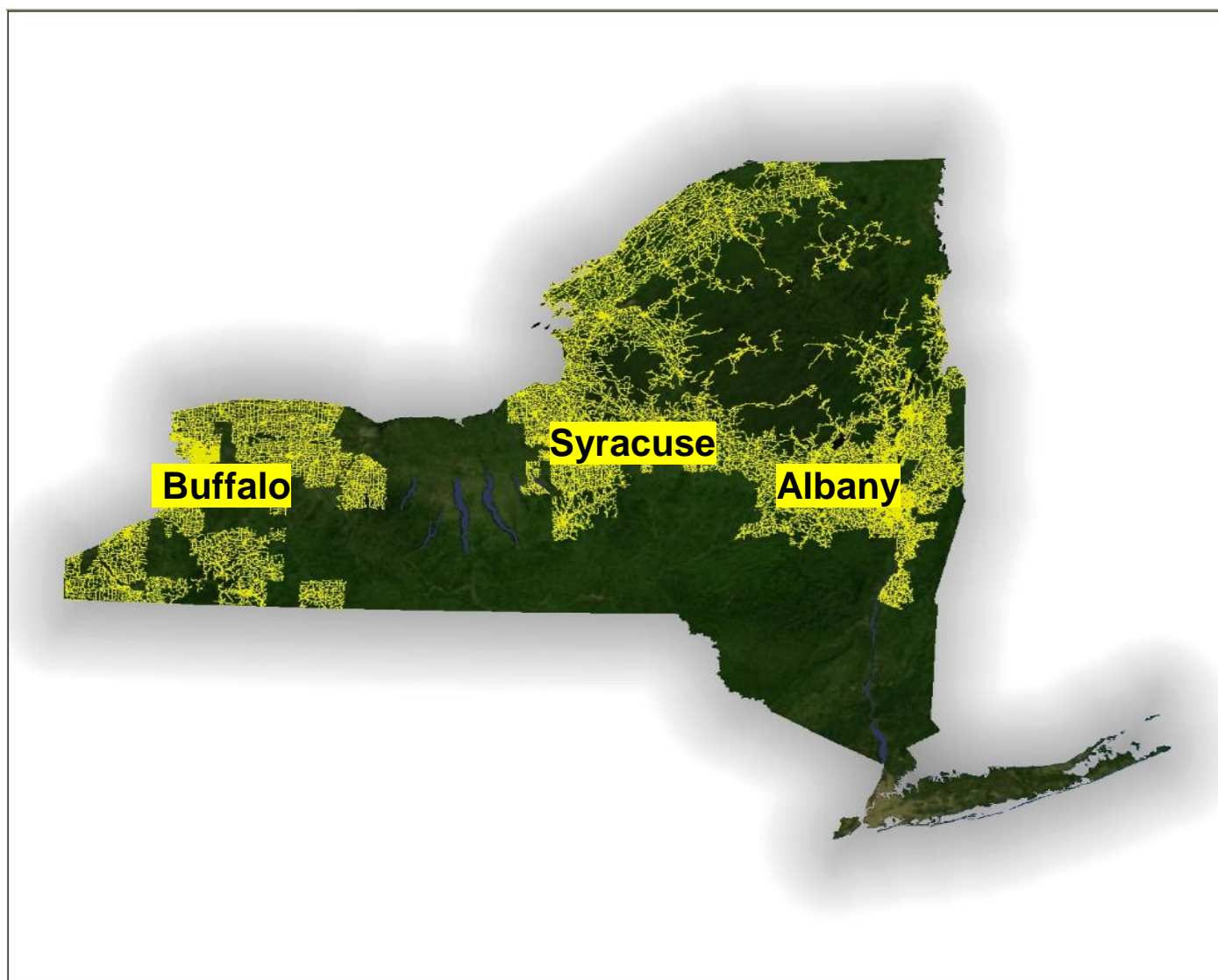




ANNUAL ELECTRIC RELIABILITY REPORT



ANNUAL ELECTRIC RELIABILITY REPORT FOR 2016
PSC CASE #17-E-0164



ANNUAL ELECTRIC RELIABILITY REPORT for 2016

Required By:

PSC CASES 02-E-1240, 15-E-0179, and 17-E-0164

Prepared By:

**Customer Reliability and
Electric Distribution Planning & Engineering
MARCH 2017**

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ANNUAL ELECTRIC RELIABILITY REPORT for 2016

Introduction

Enclosed is the Niagara Mohawk Power Corporation d/b/a National Grid (“National Grid” or “Company”) Annual Electric Reliability Report for 2016. This report has been prepared based on National Grid’s electric service to New York customers for the year ended December 31, 2016, in compliance with New York State Public Service Commission (“PSC”) Cases 02-E-1240, 15-E-0179 and 17-E-0164.

National Grid met both reliability targets System Average Interruption Frequency Index (“SAIFI”) and Customer Average Interruption Duration Index (“CAIDI”) in 2016, and as a result, no penalties were incurred.

This report reviews the reliability metrics at both the system-wide and regional levels, with analyses broken down by causes and circuits. The report includes a detailed analysis for any circuit that was among the top 5% worst performing distribution circuits in 2016. For any region where the SAIFI or CAIDI reliability metric did not meet the PSC target, we also include a detailed analysis of the factors that contributed to the below-target performance and a description of our plan to improve performance. Information on the major storms of 2016 is also included in the report.

National Grid continues its efforts to maintain reliability. This report includes a description of the Company’s Reliability Programs, Inspection and Maintenance, and Vegetation Management Programs. We have included a summary of expenditures and information regarding the composition of our work force as requested by Department of Public Service (“DPS”) Staff.

A. SUMMARY OF PERFORMANCE AND COMMENTS

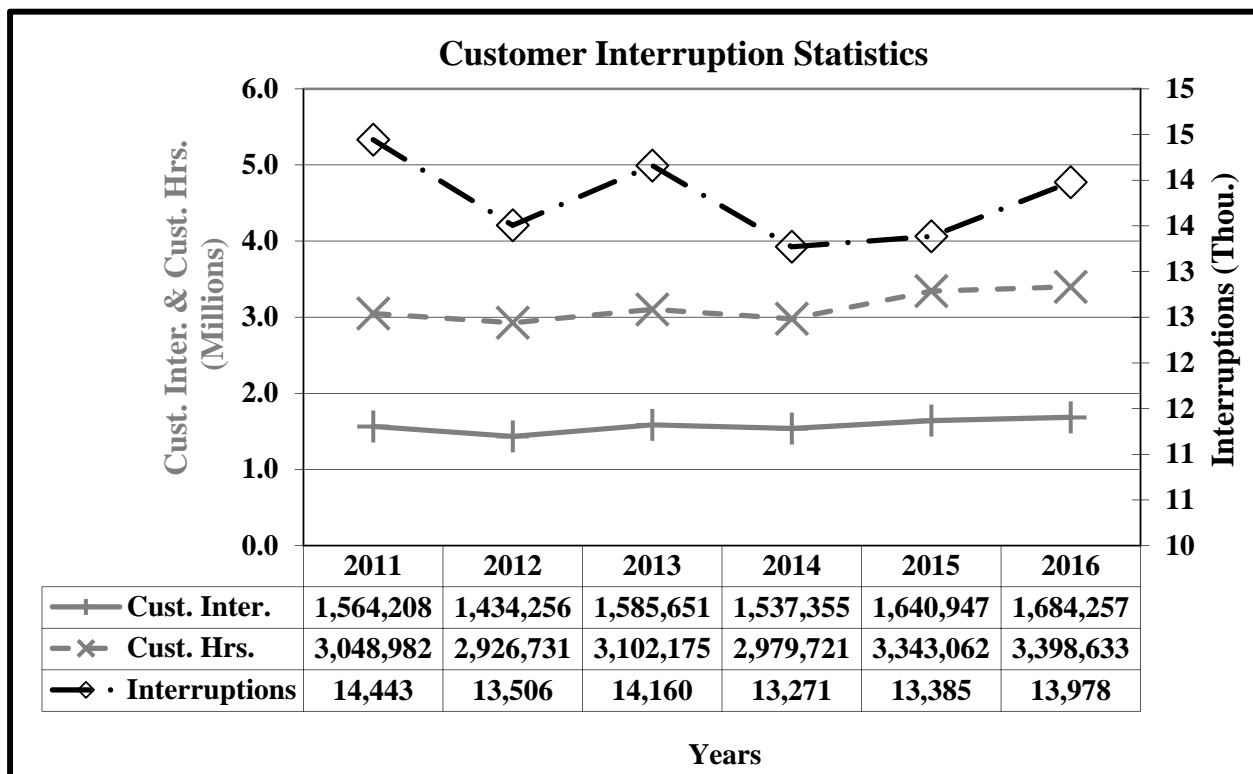
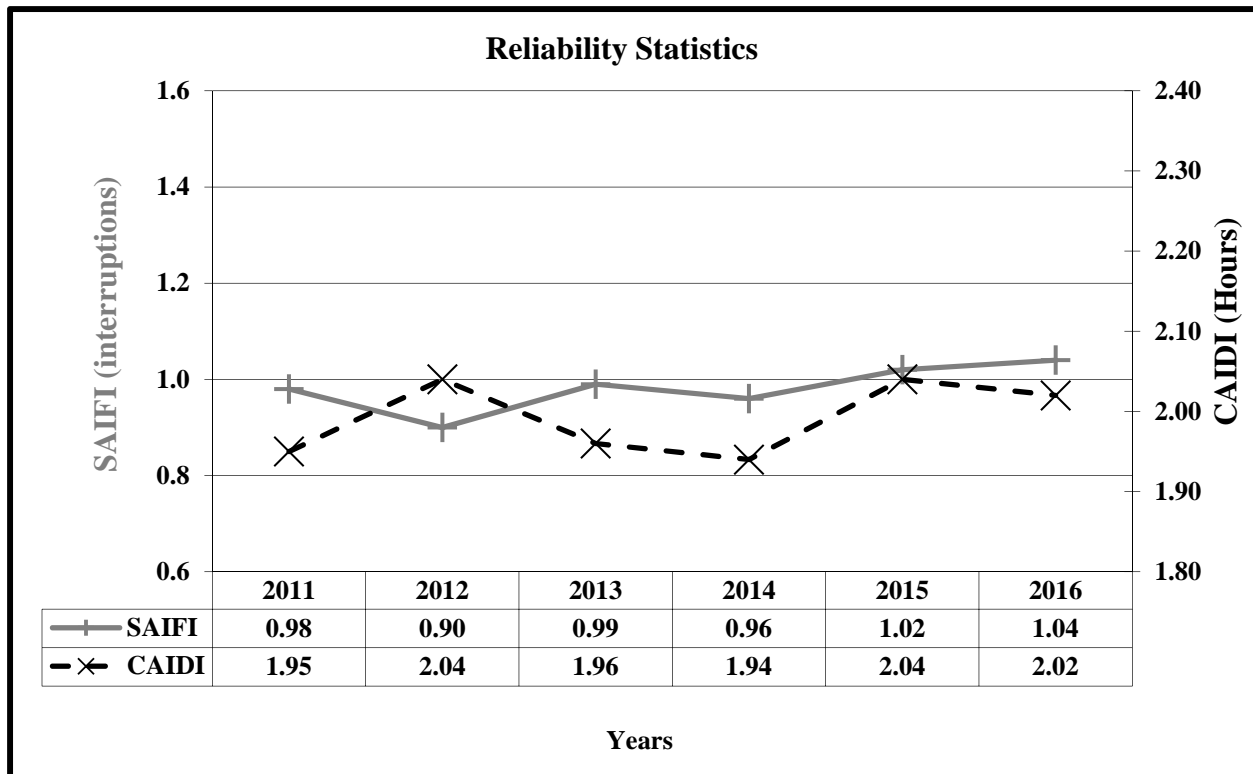
1. CORPORATE SAIFI AND CAIDI

The Company successfully met the Customer Average Interruption Duration Index (CAIDI) metric for the eleventh consecutive year, with a value 2.02 hours. This is 1% below the target of 2.05 hours and is 2% above the 5-year average.

The Company also successfully met the System Average Interruption Frequency Index (SAIFI) target for the ninth consecutive year, with a value of 1.04. This is 8% below the target of 1.13 and 7% above the 5 year average.

The number of interruptions excluding major storms was 4% above the 2015 result and was 2% above the 5-year average. The number of customers interrupted was 3% above the 2015 result and 8% above the 5-year average. The duration of customers interrupted (Customer-Hours Interrupted) was 2% above the 2015 result and was 10% above the 5-year average.

	2016	2015	2014	2013	2012	2011
CAIDI Target: 2.05	2.02	2.04	1.94	1.96	2.04	1.95
SAIFI Target: 1.13	1.04	1.02	0.96	0.99	0.90	0.98
SAIDI	2.11	2.08	1.86	1.93	1.83	1.91
Interruptions	13,978	13,385	13,271	14,160	13,506	14,443
Customers Interrupted	1,684,257	1,640,947	1,537,355	1,585,651	1,434,256	1,564,208
Customer-Hours Interrupted	3,398,633	3,343,062	2,979,721	3,102,175	2,926,731	3,048,982
Customers Served	1,614,496	1,605,794	1,604,865	1,605,502	1,600,014	1,597,998
Customers per Interruption	120.49	122.60	115.84	111.98	106.19	108.30
Availability Index	99.9760	99.9762	99.9788	99.9779	99.9791	99.9782
Interruptions/1000 Customers	8.66	8.34	8.27	8.82	8.44	9.04



2. CAIDI AND SAIFI BY REGION

The tables below illustrate CAIDI and SAIFI performance for each region. Data from 2011 through 2016 is derived from the Interruption and Disturbance System (IDS).

CAIDI performance met PSC targets in 5 of 8 regions. The customers in the Southwest region experienced the most improvement, with a 23% decrease as compared to 2015. The customers in the Capital, Genesee, and Northeast regions also showed improvement in CAIDI from 2015.

The customers in the Frontier, Northeast, and Southwest regions experienced CAIDI performances that did not meet the PSC targets.

SAIFI performance met PSC targets in 2 of 8 regions. Customers in the Genesee region experienced the most improvement with a 37% decrease from 2015. The customers in the Central, Northeast, and Northern regions also showed improvement in SAIFI from 2015.

Customers in the Capital, Central, Mohawk Valley, Northeast, Northern, and Southwest regions experienced SAIFI performance that did not meet the PSC targets.

CAIDI (IDS data)

Region	2016 Target	2016 Actual	2015 Actual	2014 Actual	2013 Actual	2012 Actual	2011 Actual
Capital	2.00	1.86	1.90	2.04*	2.01*	1.78	1.76
Central	2.00	1.86	1.83	1.62	1.84	1.96	1.83
Frontier	1.75	1.85*	1.73	1.74	1.74	1.74	1.81*
Genesee	2.00	1.62	1.98	1.96	1.96	2.22*	1.90
Mohawk Valley	2.50	1.94	1.87	2.21	1.93	2.05	2.20
Northeast	2.50	2.83*	3.00*	2.10	2.23	2.49	2.04
Northern	2.25	1.87	1.51	2.13	1.78	2.08	2.50*
Southwest	1.75	1.91*	2.47*	1.91*	2.02*	1.79*	1.81*

SAIFI (IDS data)

Region	2016 Target	2016 Actual	2015 Actual	2014 Actual	2013 Actual	2012 Actual	2011 Actual
Capital	0.90	1.01*	0.99*	0.83	1.02*	0.72	1.06*
Central	1.00	1.12*	1.19*	1.26*	0.90	1.10*	1.11*
Frontier	0.60	0.47	0.46	0.44	0.45	0.38	0.45
Genesee	1.00	0.70	1.11*	0.96	1.01*	1.19*	0.92
Mohawk Valley	1.20	2.03*	1.24*	1.12	1.24*	1.03	1.30*
Northeast	1.20	1.21*	1.25*	1.36*	1.28*	1.23*	1.09
Northern	1.00	1.35*	1.50*	1.06*	1.47*	1.13*	1.05*
Southwest	1.00	1.01*	0.94	0.96	1.21*	1.01*	1.31*

Note: The numbers in these tables are based on data that excludes major storm events. An asterisk (*) indicates that the region fell short of the PSC target for the region as specified in Attachment 1 of the Public Service Commission's Order Adopting Changes to Standards on Reliability of Electric Service [Case 02-E-1240 and 02-E-1701], issued and effective October 12, 2004.

3. PSC CAUSE CODE ANALYSIS

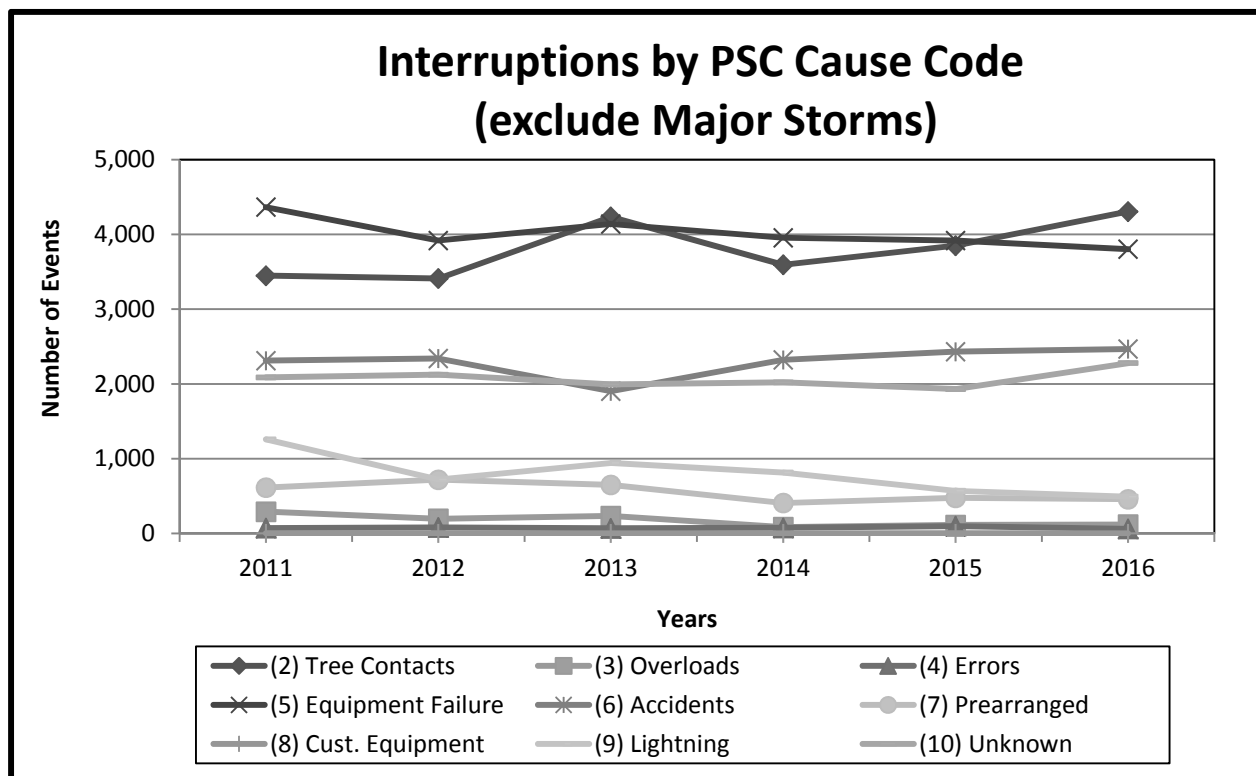
As illustrated in the table below, overall interruptions including major storms increased 17% in 2016 as compared to 2015. There was a large decrease in Operator Error interruptions and an increase in Unknown interruptions. Overall, the 17% increase can be attributed to the large increase in Tree-related events from 2015 to 2016.

Excluding Cause Code (1) Major Storms, the number of interruptions increased 4% from 2015. The top three contributors were (2) Tree Contacts at 31%, (5) Equipment Failure at 27%, and (6) Accidents at 18%.

During the past several years, National Grid has worked with DPS staff to enhance its vegetation management program. However, in 2016, (2) Tree Contacts increased by 12% from 2015, the number of customers interrupted (CI) increased by 20%, and customer-hours increased by 34%. CAIDI, due to tree contact, increased 11% in 2016 as compared to 2015. The results this year can be attributed to minor storm events that did not result in Major Storm Exclusions and also an increase in adverse weather.

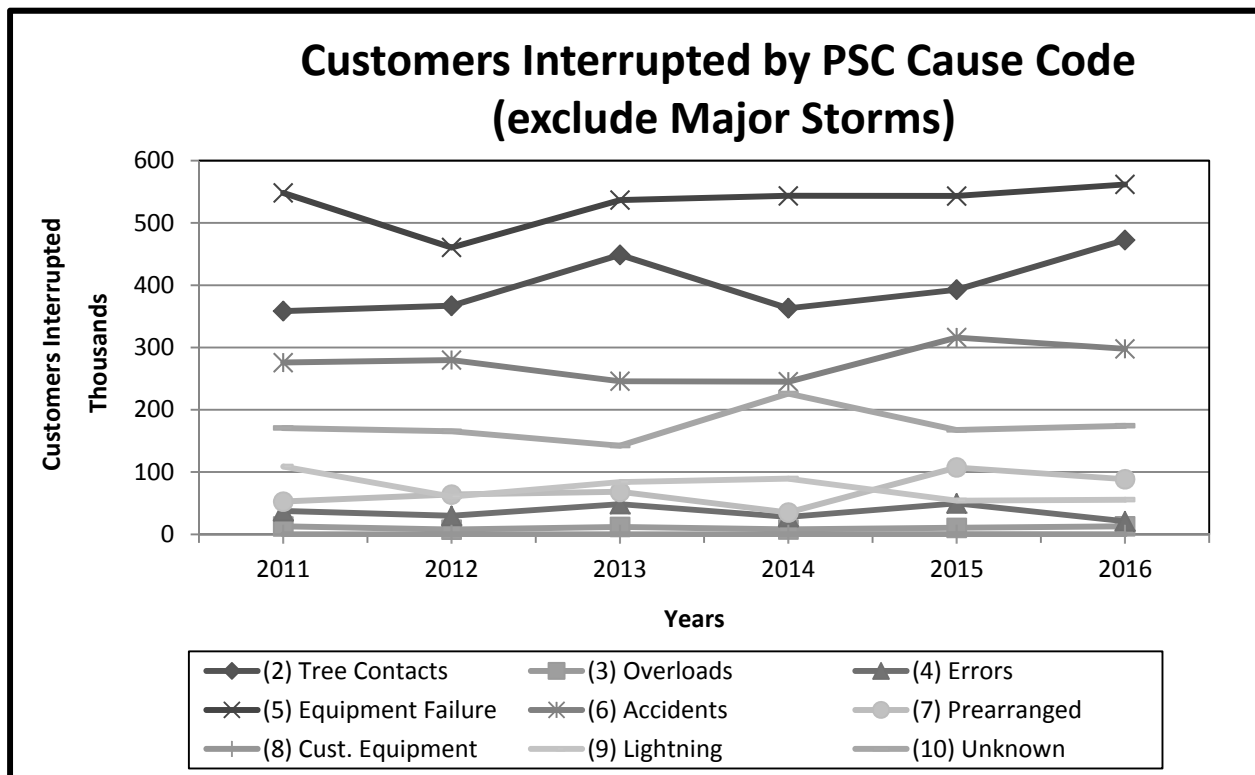
NUMBER OF INTERRUPTIONS BY CAUSE CODE

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	2,126	404	3,106	4,909	2,934	6,439
02 Tree Contacts	4,306	3,850	3,594	4,234	3,410	3,448
03 Overloads	118	113	85	233	195	290
04 Errors	60	97	74	68	79	71
05 Equipment Failure	3,802	3,918	3,955	4,139	3,919	4,365
06 Accidents	2,466	2,431	2,322	1,902	2,340	2,311
07 Prearranged	457	475	407	649	718	612
08 Customer Equipment	0	1	0	0	1	1
09 Lightning	491	570	814	942	721	1,258
10 Unknown	2,278	1,930	2,020	1,993	2,123	2,086
Totals	16,104	13,789	16,377	19,069	16,440	20,881



