Empire District™
A Liberty Utilities Company

Annual Report
2016 Vegetation Management Report
4 CSR 240-23.030
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2016 Vegetation Management Report

6(C).
Summary of the information required in subsection 6(B). Empire contracted with six contractors to assist in maintaining the vegetation on the system. They include:

- 11 ACRT utility foresters plan and inspect the work performed.
- 22 Wright Tree Service employees including 2 General Foreman under the supervision of a Project Manager. 12 two-man bucket/manual crews, 1 Jarraff crews, and 3 two-man spray crew.
- 23 Shade Tree Service employees under the supervision of a Project Manager and 1 General Foreman; 9 two-man bucket crews; and 2 mini buckets to provide assistance as needed.
- EDKO performed TGR application with approximately 4 employees.
- Kenny Singer Construction is equipped to apply TGR, herbicide using several different pieces of equipment, skid steers and other mechanical pieces of equipment for clearing on an as needed basis.
- Mid Central Contractors operate special mechanical clearing equipment on an as needed basis for select right-of-way situations.

There were no incidents of safety hazards or accidents that resulted in death or serious injury in 2016.

6(C)1.
Expenditures for vegetation management in the preceding year of 2016: $10,101,352.61.

6(C)2.
Vegetation management's budget for the current year of 2017: $11,212,624.00.

6(C)3.
Circuits, completion dates and miles trimmed in the preceding year.
See Exhibit A and Exhibit B, which depicts completion schedules for 2016. Details are documented through work plans, weekly timesheets and invoices. Empire will furnish any copies upon request.

6(C)4.
Circuits, miles scheduled for the current year:
See Exhibit C and Exhibit D, which depicts schedules for 2017.

6(C)5.
Total Distribution miles for the system and corresponding classification between rural and urban: The total overhead distribution miles on EDE's system are 5,573; classified as 1,780; Urban Miles and 3,793 Rural Miles.

8(A,B,C).
Highlights of Empire's public education and outreach program for 2016 consisted of :

- Continue to maintain and update tree related information on the website.
- Door cards with Right Tree, Right Place information.
- April 21st, 2016: Seedling Give Away at Third Thursday, Joplin, MO. Also had arborists on hand to answer tree questions and distributed invitations to our Arbor Day celebration in Landreth Park on April 29th, 2016.
- April 2016: Partnered with National Arbor Day Foundation to offer Energy Saving Trees to our customers who would get on line and enter their address, then select a tree and move it around their yard for the Energy Saving benefits. At that time they could reserve their tree. Distribution of the limited tree offer was held in conjunction with Arbor Day Celebrations. Joplin, Branson, Bolivar, Neosho and Aurora.
- Arbor Day Celebrations were held in Joplin, Branson.
- Spring 2016: Utility Arboretum expansion. Joplin FFA students installed trees in the utility arboretum in Landreth Park according to a design by one of their students.
- April, 2016: Gave away several thousand tree seedlings to the public at various locations. Some were given out at Third Thursday. More seedlings were given out at Landreth Park during our Energy-Saving Trees distribution. The public also picked up seedlings at Neosho, Branson, Aurora, Ozark and Bolivar. Along with their seedlings, recipients received information on their trees including size and growing conditions.
- April 22nd, 2016: Collaboration with Highland School in Columbus, Kansas to plant trees and talk to 145 2nd and 3rd grade students about Right Tree Right Place, general tree care, safety around trees and power lines and benefits of trees.
- October 24th, 2016: Collaboration with Jefferson School in Joplin to plant 14 trees and talk to K – 5th grade students about Right Tree Right Place, general tree care, safety around trees and power lines and benefits of trees.
- October 27th, 2016: Collaboration with Aurora High School Youth Empowerment Project to plant 13 trees at the old National Guard Armory building.
- Empire has achieved our Tree Line USA certification for the seventh year. This is a designation that we will strive to keep as an on-going involvement with the public; and annual contractor and employee training.
- Annual Tree Line training for all of our contractors and staff.
- "Wires over Wildlife" Program in conjunction with MDC and some property owners on our transmission right-of-way continues to expand.
- Partnered with Mid Central to install a web cam so that the public could view the osprey nest platform. Based on Facebook responses, the webcam was a big hit with our customers.
- Several ACRT arborist and EDE staff assisted in the MCFC Pruning Trees Workshop @ Joplin's Parr Hill Park.

4(F)2. Copies of our current Distribution System Vegetation Management Policy and Procedures Manual, Transmission Vegetation Management Program and NERC Transmission Program are attached.

4(F)5. Vegetation management had no filings of its transmission lines with the FERC, a regional reliability organization, or the NERC.

EXHIBIT A

6 (B) and (C). Summary of Information for Vegetation Management Plan 2016

DISTRIBUTION System -- Vegetation Management Plan 2016

Circuit ID	Area	Sub	Sub Name	State	Maint Schedule	2016 Scheduled Miles	2016 Completed Miles	Completion Date			
								Conventional Completion Date	Mech	Herbicide	TGR
3121	209	312	Ozark Dam- Powersite	MO	4	16.6	16.6	9/14/2016	x	n/a	x
3123	209	312	Ozark Dam- Powersite	MO	4	17.7	17.7	5/24/2016	x	x	x
3872	209	387	Hollister- East	MO	4	11.3	11.3	12/7/2016	x	n/a	x
4101	209	410	Forsyth- North	MO	4	13.2	13.2	12/27/2016	n/a	n/a	n/a
4135	209	413	Branson- Southwest	MO	4	1.2	1.2	12/7/2016	x	n/a	n/a
4136	209	413	Branson- Southwest	MO	4	2.4	2.4	n/a	x	n/a	x
4137	209	413	Branson- Southwest	MO	4	9.8	9.8	12/31/2016	x	x	x
4138	209	413	Branson- Southwest	MO	4	11.3	11.3	11/8/2016	x	n/a	x
4331	209	433	Gretna	MO	4	8.2	8.2	12/27/2016	n/a	n/a	x
4332	209	433	Gretna	MO	4	3.6	3.6	12/20/2016	x	n/a	x
4333	209	433	Gretna	MO	4	5.3	5.3	12/7/2016	x	n/a	x
4334	209	433	Gretna	MO	4	2.7	2.7	12/20/2016	n/a	n/a	n/a
4383	209	438	Riverside	MO	4	6.4	6.4	12/27/2016	x	n/a	n/a
4385	209	438	Riverside	MO	4	6.9	6.9	12/27/2016	x	n/a	x
4386	209	438	Riverside	MO	4	3.1	3.1	12/20/2016	n/a	n/a	x
2211	211	221	Billings- Northeast	MO	4	19.7	19.7	6/28/2016	x	n/a	x
3592	211	359	Republic- East	MO	6	51.3	51.3	6/7/2016	x	x	x
4371	211	437	Marionville- North	MO	6	42.8	42.8	8/29/2016	x	n/a	x
2781	212	278	Galena- Northeast	KS	6	0.7	0.7	n/a	n/a	n/a	n/a
2821	212	282	Columbus - Tennessee Stre	KS	6	9.7	9.7	2/13/2016	n/a	n/a	x
2822	212	282	Columbus- Tennessee St	KS	6	5.5	5.5	2/20/2016	x	n/a	x
2823	212	282	Columbus- Tennessee St	KS	6	26.6	26.6	7/16/2016	n/a	n/a	x
2991	212	299	Chetopa- City	KS	6	0.5	0.5	2/6/2016	n/a	n/a	x
3391	212	406	Gulf- Jayhawk Plant	KS	6	72.3	72.3	10/10/2016	x	x	x
3771	212	377	Quapaw- Eagle Pitcher	OK	4	67.7	67.7	5/14/2016	x	x	x
3772	212	377	Quapaw- Eagle Pitcher	OK	4	1.5	1.5	4/1/2016	n/a	n/a	x
4061	212	406	Riverton- South	KS	6	43.7	43.7	7/23/2016	x	x	x

EXHIBIT A

DISTRIBUTION System -- Vegetation Management Plan 2016								Completion Date			
Circuit ID	Area	Sub	Sub Name	State	Maint Schedule	2016 Scheduled Miles	2016 Completed Miles	Conventional Completion Date	Mech	Herbicide	TGR
4441	212	444	Sherwin	KS	6	0.4	0.4	n/a	n/a	n/a	x
6601	212	66	Scammon- South	KS	6	49.3	49.3	3/9/2016	x	n/a	x
2491	213	249	Boston- East	MO	6	14.5	14.5	8/17/2016	x	x	x
3181	213	318	Collins- South	MO	6	49.1	49.1	6/14/2016	x	n/a	x
3671	213	367	Bolivar- Southeast	MO	4	6.9	6.9	11/22/2016	x	n/a	x
6023	213	602	Bolivar	MO	4	2.4	2.4	6/28/2016	n/a	n/a	X
6024	213	602	Bolivar	MO	4	6.3	6.3	6/14/2016	x	n/a	x
1261	214	258	Gateway	MO	4	4.0	4.0	10/4/2016	x	x	x
4301	214	430	Joplin- 32nd & Oliver	MO	4	1.3	1.3	n/a	n/a	x	x
4302	214	430	Joplin- 32nd & Oliver	MO	4	10.5	10.5	8/10/2016	x	x	x
4304	214	430	Joplin- 32nd & Oliver	MO	4	2.0	2.0	n/a	n/a	x	x
4471	214	447	Pillsbury	MO	4	0.8	0.8	10/4/2016	n/a	n/a	x
5901	214	59	Joplin 26th St. - West	MO	4	7.7	7.7	8/5/2016	x	x	x
5902	214	59	Joplin 26th St. - South	MO	4	16.1	16.1	10/10/2016	x	x	x
5903	214	59	Joplin 26th St - North	MO	4	2.8	2.8	n/a	n/a	x	x
5904	214	59	Joplin 26th St. - East	MO	4	12.3	12.3	10/29/2016	n/a	x	x
5905	214	59	Joplin 26th St. - Northwest	MO	4	12.2	12.2	10/22/2019	n/a	x	x
1052	215	105	Webb City- Tom St- Break	MO	4	10.7	10.7	3/29/2016	n/a	x	x
1101	215	110	Joplin- Oronogo Junction- E	MO	4	20.2	20.2	10/22/2016	x	x	x
1102	215	110	Joplin- Oronogo Junction- E	MO	4	7.9	7.9	2/27/2016	n/a	x	x
3151	215	315	Webb City- ICI	MO	6	0.3	0.3	n/a	n/a	x	n/a
3951	215	395	Carthage- Southwest	MO	6	39.0	39.0	9/23/2016	x	x	x
4173	215	417	Joplin- Fir Road	MO	4	5.6	5.6	11/22/2016	x	x	x
4321	215	432	Oakland- North	MO	4	0.6	0.6	n/a	x	x	x
4322	215	432	Oakland- North	MO	4	2.4	2.4	1/23/2016	n/a	x	x
4323	215	432	Oakland- North- Breaker	MO	4	0.0	0.0	12/7/2016	n/a	n/a	n/a
4324	215	432	Oakland- North	MO	4	17.1	17.1	7/2/2016	x	x	x
1841	216	184	Neosho- South Junction	MO	6	21.9	21.9	5/3/2016	x	x	x
2963	216	296	Neosho- Rocketdyne 69 to	MO	4	0.3	0.3	2/23/2016	x	x	x
3472	216	347	Granby- North	MO	6	51.6	51.6	2/23/2016	x	x	x
3751	216	375	Seneca- East	MO	6	27.1	27.1	4/26/2016	x	x	x
3752	216	375	Seneca- East	MO	4	21.4	21.4	5/11/2016	x	x	x
3921	216	395	Decatur- South	AR	6	2.9	2.9	10/29/2016	n/a	x	x
3922	216	392	Decatur- South	AR	6	55.3	55.3	12/31/2016	x	x	x
3923	216	392	Decatur- South	AR	6	4.2	4.2	10/29/2016	n/a	n/a	x
4142	216	414	Southwest City	MO	4	15.9	15.9	6/25/2016	x	x	x
1141	217	114	Nixa- North	MO	4	11.9	11.9	9/7/2016	x	n/a	x
3302	217	330	Ozark- Northwest	MO	4	11.0	11.0	10/4/2016	x	x	x
4341	217	434	Ozark-Southeast	MO	6	44.8	44.8	10/4/2016	x	n/a	x
4342	217	434	Ozark- Southeast	MO	4	27.3	27.3	10/25/2016	x	x	x
							1059.8				

6 (B) and (C). Summary of Information for Vegetation Management Plan 2016

EXHIBIT B

Transmission System -- Vegetation Management Plan 2016

Line #	NERC	KV	State	From -- Expanded	To -- Expanded	2016 Scheduled Miles	2016 Completed Miles	Date Completed
08-0		69	M	SUB 250 - ARCOLA NORTH	SUB 614 - GREENFIELD	13.20	13.20	
08-1		69	M	SUB 250 - ARCOLA NORTH	SUB 324 - STOCKTON NORTHWEST	11.60	11.60	11/19/2016
08-2		34.5	M	SUB 308 - HUMANSVILLE WEST	SUB 217 - FAIRPLAY EAST	13.70	13.70	11/19/2016
08-2		34.5	M	SUB 308 - HUMANSVILLE WEST	SUB 304 - CAPLINGER	13.73	13.73	11/19/2016
08-2		34.5	M	SUB 324 - STOCKTON NORTHWEST	SUB 304 - CAPLINGER	5.70	5.70	11/19/2016
08-3		34.5	M	SUB 308 - HUMANSVILLE WEST	SUB 318 - COLLINS SOUTH	7.46	7.46	11/26/2016
08-4		69	M	SUB 418 - AEC STOCKTON	SUB 324 - STOCKTON NORTHWEST	2.53	2.53	11/19/2016
20-0		69	M	SUB EXPLORER PLEASANT HOPE TAP	SUB 73 - BOLIVAR BURNS	6.90	6.90	11/14/2016
20-0		69	M	SUB EXPLORER PLEASANT HOPE TAP	SUB 323 - BRIGHTON EAST	3.20	3.20	11/14/2016
20-0		69	M	SUB 209 - HERMITAGE	SUB 73 - BOLIVAR BURNS	24.79	24.79	11/14/2016
20-0		69	M	SUB 209 - HERMITAGE	MO PUBLIC SERVICE	8.57	8.57	11/14/2016
20-0		69	M	SUB 80 - MARSHFIELD JCT.	SUB 170 - NICHOLS ST.	8.80	8.80	11/14/2016
20-0		69	M	SUB 80 - MARSHFIELD JCT.	SUB 323 - BRIGHTON EAST	8.00	8.00	11/14/2016
20-1		69	M	SUB EXPLORER PLEASANT HOPE TAP	SUB EXPLORER PLEASANT HOPE	1.50	1.50	11/14/2016
26-0		69	M	SUB 80 - MARSHFIELD JCT.	SUB 445 - WILLARD	6.35	6.35	12/3/2016
26-0		69	M	SUB 80 - MARSHFIELD JCT.	SUB 397 - FAIRGROVE SOUTH	8.80	8.80	12/3/2016
26-5		69	M	SUB 445 - WILLARD	SUB 369 - WILLARD	2.10	2.10	12/3/2016
30-0		69	M	SUB 170 - NICHOLS ST.	SUB 345 - REPUBLIC NORTHEAST	10.80	10.80	12/31/2016
33-0		69	M	SUB 73 - BOLIVAR BURNS	SUB 367 - BOLIVAR SOUTHEAST	5.60	5.60	12/3/2016
33-0		69	M	SUB 367 - BOLIVAR SOUTHEAST	SUB 602 - BOLIVAR PLANT	1.60	1.60	12/3/2016
33-0		69	M	SUB CU PUMP STATION TAP	SUB 368 - DADEVILLE EAST	5.00	5.00	12/3/2016
33-0		69	M	SUB CU PUMP STATION TAP	SUB 614 - GREENFIELD	19.50	19.50	12/3/2016
33-0		69	M	SUB 217 - FAIRPLAY EAST	SUB 368 - DADEVILLE EAST	13.60	13.60	12/3/2016
33-0		69	M	SUB 217 - FAIRPLAY EAST	SUB 602 - BOLIVAR PLANT	8.00	8.00	12/3/2016
39-0		69	M	SUB 114 - NIXA NORTH	SUB 170 - NICHOLS ST.	13.60	13.60	12/26/2016
Total miles						224.6	224.6	

Herbicide work is typically the final step and may or may not occur in the same year and therefore is not reflected as part of the scheduled miles.

