private	Harris	West of the study area in the City of Baytown on the north side of IH 10.
Patients Emergency Room	TX73	Private	Chambers	Within the study area, near the southwestern boundary of the City of Mont Belvieu on the north side of IH 10.

SOURCES: AirNav, 2022; FAA, 2022; TxDOT, 2022b; USGS, 1961-1977
NOTES:
1. Aircraft support facilities are grouped by type of facility, whether the facility is registered with the FAA and length of runway. Aircraft facilities are within 20,000 feet of the study area.
2. Identification code assigned to facilities registered with the FAA.

2.1.1.6 Communication Towers

Several communication towers were located within the study area. Communication towers may include a mix of cellular phone communications, microwave towers, and other similar electronic installations located throughout the study area. No AM or FM radio transmitters were identified within the study area. No AM radio transmitters were located within 10,000 feet of the study area. No FM radio transmitters were located within 2,000 feet of the study area. There are two cellular and 13 microwave installations on six communication towers located within the study area (Federal Communications Commission [FCC], 2018; 2021a; 2021b; 2021c).

2.1.2 Socioeconomics

The following is a description of the socioeconomic patterns in population and employment in Chambers County, Texas. The trend analysis is based upon the most recent United States Census Bureau (USCB) information for the years 2010 and 2020, in addition to 2018 Texas Demographic Center (TDC) population projections.

2.1.2.1 Population Trends

The population in Chambers County increased by approximately 33.2 percent between 2010 and 2020. By comparison, the population in state of Texas increased by approximately 15.9 percent between 2010 and 2020 (USCB, 2010a; 2010b; 2020a; 2020b).

According to TDC, the population in Chambers County is projected to increase by approximately 24.3 percent (2020 to 2030), 21.8 percent (2030 to (2040), and 20.9 percent (2040 to 2050). The TDC over predicted a population of 42,320 individuals within Chambers County in 2020, which was 4,431 individuals fewer than the recorded total population represented in the 2020 U.S. Census. By comparison, the population in the state of Texas is projected to increase by approximately 17.6 percent, 16.6 percent, and 16.4 percent, respectively, during the same periods. The TDC over predicted a population of 29,677,668 individuals within the state of Texas in 2020, which was 532,163 individuals more than the total population recorded in the 2020 U.S. Census (TDC, 2018; USCB, 2020a; 2020b). **Table 2-3** presents the past population trends and projections for Chambers County and for the state of Texas for the years 2010, 2020, 2030, 2040, and 2050.

Table 2-3. Population Trends

STATE / COUNTY	PAST		PROJECTED		
	2010	2020	2030	2040	2050
Texas	25,145,561	29,145,505	34,894,452	40,686,496	47,342,105
Chambers County	35,096	46,751	52,605	64,091	77,491
SOURCES: TDC, 2018; USCB, 2010a; 2010b; USCB, 2020a; USCB, 2020b.					

2.1.2.2 Employment

Between 2010 to 2020, the civilian labor force in Chambers County increased by approximately 34.6 percent (i.e., approximately 5,475 individuals). By comparison, the civilian labor force in the state of Texas increased by 18.8 percent (i.e., approximately 2,251,395 individuals) during the same period (USCB, 2010a; 2010b; 2020a; 2020b). **Table 2-4** presents the civilian labor force for Chambers County and the state of Texas for the years 2010 and 2020.

Between 2010 and 2020, the unemployment rate for Chambers County increased from 6.2 percent to 7.1 percent. By comparison, the unemployment rate for the state of Texas decreased from 7.0 percent to 5.3 percent during the same period (USCB, 2010a; 2010b; 2020a; 2020b). **Table 2-4** presents the employment and unemployment data for Chambers County and the state of Texas for the years 2010 and 2020.

Table 2-4. Civilian Labor Force and Employment

STATE/COUNTY	2010	2020
Texas		
Civilian Labor Force	11,962,847	14,214,242
Employed	11,125,616	13,461,358
Unemployed	837,231	752,884
Unemployment Rate	7.0%	5.3%
Chambers County		
Civilian Labor Force	15,815	21,341
Employed	14,842	19,786
Unemployed	973	1,504
Unemployment Rate	6.2%	7.1%
SOURCES: USCB, 2010a; 2010b; 2020a; 2020b.		

2.1.2.3 Leading Economic Sectors

In 2020, the occupation categories that employed the most people in Chambers County were management, business, science, and arts, followed by sales and office (USCB, 2020a; 2020b). **Table 2-5** presents the number of persons employed in each occupation category in Chambers County for the year 2020.

Table 2-5. Occupations in Chambers County

OCCUPATION	CHAMBERS COUNTY
Management, business, science, and arts	8,199
Service	2,034
Sales and office	3,810
Natural resources, construction, and maintenance	2,150
Production, transportation, and material moving	3,593
SOURCES: USCB, 2020a; 2020b.	

In 2010 and 2020, the industries that employed the most people in Chambers County were manufacturing, educational services, and construction (USCB, 2010a; 2010b; 2020a; 2020b). **Table 2-6** presents the number of persons employed in each industry in Chambers County for the years 2010 and 2020.

Table 2-6. Industries in Chambers County

INDUSTRY GROUP	CHAMBERS COUNTY	
	2010	2020
Agriculture, forestry, fishing and hunting, and mining	613	500
Construction	2,149	2,299
Manufacturing	2,655	3,788
Wholesale trade	549	783
Retail trade	990	1,884
Transportation, warehousing, and utilities	1,010	1,591
Information	219	135
Finance, insurance, real estate, rental, and leasing	515	1,148
Professional, scientific, management and administrative, and waste management services	1,264	1,462
Educational services, health care, and social assistance	2,990	3,498
Arts, entertainment, recreation, accommodation, and food services	545	1,528
Other services, except public administration	563	631
Public administration	780	539
SOURCES: USCB, 2010a; 2010b; 2020a; 2020b.		

