



LCRA TSC and CPS Energy Transmission System Addition – ERCOT update

RPG Meeting
October 21, 2014

Status of CPS/LCRA RPG Project Review

- ❑ ERCOT is conducting the Independent Review of the need to address the reliability issues that limit the power import into the San Antonio area.
 - Current status:
 - ERCOT has completed the need analysis and confirmed the reliability need
 - ERCOT is testing various options for initial screening
 - Updated EIR timeline
 - Final report by November 12
 - Present to TAC on November 20
 - Present to ERCOT Board of Directors in December

Study Assumption

❑ Study Area:

- The primary focus is the system in the South Central weather zone, particularly the transmission system in Bexar, Comal, and Guadalupe Counties.

❑ Study Case:

- 2019 South/South Central (SSC) peak case from the 2014 Regional Transmission Plan (based on the 2014 SSWG Dataset B)
- Total Load in South Central Weather Zone in the 2019 SSC case
 - ~ 14,547 MW (Bexar County load = ~ 6,003 MW)
- It contains the N-1 RTP projects identified during the 2014 RTP (as of 07/08/2014) except the CPS/LCRA proposed RPG projects.
- Certain projects in the study area are also modeled in the case based on TPIT, which are:
 - Marion to Cibolo 2nd circuit addition (2017 ISD, Tier4_prj_id_2792)
 - Zorn to York Creek to Seguin upgrade (2016 ISD, Tier4_prj_id_3966)
 - Tap line between Moulton and Shiner (2019 ISD)
 - Lockhart Auto upgrade (2017, Tier4_prj_id_3963)

Study Assumption

- Status of key generators in the study base case
 - J.T. Deely 1 and 2 (~845 MW) are offline in the 2019 study base case
 - Frontera (~510 MW) is modeled offline based on the W-A072914-01 Notice of System Planning Data
 - Load in East, Coast, North, North Central, West, and Far West zones are reduced to model the status of Frontera.
 - DC Tie export from South to Mexico

- Contingencies and criteria of reliability analysis
 - All contingencies consistent with Planning Guides Section 4.1.1.2 and criteria consistent with 2014 RTP
 - For G-1+N-1, the following generator outage are tested to identify the worst G-1 condition:
 - JK Spruce JKS2 (775 MW),
 - OW Sommers OWS1 (420 MW),
 - Braunig VHB3 (412 MW)

- Transfer capability analysis (Steady-state voltage stability analysis) for the study base case
 - Load-to-Load transfer:
 - Increase the load in Bexar County, while decrease load in the rest of the areas
 - ERCOT also performed Generation-to-Load transfer for the purpose of comparison

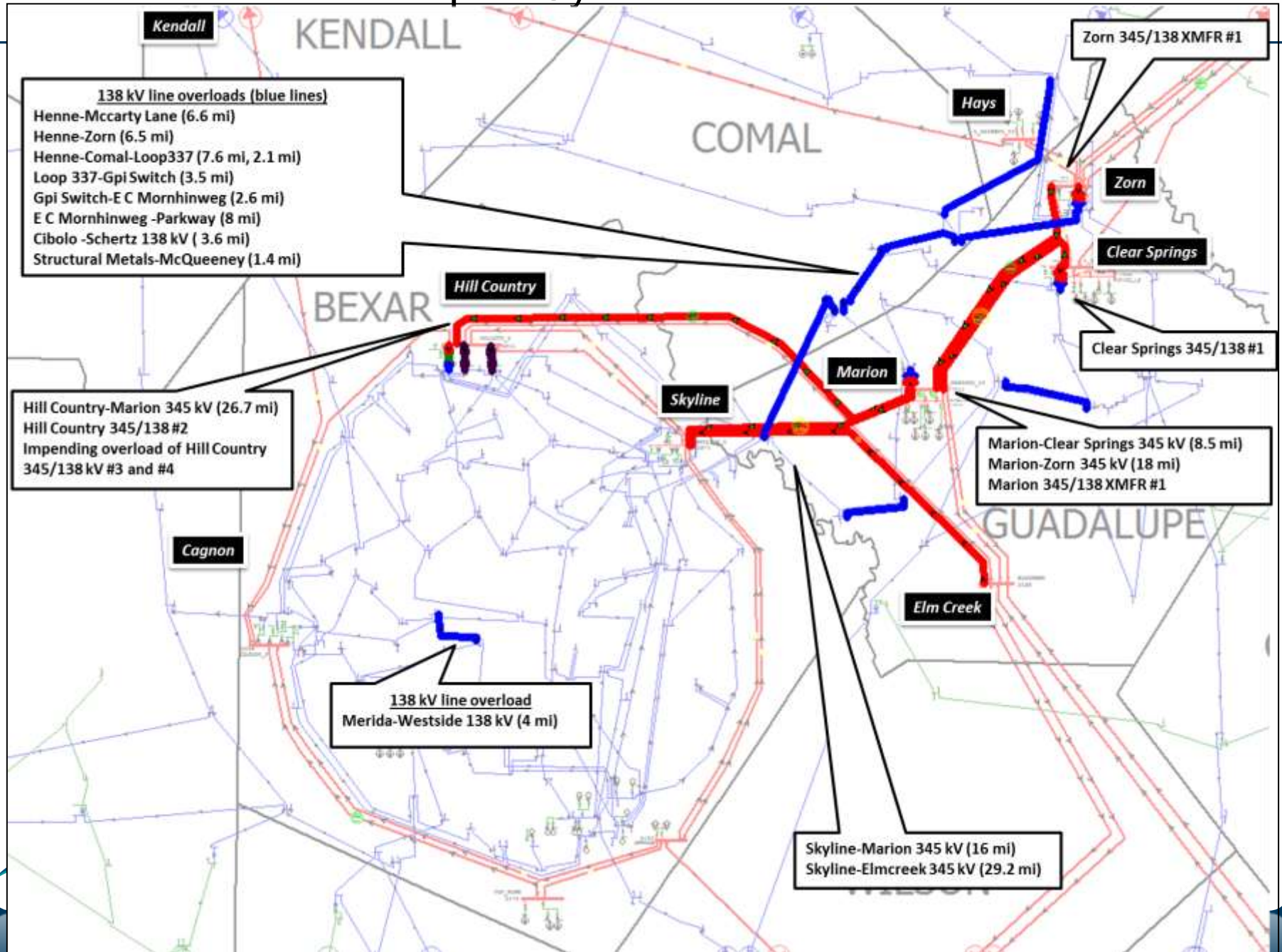
Preliminary Result of the 2019 Base Case

- N-1 Result:
 - Overloads of 69.2 miles of 345 kV lines, 26.3 miles of 138 kV lines and 2-345/138 kV transformers
 - Skyline-Marion-Clear Springs, Zorn-Marion-Hill Country (108~130%)
 - Certain 138 kV lines out of McCarty Lane, Henne and Loop 337 (107~138%)
 - 345/138 kV transformers at Clear Springs (131%), Zorn (101%), Heavy flows on Marion and Hill Country transformers
 - Worst contingency: Hill Country-Elm Creek & Marion, Marion-Zorn & Clear Springs, Zorn-Clear Springs & Marion double-circuit 345 kV lines, and Zorn-Marion, Clear Springs-Marion 345 kV lines
- G-1+N-1 Result:
 - Overloads of 98.4 miles of 345 kV lines, 41.9 miles of 138 kV lines and 4-345/138 kV transformers
 - Overload of Skyline-Marion-Clear Springs 345 kV lines (103%, 101%) under system intact condition with the JKS2 offline
 - Under all three of the generator outages G-1+N-1 conditions studied, the Skyline-Marion-Clear Springs, Zorn-Marion-Hill Country 345 kV lines were overloaded (155% ~ 130% under JKS2 G-1+N-1)
 - Under the JKS2 G-1+N-1, Elm Creek-Skyline 345 kV line is overloaded (108%)
 - 345/138 kV transformers at Clear Springs (151%), Zorn (102%), Hill Country #2 (104%) and Marion (100%)
 - JKS2 G-1 causes more severe impact on 345 kV facilities than other G-1. JKS2 is the worst G-1 condition.