CUSTOMERS INTERRUPTED BY CAUSE CODE

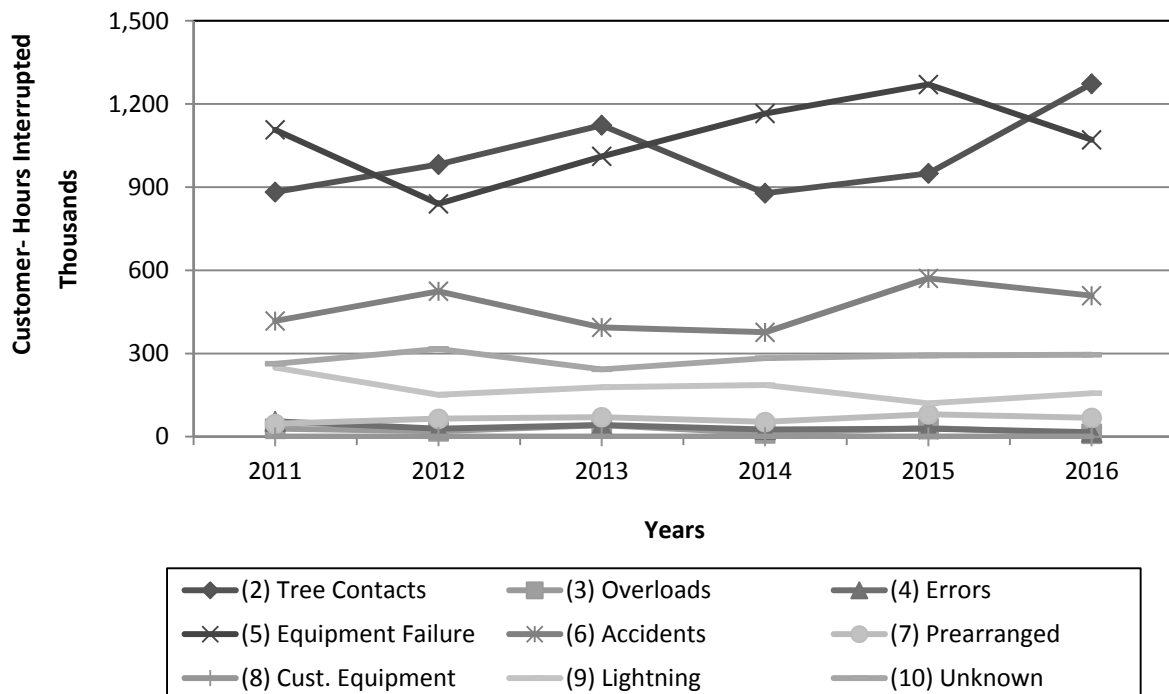
Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	222,113	70,903	336,656	646,535	370,246	799,555
02 Tree Contacts	472,561	392,737	362,901	448,579	366,956	358,380
03 Overloads	12,860	10,406	7,871	11,793	7,540	12,725
04 Errors	20,956	49,657	27,847	48,528	29,657	37,356
05 Equipment Failure	561,756	543,094	543,381	536,549	460,622	548,180
06 Accidents	297,890	315,907	244,993	245,767	279,757	275,710
07 Prearranged	88,530	107,376	35,090	68,129	63,808	52,469
08 Customer Equipment	0	158	0	0	3	10
09 Lightning	55,528	54,147	89,324	84,019	60,657	108,764
10 Unknown	174,176	167,465	225,948	142,287	165,256	170,614
Totals	1,906,370	1,711,850	1,874,011	2,232,186	1,804,502	2,363,763



CUSTOMER-HOURS INTERRUPTED BY CAUSE CODE

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	1,198,909	200,832	2,394,591	4,944,875	1,884,818	8,833,330
02 Tree Contacts	1,273,075	949,736	878,094	1,123,530	981,682	882,571
03 Overloads	10,750	30,674	11,928	41,126	19,536	28,786
04 Errors	15,743	28,256	25,540	41,802	28,638	55,186
05 Equipment Failure	1,070,578	1,270,439	1,165,638	1,010,849	839,962	1,106,760
06 Accidents	508,509	570,747	376,340	394,051	524,352	417,426
07 Prearranged	67,864	80,449	53,058	70,087	64,813	46,279
08 Cust. Equipment	0	137	0	0	4	2
09 Lightning	156,706	120,030	185,844	178,068	151,010	248,867
10 Unknown	295,409	292,595	283,280	242,662	316,734	263,106
Totals	4,597,543	3,543,894	5,374,313	8,047,050	4,811,549	11,882,312

**Customer- Hours Interrupted by PSC Cause Code
(exclude Major Storms)**



CUSTOMERS INTERRUPTED AND CUSTOMER-HOURS
INTERRUPTED BY CAUSE CODE INCLUDING MAJOR STORMS

Code	Category	Interruptions		Customers Interrupted		Customer-Hours	
		Number	% Total	Number	% Total	Number	% Total
01	Major Storms	2,126	13.20%	222,113	11.65%	1,198,909	26.08%
02	Tree	4,306	26.74%	472,561	24.79%	1,273,075	27.69%
03	Overload	118	0.73%	12,860	0.67%	10,750	0.23%
04	Errors	60	0.37%	20,956	1.10%	15,743	0.34%
05	Equipment	3,802	23.61%	561,756	29.47%	1,070,578	23.29%
06	Accidents	2,466	15.31%	297,890	15.63%	508,509	11.06%
07	Prearranged	457	2.84%	88,530	4.64%	67,864	1.48%
08	Customers	0	0.00%	0	0.00%	0	0.00%
09	Lightning	491	3.05%	55,528	2.91%	156,706	3.41%
10	Unknown	2,278	14.15%	174,176	9.14%	295,409	6.43%
	Totals	16,104	100.00%	1,906,370	100.00%	4,597,543	100.00%

CUSTOMERS INTERRUPTED AND CUSTOMER-HOURS
INTERRUPTED BY CAUSE CODE EXCLUDING MAJOR STORMS

Code	Category	Interruptions		Customers Interrupted		Customer-Hours	
		Number	% Total	Number	% Total	Number	% Total
02	Tree	4,306	30.81%	472,561	28.06%	1,273,075	37.46%
03	Overload	118	0.84%	12,860	0.76%	10,750	0.32%
04	Errors	60	0.43%	20,956	1.24%	15,743	0.46%
05	Equipment	3,802	27.20%	561,756	33.35%	1,070,578	31.50%
06	Accidents	2,466	17.64%	297,890	17.69%	508,509	14.96%
07	Prearranged	457	3.27%	88,530	5.26%	67,864	2.00%
08	Customers	0	0.00%	0	0.00%	0	0.00%
09	Lightning	491	3.51%	55,528	3.30%	156,706	4.61%
10	Unknown	2,278	16.30%	174,176	10.34%	295,409	8.69%
	Totals	13,978	100.0%	1,684,257	100.0%	3,398,633	100.0%

Cause Code 01 - Major Storms

In 2016, Major Storms accounted for 13% of interruptions, 12% of customers interrupted, and 26% of Customer-Hours Interrupted.

Interruptions due to Major Storm were up 426% from 2015, and down 40% over the 5 year average. Customers interrupted due to Major Storms were up 213% from 2015, and down 50% over the 5 year average. Customer-Hours interrupted were up 497% from 2015 and down 67% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 31% of interruptions, 28% of customers interrupted, and 37% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 12% from 2015, and up 16% over the 5 year average. Customers interrupted due to Tree Contacts were up 20% from 2015, and up 22% over the 5 year average. Customer-Hours interrupted were up 34% from 2015 and up 32% over the 5 year average.

Tree Contacts were the largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 1% of interruptions, 1% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were up 4% from 2015, and down 36% over the 5 year average. Customers interrupted due to Overloads were up 24% from 2015, and up 28% over the 5 year average. Customer-Hours interrupted were down 65% from 2015 and down 59% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 0% of interruptions, 1% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Operator Error were down 38% from 2015, and down 23% over the 5 year average. Customers interrupted due to Operator Error were down 58% from 2015, and down 46% over the 5 year average. Customer-Hours interrupted were down 44% from 2015 and down 56% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 27% of interruptions, 33% of customers interrupted, and 32% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were down 3% from 2015, and down 6% over the 5 year average. Customers interrupted due to Equipment Failure were up 3% from 2015, and up 7% over the 5 year average. Customer-Hours interrupted were down 16% from 2015 and down 1% over the 5 year average.

Equipment Failures were the 2nd largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 18% of interruptions, 18% of customers interrupted, and 15% of Customer-Hours Interrupted.

Interruptions due to Accidents were up 1% from 2015, and up 9% over the 5 year average. Customers interrupted due to Accidents were down 6% from 2015, and up 9% over the 5 year average. Customer-Hours interrupted were down 11% from 2015 and up 11% over the 5 year average.

Accidents were the 3rd largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged outages accounted for 3% of interruptions, 5% of customers interrupted, and 2% of Customer-Hours Interrupted.

Interruptions due to Prearranged outages were down 4% from 2015, and down 20% over the 5 year average. Customers interrupted due to Prearranged outages were down 18% from 2015, and up 35% over the 5 year average. Customer-Hours interrupted were down 16% from 2015 and up 8% over the 5 year average.

Prearranged outages were the 6th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

In 2016, Customer Equipment accounted for 0% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Customer Equipment were down 100% from 2015, and down 100% over the 5 year average. Customers interrupted due to Customer Equipment were down 100% from 2015, and down 100% over the 5 year average. Customer-Hours interrupted were down 100% from 2015 and down 100% over the 5 year average.

Customer Equipment was the 9th largest cause of interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 4% of interruptions, 3% of customers interrupted, and 5% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 14% from 2015, and down 43% over the 5 year average. Customers interrupted due to Lightning were up 3% from 2015, and down 30% over the 5 year average. Customer-Hours interrupted were up 31% from 2015 and down 11% over the 5 year average.

Lightning was the 5th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 16% of interruptions, 10% of customers interrupted, and 9% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 18% from 2015, and up 12% over the 5 year average. Customers interrupted due to Unknown causes were up 4% from 2015, and down 0% over the 5 year average. Customer-Hours interrupted were up 1% from 2015 and up 6% over the 5 year average.

Unknown causes were the 4th largest cause of interruptions in 2016.

4. MAJOR STORMS

National Grid's electric system experienced 16 severe weather incidents in 2016 that qualified as major storms; a 220% increase from the number of major storms reported in 2015 (5). Of the 16 events in 2016, 7 impacted the Central Division (Central – 2; Mohawk Valley – 4; Northern – 1), 8 impacted the Eastern Division (Capital – 3; Northeast – 5), and 1 impacted the Western Division (Frontier – 0; Genesee – 0; Southwest – 1). To qualify as a major storm, an event must affect at least ten percent of the customers in an operating region or have at least one customer out of service for 24 hours or more. The Company excludes all interruptions caused by major storms from the CAIDI and SAIFI indices. The storms occurred during 10 distinct time periods, affecting multiple regions and in many cases, lasting for more than one day.

Major Interruptions Due to Major Storms

As shown in the table below, the number of major storm interruptions in 2016 was 41% lower than the 2011 to 2015 average. All regions with major storm events experienced a lower number of interruptions in 2016 relative to the 5-year average with the exception of the Mohawk Valley. There was a 426% increase in the number of 2016 interruptions as compared to 2015.

Major Storm Interruptions by Region

					(a)	(b)	(c)	(d) = (b-c)/c	(e) =(b-a)/a
Regions	2011	2012	2013	2014	2015	2016	11 - 15 Average	2016 vs. 5- year average	2016 vs. 2015
Capital	2373	813	578	607	223	546	918	-40.52%	144.84%
Central	0	125	380	409	33	142	189	-24.87%	330.30%
Frontier	366	0	984	0	0	0	270	-100.00%	***
Genesee	196	0	361	52	0	0	122	-100.00%	***
Mohawk	239	204	362	386	57	360	250	44.00%	531.58%
Northeast	2,722	947	564	1333	0	917	1,113	-17.61%	***
Northern	544	621	1680	271	0	109	623	-82.50%	***
Southwest	0	224	0	48	91	52	73	-28.77%	-42.86%
Total	6,440	2,934	4,909	3,106	404	2,126	3,558	-40.25%	426.24%

*** Comparison is undefinable due to zero events in 2015 (unable to divide by zero).

Major Storms – 2016

Date	Region	Storm Conditions	CI	CHI	Interruptions	Storm Duration	24 Hour Events	24 Hour Customers Interrupted	Qualification
01/10/2016	Mohawk	Wind, Snow	14,436	136,951	93	2D 0H 5M	2	3	10%/24Hr
02/16/2016	Southwest	Wind, Snow, Ice	10,626	28,094	52	1D 12H 27M	0	0	10%
04/07/2016	Northeast	Wind, Rain	12,091	74,035	201	1D 19H 20M	32	335	24Hr
04/07/2016	Capital	Wind, Rain	12,032	51,656	186	1D 16H 56M	19	192	24Hr
07/01/2016	Northeast	Wind, Rain, Lightning	3,468	9,626	41	1D 12H 20M	1	53	24Hr
07/26/2016	Mohawk	Wind, Rain, Lightning	3,356	19,725	21	1D 11H 0M	1	16	24Hr
08/13/2016	Mohawk	Wind, Rain, Lightning	16,775	68,158	137	2D 2H 54M	13	93	10%/24Hr
08/13/2016	Capital	Wind, Rain, Lightning	19,572	120,406	192	2D 14H 33M	16	108	24Hr
08/13/2016	Northeast	Wind, Rain, Lightning	23,574	205,530	325	2D 0H 57M	28	361	10%/24Hr
10/22/2016	Northern	Snow, Wind, Rain	7,270	51,793	109	2D 10H 7M	12	345	24Hr
10/27/2016	Northeast	Snow, Wind, Rain	58,840	256,768	257	1D 19H 50M	1	10	10%/24Hr
11/20/2016	Capital	Snow, Wind	8,021	43,206	168	1D 22H 7M	26	336	24Hr
11/20/2016	Central	Snow, Wind	12,058	43,694	85	2D 23H 47M	2	34	24Hr
11/20/2016	Mohawk	Snow, Wind	6,281	31,268	110	2D 14H 17M	2	6	24Hr
11/20/2016	Northeast	Snow, Wind	5,374	30,951	93	1D 14H 38M	3	38	24Hr
12/26/2016	Central	Snow, Wind	8,875	28,107	54	1D 20H 3M	1	50	24Hr

5. CIRCUIT RELIABILITY

In order to identify action plans to maintain reliability, the Company ranks each circuit system-wide on the following four reliability metrics and generates an overall ranking by summing the four rankings for each feeder. This method helps to ensure that National Grid focuses on the worst performing feeders from the view point of customers regardless of physical location, voltage, or configuration.

- 1) Number of Interruptions
- 2) Number of Customer-Hours Interrupted (CHI)
- 3) SAIFI (Customers Interrupted/Customers Served)
- 4) SAIDI (Customer Hours/Customers Served)

The Company performs a detailed analysis of the reliability issues for the top 5% of circuits on this list. The location, duration of the interruptions, number of customers affected, cause(s), and physical environmental characteristics of the circuits are all analyzed to develop appropriate action plans that will address the issues.

For this report, the maximum number of feeders analyzed and evaluated in any one operating region is capped at twenty feeders. If any operating region has more than twenty feeders that rank among the top 5% worst performing, the performance for a commensurate number of next highly ranked feeders in other regions are analyzed. The following table shows the number of circuits in each operating region that were among the top 5% of feeders in terms of reliability issues. More detailed information can be found in Section L.1.

Company Operating Region	Total Number of Distribution Circuits	Company Criteria	
		Worst 5% For System	Circuits Analyzed
Capital	337	14	18
Central	311	17	20
Frontier	668	1	2
Genesee	132	0	0
Mohawk	137	27	20
Northeast	199	29	20
Northern	157	14	20
Southwest	152	3	5
Grand Total	2093	105	105

6. RELIABILITY PROGRAMS

The Company has made significant investments for capital improvements and maintenance activities in recent years to develop and implement programs that will maintain the long-term performance and health of network assets.

The Reliability Program is designed to significantly improve and maintain reliability through four initiatives:

- 1) Engineering Reliability Reviews (“ERRs”)
- 2) Sub-Transmission Automation
- 3) Vegetation Management
- 4) Inspection and Maintenance Program (“I&M”)

The Inspection and Maintenance Program (“I&M”) has substantially replaced some of the strategy’s program work such as feeder hardening, potted porcelain cutout replacement, targeted pole replacement, manhole, and vaults. Section B of this report describes the Company’s reliability programs in more detail.

7. TRANSMISSION AND DISTRIBUTION INSPECTION AND MAINTENANCE PROGRAM

The Company takes a very proactive approach to the management of its assets. First, it's Inspection and Maintenance program is designed to find and fix issues before they become problems. Also, the inspections provide detailed information about our assets for further analysis of trends. In addition, planning of the transmission and distribution system assesses capacity, reliability and asset replacement issues in the future. The overarching objective of the initiatives is to get ahead of reliability concerns before they become events. Inspection of the transmission and distribution system is performed on a comprehensive system-wide basis using four basic methods:

- 1) A comprehensive helicopter inspection is performed to determine the condition of select lines (mainly transmission) and to help establish a repair schedule. These inspections are used to gather information to evaluate the need for maintenance or capital improvement on poorly performing circuits. The inspections provide detailed information about conductors, hardware, and structures.
- 2) Infrared testing is performed to sense heat dissipation from sub-transmission and transmission lines. Infrared testing detects faulty splices and loop sleeves so that the Company can take a short prearranged interruption to repair the problems proactively and thereby avoid a potentially lengthy uncontrolled emergency interruption.
- 3) Distribution and transmission lines are manually patrolled.
- 4) Mobile surveys of underground electric distribution systems are performed in select areas (cities with a population of >50,000) to detect elevated voltage.

Pursuant to the Electric Safety Standards, the performance target for inspections for 2016 was 19% (i.e., 95% of the annual 20% target). Defects that required immediate attention were addressed. Others problems were prioritized so they could be addressed in future work plans. National Grid has achieved 21% inspections of its electric facilities for the period ending December 31, 2016.

The results are summarized in the following tables.

2016 Facility Inspection Program Results

Category	Total System Units	2015 Units Completed	2015 Actual Inspected
Overhead Distribution	1,242,495	258,385	21%
Overhead Transmission	103,556	22,303	22%
Underground	93,783	17,582	19%
Pad-mounted Transformers	66,589	13,985	21%
Streetlight	65,838	13,264	20%
Totals	1,572,261	325,519	21%

Inspection Performance Summary

Overhead Distribution Facilities

Inspection Year	Number of Overhead Distribution Structures Inspected	% of Overall System Inspected
2016	258,385	21%
2015	255,736	21%
2014	229,300	19%
2013	265,168	21%
2012	266,755	22%
2011	246,005	20%

Overhead Transmission Facilities

Inspection Year	Number of Overhead Transmission Facilities Inspected	% of Overall System Inspected
2016	22,303	22%
2015	22,679	22%
2014	18,889	18%
2013	21,457	20%
2012	24,913	24%
2011	27,148	26%

Underground Facilities

Inspection Year	Number of Underground Facilities Inspected	% of Overall System Inspected
2016	17,582	19%
2015	17,254	18%
2014	19,124	21%
2013	24,845	26%
2012	19,128	20%
2011	19,987	21%

Pad-mount Transformers

Inspection Year	Number of Pad-mounted Transformers Inspected	% of Overall System Inspected
2016	13,985	21%
2015	12,268	19%
2014	12,308	19%
2013	17,190	26%
2012	12,861	20%
2011	12,846	20%

Streetlights

Inspection Year	Number of Streetlights Inspected	% of Overall System Inspected
2016	13,264	20%
2015	12,664	19%
2014	13,623	21%
2013	12,688	19%
2012	14,996	23%
2011	35,733	54%

In accordance with the Safety Standards, set forth in the PSC's orders in Case 04-M-0159 National Grid uses the following severity levels to establish priority for repairs and scheduling:

Level I – Repair as soon as possible but not longer than one week. A Level I classification represents an actual or imminent safety hazard to the public or a serious and immediate threat to the delivery of power. Critical safety hazards present at the time of the inspection shall be guarded until the hazard is mitigated.

Level II – Repair within one year. A Level II classification represents conditions that are likely to fail prior to the next inspection cycle and represent a threat to safety and/or reliability should a failure occur prior to repair.

Level III – Repair within three years. A Level III classification represents conditions that do not present immediate safety or operational concerns and would likely have a minimal impact on the safe and reliable delivery of power should a failure occur prior to repair.

Level IV – A Level IV classification represents conditions found but repairs are not needed at this time. Level IV is used to track atypical conditions that do not require repair within a five year timeframe. This level is used for future monitoring purposes and planning proactive maintenance activities.

The following table summarizes the deficiencies identified by the inspection program in 2016 for the transmission and distribution system in each category. The specific issues that were identified for each asset grouping are described in the Company's 2016 Annual Stray Voltage Testing and Facility Inspection Report in Case 04-M-0159 filed on February 13, 2017. All Level I issues and most Level II issues have already been addressed. The remaining issues will be addressed consistent with the timeframes as discussed above.