EXHIBIT C

Empire District Electric Company

Distribution System - Vegetation Management Plan 2017

Circuit ID	Area	Sub	Sub name	State	Maint. Schedule	2017 Scheduled Miles
3314	209	331	Branson - North	MO	4	6.0
3873	209	387	Hollister - East	MO	4	12.3
3878	209	387	Hollister - East	MO	4	17.0
2952	209	295	Reeds Spring - 161 KV	MO	6	8.1
1242	211	124	Aurora - H.T.	MO	4	7.2
3593	211	359	Republic - East	MO	4	5.2
3594	211	359	Republic - East	MO	4	9.3
2051	211	205	Wentworth - West	MO	6	17.6
2052	211	205	Wentworth - West	MO	6	18.6
3552	211	355	Aurora - West	MO	6	17.4
3553	211	355	Aurora - West	MO	6	50.0
3675	213	367	Bolivar - Southeast	MO	4	4.7
4091	213	409	Buffalo - North	MO	4	19.6
4182	213	418	Stockton City	MO	4	17.7
4312	213	431	Bolivar - South	MO	4	6.0
4313	213	431	Bolivar - South - Breaker	MO	4	27.1
2171	213	217	Fair Play - East	MO	6	31.3
2172	213	217	Fair Play - East	MO	6	34.3
2501	213	250	Arcola - North	MO	6	4.3
3041	213	304	Caplinger	MO	6	3.3
4092	213	409	Buffalo - North	MO	6	27.2
3301	217	330	Ozark - Northwest	MO	4	2.5
3303	217	330	Ozark - Northwest	MO	4	10.5
3702	217	370	Strafford	MO	4	11.8
4153	217	415	Black Hawk Junction	MO	4	17.1
3701	217	370	Strafford	MO	6	22.2
3971	217	397	Fair Grove - South	MO	6	18.6
2712	212	271	Baxter Springs - West H.T.	OK	4	34.2
2784	212	278	Galena - Northeast	KS	6	24.3
2912	212	291	Baxter Springs - 12th Street	OK	4	24.5
2824	212	282	Columbus - Tennessee Street	KS	6	16.7
2913	212	291	Baxter Springs - 12th Street	KS	6	12.5
4251	212	425	Sherman City - Southeast	KS	6	35.5
1451	214	145	Joplin - West 7th Street	MO	4	10.7
1453	214	145	Joplin - West 7th Street	MO	4	20.1
1454	214	145	Joplin - West 7th Street	MO	4	13.9
454	214	284	Joplin - 5th Street	MO	4	0.8
455	214	284	Joplin - 5th Street	MO	4	2.1
457	214	284	Joplin - 5th Street - Breaker	MO	4	1.3
1273	214	341	Joplin - Northwest	MO	4	8.7
1282	214	360	Joplin - Northeast	MO	4	7.6
1284	214	360	Joplin - Northeast	MO	4	10.2
3894	214	389	Joplin - Southwest	MO	4	13.0
3913	214	391	Joplin - Southeast	MO	4	19.4
4223	214	422	Joplin - 24th Street	MO	4	9.5
4303	214	430	Joplin - 32nd & Oliver	MO	4	20.6
4475	214	447	Joplin -	MO	4	1.1
4691	214	469	Joplin - Southeast	MO	4	2.3
4692	214	469	Joplin - Southeast	MO	4	29.0
4693	214	469	Joplin - Southeast	MO	4	0.9
3891	214	389	Joplin - Southwest	MO	6	24.9
4221	214	422	Joplin - 24th Street	MO	6	2.5
1051	215	105	Webb City - Tom Street	MO	4	17.0
1103	215	110	Joplin - Oronogo Junction	MO	4	20.0
1104	215	110	Joplin -	MO	4	3.1
1093	215	109	Joplin - Atlas Junction	MO	6	8.2
2492	215	249	Boston - East	MO	6	6.4
3491	215	349	Asbury Power Plant	MO	6	1.5
3952	215	395	Carthage - Southwest	MO	6	45.1
4031	215	403	Jasper - West	MO	6	29.8
4211	215	421	Purcell - Southwest	MO	6	31.7
6392	215	639	Atlas Powder Line	MO	6	0.8
6393	215	639	Atlas Powder Line	MO	6	1.9
3221	216	322	Anderson - Southwest	MO	4	33.7
5603	216	56	Neosho - West	MO	6	42.4
3991	216	399	Wanda - South	MO	6	54.3
3992	216	399	Wanda - South	MO	6	8.8
Total Miles						1077.4

Empire District Electric Company

Transmission System -- Vegetation Management Plan 2017

Line #	NERC	KV	State	From -- Expanded	To -- Expanded	2017 Scheduled Miles
26-0		69	M	SUB 262 - ALBATROSS	SUB 338 - HEATONVILLE CHEROKEE	4.8
26-0		69	M	SUB 262 - ALBATROSS	SUB 351 - MOUNT VERNON EAST	5.6
26-0		69	M	SUB 121 - ASH GROVE H.T.	SUB 260 - LAWRENCEBURG SHELL	11.6
26-0		69	M	SUB 121 - ASH GROVE H.T.	SUB 445 - WILLARD	6.68
26-0		69	M	SUB 124 - AURORA H.T.	SUB 355 - AURORA WEST	2.8
26-0		69	M	SUB 355 - AURORA WEST	SUB 420 - MT. VERNON EAST	10
26-0		69	M	SUB 260 - LAWRENCEBURG SHELL	SUB 338 - HEATONVILLE CHEROKEE	6.8
26-0		69	M	SUB 351 - MOUNT VERNON EAST	SUB 420 - MT. VERNON EAST	0.8
26-1		69	M	SUB 351 - MOUNT VERNON EAST	MT. VERNON CITY 348	1
26-2		69	M	SUB 364 - RESCUE EXPLORER	SUB 262 - ALBATROSS	7.2
26-4		69	M	SUB 121 - ASH GROVE H.T.	SUB 368 - DADEVILLE EAST	15.6
30-0		69	M	SUB 124 - AURORA H.T.	SUB 152 - MONETT H.T.	11.2
30-0		69	M	SUB 124 - AURORA H.T.	SUB 437 - MARIONVILLE NORTHWEST	8.4
30-0		69	M	SUB 221 - BILLINGS NORTHEAST	SUB 359 - REPUBLIC EAST	6.04
30-0		69	M	SUB 221 - BILLINGS NORTHEAST	SUB 437 - MARIONVILLE NORTHWEST	8
30-0		69	M	SUB 131 - DIAMOND JCT.	SUB 393 - REINMILLER	12.43
30-0		69	M	SUB 131 - DIAMOND JCT.	SUB 362 - SARCOXIE SOUTHWEST	8.8
30-0		69	M	SUB 258 - GATEWAY SOUTH	SUB 447 - 32ND & STEPHENS	0.512
30-0		69	M	SUB 59 - JOPLIN 26TH ST.	SUB 258 - GATEWAY SOUTH	1.6
30-0		69	M	SUB 152 - MONETT H.T.	SUB 383 - MONETT	2
30-0		69	M	SUB 345 - REPUBLIC NORTHEAST	SUB 359 - REPUBLIC EAST	5.2
30-0		69	M	SUB 393 - REINMILLER	SUB 447 - 32ND & STEPHENS	3.1
30-0		69	M	SUB 205 - WENTWORTH WEST	SUB 362 - SARCOXIE SOUTHWEST	3.2
30-0		69	M	SUB 205 - WENTWORTH WEST	SUB 383 - MONETT	13.2
30-1		69	M	SUB 109 - ATLAS JCT.	SUB 315 - SOLAR (ATLAS POWDER CO.)	2.8
30-1		69	M	SUB 315 - SOLAR TAP (ATLAS POWDER C	SUB 393 - REINMILLER	4
30-3		69	M	SUB 347 - GRANBY JUNCTION	SUB 131 - DIAMOND JCT.	1.5
30-3		69	M	SUB 347 - GRANBY JUNCTION	SUB 242 - DIAMOND SHELL	1
30-4		69	M	SUB 347 - GRANBY JUNCTION	SUB 347 - GRANBY	4
30-5		69	M	SUB 362 - SARCOXIE	SUB 362 - SARCOXIE SOUTHWEST	4.33
30-6		69	M	SUB 376 - MONETT CITY SOUTH J2	SUB 383 - MONETT	9.2
30-7		69	M	SUB 311 - MONETT CITY	SUB 376 - MONETT CITY SOUTH J2	0.38
30-7		69	M	SUB 311 - MONETT CITY	SUB 311 - MONETT CITY	0.4
30-7		69	M	SUB 352 - MONETT CITY NORTH	SUB 352 - MONETT CITY NORTH	0.4
30-7		69	M	SUB 352 - MONETT CITY NORTH	SUB 311 - MONETT CITY	1.2
30-7		69	M	SUB 352 - MONETT CITY NORTH	SUB 383 - MONETT	2.8
30-7		69	M	SUB 376 - MONETT CITY SOUTH J2	SUB 376 - MONETT CITY SOUTH	0.4
30-7		69	M	SUB 376 - MONETT CITY SOUTH J2	SUB 416 - MONETT CITY EAST	1.2
30-7		69	M	SUB 416 - MONETT CITY EAST	SUB 390 - PURDY SOUTH	8.8
30-8		69	M	SUB 416 - MONETT CITY EAST	SUB 416 - MONETT CITY EAST	0.4
30-9		69	M	SUB 447 - 32ND & STEPHENS	SUB 447 - 32ND & STEPHENS	1
31-0		69	MK	SUB 59 - JOPLIN 26TH ST.	SUB 167 - RIVERTON	6.4
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32-2		69	M	SUB 315 - SOLAR (ATLAS POWDER CO.)	SUB 315 - SOLAR TAP (ATLAS POWDER C	2.23
2017 Transmission System -- Vegetation Management- Total						224.6

SERVICES YOU COUNT ON

Title: Distribution System Vegetation Management Policy and Procedures Manual	Revision: D	Author: Scott Mackey 3/22/2013

Approval Signatures and date:

Director of System Performance

Vice President of Commercial Operations

Applicable Standards: Missouri PSC Rules effective Aug 9, 2008

Revision	Date	Changes	Approved By
A	8/9/2008	Formalized existing documentation	McGarrah, Palmer
B	3/1/2009	Review in conjunction with our new tree trimming contracts. See letter dated Jan 30, 2009.	McGarrah, Palmer
C	3/15/2012	Annual Review – no changes.	Wallace, Penning
D	3/22/2013	Annual Review – The addition of TGR specifications. See 2.2.4 and Appendix 8.	Wallace, Penning

These policies and procedures apply to all overhead Empire District Electric Company distribution power lines, from 120V to 25kV.

This manual supersedes all previous manuals, specifications and guidelines for line clearance and vegetation management work at Empire District Electric Company March 22, 2013.

Table of Contents

Safety Policy

Section 1.0

All crews performing vegetation management work on or near Empire District Electric Company facilities or rights-of-way shall follow approved safety guidelines and procedures. All contractors performing work for Empire District Electric Company shall comply with all applicable governmental safety and health regulations and the safety and health provisions of their contract.

All contractors must also, at all times, be aware of the nature and characteristics of Empire District Electric Company's electric facilities before work begins. Contractors shall understand that electric facilities must remain energized during the performance of work unless special arrangements are made with an authorized Empire District Electric Company representative.

The following procedures pertain to contractors performing vegetation management work for Empire District Electric Company:

- The contractor shall obtain from Empire District Electric Company full information as to the voltage of its circuits before starting the work.
- The contractor shall at all times conduct work in a manner to safeguard the public from injury and property from damage.
- The contractor must use all necessary protection for its employees and the public and guard against interference with normal operation of the circuits. If, in the judgment of the contractor's general foreman/supervisor, it is hazardous to prune or remove trees with the circuits energized, the contractor must contact an authorized Empire District Electric Company representative(s). If appropriate, Empire District Electric Company will provide the necessary protective materials or de-energize circuits to ensure the safe pruning or removal of the tree(s).
- Should the contractor knock down or come into contact with Empire District Electric Company conductors (power lines), the contractor must notify Empire District Electric Company immediately and take the necessary protective measures. All contractor-caused electric service interruptions are subject to repair at the contractor's expense. This would include any damage to customers' property, including any electrical damage.
- In the event a contractor becomes aware of any dangerous, broken, loose or faulty Empire District Electric Company line facilities in the normal course of its line clearance performance, the contractor shall promptly advise Empire District Electric Company as to the exact pole location(s) and nature of the condition found.

General Guidelines

Section 2.0

2.1 – EXPLANATIONS OF TERMS AND METHODS

2.1.1 Qualified Line Clearance Tree Trimmer:
Personnel who meet the qualifications of "line clearance tree trimmer and/or trimmer trainee" as defined by OSHA 1910.269, ANSI Z133.1 and any other applicable federal, state or local, laws, codes, or regulations.

2.1.2 Distribution (<=25kV) Pruning Cycle:
Empire District Electric Company uses a scheduled pruning cycle to prune trees on lines in rural and urban areas. The company will schedule certain critical feeder lines as often as necessary to ensure reliability.

2.1.3 Trimming Around Primary and Secondary Wires:
Empire District Electric Company will identify and schedule for maintenance, any trees that are a hazard or potential hazard to the supply or reliability of primary or secondary power lines. Qualified line clearance tree trimmers under direction of Empire District Electric Company or its agents are to perform selective tree-branch removal to prevent or correct hazardous situations that may result in outages or endanger life or property. They are to make field judgments as to what amount of clearance is necessary to obtain reliability. They are to look for obvious situations such as deflected wires, branches rubbing insulated wires and broken or hanging tree branches.

2.1.4 Pole-to-House and Street Light Service Wires:
Pole-to-house and street light service wires should only be pruned if a branch is significantly pushing against or is lying on the wire.

2.1.5 General Guidelines for Tree/Conductor Clearance:
The exact amount of clearance needed to maintain reliability depends on the type of tree, its location and condition, and the type of power line and its voltage, as well as many other factors. Empire District Electric Company and its contractors will consider all factors when deciding how much clearance is necessary.

Empire District Electric Company and its representatives will use their professional judgment in determining what these clearances will be in each situation, based on the proposed maintenance cycle for the area in which they are working. The maintenance cycle is dependent upon electric reliability requirements of the system.

