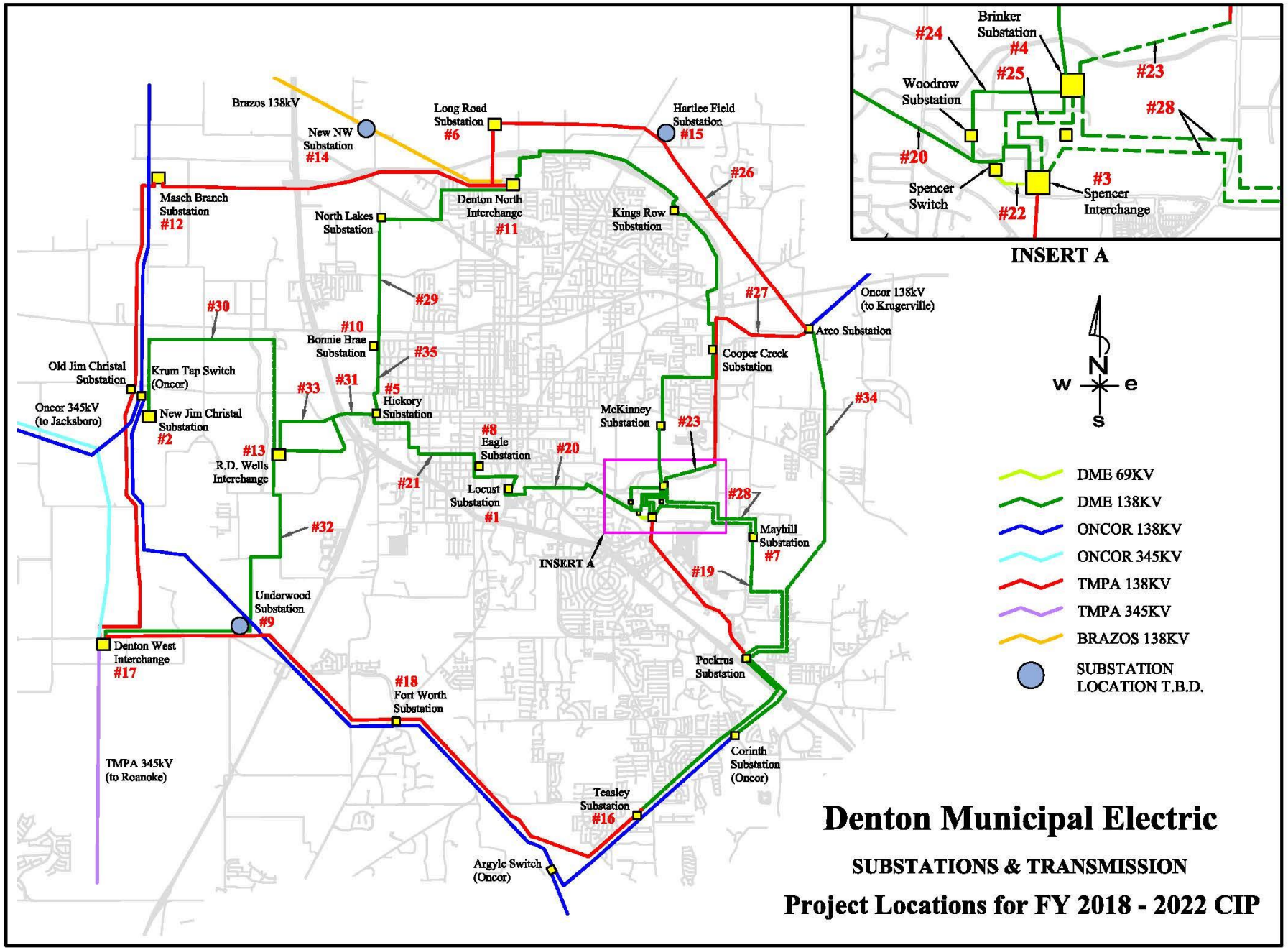

Denton Municipal Electric

SUBSTATIONS & TRANSMISSION

Project Locations for FY 2018 - 2022 CIP

Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Transmission Stations and Transmission Cost (cc046)

Map #		2018	2019	2020	2021	2022	Total Project Cost
1	**Locust Substation**	$ -	$ -	$ -	$ 210,000	$ -	$ 210,000
2	**Jim Christal Substation**	2,620,000	-	-	-	-	2,620,000
3	**TMPA Spencer Interchange**	820,000	-	-	-	-	820,000
4	**Brinker Substation**	4,250,000	1,410,000	-	-	2,100,000	7,760,000
5	**Hickory Substation**	5,120,000	7,050,000	-	-	-	12,170,000
6	**Long Road Substation**	4,330,000	1,480,000	-	-	-	5,810,000
7	**Mayhill Substation**	5,180,000	270,000	-	-	-	5,450,000
8	**Eagle Substation**	2,500,000	6,800,000	2,640,000	-	-	11,940,000
9	**Underwood Substation**	270,000	5,060,000	1,420,000	-	-	6,750,000
10	**Bonnie Brae Substation**	280,000	130,000		-	-	410,000
11	**Denton North Interchange**	990,000	650,000	-	640,000		2,280,000
12	**Masch Branch Substation**	540,000	3,330,000	1,650,000	-	-	5,520,000
13	**RD Wells Interchange**	-	-	480,000	220,000	820,000	1,520,000

Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Transmission Stations and Transmission Cost (cc046) (continued)

Map #		2018	2019	2020	2021	2022	Total Project Cost
14	New Substation NW of Denton North Interchange on the Brazos TM Line:	$ 400,000	$ -	$ -	$ -	$ 4,350,000	$ 4,750,000
15	Hartlee Field Substation	-	-	-	-	4,660,000	4,660,000
16	Upgrade Circuit Breaker CT's at Teasley	40,000	-	-	-	-	40,000
17	Denton West Interchange TMPA	390,000	-	-	-	-	390,000
17	Denton West Interchange	800,000	1,000,000	-	6,660,000	720,000	9,180,000
18	Fort Worth Substation	790,000	-	-	-	-	790,000
-	Replace EPS metering CT's at Multiple Stations	220,000	220,000	110,000	110,000	110,000	770,000
-	Install Auxiliary CT's for Transformer Differentials in Multiple Stations	55,000	55,000	-	-	-	110,000
-	Ethernet Security Gateway Relays at Multiple Stations	150,000	150,000	150,000	150,000	150,000	750,000
-	Substation Siting Study	150,000	350,000	1,000,000	2,000,000	2,000,000	5,500,000
-	Substation NERC/ERCOT Compliance	100,000	100,000	100,000	100,000	100,000	500,000
-	Substation Security (Transmission Cost)	140,000	140,000	140,000	140,000	140,000	574,000
	Total Transmission Cost for Stations	**$ 30,135,000**	**$ 28,195,000**	**$ 7,690,000**	**$ 10,230,000**	**$ 15,150,000**	**$ 91,400,000**

Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Transmission Lines (cc045)

Map #		2018	2019	2020	2021	2022	Total Project Cost
2	**Jim Christal Substation Transmission Line Tie-In**	$ 1,230,000	$ -	$ -	$ -	$ -	$ 1,230,000
19	**Pockrus - Mayhill Transmission Line**	910,000	-	-	-	-	910,000
20	**Woodrow - Locust Transmission Line**	2,200,000	-	-	-	-	2,200,000
21	**Hickory - Locust Transmission Line**	6,460,000	8,600,000	1,690,000	660,000	-	17,410,000
5	**Hickory Substation Transmission Line Upgrades**	5,500,000	1,900,000	-	-	-	7,400,000
22	**Spencer Interchange - Spencer Switch**	290,000	-	-	-	-	290,000
23	**New 138kV Transmission Line from Brinker to Loop 288**	870,000	-	-	-	-	870,000
24	**Woodrow - Brinker Transmission Line**	760,000	340,000	-	-	-	1,100,000
25	**Brinker - Spencer Interchange Transmission Line**	730,000	130,000	-	-	-	860,000
26	**Denton North - Arco Transmission Line Reconstruction**	5,730,000	-	-	-	-	5,730,000
27	**Arco - Cooper Creek Transmission Line Reconstruction**	2,230,000	670,000	-	-	-	2,900,000
13	**Convert RD Wells - Hickory TM Line to 138kV Operation**	70,000	-	-	-	-	70,000
28	**Mayhill - Brinker/Spencer Interchange Transmission Line**	-	1,610,000	1,840,000	-	-	3,450,000

Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Transmission Lines (cc045) (Continued)

