



Item 12: Port Lavaca Area Improvement Regional Planning Group Project

Woody Rickerson

Vice President, Grid Planning and Operations

Special Board of Directors Meeting

ERCOT Public

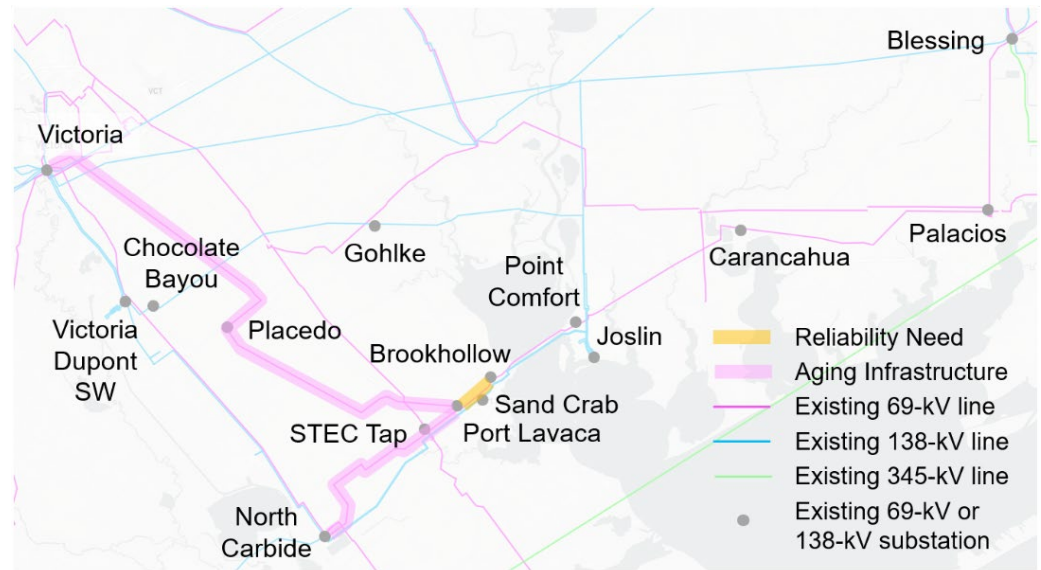
October 22, 2021

Action

- At the conclusion of this presentation the Board of Directors will be asked to endorse the Port Lavaca Area Improvement Regional Planning Group (RPG) Project based on NERC and ERCOT reliability planning criteria

Port Lavaca Area Improvement Project

- American Electric Power (AEPSC) submitted the Port Lavaca Area Improvement project for Regional Planning Group review
- The purpose of the project is to address reliability needs and aging infrastructure in the area



ERCOT Independent Review

- ERCOT performed an independent review of the project and identified **NERC and ERCOT reliability planning criteria violations** without a project.

	Thermal Overloads	Aging Infrastructure
Total	4 miles 69-kV	41 miles 69-kV (built in 1949~1953)

- ERCOT analyzed six project options and short-listed three options to resolve the planning criteria violations and address aging infrastructure

Comparison of Project Options

- ERCOT recommended Option 2EA, which provides better operational flexibility, supports future system improvement needs, and has less impact to customers under outage conditions

	Option 1	Option 2EA	Option 4EA
Met ERCOT and NERC Reliability Criteria	Yes	Yes	Yes
Improved Operational Flexibility (Planned Maintenance Outages)	Yes	Better	Yes
Require CCN (miles)	2	2	2
Voltage conversion from 69-kV to 138-kV	No	Yes	Yes
Capital Cost Estimates	\$97.5 M	\$101.5 M	\$76.4 M

Tier 1 Project Requirements

- Pursuant to Protocol Section 3.11.4, *Regional Planning Group Project Review Process*:
 - Projects with an estimated capital cost of \$100 Million or greater are classified as Tier 1 projects
 - Tier 1 projects require ERCOT independent review
 - Whether the proposed project is needed
 - Whether the proposed project is the preferred solution to the identified system performance deficiency that the project is intended to resolve
 - Tier 1 projects require Board endorsement

Basis for Board Endorsement

- ERCOT's independent review identified a reliability need for the Port Lavaca Area Improvement Project to satisfy:
 - NERC TPL-00104 Table 1 reliability criteria
 - ERCOT Planning Guide Section 4.1.1.2 Reliability Performance Criteria
- ERCOT's independent review identified Option 2EA as the best project to satisfy the reliability criteria and address aging infrastructure