2.1.6 Circuit Prioritization and Scheduling:
During a year, circuits are prioritized based on the following factors:

• Reliability – The circuits due to be trimmed for any given year are ranked based on customer minutes interrupted by tree-related causes. Circuits that have the highest numbers of customer minutes interrupted by tree growth outages are scheduled first.

- Last Trim Date – Circuits are scheduled based on the last trim date. The oldest are weighted over the earliest.
- Customers Affected – Circuits are ranked by customer count. Circuits with high numbers of customers or circuits with critical customers are ranked higher.
- Current Vegetation Conditions – The current vegetation conditions on a circuit will be used to prioritize it. Customer requests for tree trimming are also taken into consideration when determining the current vegetation conditions of a circuit.
- Other – Other factors that are considered when scheduling are circuit load, customer complaints, and political issues.

Circuits are first scored based on reliability data, last trim date, and the current vegetation conditions. Then other factors are considered to refine the rankings. Prioritization of a circuit may change based on any of these factors. For scheduling strategy, see Appendix 6.

2.1.7 Pruning

Tree pruning is the selective removal of branches that are not an adequate distance from the power lines, or that will grow too close to the power lines within the next maintenance cycle.

Trees are pruned to provide adequate clearance from Empire District Electric Company facilities. As a general rule, trees should be pruned to improve or re-establish the clearance provided from all previous tree maintenance performed.

Some factors to consider before pruning include:

- The growth rate of the tree species (how fast the branches grow back);
- The wood strength of the tree species (what is the chance of the branch breaking under the load of strong wind, snow, or ice);
- The voltage conducted by the line (the hazard presented by the branch contacting the line; the higher the voltage, the greater the hazard);
- Tree removal considerations. In some cases, it may be preferable to remove the tree. For example, when repeated severe pruning is necessary or when the tree is declining and unsafe;
- Limbs overhanging Empire District Electric Company facilities. Remove or shorten dangerous limbs – those overhanging limbs with a high potential for breaking or bending into Empire District Electric Company conductors due to ice, snow or wind loading (be aware of included bark at the branch bark ridge);ANSI-A300 procedures and techniques will be followed

2.1.8 – Manual/Mechanical Removal of Vegetation

2.1.8.1 -- Removal Considerations for trees where ownership can be determined

- Remove all tall-growing trees within the width of the right-of-way.
- Remove all tall-growing brush that has the potential to grow closer than the minimum clearance specified for a specific voltage line.
- Remove all brush and vines around poles and other EMPIRE equipment.
- All trees and brush should be cut as close to the ground as practical.
- Remove all fast-growing and undesirable tree species.
- Remove all second growth from stumps cut on previous pruning cycles.
- Remove all trees that present an obvious or potential hazard to Empire District Electric Company facilities.

2.1.8.2 -- Removal Considerations for trees where ownership cannot be determined and are either 6"- 11.9" DBH trees with original crown or Trees that have been topped or otherwise improperly pruned as defined by ANSI A-300 (Part 1)-2001 Pruning

- All considerations on section 2.1.8.1.
- Unmarketable fencerow trees that currently lack ability to be beneficial shade.
- Trees located in such a manner that ANSI A-300 (Part 1)-2001 Pruning cannot be followed while attaining clearances set in this documents Appendix 2.
- Edge trees of no market value that yield no additional benefit due to adjacent or otherwise available shade to livestock.
- Trees located in areas not manicured, accessible and inaccessible alleys in town, or not associated with a residence.

Stumps should be treated with herbicide to prevent re-sprouting.

2.1.9. Hazard Trees

Trees that are located beyond the edge of the right-of-way, that have a high probability of failure and are of sufficient height to contact the conductors and/or structures and guy wires, if they were to fall in that direction, are classified as hazard trees, and should be considered for removal.

Conditions could include but are not limited to the following:
Dead or dying leaning trees
Weak branches
Shallow root system
Root failure
Internal
decay
Canker or canker root
Bug infestation

2.1.10 – Right-of-way Screens

Right-of-way screens are strips or areas of trees and brush purposely left on the right-of-way in certain areas where it is required by federal, state and/or local laws or regulations and/or it is desirable to reduce the visual impact of the cleared right-of-way to the general public. Along certain roads and other areas frequented by the public, screens of trees may be left on the right-of-way so the natural tree line is not interrupted by the cleared right- of-way, and to reduce the "corridor" appearance of a cleared right-of-way. Screens should be composed of low-growing trees and shrubs that will not normally grow to conductor height.

2.2 - EMPIRE DISTRICT ELECTRIC COMPANY SCHEDULED TREE PRUNING

2.2.1 Procedure

Empire District Electric Company or its agents will inspect trees near power lines scheduled for maintenance and determine which trees should be pruned, removed and/or treated. Attempts will be made to notify homeowners or residents before pruning is done.

2.2.2 Limb and Branch Disposal

Empire District Electric Company/Empire District Electric Company contract crews will dispose of all debris resulting from their tree and pruning operations that are small enough to be fed through a chipper unless different arrangements have been made with the homeowner or resident. Wood too large to be chipped shall be cut and stacked at the site unless the homeowner requests the wood be removed.

2.2.3 Brush Removal

Brush is defined as a tall-growing tree stem that is less than 6 inches in diameter at breast height. Brush will be removed rather than pruned.

2.2.4 TGR Application

Empire District Electric Company and its agents will apply TGR following pruning to applicable trees. The specifications are lined out in the tables in Appendix 8.

2.3 - EMPIRE DISTRICT ELECTRIC COMPANY SCHEDULED TREE REMOVAL

2.3.1 Removal Procedure

Empire District Electric Company and its agents will inspect the trees near power lines scheduled for maintenance and determine which trees should be removed. If a tree is a candidate for removal, the homeowner or resident will be contacted and asked to authorize Empire District Electric Company and its contractors to remove the tree as low to the ground line as possible (See Section 2.10, Customer Contact).

2.3.2 Tree Disposal
Empire District Electric Company/Empire District Electric Company contract crews will dispose of all debris small enough to feed through a chipper resulting from their tree removal and pruning operations unless different arrangements have been made with the homeowner or resident. Wood too large to be chipped shall be cut and stacked at the site unless the homeowner requests the wood be removed.

2.3.3 Stumps
Empire District Electric Company and its contract crews will NOT grind out stumps, unless special arrangements have been agreed upon. All stumps shall be treated with an approved herbicide unless a property owner has requested that the stump not be treated or if the herbicide label warns against treatment of stumps in particular situations.

2.4 – CUSTOMER REQUESTED TREE PRUNING POLICY

Empire District Electric Company will promptly respond to legitimate request related to tree/right-of-way maintenance, assign a priority level for scheduling and inform the property owner of the results of the investigation. Empire District Electric Company will decide if the work requested will benefit the overall safety and reliability of the electric system and its customers and the general public.

Empire District Electric Company shall adhere to the following guidelines:

- Document all request using a standard Customer Request Form.
- Screen all request by phone by asking questions
  such as: o Do you have power?
  o Do your lights blink?

- Field inspect the request that cannot be resolved by phone. If no one is home when the field inspection occurs, provide door-hanger that notifies customer of the decision that was made and if the work will be completed, deferred or denied. This practice can increase efficiency for field investigations that are completed when property owners are not at home.

2.4.1 Procedure
When a customer requests Empire District Electric Company to prune a tree away from pole-to-pole lines, the company will send out a representative to make a determination of any potential hazards that exist. If it is determined that a potential hazard does exist, Empire District Electric Company will schedule a crew to perform all necessary pruning and/or removal.

If the tree is not a potential hazard, Empire District Electric Company will inform the customer that the tree will be re-evaluated when that particular area is scheduled for maintenance.

2.4.2 Limb and Branch Disposal
If it is determined that a potential hazard does exist, Empire District Electric Company/Empire District Electric Company contract crews will dispose of all debris small enough to feed through a chipper resulting from their tree removal and pruning operations unless different arrangements have been made with the homeowner or resident. Wood too large to be chipped shall be cut and stacked at the site unless the homeowner requests the wood be removed. If the tree is not a potential hazard and pruning and/or removal is still agreed to, the disposal of the debris is the responsibility of the property owner unless otherwise agreed to in writing.

2.5 – CUSTOMER TREE REMOVAL

2.5.1 Procedure
When a customer wants to remove a tree and Empire District Electric Company's facilities make it hazardous for the customer or customer's agent to accomplish the work, Empire District Electric Company will do one of the following:

- Temporarily drop the conductors while the customer or customer's agent performs the work. To make arrangements, call the Empire District Electric Company Customer Service Center at (800) 206-2300.
- Prune or remove the portion of the tree that is contributing to the hazard.
- A Empire District representative will inspect the request within five working days

Note: Empire District Electric Company will not remove trees to clear house (pole–to-house), or street light service wires.

2.5.2 Tree Disposal
When Empire District Electric Company prunes or removes trees at the customers' request, the disposal of the debris is the responsibility of the property owner unless otherwise agreed to in writing.

2.6 –CUSTOMER PRUNING WITH EMPIRE DISTRICT ELECTRIC COMPANY ASSISTANCE

2.6.1 Procedure
When a customer desires to prune a tree close to Empire District Electric Company lines for reasons other than line clearance, and it is hazardous to complete the work, Empire District Electric Company will do one of the following after customer notification:

- Temporarily drop the conductors while the customer or customer's agent performs the work. To make arrangements, call the Empire District Electric Company Customer Service Center at 800-206-2300.

- Prune or remove the portion of the tree that is creating the hazard.

Note: In all cases, the decision on which course of action to take will be determined by a Empire District Electric Company representative after consultation with the customer.

2.6.2 Limb and Branch Disposal
When Empire District Electric Company assists the customer to prune or remove trees at a customer's request, the disposal of the debris is the responsibility of the property owner unless otherwise agreed to in writing.

2.7 – CUSTOMER PRUNING NEAR EMPIRE DISTRICT ELECTRIC COMPANY FACILITIES

2.7.1 Procedure
When a customer desires to prune trees near Empire District Electric Company lines, the following conditions must be met:

- Only qualified line-clearance tree trimmers and/or trimmer trainees are allowed within 10 feet of any energized conductors (OSHA 19 10.269 and ANSI ZI33.1 and any other applicable federal, state or local laws, codes or regulations). Qualified line-clearance tree trimmers will do all pruning around Empire District Electric Company facilities.
- Empire District Electric Company must be notified in advance of the customer's agent performing the work.

2.7.2 Limb and Branch Disposal
Clean up and disposal of all limbs, branches and debris resulting from this clearing operation are the responsibility of the property owner.

2.8 – TREE PRUNING AND REMOVAL DURING STORMS

2.8.1 Procedure
When trees fail or branches break during storms, and they make contact with or cause failure of Empire District Electric Company facilities, Empire District Electric Company will do the necessary pruning or removal to clear its facilities and restore power.

Note: Due to the emergency conditions that exist during storms, Empire District Electric Company and its contract crews may not be able to contact all customers before pruning or cutting trees. Crews may make a courtesy knock on the customer's door to let them know that work will be performed at that location.

2.8.2 Disposal
If Empire District Electric Company and its contract crews prune or remove trees following storm emergencies, all limbs and logs will be left on the customer's premises. The disposal of limbs and/or logs is the responsibility of the property owner.

2.9 – PRUNING AND REMOVAL OF DISEASED TREES

2.9.1 Pruning

Where trees are encountered that are suspected of being diseased (Dutch elm disease, oak wilt, etc.) the customer should be notified and a determination made as to whether the tree should be pruned. If the customer is not willing to agree the tree is diseased, Empire District Electric Company will refrain temporarily from pruning the tree, if possible, until symptoms are more visible or the hazard is too great. Contract crews should report the matter to their supervisor.

2.9.2 Removal

When diseased trees are near Empire District Electric Company lines, Empire District Electric Company and its contract crews will do one of the following:
Prune the trees to clear Empire District Electric Company facilities;
Temporarily drop the conductors while the customer or customer's agent removes the tree. For a temporary line drop, customers should contact Empire District Electric Company Customer Service Center at 800-206-2300.

2.9.3 Disposal

Should a tree be condemned by a municipal jurisdiction as having Dutch elm disease, oak wilt or another tree disorder, Empire District Electric Company has no responsibility for the removal or disposal of the tree except when the tree is located on property owned by Empire District Electric Company. Removal and disposal of diseased trees is the responsibility of the property owner.

2.10 – CUSTOMER CONTACT POLICY

2.10.1 – Scheduled Pruning/Removal

An Empire District Electric Company agent or Empire District Electric Company representative will attempt to contact each customer/homeowner whenever possible before pruning any trees or in accordance with any pending special conditions mandated by an appropriate regulatory body.

For normal pruning:

An Empire District Electric Company representative or agent will knock on the door to talk with the homeowner and explain the necessary pruning. If no one is home, a notice will be left on the door.

If the homeowner does not contact Empire District Electric Company, the contract trimming crew will to do the necessary pruning. Before starting the line clearance work, the contract trimming crew will attempt a courtesy contact with the property owner by knocking on the door.

If the pruning is necessary and the homeowner refuses permission, the crew will turn the matter over to the work planner. If the planner is unable to develop concurrence with the customer regarding the necessary pruning, the planner will notify appropriate Empire District Electric Company representative.

Pruning on public property:
When pruning involves trees on public property or rights-of-way, it is recommended that the Empire District Electric Company representative or agent contact the appropriate public agency to discuss any special concerns. (Example: Contact a city forester or parks department before pruning boulevard trees). It is the line clearance trimming contractor's responsibility to acquire any licensing required by municipalities for the pruning of trees.

For tree removal:
Before removing a tree, homeowners will be contacted and informed of the necessary work. Empire District Electric Company representative or agent will secure a signed permit before starting the work unless otherwise approved by Empire District Electric Company. When property ownership cannot be determined the approved agents assigned by EDE will be allowed to authorize by signature removal of trees defined in section 2.1.8.2 for that site to the utility line clearance contractor.

2.10.2 – Customer-Requested Pruning/Removal
Emergency and hazardous conditions will be addressed immediately.
If the pruning has been agreed to over the phone, (for normal pruning) the crew will make a courtesy knock on the door before starting the work.
If the work requires written permission (tree removal), the crew will follow the same procedure as outlined for scheduled work.

2.10.3 – Storm Work
Due to emergency conditions that occur during a storm, Empire District Electric Company and its contractors will prune and remove trees necessary to restore power without contacting every homeowner.

A courtesy knock will be made at each customer site to inform them of the work being done, however, *the work will proceed even if the customer is not home.*

Herbicide Use Policy (Distribution)

Section 3.0

3.1 – SAFETY AND REGULATIONS

All herbicides shall be applied in strict compliance with all federal, state and local laws and regulations. This includes, but is not limited to: transporting, handling and chemical container disposal.

All herbicide and treatment methods used by the contractor shall have prior approval by Empire District Electric Company.

Any crew member applying herbicides must be supplied with the appropriate protective gear, current label and Material Safety Data Sheet (MSDS) for the product being applied. It is the contractor's responsibility to provide all necessary materials, including chemicals and safety gear, unless specifically indicated as being provided by Empire District Electric Company.

The contractor is responsible for the proper disposal or recycling of all herbicide containers.

A reasonable attempt to notify homeowners adjacent to the application area of necessary work should be made by the contractor performing the applications. An Empire District Electric Company representative or agent may attempt to contact homeowners before starting the work when ownership can be determined during planning. If ownership cannot be determined without property research work will be performed as planned.

