



**Item 11:  
Hidalgo-Starr Regional Planning Group  
(RPG) Project**

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Manager, Transmission & Interconnection Studies

Board of Directors Meeting

ERCOT Public

June 14, 2016

## Board Action Needed

- At the conclusion of this presentation, the Board of Directors will be asked to vote to endorse the need for the American Electric Power Service Corporation (AEPSC) Hidalgo-Starr Regional Planning Group Project based on NERC and ERCOT planning reliability criteria

## Background

In July 2015, AEPSC submitted a project proposal to the Regional Planning Group (RPG) to address planning reliability criteria violations in the Hidalgo and Starr County Region (western side of the Lower Rio Grande Valley [LRGV])

ERCOT had identified similar reliability criteria violations in previous planning studies, including the 2012 Cross Valley 345kV Project RPG Review, 2013 Regional Transmission Plan (RTP), 2014 RTP, and 2015 RTP

# ERCOT Independent Review

- ERCOT performed an independent review and confirmed NERC and ERCOT planning reliability criteria violations
- ERCOT evaluated five options to resolve the criteria violations
  - ❑ All involved some new 345 kV Right of Way and the addition of 345/138 kV transformers in the southwest LRGV region
  - ❑ All five options met the reliability criteria
  - ❑ Option D was the lowest cost option and required the least amount of new transmission Right-of-Way

# ERCOT Recommendation

- ERCOT recommends the Board endorse the need for Option D, which TAC voted to endorse (with two abstentions), to address the reliability need in the study region:
  - Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
  - Install two 345/138 kV autotransformers at the Stewart Road 138 kV substation.
  - Construct a new approximately 5-mile 345 kV double-circuit transmission line, from the Stewart Road 138 kV substation to a tap location on the existing North Edinburg to Loma Alta 345 kV line (~30 miles from the North Edinburg 345/138 kV substation).
  - Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
  - Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.
  - Operate the Pharr – North McAllen 138 kV line segment normally closed except for certain N-1-1 conditions.
- The estimated capital cost for Option D is \$51.5 million and the estimated in-service date is Q4 2019

# Tier 1 Project Requirements

- Pursuant to Protocol Section 3.11.4.7 (*Tier 1*)
  - Projects with an estimated capital cost of \$50 million or greater are Tier 1 Projects
  - Tier 1 Projects require ERCOT independent review
    - Whether proposed project is needed
    - Whether the proposed project is the preferred solution to the identified system performance deficiency that the projects is intended to resolve
  - Tier 1 Projects require Board endorsement

## Tier 1 Project – Requires Board Endorsement

Based on the estimated capital cost of the recommended Option D (that is, \$51.5 million), the Hidalgo-Starr RPG Project is categorized as a Tier 1 project and requires Board endorsement