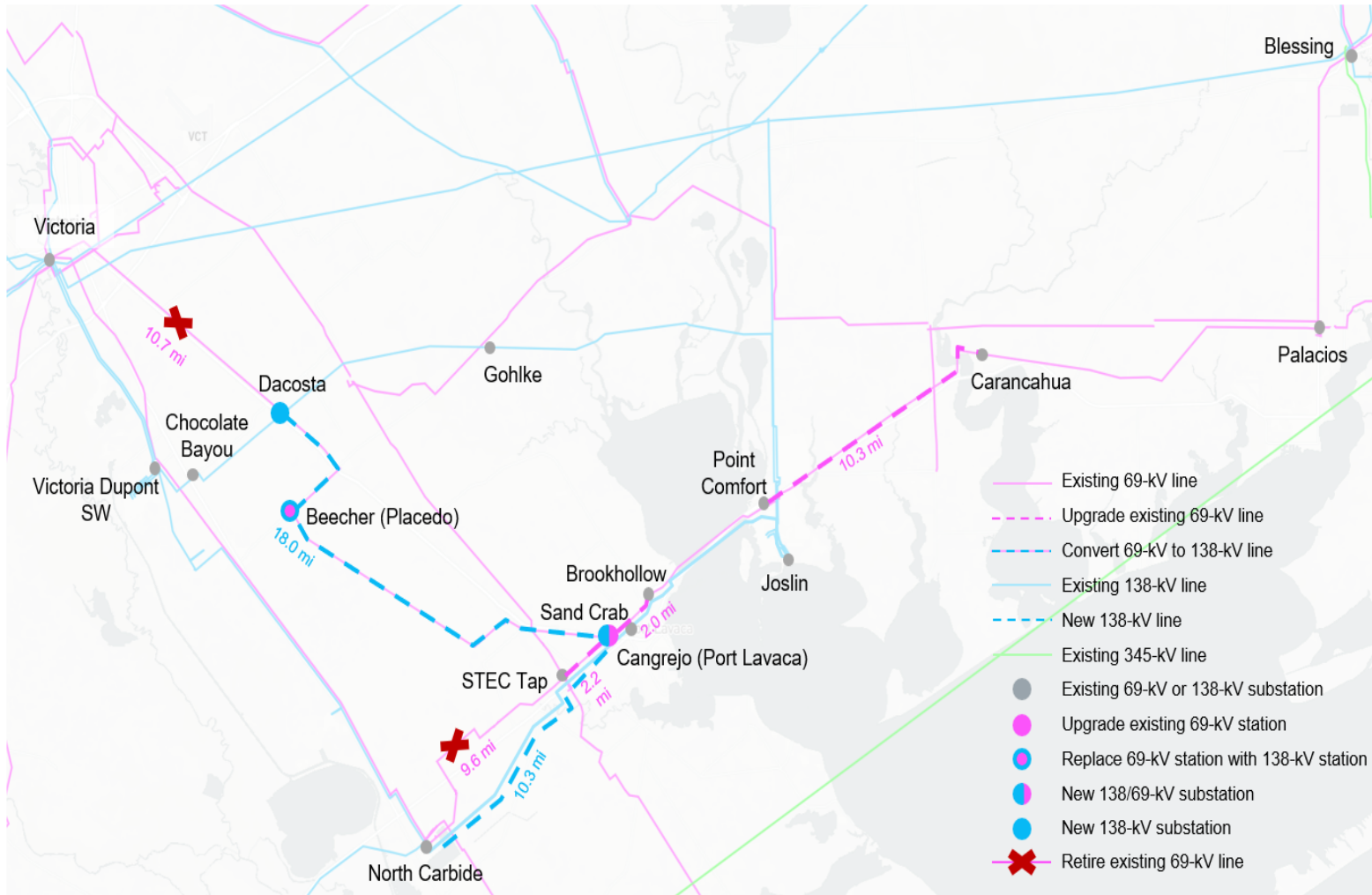
TAC Endorsement

- ERCOT presented the project to the Technical Advisory Committee on September 29, 2021
- TAC voted unanimously to endorse the project (Option 2EA)

Request for Board Vote

- ERCOT staff requests and recommends that the Board of Directors vote to endorse the need for the Port Lavaca Area Improvement Project (Option 2EA) based on NERC and ERCOT reliability planning criteria

Questions?



ERCOT Recommendation: Option 2EA

- Rebuild the existing Brookhollow - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.0 miles)
- Rebuild portion of the existing Point Comfort - Carancahua 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.0 miles)
- Construct a new Cangrejo 138/69-kV substation to replace the existing Port Lavaca 69-kV substation and install a new 138/69-kV transformer
- Rebuild a portion (STEC Tap - Cangrejo) of the existing North Carbide - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV, (2.2 miles)
- Retire the existing North Carbide - STEC Tap 69-kV line, (9.6 miles)
- Rebuild a portion of the existing North Carbide - Sand Crab 138-kV line to form a double-circuit 138-kV line (10.3 miles):
- Construct a new Beecher 138-kV substation to replace the existing Placedo 69-kV substation
- Construct a new Dacosta 138-kV, three breaker ring bus, substation at the intersection of the existing Chocolate Bayou - Gohlke 138-kV line and the existing Cangrejo (Port Lavaca) - Victoria 69-kV line
- Loop the existing Chocolate - Gohlke 138-kV line into the new Dacosta 138-kV substation
- Rebuild and convert a portion of the existing Cangrejo (Port Lavaca) - Victoria 69-kV line to 138-kV line using 2000 A conductor and terminate at the new Dacosta 138-kV substation (18 miles)
- Retire the remaining 69-kV line from Victoria going toward Dacosta, (10.7 miles)



Date: October 15, 2021
To: Board of Directors
From: Woody Rickerson, Vice President, Grid Planning and Operations
Subject: Port Lavaca Area Improvement Regional Planning Group Project

Issue for the ERCOT Board of Directors

ERCOT Board of Directors Meeting Date: October 22, 2021

Item No.: 12

Issue:

Whether the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT) should accept the recommendation of ERCOT staff to endorse the need for the Port Lavaca Area Improvement Regional Planning Group (RPG) Project in order to meet the reliability requirements and address aging infrastructure for the ERCOT System, which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted unanimously to endorse.

Background/History:

American Electric Power Services Corporation (AEPSC) submitted a proposed project for RPG review to address potential reliability needs driven by the expected load growth and aging infrastructure associated with the existing 69-kV facilities in the Port Lavaca area.

ERCOT performed an independent review of the proposed project and confirmed the reliability need for transmission system improvements based on North American Electric Reliability Corporation (NERC) and ERCOT reliability planning criteria. Based on its independent review, ERCOT recommends the following transmission upgrades (Option 2EA):

- Rebuild the existing Brookhollow - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.0 miles)
- Rebuild portion of the existing Point Comfort - Carancahua 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.0 miles)
- Construct a new Cangrejo 138/69-kV substation to replace the existing Port Lavaca 69-kV substation and install a new 138/69-kV transformer
- Rebuild a portion (STEC Tap - Cangrejo) of the existing North Carbide - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.2 miles)
- Retire the existing North Carbide - STEC Tap 69-kV line, (9.6 miles)
- Rebuild a portion of the existing North Carbide - Sand Crab 138-kV line to form a double-circuit 138k-kV line (10.3 miles)
- Construct a new Beecher 138-kV substation to replace the existing Placedo 69-kV substation
- Construct a new Dacosta 138-kV, three breaker ring bus, substation at the intersection of the existing Chocolate Bayou - Gohlke 138-kV line and the

- existing Cangrejo (Port Lavaca) - Victoria 69-kV line
- Loop the existing Chocolate - Gohlke 138-kV line into the new Dacosta 138-kV substation
- Rebuild and convert a portion of the existing Cangrejo (Port Lavaca) - Victoria 69-kV line to 138-kV line using 2000 A conductor and terminate at the new Dacosta 138-kV substation (18 miles)
- Retire the remaining 69-kV line from Victoria going toward Dacosta (10.7 miles)

The estimated cost for these improvements is \$101.5 Million.

The report describing the ERCOT Independent Review of the Port Lavaca Area Improvement Regional Planning Group Project, including ERCOT staff's recommendation for Option 2EA, is attached as **Attachment A**.

Key Factors Influencing Issue:

1. Transmission system improvements are needed to meet reliability planning criteria and address aging infrastructure for the Port Lavaca area in Calhoun and Victoria counties.
2. The recommended set of improvements was found to be the most efficient solution for meeting the planning criteria and addressing aging infrastructure.
3. Protocol Section 3.11.4.7 requires Board endorsement of a project with an estimated capital cost of \$100 Million or greater.
4. TAC voted unanimously to endorse the Port Lavaca Area Improvement Regional Planning Group Project (Option 2EA) on September 29, 2021.

Conclusion/Recommendation:

ERCOT staff recommends that the Board endorse the need for the Port Lavaca Area Improvement Regional Planning Group Project (Option 2EA), which ERCOT staff has independently reviewed and which TAC has voted unanimously to endorse, based on NERC and ERCOT reliability planning criteria.



ELECTRIC RELIABILITY COUNCIL OF TEXAS, INC.
BOARD OF DIRECTORS RESOLUTION

WHEREAS, after due consideration of the alternatives, the Board of Directors (Board) of Electric Reliability Council of Texas, Inc. (ERCOT) deems it desirable and in the best interest of ERCOT to accept ERCOT staff's recommendation to endorse the need for the Port Lavaca Area Improvement Regional Planning Project (Option 2EA), which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted unanimously to endorse, based on North American Electric Reliability Corporation (NERC) and ERCOT reliability planning criteria;

THEREFORE, BE IT RESOLVED, that the Board hereby endorses the need for the Port Lavaca Area Improvement Regional Planning Group (Option 2EA), which ERCOT staff has independently reviewed and which TAC has voted unanimously to endorse, based on NERC and ERCOT reliability planning criteria.