3.2 – APPLICATION OF HERBICIDE

3.2.1 Requirements and Precautions

- Do not apply herbicides outside the easement right-of-way boundaries except in cases where no right-of-way width has been established in the easement.
- All herbicide treatment shall be performed in a responsible manner that will reflect the best interests of the property owner and Empire District Electric Company. If a property owner should object to any of the herbicide treatments, the operation shall immediately be discontinued on that property until any differences are resolved.
- Cut off all vines ascending all poles and guy wires at the height of reach.
- Herbicide may be applied to foliage of brush under 10 feet tall.
- Herbicide may be applied to foliage of trees over 10 feet tall as approved and directed by the assigned Empire District Electric Co. employee or representing agent.
- The Contractor shall furnish all mixing materials and application equipment and shall be responsible for transporting, handling, mixing, and application of chemicals used in the immediate operation unless

otherwise directed by the manager of Vegetation Control.

- The Contractor shall comply with all State and Federal Laws and Regulations pertaining to Herbicide Applications and any other licensing or regulatory requirements.
- The Contractor shall only use herbicide solutions that contain dye according to label recommendations for basal and stump applications unless approved by Empire District Electric Company or its representatives.
- The Contractor shall guarantee a minimum ninety percent (90%) stump control per span, as determined during the growing season following the treatment. Spans not meeting these specifications shall be re-treated by the Contractor at the Contractor's expense to achieve the proper mortality. The Contractor shall guarantee a minimum of ninety-five percent (95%) mortality of brush stems per span for all foliage or basal applications. Mortality must be achieved within eighteen (18) months following treatment. Spans not meeting these specifications shall be retreated at the Contractor's expense to achieve the proper mortality.

In chemical application work, the Contractor shall have the right to skip any portion of a line when, in the opinion of the Contractor, damage to crops, orchards, or ornamental plantings may result from drift. Any skips shall be reported to the appropriate inspector or supervisor.

3.3 – REPORTING PESTICIDE INCIDENTS

When a spill is reported the contractor general foreman should determine the type of chemical and amount of spillage along with the containment efforts that were made. Then the general foreman should notify the proper state or federal agencies if necessary. Any spill, leak, fire or other accident involving pesticides *must be reported immediately* to the proper line clearance supervisor. All damage from such leaks or spills are the responsibility of the contractor.

Tree Replacement

Section 4.0

4.1 – GENERAL GUIDELINES

Repeated pruning of unmanageable trees can lead to increased utility rates for Empire customers. It may be preferable to remove and replace certain trees that pose a particular hazard to the power lines. Fast-growing, tall trees directly under power lines are an example. They grow back quickly into the wires and can cause repeated outages. Poplars, elms, willows and silver maples are some fast-growing trees that need frequent pruning near power lines.

Communities

Empire District Electric Company is willing to cooperate with communities in applying for tree-planting grants from the state and federal government. Empire District Electric Company may provide funds to purchase trees, or labor to remove existing trees, or both depending on the circumstances.

Property Owners

Empire District Electric Company works with homeowners to identify trees that are good candidates for replacement. The tree must be near Empire District Electric Company power lines and must require repeated pruning to keep the lines clear. The power line must be at least a primary circuit. Empire District Electric Company will remove the existing tree and provide assistance in replacing the tree. The planting and care of the new tree is the responsibility of the property owner, unless other arrangements are made.

Empire District Electric Company reserves the right to decide under what circumstances trees will be replaced (at the expense of Empire District Electric Company). The replacement tree must be a low-growing variety, or it must be planted a sufficient distance away from power lines as to not require future line clearance pruning, if it is a tall-growing variety.

Appendices

1. Major Tree Species and Growth Rates
2. Guideline for Line Clearances
3. Natural Pruning
4. What is a Tree
5. Scheduling Strategies
6. Plant the right tree in the right place
7. TGR Specifications
8. Definitions

Appendix 1

MAJOR TREE SPECIES AND GROWTH RATES

Common Name	Scientific Name	Growth Rate
Aillanthus	Ailianthus Altissima	F
Ash, White	Fraxinus Americana L.	F
Ash, Green	Fraxinus Pennsylvanica	F
Basswood	Tilia american L.	M
Birch	Betula Nigra L.	F
Black Walnut	Juglans Nigra	F
Boxelder	Acer negundo L.	F
Bradford Pear	Pyrus calleryiana	F
Buckeye	Aesculus	S
Catalpa	Catalpa bignonioides	M
Cherry	Prunus scrotina	F
Cottonwood	Populus deltoides	F
Dogwood	Cornus florida L.	S
Eastern Redcedar	Juniperus Virginiana	S
Elm	Ulmusspp.	F
Ginkgo	Gilkgo biloba	M
Hackberry	Celtis occidentalis	M
Hickory	Caryatexana	M
Honey locust	Gleditsia triacanthos	F
Hybrid Maples	Amur	M
Kentucky Coffee Tree	Gymnocladus dioica L.	M
Locust	Robinia pseudo-acacia L.	F
Mimosa	Albizia Julibrissin Durazz	F
Mulberry	Morus spp.	F
Osage Orange	Maclura poynifera	M
Pear	Pyrus communis L.	F
Pin Oak	Quercuspalustris	F
Pine	Pinus spp.	S
Poplar	Populus alba L.	F
Post Oak	Quercus stellata	S
Red Bud	Cercis canadensis	S
Red Oak	Quercus rubra	M
Sassafrass	Sassafrass albidum nees	F
Silver Maple	Acer Saccharinum	F
Sugar maple	Acer saccharum	S
Sweetgum	Liquid ambar styraciflua L.	F
Sycamore	Aplatanus occidentalis	F
White Oaks	Quercus alba L.	M

Appendix 2

The following guidelines (TABLE 1) for tree clearances may apply at the time of line clearance tree maintenance to protect the wires under normal operating conditions. Special clearances may be needed at times because of field conditions. Additional allowance should be made for wires that will sag due to hot weather or swing sideways in strong winds.

Table 1.

Recommended Line Clearances (in feet)

Clearance From Trees	Rate of Growth	Secondary Cable (120-480 V)	Open Wire Secondary (120-480 V	Primary Voltage Single-Phase	Primary Voltage Three-Phase
SIDE	Slow	2 (c)	2 (c)	8 (c)	10 (c)
	Fast	4 (c)	6 (c)	12 (c)	15 (c)
OVER	Slow	2	2	15 (a)	Remove all overhang
	Fast	4	6	15 (a)	
UNDER	Slow	3	8	8	10
	Fast	4	10	12	14

Site Considerations:

(a) Remove all hazardous overhang, and all overhang within 15 feet of the conductors that could contact them if weakened or broken. Remove all overhang over 3-phase lines.

(b) Remove all trees that could grow into, or fall into the lines.

(c) Large tree trunks or major limbs of established trees may be allowed to remain as close as 4 feet from the conductors if all of the following are true:

- Movement of either the conductor or the tree will not result in contact between the tree and the conductor.
- The tree is not easily or readily climbed without the use of ladders or specialized climbing equipment.
- There is no evidence of re-growth or sprouting from the tree trunk toward the line.

Appendix 3

Natural Pruning (to direct growth away from wires)

Natural pruning is a method by which branches are cut at a suitable parent limb back toward the center of the tree. The cut should be made as close as possible to the branch collar at the branch base, however the branch collar should not be injured or removed. Every branch has a branch bark ridge that separates the branch from the main stem. The cut should be made on the outer side of the ridge. If the cut is made on the inner side of the branch bark ridge, a "larger" wound will result that may inhibit the trees ability to naturally compartmentalize the wound, increasing wound closure time and the risk of entry for microorganisms. This method of pruning is sometimes called "drop-crotching", "directional trimming" or "lateral trimming." Large branches should be removed to laterals at least one-third the diameter of the branch being removed. Natural pruning is especially adapted to the topping of large trees where a great deal of wood must be removed.

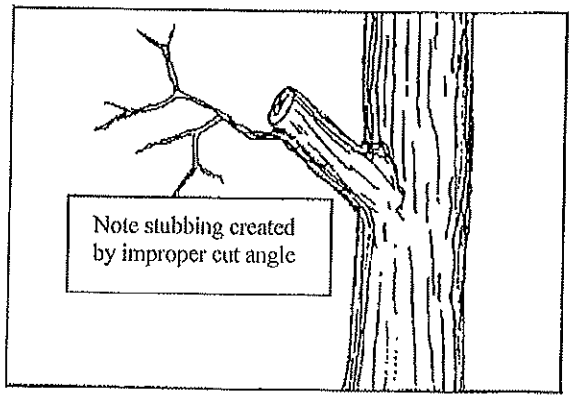
In natural pruning, almost all cuts are made with a saw, and very little pole pruning works is required. This results in a natural looking tree when finished, even if a large amount of wood has been removed. However, a hydraulic or manual pole pruner is required to trim those smaller laterals that cannot be properly trimmed using the pole saw and each crew shall be equipped with the necessary hydraulic pruners for lift crews and manual pruners for climbing crews.

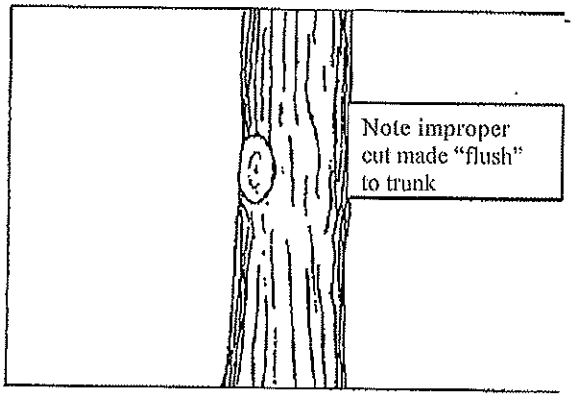
Natural pruning is also directional pruning, since it tends to guide the growth of the tree away from the wires. Stubbing or pole-clip clearance, on the other hand, tends to promote rapid sucker growth right back into the conductors. It is important to remember is that natural pruning does work, and that two or three trimming cycles done in this manner will bring about an ideal situation for both the utility and the tree owner. Most shade trees lend themselves easily to this type of pruning.

Natural pruning techniques should be used for top pruning, side pruning, under pruning, and combinations as described on the following pages.

Natural Pruning Details

Improper Trimming Techniques



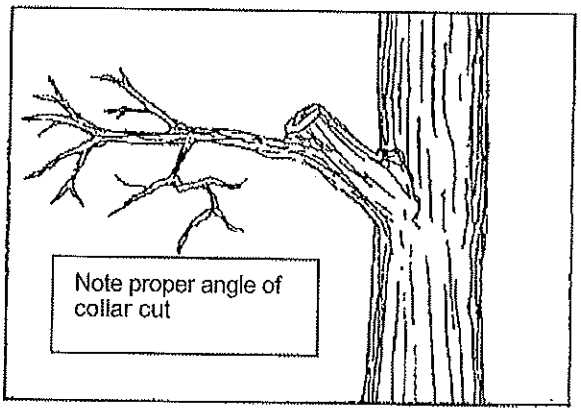


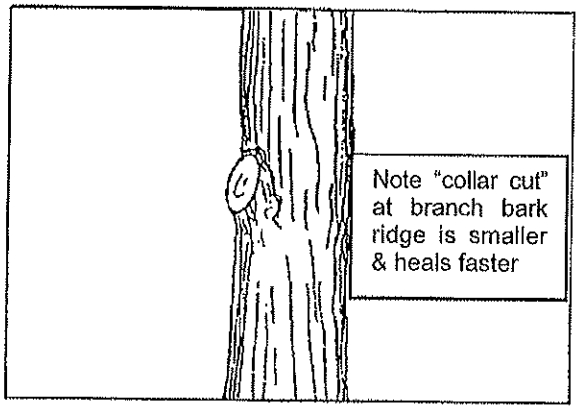
Details of improper trimming and proper natural pruning techniques are shown here. The branch at left above was cut back to a lateral that is too small. Branches should be cut back to a lateral that is at least one-third the size of the branch being removed as shown at left below. If a proper lateral is not available, the branch should be cut back to the trunk. Note that the remaining limb should be trimmed in a manner that meets the minimum clearance requirements while "training" it to grow away from the conductors. When limbs growing toward the conductors cannot be trimmed to meet these requirements, they should be removed back to the trunk of the tree.

The cut shown at right above is an improper flush cut where the branch collar was removed. The cut at right below shows the proper method to remove the branch at the trunk, leaving the branch collar but not a stub.

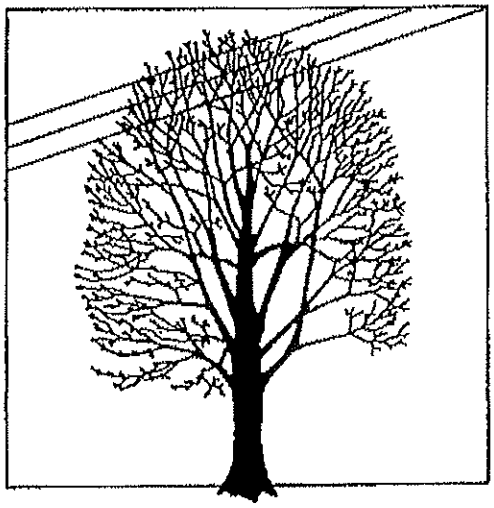
The CONTRACTOR shall remove all past stubbing, correctly trimming these limbs back to a lateral one third the size of the parent limb, or removing them back to the trunk of the tree, to promote proper healing. Removal back to the trunk will be the preferred method when it would create a "cleaner" appearance and minimize future re-growth and trimming.

Proper Pruning Techniques



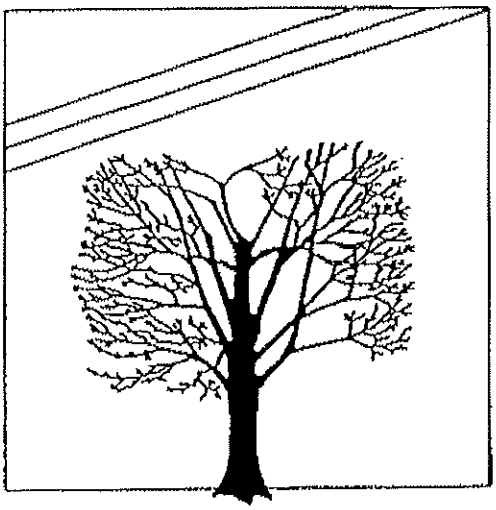


1. TOP PRUNING



Before Top Pruning

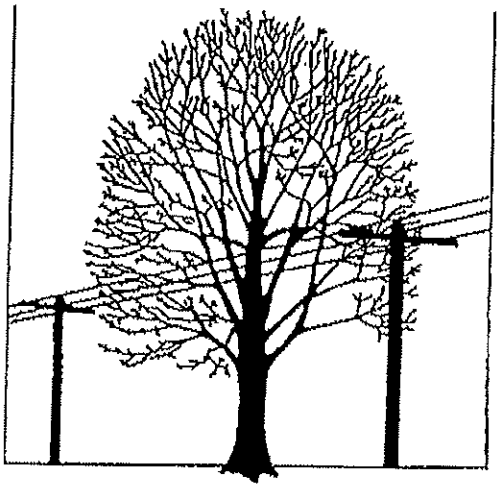
After Top Pruning



Top pruning involves cutting back large portions of the upper crown of the tree. Top pruning is often required where a tree is located directly beneath a line. The main leader or leaders are cut back to a suitable lateral. (The lateral should be at least one-third the diameter of the limb being removed.) While most cuts should be made with a saw; a hydraulic or manual pole pruner is still required to properly prune the small lateral limbs that cannot be properly pruned using a pole saw.