2.2 RECREATIONAL AND PARK AREAS

2.2.1 National, State, County, and Local Parks

A review of federal, state, and local websites and maps, in addition to a field reconnaissance survey on August 1, 2022, identified no conservation easements or wildlife management associations in the study area (National Conservation Easement Database [NCED], 2022). Correspondence with the Natural Resources Conservation Service (NRCS) did not identify any USDA-NRCS conservation easements (see **Appendix A**). No national parks, wild and scenic rivers, national battlefields, or national historic sites open to the public are located within the study area (USNPS, 2022a; 2022b; 2022c). There are no TPWD parks or public hunting units located within the study area (TPWD, 2022a; 2022b). McLeod Park is the only county park identified in the study area and is located north of IH 10. McLeod Park is owned and operated by Chambers County.

2.2.2 Wildlife Viewing Trails

A review of the TPWD Great Texas Wildlife Trails Upper Texas Coast - Great Texas Coastal Birding Trail indicated that no trails were within the study area (TPWD, 2022c).

2.3 HISTORICAL AND AESTHETIC VALUES

2.3.1 Cultural Background

A records review of previously recorded archeological historic properties was conducted to determine the likelihood of impacts to cultural resources within the study area. The research was conducted using the THC TASA database, which contains published and unpublished data on prior cultural resources surveys, districts and properties listed in or eligible for the NRHP, SALs, OTHMs, cemeteries, and previously recorded archeological historic properties, including those listed in or eligible for listing in the NRHP or SAL designation (THC, 2022a).

2.3.2 Prehistoric

The cultural chronology of the Southeast Texas archeological region (Perttula, 2004) spans from when humans first spread throughout North America to the time of first contact with European explorers. Within this framework, and for the purpose of this project, six generalized time periods established for Southeast Texas by Ricklis (2004) and Story (1990) are synthesized to characterize the prehistoric cultural chronology of the region (**Table 2-7**).

Table 2-7. Southeast Texas Cultural Chronology

TIME PERIOD	YEARS B.P.[1]	YEARS B.C.[2] A.D.[3]
Late Historic	150 B.P. – present	A.D. 1800 – present
Early Historic	250 – 150 B.P.	A.D. 1700 – 1800
European Contact	450 – 250 B.P.	A.D. 1500 – 1700
Ceramic	1850 – 450 B.P.	100 BC – AD 1500
Archaic	8000 – 1850 B.P.	6050 – 100 BC
Paleoindian	pre – 8000 B.P.	pre – 6050 B.C.

NOTES:
1. B.P. – Before Present
2. B.C. – Before Christ
3. A.D. – *anno Domini* (after Christ)

2.3.2.1 Paleoindian Period

Although there is a growing body of evidence that challenges the previously held notions on the earliest human inhabitation of North America, the first undisputed evidence of an initial presence on the continent is the Paleoindian period, which dates from around 11,700-8000 B.P. (9750-6050 B.C.). The Paleoindian period is marked by the waning of the Pleistocene epoch approximately 11,700 years ago and is characterized by small nomadic bands who hunted now-extinct megafauna (e.g., mammoth, mastodon, bison, camel, and horse) using lanceolate-shaped

and fluted projectile points hafted to wooden spears thrown with atlatls. Paleoindian projectile point technologies include Clovis, Folsom, Dalton, Scottsbluff, Golondrina and Plainview. In addition to distinct projectile point types, Paleoindian hunter-gatherers produced a variety of other stone tools, including prismatic blades, flake tools, end scrapers and gravers. Although widely characterized as "big game hunters," Paleoindian hunters also relied on smaller game, such as deer, turtle, mice, raccoons, and frogs (Collins, 1995). The reliance on small game and plant foraging likely increased over time as the large megafauna died out due to the drier and warmer climate conditions of the Late Pleistocene and Early Holocene (Bousman, 2004).

Paleoindian site types in Texas include kill sites, quarries, caches, open campsites, burials or isolated surface artifacts and mixed assemblages (Collins, 1995; Hester, 1995). According to Fields and Tomka (1993), it is possible that the low artifact densities observed at Paleoindian sites may be attributed to the small population sizes and their large territorial ranges, which discouraged prolonged site occupation. In addition, the lack of a high density of Early Paleoindian artifacts could be due to the absence of high-quality lithic material in Southeast Texas. According to Story (1990), such materials are rare along the coast, except an outcrop of siliceous stone found on the Pisgah Ridge in Navarro County. A few exceptions include the Horn Shelter No. 2 (41BQ46) site near Waco and the McFaddin Beach site (41JF50) in Jefferson County, Texas. At 41BQ46, cultural materials including two Folsom points from excellent stratigraphic context and skeletal remains were recovered in contexts that date to the Paleoindian Period (Story, 1990). At 41JF50, over 166 artifacts had been recovered, including 14 Clovis points along the Gulf Coast shoreline, where the sea water level was lower during Paleoindian times (Ricklis, 2004).

The latter half of the Paleoindian period is distinguished from the preceding subperiod by the appearance of unfluted lanceolate dart points, including San Patrice, Scottsbluff, Plainview, and Angostura. These technological changes may have been in response to the gradual warming trend that began during the Late Pleistocene and continued until around 6050 B.P. Points from the Late Paleoindian period are just as uncommon across Southeastern Texas as those defining the earlier half of the period (Ricklis, 2004). Ricklis (2004) argues that since recovered points are often of high-grade lithic material, it can be concluded that there is a widespread movement of people and materials throughout the region and subsistence consisted of a mix of hunting and gathering.