## Basis for Board Endorsement

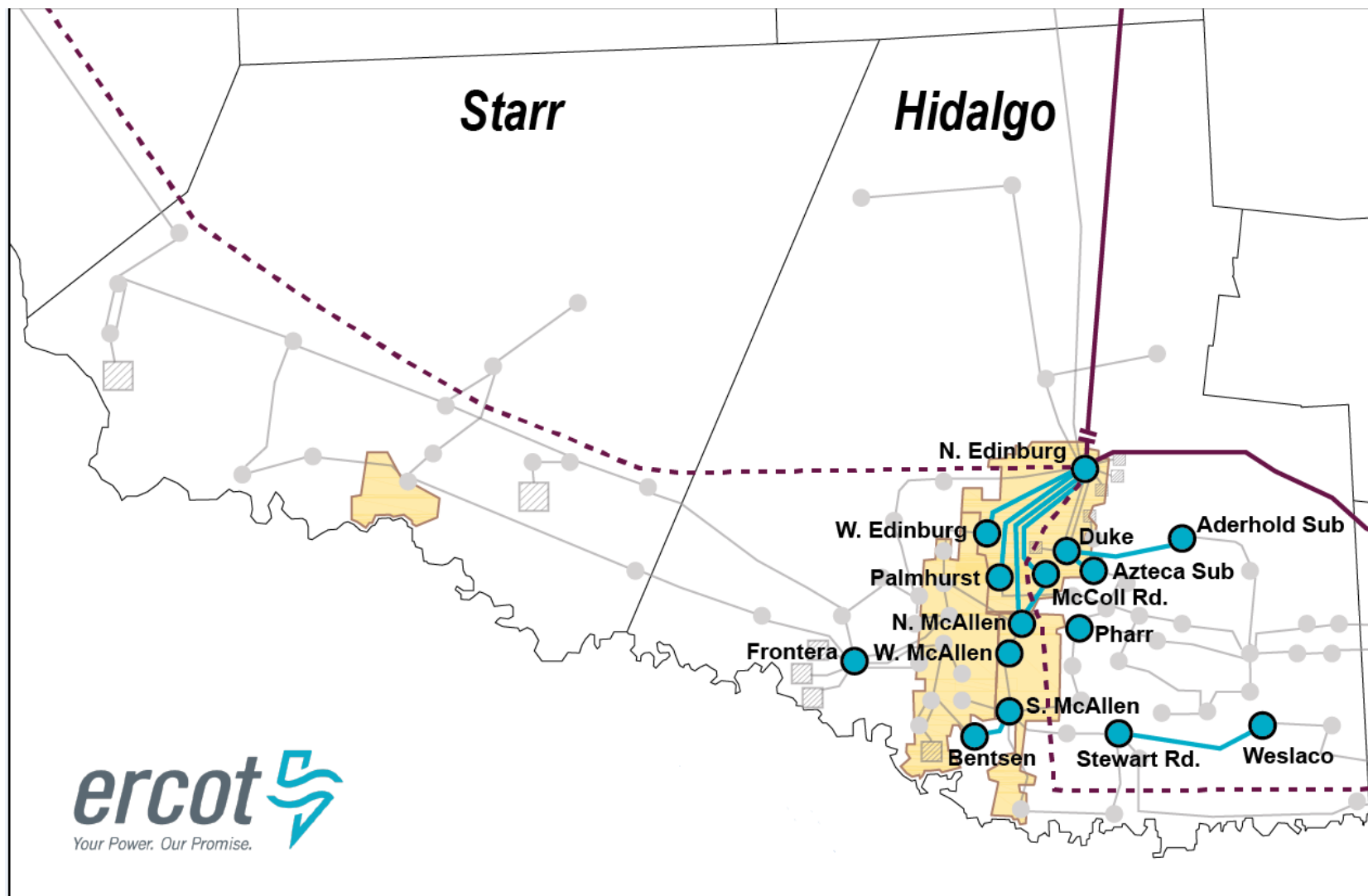
- Pursuant to Planning Guide Section 3.1.3.1 (*Definitions of Reliability-Driven and Economic-Driven Projects*)
  - Proposed transmission projects are categorized for evaluation into two types:
    - Reliability-driven projects; and
    - Economic-driven projects
- ERCOT recommends Option D of the Hidalgo-Starr RPG Project to meet the reliability criteria in the ERCOT System in the LRGV area, based on ERCOT and NERC planning reliability criteria. Option D was found to be the most cost-effective solution for meeting the reliability criteria.



## Request for Board Vote

- ERCOT staff requests and recommends that the Board of Directors vote to endorse the need for the AEPSC Hidalgo-Starr Regional Planning Group Project (Option D) based on NERC and ERCOT planning reliability criteria

# Questions?





**Date:** June 7, 2016  
**To:** Board of Directors  
**From:** Prabhu Gnanam, Manager, Transmission & Interconnection Studies  
**Subject:** Hidalgo-Starr RPG Project

**Issue for the ERCOT Board of Directors**

**ERCOT Board of Directors Meeting Date:** June 14, 2016

**Item No.:** 11

**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 Hidalgo-Starr Regional Planning Group (RPG) Project in order to meet the reliability requirements for the ERCOT System, which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted to endorse.

**Background/History:**

The demand in the West Lower Rio Grande Valley (LRGV), which consists of Hidalgo and Starr Counties, is expected to continue growing, and Frontera, one of the three generating facilities serving the area, has announced that the entire capacity of the facility will be switched to Mexico in 2016. With the additional load in the area and the unavailability of the Frontera generating facility, the transmission system is projected to exceed reliability limits. American Electric Power Service Corporation (AEPSC) submitted a project proposal to meet the needs for the area.

ERCOT performed an Independent Review of the proposal and confirmed the need for a project. ERCOT analyzed five options and determined that the following set of improvements (Option D) represents the most cost-effective solution to meet the reliability needs for the area.

- Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
- Install two 345/138 kV autotransformers at Stewart Road 138 kV substation.
- Construct a new 345 kV double circuit transmission line (a single ROW), approximately 5 miles from Stewart Road 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
- Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
- Construct approximately 1000 feet of new 138 kV transmission line to loop in the

North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

- Operate the Pharr–North McAllen 138 kV line segment normally closed except for certain N-1-1 conditions.

The estimated capital cost for these improvements is \$51.5 million.

The report describing the ERCOT Independent Review of the Hidalgo-Starr RPG Project, including ERCOT staff's recommendation for Option D, is attached at Attachment A.

**Key Factors Influencing Issue:**

1. Transmission system improvements are needed to meet reliability criteria in the ERCOT System in the LRGV area.
2. The recommended set of improvements was found to be the most cost-effective solution for meeting the reliability criteria.
3. Protocol Section 3.11.4.7 requires Board endorsement of a transmission project with an estimated capital cost of \$50 million or greater.
4. TAC voted to endorse the Hidalgo-Starr RPG Project with no opposing votes and two abstentions (Independent Retail Electric Provider Market Segment) at the May 26, 2016 TAC meeting.