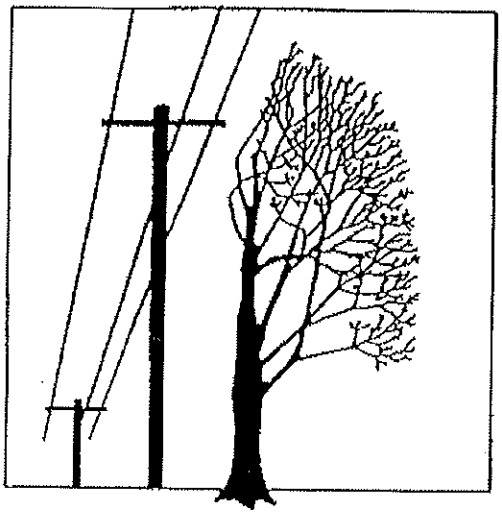
For the sake of appearance and to limit the amount of regrowth, it is best not to remove more than one-fourth of the crown when top pruning. In certain species, removal of too much of the crown may result in death of the tree.

Top trimming is generally required to address the situation where a tall growing tree has been planted or grown underneath the lines. Top trimming should NOT be used on those trees that are located partially under the line, where part of the tree could be trained to grow away from and/or beside the line, specifically required by the property owner. Side trimming is discussed in the next section.



Before Side Pruning

After Side Pruning
Rural – R/W areas



2. SIDE PRUNING IN NON-RESIDENTIAL R/W AREAS

In non-residential or rural right-of-way situations side pruning consists of cutting back or removing the side branches that are threatening the conductors from ground to sky. Side pruning is required where trees are growing adjacent to utility lines. Limbs should be removed at a lateral branch or the main trunk wherever possible to minimize future re-growth. All branches beneath the conductors should be removed to prevent them from growing up into the lines. Avoid unsightly notches in the tree, if possible.

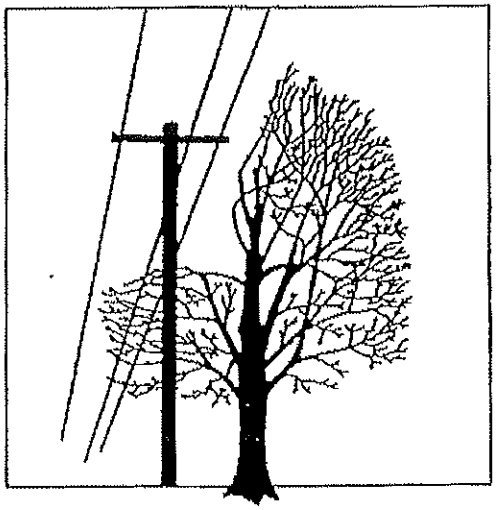
3. SIDE PRUNING IN RESIDENTIAL AREAS

In residential situations, where the tree to be trimmed is part of a lawn or landscape setting it is often necessary to leave a "shelf" of branches below the phone cable level, or at least 10 – 12 feet below the primary level. While this is NOT a preferred trimming

method, it is commonly required in residential areas in order to maintain as much of the natural appearance, screening and shade value of the tree as possible. Trees that would require excessive trimming or create serious visual impacts for the property owner should be candidates for removal.

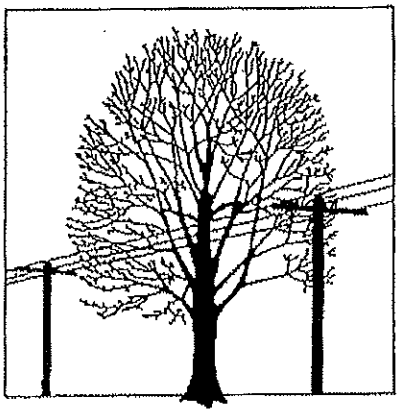
When shelf trimming is performed the remaining branches shall be trimmed so as to train them to grow out flat, or down and away from the conductors. Branches growing up, toward the overhead conductors should be removed or trimmed to laterals growing away from the wires.

After Side Pruning Residential Areas

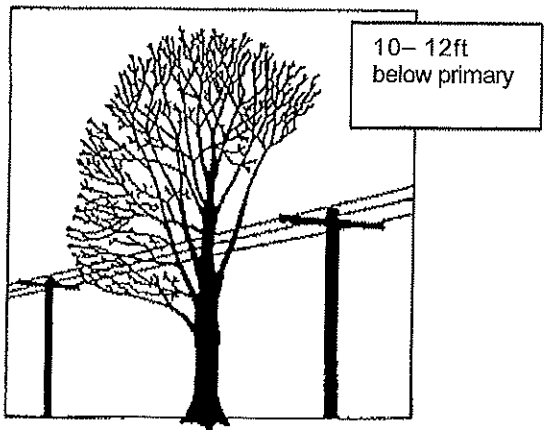


4. UNDER PRUNING

Under pruning involves removing the lower limbs of the tree to allow wires to pass below the tree crown. All cuts should be made as close as possible to the branch bark ridge at the branch collar, to avoid leaving unsightly stubs. The natural shape of the tree is retained in this type of pruning, and the tree can continue its normal growth. Overhangs shall be trimmed as required by this specification in Exhibit C Table 1, the species of tree, location. All dead branches above the wires shall be removed, regardless of height, since this dead wood could easily break off and cause an interruption.



Before Under Pruning



After Under Pruning

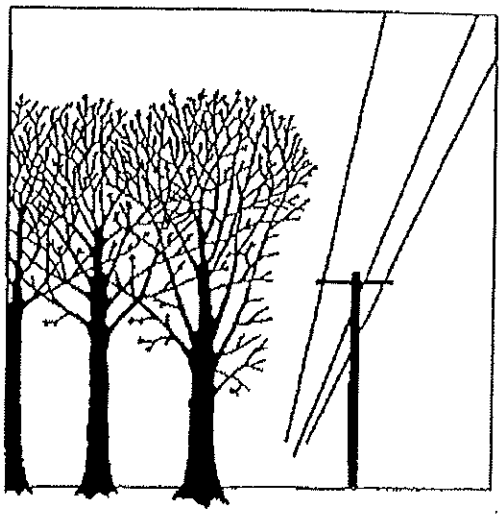
5 COMBINATIONS

It may be necessary to combine several pruning types in order to achieve a good-looking job and to obtain adequate clearances.

Improper Trimming Methods

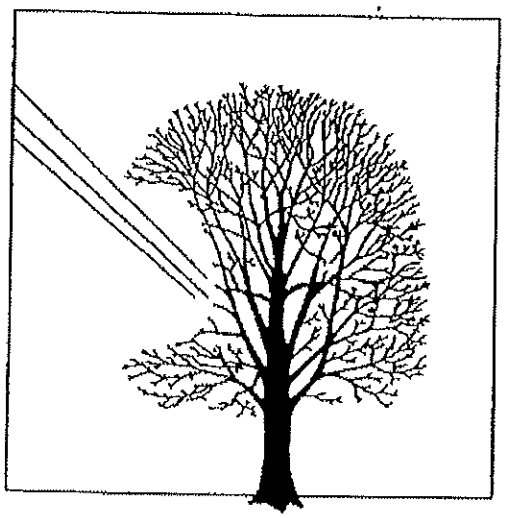
6. SIDE TRIM STUBBING

This is done by stubbing off portions of limbs along the side of the tree to obtain clearance. Cutting off portions of limbs (leaving stubs) to obtain clearance creates many fast-growing suckers that become a serious line clearance problem. Corrective pruning will be required to eliminate and repair past stubbing practices when they are encountered.



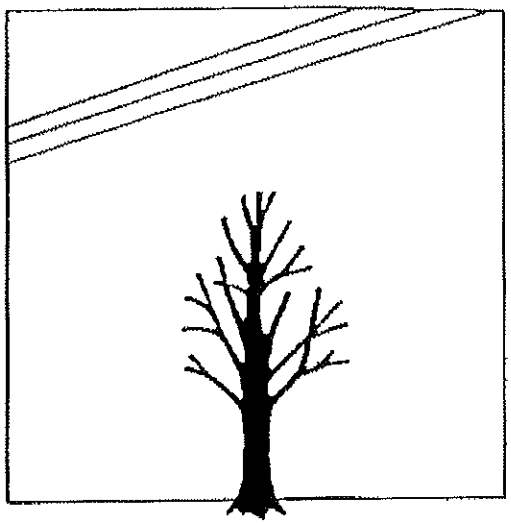
7. "SHAPING" AROUND LINES

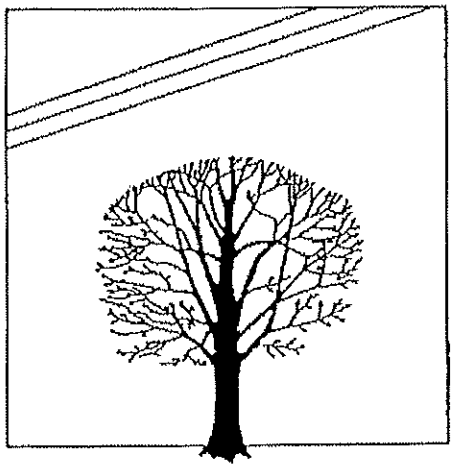
This is done by trimming limbs in an arc to obtain clearance. This unsightly method of trimming leaves branches above the conductors that could bend or break.



8. POLLARDING

This is done by stubbing off major limbs to greatly reduce the size of the tree crown. The result is not only unsightly, but promotes a multitude of fast-growing suckers that sprout from the stubs. The combination of stubbing and re-sprouting leads to weak limb attachments, disease and decay, which then lead to a serious reliability and line clearance problem.





9. ROUNDING OVER

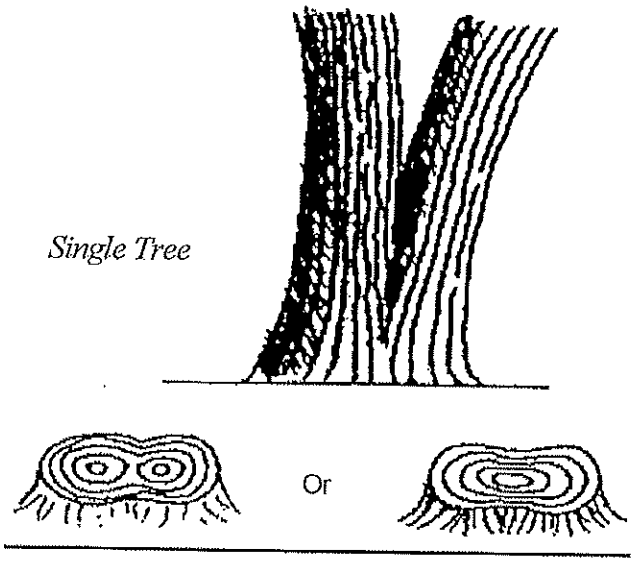
Rounding over (or shearing) is done by making many small cuts so that the tree top is sheared in a uniform line. This creates an unhealthy tree condition and results in rapid regrowth of suckers directly toward the electric conductors.

When a round over is done using a pole saw the trimmer usually leaves numerous stubs, rather than following drop crotch and directional trimming principles. This stubbing commonly leads to decay, disease and rapid re-growth. This condition is unacceptable, except when mandated by customer requirements, and even then should be a last resort.

When a round over must be done, it shall be completed using the proper hydraulic or manual pruning tools, following the proper collar cut procedures. Stubbing is unacceptable. The Owner's Representative shall be notified before a round over is performed.

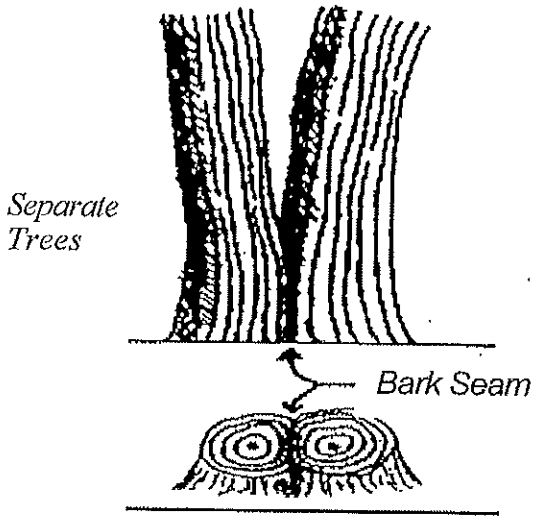
Appendix 4

What is a Tree



1. SINGLE-STEM TREE IDENTIFICATION

A tree that splits above ground line and has a visible included bark seam down to the ground line is considered a single tree.



2. MULTI-STEM TREE IDENTIFICATION

A tree that splits at ground line is considered multiple trees. A tree that splits above ground line, but has a visible included bark seam down to the ground line is considered separate trees.

Appendix 5

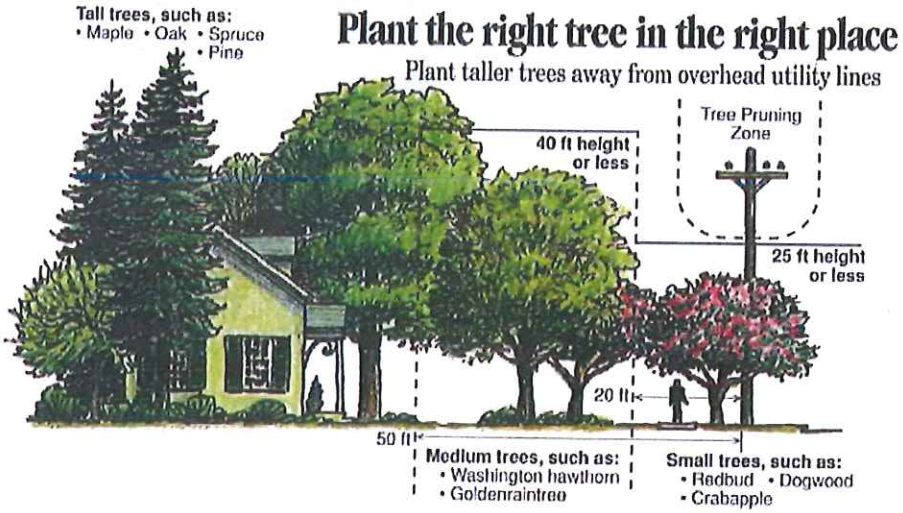
Empire Line Clearance Scheduling Strategy

The following table summarizes the Empire line clearance scheduling strategy. Individual circuits may be accelerated or deferred based on assessment of field conditions and operating performance.

Feeder Description	Primary Cycle Length (Years)	Mid-cycle Inspection/selective Tree Maintenance (Years)
Residential Feeder Multi-phase	4	2
Rural Feeders	6	3

** The above schedule will be utilized unless otherwise directed by the appropriate regulatory body*

Appendix 6


Tall trees, such as:
• Maple • Oak • Spruce
• Pine
Plant the right tree in the right place
Plant taller trees away from overhead utility lines
Tree Pruning Zone
40 ft height or less
25 ft height or less
20 ft
50 ft
Medium trees, such as:
• Washington hawthorn
• Goldenraintree
Small trees, such as:
• Redbud • Dogwood
• Crabapple

Appendix 7

Specifications for TGR Application (4-year cycle circuits)

Voltage Class	DBH class	Trees to be treated		
		Trees located within 10 feet of the nearest conductor or w/o spec. clearance or "Directional Pruning"	Trees located within 15 feet of the nearest conductor w/o or spec. clearance or "Directional Pruning"	Trees located within 20 feet of the nearest conductor or w/o spec. clearance or "Directional Pruning"
Distribution	R1	F, M	F,M	F
	R2	F, M	F,M	F
	R3	F, M	F	F
	R4	F, M	F-- under 40" DBH	F-- under 30" DBH
	Other	Special conditions may cause a need to treat certain trees not covered by this specification. The applicator should submit a request to treat that tree and turn it in to be approved by the Empire Coordinator responsible for work in that area.		