2.3.2.2 Archaic Period

The Archaic period in Southeast Texas spans from 8000 to 1850 B.P. and is marked by the intensification of broad-spectrum foraging that developed during the Late Paleoindian period. Climate fluctuations resulting in periodic rises in sea level and variable resource availability also characterizes the period, which is divided into early, middle, and late subperiods correlating to these fluxes (Story, 1990). Additionally, more xeric climatic conditions facilitated the proliferation of desert plant species across Southeast Texas, which were intensively processed via earth oven cooking technology. These xeric conditions may have led to a decrease in population size during the Early Archaic (Aten, 1983; Patterson, 1996). In terms of tool technology, there is a shift to predominantly local lower-grade lithic materials, which in turn led to more expedient tool forms compared to the Paleoindian Period as Archaic tool technologies are more functionally varied with an increased number of styles tied to certain geographic areas (Story, 1990). The Archaic Period, especially the early Archaic, is poorly understood due to mixed assemblages. Due to the weak data, chronological interpretations of the period are based on projectile points, which are compared to points of other regions with well-established dates (Story, 1990).

Early Archaic

Like Paleoindian sites, few Early Archaic (circa 8000 to 6000 B.P.) sites have been found in well stratified or preserved contexts in Southeast Texas. This is especially true for coastal groups, where changes in sea levels have destroyed the context at sites like 41JF50 with exception to site 41WH19 located along the San Bernard River in Wharton County, Texas (Long, 1977; Story, 1990). However, radiocarbon dates from the site are unreliable due to their large standard deviations (Story, 1990). Lithic technologies of the Early Archaic were dominated by expanded-stem point types, including early side-notched Keithville, Neches River, and Trinity points, and the barbed Bell and Calf Creek points, unstemmed Tortugas and stemmed Wells points (Ricklis, 2004; Patterson, 1996). Patterson (1996) argues that the presence of Bell points found at site 41HR354 in Southeast Texas is indicative of "wide-ranging settlement or trade pattern(s)" for Native Americans utilizing this point type. It was likely that the that the Brazos River would have served as a natural trade route to disperse this Central Texas style throughout the Southeast (Patterson, 1996). Sites 41SP136, 41SPI53, 41NU266 and 41NU281 produced layers of oyster shell, which points to a subsistence on estuarine shellfish. Other faunal remains are absent along the coast during this period (Ricklis, 1995). The most common points of the period consist of Wells points, which have been found in association with Middle Archaic point types at Southeast Texas sites (Patterson, 1996). Two examples include site 41AU37, and the Owens site

(41HR315), where a Yarbrough and Wells point were found associated in the same stratum (Patterson, 1980).

Middle Archaic

The transition to the Middle Archaic subperiod (circa 6000 to 3450 B.P.) is marked by a decreased grinding of point basal edges, and an increased emphasis on thinner and smaller dart points, such as Yarbrough, Bulverde, Travis, and Pedernales (Ricklis, 2004; Patterson, 1996). The increasingly xeric climate may have influenced the broadening of Middle Archaic hunter-gatherers' subsistence patterns. One example is at site 41FB34, where a significant use of freshwater shellfish, in addition to a wide variety of animals were recovered in association with Pedernales points (Patterson and Hudgins, 1986). Another Middle Archaic shift was in the rise of cemeteries in the western part of Southeast Texas (Ricklis, 2004). The most notable cemetery site dating to the Middle Archaic is Ernest Witte (41AU36) (Ricklis, 2004). The extended burials classified as Group 1 were the earliest known example of orienting human skulls, which were oriented southeast. The few observed funerary goods included a Pedernales point and six long pointed bone objects (Story, 1990).

Late Archaic

By the Late Archaic in Southeast Texas (circa 3450 to 1850 B.P.), cemeteries become an essential part of the cultural tradition, populations increase and become less mobile with defined territories (Story, 1990; Ricklis, 2004). Patterson (1996) argues that multiple factors, such as a wetter and more productive climate, the migration of newcomers into the region, and the availability and adaption to a greater range of food resources are potentially responsible for an increasingly high population growth rate during the Late Archaic. Site 41AU36 Group 2 burials demonstrate the growing importance and increased sophistication of burials in the Late Archaic. The burials in Group 2 consisted of 145 individuals in 141 burials (often extended), half of which contained exotic burial goods, such as dart points, comer-tang knives, marine shell ornaments, ground stone gorgets, and boat stones (Story, 1990). In addition, the interred were extended, and facing northeast.

During the Late Archaic, there is growing evidence of violent deaths found at multiple sites (41AUT, 41AU36, 41FB42, 41WH14, and 41WH39) caused from projectile points, which may have resulted from inter or intra-group warfare (Patterson, 1996). Other major mortuary sites in the region include Rudy Haiduk (41KA23), Rodd Field (41NU29), and Blue Bayou (41VT94)

(Ricklis, 1999). Late Archaic point types include Kent, Gary, Ensor, and Godley (Ricklis, 2004) manufactured from local and poor-quality materials, which supports a lack of population movement during this subperiod (Ricklis, 2004). Stable carbon isotope analyses conducted on skeletal remains recovered from 41AU36 revealed a Late Archaic diet of deer, nuts, and C4 grasses (Huebner and Boutton, 1992; Patterson, 1996). Along the coastline, sites, such as 41GV53 and the Eagle's Ridge site (41CH252), indicate an intensive gathering of shellfish (i.e., oyster and *Rangia cuneata*) by 4500 B.P. Late Archaic sites along the coast demonstrate a predominance of shell middens as a response to the ecological changes potentially linked to rising sea levels (Ricklis, 2004).