Map #		2018	2019	2020	2021	2022	Total Project Cost
29	Bonnie Brae - North Lakes Transmission Line	$ -	$ 40,000	$ -	$ -	$ -	$ 40,000
6	Transmission Line Additions to Support the Long Road Substation	-	340,000	-	-	-	340,000
8	Transmission Line Additions to Support the Eagle Substation	-	3,100,000	2,200,000	-	-	5,300,000
30	Jim Christal Substation - RD Wells/Hickory Transmission Line	-	500,000	1,200,000	6,000,000	4,850,000	12,550,000
9	Transmission Line Additions to Support the Underwood Substation	-	-	530,000	-	-	530,000
12	Transmission Line Additions to Support the Masch Branch Switch Station	-	-	580,000	-	-	580,000
31	RD Wells to Hickory Transmission Line	-	-	-	3,990,000	-	3,990,000
32	RD Wells to Denton West TM Line	-	-	-	4,450,000	2,950,000	7,400,000
33	Paccar Transmission Line Reroute	-	-	-	-	5,060,000	5,060,000
34	Pockrus - Arco 138kV Transmission Line	-	-	-	-	5,800,000	5,800,000
35	Hickory - Bonnie Brae Transmission Line Upgrade/Relocation	-	-	-	-	1,200,000	1,200,000
14	Transmission Line Additions to Support Substation on the Brazos TM Line	-	-	-	-	520,000	520,000
15	Transmission Line Additions to Support Hartlee Field Substation	-	-	-	-	520,000	520,000
-	Transmission Line Routing Study	500,000	750,000	1,000,000	1,000,000	1,000,000	4,250,000
-	Transmission Line to Support ERCOT/NERC Requirements	500,000	1,500,000	1,500,000	1,500,000	1,500,000	6,500,000
	Total Transmission Line Cost	**$ 27,980,000**	**$ 19,480,000**	**$ 10,540,000**	**$ 17,600,000**	**$ 23,400,000**	**$ 99,000,000**

Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Distribution Stations (cc013)

Map #		2018	2019	2020	2021	2022	Total Project Cost
2	Jim Christal Substation	$ 1,100,000	$ -	$ -	$ -	$ -	$ 1,100,000
4	Brinker Substation	2,550,000	440,000	-	-	-	2,990,000
5	Hickory Substation	2,230,000	2,380,000	-	-	-	4,610,000
6	Long Road Substation	2,120,000	970,000	-	-	-	3,090,000
7	Mayhill Substation	1,130,000	130,000	-	-	-	1,260,000
8	Eagle Substation	890,000	3,620,000	910,000	-	-	5,420,000
9	Underwood Substation	330,000	3,520,000	1,120,000	-	-	4,970,000
11	Denton North Interchange	-	320,000	-	1,900,000	-	2,220,000
12	Masch Branch Substation		-	1,900,000	-	-	1,900,000
13	RD Wells Interchange	20,000	-	-	-	-	20,000
14	New Substation NW of DNI on Brazos TM Line	200,000	-	-	-	-	200,000
15	Hartlee Field Substation	240,000	-	-	-	-	240,000
17	Denton West Interchange		-	-	-	2,220,000	2,220,000
-	RTU Upgrades	42,000	42,000	42,000	56,000	42,000	224,000
-	SCADA Master Computer Replacement	400,000	-	-	400,000	-	800,000
-	SCADA Equipment & Upgrade	-	-	-	83,000	-	83,000
	Total Distribution Substation Cost	**$ 11,252,000**	**$ 11,422,000**	**$ 3,972,000**	**$ 2,439,000**	**$ 2,262,000**	**$ 31,347,000**

Substations and Transmission Line Project Cost Summary

-	2018	2019	2020	2021	2022	Total 5 Year Cost
Total 5 Year Transmission Cost for Stations	$ 30,135,000	$ 28,195,000	$ 7,690,000	$ 10,230,000	$ 15,150,000	$ 91,400,000
Total 5 Year Transmission Line Cost	27,980,000	19,480,000	10,540,000	17,600,000	23,400,000	99,000,000
Total 5 Year Transmission Cost for Stations and Line Costs	**$ 58,115,000**	**$ 47,675,000**	**$ 18,230,000**	**$ 27,830,000**	**$ 38,550,000**	**$ 190,400,000**
Total 5 Year Distribution Substation Cost	$ 11,252,000	$ 11,422,000	$ 3,972,000	$ 2,439,000	$ 2,262,000	$ 31,347,000
Grand Totals	**$ 69,367,000**	**$ 59,097,000**	**$ 22,202,000**	**$ 30,269,000**	**$ 40,812,000**	**$ 221,747,000**

New Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Map #		2018	2019	2020	2021	2022	Total Project Cost
16	**Upgrade Circuit Breaker CT's at Teasley**	$ 40,000	$ -	$ -	$ -	$ -	$ 40,000
-	**Replace EPS metering CT's at Multiple Stations**	220,000	220,000	110,000	110,000	110,000	770,000
-	**Install Auxiliary CT's for Transformer Differentials in Multiple Stations**	55,000	55,000	-	-	-	110,000
-	**Ethernet Security Gateway Relays at Multiple Stations**	150,000	150,000	150,000	150,000	150,000	750,000
	Total Transmission Cost for Stations	**$ 465,000**	**$ 425,000**	**$ 260,000**	**$ 260,000**	**$ 260,000**	**$ 1,670,000**

Transmission Lines (cc045)