Empire District Electric Distribution TGR Application Standards Species Table

Fast Regrowth (F)
Alllanthus
Ash
Birch
Boxelder
Cherry
Cottonwood
Elm
Locust
Mimosa
Mulberry
Pear
Poplar
Sassafrass
Silver Maple
Sweetgum
Sycamore
Bradford Pear

Med. Regrowth (M) Spp. Not to Treat
Basswood
Catalpa
Ginko
Hackberry
Hickory
Hybrid Maples
Kentucky Coffee Tree
Osage Orangw
Red Oaks
White Oaks
Other Maples

Slow Regrowth(s)
Buckeye
Dogwood
Red Bud
Sugar maple

Spp. Not to Treat
Bald Cypress
Blackjack oak
Cedar
Fir
Hemlock
Holly
Magonolia
Pine
Post Oak
Spruce
Walnut
Pecan
Fruit

Other Trees Not to Treat
Trees in decline
Obviously stressed trees
Trees side-trimmed with 33% more than min.clearance

Specifications for TGR Application (6-year cycle circuits)

Voltage Class	DBH class	Treat trees measured by the off-set of the tree base to the nearest line		
		Trees located within 10 feet of the nearest conductor or w/o spec. clearance or "Directional Pruning"	Trees located within 15 feet of the nearest conductor or w/o spec. clearance or "Directional Pruning"	Trees located within 20 feet of the nearest conductor or w/o spec. clearance or "Directional Pruning"
Transmission	all	Treat all trees trimmed durring routine cycle		
Distribution	R1	F,M	F,M	F
	R2	F,M	F,M	F
	R3	F,M	F,M	F
	R4	F, M	F-- under 40" DBH	F-- under 30
	Other	Special conditions may cause a need to treat certain trees not covered by this specification. The applicator should submit a request to treat that tree and turn it in to be approved by the Empire Coordinator responsible for work in that area.		

Empire District Electric Distribution TGR Application Standards Species Table

Fast Regrowth (F)
Ailanthus
Ash
Birch
Boxelder
Cherry
Cottonwood
Elm
Locust
Mimosa
Mulberry
Pear
Poplar
Sassafrass
Silver Maple
Sweetgum
Sycamore
Bradford Pear

Med. Regrowth (M)
Basswood
Catalpa
Gingko
Hackberry
Hickory
Hybrid Maples
Kentucky Coffee Tree
Osage Orange
Red Oaks
White Oaks
Other maples

Slow Regrowth(s)
Buckeye
Dogwood
Red Bud
Sugar maple

Spp. Not to Treat
Bald Cypress
Blackjack oak
Cedar
Fir
Hemlock
Holly
Magonolia
Pine
Post Oak
Spruce
Walnut
Pecan
Fruit

Other Trees Not to Treat
Trees in decline
Obviously stressed trees
Trees side-trimmed with 33% more than min.clearance

Specifications for TGR Application (continued)- Definitions

Spec. Clearance *– Required minimum clearance to be attained at the time of utility line clearing maintenance as defined by Empire District Electric Company's Distribution System Vegetation Management Policy and Procedures Manual dated 3/22/2013 and Transmission Vegetation Management Plan dated 9/20/2011.*

Directional Pruning *– Attitudinal angle of remaining growth of a tree following utility line clearance. The desired result is to have the entire portion of the tree remaining to be growing away from the lines and be outside the minimum required specified clearance near the wire zone*

Wire Zone *– Pertaining to TGR application, wire zone refers to the portion of a tree that due to re-sprout potential on trimmed portions of the crown is in the elevation above ground to be within the minimum required specification clearance at the time of maintenance utility line clearing work.*

Appendix 8

DEFINITIONS

The following words and phrases shall have the definitions set forth below when used in these specifications:
basal treatment - Herbicide application covering the entire stem to approximately 18 inches above the soil.

brush - a woody plant that is manageable by herbicide application due to setting or tree species less than 6 inches DBH, that is not part of an existing tree, and that may reach the conductor at maturity.

brush unit - one square foot of brush-covered ground. A 1,000 square foot pricing unit of brush may consist of partial units scattered throughout the electrical corridor. Brush area shall be measured at the drip line.

brush work – trimming, clearing brush and applying a herbicide to the cut stems, or only applying herbicide to brush.

clearance - the distance between the nearest portion of a tree or other vegetation and the conductors.

coniferous - any of the cone-bearing trees or shrubs, mostly evergreens.

DBH - "diameter at breast height" – the diameter of individual tree trunks or individual stems of brush measured at a point 4.5 feet above the ground.

deciduous - any perennial plant that sheds its leaves annually at the end of a growing season.

demand tree trimming - trimming or removing trees on a customer requested or emergency basis. Also may include tree work associated with line construction projects. This is typically required when trees have grown into the conductors, or are close to the conductors, and have created a potentially dangerous situation. This may also include special trimming or chipping work when requested by EMPIRE. Only EMPIRE authorized representatives may assign customer requested, demand tree work.

directional pruning - a form of natural pruning used to encourage tree regrowth away from the conductor. It is accomplished by removing limbs growing toward the conductors entirely at the branch collar near the trunk of the tree, or by pruning to lateral branches that are at least one-third the diameter of the limb being cut and are growing away from the conductor. (References: Dr. Alex Shigo and/or ANSI A300)

drop-crotching - is a crown reduction technique in which a tree trimmer makes proper pruning cuts at crotches, removing the larger limb and favoring the smaller. For electric line clearance, the trimmer would remove limbs growing toward the conductors and favor those growing away from the conductors. This usually results in a "V" shaped appearance of the tree crown and is frequently referred to as "V-trimming". See definition of "natural pruning" for further description.

evergreen - any plant that retains its leaves/needles year-round.

foliar herbicide application - the application of a herbicide to the leaves or needles of a target plant.

hazard trees - trees that are located off the right of way, have a high probability for failure and are of sufficient height to contact the conductors and/or structures and guy wires if they were to fall in that direction, and should be cleared. Conditions could include but are not limited to the following: Dead, dying or diseased, leaning trees, weak branches, shallow root system, root failure, internal decay, canker or canker root.

herbicide - a chemical pesticide used to control, suppress, or kill plants.

Make-safes – the practice of cutting only the portion of a tree that encroaches beyond air insulation distance as required by NESC for work to be performed by companies not line clearance certified. This work does not include the chipping or removal of the resulting debris and will be performed at the direction of EMPIRE personnel.

mechanical per lineal foot, one side – A pricing unit used to describe pruning solid side wall of trees, on one side of the lines, where it is not practical to designate individual trees and is practical and appropriate to use mechanical tree trimming equipment.

natural pruning - a method by which branches are cut to the branch collar at a suitable parent limb, the trunk of the tree, or an appropriately sized lateral branch. This method of pruning is sometimes called "drop-crotching", "proper pruning", the "Shigo method" or "lateral trimming."

non-mechanical per lineal foot, one side – A pricing unit used to describe pruning solid side wall of trees, on one side of the lines, where it is not practical to designate individual trees and is not practical or appropriate to use mechanical tree trimming equipment.

preventative maintenance - trimming or removing vegetation on a systematic basis typically by, but not limited to, circuit or grid, and in a manner intended to achieve system reliability.

pruning - the removal of dead, dying, diseased, interfering, objectionable, and/or weak branches of trees or shrubs using proper arboricultural techniques.

removal - completely cutting to the ground or as close to the ground as obstructions do not inhibit an entire tree and applying herbicide to the cut stump.

right-of-way - a distribution right-of-way, an easement, a EMPIRE easement, or any other corridor of land paralleling, on both sides, an overhead distribution line, and in respect of which EMPIRE has certain rights.

rounding over - the making of many small cuts so that a tree underneath the conductors is rounded over in a uniform curve. This creates an unhealthy tree condition and results in rapid regrowth directly back toward the electrical conductors. This is not an acceptable practice.

safety zone work – removing all overhang and cutting back limbs to a minimum clearance of 10 feet from the energized conductor.

selective herbicide - a herbicide that, when applied to a mixed population of plants, will control specific species without injury to others.

shearing - the making of many small cuts so that a tree adjacent to the conductors is sheared in a uniform line. This is not a generally acceptable practice.

show-up site – site where CONTRACTOR crews receive work assignments.

side pruning - using natural pruning methods to cut back or removing side branches that are threatening the conductors; required where trees are growing adjacent to conductors.

stump treatment - applying an approved herbicide to the outer ring (cambium) portion of the stump to reduce or eliminate re-growth.

sucker growth - the re-growth within the tree that originates near the cuts made during the previous trimming.

the property - any work site associated with this contract.

topping - cutting back the upper crown of a tree to a uniform horizontal line, leaving multiple stubs. This is an improper and unacceptable trimming technique except where specified to reduce a hazard. Usually applies to make-safes and top and spray applications.

tree - a perennial plant with a woody trunk measuring at least six (6) inches DBH, and having one set of annual rings at ground level or more than one set of annual rings not separated by included bark. Trees that grow adjacent to one another and share an apparent common base completely separated by "included bark" are considered to be distinct trees. "Included bark" is bark that is included within the wood of a tree, or
between the woody stems of separate trees, creating a physical separation between the trees.

tree size classifications - tree diameter as measured at breast height
(DBH): 6" to 11.9", 12" to 17.9", 18" to 23.9", and 24" and greater

tree crown - the upper portion of the tree; the branches or leaf area.

trimming - cutting back tree branches or shrubs to shape or reduce the size of the tree or shrub.

V-trim - using natural pruning methods to cut back large portions of the upper crown of a tree. This is required when trees are located directly beneath a conductor. Also known as crown reduction pruning or drop crotching.

vegetation - all the plant (flora) life in a particular region; a plant community, assemblage, or aggregation with distinguishable characteristics.

SERVICES YOU COUNT ON

Title: Transmission Vegetation Management Program	Revision :G	Author: Scott Mackey 11/12/2013

Approval Signatures and date:

Rick Wallace, Director of System Performance

Martin Penning, Vice President of Commercial Operations

Applicable NERC Standard(s): FAC003-1
Applicable State rules: Missouri PSC Rule 4 CSR 240-23 effective Aug 9, 2008.

Revision	Date	Changes	Approved By
A	7/1/2007	Formalized existing documentation	
B	3/30/08	Annual Review, Added NERC Standards FAC003-1	McGarrah, Palmer
C	3/01/09	Annual Review in conjunction with our new tree trimming contracts.	McGarrah, Palmer
D	12/10/10	Annual Review – No changes	McGarrah, Palmer
E	8/15/2011	Annual Review – addition of clause relating to action steps in the case of property owner refusing access to maintain the facilities. *See Customer Service, Complaints.* ***Added the NERC requirement reference number before the appropriate paragraph in bold italic.*** And misc. document formatting	Wallace, Penning
F	9/20/2011	Better clarify our vegetation management approach for NERC lines.	Wallace, Penning
G	11/12/2013	Revised protocol from Manager of Vegetation Control to Transmission Vegetation Control Coordinator	Wallace, Penning

Index

Objective:

This document is to support continuity in management practices for transmission vegetation control. Empire maintains to be a viable source of reliable electric power in conjunction with other providers on the transmission grid while meeting the needs of its customers. This program shall be guided by qualified personnel as defined by the Human Resources Department's job description for Transmission Vegetation Control Coordinator, under the direction of the Manager of Vegetation Control, and is organized in the Department of System Performance of The Empire District Electric Co.

Practices:

The Department of Vegetation Control is dedicated to the implementation of standards and methods for vegetation management as described in this document. Processes are based on current standard practices for the industry and comply with ANSI A-300, and International Society of Arboriculture. Dr. Alex Shigo's "Pruning Trees near Power Lines" should serve as a quick reference guide.

FAC-003-1 TVMP R1.1

System Vegetation Surveys

Aerial surveys are conducted annually during the fall to enable appropriate action for immediate threats to the transmission facility. The documentation of vegetation on right-of-way is also used as an aid in developing the workplan for the following year. Ground Surveys are to be conducted on lines determined to have potential danger trees threatening reliability due to inclement weather such as major ice storms, flooding, etc.

Vegetation Management Approach

A. NERC regulated lines at 200kV and above (345kV OAM line from Monett 383 sub to Brookline, ending at the Greene County line.)

Complete clearing of the right-of-way for NERC regulated lines will be performed on a six (6) year cycle. Clearing may be conducted by the following work types: mechanical trimmer, mechanical mower, whole tree grinder, bucket trimming crews, manual clearing crews, and herbicide application. The purpose of clearing every six years is to maintain an obvious right-of-way for the lines and structures. This right-of-way serves as a means to access facilities and maintain clearances to full right-of-way specification that will protect conductors from making contact with trees that emerge on that right-of-way. Herbicide application by licensed applicators will be used as determined necessary by

the Transmission Vegetation Control Coordinator or another party as directed by the Manager of Vegetation Control. Herbicide applicators are required to follow all Federal, State, County and other local laws and regulations while performing this work. This work can be performed during any time as deemed necessary from surveys. Surveys may be done during normally scheduled aerial patrol or by ground patrol at another time. Empire District Electric exercises its rights by completely clearing the right-of-way and applying herbicides when needed as a maintenance method to diminish trees growing on the right-of-way.

B. Rural Areas:

Transmission line right-of-way that traverses open or wooded land not a part of a manicured lawn will be maintained, by clearing or spraying intrusive trees and brush as needed, for reliability and access purposes. Trees located outside but that have encroached into the right-of-way will be trimmed back to a proper pruning point at or near the right-of-way edge. Hazard trees off right-of-way should be addressed at the time normal maintenance is conducted in that area. Crews should make the trees safe as this document defines. Trees and brush that are sprayed will not be removed unless deemed necessary by the Transmission Vegetation Control Coordinator for safety or access. Refer to Appendix I for right-of-way specifics for widths.

2. Rural Road-side
Trees under transmission lines running along county road, state road, and interstate highway "fence row areas" should be sprayed with a properly applied herbicide mix that best meets species control needs and state and federal regulations. Trees along these corridors in lawns or other manicured areas (i.e. parks, golf courses, businesses, etc.) should be handled as indicated in the Rural Residential Areas section. Property issues as a result of this work should be handled on a case by case basis by the job coordinator and property owner.

3. Rural Residential Areas
Trees located in residential areas should be trimmed to meet ANSI A300 Standards while adhering to International Society of Arboriculture specifications and meeting Empire's minimum clearance requirements as designated in Appendix II. If the job coordinator determines these requirements cannot be met he/she shall then negotiate for "removal." (For definition of removal refer to Glossary.)