CORPORATE SECRETARY'S CERTIFICATE

I, Jonathan Levine, Assistant Corporate Secretary of ERCOT, do hereby certify that, at its October 22, 2021 meeting, the Board passed a motion approving the above Resolution by _____.

IN WITNESS WHEREOF, I have hereunto set my hand this ____ day of October, 2021.

Jonathan Levine
Assistant Corporate Secretary



ERCOT Independent Review of AEPSC Port Lavaca Area Improvement Project

Document Revisions

Date	Version	Description	Author(s)
09/16/2021	1.0	Final	Tanzila Ahmed
		Reviewed by	Sun Wook Kang, Shun Hsien (Fred) Huang

Executive Summary

American Electric Power Services Corporation (AEPSC) submitted the Port Lavaca Area Improvement project to the Regional Planning Group (RPG) in February 2021. AEPSC proposed this project to address the reliability need and aging infrastructure issues associated with the existing 69-kV facilities in the Port Lavaca area in Calhoun and Victoria counties. According to the RPG submittal, majority of the proposed upgrades are to address the aged 69-kV facilities built in 1949 and 1953; the remaining upgrades are designed to address thermal overloads under contingency conditions. The project proposed by AEPSC had an estimated cost of \$97.8 Million. The overall RPG submittal was classified as a Tier 2 project per ERCOT Protocol 3.11.4.3 since AEPSC notified ERCOT that it would need to obtain a Certificate of Convenience and Necessity (CCN) for the proposed project.

ERCOT performed an Independent Review of the RPG proposal to identify system improvements to address the reliability need and aging infrastructure issues in the Port Lavaca area. Based on this review of various transmission upgrade options, ERCOT recommends the following transmission upgrades (Option 2EA):

- To address the reliability needs due to thermal overload:
 - Rebuild the existing Brookhollow - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.0 miles, summer normal and emergency ratings of at least 239 MVA)
 - Rebuild a portion of the existing Point Comfort - Carancahua 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (upgrade 2.0 miles out of 10.3 miles, summer normal and emergency ratings of at least 182/217 MVA)
- To address aging infrastructure issues:
 - Construct a new Cangrejo 138/69-kV substation to replace the existing Port Lavaca 69-kV substation and install a new 138/69-kV transformer (summer normal and emergency ratings of at least 130 MVA)
 - Rebuild a portion (STEC Tap - Cangrejo) of the existing North Carbide - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.2 miles, summer normal and emergency ratings of at least 239 MVA)
 - Retire the existing North Carbide - STEC Tap 69-kV line (9.6 miles)
 - Rebuild a portion of the existing North Carbide - Sand Crab 138-kV line to form the following double-circuit 138-kV line (10.3 miles):
 - #1. Loop the existing North Carbide - Sand Crab 138-kV line into the new Cangrejo 138-kV substation
 - #2. Construct a new North Carbide - Cangrejo 138-kV line using 2000 A conductor (summer normal and emergency ratings of at least 478 MVA)
 - Construct a new Beecher 138-kV substation to replace the existing Placedo 69-kV substation
 - Construct a new Dacosta 138-kV substation at the intersection of the existing Chocolate Bayou - Gohlke 138-kV line and the existing Cangrejo (Port Lavaca) - Victoria 69-kV line
 - Loop the existing Chocolate - Gohlke 138-kV line into the new Dacosta 138-kV substation

- Rebuild and convert a portion of the existing Cangrejo (Port Lavaca) - Victoria 69-kV line to 138-kV using 2000 A conductor and terminate at the new Dacosta 138-kV substation (18 miles, summer normal and emergency ratings of at least 478 MVA)
- Retire the remaining 69-kV line from Victoria going toward Dacosta (10.7 miles)

The recommended project is a Tier 1 project estimated to cost approximately \$101.5 Million. A Certificate of Convenience and Necessity (CCN) application will be required for the upgrade of the existing Brookhollow - Port Lavaca 69-kV line (2.0 miles) due to line encroachments that will require multiple reroutes.

According to the AEPSC RPG submittal, the upgrades related to reliability needs due to thermal overload are expected to be in-service by May 2023. The remaining upgrades driven by aging infrastructure issues are expected to be in-service by December 2024. AEPSC also indicated that the in-service dates of the upgrades related to the aging infrastructure may need to be adjusted, since this project will be constructed in stages due to outage limitations. If thermal overload issues could occur before the reliability upgrades in service, AEPSC plans to implement mitigation action (e.g., line switching).

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1. Introduction

On February 18, 2021, AEPSC submitted the Port Lavaca Area Improvement project to the RPG to address the thermal overloads, poor performance, and deteriorating physical conditions associated with the aging 69-kV facilities in the Port Lavaca area located in Calhoun and Victoria counties near Lavaca Bay. The transmission project proposed by AEPSC was submitted as a Tier 2 project pursuant to Protocol Section 3.11.4.3 with an estimated cost of \$97.8 Million. The project requires a CCN to rebuild the existing Brookhollow to Port Lavaca 69-kV line (approximately 2.0 miles). Figure 1-1 shows the existing transmission facilities in the Port Lavaca area.