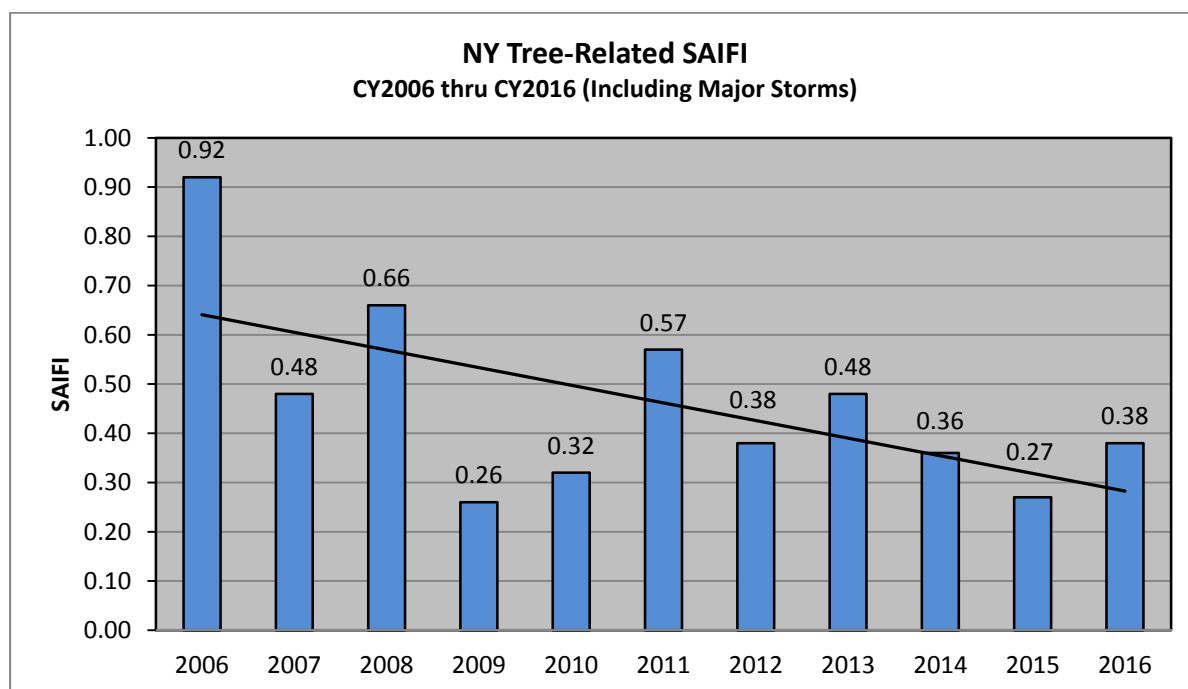
Program	Level 1	Level 2	Level 3
Distribution	913	6,735	56,124
Underground	135	548	105
Transmission	7	203	2,909

8. VEGETATION MANAGEMENT PROGRAM

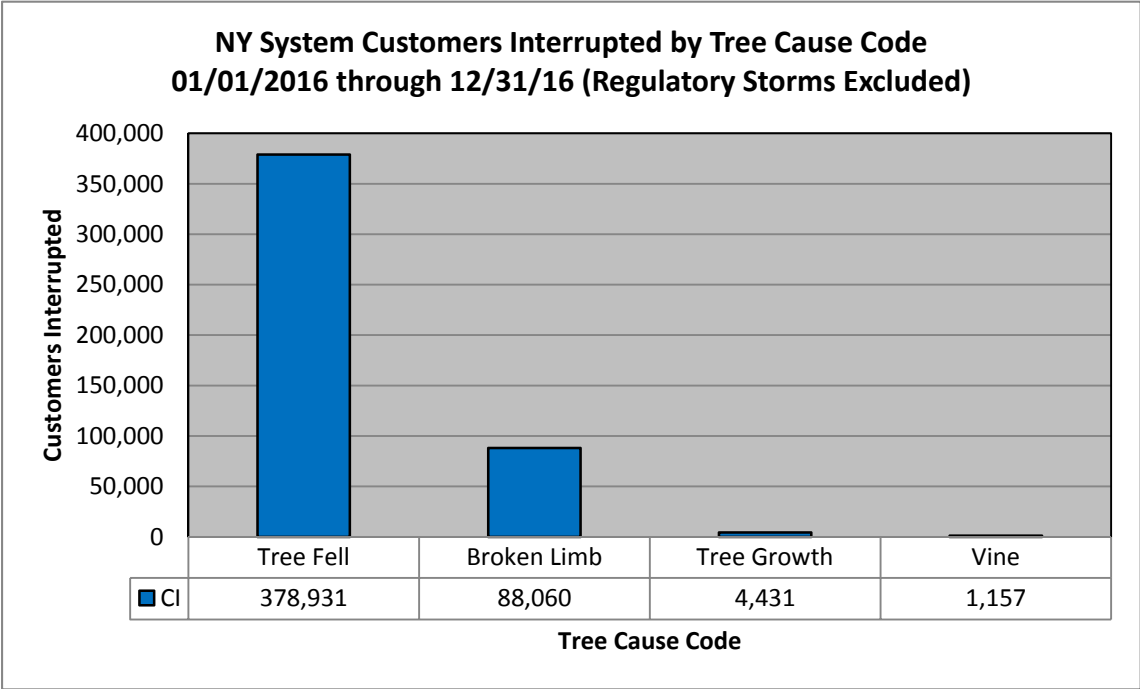
The Company's vegetation management program is divided into two sub-programs, one for the distribution system and another for the transmission system. Both programs include a cycle-based component and a reliability improvement component to minimize tree-related interruptions from trees and limbs falling into the infrastructure as well as provide a measure of public and worker safety. For the transmission system, the cycle-based program is an integrated vegetation management (IVM) program used to manage vegetation along the floor of the rights-of-way. The details regarding the transmission program performance are reported annually in a separate report to the PSC.

The Company's distribution cycle-based component is circuit pruning, a comprehensive program that provides for the pruning of vegetation along all distribution circuit miles on an average five and one half year interval or cycle. An optimal cycle length is set for each circuit based on growing season, growth characteristics of predominant tree species in that area, and the appropriate clearance to be created at the time of pruning. The Company has maintained the appropriate level of funding necessary to operate the program for many years allowing the completion of six full cycles of pruning. In addition to the routine pruning, hazard tree removals are performed on prioritized distribution feeders. The Company identifies feeders for the inspection and removal of hazard trees based on field inspections, tree exposure, historical interruption data, number of customers served and circuit configuration.

Shown in the chart below is the NY system tree-related SAIFI including major storms for the past ten years. Although tree-related interruptions are strongly correlated with wind and weather patterns; that variability and its effect on tree interruption data is mitigated when viewed over a longer period of years. As shown by the chart, SAIFI has been trending downward over the last ten years.



The distribution of tree interruptions between the four tree cause codes points to the importance of a hazard tree program. As demonstrated in the chart below, tree fell interruptions accounted for 80% of all tree interruptions in 2016, followed by 19% caused by limb failures and lastly tree and vine growth accounted for only 1% combined. The minimal number of tree and vine growth interruptions is an indication that the current pruning cycle and pruning specifications are effective in minimizing interruptions related to vegetation growth.



In the table below the NY Operating Regions are ranked based on 2016 tree-related SAIFI performance. As one would expect, regions with the highest tree densities also had the highest distribution line tree exposure. These regions generally have the highest number of interruptions each year. Vegetation program budget dollars, especially for hazard tree work, are oriented with these same facts in mind.

Tree Interruptions by Region (Excluding major storms)

Rank	Region	Number of Interruptions	Customers Interrupted	SAIFI
1	Northeast	984	122,616	0.56
2	Mohawk Valley	490	70,991	0.52
3	Southwest	495	40,125	0.39
4	Northern	550	44,582	0.33
5	Central	601	82,511	0.29
6	Capital	686	80,599	0.25
7	Genesee	192	11,050	0.11
8	Frontier	308	20,087	0.06
System Totals		4,306	472,561	0.29

9. ELECTRIC SUBSTATION PREVENTIVE MAINTENANCE PROGRAM

The Substation Computerized Maintenance Management System (“CMMS”) covers an array of inspections, diagnostics, and maintenance activities to be completed in accordance with National Grid Substation Maintenance Standards and Procedures. These documents identify intervals and maintenance activities to be performed on different types of substation equipment (transformers, circuit breakers, Load Tap Changers (“LTC”), batteries and chargers, etc.). Protection Systems Engineering Documents provide the substation relay calibration and testing requirements for the bulk power, transmission, distribution, and communication-protection systems.

National Grid Upstate New York Substations and Protection, Telecom and Operations (“PTO”) field personnel performed and documented 14,508 discrete maintenance activities across the system in calendar year 2016. Total expenditure for the Upstate New York Substation Maintenance Program was approximately \$4.69 million. The listing of specific substation maintenance activities are as follows:

<u>Substation Maintenance Programs</u> <u>Apparatus : Activity</u>	<u>Number Performed</u>
Animal Fence Maintenance	8
Battery: Diagnostic Inspection	492
Circuit Breaker: Diagnostics	330
Circuit Breaker: Mechanism Inspection (GCB2)	3
Circuit Switcher: Diagnostics	2
Disconnect: Motor Operator Operation	2
Load Tap Changer: DGA	1,025
Load Tap Changer: Internal Inspections	9
Substation: Visual & Operations (V&O) Inspections	4,657
Substation: Thermographic Inspections	739
Transformer: DGA	1,126
Transformer: Diagnostics	9
Transformer: Oil Quality (Screen Test)	75
Transformer: Cooler Cleaning	30
Voltage Regulator: DGA	26
Relay Testing: NERC	2,455
Relay Testing: Other	1,871
Battery: NPCC D8 ST-1, ST-2, Battery Diagnostic Test	33
Substation: NPCC D8 ST-3 Station Service Critical Load Test	2
Standby Generator: NPCC D8 ST-5 E Gen Run Test	143
Standby Generator: NPCC D8 ST-6 E Gen Transfer Test	11
Battery: NERC PRC-005-2 Battery Bi-Monthly Check	1,199
Circuit Breaker: NERC PRC-005-2 DC Trip Coil Checks	261
Totals	14,508

The CMMS uses a Maintenance Scheduling Number (“MSN”) that provides detailed information to prioritize and schedule the substation maintenance program work tasks. The CMMS application, Cascade, is used as a data warehouse and scheduling tool to manage workloads and balance risk. It is also used to help justify decisions related to work force and budgeting requirements. Cascade is the database used to assist in the development of maintenance plans and asset replacement programs for the calendar, fiscal, or multi-year maintenance and replacement programs.

As a maintenance example, a MSN number is used to trigger maintenance notification. The MSN number continues to increase creating a prioritized backlog until the maintenance task is completed. The MSN number increases at a predetermined rate depending on the type of maintenance task. This notification allows for the scheduling of the necessary equipment outages for maintenance inspection, diagnostics, or other tests as specified by published standards or procedures. The range between 400 and 500 allows for the scheduling of outages and completion of the maintenance activity. If the equipment MSN number is greater than 500, it is now considered overdue. Variance reports are generated monthly to indicate the maintenance activities performed during the reporting period and year-to-date.

The tables below represent a snapshot of the Cascade generated monthly report.

Substation Maintenance Status by Equipment Class – New York

Transmission

	≥ 500 Overdue*	400-499 Due	Total Units	Month TD COMP	FYTD COMP
Animal Fence Maintenance	0	0	9	0	6
Battery & Chg: Std Insp	0	59	348	26	146
CAP PrePeak Insp	0	0	50	0	43
Circuit Breaker Diag	1	2	777	1	30
Circuit Breaker Mech Insp (GCB2)	1	0	5	2	2
CKTSW Diag	0	2	142	0	1
Disconnects: MO Diag Insp	0	2	657	0	5
EGEN Diag	0	0	15	0	0
LTC:DGA	0	55	400	27	414
Substation V&O	0	177	353	195	1614
Thermographic Insp*	0	326	326	0	121
Transf DGA	1	85	542	41	453
Transf Oil Quality	0	9	98	0	22
TRF Cooler Cleaner	0	0	22	0	22

Distribution

	≥ 500 Overdue*	400-499 Due	Total Units	Month TD COMP	FYTD COMP
Animal Fence Maintenance	0	0	71	0	38
Battery & Chg: Std Insp	0	14	216	8	115
CAP PrePeak Insp	0	0	56	0	50
Circuit Breaker Diag	24	147	3865	41	582
CKTSW Diag	0	0	7	0	0
Disconnects: MO Diag Insp	0	0	93	0	0
LTC:DGA	0	40	292	25	292
LTC: Internal Insp	0	0	6	1	3
Substation V&O Insp	0	197	429	257	1973
Thermographic Insp*	0	410	412	1	110
Transf DGA	1	58	591	27	292
Transf Oil Quality	1	5	62	0	11
TRF Cooler Cleaning	1	0	6	0	5
VREG Internal	0	0	9	0	0
VREG: DGA	0	13	70	12	56

* Testing is done by PTO Meter and Test.

* ≥ 500 Overdue column includes overdue, exemptions, and OPEX. Does not include NPCC (refer to page 10).

In addition to its functionality as an asset register, the Cascade system manages other substation maintenance work. The system generates Work Orders when maintenance is required to track follow-up work with Trouble Orders and Follow-up Work Orders. As substation mechanics perform maintenance and inspections from automatically generated Work Orders, if problems are discovered, they will have several options; fix the problem while on site, initiate a Follow-up Work Order, and/or initiate a Trouble Order. Trouble Orders track problems and failures that have occurred during normal operation of the equipment and require immediate repair. Follow-up Work Orders track problems found during Visual & Operational (V&O) Inspections or scheduled equipment inspections.

Protective relays are tested on a calendar year basis. Triggers are based on the last test date and testing interval.

B. RELIABILITY PROGRAMS AND WORK FORCE INFORMATION

1. RELIABILITY PROGRAMS

National Grid has invested in a number of capital and maintenance programs to maintain the reliability of the electric system. Programs that are specifically designed to improve reliability are described below in detail with the exception of the vegetation management program which was described in a previous section of this report.

- **Engineering Reliability Reviews (“ERRs”)**
- **Sub-Transmission Automation**
- **Vegetation Management** – Enhanced right-of-way clearing and treatment and Enhanced Hazard Tree Maintenance (“ETHM”) removal of danger trees on critical sections of the distribution system.

In addition to reliability programs, certain aspects of the Inspection & Maintenance (“I&M”) program contribute to improved reliability and increased likelihood that the company will comply with PSC reliability targets. The I&M program is designed to ensure the Company fulfills its obligation to provide safe and adequate service by inspecting its facilities and repairing safety and reliability issues identified in a timely fashion. Replacement of deteriorated overhead and underground assets helps prevent a future failure which has a cumulative effect of improving reliability over time.

ERRs

As discussed in the 2014 Asset Condition Report and Capital Investment Plan, the Distribution Planning group generates the list of Worst Performing Feeders during the preparation of the Electric Service Reliability Report. The list of feeders includes interruptions associated with supply issues (transmission or substation) and excludes major storms. From the list, a small number of geographically diverse feeders are selected for an Engineering Reliability Review (“ERR”). The scope of an ERR is typically a:

- Review of one-year and multi-year historical reliability data for current issues and trends.
- Review of recently completed and/or future planned work that is expected to impact reliability.
- Review the need for the installation of radial and/or loop scheme reclosers.
- Review the need for additional line fuses to improve the sectionalization of the feeder.
- Comprehensive review of the coordination of protective devices to ensure proper operation.
- Review for equipment in poor condition.
- Review of heavily loaded equipment.

- Review for other feeder improvements such as fault indicators, feeder ties, capacitor banks, load balancing, additional switches to improve switching time, and primary reconductoring (overhead and/or underground).

This review has been in place since FY2007 with 323 feeders going through the process. To date, this program is responsible for several of the 952 recloser installations across Upstate NY.

Sub-Transmission Automation

After an initial investigation of automation and communication technologies, National Grid began a targeted Sub-Transmission Automation pilot in 2008.

The following Sub-Transmission lines have operational automation systems:

- Boonville-Lowell 22 Line (23kV)
- Lighthouse Hill-Mallory 22 Line (34.5kV)
- Chestertown-Schroon Lake #3 Line (34.5 kV)
- Battenkill-Cement Mountain #5 Line (34.5 kV)
- Cement Mountain-Cambridge #2 Line (34.5 kV)
- Cambridge-Hoosick #3 Line (34.5 kV)

These systems use distributed intelligence through local controls and switches, with peer-to-peer communication through to a local substation Energy Management System (“EMS”) uplink point achieved using spread spectrum 900 MHz radios. By up linking to EMS, Supervisory Control & Data Acquisition (“SCADA”) capability of the automation devices is provided to the Company’s Control Centers. In addition, all data is brought back to a central database warehouse for future analysis.

Following the success of pilot automation installations in 2008 and 2009, which verified the capability of advanced distribution automation enabled equipment, the Company recognized the additional benefit of identifying projects where the installation of modernized switching schemes would provide increased reliability to the Sub-Transmission system.

Given the results of the pilot, automation has been installed on the following lines:

- Boonville-Alder Creek 21 Line (46.5kV)
- Trenton-Middleville 24 Line (46kV)
- Hartfield-Ashville 854 Line (34.5kV)
- Hartfield-South Dow 859 Line (34.5kV)
- Youngstown-Mountain 401 Line (34.5kV)
- Warrensburg-Queensbury 9 Line (34.5kV)
- Warrensburg-Fort Gage 8/Fort Gage-Queensbury 2 Line (34.5kV)
- North Angola-North Ashford 861/North Eden-Eden 860 Line (34.5kV)
- North Lakeville-Hemlock 224/North Lakeville-Richmond 226 Lines (34.5kV)

- Dake Hill-Machias 803 Line (34.5kV)

In addition, automation on the Sub-Transmission system is being expanded. There are a number of lines being explored for additional automation based on their reliability performance. Currently, automation is planned to be installed on the following lines over the next several years:

- North Lakeville-Ridge 218 Line (34.5kV)
- Phillips-Medina 301 Line (34.5kV)
- Valley-Inghams 27 Line (46kV)
- Delavan-Machias 801 Line (34.5kV)
- Nicholville-Malone 21 Line (34.5kV)
- Akwesasne-Nicholville 23 Line (34.5kV)
- Rathbun-Labrador #39 Line (34.5kV)

2. CAPITAL AND O&M BUDGETS AND ACTUAL EXPENDITURES

The Company develops investment plans to meet its obligation to provide safe and adequate electric delivery service to 1.6 million customers at reasonable cost. Providing this service requires the Company to maintain a vast physical infrastructure located in 450 cities and towns across our 25,000 square mile service area.

The following tables show fiscal year Capital and Operation and Maintenance expenditure over the past five years.

Fiscal Year Capital Actual Expenditures (\$ Millions)						
System	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017*
Distribution	\$231.3	\$200.3	\$293.0	\$304.0	\$301.2	\$264.0
Sub-transmission	\$61.5	\$33.0	\$36.4	\$27.8	\$27.8	\$25.0
Transmission	\$128.8	\$165.3	\$155.0	\$178.4	\$169.4	\$188.0
Totals	\$421.6	\$398.6	\$484.4	\$510.2	\$498.5	\$477.0

* FY2017 Forecasted Spend from Resource Planning's PCM File.

The following table summarizes fiscal year tree trimming Operation and Maintenance expenditure over the past five years.

Fiscal Year Transmission Tree Trimming Actual and Budgeted Expenditure (\$ Millions)						
Spending	FY 2012	FY 2013*	FY 2014	FY 2015	FY 2016	FY 2017**
Actual	\$10.8	\$14.33	\$15.08	\$28.77	\$15.10	\$8.93
Budgeted	\$11.2	\$11.1	\$11.1	\$15.6	\$11.1	\$11.02

Fiscal Year Distribution Tree Trimming Actual and Budgeted Expenditure (\$ Millions)						
Spending	FY 2012	FY 2013*	FY 2014	FY 2015	FY 2016**	FY 2017**
Actual	\$39.9	\$27.63	\$38.21	\$47.91	\$48.64	\$35.41
Budgeted	\$40.1	\$39.8	\$40.3	\$55.1	\$43.5	\$43.57

* Actual spend is thru October FY13 only due to system conversion which made specific Vegetation Program costs unavailable for the last 5 months of FY13.

** Forecasted Spend from Finance Business Partners through January 2017.

3. WORK FORCE NUMBERS

The following table summarizes the work force numbers for field positions associated with overhead, underground, and substation crews. It should be noted that head counts are not tracked by reliability vs. non-reliability work.

Distribution

Title	2011	2012	2013	2014	2015	2016
Cable Splicer A	7	6	17	6	14	16
Cable Splicer B	11	8	7	18	18	11
Cable Splicer C	16	19	18	22	24	28
Cable Splicer Helper	2		2	3	-	6
Chief Cable Splicer A	32	30	27	26	23	26
Chief Electrician A	16	17	15	17	18	18
Chief Electrician B	3	3	3	3	2	2
Chief Equip Operator A	4	6	6	6	5	6
Chief Laborer A	1	1	1	1	1	1
Chief Line Mechanic A		1			-	-
Chief Line Mechanic A Hot Stick	288	302	295	311	304	305
Chief Line Mechanic B Hot Stick					-	-
Chief Maintenance Mechanic A	40	37	38	35	38	37
Chief Mechanic A	16	15	14	16	12	14
Chief Street Light Service Mechanic A	2	2	2	7	6	6
Distribution Inspector B	23	23	1		-	
Distribution Inspector C	15	10	32	33	29	28
Electrician A	7	1	3	1	3	2
Electrician B	1	7	7	5	2	4
Electrician C	42	40	40	39	36	38
Electrician Helper		1			1	-
Equipment Operator A	1				-	-
Equipment Operator B	2	4	3	3	2	1
Equipment Operator C	5	3	2	7	6	6
Gas Line Inspector B	3	2			-	-
Gas Mechanic C		2			-	-
Laborer					-	
Line Mechanic A	25	28	36	59	19	29
Line Mechanic B	58	35	46	48	85	72
Line Mechanic C	117	112	61	41	42	51
Line Mechanic Helper	2	18	8	11	8	21
Line Mechanic-Hot Stick	179	195	210	228	224	216
Maintenance Helper					-	2
Maintenance Mechanic A	3	4	7	7	6	4
Maintenance Mechanic B	7	10	7	13	13	9

Title	2011	2012	2013	2014	2015	2016
Maintenance Mechanic C	35	40	45	46	45	50
Mechanic A	2	4		1	1	5
Mechanic B	2	2	6	5	8	5
Mechanic C	21	21	20	19	18	24
Mechanic Helper	1			1	1	1
One Person Line/Trouble Mechanic	56	60	61	56	59	62
Platform Attendant	16	5	10	7	7	9
Relief Operator K					-	
Relief Operator M					-	
Relief Operator P	3	1	1	1	2	1
Safety Advocate	1	1	2	2	2	2
Street Light Service Mechanic Helper			1		-	
Street Light Service Mechanic A	1			1	-	2
Street Light Service Mechanic B	3	3	3	2	2	2
Street Light Service Mechanic C	25	28	29	27	28	27
Technician D	1	1	1	1	1	1
Tech-Substation Dept	4	4	3	3	3	2
Tran Line Worker Hot Stick		1			-	-
Tran Live Line Bare Hand		1	1	1	-	-
Traveling Operator A					-	-
Traveling Operator B	1	1		1	-	1
Traveling Operator C	12	13	13	15	15	14
Traveling Operator D	23	26	27	26	27	25
Trouble Mechanic A Hot Stick				1	-	
Trouble Mechanic C Hot Stick	4	5	5	4	4	4
Trouble Mechanic D Hot Stick	5	5	5	5	5	5
Distribution Total	1,144	1,164	1,141	1,191	1,169	1,201

Transmission

Title	2011	2012	2013	2014	2015	2016
Chief Electrician B				12		
Chief Live Line Bare Hand Specialist	2		6	6	6	6
Chief Line Mechanic A Hot Stick						
Chief Line Mechanic B Hot Stick	2	6				
Electrician A						
Electrician B						
Electrician C						
Equipment Operator C	3		6	6	6	6
Equipment Operator D		6				
Line Worker A/3rd Class	6	3	3	2		
Line Worker B/2nd Class	3	7	7	3	2	2
Line Worker C/1st Class	6	5	3	5	3	3
Line Worker Hot Stick	10	11	13	13	12	12
Live Line Bare Hand Specialist	9	9	11	13	19	19
Safety Advocate Electric		1	1	1	1	1
Transmission Total	41	48	49	49	49	49

Distribution & Transmission Grand Total	1,113	1,185	1,212	1,190	1,240	1,250
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4. CONTRACTOR CREW SERVICES

The following table represents the average monthly contractor head counts utilized by the company to implement its work plans for distribution and sub-transmission overhead and underground line work during the past six years. It should be noted that contractor head counts are not tracked by reliability vs. non-reliability work.

Distribution & Sub-transmission	2011	2012	2013	2014	2015	2016
Contractor average monthly head count	115	110	108	107	109	111

The following table represents the average monthly contractor head counts utilized by the company to implement its work plans for Transmission. It should also be noted that contractor head counts are not tracked by reliability vs. non-reliability work.

Transmission	2011	2012	2013	2014	2015	2016
Contractor average monthly head count	78	80	72	64	80	48

The following table represents the average monthly contractor head counts utilized by the company to implement its work plans for distribution vegetation management during the past six years. It should be noted that contractor head counts are not tracked by reliability vs. non-reliability work.

Distribution Vegetation Management	2011	2012	2013	2014	2015*	2016*
Contractor average monthly head count	134	158	157	186	430	423

* Denotes the actual head count, previous year totals have represented the number of crews.

C. CAPITAL REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS Info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 2.00)	1.86	1.90	2.04	2.01	1.78	1.76
SAIFI (Target 0.90)	1.01	0.99	0.83	1.02	0.72	1.06
SAIDI	1.88	1.88	1.70	2.05	1.28	1.87
Interruptions	2,865	2,776	2,624	2,848	2,425	3,110
Customers Interrupted	324,304	315,159	264,724	323,951	228,687	335,932
Customer-Hours Interrupted	603,753	598,061	539,882	650,008	406,566	591,756
Customers Served	320,898	318,329	317,503	317,658	316,404	316,359
Customers Per Interruption	113.20	113.53	100.89	113.75	94.30	108.02
Availability Index	99.9786	99.9786	99.9806	99.9766	99.9854	99.9786
Interruptions/1000 Customers	8.93	8.72	8.26	8.97	7.66	9.83

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Capital Region met its CAIDI reliability target and did not meet its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 1.01 interruptions, 12% above the PSC goal of 0.90 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.86 in 2016, 7% below the PSC's regional target of 2.00 hours.