Map #		2018	2019	2020	2021	2022	Total Project Cost
13	**Convert RD Wells - Hickory TM Line to 138kV Operation**	$ 70,000	$ -	$ -	$ -	$ -	$ 70,000
31	**RD Wells to Hickory Transmission Line**	-	-	-	3,990,000	-	3,990,000
32	**RD Wells to Denton West TM Line**	-	-	-	4,450,000	2,950,000	7,400,000
14	**Transmission Line Additions to Support Substation on the Brazos TM Line**	-	-	-	-	520,000	520,000
15	**Transmission Line Additions to Support Hartlee Field Substation**	-	-	-	-	520,000	520,000
	Total Transmission Line Cost	**$ 70,000**	**$ -**	**$ -**	**$8,440,000**	**$3,990,000**	**$ 12,500,000**
	TOTAL NEW SUBSTATION AND TRANSMISSION PROJECTS	**$ 535,000**	**$ 425,000**	**$ 260,000**	**$8,700,000**	**$4,250,000**	**$ 14,170,000**

Substation and Transmission Line Project Cost Summary

Transmission Stations and Transmission Cost (cc046)

Map #		2018	2019	2020	2021	2022	Total Project Cost
1	**Locust Substation:** Construct a new 138kV - 13.2kV substation on a new site to replace the existing Locust Substation. The existing Locust Substation does not have sufficient space to facilitate reconstruction or for conversion to 138kV operation on the current site. The existing substation bus does not have the capacity required by contingency planning criteria. Future use of the original site has not been determined. Reconstruction will include space for the addition of a transmission voltage capacitor. Station is complete except for transmission line connections and final commissioning. (603233)				$210,000		$210,000
2	**Jim Christal Substation:** Construct a new 138kV substation to interconnect with the Denton Energy Center, serve the needs for the western areas of DME's service territory, to provide flexibility for future transmission line connections, and to provide interconnection points for future renewable resources. This station will ultimately replace the old Jim Christal substation. The existing substation will be retired.(603990)	$2,620,000					$2,620,000
3	**TMPA Spencer Interchange:** Reconstruct a major portion of the existing interchange to increase capacity by upgrading the station bus, replacing 4 circuit breakers, replacing 18 switches, installing a new line terminal to serve the new Brinker Substation, replacing the control building, and replacing the entire protection and control system. The existing equipment does not have the capacity required. (603718)	$820,000					$820,000
4	**Brinker Substation:** Construct a new station to provide a major transmission intertie point. The station will provide terminal space for up to 10 transmission lines, up to two 138kV-69kV autotransformers, and up to five substation power transformers. Three substation power transformers and six transmission lines will be installed initially. Future expansion will be possible without increasing the size of the station. The scope of this project includes addition of an autotransformer in the later years of the CIP. (603290)	$4,250,000	$1,410,000			$2,100,000	$7,760,000
5	**Hickory Substation:** Construct a new 138kV - 13.2kV gas insulated substation on a new site to replace the existing Hickory Substation. The existing site is not large enough to allow construction of the new facilities. The existing switchgear and transformers are approaching the ends of their service lives and must be replaced. (603234)	$5,120,000	$7,050,000				$12,170,000
6	**Long Road Substation:** Construct a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the northern area of DME's service territory. (603287)	$4,330,000	$1,480,000				$5,810,000
7	**Mayhill Substation:** Construct a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the eastern and southeastern areas of DME's service territory. (603391)	$5,180,000	$270,000				$5,450,000
8	**Eagle Substation:** Construct a new 138kV - 13.2kV gas insulated substation to meet the needs of growth and maintain reliability for the area in the central areas of Denton. City council has selected a site for the substation on the southeast quadrant of the intersection of Eagle and Bernard. (603200)	$2,500,000	$6,800,000	$2,640,000			$11,940,000
9	**Underwood Substation:** Construct a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the western and southwestern areas of DME's service territory. (603289)	$270,000	$5,060,000	$1,420,000			$6,750,000
10	**Bonnie Brae Substation:** Replace five 69kV circuit breakers with 138kV circuit breakers; upgrade transmission relaying (411L relays). Replace 69kV PT's and arresters with 138kV PT's and arresters. Convert to 138kV operation. (603725)	$280,000	$130,000				$410,000
11	**Denton North Interchange:** Upgrade to 3000 amp circuit breakers, 3000 amp switches and 5" bus. Retire equipment in the existing 69kV portion of the station after the 138kV conversion is complete. Replace the chain link fence with precast concrete. Install a second 28MVA substation power transformer to serve distribution load. (604105)	$990,000	$650,000		$640,000		$2,280,000
12	**Masch Branch Substation:** Construct a new 138kV switch station to intertie TMPA 138kV transmission lines with an Oncor transmission line from a new 138kv source northwest of Denton. The station will include space for future substation power transformers. The station site has been purchased. A security wall will be constructed in 2018 with station construction to begin in 2019. (603286)	$540,000	$3,330,000	$1,650,000			$5,520,000
13	**RD Wells Interchange:** Replace differential panel with line panel and commission 4th distribution transformer and line terminal. Replace primary 311L transmission line relays with 411L relays to match remote terminals. Reconfigure station to remove two 138kV to 69kV autotransformers and feed the Hickory Substation transmission line directly from the 138kV bus. Replace the bus, and switches to 3000 amp to increase the capacity of the station. (602931)			$480,000	$220,000	$820,000	$1,520,000