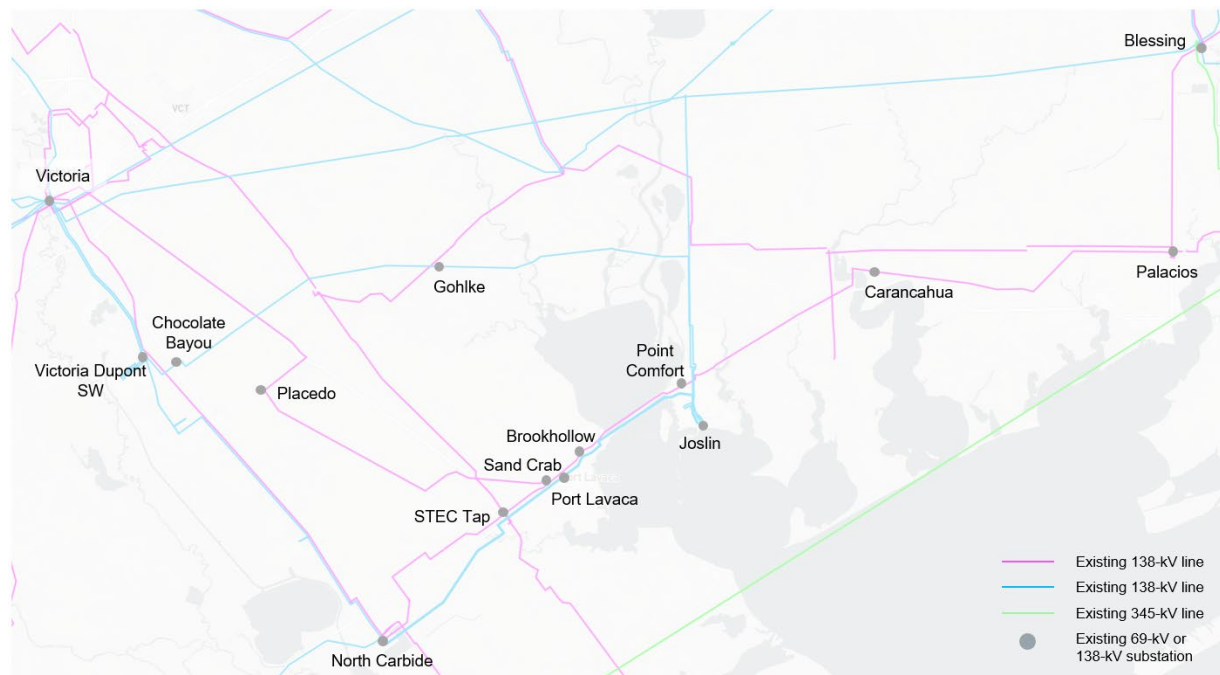


Figure 1-1: Existing transmission facilities in the Port Lavaca area

According to the RPG submittal, AEPSC identified potential thermal overloads of the existing North Carbide - STEC Tap and Brookhollow - Port Lavaca 69-kV lines under various contingency conditions and expected the overloads as early as 2022. In addition to the identified reliability issues, AEPSC also indicated significant structural issues of the existing North Carbide - Port Lavaca (56% of entire structures) and Port Lavaca - Victoria 69-kV lines (63% of entire structures) based on their recent aerial assessment. Built between 1949 and 1953, these 69-kV lines are mainly comprised of wood structures. According to the RPG submittal, the existing Port Lavaca substation was built in 1943 and has multiple condition issues (e.g., old circuit break with oil leak, severely cracked control house, old electromechanical relays, and space constraints restricting maintenance). AEPSC proposed to rebuild and/or convert the existing circuits and add new transmission facilities to address the aging infrastructure issues and the reliability need.

ERCOT performed an Independent Review for this RPG project to identify the reliability need and evaluate various transmission upgrade options to address the reliability need and the aging infrastructure issues. This report describes the study assumptions, methodology and the results of the ERCOT Independent Review (EIR) of the project.

2. Study Assumptions and Methodology

ERCOT performed studies under various system conditions to identify the system improvements that most cost-effectively meet the reliability need and the aging infrastructure issues in the study area. This section describes the study assumptions and criteria.

2.1. Study Assumptions

The study region for this review included transmission facilities in the Coast and South Weather Zones that are electrically close to the Port Lavaca area.

2.1.1. Reliability Assessment

2.1.1.1. Steady State Study Base Case

The steady-state study base case was constructed from the 2020 Regional Transmission Plan (RTP) 2025 East/Coast summer peak case posted on the Market Information System (MIS) on December 23, 2020:

- Case: 2020RTP_2025_SUM_EC_12232020

2.1.1.2. Transmission Topology

Transmission projects expected to be in-service within the study region by 2025 were added to the study case. The ERCOT Transmission Project Information and Tracking (TPIT) report posted on March 1, 2021 was used as reference. The added TPIT projects are listed in Table 2-1. No new Tier 1, 2, or 3 transmission projects were added as all approved Tier 1, 2, and 3 projects were already modeled in the base case. Tier 4 projects listed in the Table 2-1 below were added to the study base case.

Table 2-1: List of transmission projects added to base case

TPIT Number	Project Name	Projected ISD
57890	Brightside Permanent Connection	12/11/2022
51645	Sand Crab: Add New Distribution Station	4/30/2021 ¹
59117	Tres Bahias Solar Interconnection	1/31/2022
59763	Change Markham tap station to a 3-way switching station	5/15/2022

The placeholder projects associated with the Port Lavaca Area Improvement project in the 2020 RTP case were removed.

2.1.1.3. Generation

Based on the February 2021 Generator Interconnection Status (GIS) report posted on the ERCOT website on March 1, 2021, generators in the study area that met Planning Guide Section 6.9(1) conditions with Commercial Operations Date (COD) prior to May 2025 were added to the study base case. These generator additions are listed in Table 2-2. All of the new wind and solar generation units were dispatched consistent with the 2020 RTP methodology.

¹ This TPIT project is already in service

Table 2-2: List of generation added to the base case

INR	Project Name	Capacity (MW)	Fuel	Projected COD
18INR0060	Brightside Solar	50	SOL	12/14/2021
19INR0014	Formosa Increase	240	GAS	12/31/2021
19INR0057	Old Bloomington Road	100	GAS	8/31/2021
19INR0112	Cranell Wind	220	WIN	9/30/2021
20INR0266	Tres Bahias Solar	195	SOL	11/21/2022
22INR0352	Sparta Solar	256	SOL	5/2/2022

The status of the units either indefinitely mothballed or retired were reviewed at the time of this study, and the following units were turned off, if not already reflected in the starting 2020 RTP case.

- AMOCOOIL_AMOCO_5 (Coast)
- AMOCOOIL_AMOCO S2 (Coast)
- PNPI_GT2 (Coast)
- RAY_RAYBURG1 (Coast)
- RAY_RAYBURG2 (Coast)
- TGF_TGFGT_1 (Coast)
- KEO_KEO_SM1 (Far West)
- BRAUNIG_VHB1 (South Central)²
- BRAUNIG_VHB21 (South Central)²
- BRAUNIG_VHB31 (South Central)²

2.1.1.4. Loads

Since the Port Lavaca area is relatively close to the transmission system in the South Weather Zone, the load level in the South Weather Zone was adjusted to develop the South/Coast Weather Zone summer peak load case. Loads outside of study region were adjusted as necessary for power balance consistent with the 2020 RTP assumptions.

2.1.2. Congestion Analysis

Congestion analysis was conducted to identify any new congestion in the study area due to the preferred transmission upgrade option.

2.1.2.1. Economic Study Base Case

The 2026 economic starting case from the 2021 RTP available at the time of the study was used as the base case for congestion analysis. The 2026 study year was selected based on the proposed in-service date of the project.

2.1.2.2. Transmission Topology

The placeholder projects associated with the Port Lavaca Area Improvement project in the 2020 RTP case were removed from the economic base case. The Tier 4 project listed in the Table 2-3 below was

² Based on public announcement by CPS Energy, these units were offline in the study base case <https://www.cpsenergy.com/content/dam/corporate/en/Documents/CPS%20Energy%20January%202021%20Flexible%20Path%20Resource%20Plan.pdf>

added to the economic base case, since the project was not modeled in the economic starting case available at the time of study.

Table 2-3: Transmission project added to Economic base case

TPIT Number	Project Name	ISD
51645	Sand Crab: Add New Distribution Station	4/30/2021 ¹

2.1.2.3. Generation

No new generation were added to the economic starting case.