2.3.2.3 Ceramic Period

The introduction of pottery to Southeast Texas marks the transition into the Early Ceramic Period (1850 to 1250 B.P.). It is generally accepted that ceramic technology came to Southeast Texas as the result of cultural diffusion from Louisiana and the Lower Mississippi Valley. The earliest pottery is found in the upper Texas coast, and consists of thick vessel walls, contorted, poorly wedged, and un-tempered paste characteristic of the Tchefuncte cast (Ricklis, 2004). Ceramics would not be introduced to inland Southeast Texas until much later. Goose Creek sandy paste pottery is the main ceramic type in the region and is utilized from the Early Ceramic through the Historic Period (Patterson, 1996). One rare subtype variety (Goose Creek Stamped) is temporally specific to the Early Ceramic Period (Aten, 1983; Patterson, 1996). In contrast to Tchefuncte cast, Goose Creek pottery was well-wedged, thin-walled, and composed of a homogenous sandy paste temper (Ricklis, 2004).

Due to a lack of lithic materials along the coast, smaller dart points (especially those made of bone) are common during the Early Ceramic Period (Patterson, 1996; Story, 1990). Populations continued the increasing trend from the Late Archaic for the same reasons, as well increased hunting efficiency from the early adoption of the bow and arrow (Patterson, 1996; Story, 1990). However, early adoption of the bow and arrow is not generally accepted, due to the mixed deposits of the source material (Ricklis, 2004). Another continuity between the Late Archaic and Early Ceramic Periods for coastal groups are settlement and subsistence patterns, which consisted mainly of brackish water clams (*Rangia* spp.) identified in shell middens along riverine estuaries and secondary bay margins (Ricklis, 2004).

The Late Ceramic Period in Southeast Texas (1250 to 450 B.P.) is marked by the transition towards small, expanded stem arrow point types, such as Alba, Catahoula, and Scallom points

(Ricklis, 2004; Patterson, 1996). According to Ricklis (2004) the Ceramic Period can be subdivided into an Early subperiod characterized by the introduction of the bow and Scallorn arrow points, and a Late subperiod, characterized by the Toyah Phase within the inland areas, and the Rockport phase along the coastal areas. Lithic technology during the Late subperiod consisted of Perdiz arrow points, blade-cores, thin bifacial knives, unifacial end scrapers, expanded base drills, and prismatic blades (Ricklis, 2004). These changes were likely spurned by environmental changes that brought bison back into the region, leading to technologies suited for procuring and processing bison (Ricklis, 2004; Story, 1990). The reliance on bison hunting is supported by lithics and bison faunal remains found at the White Oak Bayou site (41HR541), located in northwestern Harris County, Texas (McReynolds et al., 1988).

The Mitchell Ridge site (41GV66) located on Galveston Island serves as one of the best examples of Late Ceramic sites along the Gulf coast. The Early subperiod was represented at the site in both middens and a burial where two Scallorn points were associated with a semi flexed adolescent female (Ricklis, 2004). Mitchell Ridge differs from neighboring inland sites in that the faunal remains indicated a subsistence pattern of fish and deer instead of bison along with a scarcity of scrapers (Ricklis, 2004). Although Goose Creek pottery continued to be utilized, newer pottery forms, such as bone and grog tempered pottery were developed and utilized to make jars, bowls, and constricted neck ollas. In addition, the decorative horizontal bands present along the exterior rims of pottery are wider than their Early Ceramic predecessors (Ricklis, 2004).

Sites 41B02, 41GV5, 41HR80, and 41GV66 give an insight to coastal burial practices (Patterson, 1996). At the Harris County Boys' School site (41HR80), burials were complex, and consisted of semi flexed or flexed burials placed on side positions facing in a variety of directions (Patterson, 1996). An abundance of grave goods were documented at the site and included marine shell pendants and beads, bone dice, bird bone flutes, awls, fishhooks, projectile points, and a potential rattle. Burial sites are also present along the inland sites (41HR5, 41HR7, 41HR273, and 41WH19) but do not appear associated with mortuary tradition (Patterson 1996).

2.3.3 Post Contact

In 1519, Francisco de Garay, the Spanish governor of Jamaica, sent Alonso Álvarez de Pineda on an exploratory expedition to the Gulf Coast (Chipman, 1992). Though none of the crew set foot on Texas soil, Pineda and his men sailed from Jamaica through the Yucatán Channel to southern Florida and proceeded to map the shoreline along the coast of Northeastern Mexico and Texas with relative accuracy (Chipman, 1992; Freeman, 1990). In 1528, two makeshift barges

carrying several dozen Spaniards wrecked on the Texas coast near Galveston Island. The group were members of a failed expedition led by Panfilo de Narváez to colonize Florida (Chipman, 1987). Alvar Nuñez Cabeza de Vaca was among the marooned crewmembers and spent the subsequent eight years wandering across the state, living as a trader among local indigenous groups (Freeman, 1990). Cabeza de Vaca and three additional survivors ultimately made their way to Mexico, where they recounted the earliest recorded information on the flora, fauna, and topography of Texas (Chipman, 1987).

Despite the extensive inventory of resources documented in Texas by Cabeza de Vaca and his counterparts, Spain made no attempts to establish permanent settlements in the region until the 17th century. This was caused by the Spanish government viewing the de Narvaez, de Soto, and other excursions as failures (Freeman, 1990). For Indigenous groups, this period contains many continuations of Late Ceramic period tool and subsistence adaptions observed by encroaching Europeans. A variety of bone tools (e.g., needles, fishhooks, pins, awls, and projectile points) have been found at both coastal (41GV66) and inland sites (Patterson, 1996). Cabeza de Vaca, a European explorer and trader, confirmed that there was infrequent trade between coastal and inland groups due to persisting hostilities (Patterson, 1996). Due to interactions with Europeans, Southeast Texas indigenous peoples gradually adopted some European traditions, such as replacing bone with metal and glass to produce projectile points (Turner et al., 2011).