The 2016 CAIDI result was 2% below the 2015 result of 1.90 hours, and 2% below the previous 5-year average of 1.90 hours. The 2016 SAIFI was 2% above the 2015 result of 0.99 interruptions, and 9% above the previous 5-year average of 0.93 interruptions.

In 2016, excluding major storms, the Capital Region experienced 10 transmission interruptions. These interruptions accounted for 0.3% of the region's total interruptions (10 of 2,865), 10% of the region's total customers interrupted, (31,776 of 324,304), and 5% (28,019 of 603,752) of the region's total customer-hours interrupted. Overall, transmission interruptions had a CAIDI of 0.88 hours, and a SAIFI of 0.09 interruptions.

The number of transmission-related interruptions decreased from 14 in 2015 to 10 in 2016 (a decrease of 29%). The number of customers interrupted increased from 27,061 in 2015, to 31,776 in 2016 (an increase of 17%), while the customer-hours interrupted decreased from 37,110 in 2015, to 28,019 in 2016 (a decrease of 24%).

In 2016, excluding major storms, the Capital Region experienced 13 substation interruptions. These interruptions accounted for 0.5% of the region's total interruptions (13 of 2,865), 12% of the region's total customers interrupted, (38,449 of 324,304), and 9% (55,494 of 603,752) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.44 hours, and a SAIFI of 0.12 interruptions.

The number of substation-related interruptions increased from 9 to 13 from 2015 to 2016 (an increase of 44%). The number of customers interrupted increased from 28,147 in 2015, to 38,449 in 2016 (an increase of 37%), while the customer-hours interrupted increased from 44,405 in 2015, to 55,494 in 2016 (an increase of 25%).

In 2016, excluding major storms, the Capital Region experienced 2,842 distribution interruptions. These interruptions accounted for 99% of the region's total interruptions (2,842 of 2,865), 78% of the region's total customers interrupted, (254,079 of 324,304), and 86% (520,239 of 603,752) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 2.05 hours, and a SAIFI of 0.79 interruptions.

The number of distribution-related interruptions increased from 2,753 to 2,842 from 2015 to 2016 (an increase of 3%). The number of customers interrupted decreased from 259,951 in 2015, to 254,079 in 2016 (a decrease of 2%), while the customer-hours interrupted increased from 516,545 in 2015, to 520,239 in 2016 (an increase of 1%).

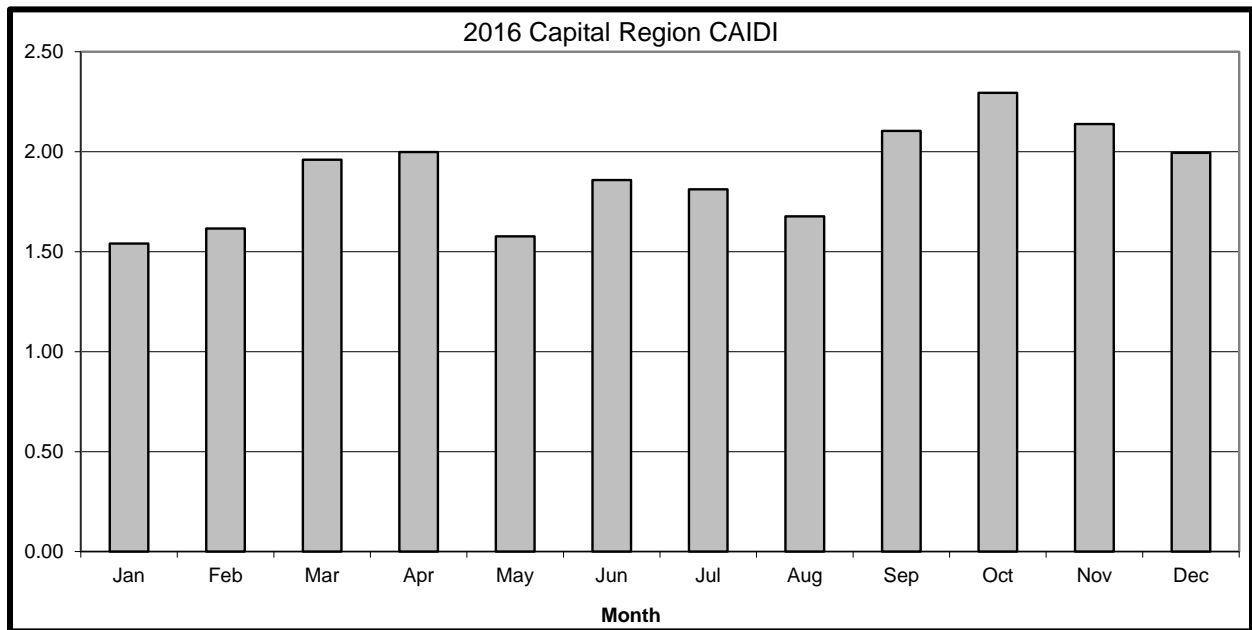
c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and SAIFI for the Capital Region for 2016 (excluding Major Storms).

The CAIDI graph shows the individual CAIDI, by month, for 2016. The Capital Region was below the PSC minimum CAIDI goal of 2.00 hours throughout the year. The lowest three months were January (1.54), May (1.58) and February (1.62). CAIDI was above the PSC minimum for three months in 2016: September (2.1), October (2.29) and November (2.14).

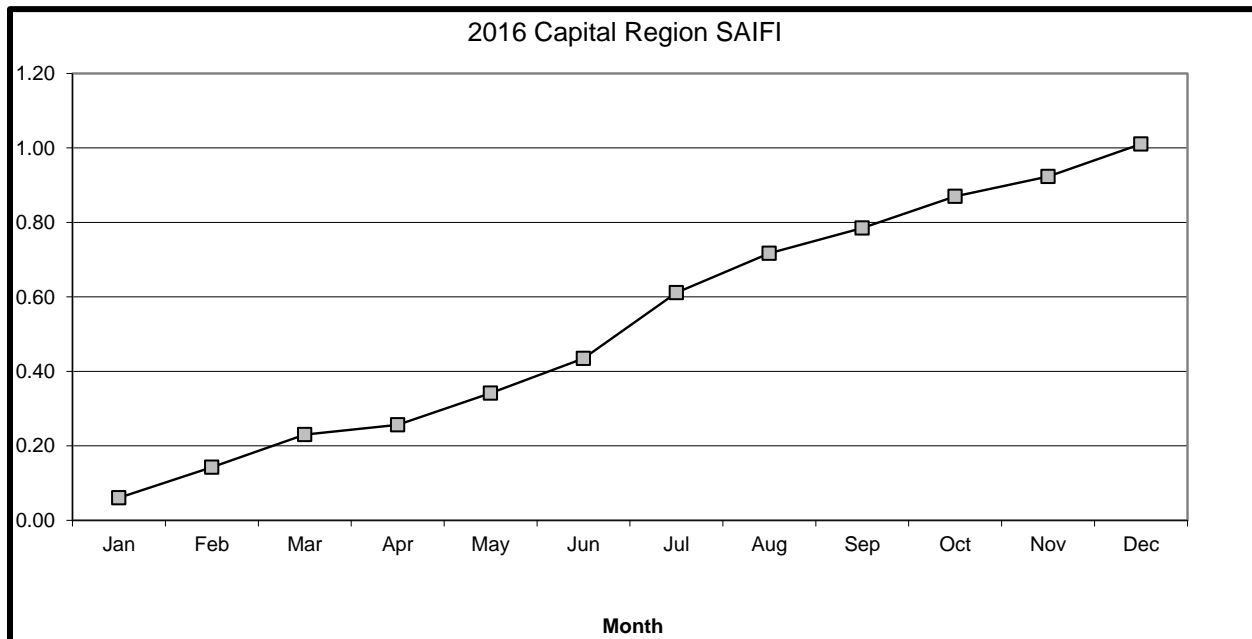
The SAIFI graph shows the cumulative SAIFI, by month, for 2016. The year-end SAIFI exceeded the PSC minimum SAIFI goal of 0.90 for the year. It showed the greatest increase during the months of March (0.09), July (0.18), August (0.11) and October (0.09); 45% of the SAIFI accrued during these four months. The lowest four months for SAIFI were January (0.06), April (0.03), September (0.07) and November (0.05); the interruptions which occurred during these four months contributed to only 21% of the total SAIFI.

GRAPH OF MONTHLY CAIDI AND SAIFI FOR THE CAPITAL REGION



PSC CAIDI Goal:	
Minimum	2.00
2016 Actual	1.86

PSC SAIFI Goal:	
Minimum	0.90
2016 Actual	1.01



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

IDS Info

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	546	223	607	578	813	2,373
02 Tree Contacts	686	651	616	755	417	673
03 Overloads	15	15	14	86	29	58
04 Operator Error	9	24	13	11	12	14
05 Equipment	877	829	782	792	771	984
06 Accidents	569	603	566	395	539	568
07 Prearranged	130	167	121	180	205	153
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	34	49	97	192	54	164
10 Unknown	545	438	415	437	398	496
Total	3,411	2,999	3,231	3,426	3,238	5,483

2) Customers Interrupted by Cause – Historical

IDS Info

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	39,625	42,528	55,956	70,792	123,536	315,093
02 Tree Contacts	80,599	66,759	74,622	91,354	49,590	71,649
03 Overloads	1,417	4,734	1,514	7,129	2,228	4,303
04 Operator Error	2,464	18,217	7,666	1,552	3,975	5,574
05 Equipment	132,270	101,417	82,762	111,818	81,011	119,557
06 Accidents	60,286	80,534	51,469	56,008	55,580	54,049
07 Prearranged	7,762	13,613	5,973	11,724	6,325	20,283
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	6,577	2,392	11,076	20,564	4,150	18,777
10 Unknown	32,929	27,493	29,642	23,802	15,828	41,740
Total	363,929	357,687	320,680	394,743	352,223	651,025

3) Customer-Hours Interrupted by Cause – Historical

IDS Info

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	215,269	127,395	363,528	631,907	440,570	3,152,761
02 Tree Contacts	197,390	139,822	171,907	217,521	110,153	164,035
03 Overloads	1,409	17,589	2,256	32,604	7,015	9,894
04 Operator Error	4,550	9,770	5,494	1,017	1,315	4,461
05 Equipment	235,270	227,997	205,004	221,875	155,705	229,103
06 Accidents	86,827	125,869	73,579	74,014	81,846	76,360
07 Prearranged	6,798	16,360	7,081	12,511	12,426	10,249
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	19,451	7,330	31,078	43,615	9,883	38,665
10 Unknown	52,057	53,324	43,483	46,851	28,224	58,989
Total	819,021	725,456	903,409	1,281,915	847,137	3,744,518

4) Interruptions, Customers Interrupted, and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer-hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	546	16.0%	39,625	10.9%	215,269	26.3%
02 Tree Contacts	686	20.1%	80,599	22.1%	197,390	24.1%
03 Overloads	15	0.4%	1,417	0.4%	1,409	0.2%
04 Operator Error	9	0.3%	2,464	0.7%	4,550	0.6%
05 Equipment	877	25.7%	132,270	36.3%	235,270	28.7%
06 Accidents	569	16.7%	60,286	16.6%	86,827	10.6%
07 Prearranged	130	3.8%	7,762	2.1%	6,798	0.8%
08 Customer Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	34	1.0%	6,577	1.8%	19,451	2.4%
10 Unknown	545	16.0%	32,929	9.0%	52,057	6.4%
Total	3,411	100.0%	363,929	100.0%	819,021	100.0%

e. **INTERRUPTION REVIEW BY PSC CAUSE CODES**

Cause Code 01 - Major Storms

In 2016, Major Storms accounted for 16% of interruptions, 11% of customers interrupted, and 26% of Customer-Hours Interrupted.

Interruptions due to Major Storms were up 145% from 2015, and down 41% over the 5 year average. Customers interrupted due to Major Storms were down 7% from 2015 and down 67% over the 5 year average. Customer-Hours interrupted were up 69% from 2015 and down 77% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 24% of interruptions, 25% of customers interrupted, and 33% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 5% from 2015, and up 10% over the 5 year average. Customers interrupted due to Tree Contacts were up 21% from 2015, and up 14% over the 5 year average. Customer-Hours interrupted were up 41% from 2015 and up 23% over the 5 year average.

Tree Contacts were the 2nd largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 1% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were flat at 0% from 2015, and down 63% over the 5 year average. Customers interrupted due to Overloads were down 70% from 2015, and down 64% over the 5 year average. Customer-Hours interrupted were down 92% from 2015 and down 90% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 0% of interruptions, 1% of customers interrupted, and 1% of Customer-Hours Interrupted.

Interruptions due to Operator Error were down 63% from 2015, and down 40% over the 5 year average. Customers interrupted due to Operator Error were down 86% from 2015, and down 67% over the 5 year average. Customer-Hours interrupted were down 53% from 2015 and up 3% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 31% of interruptions, 41% of customers interrupted, and 39% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were up 6% from 2016 and up 5% over the 5 year average. Customers interrupted due to Equipment Failure were up 30% from 2016 and up 33% over the 5 year average. Customer-Hours interrupted were up 3% from 2015 and up 13% over the 5 year average.

Equipment Failures were the largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 20% of interruptions, 19% of customers interrupted, and 14% of Customer-Hours Interrupted.

Interruptions due to Accidents were down 6% from 2015, and up 7% over the 5 year average. Customers interrupted due to Accidents were down 25% from 2015, and up 1% over the 5 year average. Customer-Hours interrupted were down 31% from 2015 and up 1% over the 5 year average.

Accidents were the 3rd largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 5% of interruptions, 2% of customers interrupted, and 1% of Customer-Hours Interrupted.

Interruptions due to Prearranged were down 22% from 2016 and down 21% over the 5 year average. Customers interrupted due to Prearranged were down 43% from 2016 and down 43% over the 5 year average. Customer-Hours interrupted were down 58% from 2015 and down 42% over the 5 year average.

Prearranged was the 5th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 1% of interruptions, 2% of customers interrupted, and 3% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 31% from 2016 and down 69% over the 5 year average. Customers interrupted due to Lightning were up 175% from 2015, and down 42% over the 5 year average. Customer-Hours interrupted were up 165% from 2015 and down 26% over the 5 year average.

Lightning was the 6th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 19% of interruptions, 10% of customers interrupted, and 9% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 24% from 2016 and up 25% over the 5 year average. Customers interrupted due to Unknown causes were up 20% from 2016 and up 19% over the 5 year average. Customer-Hours interrupted were down 2% from 2015 and up 13% over the 5 year average.

Unknown causes were the 4th largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2015/16 SPENDS:

The Company continues to work on capital-related projects in the Capital Region to maintain customer satisfaction and future reliability. The company utilized programs such as the Summer Preparedness Program and Overloaded Ratios to identify loading issues in order to have them addressed before peak load. Multiple jobs were created as part of these programs, including ratio transformer size increases, load transfers (re-allocating load to neighboring feeders), capacitor installations for reactive support and conversion jobs to remove overloaded ratio transformers.

National Grid has worked on solving hot spots from the Quick Resolution System (QRS) and other customer inquiries. These solutions varied, including asset replacement, fusing, adding tree wire, small rebuilds and also tree trimming.

Some specific projects that were constructed in CY16 or will be constructed in CY17 are listed below.

Mohawk Harbor Development and Rivers Casino

This project calls for the construction of an approximately 8,300 foot manhole and duct-line system from the Front Street Substation through the former American Locomotive Company (ALCO) site in Schenectady, NY to Freemans Bridge and Nott Street. This is done in order to allow for a \$150 million transformation of the former ALCO site into upscale apartments, restaurants, retail stores, condos, hotels, offices, and a casino.

This civil construction will allow us to relocate two overhead getaways from Front Street (36052 and 36053) underground through the development then across Freemans Bridge to continue to serve the Glenville population. It will also allow for two new distribution feeders, the 36050 and 36051 to go underground through the duct-line system to serve the electrical demand of the Mohawk Harbor Development.

Construction – Ongoing

Projected Completion Date – Summer 2017

Lasher Road Station Project

The \$14 million Lasher Road Station Project will serve the growing Ballston Spa, NY area by increasing the reliability of electrical service to our residential customers. The project calls for the construction of a new 115kV switching station with a two bay breaker and a half configuration with a step-down 115/13.2kV, 15/20/25MVA power transformer with four feeders through a seven bay metalclad to serve the surrounding community.

The primary driver for this project is to relieve exposure to post-contingency thermal overloading of the Luther Forest- Eastover Road #308, 115kV line with the Global Foundries planned expansion. Once the new station is constructed, it will absorb distribution load from the surrounding community and allow for the eventual retirement of the existing 34.5/13.2kV Randall Road Substation and the 34.5/4.8kV Shore Road Substation.

Projected Construction Start Date – October 2017

Station Ready for Load – July 2019

Partridge St – Avenue A #5, 34.5kV Cable Replacement

The Partridge St – Ave A #5 cable has not been filled with nitrogen for more than 20 years due to numerous leaks which can no longer be repaired to maintain pressure. When not filled with gas this type of cable is at a greater risk for failure.

This project calls to replace approximately 7,000 feet of 350 Cu gas filled cable with 3-1/C 500 kcmil Cu EPR 35kV cable within a concrete encased, 5” 2x2 duct line system. Approximately 2,300 feet of new manhole and duct-line will be built from the intersection of Partridge Street and Washington Avenue to Partridge Street and Madison Avenue in Albany, NY.

Construction – Ongoing

Projected Completion Date:

- Civil work – April 2017
- Cable work – April 2019

Grooms Road Transformer Replacement

This project will replace the existing transformer banks TB1 and TB2 at the Grooms Road Substation. The primary driver for this project is asset condition. The LTCs on these units have a history of chronic failures, and the design is prone to consistent and complicated mechanical issues. The secondary driver is system capacity. As the surrounding Clifton Park, NY area continues to grow; the existing transformer capacity is no longer sufficient.

Construction – Ongoing

Projected Completion Date – December 2017

Rotterdam 13852 & 13853 - Lock 8 Mohawk River Relocation

Per Canal Authority request, the Company will be relocating two distribution feeder getaways, the Rotterdam 13852 and 13853, off of Erie Canal Lock 8 in Rotterdam, NY. These getaways are vital to our distribution system as they serve large portions Scotia and Glenville, including the Scotia Industrial Park just north of the lock on State Route 5.

This project calls for installing a river crossing, via directional bore, for both distribution feeders using 1000 MCM Cu UG cable.

Projected Construction Start Date – April 2017

Projected Completion Date - December 2017

Samaritan Hospital 34.5kV Upgrade

Samaritan Hospital in Troy, NY has multiple, distribution-level electric services to the main campus; with a cumulative peak kW (demand) load approaching 3 MW. Samaritan is now requesting an increase of another 2.5MW. This additional load will bring the total load past 6MVA. National Grid has performed a thorough analysis of the proposed load increase at this site and the related impacts on the Company's local medium voltage distribution in the area, which presently serves Samaritan Hospital. In consideration of the projected electrical demand planned for this site and the related operation of various motors and related impacts from motor starting and transient operations, National Grid will not be able to support this load increase on its existing system.

This project was developed to extend the existing 34.5kV sub-transmission system in the area, to their facility. This involves the installation of a new manhole and duct-line system from the Tibbets Avenue Substation to the entrance of Samaritan Hospital on Peoples Avenue, approximately 4,800 feet. It calls for the extension of the North Troy – Tibbets #2 and #7, 34.5kV sub-transmission lines from Tibbets Avenue Substation to Samaritan through new civil construction. The project also calls for the upgrade of approximately 6,250 feet of the Liberty Street – Tibbets #8 feeder from Tibbets Avenue Substation to riser pole 302 from 400 MCM Cu cable to two parallel 500 MCM compact Cu cables.

Projected Construction Start Date – FY17

Projected Completion Date – FY17

Van Dyke Station Project

The installation of a new large commercial development referred to as Vista Tech Park in Bethlehem, NY drives the need for this project. This project calls for creating the new 115/13.2kV Van Dyke Substation. This station will provide improved electric service reliability by relieving load issues, add the capacity necessary to provide electric service to the Vista Tech Park, approximately 12 MVA, and also allow for the retirement of the aging and near capacity Juniper and Delmar Substation

Construction – Ongoing

Projected Completion Date – FY20

Nassau-Hudson #9 34.5kV Recloser installation Auto-sectionalizing scheme.

Continuous interruptions on this line south of Stuyvesant Station caused the R9 at Hudson to lock out, thereby removing the customers and Stuyvesant Hydro Generating Plant from service. This re-build job and installation of reclosers will create an auto-sectionalizing scheme so that Stuyvesant Station can be transferred to the Greenbush Nassau #6 line in the event of a fault on the Nassau-Hudson #9 line.

Construction – Ongoing

Projected Completion Date – FY18

Hudson 08753 Conversion Convert Existing Feeder Tie to 13.2 kV

This Hudson 08753 section on White Birch Road has a primary voltage of 1-phase 4.8kV via a step-down ratio off of Route 9G. The existing single-phase ratio is at its summer normal limits. This gas closure, rebuild, and conversion will allow for the necessary load relief on White Birch Road, as well as, extend 3-phase from the Hudson 08753 to Buckley Corners 45451 3-phase future tie. Open and scheduled for completion in FY18.

Construction – Ongoing

Projected Completion Date – FY18

Albany Network Equipment

There is an annual program for Albany area networks to review and change transformers and protectors due to deterioration as needed. The Albany area has approximately 250 vaults containing network transformers and protectors. The goal of this program is to replace the equipment before failure occurs. More detail on the low voltage AC network can be found in section 1.g.

Major Capital Projects for Capital Region:

Region	Project Name	Project Type	Fin Sys Project No.	Finish	Total Spend
CAPITAL	VAN DYKE STATION – NEW 53 DIST FEEDER	D LINE	C046493	07/24/17	\$1,887,239
CAPITAL	VAN DYKE STATION – NEW 115/13.2kV	D LINE	C046490	03/15/2018	\$495,000

g. DISCUSSION OF REGIONAL PERFORMANCE OF LOW VOLTAGE AC (LVAC) NETWORK DISTRIBUTION SYSTEM(S)

Albany Secondary (LVAC) Network

The Albany secondary network serves the downtown area of Albany, NY and is supplied by 10 – 13.2 KV feeders that originate from the Riverside and Trinity Substations. This system serves approximately 3060 customer accounts and experienced a peak load of approximately 29.2 MVA in 2016.

The table below lists each distribution circuit serving the Albany secondary Network with the number of events that caused an operation of the Substation Breaker.

Substation	Feeder	# Breaker Operations from Faults / Failures
Riverside	28801	0
Riverside	28802	0
Riverside	28805	1
Trinity	16406	1
Riverside	28807	1
Trinity	16408	0
Trinity	16410	0
Riverside	28811	0
Riverside	28812	0
Riverside	28815	1

As shown above the Albany Secondary Network experienced a total of 4 unplanned distribution circuit outages in 2016. At no time was this network operated beyond its double contingency (N-2) design criteria.

Major equipment replacements in 2016 consisted of 1 transformer, 4 network protectors, and 1 transformer vault roof replacement. Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

Troy Secondary (LVAC) Network

The Troy Secondary Network serves the downtown area bounded by River St., Congress St., and Union St. This network is supplied by 6 – 4.160 KV and 2 – 13.2 KV feeders that originate from the Liberty Street Substation. This system serves approximately 1579 customer accounts and experienced a peak load of approximately 10.5 MVA in 2016.

The table below lists each distribution circuit serving the Troy Secondary Network with the number of events that caused an operation of the Substation Breaker.