2.1.2.4. Loads

Loads were maintained consistent with the economic starting case.

2.2. Methodology

2.2.1. Contingencies and Criteria

The reliability assessments were performed based on NERC Reliability Standard TPL-001-4, ERCOT Nodal Protocol and Planning Criteria.

The following steady state contingencies³ were simulated for the study region:

- P0
- P1 (N-1)
- P2-1 (N-1)
- P2-2, P2-3 (All EHV⁴ only)
- P3: G-1 + N-1 {G-1: Victoria CC, Coleto Creek, & Rayburn CC}
- P4-1, P4-2, P4-3, P4-4, P4-5 (All EHV only)
- P5-1, P5-2, P5-3, P5-4, P5-5 (All EHV only)
- P6-2: X-1 + N-1 {X-1:345/138-kV transformers at Blessing}
- P7-1 (N-1)

All 69-kV and above buses, transmission lines, and transformers in the study region were monitored (excluding generator step-up transformers) and the following thermal and voltage limits were enforced:

- Thermal
 - Rate A for pre-contingency conditions
 - Rate B for post-contingency conditions
- Voltages
 - Voltages exceeding pre-contingency and post-contingency limits
 - Voltage deviations exceeding 8% on non-radial load buses

2.2.2. Study Tools

ERCOT utilized the following software tools to perform this independent review:

- PowerWorld Simulator version 21 for Security Constrained Optimal Power Flow (SCOPF) and steady state contingency analysis
- UPLAN version 10.4.0.22733 to perform congestion analysis

³ Details of each event and contingency category is defined in the NERC reliability standard TPL-001-4.

⁴ Extra-high voltage (EHV) is defined as greater than 300kV.

3. Project Need

3.1. Steady-State Reliability Analysis

The steady-state reliability analysis was performed in accordance with NERC TPL-001-4 and ERCOT Planning Criteria. This analysis indicated a thermal overload issue under N-1 contingency in the study area. A similar overload was also observed under both P3 (G-1+N-1) and P6 (X-1+N-1) contingencies. These issues are summarized in Table 3-1. Figure 3-1 depicts the reliability need.

Table 3-1: Thermal overload in the study area

NERC Contingency Category	Overloaded Element	Voltage Level (kV)	Length (miles)	Loading %
P1: N-1	Brookhollow - Port Lavaca	69	2.0	101
P3: G-1+N-1	Brookhollow - Port Lavaca	69	2.0	103
P6: X-1+N-1	Brookhollow - Port Lavaca	69	2.0	102

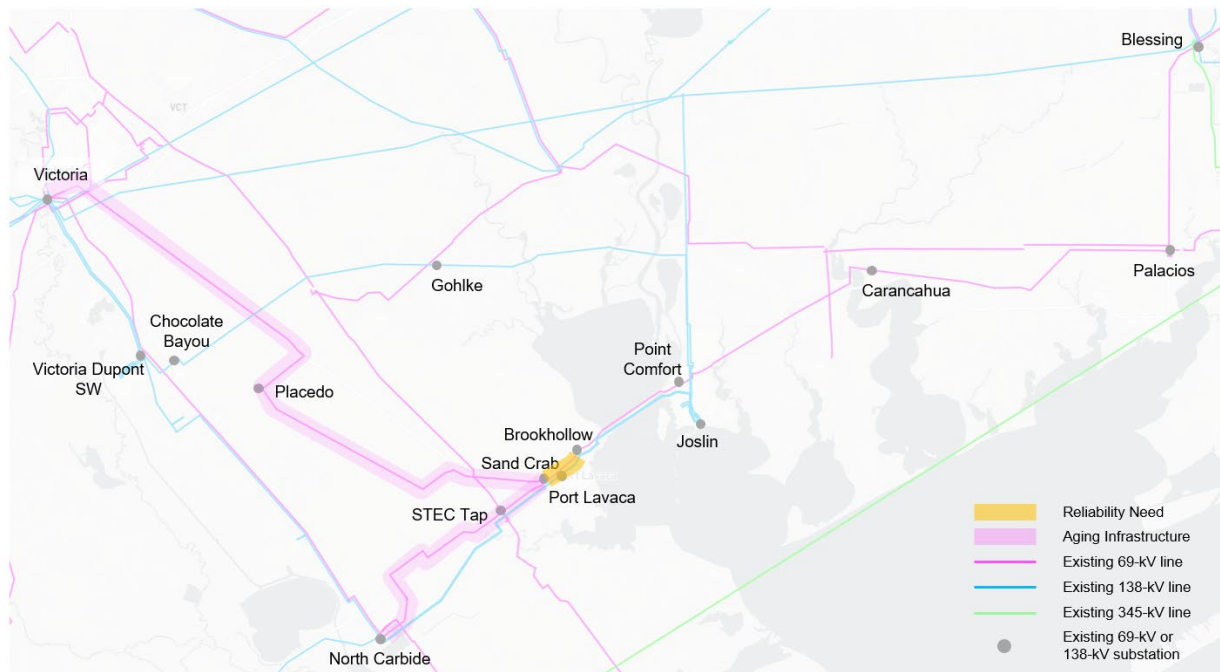


Figure 3-1: Study area map showing project need

4. Initial Options

ERCOT initially evaluated six system improvement options to address the thermal overload that was observed in the study case along with the aging infrastructure issues in the Port Lavaca Area. All six options resolved the thermal overload and the aging issues in the study area. Detailed maps of each option are provided in Appendix B.

Table 4-1: Components of the six initial options

Transmission Upgrade	Approximate Length of line (mile)	Normal & Emergency Rating (MVA)	Options						
			1	2	2EA	3	3EA	4EA	
Construct a new Cangrejo 69-kV substation to replace the existing Port Lavaca 69-kV substation	N/A	N/A	✓						
Construct a new Cangrejo 138/69-kV substation (five-breaker 138-kV ring bus and two-breaker 69-kV straight bus) to replace the existing Port Lavaca 69-kV substation and install an auto transformer	N/A	130		✓	✓	✓	✓	✓	✓
Rebuild the existing Brookhollow - Cangrejo (Port Lavaca) 69-kV line using a 2000 A conductor, 138-kV capable but continue to operate at 69-kV	2.0	239	✓	✓	✓	✓	✓	✓	✓
Rebuild a portion (STEC tap - Cangrejo) of the existing North Carbide - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV	2.2	239	✓	✓	✓	✓	✓	✓	✓
Retire the existing STEC tap - North Carbide 69-kV line ⁵	9.6	N/A	✓	✓	✓	✓	✓	✓	✓
Rebuild a portion of the existing North Carbide - Sand Crab 138-kV line to form a double-circuit: #1) Loop the existing the North Carbide - Sand Carb 138-kV line into the new Cangrejo substation, #2) Construct a new North Carbide - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV	10.3	#1) 216 #2) 239	✓						
Rebuild a portion of the existing North Carbide - Sand Crab to form a double-circuit: #1) Loop the existing the North Carbide - Sand Crab 138-kV line into the new Cangrejo substation, #2) Construct a new North Carbide - Cangrejo (Port Lavaca) 138-kV line using 2000 A conductor	10.3	#1) 216 #2) 478		✓	✓	✓	✓	✓	✓
Rebuild the existing Cangrejo (Port Lavaca) - Placedo - Victoria 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV	28.8	239	✓						
Construct a new Beecher 138-kV substation to replace the existing Placedo 69-kV substation	N/A	N/A		✓	✓	✓	✓	✓	✓
Construct a new Dacosta 138-kV, three breaker ring bus, substation at the intersection of the existing Chocolate Bayou - Gohlke 138-kV line and the existing Beecher (Placedo) - Victoria 69-kV line	N/A	N/A		✓	✓				
Construct a new Dacosta 138-kV, three-breaker ring bus substation located approximately 1.2 miles south of Victoria station. The Dupont Sw. - Victoria circuit one and two will be cut into the new station	N/A	N/A				✓	✓		