Spanish interests in Texas were bolstered by news that French explorer René-Robert Cavalier, Sieur de la Salle had landed at Matagorda Bay in 1685, initially with the intention of establishing a military colony near the mouth of the Mississippi River (Foster, 2015). Due to navigational errors, La Salle and his men overshot the Mississippi River and ran aground on the Texas coast. The group subsequently established Fort Saint Louis near Garcitas Creek in present-day Victoria County and La Salle set off with an exploration party in search of the Mississippi River (Bruseth and Tumer, 2005). During La Salle's search for the Mississippi, the remaining settlers at Fort Saint Louis were subjected to bouts of disease and defense attacks by local Indigenous populations, such as the Karankawa in 1688 (Bruseth and Turner, 2005). Gilmore (1986) confirmed the location of Fort Saint Louis (41VT4) in 1973, and in 1996 THC archeologists discovered seven cannons buried by La Salle's crew, salvaged from the wreckage of L'Aimable (Bruseth and Turner, 2005).

The French incursion into territory claimed by Spain renewed the latter's interest in colonizing Texas. Alonso de León consequently led a series of expeditions to find Fort Saint Louis beginning

in 1686 (Chipman, 1995). De Leon successfully relocated the remnants of the fort in 1689 and returned to Texas the following year to establish Mission San Francisco de los Tejas in east Texas between the Trinity and Neches rivers (Bolton, 1912). The purpose of the mission was twofold: it served as a buffer between Spanish territory in Texas and French territory in Louisiana but was also intended to extend the reach and favorable influence of Spain over all Indians from Coahuila to Texas (Chipman, 1995). Once Christianized, the Spanish assumed native groups would act as loyal Spanish citizens to protect the frontier from foreign incursions (Walter, 2007). Despite these intentions, Mission San Francisco de los Tejas was abandoned in 1693 due to rising tensions between the occupying Spanish soldiers and local Hasinai groups.

2.3.4 Previous Investigations

Early Historic Period

The Early Historic Period (250 to 150 B.P.) represents a renewed interest in Texas by the Spanish, and the development of Texas as a Spanish Colony. Following the abandonment of Mission San Francisco de los Tejas, Spain did not pursue the establishment of any additional missions in Texas for roughly 20 years (Campbell, 2003), Father Francisco Hidalgo, a Franciscan priest who had served at Mission San Francisco de los Tejas prior to its abandonment, renewed Spanish interests in Texas settlement by appealing to French colonists in Louisiana to establish missions in East Texas, consequently reinvigorating the sense of a "French threat" among the Spanish colonial administration in Northern Mexico. In 1711, Father Hidalgo sent a letter to the French governor of Louisiana, Antione Laumet, Sieur de Cadillac, encouraging him to establish French missions among the Caddo (Campbell, 2003). When the letter finally reached Laumet in 1713, he was incentivized by the prospect of trade with the Caddo and subsequently charged Louis Juchereau de Saint-Denis to petition the Spanish government for assistance in creating an East Texas mission. In 1716, Saint-Denis returned to East Texas, accompanied by Captain Domingo Ramón and Spanish soldiers, priests, and colonizers intent on maintaining a Spanish presence in the region. The Ramón expedition founded four missions and a presidio in East Texas and present-day Louisiana, and Mission San Antonio de Valero soon followed (circa 1718) to serve as a halfway point between the East Texas missions and those in the Rio Grande Valley (Campbell, 2003).

Several of the missions located on the eastern margin of Spanish territory were abandoned in 1719 after a brief war broke out between Spain and France near the disputed frontier zone. The inhabitants fled to San Antonio, but the missions were reestablished shortly thereafter by the

Aguayo expedition (Campbell, 2003). Between 1722 and 1731, five additional missions were founded near present-day San Antonio, including San José y San Miguel de Aguayo, San Francisco Xavier de Najera, San Juan Capistrano, San Francisco de la Espada, and Nuestra Señora de la Purisima Concepción (Walter, 2007). Also, in 1722, Mission Nuestra Señora del Espíritu Santo de Zúñiga was founded on the banks of Garcitas Creek near the site of the former failed French colony of Fort St. Louis (on top of which a presidio was built in 1721). The mission was established to serve as a buffer along the east coast.

Attempts to formalize Spanish control over east Texas intensified during the mid-18th century (Freeman, 1990). An expedition by Captain Joaquin Orobio Bazterra (stationed at Presidio Nuestra Senora de Loreto) was authorized in response to the French presence in east Texas, which consisted of the establishment of trading posts in the region (Freeman, 1990). The initial expedition (1745-1746), which confirmed the French presence in Texas, was followed by one in 1748 to explore coastal areas lying between the Trinity and Guadalupe Rivers and determine if there were potential areas to settle (Freeman, 1990). In 1756, mission Nuestra Senora de la Luz was established to protect Spanish interests in east Texas. Conditions at the mission were turbulent and included infighting between the Spanish, which resulted in a significant portion of the complex being burned down. The final straw for the mission came in 1766, when a hurricane severely damaged most of the mission (Freeman, 1990). In 1773, all of east Texas was abandoned by the Spanish, who drew the east-most boundary lines for Spanish settlement at San Antonio. However, Spanish settlers, who were already residing in East Texas persuaded the King of Spain to return to the area. Initially, a new mission, Nuestra Senora del Pilar de Bucareli, was established in 1774. The residents eventually abandoned the mission due to floods, fires, and Comanche attacks, and reestablished their community in modern-day Nacogdoches. The community would eventually serve as a gateway to reach more eastern parts of Texas and as an important trade post with Eastern Indigenous tribes (Freeman, 1990).