Substation and Transmission Line Project Cost Summary

Transmission Stations and Transmission Cost (cc046) (continued)

Map #		2018	2019	2020	2021	2022	Total Project Cost
14	**New Substation NW of Denton North Interchange on the Brazos TM Line:** Construct a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the northwest area of the system (location undetermined). (603499)	$400,000				$4,350,000	$4,750,000
15	**Hartlee Field Substation:** Construct a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the northeast area of the system. Land purchase in 2018. Construction will begin when load growth in northeast Denton increases to a point where it is needed.(604052)					$4,660,000	$4,660,000
16	**Upgrade Circuit Breaker CT's at Teasley:** Replace 12 bushing CT's each on T430 and T440 to match line and station capacities.	$40,000					$40,000
17	**Denton West Interchange TMPA:** Replace 3 circuit breakers, six switches, and approximately 400 feet of bus to upgrade to 3000 amp. Replace panels and upgrade relaying for the transmission lines to match adjacent terminals and meet the recommendations in NERC guidelines. TMPA has purchased the 138kV circuit breakers. (Reimbursable)	$390,000					$390,000
17	**Denton West Interchange:** Install new 138kV transmission line terminals to support. Addition of a 345kV to 138kV autotransformer and associated breakers. Transmission construction to support installation of a 28MVA substation power transformer. (603496)	$800,000	$1,000,000		$6,660,000	$720,000	$9,180,000
18	**Fort Worth Substation:** Replace the F440 primary 311L transmission line relay with a 411L relay to match remote terminal. (603719) Upgrade 138kV switches and 138kV circuit breakers to 3000 amp and upgrade the 138kV bus to 5". These upgrades are to avoid station equipment being the source of system constraints. (604789)	$790,000					$790,000
-	**Replace EPS metering CT's at Multiple Stations:**	$220,000	$220,000	$110,000	$110,000	$110,000	$770,000
-	**Install Auxiliary CT's for Tranformer Differentials in Multiple Stations:** Install auxiliary CT's for each distribution transformer in DN, KR, CC, MK, WR, PK, TSL, FTW, NL, and LOC. This addition is required to match line and station capacities to avoid having breaker CT's be the most limiting elements for transmission flows.	$55,000	$55,000				$110,000
-	**Ethernet Security Gateway Relays at Multiple Stations:** Installation of SEL 3610, 3620, and 2730 SEL relays at multiple stations to protect critical cyber assets.	$150,000	$150,000	$150,000	$150,000	$150,000	$750,000
-	**Substation Siting Study:** Develop a comprehensive long term plan for substation additions. Complete site selection and begin land acquisition.	$150,000	$350,000	$1,000,000	$2,000,000	$2,000,000	$5,500,000
-	**Substation NERC/ERCOT Compliance:** Installation of card entry systems, computer firewalls, and other compliance related measures.	$100,000	$100,000	$100,000	$100,000	$100,000	$500,000
-	**Substation Security (Transmission Cost):** Upgrade cameras, lighting and fence security in all substations. This will include condit, poles and pullboxes.	$140,000	$140,000	$140,000	$140,000	$140,000	$700,000
	Total Transmission Cost for Stations	**$30,135,000**	**$28,195,000**	**$7,690,000**	**$10,230,000**	**$15,150,000**	**$91,400,000**

Substation and Transmission Line Project Cost Summary

Transmission Lines (cc045)