⁵ The existing STEC Tap - North Carbide 69-kV is being replaced with the new Cangrejo (Port Lavaca) 138-kV line.

Transmission Upgrade	Approximate Length of line (mile)	Normal & Emergency Rating (MVA)	Options					
			1	2	2EA	3	3EA	4EA
Rebuild and convert a portion of the existing Cangrejo (Port Lavaca) - Beecher (Placedo) - Victoria 69-kV line to 138-kV, and terminate at the new Dacosta 138-kV station	Option 2 & 2EA: 18	Cangrejo - Beecher: 478, Beecher - Dacosta: 216		✓	✓	✓	✓	
	Option 3 & 3EA: 27.7	478						
Retire the remaining 69-kV line from Victoria going toward Dacosta	Option 2, 2EA & 4EA: 10.7 Option 3 & 3EA: 1.2	N/A		✓	✓	✓	✓	
Rebuild and convert a portion of the existing Beecher (Placedo) - Victoria 69-kV line to 138-kV with double-circuit structures, then cut into the existing Chocolate Bayou - Gohlke 138-kV line to create a loop	2.8	216						✓
Retire the remaining portion of the existing Beecher (Placedo) - Victoria 69-kV line	12.1	N/A						✓
Retire the existing Cangrejo (Port Lavaca) - Beecher (Placedo) 69-kV line	14.0	N/A						✓
Rebuild a portion of the existing Blessing - Palacios 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV	0.3 miles out of 9.9 ⁶	239		✓		✓		
Rebuild a portion of the existing Point Comfort - Carancahua 69-kV line ⁷ using 2000 A conductor, 138-kV capable but continue to operate at 69-kV	2.0 miles out of 10.3 ⁶	182/217			✓		✓	✓
Rebuild the existing Carancahua - Palacios 69-kV line ⁷ using 2000 A conductor, 138-kV capable but continue to operate at 69-kV	13.6 ⁶	182/217					✓	

4.1. Initial Reliability Assessment Results

These options were evaluated based on the contingencies described in the methodology section of this report, and no reliability criteria violation were identified for Option 1, 2EA and 4EA as shown in Table 4-2.

Table 4-2: Results of initial reliability assessment of all six options

Option	N-1		X-1 N-1		G-1 N-1	
	Thermal Overload	Voltage Violation	Thermal Overload	Voltage Violation	Thermal Overload	Voltage Violation
1	None	None	None	None	None	None
2	Yes	None	Yes	None	Yes	None
2EA	None	None	None	None	None	None
3	Yes	None	Yes	None	Yes	None
3EA	Yes	None	Yes	None	Yes	None
4EA	None	None	None	None	None	None

⁶ According to AEPSC, remainder of the line has already been upgraded.

⁷ Point Comfort - Carancahua 69-kV line was found to overload in the initial options 2, 3, and 4. Carancahua - Palacios 69-kV line was also found to overload in the initial option 3. Options 2EA, 3EA, and 4EA were created to address this additional overload.

5. Short-listed Options

As shown in Table 4-2, Option 1, Option 2EA, and Option 4EA met all the reliability criteria, and these options were short-listed for further assessment. These three options are illustrated in Figures 5-1, 5-2, and 5-3.

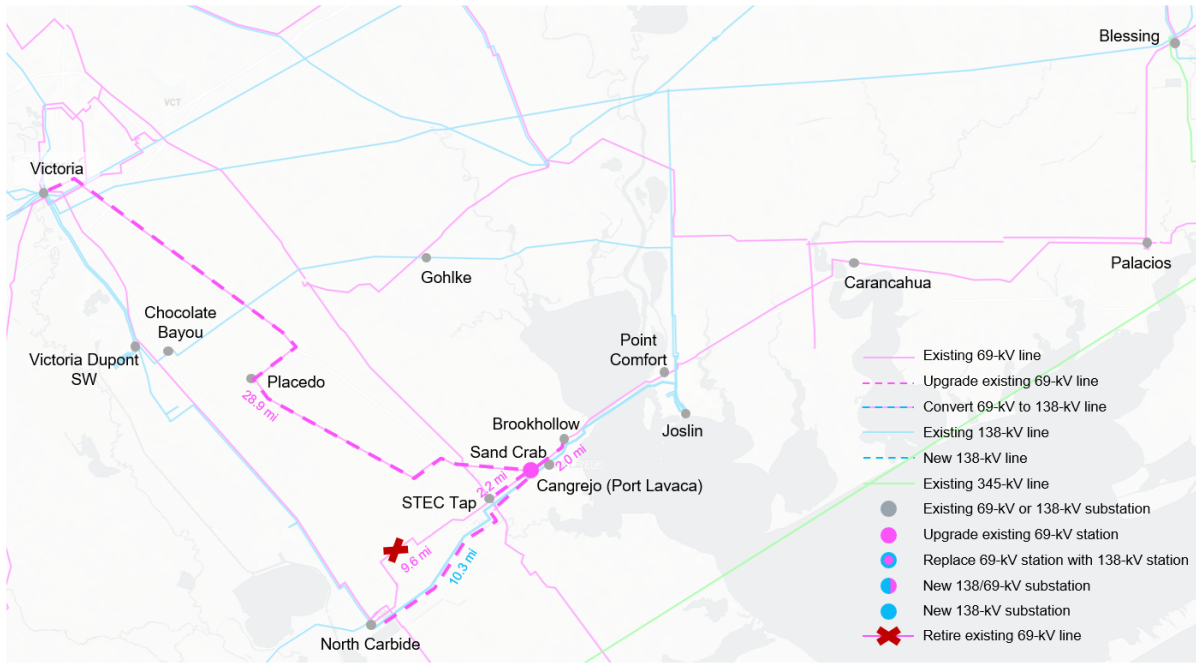


Figure 5-1: Map of Option 1 (AEPSC Submittal)