Late Historic Period

The Late Historic Period (150 B.P. to Present) is marked by waning Spanish influence in Texas, and a growing Anglo-American influence in Texas. This transition began in 1803, when the Spanish ceded their claim on Louisiana Territory to the French, who in tum sold it to the U.S. (Freeman, 1990). This led to increased Anglo-American presence in the region. Spain faced a series of naval and other battle losses that culminated with Napoleon Bonaparte deposing King Ferdinand VII and occupying Spain in 1808 (Henderson, 2009). During the French occupation of

Spain, the Mexican Revolution (1810-1821) broke out in the name of King Ferdinand VII (Henderson, 2009). During these tumultuous times, American and French colonists started to settle east Texas and supported Mexican Republicans (Freeman, 1990). These Anglo-American adventurers were called "filibusters", who had come to Texas in order to make a living for themselves. It was by these filibuster expeditions that the first Anglo Americans explored parts of what is now Harris County (Feik et al., 1977). One notable filibuster was Jean Lafitte, who established a self-sufficient government on Galveston Island between 1816 and 1817 (Freeman, 1990). The increasing occurrence of filibusters coming into Texas suggested that the Spanish had difficulty maintaining and controlling their borders (Freeman, 1990). In 1821, Agustin de Iturbide joined forces with Vicente Guerrero and enacted his Plan de Iguala, which cemented Mexico's independence from Spain.

This remainder of this section contains an excerpt from the Handbook of Texas Online search for "Chambers County" (Kleiner, 2020) to characterize the historic context of the study area and surrounding region.

Chambers County

Chambers County, named for Thomas Jefferson Chambers is a rural county less than twenty miles east of Houston in the Coastal Prairie region of Southeast Texas. The county is divided by the Trinity River. The Union Pacific provides railroad service, and IH 10 was built through the county in 1955. Archeological excavations in the county have produced artifacts dating to A.D. 1000. Karankawa, Coapite, and Copane Indians lived in the area when the first expeditions traveled the lower Trinity River. The land that became Chambers County formed part of the Atascosito (or lower Trinity River) District, a subdivision of Nacogdoches in Spanish Texas. By the late seventeenth century the French intruded on Spanish interests by trading with the Indians as far as the Sabine River. French trader Joseph Blancpain's expedition to the area along Galveston Bay and the lower Trinity in 1754 provoked Spanish efforts to protect the region with a system of missions guarded by adjoining presidios. In 1756 Spanish missionaries established Nuestra Señora de la Luz Mission near the site of present Wallisville, and, to gain strategic control of the lower Trinity, soldiers constructed San Agustín de Ahumada Presidio on its east bank near what is now the Chambers-Liberty County line. Missionaries worked with Orcoquiza Indians who inhabited the region. After the 1763 Treaty of Paris removed the French threat by awarding Louisiana to the Spanish, storms and constant Indian hostility

resulted in removal of the missions to another location in 1766 and abandonment of the settlements by 1772. In 1805 Spanish troops landed at what is now Smith's Point to reinforce the Atascosito ("Marshy") community, but by 1812 few Spanish settlers had moved into the region. It was subsequently used by filibusters as a staging ground to mount attacks against Spanish Mexico.

By the early 1800s, Alabama and Coushatta Indians had arrived in the area from Alabama, assimilated the local Bidais and Orcoquizas, taken over their livestock trade with settlers along the Atascosito Road, and planted crops. A colony of French exiles from Napoleon's Grand Army under Charles François Antoine Lallemand, planning to free Napoleon and put his brother Joseph on the Mexican throne, attempted to establish themselves near the site of present Anahuac in 1818, but were driven out by the Spanish. Jean Laffite left the area permanently around 1820.

Mexican influence in the area increased after the Mexican war of independence from Spain in 1821, and Mexican place names replaced many earlier designations. In 1825 Perry's Point, the principal port of entry for the colonial grant, was renamed Anahuac, after the ancient capital of the Aztecs. American settlement began in 1821 at the invitation of the Mexican government. Some of Laffite's men stayed, and empresarios Haden Edwards, Joseph Vehlein, David G. Burnet, and Lorenzo de Zavala received grants in the area. A major part of what is now Chambers County became Vehlein's grant. T.J. Chambers received land for serving as chief justice of the Supreme Court of Coahuila and Texas and, in 1829, as surveyor general. Chambers's home, built in 1835, today houses the county library. Other early settlers, largely from southern and western Louisiana, included Peter Ellis Bean, James Morgan, James Taylor White, and the Wallis family, which settled at the future site of Wallisville. White is believed to have introduced a herd of longhorn cattle at Turtle Bayou in 1827; other farmers raised rice and cotton, and the lumber industry became important by the 1850s. Antebellum education in Chambers County was private.

Struggles between Anglo settlers and Mexican authorities increased as officials sought to prevent further immigration from the United States and maintain control. The Mexican government established Fort Anahuac in 1830 and gave command of the port at Anahuac to John Davis Bradburn, whose difficulties with the settlers culminated in the Turtle Bayou Resolutions and the eventual withdrawal of the Mexican garrison. Bradburn also

arrested Francisco I. Madero, whose commission was to grant land titles to American immigrants. In a further foreshadowing of the Texas Revolution, discontented settlers rose against Mexican rule in 1835 in a conflict set off by disagreements over Mexican tariff policy. At the same time, others chose to get along with a lax Mexican government that levied no taxes and frequently failed to enforce the law. A substantial number of these moved eastward during the Texas Revolution.

In the 1840s, the western edge of the future county was developed. Among those who acquired land was Sam Houston, who established a home at Cedar Point around 1837. The first post office was established at Anahuac, then known as Chambersea, in 1844. When the area became part of Liberty County after independence, land quarrels broke out, among them the notorious conflict between Charles Willcox and Chambers, who, with property valued at more than half a million dollars by 1860, was the county's wealthiest resident.

Chambers County was formed in 1858 from Liberty and Jefferson counties and organized the same year with Wallisville as its county seat. By 1860, census returns reported merino sheep, 26,632 cattle, and 344 slaves countywide, a reflection of the importance of livestock in the local economy. Of sixty families that owned slaves in 1859, John White held thirty-three, and twelve families among the remainder owned more than ten. Cotton growing increased in the antebellum period, but by 1860 only 100 cotton farmers operated in a county population of 1,508. Industry was confined to a steam sawmill and a shipyard.