Map #		2018	2019	2020	2021	2022	Total Project Cost
2	**Jim Christal Substation Transmission Line Tie-In:** Construct approximately .5 miles of 138kV transmission line to tie the Jim Christal Substation into the existing West Denton to existing Jim Christal transmission line. (605075)	$1,230,000					$1,230,000
19	**Pockrus - Mayhill Transmission Line:** Construct approximately 1.95 miles of new 138kV transmission line from Pockrus Substation to the new Mayhill Substation site. This construction will be double circuit from the Pockrus Substation to the south side of the land fill. All construction will have underbuild. The new line segment is needed to provide additional capacity and an alternate route to the existing TMPA Pockrus - Spencer Interchange 138kV transmission line and serve the new Mayhill Substation. (600755)	$910,000					$910,000
20	**Woodrow - Locust Transmission Line:** Reconstruct approximately 2 miles of transmission line to provide the capacity needed to meet the requirements of contingency planning criteria. Reconstruct and reconfigure the line in the area of Locust Substation to route the line into the new Locust Substation site. The reconstructed will be operation at 138kV. (602948)	$2,200,000					$2,200,000
21	**Hickory - Locust Transmission Line:** Reconstruct approximately 2.5 miles of existing transmission line to replace aging facilities and provide the capacity needed to meet the requirements of contingency planning criteria. The line will be reconstructed for operation at 138kV. The budget numbers reflect 0.25 mi. underground transmission. The amounts for the project include the cost for purchase of additional easements. (602949)	$6,460,000	$8,600,000	$1,690,000	$660,000		$17,410,000
5	**Hickory Substation Transmission Line Upgrades:** Reconstruct the Hickory ends of the transmission lines from the Bonnie Brae and RD Wells substations to connect the new Hickory Substation. The project will include approximately 900 feet of underground transmission line. .	$5,500,000	$1,900,000				$7,400,000
22	**Spencer Interchange - Spencer Switch:** Reconstruct approximately 1,200 feet of existing 69kV transmission line from the Spencer Interchange to the Spencer Switch to provide the capacity needed to meet the requirements of contingency planning criteria.	$290,000					$290,000
23	**New 138kV Transmission Line from Brinker to Loop 288:** Construct approximately 0.64 mile of new 138kV transmission line from the new Brinker Substation along Shady Oaks to connect to the TMPA transmission line near the intersection of Shady Oaks and Loop 288. The new line segment will be constructed for double circuit but initially only equipped with one circuit. The line will also be structured for double circuit distribution underbuild. (603716)	$870,000					$870,000
24	**Woodrow - Brinker Transmission Line:** Reconstruct approximately 2,280 feet of 138kV transmission line between the Woodrow Substation and new Brinker Substation site to provide the capacity to match the Brinker to McKinney line and to provide space for the Spencer Interchange to Brinker lines. Construction of this line must be completed before the Brinker to Spencer transmission line construction. (604103)	$760,000	$340,000				$1,100,000
25	**Brinker - Spencer Interchange Transmission Line:** Construct approx. .5 miles of new transmission line from the new Brinker Substation to Spencer Interchange. Construction of this line must be coordinated with construction of the Woodrow to Brinker transmission line which must be completed first. (603500)	$730,000	$130,000				$860,000
26	**Denton North - Arco Transmission Line Reconstruction:** Reconstruct approximately 2.7 miles from Denton North to Sherman Drive. This section will include distribution underbuild. Replace the exsiting conductor and add second set of conductors on approximately 3.0 miles of 138kV transmission line from Sherman Drive to Arco Substation. This project is to provide the capacity needed to meet the requirements of contingency planning criteria. Because this only a partial reconstruction, TMPA may elect to retain ownership and reimburse DME for the cost. DME will undertake construction in accordance with the operations and maintenance agreement that is in place between TMPA and DME. (603512)	$5,730,000					$5,730,000
27	**Arco - Cooper Creek Transmission Line Reconstruction:** Reconstruct approximately 1.5 miles of Arco Substation to Cooper Creek Substation 138kV transmission line to provide the additional capacity needed to meet the requirements of contingency planning criteria. (603511)	$2,230,000	$670,000				$2,900,000
13	**Convert RD Wells - Hickory TM Line to 138kV Operation:** Install three spans of transmission line in the RD Wells Interchange to connect the Hickory TM Line to the 138kV bus. (604087)	$70,000					$70,000
28	**Mayhill - Brinker/Spencer Interchange Transmission Line:** Construct approximately 1 mile of new 138kV double circuit transmission line from the Mayhill Substation site to behind Tractor Supply. Reconstruct approximately .75 miles of 138kV double circuit transmission line from behind Tractor Supply to the new Brinker Substation and to Spencer Interchange. All construction will have distribution underbuild. The new line is needed to provide additional capacity and an alternate route to the existing TMPA Pockrus - Spencer Interchange 138kV transmission line, and the new line will complete the transmission loop that will serve the new Mayhill Substation. The route for this line has not been determined. Consequently, the line length could change. (603867)		$1,610,000	$1,840,000			$3,450,000

Substation and Transmission Line Project Cost Summary

Transmission Lines (cc045) (Continued)