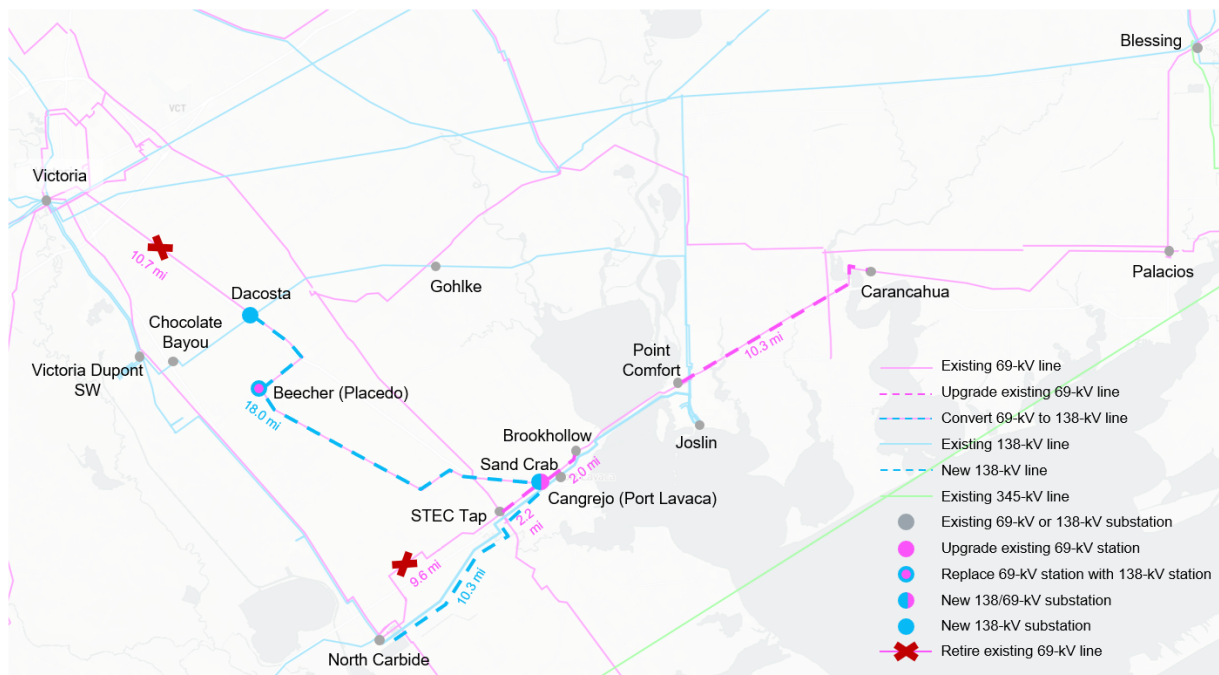


Figure 5-2: Map of Option 2EA

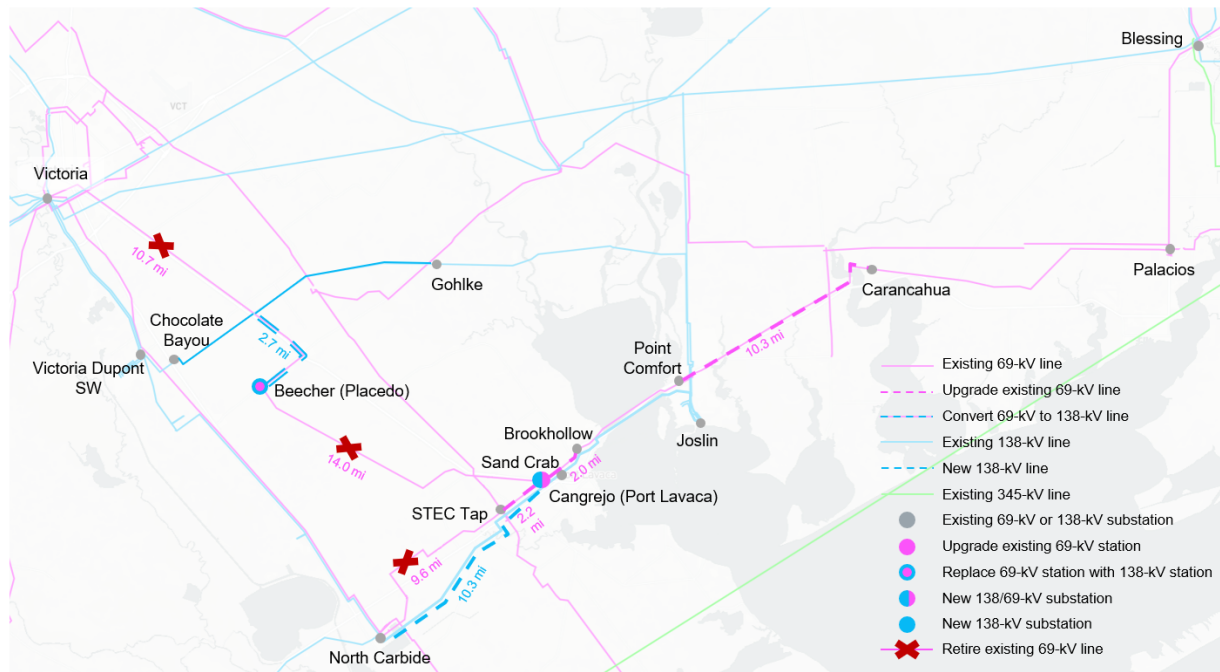


Figure 5-3: Map of Option 4EA

5.1. Planned Maintenance Outage (N-1-1) Analysis

ERCOT developed an off-peak maintenance season scenario to further evaluate the short-listed options.

The load levels in the South and Coast Weather Zones were reduced by 6%⁸, excluding flat loads, to reflect assumed off-peak season load based on historical real-time load data of the South and Coast Weather Zones.

Using the P1 and P7 contingencies provided by AEPSC, ERCOT conducted an N-2 contingency analysis for each short-listed option to represent system element outage(s) under planned maintenance condition (N-1-1) in the area. As shown in Table 5-1, the results of this maintenance assessment indicated that Option1 and Option 2EA performed similarly and better than Option 4EA.

Table 5-1: Results of planned maintenance outage analysis

Options	Unsolved Power Flow	Transformer Overloads	Line Miles with Heavy Flow	
			>=95%	>=100%
1	None	3	50.1 miles 69-kV 0 miles 138-kV	36.1 miles 69-kV 0 miles 138-kV
2EA	None	2	50.1 miles 69-kV 7.7 miles 138-kV	37.1 miles 138-kV 7.7 miles 138-kV
4EA	None	2	66 miles 69-kV 7.7 miles 138-kV	66 miles 69-kV 7.7 miles 138-kV

⁸ This percentage was determined based on the review of top ten historical loads in Spring, Fall, and Winter for the last three years associated with the South and Coast Weather Zones. Among the seasons, Spring was the season with highest historical load.
 $6\% = (\text{peak demand} - \text{average of top ten historical load in Spring}) / \text{peak demand}$

6. Comparison of Short-listed Options

The study results demonstrated that all three short-listed options addressed the reliability criteria violation and aging infrastructure issues in the Port Lavaca area.