Chambers County residents voted 109 to 26 for secession, and many participated in the ensuing conflict. The Liberty Invincibles, formed in 1861, joined Company F of the Fifth Regiment of Texas Volunteers. Others joined the Twenty-sixth Regiment of Texas Cavalry, the Moss Bluff Rebels, which became Company F of the Twenty-first Regiment of Texas Cavalry, or Company B of the Texas State Troops. Fort Chambers was established by Confederate troops in 1862 to protect the Gulf Coast, and Union troops reached Liberty by July 1865, but no major fighting occurred in Chambers County.

During Reconstruction the county began to recover from the hardships of war, but by 1870 its population had dropped to 1,503, below the prewar total. Roughly one-third of this number were Black, and as many as 15 African Americans were property owners. The Freedmen's Bureau opened a Black school at Wallisville in 1869, and other Black and

White schools opened in 1871. By 1898 13 White schools were operating with an enrollment of 324, and 10 Black schools with 211. Local politics reflected a struggle for control between those seeking to institute reforms and others resistant to change. Among the most notable incidents was General Joseph J. Reynolds's attempt in 1869 to remove county and city officials who did not qualify under the Iron Clad Oath. Other conflicts arose from Ku Klux Klan opposition to the Union League, which sought to enroll Black voters, and from other opposition to improvements in the lives of former slaves. In 1876 the election of local officials reflected passage of a new Texas constitution that overturned many Radical Republican reforms. Thereafter, the white primary and the poll tax remained as obstacles to civil rights.

The opening of a meat-packing plant in Wallisville in the 1870s reflected the continuing importance of ranching in the Chambers County economy, though many cattlemen drove their herds north to Kansas City or shipped them after railroad service reached the area. The Whites and Jacksons maintained large ranches, and James Jackson introduced wire fencing on 26,000 acres in 1882. Price declines after the Civil War kept cotton farming to a minimum. Brickmaking on Cedar Bayou supported a Galveston building boom in the 1870s, while other manufacturers turned to boatbuilding, particularly at the Turtle Bayou Shipyard. The lumber industry centered at Wallisville helped that city to grow in the 1880s and 1890s, while Anahuac remained unoccupied.

Because railroad routes reached no farther than the county's eastern and western borders by the 1890s, with the exception of a single branch line that provided freight service to the interior, Chambers County remained isolated and dependent on steamer traffic and other water transportation to Galveston. No important towns developed in the county until 1896, when settlers from the Midwest, who also developed the port at Bolivar, helped to complete the Gulf and Interstate Railway from Beaumont to Bolivar Peninsula. Later, important railroad towns developed at Winnie and Stowell, in the extreme northeastern part of the county. Railroads in the western part of the county were first built from Dayton to the Goose Creek oilfield by Ross S. Sterling and later taken over by the Southern Pacific.

A disastrous fire at the county's wooden courthouse destroyed early records in 1875, hurricanes in 1875 and 1900 damaged crops and livestock, and a smallpox epidemic in 1877 killed many residents. Though some farmers left Chambers County after the 1875

hurricane, total farms increased from 146 to 327 between 1870 and 1900. In the latter year the total acres in farms reached 366,436; farm value had increased tenfold in the previous 10 years. General prosperity resulted in a near doubling of the population between 1880 and 1910 from 2,187 to 4,234. In 1900 county farmers owned a total of 49,000 cattle, the highest in the county's history.

Between 1910 and 1930, tenant farmers increased from roughly 27 percent to more than 35 percent of all farmers. Mules in use as draft animals reached a high of 1,022 in 1920. In the early 1900s, canal development by the Lone Star Canal Company and other firms enabled some farmers to begin rice farming, while others in the eastern part of the county turned to truck farming. A total of 210,000 barrels of rice was harvested in 1903, and significant quantities of sweet potatoes, Indian corn, and sugar were produced by 1910. Lumber peaked at Wallisville in 1906 but declined during the panic of 1907. The largest local mill and the community's only important industry, Cummings Export Lumber Company, built by the Cummings brothers in 1898, closed in 1915 when another major hurricane blew through.

In 1906, Wallisville adopted a stock law to prevent pigs from running loose. Anahuac had become a boomtown. In 1908, Anahuac supporters filed suit and, in spite of Wallisville's genteel swine law, succeeded in making their town the county seat. Efforts to dissolve the county itself were made in 1915, 1923, and 1925 as conflicts developed over stock laws, prohibition, and the county seat question; these were complicated by offers of lower taxes from Harris and Liberty counties, whose officials hoped to cash in on Chambers County oilfields.

Despite increased agricultural production, the Chambers County population declined from 4,234 to 4,162 between 1910 and 1920, then rose again to reach a high of 5,710 by 1930 as a growing oil boom brought new residents to the area. Barbers Hill oilfield, developed after 1918, reached its peak production of 8,082,000 barrels in 1933; the field was later serviced by five pipelines. Oilfields were subsequently discovered at Lost Lake, Anahuac, Monroe City, and Turtle Bay, and near Hankamer, and gas reserves were developed in the eastern part of the county. Oil production provided jobs and revenue that helped the county weather the Great Depression with relatively little discomfort and brought in workers who increased the population to 7,511 by 1940. Transportation gains after 1926 included the extension of SH 146 from Anahuac to Stowell.

During World War II, many Chambers County residents found employment in refineries and shipyards at Baytown, Houston, Beaumont, Port Arthur, and Orange. After September 1943 rice farmers employed German prisoners of war from camps in Liberty and Chambers counties. The establishment of the Fraternity of the White Heron, the Forward Trinity Valley Association, the Texas Water Conservation Association, and the Chambers-Liberty County Navigation District advanced area water interests, including the dredging of a channel from the Houston Ship Channel to Smith Point, Anahuac, and Liberty. The Trinity Bay Conservation District was started in 1949. Major highway improvements were made to Farm roads 563 and 565 and SH 73, later IH 10.