Substation	Feeder	# Breaker Operations from Faults / Failures
Liberty	09425	0
Liberty	09427	0
Liberty	09431	0
Liberty	09432	0
Liberty	09442	0
Liberty	09444	0
Liberty	09451	1
Liberty	09411	0

As shown above the Troy Secondary Network experienced a total of 1 unplanned distribution circuit outage in 2016. At no time was this network operated beyond its double contingency (N-2) design criteria.

Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

Schenectady Secondary (LVAC) Network

The Schenectady Secondary Network serves the downtown area around State Street from Nott Terrace to Washington Avenue, Erie Boulevard from State Street to River Road, and Broadway to Smith Street. This network is supplied by 5 – 13.2 KV feeders that originate from the Front Street Substation. This system serves approximately 1200 customer accounts and experienced a peak load of approximately 12.0 MVA in 2016.

The table below lists each distribution circuit serving the Schenectady Secondary Network with the number of events that caused an operation of the Substation Breaker.

Substation	Feeder	# Breaker Operations from Faults / Failures
Front	36002	0
Front	36003	0
Front	36006	1
Front	36007	0
Front	36008	1

As shown above, the Schenectady Secondary Network experienced a total of 2 unplanned distribution circuit outages in 2016. At no time was this network operated beyond its double contingency (N-2) design criteria.

Major equipment replacements in 2016 consisted of 1 transformer and 2 network protectors. Equipment maintenance in 2016 consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

2. OPERATING CIRCUIT LISTS

The next three (3) tables will provide the following information for the Capital Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by # of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

CAPITAL REGION

FEEDER #	A CUST. SERVED	B TOTAL INTER.	C # CUST. INTER.	D CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
ALTAMONT 28356	2,311	49	8,867	16,272	3.84	7.04	1.84	1
ELNORA 44256	2,223	29	8,150	20,799	3.67	9.36	2.55	0
BETHLEHEM 02158	2,737	31	10,195	22,039	3.72	8.05	2.16	2
FRONT ST 36053	1,594	19	7,426	14,168	4.66	8.89	1.91	0
BLUE STORES 30351	2,124	38	4,090	15,127	1.93	7.12	3.70	6
BLUE STORES 30352	1,091	31	1,626	9,711	1.49	8.90	5.97	1
REYNOLDS RD 33452	1,061	15	4,293	7,087	4.05	6.68	1.65	1
SWAGGERTOWN 36453	2,123	31	4,109	9,538	1.94	4.49	2.32	0
BOYNTONVILLE 33351	1,956	56	4,428	6,850	2.26	3.50	1.55	0
TRINITY PLACE 16456	1,183	13	2,759	11,419	2.33	9.65	4.14	2
WOLF ROAD 34451	2,021	23	4,426	8,312	2.19	4.11	1.88	3
SELKIRK 14952	1,579	18	3,951	7,002	2.50	4.43	1.77	1
FRONT ST 36051	3,284	33	7,495	9,095	2.28	2.77	1.21	4
HOOSICK 31451	1,638	27	4,852	5,081	2.96	3.10	1.05	0
MCCLELLAN ST 30452	3,028	18	7,267	9,811	2.40	3.24	1.35	4
OATHOUT LN 40251	725	26	1,860	2,916	2.57	4.02	1.57	2
MAPLEWOOD 30751	2,746	14	5,863	11,277	2.14	4.11	1.92	4
MAPLEWOOD 30753	2,183	16	5,042	7,619	2.31	3.49	1.51	2

Regional Goals:
CAIDI Min. 2.00
SAIFI Min. 0.90

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES

CAPITAL REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
ALTAMONT 28356	1.84	2.75	1.51	2.30	3.84	0.26	3.41	0.49
ELNORA 44256	2.55	1.33	2.11	0.88	3.67	1.61	1.38	1.14
BETHLEHEM 02158	2.16	2.44	3.74	1.58	3.72	0.62	0.51	1.62
FRONT ST 36053	1.91	1.37	1.91	1.17	4.66	7.48	0.43	1.08
BLUE STORES 30351	3.70	3.18	2.60	3.68	1.93	0.72	2.52	1.35
BLUE STORES 30352	5.97	2.35	4.69	11.46	1.49	0.37	1.13	0.46
REYNOLDS RD 33452	1.65	2.93	3.67	1.77	4.05	0.35	0.18	1.00
SWAGGERTOWN 36453	2.32	2.11	4.06	0.84	1.94	1.08	0.36	0.69
BOYNTONVILLE 33351	1.55	2.92	3.14	2.16	2.26	1.81	2.83	2.24
TRINITY PLACE 16456	4.14	3.80	2.81	1.49	2.33	0.11	0.20	1.20
WOLF ROAD 34451	1.88	1.70	1.27	1.78	2.19	0.23	2.70	0.07
SELKIRK 14952	1.77	3.68	N/A	N/A	2.50	2.71	N/A	N/A
FRONT ST 36051	1.21	N/A	N/A	N/A	2.28	N/A	N/A	N/A
HOOSICK 31451	1.05	2.33	3.41	2.21	2.96	1.88	1.53	1.19
MCCLELLAN ST 30452	1.35	2.42	2.47	1.00	2.40	0.18	1.29	1.17
OATHOUT LN 40251	1.57	2.19	5.82	4.32	2.57	0.07	0.63	0.15
MAPLEWOOD 30751	1.92	0.95	0.62	0.96	2.14	1.28	2.13	0.35
MAPLEWOOD 30753	1.51	1.24	0.81	2.87	2.31	3.17	1.33	0.11

Regional Goals:
CAIDI Min. 2.00
SAIFI Min. 0.90

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

CAPITAL REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

This year, the Capital Region's list of Worst Feeders consists of eighteen 13.2kV feeders.

For the Capital Region the PSC minimum CAIDI is 2.00 and PSC minimum SAIFI is 0.90.

1. ALTAMONT 28356 – 13.2kV

Profile: 2,311 Customers, 133.937 Circuit Miles

Indices: CAIDI = 1.84, SAIFI = 3.84

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	22.45%	3,118	35.16%	5,973	36.71%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	14	28.57%	5,006	56.46%	9,051	55.63%
6	ACCIDENTS	5	10.20%	140	1.58%	201	1.24%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	3	6.12%	19	0.21%	70	0.43%
10	UNKNOWN	16	32.65%	584	6.59%	977	6.00%
	Totals	49	100.00%	8,867	100.00%	16,272	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Altamont 28356 in 2016.
- There were zero substation interruptions that affected the Altamont 28356 in 2016.
- All forty-nine interruptions on the Altamont 28356 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Altamont 28356 experienced one momentary operation in 2016.
- The distribution circuit breaker for the Altamont 28356 experienced three sustained operations (lockouts) in 2016. These interruptions accounted for 77% of the total amount of customers interrupted (6,871 of 8,867) and 75% of the total amount of the customer-hours interrupted (12,370 of 16,272).
 - The first lockout occurred on July 3rd as a result of tree conditions. A large tree fell on Route 146, taking 3-phase wire down to the ground. This lockout accounted for 26% of the total customers interrupted (2,309 of 8,867), and 27% of the total customer hours interrupted (4,349 of 16,272).
 - The second lockout occurred on January 16th as a result of equipment failure. A broken insulator on Altamont Road, allowed conductor to drop down to the ground. This lockout accounted for 26% of the total customers interrupted (2,281 of 8,867) and 19% of the total customer hours interrupted (3,079 of 16,272).
 - The third lockout occurred on January 16th as a result of equipment failure. A bad press connection on pole 250 let loose on Altamont Road and allowed the conductor to drop down to the ground. This lockout accounted for 26% of the total customers

interrupted (2,281 of 8,867) and 30% of the total customer hours interrupted (4,942 of 16,272).

- The distribution circuit experienced four interruptions that involved 3-phase, but were not associated with the circuit breaker, which affected 120 or more customers. The isolating devices involved with these 3-phase interruptions include one recloser, one set of fused disconnects and one set of solid blade disconnects. These interruptions accounted for 11% of the total amount of customers interrupted (937 of 8,867) and 9% of the total amount of customer-hours interrupted (1,558 of 16,272).
 - The first interruption occurred on January fourth as a result of a device failure. A broken cutout at pole 33 Westfall Street, caused the need for an outage to repair the cutout safely. This interruption accounted for 1% of the total customers interrupted (126 of 8,867) and 1% of the total customer-hours interrupted (223 of 16,272).
 - The second interruption occurred on February 12th as a result of a device failure. A broken cutout at pole 33 Westfall Street, caused the need for an outage to repair the cutout safely. This interruption accounted for 1% of the total customers interrupted (126 of 8,867) and 2% of the total customer-hours interrupted (365 of 16,272).
 - The third interruption occurred on July 15th when as a result of animal contact when one of three line fuses was blown at pole 1 Brandle Road. The line was patrolled by line crews and the animal was found. The fuse was closed back in, restoring power to all the customers. The interruption accounted for 1% of total customers interrupted (128 of 8,867) and 0.9% of total customer hours interrupted (145 of 16,272).
 - The fourth interruption occurred on October 23rd. The cause of this outage was tree relate. Disconnects were opened at pole 33 Western Ave and pole 78 Township road to repair damage equipment and remove a tree that fell on a section of the three phase between pole 55 and pole 56 on Township Road. The emergency repair and interruption caused an interruption to all customers downstream of that point on the Altamont 28356. This interruption accounted for 6% of total customers interrupted (557 of 8,867) and 4% of total customer hours interrupted (697 of 16,272).
- Equipment failures were the leading cause of the number of interruptions with 56% of the total amount (5,006 of 8,867) of customers interrupted and also the leading cause of customer-hours interrupted with 56% of the total amount (9,051 of 16,272).
- Thirty-five of the forty-nine interruptions that occurred on the Altamont 28356 in 2016 affected thirty customers or less.

Action Taken:

- There are three pole top reclosers installed on the Altamont 28356. The reclosers have proven to be beneficial to the reliability of the feeder since two of the mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized CI and CHI over the past year for the Altamont 28356.
- A maintenance foot patrol (I&M inspection) was performed on the Altamont 28356 in 2013 and all identified maintenance has been completed.
- An Engineering Reliability Review (ERR) was performed on the Altamont 28356 in FY16 and all recommended changes from the ERR were completed in FY16.
- Routine tree trimming/pruning on the Altamont 28356 was completed in FY16.

- Enhanced Hazard Tree Maintenance (EHTM) which removed 81 danger trees was completed on the Altamont 28356 in FY16.

Action Plan:

- A maintenance foot patrol (I&M inspection) of the Altamont 28356 is scheduled for FY18. Thereafter, complete all identified level 1 maintenance on the Altamont 28356 by the end of FY18.
- Single phase line recloser (trip saver) to be added at pole 30 Knox Cave Road and pole 24 Settles Hill Road for improved reliability
- One ratio is due to be replaced on pole 29 Knox Cave Road in Knox on the Altamont 28356 feeder for improved reliability.
- Altamont TB1 transformer is scheduled for replacement in FY19 for increase capacity and improved reliability.

2. ELNORA 44256 – 13.2kV

Profile: 2,223 Customers, 55.7 Circuit Miles

Indices: CAIDI = 2.55, SAIFI = 3.67

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	27.59%	4,044	49.62%	15,414	74.11%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	34.48%	1,655	20.31%	938	4.51%
6	ACCIDENTS	6	20.69%	67	0.82%	95	0.46%
7	PREARRANGED	1	3.45%	22	0.27%	6	0.03%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	13.79%	2,362	28.98%	4,346	20.90%
Totals		29	100.00%	8,150	100.00%	20,799	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Elnora 44256 in 2016.
- There were zero substation interruptions that affected the Elnora 44256 in 2016.
- All twenty-nine interruptions for the Elnora 44256 occurred on the distribution system.
- The distribution circuit breaker for the Elnora 44256 experienced one sustained operation (lockout) in 2016. The interruption occurred on September 10th as a result of unknown conditions causing primary conductor to burn down at pole 55 on Route 146A, locking out the feeder. This interruptions accounted for 27% of the total amount of customers interrupted (2,223 of 8,150), and 20% of the total amount of the customer-hours interrupted (4,150 of 20,799).
- There were four interruptions on the Elnora 44256 that involved 3-phase mainline, but were not associated with the circuit breaker, which affected 300 or more customers. The isolating devices were two sets of solid disconnects and two pole top reclosers. These interruptions accounted for 61% of the total amount of customers interrupted (5,002 of 8,150) and 63% of the total amount of customer-hours interrupted (13,118 of 20,799).
 - The first interruption occurred on February 11th as a result of tree damage. Crews opened disconnects at pole 17H MacElroy Rd to clear trees from primary cable between poles 17H and 6 MacElroy Rd. This interruption accounted for 18% of the total amount of customers interrupted (1,434 of 8,150) and 15% of the total amount of customer-hours interrupted (3,108 of 20,799).
 - The second interruption occurred on August 16th as a result of a device failure. A primary conductor burned down between poles 55 and 56 Route 146A. Crews isolated the outage by opening disconnect switches at poles 55 and 66 to backfeed downstream customers. They then repaired the conductor, restoring power to all

the customers affected. This interruption accounted for 20% of the total amount of customers interrupted (1,600 of 8,150) and 2% of customer-hours interrupted (496 of 20,799).

- The third interruption occurred on October 27th as a result of tree damage. Trees fell at various locations on the Elnora 44256, resulting in the recloser at pole 30 MacElroy Rd locking out. Crews cleared the trees and closed in the recloser, restoring power to all the customers affected. This interruption accounted for 18% of the total amount of customers interrupted (1,501 of 8,150) and 25% of customer-hours interrupted (5,128 of 20,799).
- The fourth interruption also occurred on October 27th as a result of tree damage. Tree limbs took down primary conductor between poles 258 and 259 Kingsbury Road, resulting in the recloser at pole 5 Blue Barn Rd locking out. Crews cleared the trees and repaired the primary conductor then closed in the recloser, restoring power to all the customers affected. This interruption accounted for 4% of the total amount of customers interrupted (360 of 8,150), and 21% of customer-hours interrupted (4,386 of 20,799).
- Trees were the largest cause of Customers Interrupted on the Elnora 44256 in 2016, interrupting service to 4,044 customers (50%) and accounting for 15,414 customer-hours interrupted (74%).
- Unknown failures were the second largest cause of Customers Interrupted on the Elnora 44256 in 2016, interrupting service to 2,362 customers (29%) and accounting for 4,346 customer-hours interrupted (21%).
- Fourteen of the twenty-nine interruptions on the Elnora 44256 affected ten customers or less.

Action Taken:

- There were two pole top reclosers installed on the Elnora 44256. The reclosers have proven to be beneficial to the reliability of the feeder since two of the mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized CI and CHI over the past year for the Elnora 44256.
- A maintenance foot patrol of the Elnora 44256 was completed in 2016 and all identified level 1 maintenance has been completed
- Tree trimming/pruning for the Elnora 44256 was completed in FY13.

Action Plan:

- Complete all level 2 maintenance work that was identified by the 2016 I&M inspection (foot patrol) on the Elnora 44256 by October 2017.
- Complete all level 3 maintenance work that was identified by the 2014 I&M inspection (foot patrol) on the Elnora 44256 by October 2019.
- Routine tree trimming/pruning on the Elnora 44256 to be completed in FY18.

3. BETHLEHEM 02158 - 13.2kV

Profile: 2,737 Customers, 70.123 Circuit Miles

Indices: CAIDI = 2.16, SAIFI = 3.72

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	16.13%	96	0.94%	770	3.50%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	8	25.81%	5,611	55.04%	19,004	86.23%
6	ACCIDENTS	5	16.13%	3,673	36.03%	986	4.47%
7	PREARRANGED	6	19.35%	721	7.07%	921	4.18%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.23%	16	0.16%	119	0.54%
10	UNKNOWN	6	19.35%	78	0.77%	240	1.09%
Totals		31	100.00%	10,195	100.00%	22,039	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Bethlehem 02158 in 2016.
- There were zero substation interruptions that affected the Bethlehem 02158 in 2016.
- All 31 interruptions on the Bethlehem 02158 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Bethlehem 02158 experienced 2 momentary operations in 2016.
- The distribution circuit breaker for Bethlehem 02158 experienced four operations (manual operation) that led to a sustained interruption in 2016. These interruptions accounted for 90% of the total amount of customers interrupted (9,144 of 10,195) and 88% of the total amount of the customer-hours interrupted (19,496 of 22,039).
 - The first interruption occurred on May 30th as a result of device failure. A section of C-phase overhead conductor came down and Bethlehem 02158 was opened via EMS by ERCC. Crews replaced the damaged section of cable and closed the station breaker back in. This interruption accounted for 27% of the total amount of customers interrupted (2,740 of 10,195) and 13% of the total amount of customer-hours interrupted (2,877 of 22,039).
 - The second, third and fourth interruptions occurred all on November 19th as a result of a single device failure. A section of underground cable between pole 266 and pole 276 on Feura Bush Road failed. This second interruption was initially isolated by station relaying and circuit breaker. While crews were repairing the conductor and replacing the damaged pole, they isolated the failed section and then closed the station breaker back in at Bethlehem Station to reduce the amount of customers interrupted on the feeder. This was done after sectionalizing at pole

170 and again at pole 266 on Feura Bush Road. The feeder breaker was manually opened and closed back at the station at 12:36 to pick these customers up. And was again opened manually after the repairs were made and before the breaker was closed in for the entire circuit at 16:45 causing the second and third interruption to the customers who were picked up while the repairs were being made. These three interruptions accounted for 63% of the total amount of customers interrupted (6,404 of 10,195) and 75% of the total amount of customer-hours interrupted (16,619 of 22,039).

- There were two interruptions on the Bethlehem 02158 that involved 3-phase mainline, but were not associated with the circuit breaker, which affected seventy-five or more customers. The isolating devices were solid disconnects which were manually operated for voltage conversions that occurred thru-out the spring and summer of 2016. These two interruptions accounted for 6% of the total amount of customers interrupted (572 of 10,195) and 4% of the total amount of customer-hours interrupted (829 of 22,039).
 - The first interruption occurred on June 15th and was a manual open of a solid blade disconnect on pole 276 Feura Bush Road to isolate a section of overhead three phase conductor to perform a conversion tie safely. This was not a planned interruption and was determined that day to perform the additional outage to add an extra layer of safety for the conversion crews. This interruption accounted for 2% of the total amount of customers interrupted (174 of 10,195) and 1% of the total amount of customer-hours interrupted (258 of 22,039).
 - The second interruption occurred on June 21st and was a manual open of a solid blade disconnect on pole 209 Feura Bush Road to isolate a section of overhead three phase conductor to perform a conversion tie safely. This was not a planned interruption and was determined that day to perform the additional outage to add an extra layer of safety for the conversion crews. This interruption accounted for 4% of the total amount of customers interrupted (398 of 10,195) and 3% of the total amount of customer-hours interrupted (570 of 22,039).
- Equipment failure was the leading cause of the number of customers interrupted with 55% of the total amount (5,611 of 10,195) and was also the leading cause of customer-hours interrupted with 86% of the total amount (19,004 of 22,039)
- Nineteen of the thirty-one interruptions on the Bethlehem 02158 in 2016 affected thirty customers or less.

Action Taken:

- Bethlehem 02158 went thru extensive conversions and modifications in 2016 to convert it to 13.2kV which will allow for increase capacity.
- A maintenance foot patrol of the Bethlehem 02158 was completed in 2017 which removed over 200 danger trees.

Action Plan:

- Bethlehem 02158 recloser R20275 on pole 126 Elm Street is scheduled to be moved to pole 70 Elm Street to improve reliability.
- Bethlehem 02158 is currently involved in an enhanced Emerald Ash Bore tree mitigation project which has had 217 dead ash trees removed from Bethlehem 02158 ROW easements for a cost to date for the overall program of \$389,300.
- Engineering to review if the addition of a radial G&W recloser Cooper Type VWE 3-phase recloser with Form 4C control on pole 175 Feura Bush Road with integrated potential transformers and Schweitzer SEL-651R control. That will allow remote control of the recloser and remote access to recloser data. Is beneficial to Bethlehem 02158.
- Complete all identified level 1 maintenance items in 2017. And all level 2 and 3 maintenance work from the 2017 II&M&M inspection (foot patrol) on the Bethlehem 02158 by December 2019.
- Tree trimming/pruning for the Bethlehem 02158 scheduled to be completed in FY17.
- Distribution Engineering will perform an Engineering review of Bethlehem 02158 for locations of existing Reclosers for possible improved reliability.
- Complete all identified maintenance on the Bethlehem-Selkirk 34.5kV transmission lines in FY2018.
- Integrated Vegetation Management is scheduled for FY18 on the Bethlehem-Selkirk 34.5kV transmission lines.

4. FRONT ST 36053 – 13.2kV

Profile: 1,594 Customers, 24.2 Circuit Miles

Indices: CAIDI = 1.91, SAIFI = 4.66

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	0	0.00%	0	0.00%	0	0.00%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	7	36.84%	3,477	46.82%	8,596	60.67%
6	ACCIDENTS	5	26.32%	3,745	50.43%	4,395	31.02%
7	PREARRANGED	1	5.26%	31	0.42%	75	0.53%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	6	31.58%	173	2.33%	1,102	7.78%
Totals		19	100.00%	7,426	100.00%	14,168	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Front St 36053 in 2016.
- There were zero station interruptions that affected the Front St 36053 in 2016.
- All nineteen interruptions that affected the Front St 36053 occurred on the distribution system.
- The distribution circuit breaker for Front Street 36053 experienced three operations (lockouts) that led to sustained interruptions in 2016. These interruptions accounted for 64% of the total amount of customers interrupted (4,722 of 7,426) and 48% of the total amount of the customer-hours interrupted (6,747 of 14,168).
 - The first interruption occurred on February 24th as a result of a device failure. The Front Street 36053 getaway failed, resulting in the R530 locking out. Crews isolated and repaired the cable. This interruption accounted for 21% of the total amount of customers interrupted (1,550 of 7,426) and 28% of the total amount of the customer-hours interrupted (3,978 of 14,168).
 - The second interruption occurred on March 29th as a result of device failure. An outage on the Front St 36052, coupled with a slow operating R520 breaker, resulted in the R530 breaker locking out. This interruption accounted for 21% of the total amount of customers interrupted (1,595 of 7,426) and 10% of the total amount of customer-hours interrupted (1,409 of 14,168).
 - The third interruption occurred on July 19th as a result of a vehicle accident. A motor vehicle hit pole 76 Maxon Road, causing the station breaker to lock out. Crews isolated and repaired the damaged pole. This interruption accounted for

21% of the total amount of customers interrupted (1,577 of 7,426) and 10% of the total amount of customer-hours interrupted (1,359 of 14,168).

- The distribution circuit experienced two interruptions that involved 3-phase mainline, but were not associated with the circuit breaker, which affected 300 or more customers. The isolating devices involved with these 3-phase interruptions were disconnect switches and a pole top recloser. These interruptions accounted for 26% of the total amount of customers interrupted (1,953 of 7,426) and 18% of the total amount of customer-hours interrupted (2,597 of 14,168).
 - The first interruption occurred on March 15th as a result of a vehicle accident. A motor vehicle hit pole 111 on Saratoga Road. Crews isolated the pole, by opening disconnect switches at pole 94 Saratoga Road, and made repairs. This interruption accounted for 9% of the total amount of customers interrupted (705 of 7,426) and 4% of the total amount of the customer-hours interrupted (529 of 14,168).
 - The second interruption occurred on December 29th as a result of a vehicle accident. A motor vehicle hit pole 89 Saratoga Road, resulting in the recloser at pole 39 Freemans Bridge Road locking out. Crews isolated the pole, and made repairs. This interruption accounted for 17% of the total amount of customers interrupted (1,248 of 7,426) and 15% of the total amount of the customer-hours interrupted (2,069 of 14,168).
- Accidents were the largest cause of Customers Interrupted on the Front St 36053 in 2016, interrupting service to 3,745 customers (50%) and accounting for 4,395 customer-hours interrupted (31%).
- Equipment failure was the second largest cause of Customers Interrupted on the Front St 36053 in 2016, interrupting service to 3,477 customers (47%) and accounting for 8,596 customer-hours interrupted (61%).
- Six of the nineteen interruptions affected ten customers or less.