**Conclusion/Recommendation:**

ERCOT staff recommends that the Board of Directors endorse the need for the Hidalgo-Starr RPG Project (Option D) which ERCOT staff has independently reviewed and which TAC voted to endorse, based on NERC and ERCOT planning reliability 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 Hidalgo-Starr Regional Planning Group (RPG) Project (Option D), which ERCOT staff has independently reviewed and which the Technical Advisory Committee (TAC) has voted to endorse, based on NERC and ERCOT planning reliability criteria; and

THEREFORE, BE IT RESOLVED, that ERCOT Board hereby endorses the need for the Hidalgo-Starr RPG Project (Option D), which ERCOT staff has independently reviewed and which TAC has voted to endorse, based on NERC and ERCOT planning reliability criteria.

**CORPORATE SECRETARY'S CERTIFICATE**

I, Vickie G. Leady, Assistant Corporate Secretary of ERCOT, do hereby certify that, at its June 14, 2016 meeting, the ERCOT Board passed a motion approving the above Resolution by \_\_\_\_\_.

IN WITNESS WHEREOF, I have hereunto set my hand this \_\_\_\_ day of June, 2016.

\_\_\_\_\_  
Vickie G. Leady  
Assistant Corporate Secretary



# **ERCOT Independent Review of the AEPSC Hidalgo-Starr Transmission Project**

## Document Revisions

Date	Version	Description	Author(s)
05/19/2016	1.0	Final	Ping Yan, Khan Adnan
		Review ed by	Prabhu Gnanam, Jeff Billo

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## 1. Executive Summary

While the demand in the West Lower Rio Grande Valley (LRGV), which consists of Hidalgo and Starr Counties, is expected to continue growing, Frontera, one of the three generating facilities serving the area, has announced that the entire capacity of the facility will be switched to Mexico in 2016. The unavailability of the Frontera generating facility will increase the power flow from North Edinburg, where the remaining generation and 345 kV connections are, to the south part of the LRGV. In addition, the 300 MW Railroad DC Tie export will further increase the power flow from North Edinburg to the south part of the LRGV. These conditions will stress the transmission system in the West LRGV area, and cause NERC and ERCOT reliability criteria violations.

The transmission system in the study region will also experience reliability criteria violations during maintenance outages, which makes it difficult to schedule the maintenance outages.

AEPSC submitted a Regional Planning Group (RPG) project in July 2015 to address the reliability issues in the West LRGV.

Based on the independent review, ERCOT concludes that new transmission reinforcement is needed to meet the reliability criteria. ERCOT evaluated project alternatives to address the reliability needs and concluded the transmission project defined as Option D as the best solution. The detailed description of Option D is as follows.

- Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
- Install two 345/138 kV autotransformers at Stewart Road 138 kV substation.
- Construct a new 345 kV double circuit transmission line (a single ROW), approximately 5 miles from Stewart Road 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
- Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
- Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.
- Operate the Pharr –North McAllen 138 kV line segment normally closed except for certain N-1-1 conditions.

The estimated cost of the preferred project is approximately \$51.5 million dollars. The estimate may vary as the designated providers of the new transmission reinforcement perform more detailed cost analysis.

## 2. Introduction

The unavailability of the Frontera generating facility, the continued load growth in the West LRGV together with the Railroad DC Tie export will cause reliability criteria violations in the area. Transmission reinforcement is needed to address the reliability criteria violations. Figure 2.1 shows the system map of the study area.