No steady-state voltage issues were identified.

Map of System Problems



Preliminary Study Result – Transfer Capability Analysis

☐ Transfer Capability Analysis:

- Approximately 321 contingencies (300 kV and above in South Central, South and West) were tested under N-1 and G-1+N-1, while monitoring facilities with 100 KV and above in South Central.
- Thermal overload is more limiting than voltage stability
- Sufficient voltage stability margin under the worst G-1+N-1 condition

Case	Total Load (MW) in Bexar County at Voltage Collapse		Total Load (MW) of Bexar County in Base Case (2019)
	Load to Load Transfer	Generation to Load Transfer	
Base (2019 Case)	7362.9	7332.9	6002.9
Base w/ G-1 (JKS2)	6787.9	6762.9	6002.9
Base w/ G-1 (OWS1)	6972.9	6947.9	6002.9
Base w/ G-1 (VHB3)	6897.9	6872.9	6002.9

Initial Option Evaluation

□ Initial Options

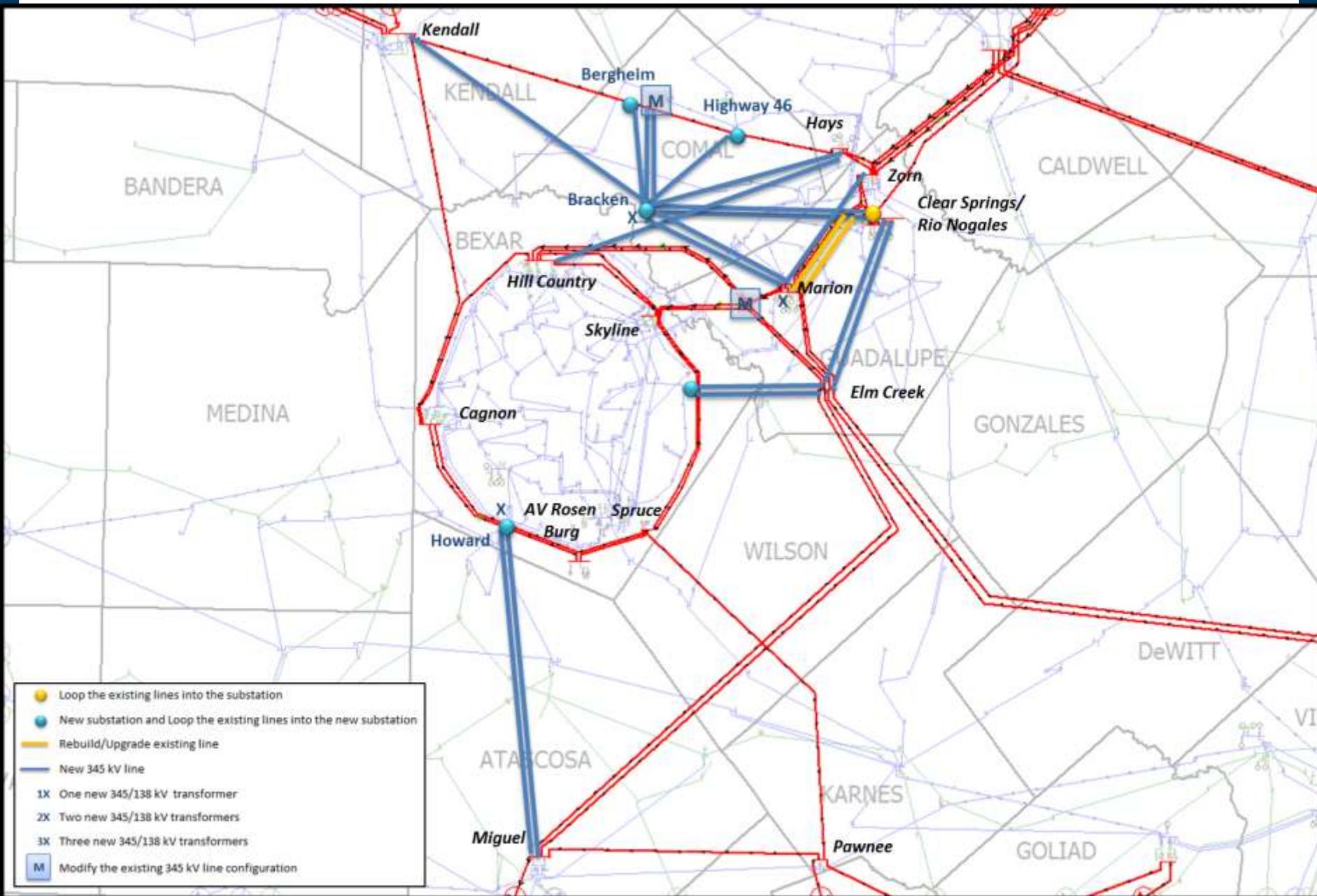
- Thirteen Options were developed for test, based on the inputs from TSPs and the reliability issues identified:
 - Eight options were identified in the original study. LCRA/CPS submitted these eight options
 - ERCOT added five options based on N-1 and G-1+N-1 evaluation

Major Facilities in Each Initial Option for N-1

	Option ID	Major facilities in each option	Approximate Length of New Line (mile)	Number of new 345/138 kV transformers	Number of new 345 kV or 345/138 kV substation
LCRA/CPS Options	Option 1	New Highway 46-Bracken 1-345 kV	8	6	3
		New Bracken-Clear Springs 2-345 kV	19		
		Loop the existing Zorn-Marion into Clear Springs and Upgrade Marion-Clear Springs 2-345 kV	9		
	Option 2	Loop the existing Hays-Kendall 345 kV into Bracken	8	6	2
		New Bracken-Clear Springs 2-345 kV	19		
		New Zorn-Marion 1-345 kV	18		
	Option 3	Loop the existing Hays-Kendall 345 kV into Bracken	8	5	2
		New Zorn-Marion 1-345 kV	18		
	Option 4	New Highway 46-Bracken 1-345 kV	8	6	3
		New Bracken-Clear Springs 2-345 kV	19		
		New Zorn-Marion 1-345 kV	18		
	Option 5	New Highway 46-Bracken 1-345 kV	8	6	3
		New Bracken-Marion 2-345 kV	7		
		New Zorn-Marion 1-345 kV	18		
	Option 6	New Bergheim-Bracken 1-345 kV	17	6	3
		New Bracken-Clear Springs 2-345 kV	19		
		New Zorn-Marion 1-345 kV	18		
	Option 7	New Bergheim-Bracken 1-345 kV	17	6	3
		New Bracken-Marion 2-345 kV	7		
		New Zorn-Marion 1-345 kV	18		
	Option 8	New Rio Nogales-Elm Creek 2-345 kV	9	6	2
		New Elm Creek-Martinez 2-345 kV	20		
		New Zorn-Marion 1-345 kV	18		
	ERCOT Options	Option 9	Loop the existing Hays-Kendall 345 kV into Bracken	8	3
New Hays-Bracken 1-345 kV			25		
New Zorn-Marion 1-345 kV			18		
Option 10		Loop the existing Hays-Kendall 345 kV into Bracken	8	3	1
		New Kendall-Bracken 1-345 kV	53		
		New Zorn-Marion 1-345 kV	18		
Option 11		New Miguel-Howard 2-345 kV	32	3	1
		New Zorn-Marion 1-345 kV	18		
Option 12		New Hill Country-Hays 1-345 kV	35	1	0
		New Zorn-Marion 1-345 kV	18		
Option 13		New Bracken-Zorn 1-345 kV	29	3	1
		New Bracken-Marion 1-345 kV	27		
		Loop the existing Zorn-Marion into Clear Springs and Upgrade Marion-Clear Springs 2-345 kV	9		



Map of Major Facilities in Initial Options



Other Upgrades Modeled in Initial Options

- ❑ In all options, the existing Hill Country-Elm Creek/Marion and Skyline-Marion/Elm Creek 345 kV double-circuit lines are reconfigured to form Hill Country-Marion double circuit and Skyline-Elm Creek double circuit.

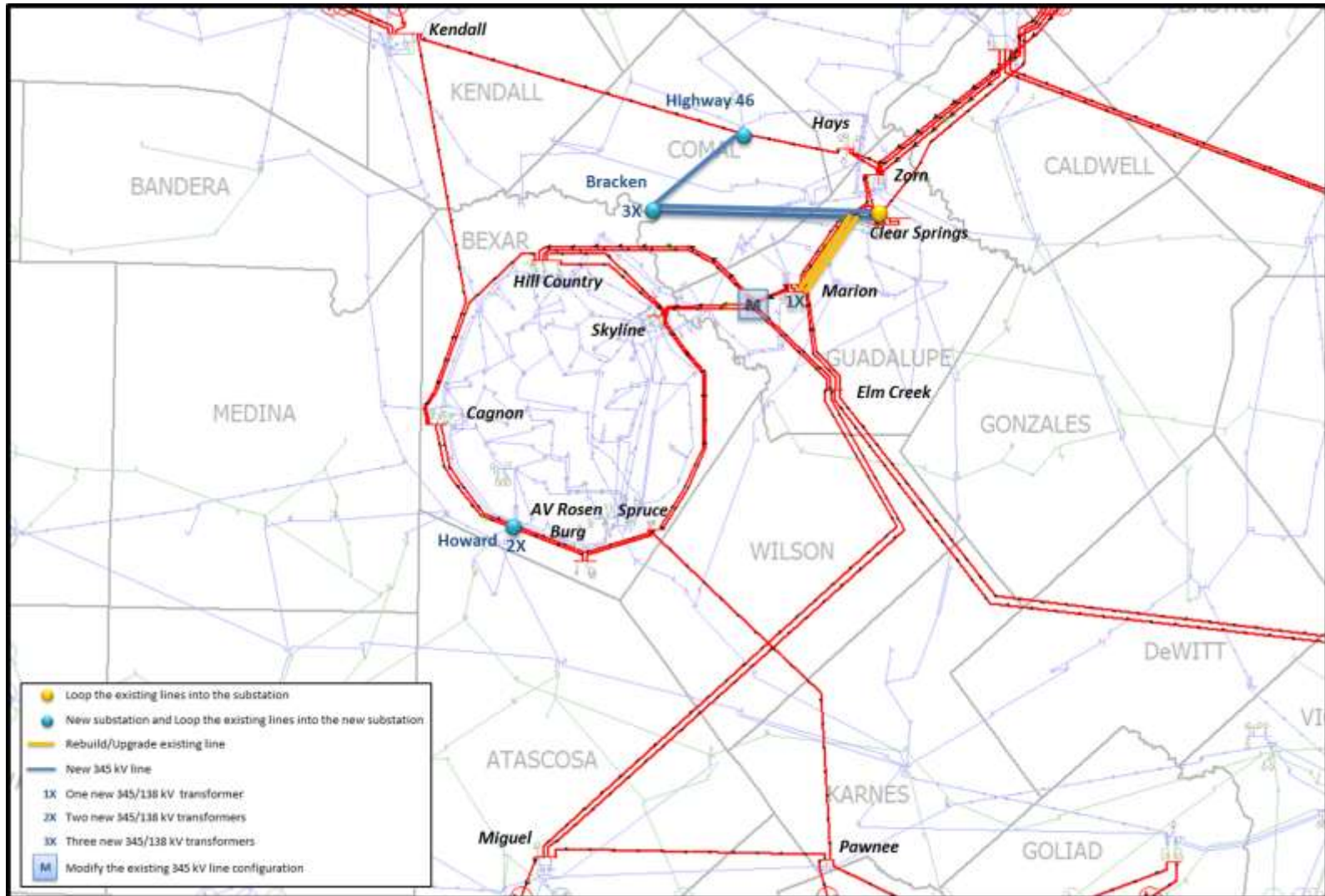
- ❑ 138 kV facility upgrades
 - Options 1 through 8 contain the 138 kV system upgrades described in the LCRA TSC/CPS Energy RPG proposal document
 - 138 kV system upgrade associated with new Bracken 345/138 kV substation:
 - Modification of existing 138 kV lines and new 138 kV lines are needed to distribute the flows coming from the new 345 kV lines terminated at Bracken.
 - Construct a new double-circuit transmission line to loop the Bulverde-Green Mountain 138 kV line into Bracken (Bracken – Bulverde, 7.5 miles; Bracken – Green Mountain, 11.1 miles)
 - Construct a new double-circuit transmission line to loop the Skyline-Tri County 138 kV line into Bracken (Bracken – Skyline, 15 miles; Bracken – Tri-County, 8 miles)
 - Other 138 kV system upgrades in Option 9, 10, 11, 12, and 13
 - Rebuild Hamilton Wolf to Medical Center 138 kV line (1 mile) in Option 9, 10, 11, 12, and 13
 - Upgrade McCarty Lane – Henne – Comal 138 kV line (approximately 14 miles) in Option 13

Next Steps

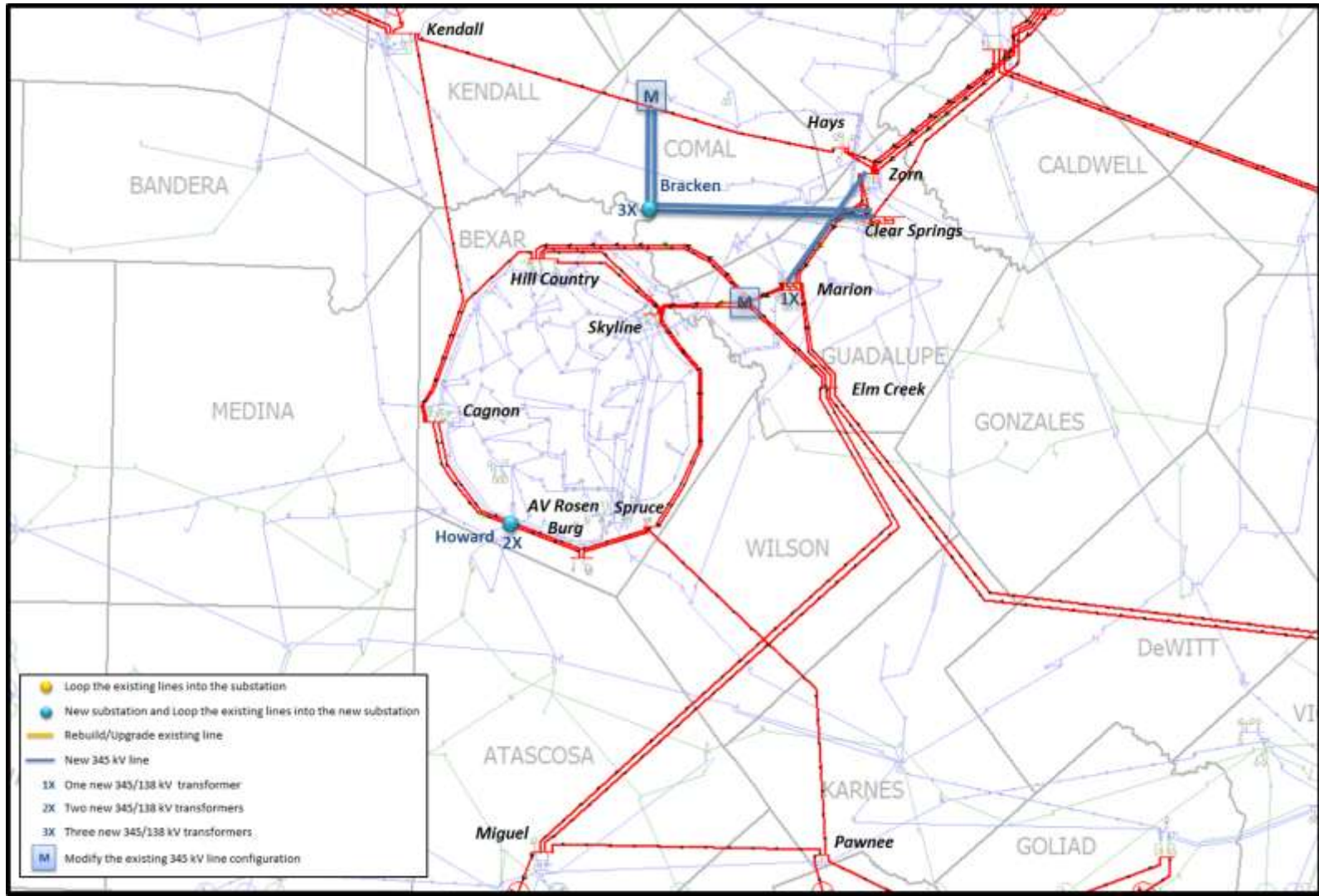
- ❑ ERCOT will perform X-1+N-1 Analysis for the base case
- ❑ ERCOT will complete the initial screening and select options for further analysis.
- ❑ ERCOT will perform the following detailed analysis for options selected:
 - Transfer capability analysis
 - Impact of Category C and D contingencies
 - Transmission efficiency (loss analysis)
 - Project cost comparison
 - X-1+N-1 Analysis
 - Economic/Congestion Analysis
 - Other analysis if needed

Questions?

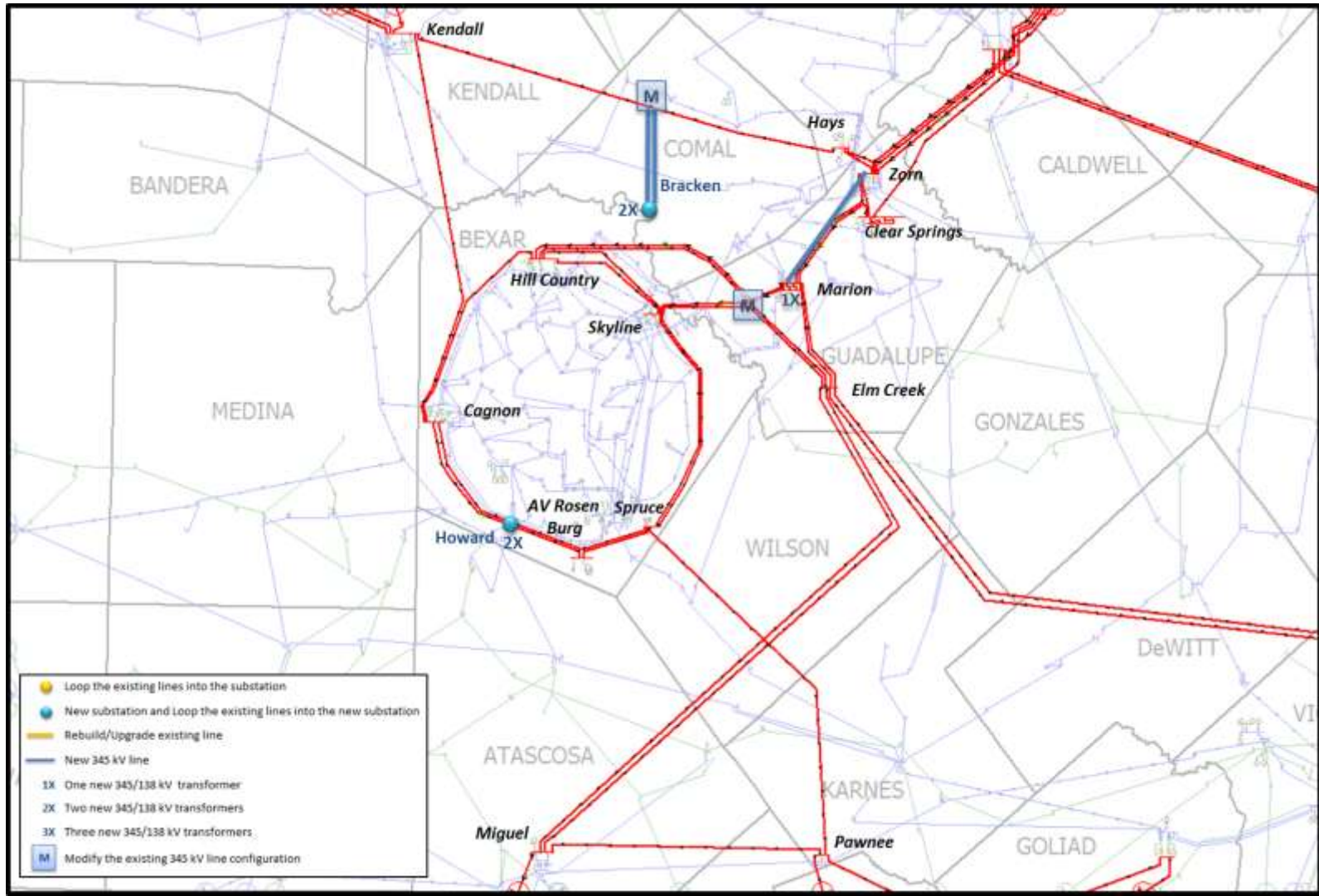
Appendix – Major Facilities in Option 1



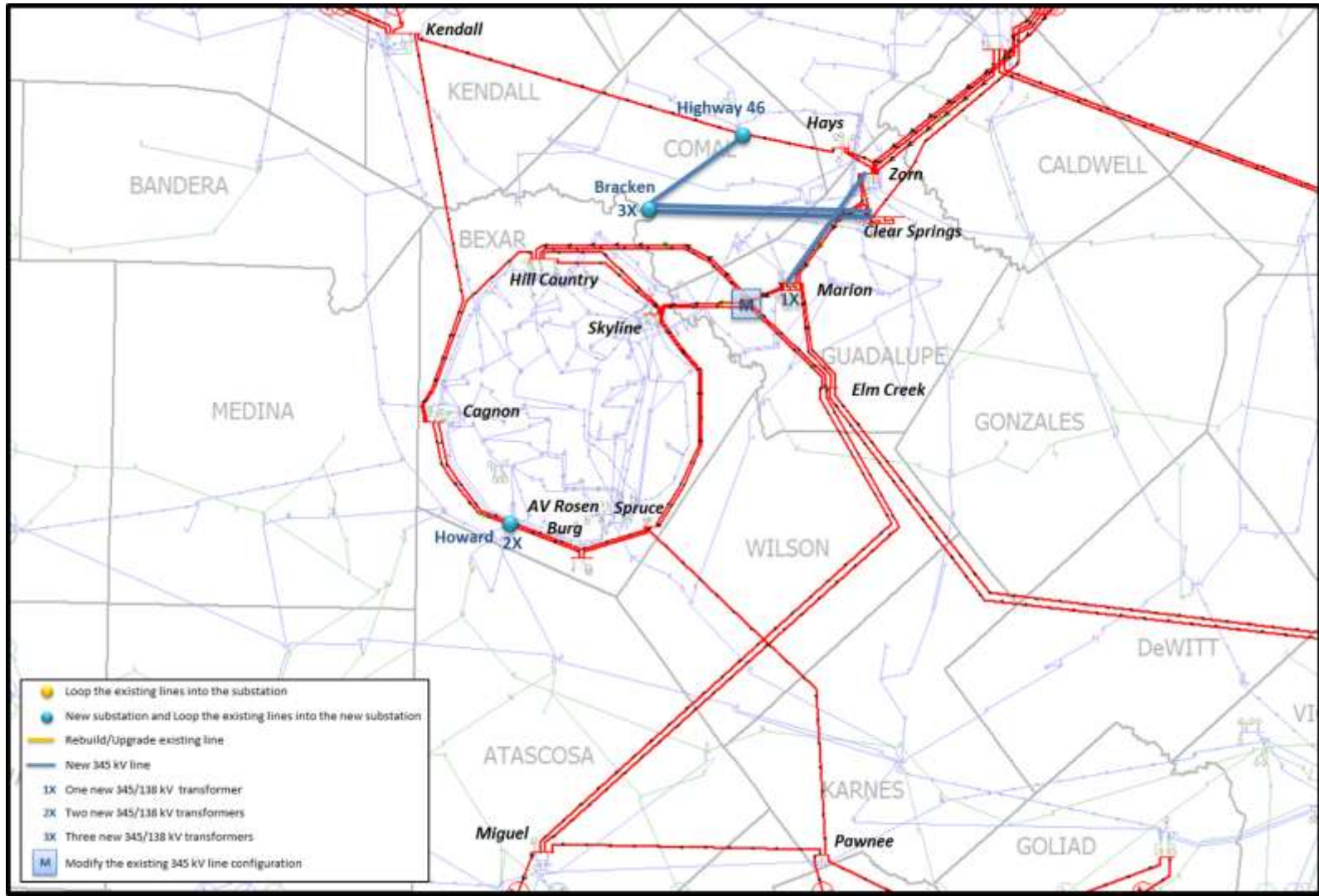
Appendix – Major Facilities of Option 2



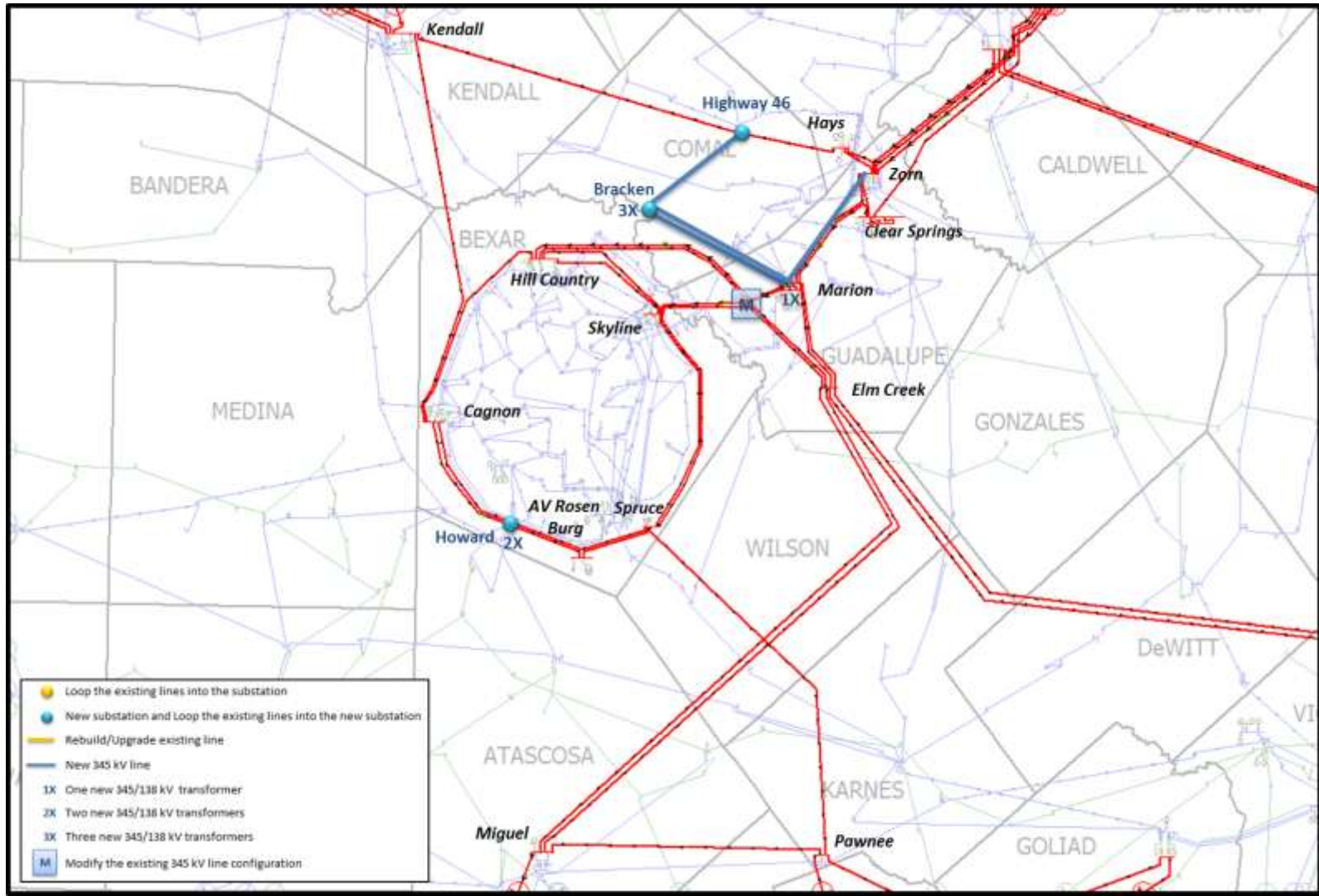
Appendix – Major Facilities of Option 3



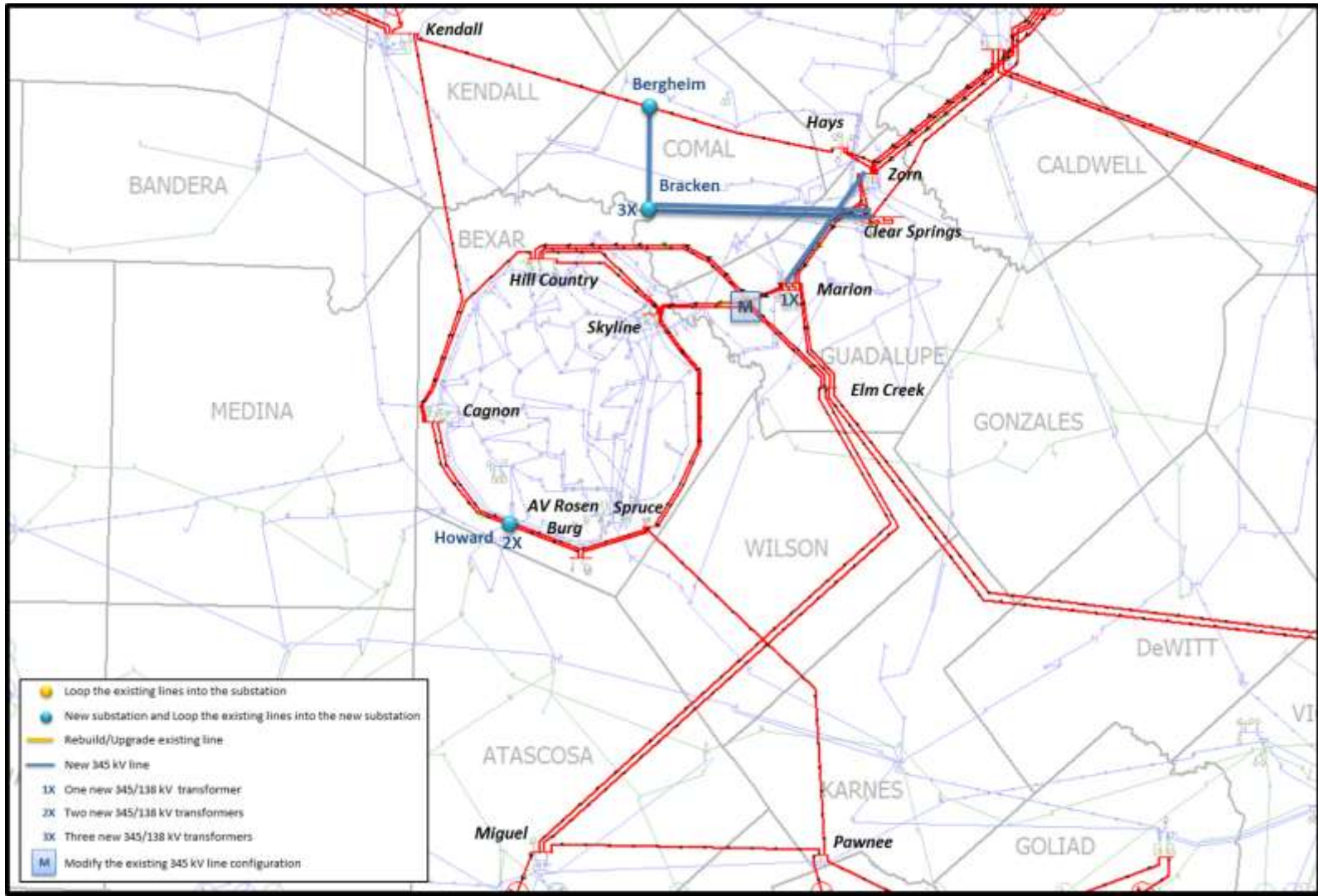
Appendix – Major Facilities of Option 4



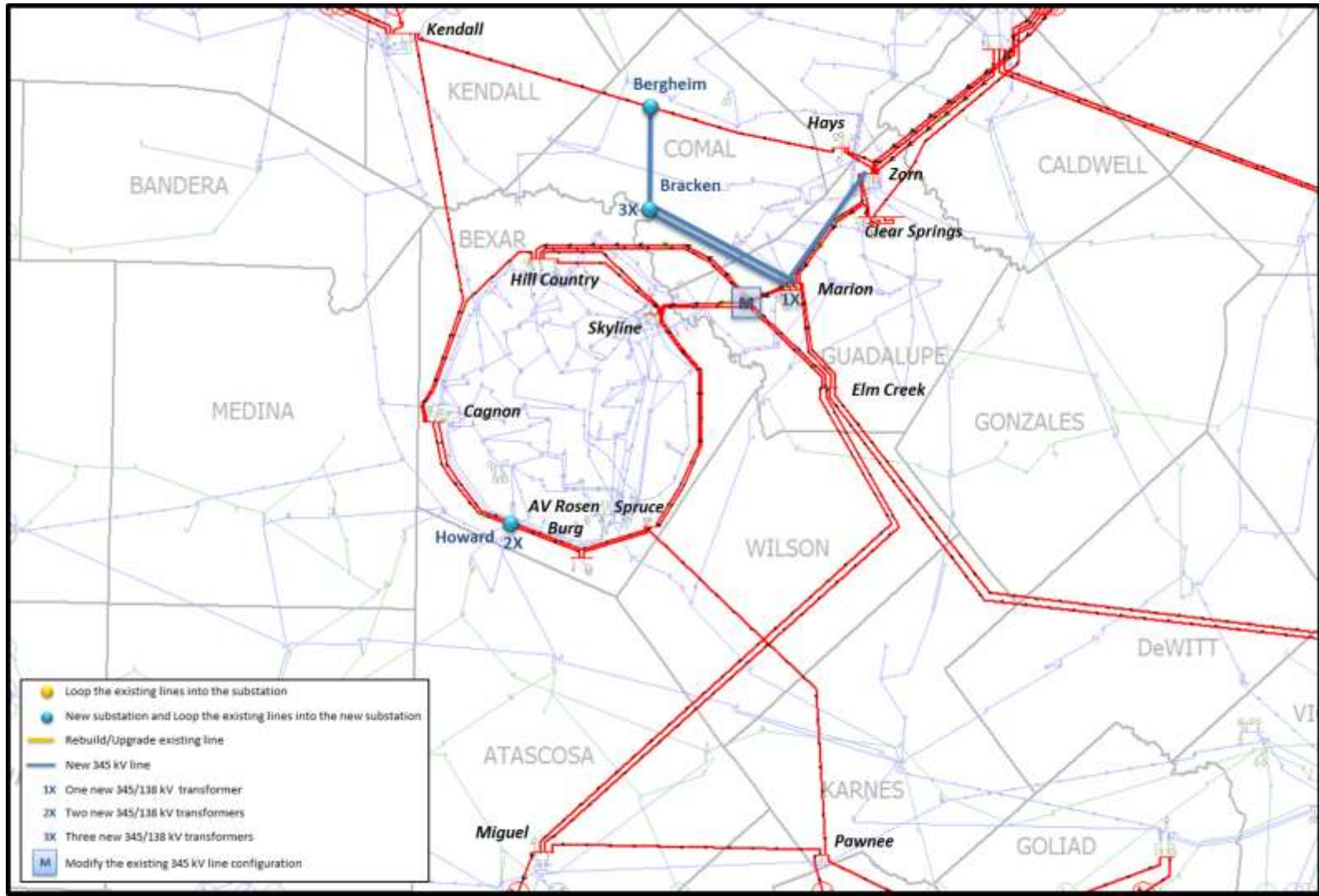
Appendix – Major Facilities of Option 5



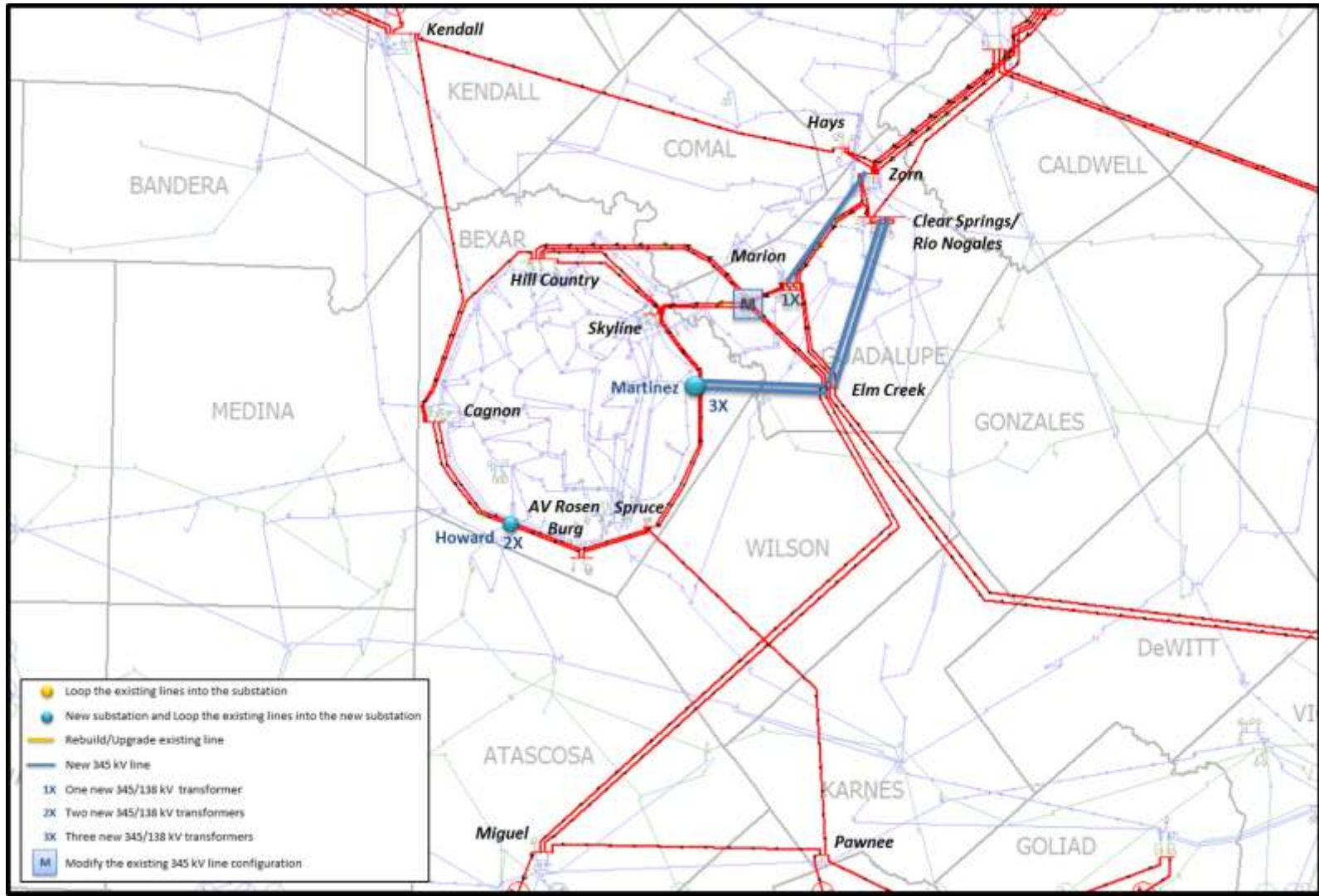
Appendix – Major Facilities of Option 6



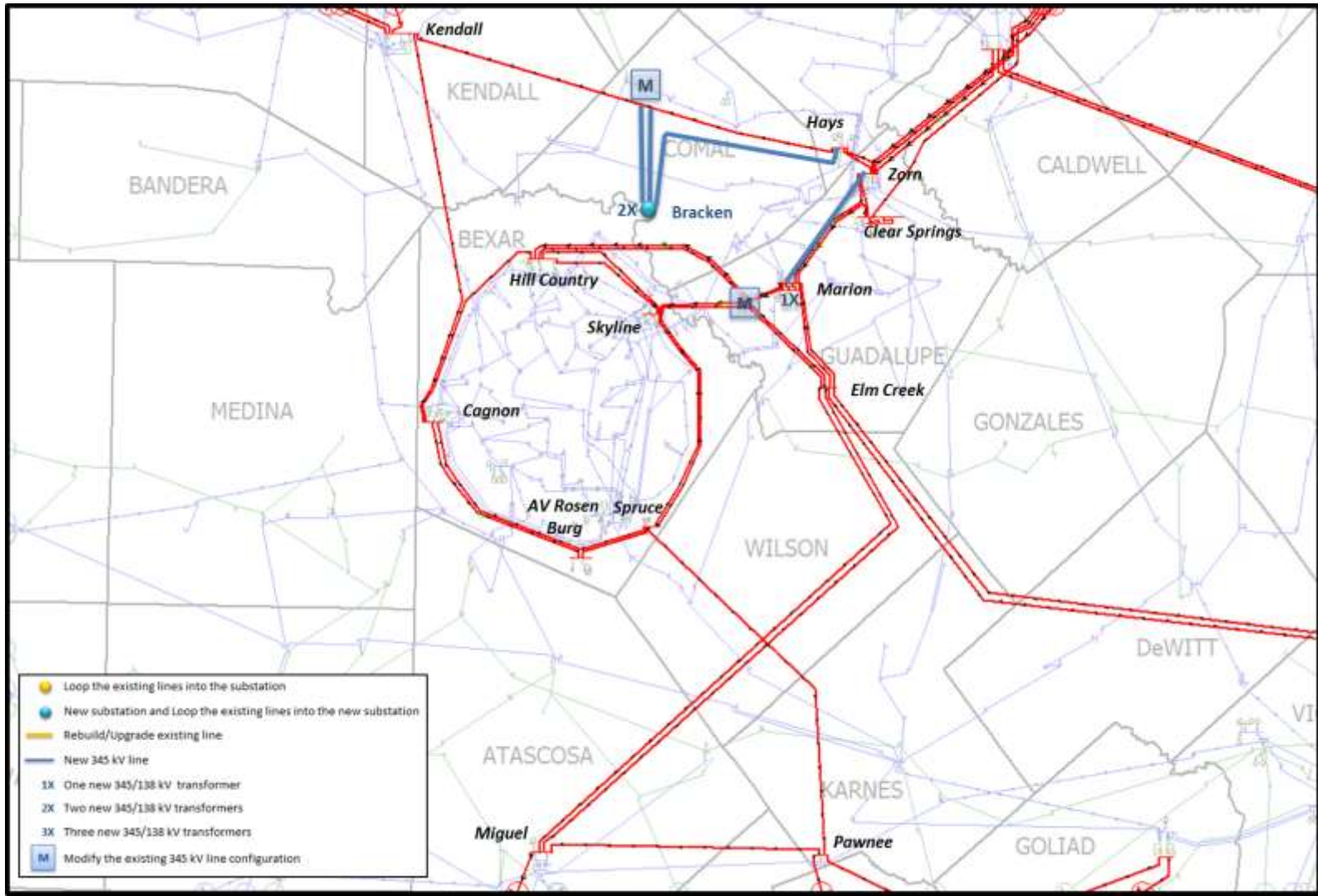
Appendix – Major Facilities of Option 7