Action Taken:

- Removed approximately 1,000 feet of direct buried 750 Al and 2,800 feet of overhead distribution, which functioned as the circuit getaway from the station, and along the Mohawk River to Freemans Bridge. Thereafter, began the relocation of the feeder getaways underground, using 5,500 of the over 25,400 feet of 1,000 MCM Cu conductor in a planned manhole and duct-line installation. This was done to accommodate the \$150M transformation of the former American Locomotive Company (ALCO) site along the Mohawk River in Schenectady, NY into upscale apartments, restaurants, retail stores, condos, a hotel, offices, and a casino. This will be known as Mohawk Harbor.

- The Front St Station transformer TB2 was replaced after it failed on February 24th. A mobile transformer was temporarily installed in place to support the over 5,900 customers normally served from TB2 until the permanent replacement TB2 was installed on May 6th.
- There are two pole top reclosers installed on the Front Street 36053 feeder. The reclosers have proven to be beneficial to the reliability of the feeder since three of the mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized CI and CHI over the past year for the Front Street 36053.
- A maintenance foot patrol of the Front St 36053 was completed in 2014 and all identified level 1 and 2 maintenance has been completed.
- Tree trimming/pruning for the Front St 36053 was completed in FY13.

Action Plan:

- Complete the installation of over 5,500 feet of 1,000 MCM Cu through the Mohawk Harbor Site. This will function as the new getaway for the 36053, with its entire load north of the Freeman's Bridge remaining it, while its existing within Mohawk Harbor will be transferred to the new 36050 and 36051 feeders.
- Engineering to complete an Engineering Reliability Review (ERR) of the Front St 36053 in FY18.
- Complete all level 3 maintenance work that was identified by the 2014 I&M inspection (foot patrol) on the Front St 36053 by June 2017.
- Routine tree trimming/pruning on the Front St 36053 to be completed in FY18.

5. BLUE STORES 30351 - 13.2kV

Profile: 2,124 Customers, 111.094 Circuit Miles
Indices: CAIDI = 3.70, SAIFI = 1.93

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	14	36.84%	3,337	81.59%	12,914	85.37%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	13	34.21%	441	10.78%	1,517	10.03%
6	ACCIDENTS	3	7.89%	202	4.94%	561	3.71%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	8	21.05%	110	2.69%	135	0.89%
Totals		38	100.00%	4,090	100.00%	15,127	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Blue Stores 30351 in 2016.
- There were zero substation interruptions that affected the Blue Stores 30351 in 2016.
- All thirty-eight interruptions that affected the Blue Stores 30351 in 2016 occurred on the distribution system.
- The distribution circuit breaker for Blue Stores 30351 experienced 6 momentary operations in 2016.
- The distribution circuit breaker for the Blue Stores 30351 experienced one operation (lockout) that led to a sustained interruption in 2016. It occurred on July 2nd as a result of tree contact. A tree came down on pole 3 Buckwheat Bridge, causing the station breaker to lock out. Crews isolated and replaced the damaged section, thereby restoring power to all customers. The interruption accounted for 51% of customers interrupted (2,074 of 4,090) and 32% of the total amount of customer-hours interrupted (4,874 of 15,127).
- There were four interruptions on the Blue Stores 30351 in 2016 involving 3-phase mainline facilities, but were not associated with the circuit breaker, affecting over one hundred customers. All four of these interruptions were associated with existing 3-phase pole top reclosers.
 - The first interruption occurred on May 31st when the pole top recloser at pole 12 County Highway #2 opened due to animal contact causing the pole top recloser at pole 12 County Highway 2 to lockout. Crews patrolled the line and the animal was found. And closed the recloser back in restoring power to all the customers. The animal contact caused interruption accounted for 5% of the total amount of customers interrupted (199 of 4,090) and 4% of the total amount of customer-hours interrupted (544 of 15,127).

- The second interruption occurred on July 1st as a result of tree conditions. A tree on US Highway 9 fell on primary conductor causing the pole top recloser at pole 383-1/2 US Highway 9 to lockout. Crews cleared the tree conditions, repaired the conductor, and closed the recloser back in. This interruption accounted for 14% of the total amount of customers interrupted (590 of 4,090) and 36% of the total amount of customer-hours interrupted (5,517 of 15,127).
- The third interruption occurred on August 10th as a result of tree conditions. A tree at pole 4 Old Cap Road fell on primary conductor causing the pole top recloser at pole 12 County Highway 2 to lockout. Crews cleared the tree conditions, repaired the conductor, and closed the recloser back in. Taps were opened to isolate and make repairs. This interruption accounted for 5% of the total amount of customers interrupted (197 of 4,090) and 3% of the total amount of customer-hours interrupted (485 of 15,127).
- The fourth interruption occurred on September 7th as a result of tree conditions. A tree at pole 13 Beaver Road fell on primary conductor causing the pole top recloser at pole 12 County Route 2 to lockout. Crews cleared the tree conditions, repaired the conductor, and closed the recloser back in. This interruption accounted for 5% of the total amount of customers interrupted (198 of 4,090) and 5% of the total amount of customer-hours interrupted (825 of 15,127).
- Trees were the leading cause of customers interrupted accounting for 82% of the total amount (3,337 of 4,090), and trees were also the leading cause of customer-hours interrupted accounting for 85% of the total amount (12,914 of 15,127).
- Twenty-six of the thirty-eight interruptions affected twenty customers or fewer.

Action Taken:

- There are four pole top reclosers installed on the Blue Stores 30351. These reclosers have proven to be beneficial to the reliability of this feeder since five out of six of the mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers minimized CI and CHI over the past year on the Blue Stores 30351.
- A maintenance foot patrol of the Blue Stores 30351 was completed in 2013, and all identified level 1, 2 and 3 maintenance has been completed.
- Enhanced Hazard Tree Mitigation (EHTM) on the Blue Stores 30351 was completed in FY15.
- Engineering Reliability Review (ERR) of the Blue Stores 30351 completed in FY15 and all associated recommendations completed in FY16.
- A small capital improvement project was designed and completed to replace a row of poles out of a swamp onto Camp Road in Gallatin for reliability improvement.
- A small capital improvement project was designed and completed to replace underground cable in the Vineyard Court URD on Blue Stores 30351 in 2016 for improved reliability.

Action Plan:

- Maintenance foot patrol is scheduled for 2018 for Blue Stores 30351.
- Four overloaded ratios are being replaced on Blue Stores 30351 for improved reliability at pole 1 Parker Road in Livingston NY, pole 1 on Loyola Road in Livingston NY, pole 11h on Maple Lane in Livingston NY and pole h on White Oak Road in Livingston NY.
- Tree trimming on the Blue Stores 30351 is on-going and due to be completed in FY17, and has removed over 190 hazard trees to date.

6. BLUE STORES 30352 - 13.2kV

Profile: 1,091 Customers, 52.123 Circuit Miles

Indices: CAIDI = 5.97, SAIFI = 1.49

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	15	48.39%	1,451	89.24%	9,286	95.63%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	19.35%	21	1.29%	59	0.61%
6	ACCIDENTS	5	16.13%	131	8.06%	221	2.27%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	6.45%	18	1.11%	118	1.21%
10	UNKNOWN	3	9.68%	5	0.31%	27	0.28%
Totals		31	100.00%	1,626	100.00%	9,711	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Blue Stores 30352 in 2016.
- There were zero substation interruptions that affected the Blue Stores 30352 in 2016.
- The distribution circuit breaker for Blue Stores 30352 experienced zero momentary operations in 2016.
- The distribution circuit breaker for the Blue Stores 30352 experienced one operation (lockout) that led to a sustained interruption in 2016. The interruption occurred on August 13th as a result of tree contact. A tree came down on pole 85 Buckwheat Bridge, causing the station breaker to lock out. Crews isolated and replaced the damaged section, thereby restoring power to all customers. The interruption accounted for 67% of customers interrupted (1,086 of 1,626) and 28% of the total amount of customer-hours interrupted (2,725 of 9,711).
- The remaining thirty interruptions were distribution interruptions in 2016 that accounted for 33% of the total customers interrupted (540 of 1,626), and 72% of total customer-hours interrupted (6,986 of 9,711).
- The distribution circuit experienced one interruption involving 3-phase mainline (or 3-phase tap) facilities affecting one hundred or more customers. This event occurred on July 1st as a result of tree conditions. A tree at pole 427 ½ on East Camp fell on primary conductor causing the pole top fuses on pole 393 East Camp Road to operate. Crews cleared the tree conditions, repaired the conductor, replaced poles 4, 5 and pole 11 on Cemetery Road and replaced closed the fuses back in. This interruption accounted for 10% of total customers interrupted (157 of 1,626) and 48% of total customer-hours interrupted (4,653 of 9,711).

- Tree conditions was the leading cause of customers interrupted accounting for 89% of the total amount (1,451 of 1,626) and was also the leading cause of customer-hours interrupted with 96% of the total amount (9,286 of 9,711).
- Twenty-five of the thirty-one interruptions affected twenty customers or less.

Action Taken:

- The Blue Stores 30352 was tree trimmed in its entirety in 2016.
- A maintenance foot patrol was performed on the Blue Stores 30352 in March of 2016. All Level 1 maintenance on the Blue Stores 30352 was completed by January 2017.
- Enhanced Hazard Tree Mitigation (EHTM) on the Blue Stores 30352 was completed in FY16, which removed 197 danger trees.

Action Plan:

- Complete Level 2 maintenance on the Blue Stores 30352 by March 2017.
- Complete Level 3 maintenance on the Blue Stores 30352 by March 2018.
- A small capital improvement project was designed and scheduled to be completed in FY20 to re-conductor and convert from Blue Stores 30352 to Hudson 08753 for Route 9, Main Street and Hoover Ave in Germantown NY. This conversion and re-conductor will improve reliability and shorten lengths of outages with this ability to tie between these two feeders.

7. REYNOLDS RD 33452 - 13.2kV

Profile: 1,061 Customers, 19.224 Circuit Miles

Indices: CAIDI = 1.65, SAIFI = 4.05

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	1	6.67%	1	0.02%	3	0.05%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	6.67%	1,065	24.81%	959	13.53%
5	EQUIPMENT	7	46.67%	2,149	50.06%	5,290	74.64%
6	ACCIDENTS	2	13.33%	1,064	24.78%	819	11.55%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	26.67%	14	0.33%	17	0.23%
Totals		15	100.00%	4,293	100.00%	7,087	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Reynolds Road 33452 in 2016.
- There were zero substation interruptions that affected the Reynolds Road 33452 in 2016.
- All fifteen interruptions that affected the Reynolds Road 33452 in 2016 occurred on the distribution system.
- The distribution circuit breaker for Reynolds Road 33452 experienced one momentary operations in 2016.
- The distribution circuit breaker for Reynolds Road 33452 experienced four operations (lockout) that led to sustained interruptions in 2016. These interruptions accounted for 98% of the total amount of customers interrupted (4,214 of 4,293) and 97% of the total amount of the customer-hours interrupted (6,845 of 7,087).
 - The first interruption occurred on February 17th as a result of the underground conductor being dug up by Verizon between switchgear 8557 and switchgear 8176 on North Greenbush Road locking out the station breaker. Crews repaired the underground cable. This interruption accounted for 25% of the total amount of customers interrupted (1,065 of 4,293) and 14% of the total amount of the customer-hours interrupted (959 of 7,087).
 - The second interruption occurred on June 6th as a result of the underground getaway from the station sustaining a fault. Crews repaired the underground cable and closed the station breaker back in, restoring power to all the customers. This interruption accounted for 25% of the total amount of customers interrupted

- (1,056 of 4,293) and 23% of the total amount of customer-hours interrupted (1,654 of 7,087).
- The third interruption occurred on June 14th as a result of the underground conductor being dug up by a Contractor between intersection of Route 4 and 3rd Ave locking out the station breaker. Crews repaired the underground cable and closed the station breaker back in, restoring power to all the customers. This interruption accounted for 25% of the total amount of customers interrupted (1,056 of 4,293) and 11% of the total amount of customer-hours interrupted (792 of 7,087).
 - The fourth interruption occurred on December 16th and was equipment related. The switchgear pad 8205 on NY State Route 43 burned up locking out the station breaker. Crews replaced the switchgear and repaired the neighboring underground conductor and closed the station breaker back in, restoring power to all the customers. This interruption accounted for 24% of the total amount of customers interrupted (1,037 of 4,293) and 49% of the total amount of customer-hours interrupted (3,440 of 7,087).
 - Equipment failures was the leading cause of the number of customers interrupted with 50% of the total amount (2,149 of 4,293) and were also the leading cause of customer-hours interrupted with 75% of the total amount (5,290 of 7,087).
 - Ten of the fifteen interruptions on the Reynolds Road 33452 in 2016 affected eleven customers or less.

Action Taken:

- A maintenance foot patrol of the Reynolds Road 33452 was completed in 2014 and all identified Level 1 and 2 maintenance was completed before February 2015. All Level 3 were completed before 2016.
- Tree trimming/pruning for the Reynolds Road 33452 was completed in FY13 and is scheduled for CY17/FY18.

Action Plan:

- A maintenance foot patrol of the Reynolds Road 33452 is scheduled for 2017.
- Forestry department to perform routine tree trimming/pruning field check and mitigate any issues that occur on the Reynolds Road 33452 in FY17.

8. SWAGGERTOWN 36453 – 13.2kV

Profile: 2,123 Customers, 99.7 Circuit Miles

Indices: CAIDI = 2.32, SAIFI = 1.94

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	10	32.26%	2,696	65.61%	6,919	72.54%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	7	22.58%	68	1.65%	331	3.47%
6	ACCIDENTS	4	12.90%	1,027	24.99%	1,429	14.99%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	4	12.90%	4	0.10%	53	0.55%
10	UNKNOWN	6	19.35%	314	7.64%	805	8.44%
Totals		31	100.00%	4,109	100.00%	9,538	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Swaggertown 36453 in 2016.
- There were zero station interruptions that affected the Swaggertown 36453 in 2016.
- All thirty-one interruptions that affected the Swaggertown 36453 occurred on the distribution system.
- The distribution circuit experienced three interruptions that involved 3-phase mainline, but were not associated with the circuit breaker, which affected 300 or more customers. The isolating devices involved with these 3-phase interruptions were pole top reclosers. These interruptions accounted for 76% of the total amount of customers interrupted (3,104 of 4,109) and 68% of the total amount of customer-hours interrupted (6,508 of 9,538).
 - The first interruption occurred on May 24th as a result of a vehicle accident. A motor vehicle hit pole 7 Snake Hill Road, resulting in the recloser at pole 205 Sacandaga Rd locking out. Crews isolated and replaced the broken pole. This interruption accounted for 14% of the total amount of customers interrupted (581 of 4,109) and 9% of the total amount of the customer-hours interrupted (832 of 9,538).
 - The second interruption occurred on June 21st as a result of tree damage. A tree fell on primary conductor at pole 284 Sacandaga Road, resulting in the recloser at pole 263 Sacandaga Road locking out. Crews isolated and made repairs. This interruption accounted for 31% of the total amount of customers interrupted (1,255 of 4,109) and 37% of the total amount of the customer-hours interrupted (3,536 of 9,538).

- The third interruption occurred on July 15th as a result of tree damage. A tree fell on primary conductor at pole 303 Sacandaga Road, resulting in the recloser at pole 263 Sacandaga Road locking out. Crews isolated and made repairs. This interruption accounted for 31% of the total amount of customers interrupted (1,271 of 4,109) and 22% of the total amount of the customer-hours interrupted (2,140 of 9,538).
- Trees were the largest cause of interruptions on the Swaggertown 36453 in 2016, interrupting service to 2,696 customers (66%) and accounting for 6,919 customer-hours interrupted (73%).
- Accidents were the second largest cause of Customers Interrupted on the Swaggertown 36453 in 2016, interrupting service to 1,207 customers (25%) and accounting for 1,429 customer-hours interrupted (15%).
- Seventeen of the thirty-one interruptions on the Swaggertown 36453 in 2016 affected ten customers or less.

Action Taken:

- There are five pole top reclosers installed on the Swaggertown 36453. These reclosers have proven to be beneficial to the reliability of this feeder since three of the mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers minimized CI and CHI over the past year on the Swaggertown 36453.
- All work on the Swaggertown 36453 that is associated with the I&M inspection (foot patrol) that was performed in 2013 was completed in August 2016.
- Tree trimming/pruning for the Swaggertown 36453 was completed in FY16

Action Plan:

- Engineering to complete an Engineering Reliability Review (ERR) of the Swaggertown 36453 in FY18.

9. BOYNTONVILLE 33351 - 13.2kV

Profile: 1,956 Customers, 145.617 Circuit Miles

Indices: CAIDI = 1.55, SAIFI = 2.26

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	14	25.00%	1,775	40.09%	4,638	67.71%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	16	28.57%	2,063	46.59%	1,014	14.80%
6	ACCIDENTS	12	21.43%	146	3.30%	267	3.89%
7	PREARRANGED	1	1.79%	175	3.95%	38	0.55%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	1.79%	45	1.02%	158	2.30%
10	UNKNOWN	12	21.43%	224	5.06%	736	10.75%
Totals		56	100.00%	4,428	100.00%	6,850	100.00%

Problem Analysis:

- There was one transmission interruption that affected the Boyntonville 33351 in 2016 as a result of equipment failure. On May 15th the North Troy – Hoosick #3 transmission line tripped open removing Boyntonville TB1 transformer from service when a phase came down at Transmission Structure 172. This caused the downstream breakers to lockout, resulting in a sustained interruption to all distribution customers served from the Boyntonville Substation. North Troy – Hoosick #3 was restored and breaker R510 was closed. This interruption accounted for 44% of total customers interrupted (1,950 of 4,428), and 6% of total customer-hours interrupted (390 of 6,850).
- There were zero substation interruptions that affected the Boyntonville 33351 in 2016.
- The remaining fifty-five interruptions on the Boyntonville 33351 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Boyntonville 33351 experienced no momentary operations in 2016.
- There were three interruptions on the Boyntonville 33351 that involved 3-phase mainline, but were not associated with the circuit breaker, which affected one hundred or more customers. The isolating devices were pole-top reclosers operating automatically or manually operated. These interruptions accounted for 39% of the total amount of customers interrupted (1,748 of 4,428) and 58% of the total amount of customer-hours interrupted (3,962 of 6,850).
 - The first interruption occurred on January 11th as a result of a tree falling onto the conductors near pole 11 Balm Road, breaking pole 12 and dragging conductor down which opened the Recloser on pole 249 State Highway 7. This interruption

accounted for 27% of total customers interrupted (1,180 of 4,428), and 38% of total customer-hours interrupted (2,628 of 6,850).

- The second interruption occurred on June 14th as a result of device failure. The recloser at pole 514-A automatically opened to isolate the branch circuit when conductors came down at pole 107 State Highway 7. This interruption accounted for 4% of total customers interrupted (175 of 4,428), and 0.6% of total customer-hours interrupted (38 of 6,850).
- The third interruption occurred on July 31st as a result of a tree falling onto the conductors near pole 33 Babcock Lake Road, dragging the 3-phase conductor down which opened the Recloser on pole 7 Kautz Hollow Road. This section of main line was isolated to make repairs. This interruption accounted for 9% of total customers interrupted (393 of 4,428), and 19% of total customer-hours interrupted (1,297 of 6,850).
- Equipment failure was the leading cause of the number of Customers Interrupted with 47% of the total amount (2,063 of 4,428). Tree contacts were the leading cause of customer-hours interrupted with 68% of the total amount (4,638 of 6,850).
- Thirty-one of the fifty-six interruptions on the Boyntonville 33351 in 2016 affected ten customers or less.

Action Taken:

- There are six pole top reclosers installed on the Boyntonville 33351. The reclosers have proven to be beneficial to the reliability of the feeder since four of the mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized CI and CHI over the past year for the Boyntonville 33351.
- A I&M inspection (foot patrol) maintenance foot patrol of the Boyntonville 33351 was completed in July 2016. All level maintenance work that was identified has been completed.
- Enhanced Hazard Tree Mitigation (EHTM) was completed on the Boyntonville 33351 in FY15 which removed 523 danger trees.
- Routine tree trimming/pruning on the Boyntonville 33351 was completed in FY15.

Action Plan:

- Complete all level 2 and 3 maintenance work that was identified by the 2016 I&M inspection (foot patrol) on the Boyntonville 33351 by July 2017 and 2018, respectively.
- Forestry department to field check and mitigate any issues that are found on the Boyntonville 33351 to be completed in FY17.
- Four overloaded ratios to be replaced on Boyntonville 33351 at pole ½ Logwoods Road Pittstown NY, pole 2 Mickel Hill Road in Brunswick NY, pole 14-1/2 Keyler Ave in Grafton NY and pole 133 Tamarac Road in Pittstown NY all for improved reliability.

10. TRINITY PLACE 16456 - 13.2kV

Profile: 1,183 Customers, 7.278 Circuit Miles

Indices: CAIDI = 4.14, SAIFI = 2.33

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	0	0.00%	0	0.00%	0	0.00%
3	OVERLOADS	1	7.69%	1	0.04%	1	0.01%
4	OPER. ERROR	1	7.69%	1,191	43.17%	3,014	26.40%
5	EQUIPMENT	2	15.38%	1,185	42.95%	7,323	64.13%
6	ACCIDENTS	4	30.77%	174	6.31%	517	4.52%
7	PREARRANGED	1	7.69%	17	0.62%	9	0.08%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	30.77%	191	6.92%	555	4.86%
Totals		13	100.00%	2,759	100.00%	11,419	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Trinity Place 16456 in 2016.
- There was one substation interruption that affected the Trinity Place 16456 which occurred on March 6th. The cause of this interruption was cable fault on the 16456 getaway cable in Manhole 697. The level of fault in proximity to the station caused the 94B (13.2kV) bus to trip and lockout. Crews isolated Trinity Place 16456 and closed the bus back in. Then repaired the getaway cable on Trinity 16456, and closed the station breaker back in to restore power to all customers. This interruption accounted for 43% of the total amount of customers interrupted (1,184 of 2,759), and 64% of the total amount of customer-hours interrupted (7,319 of 11,419).
- The remaining twelve interruptions that affected the Trinity Place 16456 occurred on the distribution in 2016.
- The distribution circuit breaker for Trinity Place 16456 experienced two momentary operations in 2016.
- There was one distribution circuit breaker operation (lockout) that resulted in a sustained interruption to customers on the Trinity Place 16456 in 2016. The lockout occurred on December 21st as a result of equipment failure. The reclosing relay malfunctioned on Trinity 16456, resulting in a breaker lockout. I & C crews repaired the relay and Operations closed the breaker, restoring power to all customers. This interruption accounted for 43% of the total amount of customers interrupted (1,191 of 2,759), and 26% of the total amount of customer-hours interrupted (3,014 of 11,419).
- There were no large interruptions on the 3-phase mainline distribution system that was not associated with a substation breaker which affected over one hundred customers.

- Operator Error was the leading cause of customers interrupted accounting for 43% of the total amount (1,191 of 2,759) and Equipment Failure was the leading cause of customer-hours interrupted accounting for 64% of the total amount (7,323 of 11,419).
- Seven of the thirteen interruptions affected twenty customers or fewer.

Action Taken:

- The Inspection & Maintenance (I&M) inspection (foot patrol) of the Trinity Place 16456 was completed in June 2014, and all identified level 1 and 2 maintenance has been completed.
- There is one pole top reclosers currently in service on Trinity Place 16456.

Action Plan:

- Complete all Level 3 work on the Trinity Place 16456 that are associated with the I&M inspection (foot patrol) that was performed in 2014, by the end of June 2017.
- Tree trimming/pruning for the Trinity Place 16456 scheduled to be completed in CY17/FY18.
- A small capital improvement project was designed and is scheduled to be started in FY17 and completed in FY18 for the replacement of Trinity Station relaying and RTU/EMS for improved reliability and communication with ERCC.