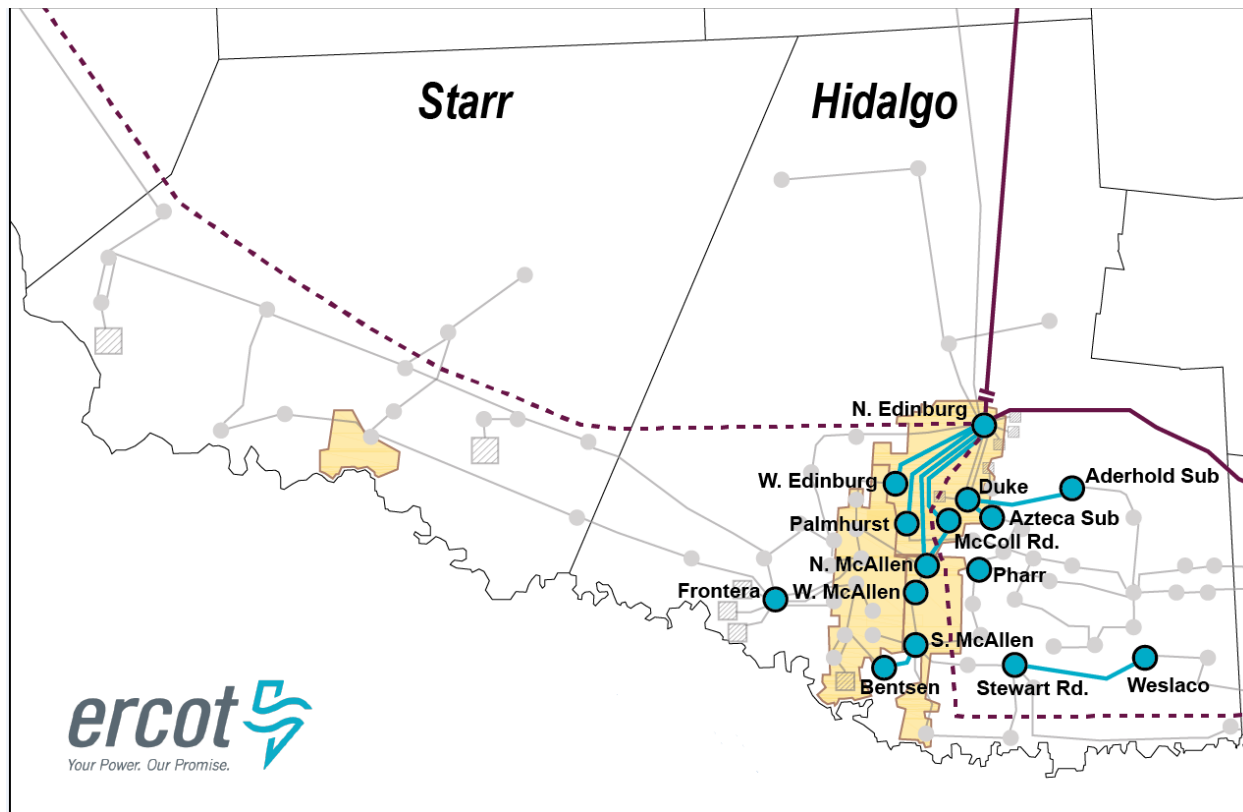


Figure 2.1: Transmission System Map of Study Area with Key Substations

AEPSC proposed the following project to improve the reliability in the West LRGV:

- Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
- Install two 345/138 kV autotransformers at Stewart Road 138 kV substation.
- Construct two new 345 kV transmission lines (two separate ROWs), approximately 5 miles each from Stewart Road 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
- Expand the existing Frontera 138 kV substation to include new breakers and protection equipment for a single new 345 kV transmission line and single 345/138 kV transformer.
- Install a single 345/138 kV autotransformer at Frontera 138 kV substation.
- Construct a new 345 kV transmission line, approximately 23 miles from Frontera 345 kV substation to the planned Pomelo station located on the existing North Edinburg to Del Sol 345 kV line.
- Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
- Construct approximately 1000 feet of new double-circuit 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

The total cost for this project is estimated to be \$143.4 million.

### 3. Criteria, Study Assumption and Methodology

ERCOT performed studies to evaluate the reliability need and to find a robust and cost-effective solution from both near-term and long-term transmission planning perspectives. The study criteria, assumptions and methodology for the ERCOT independent review are described in this section.

#### 3.1. Study Region and Criteria

The primary focus of the study is the transmission system in the West LRGV, which consists of the following five zones defined in the base cases:

- 615 (W Valley)
- 800 (BPUB)
- 829 (SHRY)
- 876 (MVEC\_W)
- 1099 (E\_HIDALGO)

The analysis of the system focused on the steady state thermal and voltage reliability of the ERCOT transmission system in the area of concern.

The criteria applied for the power flow analyses are consistent with the ERCOT Planning Guide 4.1.1.2 and the ERCOT 2015 Regional Transmission Plan (RTP).

NERC TPL-001-4 contingency events (P0, P1, P2-1, P3, P6 and P7) were analyzed.

#### 3.2. Study Assumption and Methodology

##### 3.2.1. Study Base Cases

The following base cases were used in the study:

- The 2018 and 2021 South/South Central (SSC) summer peak cases from the 2015 RTP (based on the 2015 Steady State Working Group (SSWG) Dataset B).
- The 2018 and 2021 SSC spring peak cases derived from the corresponding summer peak cases:
  - Based on ERCOT South Weather Zone 90/10 load forecast for spring peak and summer peak of 2018 and 2021, the spring peak load is approximately 11% lower than the summer peak load. As a result, the load of the South Weather Zone in the summer peak cases was uniformly scaled down by 11% to create the spring peak cases.
- The 2021 SSC winter peak case derived from the corresponding summer peak case:
  - The load in the Lower Rio Grande Valley was uniformly scaled up to the AEP 2021 90/10 winter forecast value. The capacity of the wind generators were set to 24.4% of their maximum capacity based on a review of historic information for wind generation in the area.