After the war the population grew to 7,871 by 1950 and 10,379 by 1960. By 1959, county farms totaled 483, of which roughly 62 percent were commercial and only 12.4 percent tenant-operated. Mining, contract construction, wholesale distribution, petroleum extraction, and natural-gas production were the chief county industries. Only four manufacturing firms were operating, among 112 mining and mineral establishments. By 1966, though the overall population continued to increase, no populated place in Chambers County had as many as 2,500 inhabitants; 22.5 percent of the population was described as living in poverty; and the population density was only 19 persons per square mile. In this period, many Black residents left for jobs in urban areas.

Growing national support for environmental preservation and passage of the 1967 National Environmental Policy Act had important effects on Chambers County. Relying upon an earlier study by the USACE in preparation for the construction of a saltwater barrier across the Trinity River to aid rice farmers, improve river navigation, and provide increased water supplies for adjacent counties, in 1960 state legislators proposed a 23,200-acre reservoir and wildlife refuge that would inundate Wallisville. Despite protests, engineers purchased the townsite, the plan was approved in 1962, and work began. Excavations led to the unearthing of a primitive burial site and other historic discoveries. Ultimately, the project drew the interest of the Sierra Club, and other environmental groups, in addition to a representative of the commercial shrimping industry filed suit against several state and national agencies. In 1973, a U.S. district judge ordered construction stopped, when the project was 75 percent complete. The USACE eventually wrote off the $23 million investment and in 1977 recommended a smaller project. Wallisville Heritage Park, established in 1979, henceforth preserved the townsite and some of the community's historic buildings.

Between 1970 and 1980, the rural population of Chambers County grew 52 percent, and in the early 1980s the total county population was 19,100. People of English origin comprised 27 percent, Irish 17 percent, French 6.5 percent, African American 14 percent, and Hispanic 3 percent. Forest products and cattle, along with rice and soybeans, potatoes, peaches, and pecans constituted the county's principal products. A total of 288 business establishments operated countywide, including 16 manufacturing establishments with 400 employees. Oil and gas extraction, agribusiness, petroleum refining, and the manufacture of plastics and resins topped the list of industries. The proximity to Houston enabled many residents to commute to jobs in that city. In the late 1980s, after a number of petroleum-industry-related accidents nearby, residents of Mont Belvieu were moved and the community was purchased by oil companies, which rebuilt it at another location. The county's three school districts included four elementary, three middle, and three high schools. Whereas in 1960, 10 percent of the population had completed high school and fewer than 3 percent had completed college, 57.5 percent of the county population had completed high school and 10 percent had finished college in 1982. By 1990, the county's population had grown to 20,088.

Incorporated communities in Chambers County include Anahuac (population, 2.288), the seat of government; Beach City (2,365); Cove (505); Mont Belvieu (4,418); Stowell (1,839); Old River-Winfree (1,248); and Wallisville (300). Several important wildlife areas are located in Chambers County, including Moody National Wildlife Refuge and Anahuac National Wildlife Refuge, at the juncture of Oyster Bay and East Bay. Lake Anahuac and Fort Anahuac Park were built in the 1940s, H. H. (Hub) McCollum Park in 1959, and Whites Park in 1965. The Texas Rice Festival, which began in 1969, is celebrated annually at Winnie-Stowell in September.

2.3.5 Records Review

Previous Archeological Investigations

According to a review of the TASA database on November 16, 2022, a total of four archeological historic properties, all of which have an undetermined NRHP eligibility, and one cemetery, are documented in the study area. In addition, the TASA records search revealed that approximately 14 percent of the study area has undergone previous archeological investigations. A list and description of the archeological historic properties and cemetery documented in the study area is provided below in **Table 2-8** followed by the historic-age resources in **Table 2-9**.

Table 2-8. Archeological Historic Properties and Cemeteries Documented within the Study Area

RESOURCE ID	RESOURCE TYPE	CHRONOLOGY	RESOURCE DESCRIPTION	NRHP/ SAL ELIGIBILITY	YEAR RECORDED
41CH394	Historic-age artifact scatter	Early to mid-20th century	Ceramic, glass, and metal fragments. Brick and a possible well-head	Undetermined	2014
41CH399	Historic material scatter	Mid-20th century	Exposed pipe in concrete. Brick fragments and nails	Undetermined	2012
41CH400	Historic dwelling	Early to mid-20th century	Pier and beam foundation with chimney remnant. Glass, metal, and ceramic artifacts	Undetermined	2016
41CH401	Industrial	Historic	Concrete features associated with several historic oil drilling platforms	Undetermined	2017
Benjamin F. Fisher Cemetery	Cemetery	1898	Vicinity boundary of a three-grave cemetery	NA	NA
SOURCE: THC, 2022a.					

Historic Period Sites

The TASA records show an OTHM, Barbers Hill Oil Field, documented within the study area (**Table 2-9**). No state historical sites, century farms or ranches are mapped in the study area.

Table 2-9. NRHP Properties/Districts, OTHMS and Cemeteries Documented in the Study Area

RESOURCE ID	RESOURCE TYPE	CHRONOLOGY	RESOURCE DESCRIPTION	YEAR RECORDED
Barbers Hill Oil Field	Historic Marker	1889	Early oil field	1977
SOURCE: THC, 2022a.				

Barbers Hill Oil Field

The OTHM for Barbers Hill Oil Field is located on the west side of SH146 and approximately 2 miles north of IH 10 in Mont Belvieu. The majority of the oil field itself is located to the north of the historical marker and outside of the study area. The following is a description of Barbers Hill Oilfield from the historical marker text: