Overview of Southern DFW Load Interconnection and General Grid Strengthening Project

ERCOT RPG Meeting

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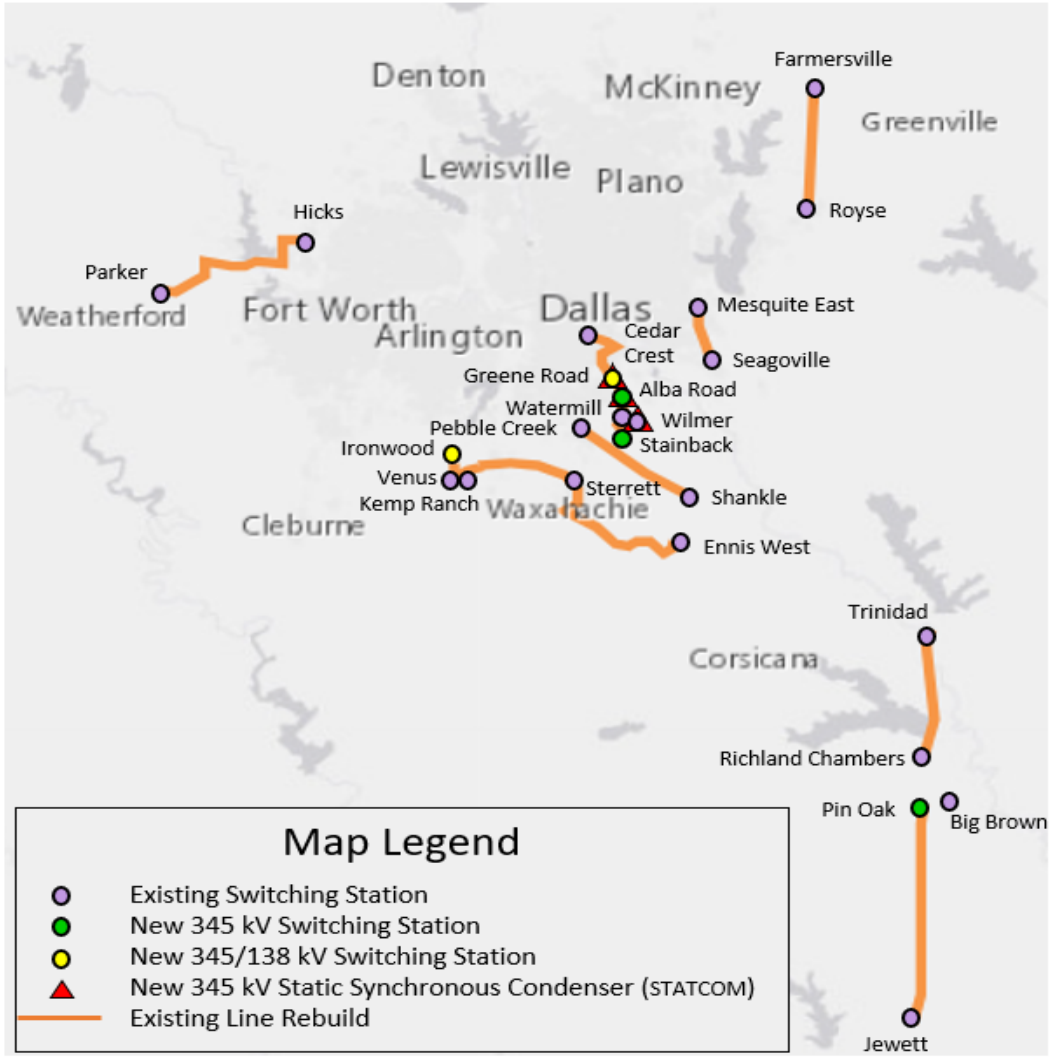
Project Overview

- Tier-1 Project in Tarrant, Dallas, Ellis, Navarro, Parker, Freestone, Leon, Henderson, Rockwall, and Collin counties
- CCN Required
- Driven by new 4064 MW large loads in southern DFW that either executed an interconnection agreement or demonstrated well-defined forward movement in meeting the conditions for a load interconnection date between 2026-2028
- Resolves identified thermal violations, provide additional 345 kV sources for the area, enhance the load-serving capability of the existing transmission infrastructure, and enhance system reliability
- Four new Switch Stations
  - Greene Road 345/138 kV Switch
  - Ironwood 345/138 kV Switch
  - Stainback 345 kV Switch
  - Alba Road 345 kV Switch
- One 345 kV Switch Station rebuild
- Four new 138 kV lines (2.0 miles each)
- 243 circuit-mile upgrade of 345 kV and 138 kV lines
  - 169.8 circuit-miles of 345 kV line
  - 73.1 circuit miles of 138 kV line
- Nine Reactive Devices
  - Three 345 kV Static Synchronous Compensator (STATCOMs)
  - Three 345 kV capacitor banks
  - Three 138 kV capacitor banks
- Cost Estimate: $1.219 billion



Southern DFW Area Load Interconnection Proposed Projects

New Switch Stations
Greene Road 345/138 kV Switch
Ironwood 345/138 kV Switch
Stainback 345 kV Switch
Alba Road 345 kV Switch
Pin Oak 345 kV Switch

Transmission Lines		
	Name	Circuit Mile
New Lines	Ironwood Switch - Midlothian Tap 138 kV Line 1	2
	Ironwood Switch - Midlothian Tap 138 kV Line 2	2
	Ironwood Switch - Midlothian Tap 138 kV Line 3	2
	Ironwood Switch - Midlothian Tap 138 kV Line 4	2
Line Upgrades	Watermill Switch – Greene Road Switch 345 kV DCKT	7.2
	Watermill Switch – Stainback Switch 345 kV DCKT	6
	Farmersville Switch – Royse Switch 345 kV DCKT	30.6
	Jewett Switch – Pin Oak Switch 345 kV DCKT	65.6
	Richland Chambers Switch – Trinidad Switch 345 kV Double-Circuit	37.4
	Parker Switch – Hicks Switch 345 kV Line	23
	Watermill Switch – Wilson Switch 138 kV DCKT	1.5
	Wilson Switch – Greene Road Switch 138 kV DCKT	4
	Greene Road Switch – Cedar Crest 138 kV Line	10.9
	Sterrett Switch – Midlothian TXI 138 kV Line Section	11.8
	Ennis West Switch – Sterrett Switch 138 kV Line	21
	Pebble Creek Switch – Shankle Switch 138 kV Line	15.5
	Mesquite East Switch – Seagoville Switch 138 kV Line	7.4
	Kemp Ranch - Midlothian Tap 138 kV Line Section 1	0.5
	Kemp Ranch - Midlothian Tap 138 kV Line Section 2	0.5
	Total (Miles)>>	*251*

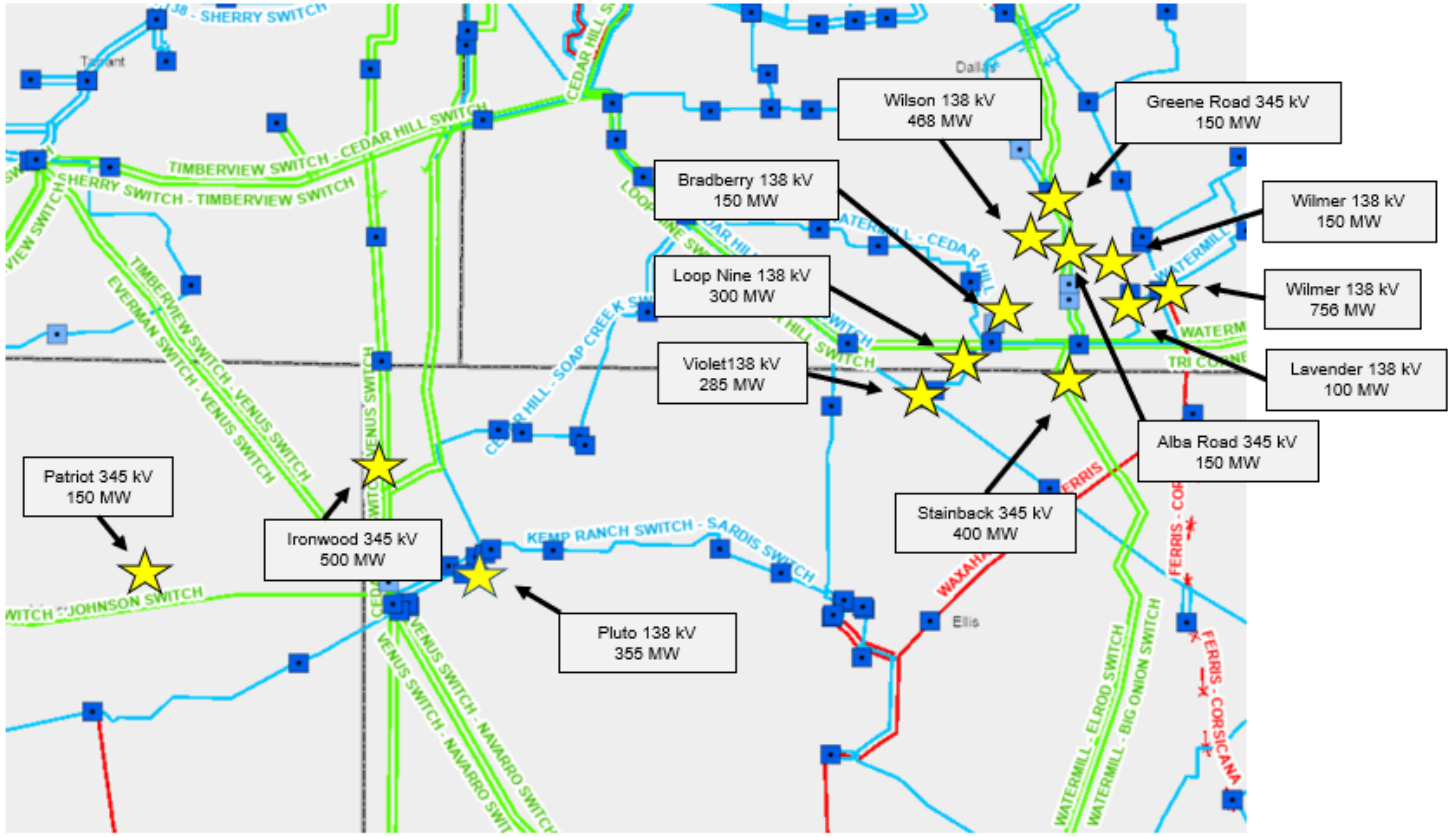
Reactive Devices					
Location	kV	Device Type	Number of Devices/Stages	Reactive Power (MVAr)	Total Reactive Power (MVAr)
Greene Road Switch	345	STATCOM	1	250	250
Alba Road Switch	345	STATCOM	1	250	250
Wilmer Switch	345	STATCOM	1	250	250
Alba Road Switch	345	Shunt	6	80	480
Stainback Switch	345	Shunt	6	80	480
Greene Road Switch	345	Shunt	3	80	240
Greene Road Switch	138	Shunt	3	36.8	110.4
Ironwood Switch	138	Shunt	6	36.8	220.8
Pebble Creek	138	Shunt	6	36.8	220.8
				Total (MVAr)>>	*2502*

2024 RTP Projects Addressed by Proposed Projects in this RPG Submittal

Project Number	Project Description
2024-E12	Trinidad SES (3124) to Richland Chambers (3134) 345-kV Line Upgrade
2024-E3	Big Brown SES West (3381) to Jewett (3391) 345-kV Line Upgrade and Substation Rebuilds
2024-NC13	Pebble Creek (2229) to Trumbull (221) to Gamma (12344) to Shankle Switch (12329) 138-kV Line Upgrades
2024-NC14	Green Road (3069) to Ten Mile (2126) to Watermill (2429) to Reindeer (3065) 138-kV Line Upgrades
2024-NC18	Ennis West Switch (2241) to Templeton (12320) to Waxahachie (2321) 138-kV Line Upgrades
2024-NC31	Royse Area 345-kV Line Upgrades and Substation Rebuilds
2024-NC63	Watermill Area 345-kV Line Additions and Reactive Support
2024-NC68	Batchler Road (2217) to Watermill (2427) 345-kV Line Upgrades
2024-NC70	Miller Road (2632) 345/138-kV Substation Addition and 345-kV Lines Re-Termination
2024-NC73	Greene Road (3069) to Cedar Crest (2486) 138-kV Line Upgrades
2024-NC85	Miller Road (2635) to Kemp Ranch Switch (2303) 138-kV Double-Circuit Line Upgrade
2024-NC86	Greene Road (3063/3069) New 138-kV and 345-kV Line Additions and Substation Rebuilds

Load Assumptions

Station Name	Bus Number	Bus (kV)	Load (NW)
Loop Nine Switch	2848	138	300
Violet	2230	138	190
Pluto 1	12303	138	82
Pluto 2	12304	138	82
Bradberry Switch	3064	138	150
Wilmer Switch	3083	138	756
Stainback Switch	2217	345	400
Wilson Switch	3074	138	156
Wilson Switch	3074	138	312
Ironwood Switch	2632	345	500
Pluto 1	12303	138	95.5
Pluto 2	12304	138	95.5
Violet	2230	138	95
Lavender Switch	2261	138	100
Wilmer Switch	3083	138	150
Alba Switch	3062	345	150
Venus Switch	1907	345	150
Greene Road Switch	3063	345	150
Loop Nine Switch	2847	345	150
		Total (MW) >>	*4064*



Generation Assumptions

- To improve the accuracy of the study case and compensate for the 4064 MW load, the total 3400 MW comprising of the following generating units, was supplied to the study cases until the power flow was solved.
  - The generation from the 2023 December and February 2024 Generator Interconnection Status (GIS) reports that fully met the requirements in the ERCOT Planning Guide (PG) Section 6.9(1) were added to the study cases until the power flow was solved.
- Despite the addition of generation, a deficit persisted, requiring 450 MW to be proportionally scaled across South and Coast ERCOT weather zones.

Unit ID	Number of Generating Units	Dispatch %
Wind (W)	2	44%
Solar (S)	15	79%
Gas (N)	1	100%

Southern DFW Area Load Interconnection – Added Generation Dispatch Level

Pre-Project Violations

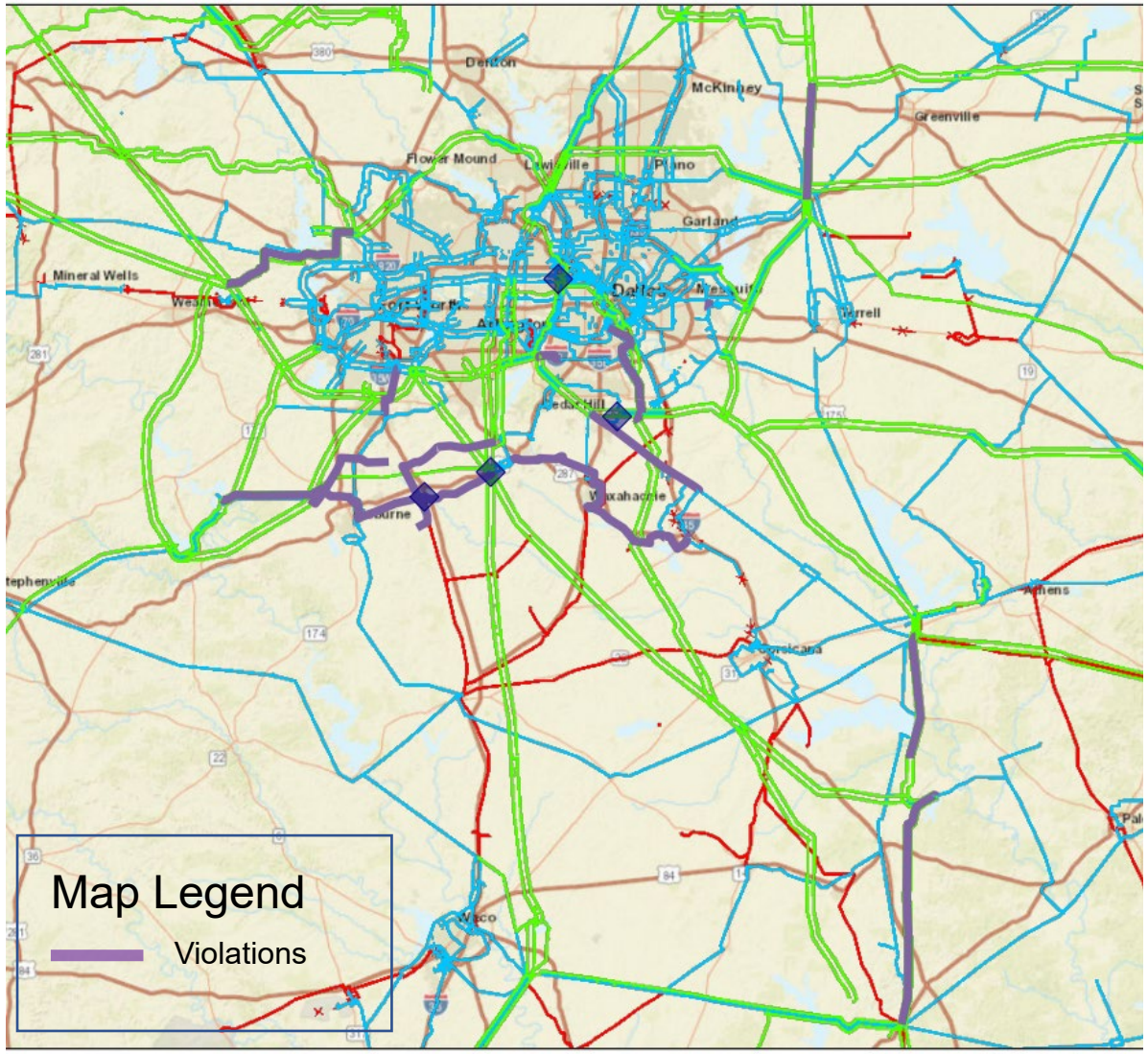
- **Thermal Violation**

  With the addition of projected load of 4064 MW in the Southern DFW Area, several contingencies result in transmission lines loading beyond their emergency ratings in the summer peak case as summarized below:

  - 169.8 circuit miles of 345 kV lines
  - 73.1 circuit miles of 138 kV lines
  - Three autotransformers

- **Voltage Violation**

  The total projected load additions of 4064 MW results in base case conditions (pre-contingency) where voltage drops below 0.95 P.U. at multiple stations across Dallas and Ellis counties and causes convergence issue in the study case



Oncor Recommendation

- Establish Greene Road 345/138 kV Switch and Install two 345/138 kV autotransformers with normal rating of 700 MVA and emergency rating of 750 MVA
- Establish the Ironwood 345/138 kV Switch and Install two 345/138 kV autotransformers with normal rating of 700 MVA and emergency rating of 750 MVA
- Establish Alba Road 345 kV Switch
- Establish Stainback 345 kV Switch
- Rebuild Big Brown 345 kV Switch
- Rebuild the 3.6-mile Greene Road Switch – Watermill Switch 345 kV DCKT using a conductor rated 5000 A (2987 MVA) or greater
- Rebuild the 3.0-mile Watermill Switch – Stainback Switch 345 kV DCKT using a conductor rated 5000 A (2987 MVA) or greater
- Rebuild the 15.25-mile Farmersville Switch – Royse Switch 345 kV DCKT using a conductor rated 5000 A or greater (1792/1792/2987 MVA)
- Rebuild the 32.80-mile Jewett Switch – Pin Oak Switch 345 kV DCKT using a conductor rated 5000 A or greater (1792/1792/2987 MVA)
- Rebuild the 18.7-mile Richland Chambers Switch – Trinidad Switch 345 kV DCKT using a conductor rated 5000 A or greater (1792/1792/2987 MVA)
- Rebuild the 23.0-mile Parker Switch – Hicks Switch 345 kV Line using a conductor rated 5000 A or greater (1912/1912/2987 MVA)
- Loop the Kemp Ranch Switch – Sardis Switch (BEPC)/Soap Creek 138 kV DCKT into Ironwood 138 kV Switch by disconnecting the double circuit line at structure #1/2 (Midlothian Tap) and constructing four 2.0-mile circuits from Midlothian Tap to Ironwood 138 kV Switch on separate structures. Use a conductor rated 3200 A (764 MVA) or greater
- Rebuild the two 0.5-miles Kemp Ranch Switch – Midlothian Tap 138 kV Line Sections using two separate structures. Use a conductor rated 3200 (764 MVA) or greater

Oncor Recommendation (Cont'd)