NERC TPL-001-4 contingency events (P0, P1, P2-1, P3, P6 and P7) were analyzed for the summer peak and winter peak cases in this study. NERC TPL-001-4 P6 (N-1-1) contingency analysis was performed for the spring peak cases to study the system maintenance outage conditions.

The Frontera Facility (524 MW) was offline in all study base cases. In this independent review, it was assumed that the Railroad DC tie exported 300 MW to Mexico for N-1 analysis and was set to 0 MW transfer for G-1+N-1 (prior generator outage followed by another contingency), X-1+N-1 (prior 345/138 kV transformer outage followed by another contingency), and N-1-1 analysis. Since the distributed generators in the LRGV are not price responsive to the LMP and are not dispatchable by ERCOT Operators, they were assumed unavailable for dispatch in all the study base cases.

The following transmission upgrades and projects were included in the RTP base cases to address the reliability issues associated with the LRGV. These projects were removed from the RTP base cases to create the study base case.

- Cross Valley Project tap at South McAllen (345 kV)
- Second South McAllen (8371) 345/138 kV transformer
- Second Palmito (5966) 345/138 kV transformer
- NorthHill (98455) to Zia (9838) 345 kV line project
- STATCOM at Pharr (5762)

The following component, which is common for all the options, is a Tier 4 project listed in Transmission Project Information Tracking (TPIT), and it was included in the base case:

- Looping in the McColl Road – North McAllen 138 kV line into Pharr 138 kV substation and operate the Pharr – North McAllen 138 kV line segment normally open.

The cost of this component was excluded from all the options.

Generators in the South Weather Zone that met Planning Guide Section 6.9 requirements at the time of study, which were not included in the RTP cases, were added. The added generators are listed in Table 2.1.

**Table 2.1: Generators Met Planning Guide Section 6.9 Requirements as of October 21, 2015**

GINR Number	Project Name	MW	Fuel	County	Weather Zone
13INR0055	Javelina Wind	250	Wind	Zapata	Southern
14INR0013	San Roman I	103	Wind	Cameron	Southern
14INR0041a	Redfish Wind 2a	115	Wind	Willacy	Southern
14INR0041a	Redfish Wind 2b	115	Wind	Willacy	Southern
14INR0045a	Torrecillas Wind A	200	Wind	Webb	Southern
14INR0045b	Torrecillas Wind B	200	Wind	Webb	Southern
15INR0021	Los Vientos V	110	Wind	Starr	Southern
15INR0037	Los Vientos IV	200	Wind	Starr	Southern
16INR0024	Hidalgo & Starr	250	Wind	Hidalgo	Southern
16INR0055	Chapman Ranch Wind I	250	Wind	Nueces	Southern

### 3.2.2 Study Methodology

To evaluate the reliability need, NERC TPL-001-4 contingency events (P0, P1, P2-1, P3, P6 and P7) were analyzed for the 2018 and 2021 summer peak cases in this

study, and NERC TPL-001-4 P6 (N-1-1) contingency analysis was performed for the 2018 and 2021 spring peak cases to study the system maintenance outage conditions. ERCOT studies confirmed the reliability need in the study region. More details of the reliability need analysis can be found in Section 4.

ERCOT then studied five options based on analyzing the identified reliability issues and reviewing the RPG project submittal. More details of the five options can be found in Section 5.

For the project option evaluation, ERCOT also performed sensitivity analysis using the 2021 winter peak case.

In addition to comparing the system performance of each option, ERCOT also compared the cost estimates of the five options.

## 4. Project Need

ERCOT conducted a power flow analysis using the 2018 and 2021 South/South Central study base cases. The study results indicated transmission line overloading and bus voltage violations in the area under N-1, G-1+N-1, X-1+N-1, and N-1-1 contingency conditions. The need analysis results are summarized in Table 4.1 to Table 4.6.

**Table 4.1 Voltage Violations Identified in the Study Region under Summer Peak N-1 Conditions**

Bus	kV	Limit (p.u.)	N-1	
			2018	2021
North Edinburg	345	1.1	1.11	1.13
Rio Hondo	345	1.1	-	1.10

**Table 4.2 Voltage Violations Identified in the Study Region under Summer Peak G-1+N-1 and X-1+N-1 Conditions**

Bus	kV	Limit (p.u.)	G-1+N-1		X-1+N-1	
			2018	2021	2018	2021
North Edinburg	345	1.1	-	-	-	1.11
Goodwin	138	0.92	-	0.91	-	0.91