C. Urban and Suburban Areas:

1. Urban/Suburban Nonresidential
Transmission lines running through nonresidential/unimproved Urban and Suburban areas should be maintained clear of trees and brush located under the lines that could

cause outages or impede access to the facility. This condition must be considered with current construction of facility and maximum height and spread of vegetation. Although mechanical and or labor clearing will be used routinely, herbicide use should be considered whenever applicable. Designated right-of-way should be reclaimed and maintained to full width in these areas. However, the minimum needs for right–of-way clearing of woody stem vegetation is ten feet outside the "wire-zone."

2. Urban/Suburban Residential/Commercial
Transmission lines running through residential/commercial areas in a town should be maintained by dealing one on one with each property owner to develop an acceptable solution to each issue on site.

a). Tall or Fast re-growth category trees located or growing directly under the lines should be removed.
b) Shrubs and flowers should not be targeted for removal as they are desirable in such settings.
c) Smaller tree species with slow re-growth potential are generally acceptable under the lines, however if determined by the job coordinator unmanageable with trimming, the trees should he removed.

Note: Factors to consider in determining residential trees as candidates for removal are:

i. public safety
ii. crew safety
iii. cycle reliability
iv. site quality
v. mature tree height and crown spread
vi. conductor height and sag
vii. wind
viii. topography
ix. other variables

Customer Service

A. Notification

A reasonable effort to notify property owners should be made for work to be performed on property that is evidently residential and/or manicured. The normal notification period is 7 to 90 days.

B. Complaints

1. Resulting complaints from work conducted on the transmission system should be forwarded to and resolved by the Transmission Vegetation Control Coordinator. Resolution to these complaints should be held to clearance guidelines in this manual. If the Transmission Vegetation Control Coordinator is not able to reach a resolution with the property owner, the mandated integrity of the system holds precedence and the Transmission Vegetation Control Coordinator will engage the assistance of the local law enforcement to gain the necessary access.

2. All complaints resulting in contractor negligence will be routed through the Transmission Vegetation Control Coordinator to the responsible contractor's supervisor and should be resolved within 14 days. If the complaint is not resolved within 14 days the Transmission Vegetation Control Coordinator may resolve the complaint and the resulting cost will be credited to Empire from the responsible contract company.

Approved Procedures

A. Residential Sites

1. Notification — a reasonable effort should be made to notify owners with yard trees in need of trimming or removal to clear for transmission lines. A standard "notification period" of 7 to 90 days is required. If, due to safety or reliability, the job coordinator declares the vegetation clearing is an emergency situation notification is not necessary. Communication to the property owner should be relayed by the crew that performed the work or the responsible coordinator.

2. Directional Trim — to remove the portion of a tree crown encroaching on or toward utility line while leaving any portion of the crown that will not become an obstruction to the safe delivery of reliable electricity. This trimming shall follow ISA standards on residential sites in an effort to sustain public safety, cyclic conductor clearance, and the health and structural integrity of the tree. As a quick reference guide all crews shall be required to have in their possession and follow "Pruning Trees near Electric Utility Lines" by Dr. Alex Shigo.

3. Removal — to cut a tree down as low to the ground as possible, usually below a three inch stump. If the lower portion of the trunk has any obstruction or foreign object in it that the saw operator sees as a safety risk the final cut may be made above that obstruction.

In either case Empire will not grind out the stump or pay for such services. All slash as defined in "Definition" of this document will be chipped up and hauled off site unless otherwise directed. All Firewood will be cut into 16-24 inch lengths and piled near the stump. The residual stump shall be treated with herbicide in an effort to eliminate sprouting. Empire reserves the right to use work above and beyond these work details as a tool in negotiating tree removals advantageous to the company's needs for safety or reliability.

4. Brush Control — Brush control will vary greatly due to many variables including property owner desires. Whenever possible, herbicides should be used in controlling small brush to limit growth and proliferation. When the use of herbicides is not possible lowering the number of stems on site by cutting brush will be acceptable. All stumps shall be treated with herbicide to limit sprouting.

B. Nonresidential Sites

1. Herbicide Use — Vegetation control by proper use of herbicides is the most cost efficient, effective means of control and impacts the site less than other current available means of vegetation control. Herbicide should be used anywhere applicable on nonresidential sites including cross-country, roadside, clear pasture, hay meadows, cash crop fields, fencerows, wooded areas, and railroad beds. This method should become the primary means of vegetation control where possible to promote a reliable transmission system while helping to promote varying herbaceous, grass, and shrub species for cover and food sources to wildlife.

2. Mechanical Clearing — This means of clearing is to be used where herbicide is a desirable means of management but cannot be used due to varying issue including access limitations, surrounding properties, USFS property, R/W details stating no herbicide use, etc.

3. Labor Clearing — this is a conventional type clearing usable on nearly all type settings and due to the costly nature of this type work should be avoided when other tools are available and appropriate.

Appendix I
EDE Right-of-Way
Specifications for Vegetation Control

Appendix I

Right-of-Way Width Specifications for Vegetation Control

Facility Characteristics	Right-of-Way specifics	
Voltage Construction Type	Each side of facility center	Total width
34.5 kV single pole	**25 feet**	**50 feet**
34.5 kV double pole H-frame	**50 feet**	**100 feet**
69 kV single pole	**25 feet**	**50 feet**
69 kV double pole H-frame	**50 feet**	**100 feet**
161 kV single pole	**35 feet**	**70 feet**
161 kV double pole H-frame	**50 feet**	**100 feet**
345 kV double pole H-frame	**75 feet**	**150 feet**

Appendix II
Residential Tree Trimming Clearances for Transmission Voltage Conductors

Appendix II
Side Trim Clearance Specifications for 34.5kV–69kV lines

Category I (species w/fast re-growth): 20 feet of separation minimum requirement

Silver Maple
Sugar Maple
Hackberry
Mulberry
Locusts
Ailanthus
Cottonwood
Poplars
Sycamore
Willows
Walnut
Elms
Sassafras

Category II (species w/medium re-growth): 16 feet of separation minimum requirement

Red Oaks except Black Jack Oak (pointed lobed leaves)
Pecan
Catalpa
Red Maple
Kentucky Coffee
Bois D' Arc (Osage Orange, hedge)
Hickory
Trees in moderately stressing conditions

Category III (species w/slow re-growth): 12 feet of separation minimum requirement

White Oaks (rounded lobed leaves)
Black Jack Oak
Evergreens
Apples, Pears, and other fruit trees
Ornamental dwarf tree species
Trees in stressing conditions

Side Trim Clearance Specifications for 161kV–345kV lines

Category I (species w/fast re-growth): 30 feet of separation minimum requirement

Silver Maple
Sugar Maple
Hackberry
Mulberry
Locusts
Ailanthus
Cottonwood
Poplars
Sycamore
Willows
Walnut
Elms
Sassafras

Category II (species w/medium re-growth): 25 feet of separation minimum requirement

Red Oaks except Black Jack Oak (pointed lobed leaves)
Pecan
Catalpa
Red Maple
Kentucky Coffee
Bois D' Arc (Osage Orange, hedge)
Hickory
Trees in moderately stressing conditions

Category III (species w/slow re-growth): 20 feet of separation minimum requirement

White Oaks (rounded lobed leaves)
Black Jack Oak
Evergreens
Apples, Pears, and other fruit trees
Ornamental dwarf tree species
Trees in stressing conditions

Additional Notes for Side-Trimming Specifications:

1. Consider that these clearances are based upon 6 years of separation for clearing average sites. Higher quality sites will have need for more clearance. Examples of higher quality sites would be river or creek crossings, drainage areas, and other irrigated type sites such as crop fields, livestock ponds, etc.

2. When right-of-way is defined, full reclamation of that R/W should be cleared. These clearances will be applied primarily to yards or other manicured areas near the right-of-way.

3. Conductor height in relation to mature canopy height may enable lower clearance needs. Trained job coordinating personnel may make this determination.

4. These are minimum re-growth clearance requirements and ISA standards may require more clearance for physiological or structural vegetation integrity.

5. If these clearances for side-trimming are not attainable due to limiting factors the tree becomes a candidate for removal or other means of control. These issues will have to be addressed individually with regard to property owner wishes.

Appendix III
Minimum Vegetation-to-Conductor Separation Distances for Transmission Voltages

Appendix III
Minimum Vegetation-to-Conductor Separation Distances for Transmission Voltages

Reference IEEE Standard 516-2003 page 20, Table-5 MAID w/o tools in the gap (phase to ground)

Voltages in Kilovolts phase to phase	Distances meters	USS conversion in feet
72.5 -- 121	0.75	2.46
138 -- 145	0.9	2.95
161 -- 169	1.05	3.44
230 -- 242	1.57	5.15
345 -- 362	2.88	9.45
500 -- 550	4.48	14.70
765 -- 800	6.24	20.47

Appendix IV
Transmission Danger Tree Response Procedures

Appendix IV
Transmission Danger Tree Response Procedures

In the event that field or other Empire District Electric Co personnel or contractors find that in their assessment a tree or other vegetation poses an imminent threat to the reliability of a transmission voltage circuit by causing damage or coming into contact with a conductor the following steps are required for hazard elimination:

1. The individual on site shall immediately report the information to the appropriate Area Manager.
2. The Area Manager should then assess the condition and scope of the work to determine the capability in his area to deal with the situation and act accordingly.
    a. If in his/her assessment they do not have the appropriate capabilities at his/her disposal for immediate remediation of the situation
        i. A call to the Transmission Vegetation Control Coordinator should be made
        ii. Follow-up documentation by an e-mailed copy of all pertinent information available for quick response to the hazard.
    b. If the Area Manager is able to respond immediately to the hazard only an e-mail of the situation should be sent to the Transmission Vegetation Control Coordinator.
3. Transmission Vegetation Control Coordinator I should follow the procedures above with an assessment on site for other potential threats and appropriate action will be taken.
4. If there is any reason the situation cannot be immediately resolved (such as may be due to accessibility or safety issues) the Transmission Vegetation Control Coordinator shall contact dispatching to inform them of the situation so as to determine necessary steps to avoid an outage by following appropriate system dispatching protocol to avoid an unintended outage.

The purpose of this process is to ensure that all immediate threats to the reliable integrity of the Empire District Electric Co. transmission system are resolved in an efficient manner and documented. Also this can be used as an indicator of many potential areas that may need further attention.

Appendix V
Relay Operations Reporting Procedures

Appendix V
Relay Operations Reporting Procedures

This document contains NERC requirements for reporting relay mis-operations and EDE procedures for gathering information.

The North American Electric Reliability Council (NERC) has issued mandatory reporting requirements concerning mis-operation of protective relaying equipment. Transmission owners must file a report quarterly showing any mis-operation, what the cause was for it, and any remedial action taken to fix it. This is in addition to other requirements for documentation of relay testing procedures, schedule for testing, and date tested.

To meet this requirement, EDE will use the following procedure to monitor and document relay operations.

1. System Operations will monitor the transmission system for any switch or breaker operations at 34kV and above. The list of operations will be sent (Faxed) daily to the Manager of Substation Operations for each operating area and also to Protection & Planning Engineering.

2. It is the responsibility of the Manager of Substation Operations for each area to direct field personnel to gather relay target information, as soon as practical, from substations in their area for operations listed as well as any other system devices that may be involved.
   (Note: Where operations may involve equipment in another area, the Manager should coordinate with the Manager for that area to ensure information is obtained.)

3. Relay information will be provided to Protection & Planning Engineering by entering the required data using a PC, into a database form provided by Engineering or by hard copy form if electronic means are unavailable.

4. Outages suspected to have been caused by vegetation will be reported to the Vegetation Management Department by System Protection and Planning Engineering for notification about and confirmation of possible vegetation outages.

5. Protection & Planning Engineering will track all vegetation outages defined as reportable by Southwest Power Pool and will submit this information to SPP on a quarterly basis.

6. Protection & Planning Engineering will analyze the outage data obtained for mis-operations, check coordination settings, etc. and flag any problems.

7. The System Relay Technicians will investigate any mis-operations and report findings to Protection & Planning Engineering for inclusion in the database.

8. Reports will be prepared and sent to Southwest Power Pool and appropriate personnel within EDE.

Appendix VI
Definitions

Appendix VI
Definitions

ANSI A300 Standards - A set of standards for tree trimmers pertaining to safety and tree care published by the American National Standards Institute.
Brush — **a.** Woody stem vegetation declared brush by species designation. **b.** Trees smaller than six inches DBH. **c.** Any vegetation at a height and in a setting manageable by machinery or through herbicide application.
DBH -Diameter at Breast Height, 4 1/2 feet above ground level on the uphill side of a tree.
Firewood — All debris resulting from utility line clearing that cannot be chipped by a utility line clearance contractor's average chipper.
IEEE Standard 516-2003 — A reference established by the Institute of Electrical and Electronics Engineers pertaining to maintenance of electrical systems.
ISA - International Society of Arboriculture — a professional group that researches and addresses current tree care practices including needs pertaining to line-clearance work.
Job Coordinator — The individual responsible for notifying property owners and quality control of tree clearing work conducted on rights-of-way.
Make Safe — Cutting down or trimming to a level that is safe for the property owner to have a professional tree trimming company trim or remove the rest of the tree and brush. All resulting debris will be left on site. NESC requires 10 feet if voltage is lower than 50kV.
Qualified Personnel — The manager of Vegetation Control is the position that defines qualified personnel and qualifications are defined in the job description as having a B.S. in Forestry or a closely related field and at least four years experience in electric utility vegetation management.
Notification Period — The amount of time between the date a customer was left notice of tree clearing work on their property to the date work is performed on that site.
Removal - A tree that should be cut down rather than trimmed. Stumps and wood will be left on site. Slash will be chipped onto the site or hauled off.
R/W — Right-of-way — the corridor through which Empire's facility traverses public and private properties.
Stump — The remaining intact portion of a removal.
Slash — **a.** Forestry term describing the un-merchantable portion of a tree as a result of removal i.e. limbs, leaves, twigs, etc. **b.** All debris resulting from a removal that can be chipped up by tree crews.
Transmission Lines — Empire facility conducting electricity ranging from 34.5kV to 345kV.
Transmission Vegetation Outages — Outages on 34.5kV to 345kV lines caused by vegetation coming in contact with conductors or causing damage to transmission facility. (For details on reporting outages refer to Appendix V of this document.)
Wire-Zone — The right-of-way area located directly under the conductors.

SERVICES YOU COUNT ON

Title: NERC Transmission Program	Revision :B	Author: Jason Grossman 10-2-15

Approval Signatures and date:

John D. Donaldson

John Donaldson, Director of System Performance

Brent A. Baker

Brent Baker, Vice President of Customer Service, Transmission and Engineering

Applicable NERC Standard(s): FAC003-3

Revision	Date	Changes	Approved By
A	6-23-14	Formalized existing documentation for FAC 003-3	John Donaldson Martin Penning
B	10-2-15	Revised MVCD calculations and table. Added Sway calculations table (Appendix III)	John Donaldson Brent Baker

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NERC Transmission Program

R1 & R2. Purpose (FAC-003-03 R1 & R2)

This Document provides strategies and goals to reduce the risk of vegetation related outages on NERC regulated lines. Strategies lined out in this document are designed to manage vegetation to distances beyond the Minimum Vegetation Clearance Distance (MVCD) to ensure no encroachment into the MVCD. The MVCD is defined by FAC-003-3, Table 2 (see Appendix I). Empire District Electric Company (EDE) will provide evidence that it managed vegetation to prevent encroachment into the MVCD (See M3).

EDE does not currently have any lines that fall under FAC-003-3 R1.