11. WOLF ROAD 34451 - 13.2kV

Profile: 2,021 Customers, 19.777 Circuit Miles

Indices: CAIDI = 1.88, SAIFI = 2.19

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	0	0.00%	0	0.00%	0	0.00%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	4.35%	4	0.09%	11	0.13%
5	EQUIPMENT	11	47.83%	4,179	94.42%	7,736	93.06%
6	ACCIDENTS	10	43.48%	241	5.45%	561	6.75%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	4.35%	2	0.05%	5	0.06%
Totals		23	100.00%	4,426	100.00%	8,312	100.00%

Problem Analysis:

- There were zero transmission interruptions that affected the Wolf Road 34451 feeder in 2016.
- There was one substation interruptions that affected the Wolf Road 34451 feeder in 2016.
 - The interruption occurred on June 26th as a result of a get-away cable failure. The level of fault in proximity to the station caused the (13.2kV) bus to trip and lockout. Crews isolated Wolf Road 34451 and closed the bus back in. Then repaired the getaway cable on Wolf Road 34451, and closed the station breaker back in to restore power to all customers. This interruption accounted for 46% of the total amount of customers interrupted (2,020 of 4,426), and 65% of the total amount of the customer-hours interrupted (5,387 of 8,312).
- The remaining twenty-two interruptions on Wolf Road 34451 feeder occurred on the distribution system in 2016.
- The distribution circuit breaker for the Wolf Road 34451 experienced 3 momentary operations in 2016.
- The distribution circuit breaker for Wolf Road 34451 experienced one sustained interruption (lockout) in 2016.
 - The interruption occurred on July 5th as a result of overload when Wolf Road 34451 was tied to feeder 34452 when the 51 had a getaway failure. The total load on the 51 was transferred to Patroon 32352 and Wolf Road 51 breaker was closed back in at the station. This interruption accounted for 46% of the total amount of customers interrupted (2,020 of 4,426) and 25% of the total amount of the customer-hours interrupted (2,054 of 8,312).

- There were no interruptions on the Wolf Road 34451 feeder in 2016 that involved 3-phase mainline but were not associated with the circuit breaker, which affected one seventy-five or more customers.
- Equipment failures were the leading cause of customer interruptions, accounting for 94% of the total amount (4,179 of 4,426), and also the leading cause of customer-hours interrupted accounting for 93% of the total amount (7,736 of 8,312).
- Fifteen of the twenty-three interruptions on the Wolf Road 34451 in 2016 affected sixteen customers or less.

Action Taken:

- A maintenance foot patrol (I&M inspection) of the Wolf Road 34451 was completed August of 2016.

Action Plan:

- Tree trimming/pruning for the Wolf Road 34451 scheduled to be completed in 2017.
- Enhanced Hazard Tree Mitigation (EHTM) is scheduled on the Wolf Road 34451 in CY17/FY18.
- Monitor results of vegetation work from CY17/FY18 on the Wolf Road 34451.
- Complete all identified level 1 maintenance on the Wolf Road 34451 before August FY17.
- Complete all level 2 and 3 maintenance work that was identified by the 2016 I&M inspection (foot patrol) on the Boyntonville 33351 by June 2018 and 2019, respectively.

12. SELKIRK 14952 - 13.2kV

Profile: 1,579 Customers, 49.876 Circuit Miles

Indices: CAIDI = 1.77, SAIFI = 2.50

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	33.33%	2,005	50.75%	1,953	27.89%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	7	38.89%	1,824	46.17%	4,761	67.99%
6	ACCIDENTS	2	11.11%	52	1.32%	133	1.89%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	16.67%	70	1.77%	156	2.23%
Totals		18	100.00%	3,951	100.00%	7,002	100.00%

Problem Analysis:

- There was one transmission interruptions that affected the Selkirk 14952 in 2016 as a result of equipment failure. On February 17th the Bethlehem-Selkirk #5 transmission line tripped open removing Selkirk R510 and R520 breakers from service when a phase came down between Transmission Structure 82 to 83. This caused the downstream breakers to lock out, resulting in a sustained interruption to all distribution customers served from the Selkirk Substation. Bethlehem-Selkirk #5 transmission was restored, and breaker R520 was closed. This interruption accounted for 40% of total customers interrupted (1,578 of 3,951), and 60% of total customer-hours interrupted (4,182 of 7,002).
- There were zero substation interruptions that affected the Selkirk 14952 in 2016.
- The remaining 17 interruptions that affected the Selkirk 14952 in 2016 occurred on the distribution system.
- The distribution circuit breaker for Selkirk 14952 experienced one momentary operation in 2016.
- The distribution circuit breaker for Selkirk 14952 experienced one operation (lockout) that led to sustained interruption in 2016. This interruption accounted for 40% of the total amount of customers interrupted (1,567 of 3,951), and 18% of the total amount of the customer-hours interrupted (1,227 of 7,002).
 - The interruption occurred on June 13th as a result of tree conditions. Tree limbs fell on pole 432 Maple Ave causing the station breaker to lock-out. The tree limb was removed from the three-phase primary and breaker closed back in. This interruption accounted for 40% of the total amount of customers interrupted

(1,567 of 3,951) and 18% of the total amount of the customer-hours interrupted (1,227 of 7,002).

- Tree contact was the leading cause of customers interrupted accounting for 51% of the total amount (2,005 of 3,951) and equipment failure was the leading cause of customer-hours interrupted accounting for 68% of the total amount (4,761 of 7,002).
- Nine of the eighteen interruptions affected ten customers or fewer.

Action Taken:

- There are four 3-phase reclosers on the Selkirk 14952. They have been in service since 1999, 2011 and 2014.
- As part of the Selkirk 14952 feeder reconfiguration, a large portion of the 14951 was re-allocated to the 14952. In doing so, a new recloser was installed on what is now the 14952 (originally 14951) for improved reliability.
- Selkirk 14952 had about 1.7 miles of conversion to 13.2kV and reallocation to Bethlehem 02156 on Highway 9W from 4.8 to 13.2kV and a new 13.2kV tie with Selkirk 14952 was added. This conversion allows for transfers of the Selkirk to Bethlehem through this tie for improved reliability.
- A maintenance foot patrol (I&M inspection) of the Selkirk 14952 was completed in 2016, and all identified level 1 and 2 maintenance has been completed.

Action Plan:

- Portions of the US Highway 9, totaling about 300 customers, experienced multiple smaller outages. A project was created to install a recloser for US Highway #9 to improve reliability.
- All identified level 3 maintenance on the Selkirk 14952 is scheduled to be completed in FY18.
- Tree trimming for the Selkirk 14952 is ongoing in 2017 and will be completed FY17 which has removed over 815 hazard trees to date.
- Monitor results of vegetation work from the tree trimming on the Selkirk 14952.
- The I&M inspection (foot patrol) is scheduled for the 34.5kV transmission lines in FY2018. Thereafter, complete all identified maintenance on the Bethlehem-Selkirk 34.5kV transmission lines in FY2018.
- Integrated Vegetation Management is scheduled for FY18 on the Bethlehem-Selkirk 34.5kV transmission lines.

13. FRONT ST 36051 - 13.2kV

Profile: 3,284 Customers, 18.6 Circuit Miles

Indices: CAIDI = 1.21, SAIFI = 2.28

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	18.18%	860	11.47%	1,975	21.71%
3	OVERLOADS	1	3.03%	7	0.09%	16	0.18%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	13	39.39%	5,404	72.10%	5,130	56.40%
6	ACCIDENTS	10	30.30%	1,186	15.82%	1,885	20.73%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	9.09%	38	0.51%	89	0.98%
Totals		33	100.00%	7,495	100.00%	9,095	100.00%

Problem Analysis:

- There were zero transmission interruption that affected Front St 36051 in 2016.
- There were zero substation interruptions that affected the Front St 36051 in 2016.
- There were thirty-three interruptions on Front St 36051 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Front St 36051 experienced one sustained operation (lockout) in 2016. The interruption occurred on July 29th as a result of tree conditions. A tree branch fell on primary conductor on pole 163 Fifth St in Scotia. This interruptions accounted for 10% of the total amount of customers interrupted (722 of 7,495) and 17% of the total amount of the customer-hours interrupted (1,583 of 9,095).
- The distribution circuit experienced four interruptions that involved 3-phase mainline, but were not associated with the circuit breaker, which affected 300 or more customers. The isolating devices involved with these 3-phase interruptions include one pole top recloser and three sets of solid blade disconnects. These interruptions accounted for 82% of the total amount of customers interrupted (6,144 of 7,495) and 67% of the total amount of customer-hours interrupted (6,087 of 9,095).
 - The first interruption occurred on April 20th as a result of device failure. Crews needed to open solid disconnects at pole 129 Washington Ave in order repair a downstream connector. This interruption accounted for 27% of the total amount of customers interrupted (2,041 of 7,495) and 4% of the total amount of the customer-hours interrupted (408 of 9,095).

- The second interruption occurred on July 28th as a result of device failure. Primary conductor fell at pole 90 Sunnyside Road. Crews opened at poles 88 and 91 Sunnyside road to isolate and backfeed customers while repairs were being made. This interruption accounted for 40% of the total amount of customers interrupted (3,019 of 7,495), and 45% of the total amount of the customer-hours interrupted (4,121 of 9,095).
- The third interruption occurred on September 1st as a result of a vehicle accident. A motor vehicle hit pole 19 on Van Buren Road, this resulted in the recloser at pole 79 Swaggertown Road locking out. Crews isolated and replaced the broken pole. This interruption accounted for 7% of the total amount of customers interrupted (542 of 7,495), and 11% of the total amount of the customer-hours interrupted (985 of 9,095).
- The fourth interruption occurred on September 2nd as a result of a vehicle accident. A motor vehicle hit pole 39 Swaggertown Road. Crews opened switches at pole 36 Swaggertown Road to isolate the outage and replace the broken pole. This interruption accounted for 7% of the total amount of customers interrupted (542 of 7,495) and 6% of the total amount of the customer-hours interrupted (573 of 9,095).
- Equipment failure was the largest cause of interruptions on the Front St 36051 in 2016, interrupting service to 5,404 customers (72%) and accounting for 5,130 customer-hours interrupted (56%).
- Accidents were the second largest cause of interruptions on the Front St 36051 in 2016, interrupting service to 1,186 customers (16%) and accounting for 1,885 customer-hours interrupted (21%).
- There were four momentary operations on the distribution circuit breaker for the Front St 36051 in 2016.
- Sixteen of the thirty-three interruptions on the Front St 51 in 2016, affected ten customers or less.

Action Taken:

- Removed approximately 1,000 feet of direct buried 750 Al and 2,800 feet of overhead distribution, which functioned as the circuit getaway from the station, and along the Mohawk River to Freemans Bridge. Then began the relocation of the feeder getaways underground, using 5,700 of the over 25,400 feet of 1,000 MCM Cu conductor in a planned manhole and duct-line installation. This was done to accommodate the \$150 million transformation of the former American Locomotive Company (ALCO) site along the Mohawk River in Schenectady, NY into upscale apartments, restaurants, retail stores, condos, a hotel, offices, and a casino. This will be known as Mohawk Harbor.
- The Front St Station transformer TB2 was replaced after it failed on February 24th. A mobile transformer was temporarily installed in place to support the over 5,900 customers normally served from TB2 until the permanent replacement TB2 was installed on May 6th.
- The feeder tie between Front St 36051 and Swaggertown 36451 was relocated to a safer location. In its original location, at the intersection of Swaggertown and Van Buren Road, it was on a hill and a curve. This required the need for flaggers would potentially increase any outage times. The new feeder tie is now located at pole 66 Swaggertown Road.
- There are three pole-top reclosers currently in service on the Front Street 36051.
- A maintenance foot patrol of the Front St 36051 was completed in 2014, and all identified level 1 and 2 maintenance has been completed.
- Tree trimming/pruning for the Front St 36051 was completed in FY13.

Action Plan:

- Complete the installation of over 5,700 feet of 1,000 MCM Cu through the Mohawk Harbor Site. This will function as the new getaway for the 36052, with the entire load north of the Freeman's Bridge transferred to it, while the bulk of the 36051 load will be just Mohawk Harbor load.
- Complete all level 3 maintenance work that was identified by the 2014 1&M inspection (foot patrol) on the Front St 36051 by May 2017.
- Routine tree trimming/pruning on the Front St 36051 to be completed in FY18.

14. HOOSICK 31451 - 13.2kV

Profile: 1,638 Customers, 96.227 Circuit Miles

Indices: CAIDI = 1.05, SAIFI = 2.96

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	40.74%	1,244	25.64%	3,067	60.37%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	37.04%	1,985	40.91%	1,279	25.17%
6	ACCIDENTS	3	11.11%	8	0.16%	19	0.37%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	7.41%	3	0.06%	17	0.34%
10	UNKNOWN	1	3.70%	1,612	33.22%	699	13.75%
Totals		27	100.00%	4,852	100.00%	5,081	100.00%

Problem Analysis:

- There was one transmission interruptions that affected the Hoosick 31451 in 2016 as a result of equipment failure. On May 15th the North Troy – Hoosick #5 transmission line tripped open removing breaker R510 from service when a phase came down between Transmission Structure 172 to 173 outside of Hoosick Sub. The line was sectionalized for repair. North Troy – Hoosick #5 transmission was restored. This interruption accounted for 33% of total customers interrupted (1,602 of 4,852), and 6% of total customer-hours interrupted (320 of 5,081).
- There were zero substation interruptions that affected the Hoosick 31451 in 2016.
- The remaining twenty-six interruptions on the Hoosick 31451 occurred on the distribution system in 2016.
- The distribution circuit breaker for Hoosick 31451 experienced one sustained interruption (lockout) in 2016. The interruption occurred on January 16th as a result of an unknown event on the distribution feeder. Line was patrolled and breaker R510 closed back in. This interruption accounted for 33% of total customers interrupted (1,612 of 4,852), and 14% of total customer-hours interrupted (699 of 5,081).
- There were four interruptions on the Hoosick 31451 that involved 3-phase mainline, but were not associated with the circuit breaker, which affected one hundred or more customers. The isolating devices were solid disconnects, fused disconnects and pole-top reclosers operating automatically. These interruptions accounted for 24% of the total amount of customers interrupted (1,498 of 4,852) and 59% of the total amount of customer-hours interrupted (3,012 of 5,081).

- The first interruption occurred on June 26th as a result of a tree falling dragging conductor down near pole 34 and 35 on Buskirk-West Hoosick Road. Recloser operated to protect upstream customers. This section of main line was isolated to make repairs. Customers were back-fed to minimize the amount of customers out while poles were replaced and tree was removed. This interruption accounted for 7% of total customers interrupted (333 of 4,852), and 14% of total customer-hours interrupted (726 of 5,081).
- The second interruption occurred on July 31st as a result of device failure. Pole 24 at State Highway 22 caught fire and emergency repairs were completed when disconnect at pole 42 State Highway 22 was opened to isolate the branch circuit. Pole, cross arms and OH conductor were replaced and the branch circuit returned back to service. This interruption accounted for 6% of total customers interrupted (307 of 4,852), and 5% of total customer-hours interrupted (237 of 5,081).
- The third interruption occurred on September 19th as a result of a tree falling onto the conductors between poles 23 and 24 Buskirk-West Hoosick Road. This section of main line was isolated to make repairs. Customers were back-fed to minimize the amount of customers out while poles were replaced and tree was removed. This interruption accounted for 10% of total customers interrupted (462 of 4,852), and 22% of total customer-hours interrupted (1,105 of 5,081).
- The fourth interruption also occurred on November 9th, as a result of device failure. A ratio failed on pole 101-1/2 on State Highway 67. Ratio was replaced and repairs were completed. A disconnect was opened to isolate the branch circuit. There was a second outage at the end of the outage when a drop and pick occurred to return the branch circuit back into service. This interruption accounted for 12% of total customers interrupted (59 of 4,852), and 12% of total customer-hours interrupted (628 of 5,081).
- Equipment failure was the leading cause of customer interruptions with 41% of the total amount (1,985 of 4,852) and tree contact was the leading cause of customer-hours interrupted with 60% of the total amount (3,067 of 5,081).
- Twenty of the twenty-seven interruptions on the Hoosick 31451 in 2016 affected twenty customers or less.

Action Taken:

- There are two pole top reclosers installed on the Hoosick 31451. The reclosers have proven to be beneficial to the reliability of the feeder since one of the mainline interruptions was isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized CI and CHI over the past year for the Hoosick 31451.
- The I&M inspection (foot patrol) of the Hoosick 31451 was completed in July 2013. And all of the Level 1, 2 and level 3 maintenance work that were identified from the I&M inspection (foot patrol) on the Hoosick 31451 were completed.
- Engineering Reliability Review (ERR) performed in 2015 for the Hoosick 31451, and recommendations for system improvements (added lightning arrestors, fusing, etc.) was completed FY16.
- Tree trimming, which removed over 345 hazard trees on the Hoosick 31451 was completed in FY16.

Action Plan:

- Forestry department to field check and mitigate any issues that occur on the Hoosick 31451 in 2016.
- Overloaded ratio on pole 2 State Highway #7 to be increased for improved reliability
- A maintenance foot patrol (I&M inspection) of the Hoosick 31451 is scheduled for FY18. Thereafter, complete all identified level 1 maintenance on the Hoosick 31451 in FY18.
- A small capital improvement project was designed and scheduled to be started FY20 to complete at conversion/feeder tie between the Hoosick 31451 and Hoosick 31452 feeders. This will increase reliability.

15. MCCLELLAN ST 30452 - 13.2kV

Profile: 3,028 Customers, 15.3 Circuit Miles

Indices: CAIDI = 1.35, SAIFI = 2.40

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	1	5.56%	3,221	44.32%	5,744	58.55%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	33.33%	74	1.02%	389	3.97%
6	ACCIDENTS	3	16.67%	56	0.77%	178	1.81%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	8	44.44%	3,916	53.89%	3,500	35.68%
Totals		18	100.00%	7,267	100.00%	9,811	100.00%

Problem Analysis:

- There was one transmission interruption that affected the McClellan St 30452 on July 7th 2016 that was caused by unknown conditions that caused the bus pot at the Emmet Substation to fail. This interruption accounted for 45% of the total amount of customers interrupted (3,291 of 7,267), and 26% of the total customer-hours interrupted (2,523 of 9,811).
- There were zero substation interruptions that affected the McClellan St 30452 in 2016.
- The remaining seventeen interruptions on the McClellan St 30452 occurred on the distribution system in 2016.
- The distribution circuit breaker for McClellan St 30452 experienced one operation (lockout) that led to a sustained interruption in 2016. The interruption occurred on October 23rd as a result of tree conditions. A tree branch fell on primary conductor on pole 27 Brandywine Ave. This interruption accounted for 44% of the total amount of customers interrupted (3,221 of 7,267) and 59% of the total amount of the customer-hours interrupted (5,744 of 9,811).
- Unknown causes were the largest cause of interruptions on the McClellan St 30452 in 2016, interrupting service to 3,916 customers (54%) and accounting for 3,500 customer-hours interrupted (36%).
- Trees were the second largest cause of Customers Interrupted on the McClellan St 30452 in 2016, interrupting service to 3,221 customers (44%) and accounting for 5,744 customer-hours interrupted (59%).
- There were four momentary operations on the distribution circuit breaker for the McClellan 30452 in 2016.

- The 17 interruptions on the McClellan St 30452 attributed to the distribution system interrupted 3,976 customers (55%) and accounted for 7,288 customer-hours interrupted (74%) for a distribution SAIFI of 1.31 and CAIDI of 1.83.
- Four of the eighteen interruptions on the McClellan St 30452 in 2016 affected ten customers or less.

Action Taken:

- A maintenance foot patrol of the McClellan St 30452 was completed in 2014 and all identified level 1 and 2 maintenance has been completed
- Tree trimming/pruning for the McClellan St 30452 was completed in FY13.

Action Plan:

- Complete all level 3 maintenance work that was identified by the 2014 I&M inspection (foot patrol) on the McClellan St 30452 by July 2017.
- Routine tree trimming/pruning on the McClellan St 30452 to be completed in FY19.

16. OATHOUT LN 40251 - 13.2kV

Profile: 725 Customers, 15.921 Circuit Miles

Indices: CAIDI = 1.57, SAIFI = 2.57

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	34.62%	912	49.03%	2,103	72.14%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	23.08%	728	39.14%	540	18.53%
6	ACCIDENTS	7	26.92%	197	10.59%	190	6.50%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	15.38%	23	1.24%	83	2.83%
Totals		26	100.00%	1,860	100.00%	2,916	100.00%

Problem Analysis:

- There was one transmission interruptions that affected the Oathout 40251 in 2016 as a result of equipment failure. On May 16th the Maplewood-Latham #9 line had a single phase condition on the transmission line which tripped open breaker R510. Typically Oathout would be fed from Patroon Station but this Transmission line was out under clearance when the event occurred. The line was sectionalized for repair and restored via the normal supply from Patroon Station. This interruption accounted for 39% of total customers interrupted (721 of 1,860), and 16% of total customer-hours interrupted (481 of 2,916).
- There were zero substation interruptions that affected the Oathout 40251 in 2016.
- The remaining twenty-five interruptions on the Oathout 40251 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Oathout 40251 experienced two momentary operations in 2016.
- The distribution circuit breaker for Oathout 40251 experienced one lockout operation that led to a sustained interruption in 2016. This interruption occurred on October 27th as a result of tree contact on pole 28 on Old Wolf Road. The tree came down on the three phase overhead cable for Oathout Lane 40251, causing the station breaker to lockout. Crews removed the tree and closed the station breaker back in. This interruption accounted for 39% of total customers interrupted (720 of 1,860), and 33% of total customer-hours interrupted (960 of 2,916).
- There were two interruptions on the Oathout 40251 that involved 3-phase mainline, but were not associated with the circuit breaker, which affected ninety-four or more

customers. The isolating devices were solid disconnect and fused disconnect. These interruptions accounted for 14% of the total amount of customers interrupted (267 of 1,860) and 17% of the total amount of customer-hours interrupted (509 of 2,916).

- The first interruption occurred on August 2nd as a result of tree conditions. A tree fell on a section of primary on Sherwood Drive, causing protective OH line fuses on pole 126 Watervliet Shaker Road to operate. Crews removed the tree and replaced the fuse restoring power to all the customers on the branch circuit. This interruption accounted for 5% of total customers interrupted (94 of 1,860), and 13% of total customer-hours interrupted (376 of 2,916).
- The second interruption occurred on November 10th as a result of a vehicle accident. A car hit and broke pole 123 on Watervliet Shaker Road. The main line solid disconnect switches on pole 131 and 122 on Watervliet Shaker Road were used to isolate the entrapped motor vehicle. Crews replaced the broken pole and closed the switches back in restoring power to all customers. This interruption accounted for 9% of the total amount of customers interrupted (173 of 1,860) and 5% of the total amount of customer-hours interrupted (133 of 2,916).
- Tree contact was the leading cause of the number of interruptions with 49% of the total amount (912 of 1,860) of customers interrupted. Tree contact was also the leading cause of customer-hours interrupted with 72% of the total amount (2,103 of 2,916).
- Twenty of the twenty-six interruptions on the Oathout 40251 in 2016 affected ten customers or less.

Action Taken:

- There is one pole top reclosers installed on the Oathout 40251. The recloser has proven to be beneficial to the reliability of the feeder since one of the mainline interruptions was isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized CI and CHI over the past year for the Oathout 40251.
- The I&M inspection (foot patrol) of the Oathout 40251 was completed in July 2016. All of the Level 1 maintenance work that was identified from the I&M inspection (foot patrol) on the Oathout 40251 was completed.
- Tree trimming for the Oathout 40251 was also completed in FY16.