**Table 4.3 Voltage Violations Identified in the Study Region under Spring Peak Conditions**

Bus	kV	Limit (p.u.)	N-1-1	
			2018	2021
Garza	138	0.92	0.92	0.88
Roma Switch	138	0.92	-	0.92

**Table 4.4 Thermal Overload or Heavy Flow Issues Identified in the Study Region under Summer Peak N-1 Conditions**

Branch	Length (miles)	N-1	
		2018	2021
West Edinburg to North Edinburg 138 kV Ckt 1	4.6	129%	138%
North McAllen to North Edinburg 138 kV Ckt 2	9.2	125%	134%
North Pharr to Polk Avenue 138 kV Ckt 1	3.6	113%	119%
South McAllen to Hall Acres 138 kV Ckt 1	3.7	107%	114%
West Edinburg to Alton 138 kV Ckt 1	6.9	105%	111%
West McAllen to North McAllen 138 kV Ckt 1	4.7	101%	106%
Rio Rico to Stewart Road 69 kV Ckt 1	22.7	93%	101%
North Edinburg 345/158 kV transformer	-	106% to 109%	121% to 124%
Alton to Key Switch 138 kV Ckt 1	0.9	94%	99%
South McAllen to Bentsen 138 kV Ckt 1	3.3	97%	98%

**Table 4.5 Thermal Overload or Heavy Flow Issues Identified in the Study Region under Summer Peak G-1+N-1 and X-1+N-1 Conditions**

Branch	Length (miles)	G-1+N-1		X-1+N-1	
		2018	2021	2018	2031
West Edinburg to North Edinburg 138 kV Ckt 1	4.6	104%	115%	103%	113%
North McAllen to North Edinburg 138 kV Ckt 2	9.2	-	110%	99%	108%
Rio Rico to Stewart Road 69 kV Ckt 1	22.7	-	100%	-	-
North Edinburg 345/158 kV transformer	-	-	-	-	97%-99%

**Table 4.6 Thermal Overload or Heavy Flow Issues Identified in the Study Region under Spring Peak Conditions**

Branch	Length (miles)	N-1-1	
		2018	2021
West Edinburg to North Edinburg 138 kV Ckt 1	4.6	119%	130%
North McAllen to North Edinburg 138 kV Ckt 2	9.2	119%	129%
North Pharr to Polk Avenue 138 kV Ckt 1	3.6	109%	118%
South McAllen to Hall Acres 138 kV Ckt 1	3.7	109%	119%
West Edinburg to Alton 138 kV Ckt 1	6.9	-	106%
Duke/HEC to Azteca Sub 138 kV Ckt 1	2.3	107%	115%
Azteca Sub to SE Edinburg 138 kV Ckt 1	5.4	105%	112%
North Edinburg to Moore Field 138 kV Ckt 1	8.0	102%	110%
Moore Field to Citrus City 138 kV Ckt 1	5.2	99%	106%
Citrus City to Palmhurst tap 138 kV Ckt 1	3.9	-	106%
Palmhurst tap to Palm View 138 kV Ckt 1	2.2	-	105%
Key Switch to Palmhurst tap 138 kV Ckt 1	2.5	-	102%
SE Edinburg to Pharr Magic Valley 138 kV Ckt 1	1.6	-	101%
North Edinburg to McColl Road 138 kV Ckt 1	2.6	-	101%

## 5. Project Options

ERCOT considered five options to resolve the identified criteria violations. The detailed description of the five options are listed below.

- Option A
  - Expand the existing Frontera 138 kV substation to include new breakers and protection equipment for a single new 345 kV transmission line and two 345/138 kV transformers.
  - Install two 345/138 kV autotransformers at Frontera 138 kV substation.
  - Construct a new 345 kV transmission line, approximately 23 miles from the Frontera 345 kV substation to the planned Pomelo station located on the existing North Edinburg to Del Sol 345 kV line.
  - Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
  - Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

The total cost estimate for Option A is approximately \$94.3 million.

- Option B
  - Expand the existing South McAllen 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
  - Install two 345/138 kV autotransformers at South McAllen 138 kV substation.
  - Construct two new 345 kV transmission lines (two separate ROWs), approximately 12 miles each from South McAllen 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
  - Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
  - Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

The total cost estimate for Option B is approximately \$89.5 million.

- Option C
  - Expand the existing South McAllen 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
  - Install two 345/138 kV autotransformers at South McAllen 138 kV substation.
  - Construct a new 345 kV double circuit transmission line (a single ROW), approximately 12 miles from South McAllen 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
  - Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.



- Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

The total cost estimate for Option C is approximately \$70 million.

▪ Option D

- Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
- Install two 345/138 kV autotransformers at Stewart Road 138 kV substation.
- Construct a new 345 kV double circuit transmission line (a single ROW), approximately 5 miles from Stewart Road 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
- Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
- Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.
- Operate the Pharr – North McAllen 138 kV line segment normally closed except for certain N-1-1 conditions.