Map #		2018	2019	2020	2021	2022	Total Project Cost
29	**Bonnie Brae - North Lakes Transmission Line:** Remove jumpers from old North Lakes Substation tie-in and extend line to New North Lakes Substation upon 138kV conversion. (602946)		$40,000				$40,000
6	**Transmission Line Additions to Support the Long Road Substation:** Construct transmission line facilities to connect the proposed new Long Road Substation.		$340,000				$340,000
8	**Transmission Line Additions to Support the Eagle Substation:** Construct underground transmission line facilities to connect the proposed new Eagle Substation.		$3,100,000	$2,200,000			$5,300,000
30	**Jim Christal Substation - RD Wells/Hickory Transmission Line:** Construct new transmission line from the new Jim Christal Substation to RD Wells Substation to provide a new transmission source to RD Wells and Hickory substations. The exact routing is undetermined; therefore, the line length can only be estimated at this time to be in the approximately 3.5 miles.		$500,000	$1,200,000	$6,000,000	$4,850,000	$12,550,000
9	**Transmission Line Additions to Support the Underwood Substation:** Construct transmission line facilities to connect the proposed new Underwood Substation.			$530,000			$530,000
12	**Transmission Line Additions to Support the Masch Branch Switch Station:** Construct transmission line facilities to connect the new Masch Branch Substation.			$580,000			$580,000
31	**RD Wells to Hickory Transmission Line:** Reconstruct approximately 1.75 miles of 138kV transmission line from RD Wells Interchange to Hickory Substation to provide the capacity needed to meet the requirements of contingency planning criteria				$3,990,000		$3,990,000
32	**RD Wells to Denton West TM Line:** Reconstruct approximately 4.5 miles of 138kV transmission line from RD Wells Interchange to Denton West Interchange to provide the capacity needed to meet the requirements of contingency planning criteria				$4,450,000	$2,950,000	$7,400,000
33	**Paccar Transmission Line Reroute:** Reroute transmission line in the area of the Peterbilt factory (reimbursable). (603501)					$5,060,000	$5,060,000
34	**Pockrus - Arco 138kV Transmission Line:** Construct an new 138kV transmission line from Pockrus to Arco.					$5,800,000	$5,800,000
35	**Hickory - Bonnie Brae Transmission Line Upgrade/Relocation:** Construction cost to upgrade and/or relocate the Hickory Substation to Bonnie Brae Substation transmission line in conjunction with City of Denton widening of Bonnie Brae Street and reconstruction of the Hickory Substation.					$1,200,000	$1,200,000
14	**Transmission Line Additions to Support Substation on the Brazos TM Line:** Construct transmission line facilities to connect the proposed new Brazos Line Substation.					$520,000	$520,000
15	**Transmission Line Additions to Support Hartlee Field Substation:** Construct transmission line facilities to connect the proposed new Hartlee Field Substation.					$520,000	$520,000
-	**Transmission Line Routing Study:** Develop a comprehensive long-term transmission routing plan. Begin easement acquisition.	$500,000	$750,000	$1,000,000	$1,000,000	$1,000,000	$4,250,000
-	**Transmission Line to Support ERCOT/NERC Requirements:** Contingency cost to allow construction of transmission line facilities to address issues or deficiencies identified by ERCOT or FERC 715 studies.	$500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$6,500,000
Total Transmission Line Cost		**$27,980,000**	**$19,480,000**	**$10,540,000**	**$17,600,000**	**$23,400,000**	**$99,000,000**

Substation and Transmission Line Project Cost Summary

Distribution Stations (cc013)

Map #		2018	2019	2020	2021	2022	Total Project Cost
2	**Jim Christal Substation:** Distribution cost for construction of a new 138kV - 13.2kV substation to serve the needs for the western areas of DME's service territory. This station will eventually replace the existing Jim Christal Substation. (603990)	$1,100,000					$1,100,000
4	**Brinker Substation:** Distribution cost for construction of a new 138kV - 13.2kV substation to meet the needs and maintain reliability. (603290)	$2,550,000	$440,000				$2,990,000
5	**Hickory Substation:** Distribution cost for reconstruction of the Hickory Substation on a new site. (603234)	$2,230,000	$2,380,000				$4,610,000
6	**Long Road Substation:** Distribution cost for construction of a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the northern area of DME's service territory. (603287)	$2,120,000	$970,000				$3,090,000
7	**Mayhill Substation:** Distribution cost for construction of a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the eastern and southeastern areas of DME's service territory (603391)	$1,130,000	$130,000				$1,260,000
8	**Eagle Substation:** Distribution cost for construction of a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the area in and around UNT (location undetermined). (603200)	$890,000	$3,620,000	$910,000			$5,420,000
9	**Underwood Substation:** Distribution cost for construct of a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the western and southwestern areas of DME's service territory. (603289)	$330,000	$3,520,000	$1,120,000			$4,970,000
11	**Denton North Interchange:** Install second 28MVA transformer and distribution switchgear building in the existing Denton North Interchange.		$320,000		$1,900,000		$2,220,000
12	**Masch Branch Substation:** Distribution cost for addition of one 138kV - 13.2kV transformer.			$1,900,000			$1,900,000
13	**RD Wells Interchange:** Commission 4th distribution transformer and building.	$20,000					$20,000
14	**New Substation NW of DNI on Brazos TM Line:** Distribution cost for construct of a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the northwestern areas of DME's service territory (location undetermined). This new station will be served from the Brazos 138kV transmission line. (603499)	$200,000					$200,000
15	**Hartlee Field Substation:** Distribution cost for construct of a new 138kV - 13.2kV substation to meet the needs of growth and maintain reliability for the northeastern areas of DME's service territory.	$240,000					$240,000
17	**Denton West Interchange:** Install 28MVA transformer and distribution switchgear building.					$2,220,000	$2,220,000
-	**RTU Upgrades:** Replace older RTU's in stations to allow for Ethernet capabilities.	$42,000	$42,000	$42,000	$56,000	$42,000	$224,000
-	**SCADA Master Computer Replacement:** Replace master SCADA computer every 4 years.	$400,000			$400,000		$800,000
-	**SCADA Equipment & Upgrade -** SCADA simulator replacement/upgrade				$83,000		$83,000
	Total Distribution Substation Cost	**$11,252,000**	**$11,422,000**	**$3,972,000**	**$2,439,000**	**$2,262,000**	**$31,347,000**