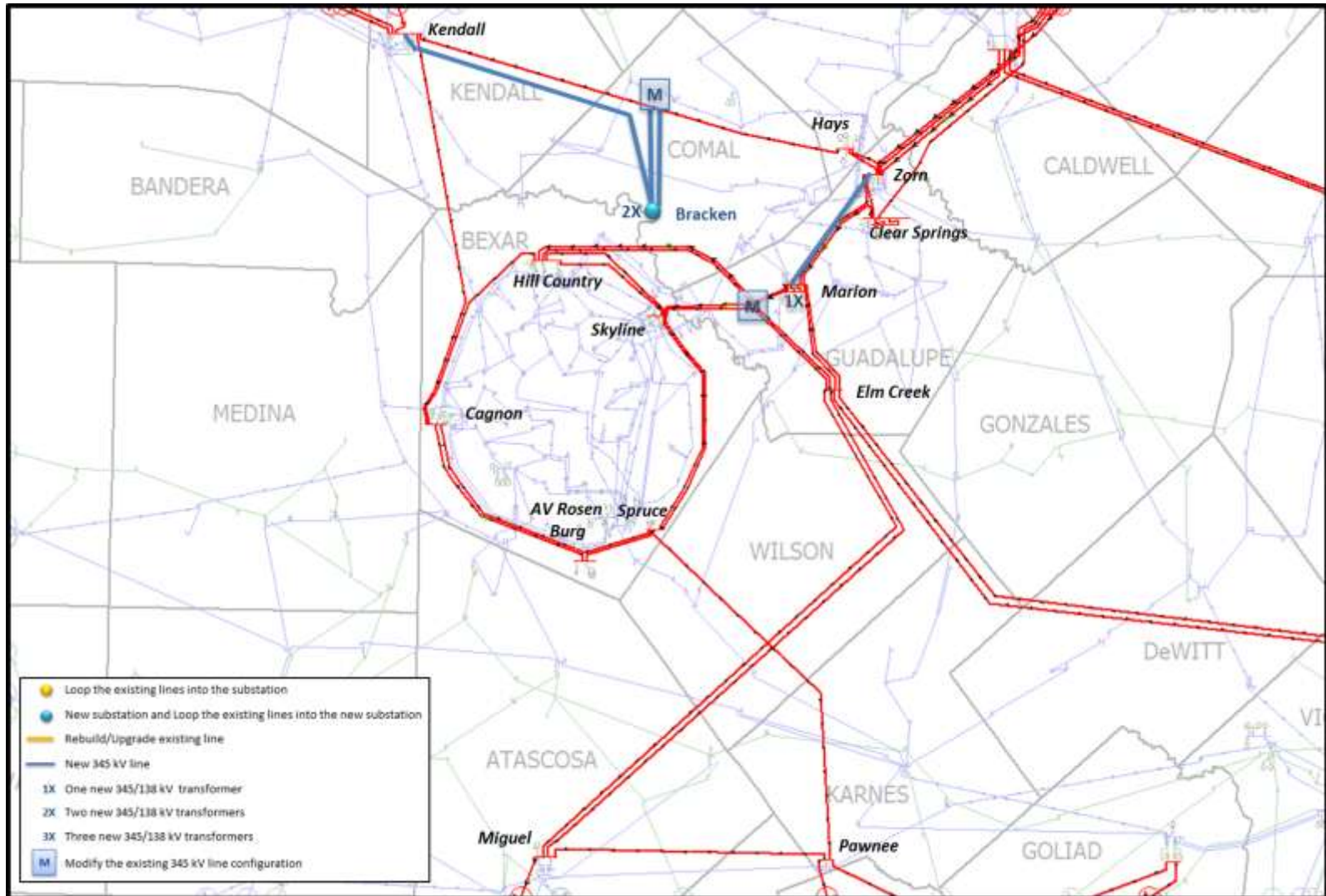
Appendix – Major Facilities of Option 8



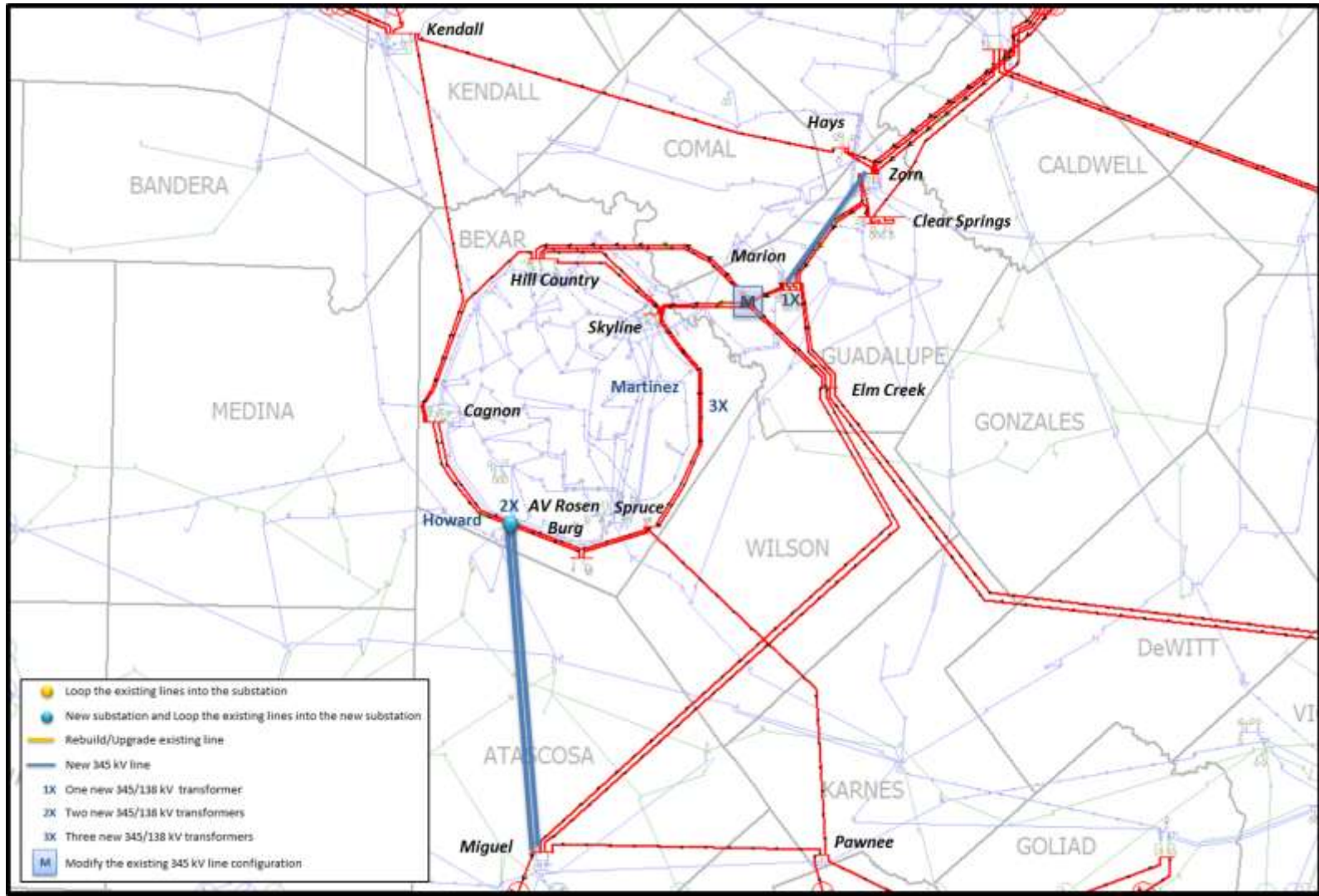
Appendix – Major Facilities of Option 9 (E-1)



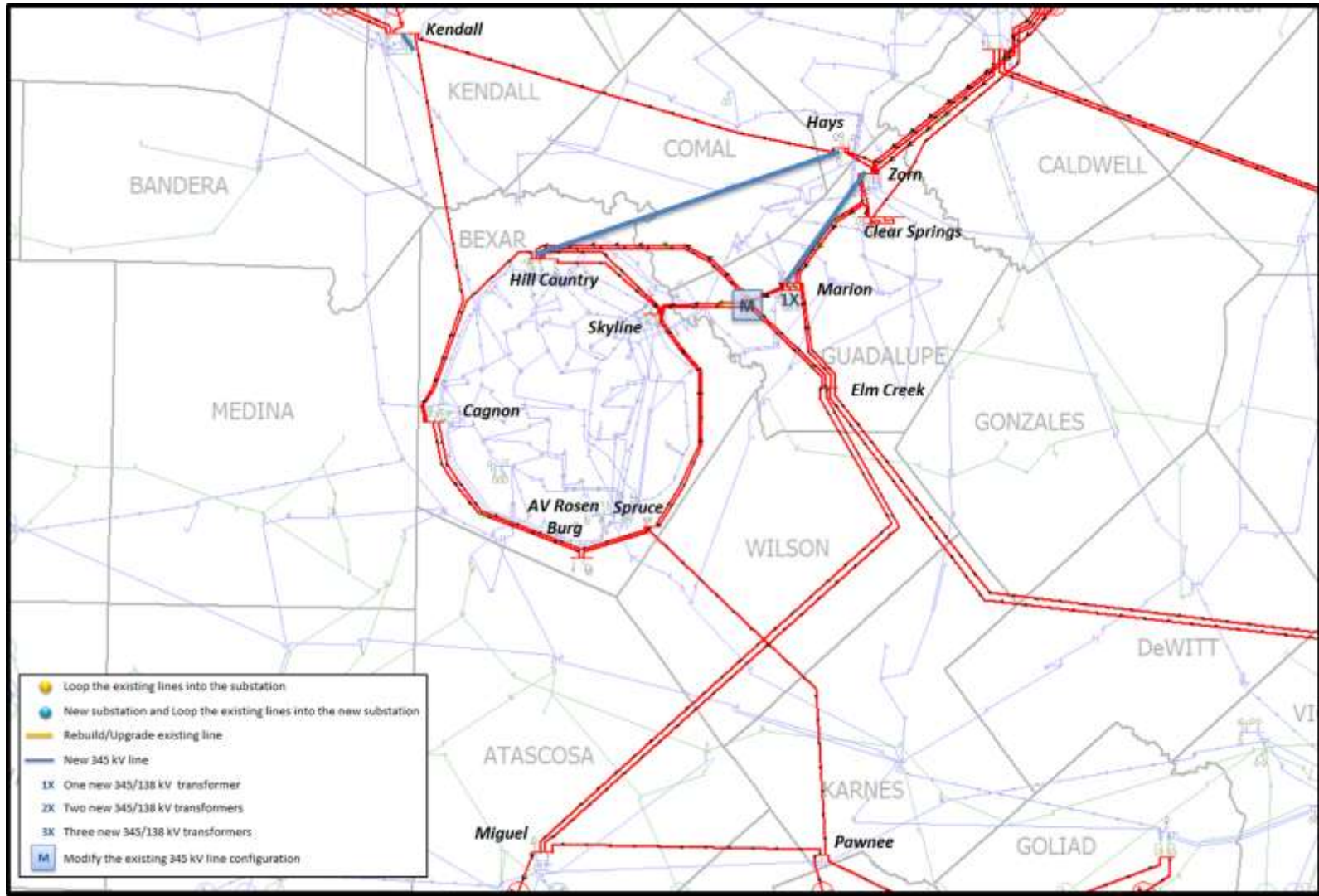
Appendix – Major Facilities of Option 10 (E-2)



Appendix – Major Facilities of Option 11 (E-3)



Appendix – Major Facilities of Option 12 (E-4)



Appendix – Major Facilities of Option 13 (E-5)