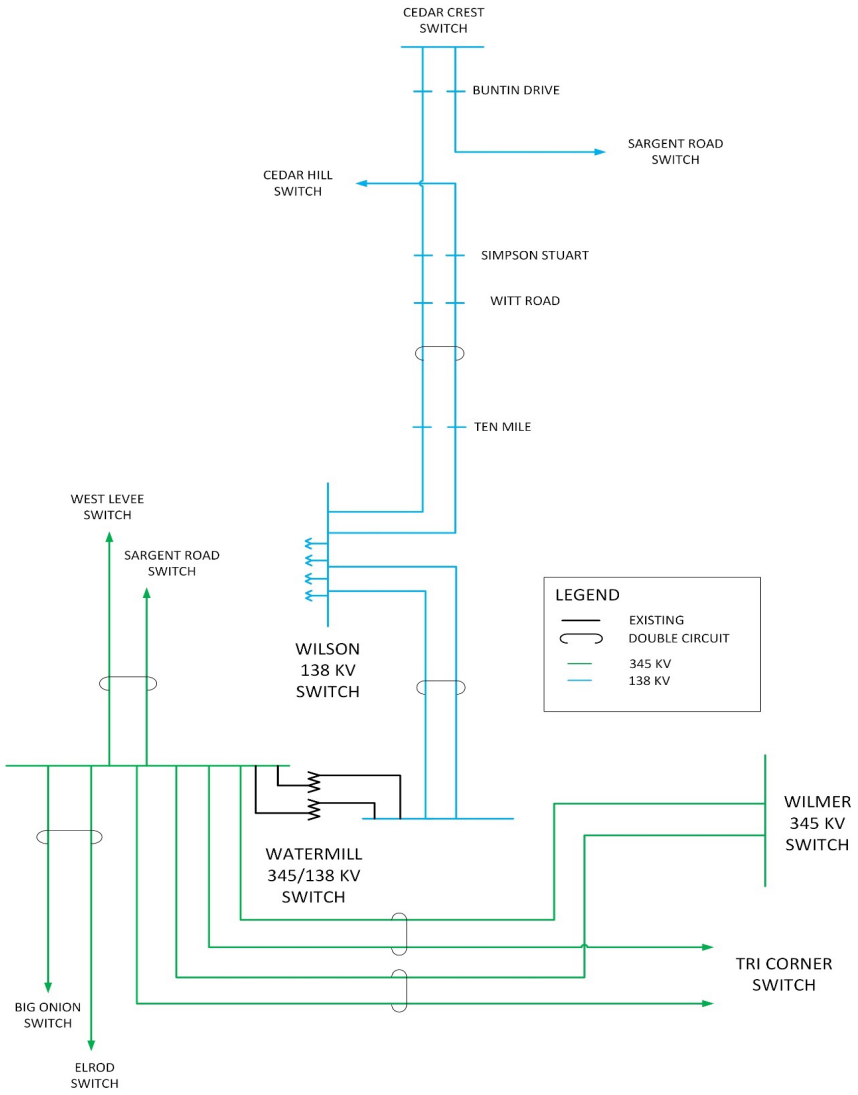
- Rebuild the 0.75-mile Watermill Switch – Wilson Switch 138 kV DCKT using a conductor rated 3200 A (764 MVA) or greater
- Rebuild the 2.0-mile Wilson Switch – Greene Road Switch 138 kV DCKT using a conductor rated 3200 A (764 MVA) or greater
- Rebuild the 10.9-mile Greene Road Switch – Cedar Crest 138 kV Line using a conductor rated 3200 A (764 MVA) or greater
- Rebuild the 11.8-mile Sterrett Switch – Midlothian TXI 138 kV Line Section using a conductor rated 3200 A (764 MVA) or greater
- Rebuild the 21.0-mile Ennis West Switch – Sterrett Switch 138 kV Line using a conductor rated 2569 A (614 MVA) or greater
- Rebuild the 15.5-mile Pebble Creek Switch – Shankle Switch 138 kV Line using a conductor rated 3200 A (764 MVA) or greater
- Rebuild the 7.4-mile Mesquite East Switch – Seagoville Switch 138 kV Line using a conductor rated 3200 A (764 MVA) or greater
- Install one +250/-250 MVAr STATCOM at Greene Road 345 kV Switch
- Install one +250/-250 MVAr STATCOM at Alba Road 345 kV Switch
- Install one +250/-250 MVAr STATCOM at Wilmer 345 kV Switch
- Install two 240 MVAr 345 kV capacitor banks at Stainback 345 kV Switch
- Install two 240 MVAr 345 kV capacitor banks at Alba Road 345 kV Switch
- Install one 240 MVAr 345 kV capacitor bank at Greene Road 345 kV Switch
- Install two 110.4 MVAr 138 kV capacitor banks at Ironwood 138 kV Switch
- Install two 110.4 MVAr 138 kV capacitor banks at Pebble Creek 138 kV Switch
- Install one 110.4 MVAr 138 kV capacitor bank at Greene Road 138 kV Switch

Oncor Recommendation (Cont'd)