R3. Vegetation Management Strategy (FAC-003-03 R3)

EDE will manage all vegetation with potential growth into the MVCD (Appendix I) to the full width of the Right Of Way (ROW) on a six year cycle. Annual inspections will be used to monitor the conditions on and off the ROW. Any Vegetation observed that presents an elevated risk of encroachment into the MVCD prior to the subsequent cycle shall be addressed appropriately and documented for record keeping (See Annual Vegetation Work Plan for more details). Conditions to be considered for an elevated risk of encroachment will take into account sag of the lines (Appendix II), sway of the lines (Appendix III), vegetation growth rates, frequency of inspections and control methods. EDE will use an Integrated Vegetation Management approach including but not limited to: mechanical trimming, mechanical mowing, conventional bucket crews, tree growth regulators and herbicide applications. Resources will be allocated as determined by the Transmission Vegetation Control Coordinator.

Violation Response Procedure

R4. Potential Fault Caused by Vegetation (FAC-003-03 R4)

If EDE confirms a vegetation condition that is likely to cause a Fault at any moment, the individual on site shall contact E.D.E. dispatching who will notify the control centers of City Utilities of Springfield and/or AEP that holds the switching authority for the 345kV line, immediately and without delay to inform them of the situation and to determine necessary steps to avoid an unintended outage. A follow up email shall be sent to the Area Manager and the Transmission Vegetation Control Coordinator with all pertinent information. Documentation of the notification shall be retained for records. Appropriate resources will be redirected to mitigate the condition once the situation is deemed safe. The Transmission Vegetation Control Coordinator will assess the site for other potential threats with the appropriate remediation actions taken.

R5 Known Potential Fault (FAC-003-03 R5)

In the event EDE is constrained from performing vegetation management that could lead to an encroachment into the MVCD prior to the subsequent cycle, the Transmission Vegetation Control Coordinator shall be made aware of the condition by phone with a follow up email detailing the situation. If the condition cannot be remediated through conventional means with the property owner, documentation of the constraint shall be made for records and an alternative path of remediation shall be pursued up to and including de-rating of the line through engineering and System Operations Department. All ensuing constraints shall also be documented until the situation is resolved with the risk reduced to an acceptable level. If EDE is unable to clear to the full width of the ROW, trees will be trimmed to clearances listed in Appendix III.

R6. Vegetation Inspection Frequency (FAC-003-03 R6)

EDE will conduct an annual Aerial Patrol of the applicable transmission lines once per calendar year with less than 18 months in between patrols. A work plan will be generated as verification of patrol, even in the absence of any encroaching vegetation.

Ground Patrols will be conducted on all lines scheduled for maintenance and on an as needed basis determined by the Transmission Vegetation Control Coordinator. In the event that the Aerial Patrol is unable to complete 100% of the inspection, a ground survey will be scheduled to complete the remainder of the applicable lines.

R7. Annual Vegetation Work Plans (FAC-003-03 R7)

Annual Work plans for vegetation shall be generated based on the Aerial Patrol and/or any ground Patrols. A thorough ground inspection shall be conducted during the scheduled maintenance cycle. 100% of the Annual Work Plan shall be completed within the year it is generated to ensure no vegetation encroaches into the MVCD. Any modifications in response to changing conditions will be documented and a final Amended Vegetation Work Plan will be kept for documentation.

Appendix I

Minimum Vegetation Clearance Distance

Nominal AC System Voltage (kV)	MVCD at 1.0 Gap Factor (feet)														
	Sea Level up to 500 ft	Over 500 ft up to 1,000 ft	Over 1,000 ft up to 2,000 ft	Over 2,000 ft up to 3,000 ft	Over 3,000 ft up to 4,000 ft	Over 4,000 ft up to 5,000 ft	Over 5,000 ft up to 6,000 ft	Over 6,000 ft up to 7,000 ft	Over 7,000 ft up to 8,000 ft	Over 8,000 ft up to 9,000 ft	Over 9,000 ft up to 10,000 ft	Over 10,000 ft up to 11,000 ft	Over 11,000 ft up to 12,000 ft	Over 12,000 ft up to 13,000 ft	Over 13,000 ft up to 14,000 ft
765	11.6	11.7	11.9	12.1	12.2	12.4	12.6	12.8	13.0	13.1	13.3	13.5	13.7	13.9	14.0
500	7.0	7.1	7.2	7.4	7.5	7.6	7.8	7.9	8.1	8.2	8.3	8.5	8.6	8.8	8.9
345	4.3	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6
287	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.1	6.2	6.3	6.4	6.5	6.6	6.7
230	4.0	4.1	4.2	4.3	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3
161	2.7	2.7	2.8	2.9	2.9	3.0	3.0	3.1	3.2	3.3	3.3	3.4	3.5	3.6	3.6
138	2.3	2.3	2.4	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.8	2.9	3.0	3.0	3.1
115	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6
88	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1
69	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5

Table 1 – Table of MVCD values at a 1.0 gap factor (in U.S. customary units)

For the 345kV line, EDE operates between 1000-2000ft above Sea Level. At this altitude the MVCD is **4.4 ft.**

Appendix II

Sag Calculations

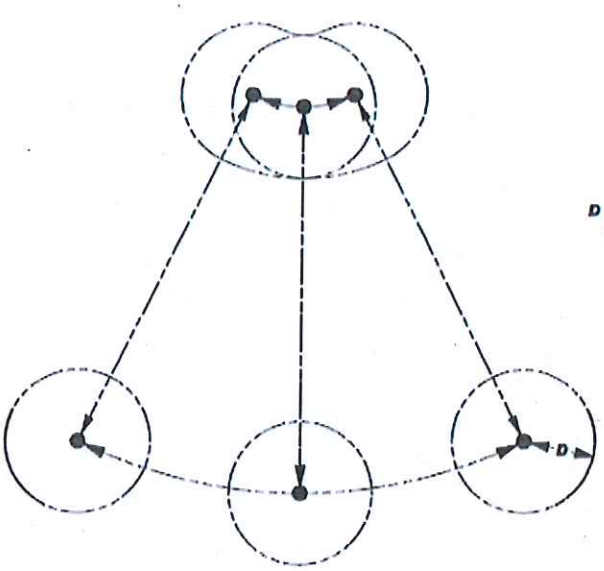

Figure 1

Sag*= ((Span Length ft^2)/(892 ft^2) x 25.21ft

** measured at 167^{O}F, the sag for an 892ft conductor was 25.21ft*

Appendix III

Sway Calculations for maximum Sag on 345kV

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
AEC322	EDE1	737	47.17	4.4	51.57			
EDE1	EDE2	1037	59.62	4.4	64.02			
EDE2	EDE3	877	49.31	4.4	53.71			
EDE3	EDE4	670	41.14	4.4	45.54			
EDE4	EDE5	801	49.29	4.4	53.69			
EDE5	EDE6	713	43.85	4.4	48.25			
EDE6	EDE7	720	44.31	4.4	48.71			
EDE7	EDE8	969	57.03	4.4	61.43			
EDE8	EDE9	679	46.41	4.4	50.81			
EDE9	EDE10	670	45.01	4.4	49.41			
EDE10	EDE11	635	43.81	4.4	48.21			
EDE11	EDE12	864	50.12	4.4	54.52			
EDE12	EDE13	766	46.08	4.4	50.48			
EDE13	EDE14	901	53.44	4.4	57.84			
EDE14	EDE15	885	52.95	4.4	57.35			
EDE15	EDE16	930	54.8	4.4	59.2			
EDE16	EDE17	732	47.36	4.4	51.76			
EDE17	EDE18	936	55.46	4.4	59.86			
EDE18	EDE19	904	54.4	4.4	58.8			
EDE19	EDE20	647	42.69	4.4	47.09			
EDE20	EDE21	753	45.95	4.4	50.35			
EDE21	EDE22	875	52.78	4.4	57.18			
EDE22	EDE23	790	49.08	4.4	53.48			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE23	EDE24	788	49.58	4.4	53.98			
EDE24	EDE25	949	56.31	4.4	60.71			
EDE25	EDE26	759	47.84	4.4	52.24			
EDE26	EDE27	908	53.74	4.4	58.14			
EDE27	EDE28	882	53.39	4.4	57.79			
EDE28	EDE29	853	51.98	4.4	56.38			
EDE29	EDE30	915	54.45	4.4	58.85			
EDE30	EDE31	739	47.72	4.4	52.12			
EDE31	EDE32	876	52.45	4.4	56.85			
EDE32	EDE33	745	47.46	4.4	51.86			
EDE33	EDE34	923	54.44	4.4	58.84			
EDE34	EDE35	813	50.48	4.4	54.88			
EDE35	EDE36	763	48.84	4.4	53.24			
EDE36	EDE37	852	51.48	4.4	55.88			
EDE37	EDE38	1022	58.92	4.4	63.32			
EDE38	EDE39	914	54.7	4.4	59.1			
EDE39	EDE40	934	55.78	4.4	60.18			
EDE40	EDE41	720	45.79	4.4	50.19			
EDE41	EDE42	505	37.65	4.4	42.05			
EDE42	EDE43	631	41.96	4.4	46.36			
EDE43	EDE44	915	54.44	4.4	58.84			
EDE44	EDE45	820	51.1	4.4	55.5			
EDE45	EDE46	766	49.23	4.4	53.63			
EDE46	EDE47	1054	61.18	4.4	65.58			
EDE47	EDE48	544	41.26	4.4	45.66			
EDE48	EDE49	1054	59.76	4.4	64.16			
EDE49	EDE50	738	47.53	4.4	51.93			
EDE50	EDE51	828	50.84	4.4	55.24			
EDE51	EDE52	834	51.08	4.4	55.48			
EDE52	EDE53	900	54.03	4.4	58.43			
EDE53	EDE54	900	53.84	4.4	58.24			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE54	EDE55	800	49.93	4.4	54.33			
EDE55	EDE56	752	48.2	4.4	52.6			
EDE56	EDE57	813	50.72	4.4	55.12			
EDE57	EDE58	954	56	4.4	60.4			
EDE58	EDE59	381	38.13	4.4	42.53			
EDE59	EDE60	925	50.8	4.4	55.2			
EDE60	EDE61	680	41.7	4.4	46.1			
EDE61	EDE62	989	57.6	4.4	62			
EDE62	EDE63	730	47.14	4.4	51.54			
EDE63	EDE64	1170	66.84	4.4	71.24			
EDE64	EDE65	800	50.05	4.4	54.45			
EDE65	EDE66	526	41.47	4.4	45.87			
EDE66	EDE67	1000	58	4.4	62.4			
EDE67	EDE68	900	53.38	4.4	57.78			
EDE68	EDE69	956	56.22	4.4	60.62			
EDE69	EDE70	960	56.51	4.4	60.91			
EDE70	EDE71	718	46.89	4.4	51.29			
EDE71	EDE72	942	55.39	4.4	59.79			
EDE72	EDE73	900	53.69	4.4	58.09			
EDE73	EDE74	851	51.53	4.4	55.93			
EDE74	EDE75	885	53.1	4.4	57.5			
EDE75	EDE76	1094	62.42	4.4	66.82			
EDE76	EDE77	833	47.4	4.4	51.8			
EDE77	EDE78	769	45.13	4.4	49.53			
EDE78	EDE79	945	55.35	4.4	59.75			
EDE79	EDE80	944	55.69	4.4	60.09			
EDE80	EDE81	756	48.19	4.4	52.59			
EDE81	EDE82	804	50.1	4.4	54.5			
EDE82	EDE83	1206	68.72	4.4	73.12			
EDE83	EDE84	948	55.56	4.4	59.96			
EDE84	EDE85	816	50.4	4.4	54.8			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE85	EDE86	848	51.72	4.4	56.12			
EDE86	EDE87	830	50.97	4.4	55.37			
EDE87	EDE88	821	50.67	4.4	55.07			
EDE88	EDE89	814	50.49	4.4	54.89			
EDE89	EDE90	900	53.72	4.4	58.12			
EDE90	EDE91	821	50.8	4.4	55.2			
EDE91	EDE92	744	47.48	4.4	51.88			
EDE92	EDE93	840	51.06	4.4	55.46			
EDE93	EDE94	866	52.09	4.4	56.49			
EDE94	EDE95	912	50.64	4.4	55.04			
EDE95	EDE96	721	43.37	4.4	47.77			
EDE96	EDE96A	422	39.1	4.4	43.5			
EDE96A	EDE97	508	41.57	4.4	45.97			
EDE97	EDE98	830	50.93	4.4	55.33			
EDE98	EDE99	651	44.32	4.4	48.72			
EDE99	EDE100	933	55.4	4.4	59.8			
EDE100	EDE101	867	53.01	4.4	57.41			
EDE101	EDE102	798	50.02	4.4	54.42			
EDE102	EDE103	1066	60.44	4.4	64.84			
EDE103	EDE104	554	41.16	4.4	45.56			
EDE104	EDE105	598	43.9	4.4	48.3			
EDE105	EDE106	1360	78.33	4.4	82.73	78	484	495
EDE106	EDE107	641	44.25	4.4	48.65			
EDE107	EDE108	1398	76.49	4.4	80.89	85	541	594
EDE108	EDE109	671	42.52	4.4	46.92			
EDE109	EDE110	600	43.66	4.4	48.06			
EDE110	EDE111	707	46.67	4.4	51.07			
EDE111	EDE112	1069	61.57	4.4	65.97			
EDE112	EDE113	880	52.72	4.4	57.12			
EDE113	EDE114	584	42.71	4.4	47.11			
EDE114	EDE115	906	54.42	4.4	58.82			

Start Structure Number	End Structure Number	Span (ft)	Max Blowout Offset from Centerline (79.1 mph)	Minimum Vegetation Clearance Distance (ft)	TOTAL (ft)	Height of Conductor above Centerline Elevation at Lowest Point of Sag (ft)	Distance from start Structure where Conductor exits ROW (ft)	Distance from End Structure where Conductor exits ROW (ft)
EDE115	EDE116	904	53.81	4.4	58.21			
EDE116	EDE117	704	45.43	4.4	49.83			
EDE117	EDE118	922	54.72	4.4	59.12			
EDE118	EDE119	1398	81.3	4.4	85.7	83	443	438
EDE119	EDE120	650	44.53	4.4	48.93			
EDE120	EDE121	300	35.11	4.4	39.51			
EDE121	EDE122	948	55.27	4.4	59.67			
EDE122	EDE123	1403	81.6	4.4	86	72	434	434
EDE123	EDE124	764	48.64	4.4	53.04			
EDE124	EDE125	908	53.1	4.4	57.5			
EDE125	EDE126	675	45.43	4.4	49.83			
EDE126	EDE127	736	47.75	4.4	52.15			
EDE127	EDE128	1015	58.95	4.4	63.35			
EDE128	EDE129	348	37.71	4.4	42.11			
EDE129	EDE130	1142	64.77	4.4	69.17			
EDE130	EDE131	926	54.98	4.4	59.38			
EDE131	EDE132	831	50.96	4.4	55.36			
EDE132	EDE133	452	39.81	4.4	44.21			
EDE133	EDE134	1084	62.33	4.4	66.73			
EDE134	EDE135	496	39.51	4.4	43.91			
EDE135	EDE136	472	39.09	4.4	43.49			
EDE136	EDE137	975	51.19	4.4	55.59			
EDE137	EDE138	1042	53.86	4.4	58.26			
EDE138	CU Line	682	41.76	4.4	46.16			