The total cost estimate for Option D is approximately \$51.5 million.

▪ Option E (Submitted option)

- Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
- Install two 345/138 kV autotransformers at Stewart Road 138 kV substation.
- Construct two new 345 kV transmission lines (two separate ROWs), approximately 5 miles each from Stewart Road 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
- Expand the existing Frontera 138 kV substation to include new breakers and protection equipment for a single new 345 kV transmission line and single 345/138 kV transformer.
- Install a single 345/138 kV autotransformer at Frontera 138 kV substation.
- Construct a new 345 kV transmission line, approximately 23 miles from the Frontera 345 kV substation to the planned Pomelo station located on the existing North Edinburg to Del Sol 345 kV line.
- Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
- Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

The total cost estimate for Option D is approximately \$143.4 million.



## 6. Option Comparison

In order to compare the five options, ERCOT performed the following contingency analysis.

- N-1, G-1+N-1 and X-1+N-1 analysis using the 2021 South/South Central summer peak case from the 2015 Regional Transmission Plan.
- N-1-1 analysis using the 2021 South/South Central spring peak case.
- N-1, G-1+N-1 and X-1+N-1 sensitivity analysis using the 2021 South/South Central winter peak case.

All five options can address the reliability need in the West LRGV study region, and option D is the least cost option. The contingency analysis results are summarized in Table 6.1 to Table 6.4.

**Table 6.1 Thermal Loadings in 2021 Summer Peak Case for all Options under N-1**

Branch	Length (miles)	Option A	Option B	Option C	Option D	Option E
N. McAllen to N. Edinburg 138 kV Ckt 2	9.2	94.0%	96.6%	96.6%	95.1%	82.8%
South McAllen to Bentsen 138 kV Ckt 2	3.3	97.3%	94.7%	94.7%	95.2%	95.2%
N. Edinburg to McColl Road 138 kV Ckt 1	2.6	91.8%	87.2%	87.2%	96.0%	85.0%

The 2021 summer peak case G-1+N-1 and X-1+N-1 contingency analysis results do not show any branches loaded above 95% of their Rate B (emergency rating) in the study region.

**Table 6.2 Thermal Loadings in 2021 Spring Peak Cases for all Options under N-1-1**

Branch	Length (miles)	Option A	Option B	Option C	Option D	Option E
Aderhold Sub to Duke/HEC 138 kV Ckt 1 *	7.6	98.5%	97.0%	98.5%	98.0%	98.1%
N. Edinburg to McColl Road 138 kV Ckt 1	2.6	95.6%	92.6%	92.6%	95.2%	90.1%
N. McAllen to N. Edinburg 138 kV Ckt 2	9.2	92.5%	97.2%	97.3%	92.6%	76.8%
W. Edinburg to N. Edinburg 138 kV Ckt 2	4.5	92.9%	93.2%	93.2%	96.4%	86.7%
Duke/HEC to Azteca Sub 138 kV Ckt 1 *	2.3	97.4%	97.3%	97.3%	99.4%	97.2%
W. Edinburg to N. Edinburg 138 kV Ckt 1	4.6	91.2%	96.8%	96.9%	98.7%	93.0%

Note: \* dynamically rated line

**Table 6.3 Thermal Loadings in 2021 Winter Peak Sensitivity Case for all Options under N-1**

Branch	Length (miles)	Option A	Option B	Option C	Option D	Option E
N. McAllen to N. Edinburg 138 kV Ckt 2	9.2	95.6%	97.6%	97.3%	96.0%	84.7%
South McAllen to Bentsen 138 kV Ckt 2*	3.3	98.1%	95.3%	95.3%	96.2%	96.3%
N. Edinburg to McColl Road 138 kV Ckt 1	2.6	93.2%	88.3%	88.0%	97.3%	87.6%

Note: \* dynamically rated line

**Table 6.4 Thermal Loadings in 2021 Winter Peak Sensitivity Case for all Options under X-1+N-1**

Branch	Length (miles)	Option A	Option B	Option C	Option D	Option E
Weslaco unit to Stewart Road 138 kV ckt 1	14.7	92.3%	92.5%	92.5%	94.1%	99.6%

The 2021 winter peak case G-1+N-1 contingency analysis results do not show any branches loaded above 95% of their Rate B in the study region.

The cost/new ROW comparison for the five options are summarized in table 6.5. While all the five upgrade options considered can address the reliability need in the study region, Option D is the most cost effective option with the least new right of way.