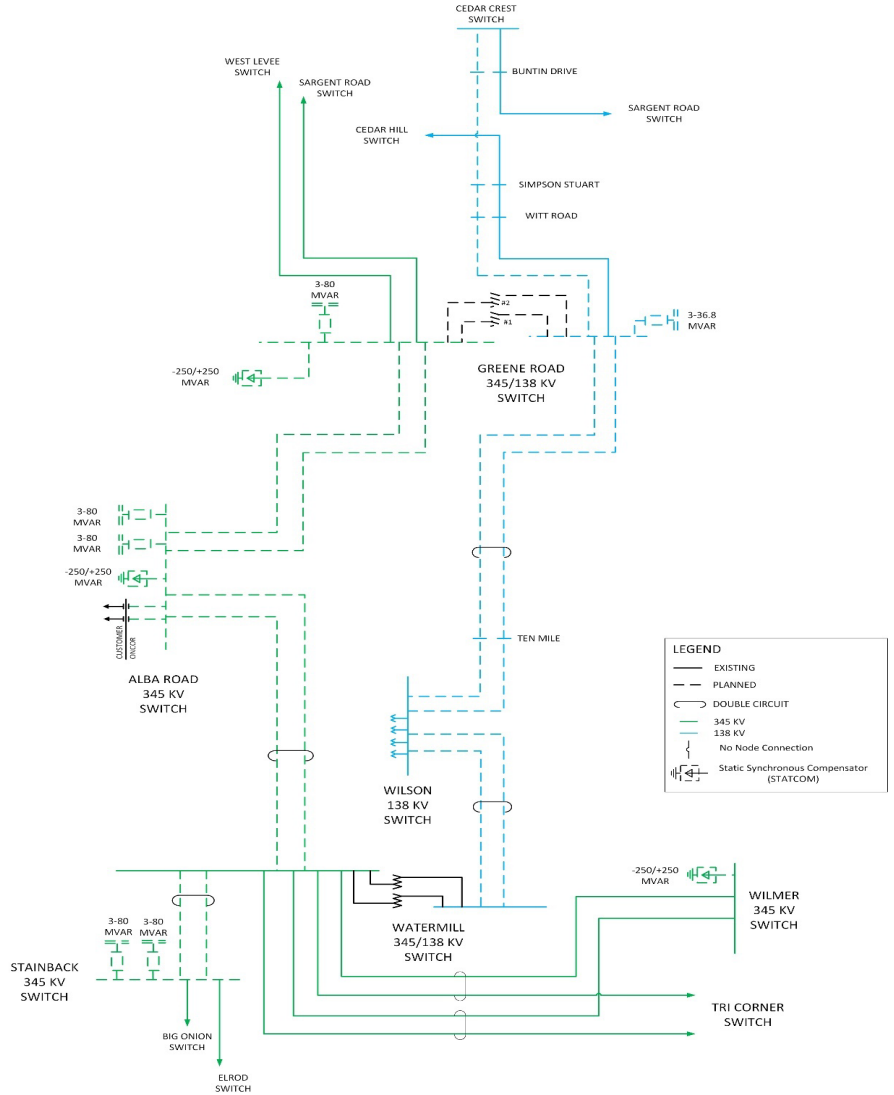
- For existing 345 kV terminal equipment, ensure they meet or exceed a rating of 3000 A (1792 MVA)
- For the new 345 kV terminal equipment, ensure they meet or exceed a rating of 5000 A (2987 MVA) if the station is 5000 A capable. Otherwise ensure the new 345 kV terminal equipment meets or exceeds a rating of 3200 A
- For the 138 kV terminal equipment, ensure they meet or exceed a rating of 3000 A (764 MVA)

Oncor has not identified the need to upgrade all of the limiting 345 kV terminal equipment at existing stations to 5000 A. Even with this limiting terminal equipment in place, each circuit will have enough capacity once the upgrade is complete. Oncor will continue to study demand growth in the region and will upgrade terminal equipment in a timely manner as the need arises.