A comparison of the short-listed options, with corresponding cost estimates provided by AEPSC, is summarized in Table 6-1.

Table 6-1: Comparison of short-listed options

	Option 1	Option 2EA	Option 4EA
Met ERCOT and NERC Reliability Criteria	Yes	Yes	Yes
Improved Operational Flexibility (Planned Maintenance Outages)	Yes	Yes	No
CCN needed (miles)	Yes (~2.0)	Yes (~2.0)	Yes (~2.0)
Voltage conversion from 69-kV to 138-kV	No	Yes	Yes
Capital Cost Estimates	\$97.5 M	\$101.5 M	\$76.4 M

ERCOT recommends Option 2EA as the preferred option to address the reliability need and aging infrastructure issues in the Port Lavaca area based on the following considerations:

- Option 2EA provides better operational flexibility and less impact to customers under outage conditions than Option 4EA
- Even though Option 2EA is slightly more costly than Option 1, Option 2EA is expected to be more cost-effective in the long run by including a conversion of circuits from 69-kV to 138-kV during the rebuild process
- AEPSC indicated that the existing Victoria substation has space limitations which would limit local system capability or increase the cost for future improvement if Option 1 is considered

7. Sensitivity Studies

The preferred option (Option 2EA, \$101.5 M) is categorized as a Tier 1 project, pursuant to ERCOT Protocol 3.11.4.3. As required by Planning Guide Section 3.1.3 (4), ERCOT performed generation and load sensitivity studies to identify the preferred option performance.

7.1. Planning Guide Section 3.1.3 (4) Sensitivities

7.1.1. Generation Addition Sensitivity Analysis

ERCOT performed a generation addition sensitivity analysis based on Planning Guide Section 3.1.3(4)(a).

Based on a review of the August 2021 GIS reports, no units were found within the Port Lavaca area load pocket which could have an impact on the identified reliability issues.

7.1.2. Load Scaling Sensitivity Analysis

Planning Guide Section 3.1.3(4)(b) requires an evaluation of the potential impact of load scaling on the criteria violations seen in this ERCOT independent review. As stated in Section 2.1, ERCOT used the 2025 East/Coast (EC) summer peak case from the 2020 RTP and adjusted the load to create the 2025 Coast/South summer peak case to study the Port Lavaca area. This study base case, which was created in accordance with the 2020 RTP Study Scope and Process document and Section 2.1 of this

document, included load scaled down from the respective non-coincident peaks in the North, North Central, West, Far West, East, and South Central Weather Zones.

The Outage Transfer Distribution Factors (OTDFs) of overloaded elements with respect to the load transfer for each Weather Zone (excluding South/South Central) were calculated using PowerWorld Simulator. The OTDFs were less than 1% for each of the overloaded elements, i.e., they were not significant enough to have an impact on the overloaded elements. ERCOT concluded that the load scaling used to develop the base case in this study did not have a material impact on the project need, which was primarily driven by thermal overloads and aging infrastructure issues in the Port Lavaca area.

8. Congestion Analysis

ERCOT conducted a congestion analysis to identify any potential impact on system congestion related to the addition of the recommend project, Option 2EA, using the 2021 RTP 2026 economic study case.

The results of congestion analysis indicated no additional congestion in the area due to the addition of the recommended transmission upgrades.

9. Conclusion

ERCOT identified a thermal overload issue in the Port Lavaca area located in Calhoun county. ERCOT evaluated six initial options to address the thermal overload and aging infrastructure issues. Based on the results of this Independent Review, ERCOT recommends Option 2EA as the preferred solution because of the following reasons:

- Option 2EA addresses both the thermal overload and aging infrastructure issues
- Option 2EA provides better operational flexibility and less impact to customers under normal and outage conditions than Option 4EA
- Option 2EA is likely to be more cost-effective in the long run by combining conversion of circuits from 69-kV to 138-kV during the rebuild process

Option 2EA consists of the following transmission upgrades and is estimated to cost \$101.5 Million:

- To address the reliability needs due to thermal overload:
 - Rebuild the existing Brookhollow - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.0 miles, summer normal and emergency ratings of at least 239 MVA)
 - Rebuild a portion of the existing Point Comfort - Carancahua 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (upgrade 2.0 miles out of 10.3 miles, summer normal and emergency ratings of at least 182/217 MVA)
- To address aging infrastructure issues:
 - Construct a new Cangrejo 138/69-kV substation to replace the existing Port Lavaca 69-kV substation and install a new 138/69-kV transformer (summer normal and emergency ratings of at least 130 MVA). The 138-kV bus will be a five-breaker ring bus, and the 69-kV bus will be a two-breaker straight bus


- Rebuild a portion (STEC Tap - Cangrejo) of the existing North Carbide - Cangrejo (Port Lavaca) 69-kV line using 2000 A conductor, 138-kV capable but continue to operate at 69-kV (2.2 miles, summer normal and emergency ratings of at least 239 MVA)
- Retire the existing North Carbide - STEC Tap 69-kV line (9.6 miles)
- Rebuild a portion of the existing North Carbide - Sand Crab 138-kV line to form the following double-circuit 138-kV line (10.3 miles):
 - o #1. Loop the existing North Carbide - Sand Crab 138-kV line into the new Cangrejo 138-kV substation
 - o #2. Construct a new North Carbide - Cangrejo 138-kV line using 2000 A conductor (summer normal and emergency ratings of at least 478 MVA)
- Construct a new Beecher 138-kV substation to replace the existing Placedo 69-kV substation
- Construct a new Dacosta 138-kV, three-breaker ring bus substation at the intersection of the existing Chocolate Bayou - Gohlke 138-kV line and the existing Cangrejo (Port Lavaca) - Victoria 69-kV line
- Loop the existing Chocolate - Gohlke 138-kV line into the new Dacosta 138-kV substation
- Rebuild and convert a portion of the existing Cangrejo (Port Lavaca) - Victoria 69-kV line to 138-kV line using 2000 A conductor and terminate at the new Dacosta 138-kV substation (18 miles, summer normal and emergency ratings of at least 478 MVA)
- Retire the remaining 69-kV line from Victoria going toward Dacosta (10.7 miles)

Based on the cost estimate provided by AEPSC, the recommended project is categorized as a Tier 1 project, pursuant to ERCOT Protocol 3.11.4.3. A CCN application will be required for rebuilding the existing Brookhollow to Port Lavaca 69-kV line (2.0 miles).

AEPSC expects to implement the upgrades related to reliability issue by May 2023 and the upgrades addressing aging infrastructures by December 2024. AEPSC also indicated that the in-service dates of the upgrades related to the aging infrastructure may need to be adjusted, since this project will be constructed in stages due to outage limitations. If thermal overload issues are expected before the reliability upgrades are in service, AEPSC will work with ERCOT to develop and implement appropriate mitigation actions.

10. Appendix

Table 10-1: List of Appendices and attached documents

Index	Description	Document	Access
A	Maps of all six options evaluated	 Maps of Six Options - AEPSC Port Lavaca Area Improvement Project	Public