**Table 6.5 Option Comparison**

Option	Resolved Reliability Issues?	Cost	New Right of Way
A	Yes	\$94.3M	One 23-mile 345 kV line
B	Yes	\$89.5M	Two 12-mile 345 kV lines
C	Yes	\$70.0M	One 12-mile 345 kV double circuit line
D	Yes	\$51.5M	One 5-mile 345 kV double circuit line
E	Yes	\$143.4M	Two 5-mile 345 kV lines and one 23-mile 345 kV line

## 7. Sensitivity Study with the 2016 RTP Load Forecast

The LRGV load forecast was 2797 MW (excluding distributed generators) in the 2021 SSC summer peak case from the 2015 RTP, however, the load forecast was updated to 2622 MW (excluding distributed generators) in the 2021 SSC summer peak case based on the latest load forecast from the 2016 RTP. Sensitivity studies were performed using the updated load forecast from the 2016 RTP. The sensitivity studies were performed for both the 2021 SSC summer peak case and the 2021 SSC spring peak case. The study results confirmed the reliability need for new transmission reinforcement. The contingency analysis results for Option D, which is the least cost option, are listed in Table 7.1 and 7.2.

**Table 7.1 Thermal Loadings in 2021 Summer Peak Sensitivity Case**

Branch	Length (miles)	N-1
N. McAllen to N. Edinburg 138 kV Ckt 2	9.2	90.4%
South McAllen to Bentsen 138 kV Ckt 2	3.3	94.0%
N. Edinburg to McColl Road 138 kV Ckt 1	2.6	91.0%

**Table 7.2 Thermal Loadings in 2021 Spring Peak Sensitivity Case**

Branch	Length (miles)	N-1-1
Aderhold Sub to Duke/HEC 138 kV Ckt 1*	7.6	98.0%
N. Edinburg to McColl Road 138 kV Ckt 1	2.6	90.0%
W. Edinburg to N. Edinburg 138 kV Ckt 2	4.5	91.4%
Duke/HEC to Azteca Sub 138 kV Ckt 1*	2.3	97.5%
W. Edinburg to N. Edinburg 138 kV Ckt 1	4.6	91.6%

Note: \* dynamically rated line

It can be seen that most of the line thermal loadings were reduced except the 138 kV line from Aderhold Sub to Duke/HEC, which has the same thermal loading compared with the results in Table 6.2.

The 138 kV line from South McAllen to Bentsen was loaded at 94.0% of its Rate B under the N-1 contingency conditions. In the cases from 2016 RTP, its Rate B was reduced from 370 MVA to 345 MVA, due to a limiting switch in the South McAllen substation. This rating reduction will cause the line to be overloaded under the N-1 contingency conditions. The overload is not unique to Option D, and it will affect all the five options under consideration. AEPSC indicated that the limiting switch can be readily replaced, therefore, ERCOT used the 370 MVA rating in the sensitivity studies.

## 8. Conclusion and Recommendation

Based on the independent review, ERCOT recommends the following transmission upgrades studied as Option D, which constitute the most effective solution with the least new right of way to meet the reliability need of the area of study:

- Expand the existing Stewart Road 138 kV substation to include new breakers and protection equipment for two new 345 kV transmission lines and two 345/138 kV transformers.
- Install two 345/138 kV autotransformers at Stewart Road 138 kV substation.
- Construct a new 345 kV double circuit transmission line (a single ROW), approximately 5 miles each from Stewart Road 138 kV substation to a tap location on the North Edinburg to Loma Alta 345 kV line, 30 miles from North Edinburg 345/138 kV substation.
- Expand the existing West Edinburg 138 kV substation to a new 5 breaker ring bus to accommodate the termination of two new 138 kV transmission lines.
- Construct approximately 1000 feet of new 138 kV transmission line to loop in the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.
- Operate the Pharr –North McAllen 138 kV line segment normally closed except for certain N-1-1 conditions.

## 9. Designated Provider of Transmission Facilities

In accordance with the ERCOT Nodal Protocols Section 3.11.4.8, ERCOT staff is to designate transmission providers for projects reviewed in the RPG. The default providers will be those that own the end points of the new projects. These providers can agree to provide or delegate the new facilities or inform ERCOT if they do not elect to provide them. If different providers own the two ends of the recommended projects, ERCOT will designate them as co-providers and they can decide between themselves what parts of the recommended projects they will each provide.

ERCOT designates AEPSC as the provider for the expansion of the existing Stewart Road 138 kV substation, the installation of the two 345/138 kV autotransformers at Stewart Road 138 kV substation, and the construction of the new 345 kV double circuit transmission line from Stewart Road to a tap location on the North Edinburg to Loma Alta 345 kV line. ERCOT designates STEC as the provider for the expansion of the existing West Edinburg 138 kV substation, and the looping in of the North Edinburg to Palmhurst 138 kV line into the West Edinburg 138 kV substation.

## 10. Appendix

AC Contingency Analysis Result of the 2021 Cases with all the options (N-1, G-1+N-1, X-1+N-1 and N-1-1 analysis)



AC Contingency  
Analysis Results.xlsx