Oncor's Proposed New Switch Stations – Watermill Area

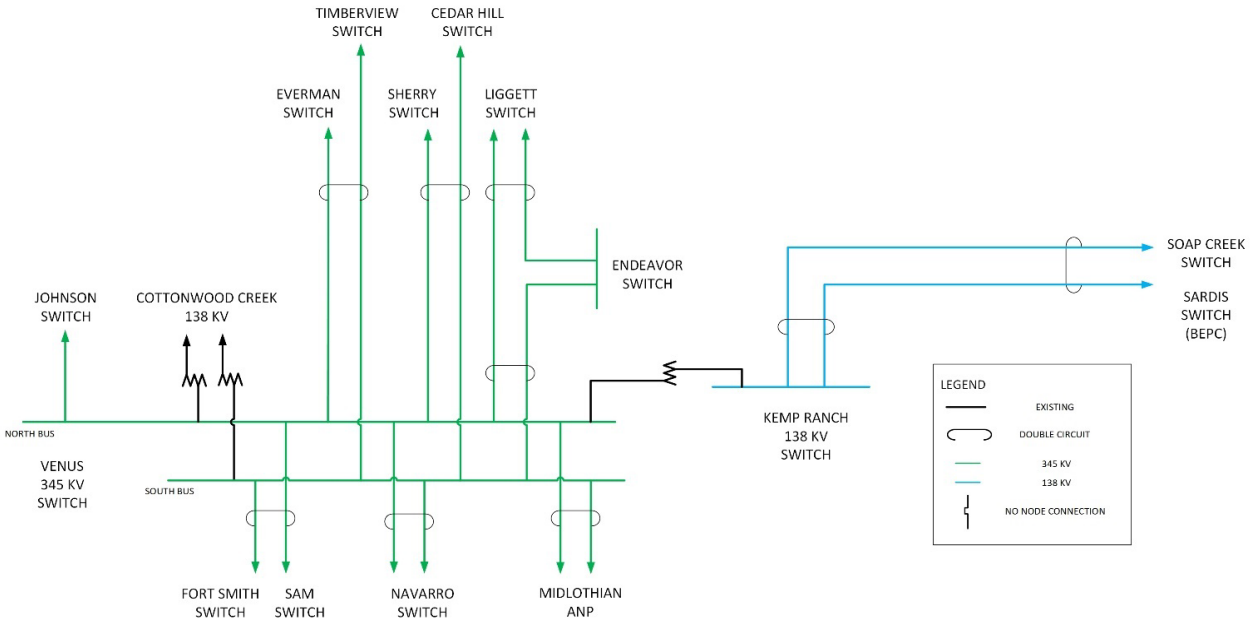


Pre-Establishing Greene Road 345/138 kV Switch, Alba Road 345 kV Switch, and Stainback 345 kV Switch

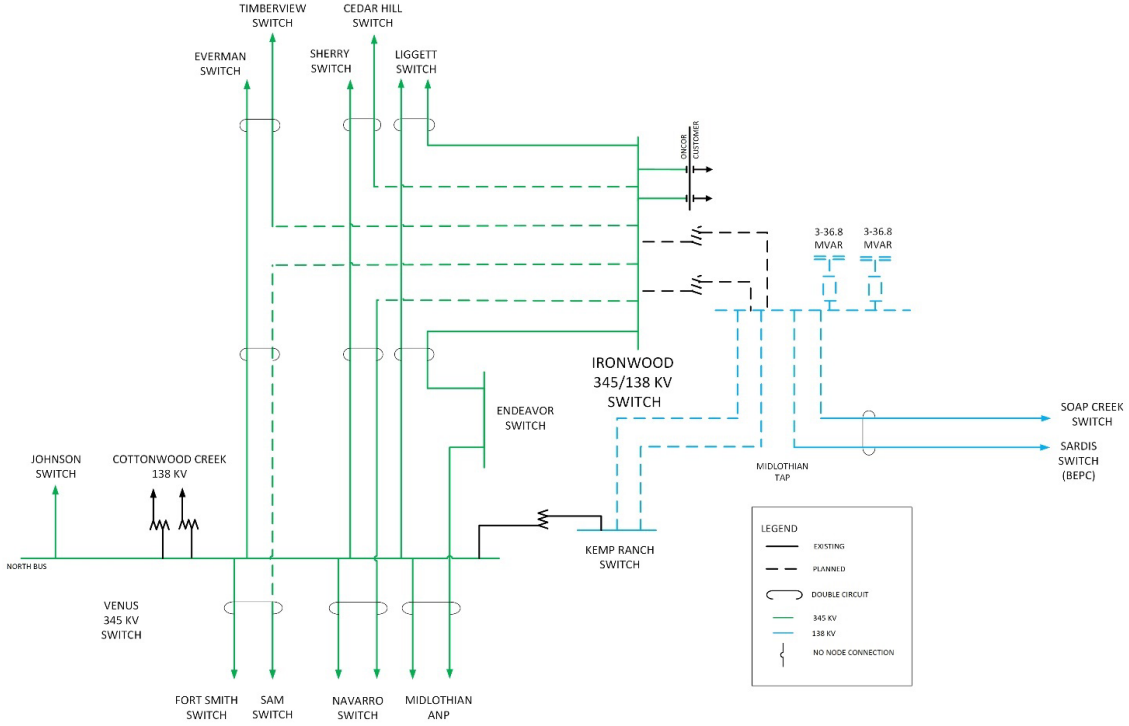


Post-Establishing Greene Road 345/138 kV Switch, Alba Road 345 kV Switch, and Stainback 345 kV Switch

Oncor's Proposed New Switch Stations – Venus Area



Pre-Establishing Ironwood 345/138 kV Switch



Post-Establishing Ironwood 345/138 kV Switch

Questions?