Substation and Transmission Line Project Cost Summary

	2018	2019	2020	2021	2022	Total 5 Year Cost
Total 5 Year Transmission Cost for Stations	$30,135,000	$28,195,000	$7,690,000	$10,230,000	$15,150,000	$91,400,000
Total 5 Year Transmission Line Cost	$27,980,000	$19,480,000	$10,540,000	$17,600,000	$23,400,000	$99,000,000
Total 5 Year Transmission Cost for Stations and Line Costs	**$58,115,000**	**$47,675,000**	**$18,230,000**	**$27,830,000**	**$38,550,000**	**$190,400,000**
Total 5 Year Distribution Substation Cost	$11,252,000	$11,422,000	$3,972,000	$2,439,000	$2,262,000	$31,347,000
Grand Totals	**$69,367,000**	**$59,097,000**	**$22,202,000**	**$30,269,000**	**$40,812,000**	**$221,747,000**

New Substation and Transmission Line Project Cost Summary
For the 2018 - 2022 CIP

Transmission Stations and Transmission Cost (cc046)

Map #		2018	2019	2020	2021	2022	Total Project Cost
16	**Upgrade Circuit Breaker CT's at Teasley:** Replace 12 bushing CT's each on T430 and T440 to match line and station capacities.	$40,000					$40,000
-	**Replace EPS metering CT's at Multiple Stations**	$220,000	$220,000	$110,000	$110,000	$110,000	$770,000
-	**Install Auxiliary CT's for Transformer Differentials in Multiple Stations:** Install auxiliary CT's for each distribution transformer in DN, KR, CC, MK, WR, PK, TSL, FTW, NL, and LOC. This addition is required to match line and station capacities to avoid having breaker CT's be the most limiting elements for transmission flows.	$55,000	$55,000				$110,000
-	**Ethernet Security Gateway Relays at Multiple Stations:** Installation of SEL 3610, 3620, and 2730 SEL relays at multiple stations to protect critical cyber assets.	$150,000	$150,000	$150,000	$150,000	$150,000	$750,000
	Total Transmission Cost for Stations	**$465,000**	**$425,000**	**$260,000**	**$260,000**	**$260,000**	**$1,670,000**

Transmission Lines (cc045)

Map #		2018	2019	2020	2021	2022	Total Project Cost
13	**Convert RD Wells - Hickory TM Line to 138kV Operation:** Install three spans of transmission line in the RD Wells Interchange to connect the Hickory TM Line to the 138kV bus. (604087)	$70,000					$70,000
31	**RD Wells to Hickory Transmission Line:** Reconstruct approximately 1.75 miles of 138kV transmission line from RD Wells Interchange to Hickory Substation to provide the capacity needed to meet the requirements of contingency planning criteria				$3,990,000		$3,990,000
32	**RD Wells to Denton West TM Line:** Reconstruct approximately 4.5 miles of 138kV transmission line from RD Wells Interchange to Denton West Interchange to provide the capacity needed to meet the requirements of contingency planning criteria				$4,450,000	$2,950,000	$7,400,000
14	**Transmission Line Additions to Support Substation on the Brazos TM Line:** Construct transmission line facilities to connect the proposed new Brazos Line Substation.					$520,000	$520,000
15	**Transmission Line Additions to Support Hartlee Field Substation:** Construct transmission line facilities to connect the proposed new Hartlee Field Substation.					$520,000	$520,000
	Total Transmission Line Cost	**$70,000**	**$0**	**$0**	**$8,440,000**	**$3,990,000**	**$12,500,000**
	TOTAL NEW SUBSTATION AND TRANSMISSION PROJECTS	**$535,000**	**$425,000**	**$260,000**	**$8,700,000**	**$4,250,000**	**$14,170,000**