Action Plan:

- Forestry department to field check and mitigate any issues that occur on the Oathout 40251 in 2017.
- Complete all level 2 and 3 maintenance work that was identified by the 2016 I&M inspection (foot patrol) on the Oathout 40251 by July 2017 and 2018 respectively.
- Tree trimming and an EHTM hazard tree review are scheduled for the Oathout 40251 in CY2019/FY20.

17. MAPLEWOOD 30751 - 13.2kV

Profile: 2,746 Customers, 24.182 Circuit Miles

Indices: CAIDI = 1.92, SAIFI = 2.14

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	3	21.43%	4	0.07%	22	0.20%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	2	14.29%	2,837	48.39%	1,921	17.04%
6	ACCIDENTS	4	28.57%	130	2.22%	319	2.83%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	14.29%	2,882	49.16%	8,966	79.51%
10	UNKNOWN	3	21.43%	10	0.17%	48	0.42%
Totals		14	100.00%	5,863	100.00%	11,277	100.00%

Problem Analysis:

- There was one Substation interruptions that affected the Maplewood 30751 in 2016 as a result of equipment failure. On February 12th there was a B-phase failure on the 115kV bus 77G inside Maplewood Station which tripped open breakers R510, R520, R530 and R540. Field ties were performed to limit customer outage time while repairs were made. The high side bus work was repaired and restored to service. This interruption accounted for 47% of total customers interrupted (2,760 of 5,863), and 16% of total customer-hours interrupted (1,780 of 11,277).
- There were zero Transmission interruptions that affected the Maplewood 30751 in 2016.
- The remaining thirteen interruptions on the Maplewood 30751 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Maplewood 30751 experienced four momentary operations in 2016.
- The distribution circuit breaker for Maplewood 30751 experienced one lockout operation that led to a sustained interruption in 2016. This interruption was the result of a lightning strike immediately outside the station on pole 21 Crabapple Street on September 11th. The lightning strike brought a phase of the primary down, opening Maplewood 30751 R510 breaker. This interruption accounted for 47% of total customers interrupted (2,736 of 5,863), and 76% of total customer-hours interrupted (8,618 of 11,277).
- There were no interruptions on the Maplewood 30751 that involved 3-phase mainline, but were not associated with the circuit breaker for over one hundred customers.

- Lightning strikes were the leading cause of the number of Customers Interrupted with 49% of the total amount (2,882 of 5,863) of customers interrupted and also the leading cause of customer-hours interrupted with 80% of the total amount (8,966 of 11,277).
- Seven of the fourteen interruptions on the Maplewood 30751 in 2016 affected ten customers or less.

Action Taken:

- There is one pole top recloser installed on the Maplewood 30751.
- The I&M inspection (foot patrol) of the Maplewood 30751 was completed August 2017. Moreover, all of the Level 1 maintenance work that was identified from the I&M inspection (foot patrol) on the Maplewood 30751 was completed.
- Tree trimming of the Maplewood 30751 will be completed by July 2017. Tree trimming has removed over 26 hazard trees to date.

Action Plan:

- Tree trimming is ongoing on Maplewood 30751 in FY17 by the Forestry Department.
- Complete all level 2 maintenance work that was identified by the 2013 I&M inspection (foot patrol) on the Maplewood 30751 by September 2017.
- Complete all level 3 maintenance work that was identified by the 2013 I&M inspection (foot patrol) on the Maplewood 30751 by September 2018.

18. MAPLEWOOD 30753 - 13.2kV

Profile: 2,183 Customers, 29.304. Circuit Miles

Indices: CAIDI = 1.51, SAIFI = 2.31

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	1	6.25%	1	0.02%	9	0.12%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	8	50.00%	4,473	88.71%	6,401	84.01%
6	ACCIDENTS	4	25.00%	438	8.69%	877	11.51%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	6.25%	21	0.42%	117	1.53%
10	UNKNOWN	2	12.50%	109	2.16%	216	2.83%
Totals		16	100.00%	5,042	100.00%	7,619	100.00%

Problem Analysis:

- There was one Substation interruptions that affected the Maplewood 30753 in 2016 as a result of equipment failure. On February 12th there was a B-phase failure on the 115kV bus 77G inside Maplewood Station which tripped open breakers R510, R520, R530 and R540. Field ties were performed to limit customer outage time while repairs were made. The high side bus work was repaired and restored to service. This interruption accounted for 43% of total customers interrupted (2,170 of 5,042), and 17% of total customer-hours interrupted (1,301 of 7,619).
- There were zero Transmission interruptions that affected the Maplewood 30753 in 2016.
- The remaining fifteen interruptions on the Maplewood 30753 occurred on the distribution system in 2016.
- The distribution circuit breaker for the Maplewood 30753 experienced two momentary operations in 2016.
- The distribution circuit breaker for Maplewood 30753 experienced one lockout operation that led to a sustained interruption in 2016. This interruption was the result of equipment failure on the termination to the overhead conductor on riser pole 23, disconnect switch 5193 immediately outside the station on Crabapple Street on June 19th. The bad termination opened B phase riser causing the station breaker to trip. All customers were picked up on field ties to limit outage times for the customers. The riser was isolated and repaired. This interruption accounted for 57% of total customers interrupted (2,176 of 5,042), and 59% of total customer-hours interrupted (4,525 of 7,619).
- There was one interruption on the Maplewood 30753 that involved 3-phase mainline, but was not associated with the circuit breaker, which affected one hundred or more

customers. The isolating device was a pole-top recloser. The interruption occurred on June 15th with no cause found. The recloser on Pole 175h Wilson Hill Road operated. The line was patrolled and no tree or animal contacts were found. The recloser was closed back in and line held. This interruption accounted for 11% of the total amount of customers interrupted (341 of 3,036) and 11% of the total amount of the customer-hours interrupted (796 of 7,068).

- Equipment failures were the leading cause of the number of interruptions with 50% of the total amount (4,473 of 5,042) of customers interrupted as well as the leading cause of customer-hours interrupted with 84% of the total amount (6,401 of 7,619).
- Eight of the sixteen interruptions on the Maplewood 30753 in 2016 affected twenty customers or less.

Action Taken:

- There is one pole top recloser installed on the Maplewood 30753. Installed a new 3-phase G&W recloser on the Maplewood 30753 in 2011 as part of the FY12 Recloser program on Swatling Ave.
- The I&M inspection (foot patrol) of the Maplewood 30753 was completed January 2013 and all identified level 1, 2 and 3 maintenance on the Maplewood 30753 were completed before January 2016.
- Enhanced animal protection was completed at Maplewood Substation in 2015.

Action Plan:

- Tree trimming is ongoing on Maplewood 30753 in FY17 by the Forestry Department.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION ITEM PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Complete Date	Estimated Cost	Comments
Altamont	28356	2016	Trip saver	17-Oct	\$35k	On schedule
Altamont	28356	2016	I&M Inspection (foot patrol)	17-Oct		On schedule
Elnora	44256	2016	Complete level 2 maintenance	17-Oct	\$46k	On schedule
Elnora	44256	2016	Complete level 3 maintenance	19-Oct	TBD	In Design
Elnora	44256	2016	Tree Trimming/Pruning	18-Apr		On schedule
Bethlehem	2158	2016	I&M Inspection (foot patrol)	17-Dec		On schedule
Bethlehem	2158	2016	Complete level 2 maintenance	18-Dec		On schedule
Bethlehem	2158	2016	Complete level 3 maintenance	19-Dec		On schedule
Bethlehem	2158	2016	Tree Trimming/Pruning	17-Dec		On schedule
Bethlehem	2158	2016	Engineering review for Reclosers for possible additional recloser	17-Dec		On schedule
Front St	36053	2016	Front St 52 & 53 OH to UG relocation	17-Dec	\$1.3M	On schedule
Front St	36053	2016	Complete level 3 maintenance	17-Jun	\$325k	On schedule
Front St	36053	2016	Complete ERR	18-Apr		On schedule
Front St	36053	2016	Tree Trimming / Pruning	18-Apr		On schedule
Blue Stores	30351	2016	Tree Trimming / Pruning	17-Dec		On schedule
Blue Stores	30351	2016	Monitor results of vegetation work from FY17	16-Dec		On schedule
Blue Stores	30352	2016	Complete level 2 maintenance	18-Jan		On schedule
Blue Stores	30352	2016	Complete level 3 maintenance	19-Jan		On schedule
Reynolds	33452	2016	I&M Inspection (foot patrol)	17-Dec		On schedule
Reynolds	33452	2016	Tree Trimming / Pruning	17-Dec		On schedule
Swaggertown	36453	2016	Complete ERR	18-Apr		On schedule
Boyntonville	33351	2016	Complete level 2 maintenance	18-Jul		On schedule
Boyntonville	33351	2016	Complete level 3 maintenance	19-Jul		On schedule
Boyntonville	33351	2016	Tree Trimming / Pruning	17-Dec		On schedule
Trinity Place	16456	2016	Complete level 3 maintenance	16-Jun		On schedule
Trinity Place	16456	2016	Tree Trimming / Pruning	17-Jan		On schedule
Wolf Road	34451	2016	Tree Trimming / Pruning	17-Jan		On schedule
Wolf Road	34451	2016	I&M Inspection (foot patrol)	17-Aug		On schedule
Wolf Road	34451	2016	Complete level 2 maintenance	18-Aug		On schedule
Wolf Road	34451	2016	Complete level 3 maintenance	19-Aug		On schedule
Selkirk	14952	2016	Complete level 3 maintenance	18-Aug		On schedule
Selkirk	14952	2016	Tree Trimming / Pruning	17-Apr		On schedule
Maplewood	30753	2016	Complete level 3 maintenance	16-Feb	\$22k	Completed
Maplewood	30753	2016	Tree Trimming / Pruning	16-Apr		On schedule
Front St	36051	2016	Front St 52 & 53 OH to UG relocation	17-Dec	\$1.3M	On schedule
Front St	36051	2016	Complete level 3 maintenance	17-May	\$177k	Complete
Front St	36051	2016	Tree Trimming/Pruning	18-Apr		On schedule
Hoosick	31451	2016	Monitor results of vegetation work from FY16	17-Dec		On schedule
McClellan St	30452	2016	Complete level 3 maintenance	17-Jul	\$88k	On schedule
McClellan St	30452	2016	Tree Trimming/Pruning	19-Apr		On schedule
Oathout	40251	2016	Monitor results of vegetation work from FY16	17-Dec		On schedule
Oathout	40251	2016	Complete level 2 maintenance	17-Dec		On schedule
Oathout	40251	2016	Complete level 3 maintenance	18-Dec		On schedule
Maplewood	30751	2016	Tree Trimming/Pruning	17-Dec		On schedule
Maplewood	30751	2016	Complete level 2 maintenance	17-Sep		On schedule
Maplewood	30751	2016	Complete level 3 maintenance	18-Sep		On schedule

Station	Feeder	Report Year	Action Plan	Projected Complete Date	Estimated Cost	Comments
Maplewood	30753	2016	Tree Trimming/Pruning	17-Dec		On schedule

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Actual/Est. Completion Date	Actual/Est. Cost	Comments
Voorheesville	17851	2016	Complete ERR	Apr – 16		On schedule
Voorheesville	17851	2016	I&M Inspection (foot patrol)	Mar – 16		On schedule
Voorheesville	17851	2016	Tree Trimming / Pruning	Apr – 17		On schedule
Front Street	36052	2016	Mohawk Harbor Development	Dec – 16	\$6.9M	On schedule
Front Street	36052	2016	Complete level 3 maintenance	May-17	\$175k	On schedule
Front Street	36052	2016	Monitor results of vegetation work from FY13	Dec-16		On schedule
Front Street	36053	2016	Mohawk Harbor Development	Dec – 16	\$6.9M	On schedule
Front Street	36053	2016	Complete level 3 maintenance	June-17	\$329k	On schedule
Front Street	36053	2016	Monitor results of vegetation work from FY13	Dec-16		On schedule
Brunswick	26453	2016	Complete ERR	Apr – 16		On schedule
Brunswick	26453	2016	I&M Inspection (foot patrol)	Dec-16		On schedule
Brunswick	26453	2016	Monitor results of vegetation work from FY15	Dec-16		On schedule
Grooms Road	34557	2016	Complete level 3 maintenance	Oct-16	\$578k	On schedule
Grooms Road	34557	2016	Tree Trimming / Pruning	Apr-16		On schedule
Grooms Road	34557	2016	Finalize recommendations from the ERR completed in FY15	Apr-16		On schedule
Grooms Road	34557	2016	Grooms Road 34557 – Saratoga Road Conversion	Apr-20	\$600K	WR# 14925880 Delayed until FY20
Hoags Corners	22151	2016	Finalize recommendations from the ERR completed in FY15	Apr-16		On schedule
Hoags Corners	22151	2016	Complete level 3 maintenance	Sep-17	\$520k	On schedule
Hoags Corners	22151	2016	Complete level 3 maintenance on Hoags-Brainard #1	Sep-18		On schedule
Hoags Corners	22151	2016	Monitor results of vegetation work from FY15	Dec-16		On schedule
Inman Road	37055	2016	I&M Inspection (foot patrol)	Dec-17		On schedule
Inman Road	37055	2016	Monitor results of vegetation work from FY14	Dec-17		On schedule
Schodack	45151	2016	I&M Inspection (foot patrol)	Dec-16		On schedule
Schodack	45151	2016	Tree Trimming / Pruning	Apr-17		On schedule
Hemstreet	32851	2016	Complete level 2 maintenance	Nov-16	\$53k	On schedule
Hemstreet	32851	2016	Complete level 3 maintenance	Nov-18	\$496k	On schedule
Hemstreet	32851	2016	Tree Trimming / Pruning	Apr-17		On schedule
Ruth Road	38153	2016	Replace station breaker R530 in Ruth Road Substation	Dec-16		On schedule
Ruth Road	38153	2016	Finalize recommendations from the ERR completed in FY15	Apr-16		On schedule
Ruth Road	38153	2016	Complete level 3 maintenance	Jun-17	\$44k	On schedule
Ruth Road	38153	2016	Tree Trimming / Pruning	Apr-17		On schedule
Boyntonville	33351	2016	Finalize recommendations from the ERR completed in FY15	Apr-16		On schedule
Boyntonville	33351	2016	I&M Inspection (foot patrol)	Dec-16		On schedule
Boyntonville	33351	2016	Monitor results of vegetation work from FY15	Dec-16		On schedule
Grooms Road	34555	2016	Deer Run Hollow URD Cable Replacement	Apr-17	\$219K	WR# 21073204 On schedule
Grooms Road	34555	2016	Complete level 3 maintenance	Jun-16	\$27k	On schedule
Grooms Road	34555	2016	Tree Trimming / Pruning	Apr-16		On schedule
Selkirk	14952	2016	Finalize recommendations from the ERR completed in FY15	Apr-16		On schedule
Selkirk	14952	2016	I&M Inspection (foot patrol)	Dec-16		On schedule
Selkirk	14952	2016	Tree Trimming / Pruning	Apr-17		On schedule
Maplewood	30753	2016	Complete level 3 maintenance	Feb-16	\$22k	Completed
Maplewood	30753	2016	Tree Trimming / Pruning	Apr-16		On schedule
Hoosick	31451	2016	Complete level 3 maintenance	Dec-16	\$916k	On schedule
Hoosick	31451	2016	Monitor results of vegetation work from FY16	Dec-16		On schedule
Valkin	42752	2016	Finalize recommendations from the ERR completed in FY15	Apr-16		On schedule
Valkin	42752	2016	Complete level 2 maintenance	Oct-16	\$42k	On schedule

Station	Feeder	Report Year	Action Plan	Actual/Est. Completion Date	Actual/Est. Cost	Comments
Valkin	42752	2016	Complete level 3 maintenance	Oct-18	\$33k	On schedule
Valkin	42752	2016	Monitor results of vegetation work from FY15	Dec-16		On schedule

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS WHICH CAUSED THE BELOW MINIMUM PERFORMANCE

In 2016, the Capital Region did not meet the PSC minimum goal for SAIFI of 0.90 interruptions, ending the year with a total SAIFI of 1.01 interruptions. This was a 2% increase over 2015's SAIFI of 0.99. The 2016 SAIFI was 8.6% greater than the 5-year SAIFI average of 0.93.

Excluding Major Storms, the 2016 data indicates that the number of interruptions was 2% above the previous 5-year average; the customers interrupted were 10.4% above the previous 5-year average while the customer-hours interrupted were 8.3% above the previous 5-year average. The ratio between the number of customers interrupted and the number of customers served is the SAIFI (System Average Interruption Frequency Index) reliability measurement.

Reviewing the 2016 SAIFI data by facility type:

Excluding major storms, the 2016 transmission facilities contributed 0.10 to the regional SAIFI. This consisted of ten interruptions, which made up 9.8% of total customers interrupted and 4.6% of total customer-hours interrupted. This amount is a 28.6% decrease from 2015's fourteen transmission interruptions. The ten transmission interruptions accounted for 31,776 out of the 320,898 customers served in 2016.

The 2016 SAIFI for substation facilities contributed 0.12 to the regional SAIFI. This consisted of thirteen interruptions, which made up 11.9% of the total number of customers interrupted and 9.2% of the total customer-hours interrupted. This amount is a 44.4% increase from 2015's nine substation interruptions. The thirty-four substation interruptions accounted for 38,449 out of the 320,898 customers served in 2016.

The 2016, distribution contributed 99.2% of the total interruptions to the regional SAIFI. This consisted of 2,842 interruptions, which made up 78.4% of the total customers interrupted and 86.2% of the total customer-hours interrupted. The 2016 SAIFI for distribution was 3.7% below the 5-year average of 0.79 and 3.7% below the 2015 SAIFI of 0.82.

Reviewing the 2016 SAIFI data by cause codes that had a SAIFI greater than the previous year's results (excluding Major Storms):

(02) Tree Contacts

The overall SAIFI for Tree Contacts was 0.25 in 2016, which is 13% above the previous 5-year average (0.38) and 20% above the 2015 SAIFI of 0.21. There were 686 interruptions caused by tree contacts that accounted for 22% of the total number of customers interrupted.

There was an increase in interruptions caused by tree contacts from 2015 to 2016. Interruptions increased from 651 to 686 between 2015 and 2016, customers interrupted increased 21%, and customer-hours interrupted increased 41% from 2015.

(05) Equipment Failure

The overall SAIFI for equipment failure was 0.41, which is 31.7% above the previous 5-year average (0.31) and 29.4% above the 2015 SAIFI of 0.32 for equipment failure. There were 877 interruptions caused by equipment failure that accounted for 40.8% of the total number of customers interrupted (132,270 of 324,304) and 39% of total customer-hours interrupted (235,270 of 603,752).

There was an increase in interruptions caused by equipment failure from 2015 to 2016. Interruptions increased 5.8%, customers interrupted increased 30.4% and customer-hours interrupted increased 3.2% from 2015.

(09) Lightning

The overall SAIFI for Lightning was 0.02, which is 43% below the previous 5-year average (0.04) and 173% above the 2015 SAIFI of 0.01. There were 34 interruptions caused by Lightning that accounted for 2% of the total number of customers interrupted and 3% of total customer-hours interrupted

There was an increase in interruptions caused by Lightning from 2015 to 2016. Interruptions decreased 31%, customers interrupted increased 175% and customer-hours interrupted increased 165% from 2015.

(10) Unknown

The overall SAIFI for Unknown was 0.10, which is 18% above the previous 5-year average (0.09) and 19% above the 2015 SAIFI of 0.09 for Unknown. There were 545 interruptions caused by Unknown that accounted for 10% of the total number of customers interrupted and 9% of total customer-hours interrupted.

There was an increased in interruptions caused by Unknown from 2015 to 2016. Interruptions increased 24%, customers interrupted increased 20% and customer-hours interrupted decreased 2% from 2015.

b. **PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES**

The Company is continuing its efforts in the Capital Region to maintain reliability. These efforts include distribution patrols, maintenance programs, line recloser installations, protection coordination studies, lightning protection installations, and tree trimming programs. All of these programs and corrective actions not only will reduce the number of interruptions and/or customers interrupted but also the restoration times. The Company will continue to stay on schedule for tree trimming and believes that this maintained schedule for tree trimming and miles trimmed will reduce both the incidence and duration of tree-related interruptions.

Substation Improvements

- 1) When substation equipment is being installed or repaired, animal guards are being installed.
- 2) When opportunities arise, feeder-ties will be constructed to temporarily transfer load onto adjacent substations. This will improve reliability for the affected station.
- 3) The Company's ongoing maintenance program for substations should help reduce the potential for substation problems in 2016. This program includes:
 - Circuit breaker diagnostic tests
 - Circuit breaker mechanism checks
 - Load tap changer internal inspections
 - Dissolved gas analysis on load tap changers and transformers.
 - Calibration/inspections on relay positions and communication packages
 - Functional testing of relays
 - Battery maintenance
- 4) Network --- Annual program for Albany area networks to review and change out transformers and protectors due to deterioration as needed. The Albany area has approximately 250 vaults containing network transformers and protectors. The goal of this program is to replace the equipment before failure occurs.

Engineering Reliability Reviews (ERR)

In a separate initiative based on primary distribution interruptions only, each region of the company is presented with a list of worst performing feeders. The review's purpose was to identify corrective measures that would improve that feeder's reliability statistics, determine the associated incremental reliability improvement, and each corrective measures' associated cost.

In addition to these preventative maintenance measures, the Company will perform ERR's on a select number of the worst performing feeders in order to review these feeders in detail and also to provide recommendations to improve the reliability on the feeder. These recommendations may include but are not limited to, the addition of reclosers and fuses, the construction of feeder ties, and the

identification and replacement of overloaded equipment.

As part of the ERR, the Company plans to sectionalize more feeders in the Capital Region. This will help reduce the number of customers that are impacted by incidents that cannot be avoided. One method of sectionalizing will be the use of pole top reclosers. The installation of radial line reclosers has a positive impact on the Company's SAIFI performance by reducing the number of customer interruptions. Further benefits can be realized to the extent that these devices provide remote monitoring and control and provide a platform for future automation schemes.

To help minimize interruptions caused by animal contact, the Company will continue to install animal guards on all new transformer installations and retrofit animal guards on existing transformers in areas plagued with animal-related interruptions in the Capital Region.

Taken together, the Company believes these preventative actions will help minimize the potential for unplanned interruptions and improve the Capital Region's SAIFI and CAIDI performance.

D. CENTRAL REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS Info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 2.00)	1.86	1.83	1.62	1.84	1.96	1.83
SAIFI (Target 1.00)	1.12	1.19	1.26	0.90	1.10	1.11
SAIDI	2.07	2.18	2.03	1.66	2.16	2.04
Interruptions	2,201	2,023	2,029	2,021	2,146	2,239
Customers Interrupted	312,792	332,703	350,855	252,765	306,265	309,526
Customer-Hours Interrupted	580,949	607,511	567,101	464,793	601,249	567,021
Customers Served	280,384	278,647	279,236	279,326	278,358	277,980
Customers Per Interruption	142.11	164.46	172.92	125.07	142.71	138.24
Availability Index	99.9764	99.9751	99.9768	99.9810	99.9754	99.9767
Interruptions/1000 customers	7.85	7.26	7.27	7.24	7.71	8.05

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Central Region met its CAIDI reliability target and did not meet its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 1.12 interruptions, 12% above the PSC goal of 1.00 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.86 in 2016, 7% below the PSC's regional target of 2.00 hours.

The 2016 CAIDI result was 2% above the 2015 result of 1.83 hours, and 3% above the previous 5-year average of 1.81 hours. The 2016 SAIFI was 6% below the 2015 result of 1.19 interruptions, and 1% above the previous 5-year average of 1.11 interruptions.

In 2016, excluding major storms, the Central Region experienced 14 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (14 of 2,201), 10% of the region's total customers interrupted (CI), (30,108 of 312,792), and 7% (43,452 of 580,947) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 1.44 hours, and a SAIFI of 0.11 interruptions.

The number of transmission-related interruptions decreased from 22 in 2015 to 14 in 2016 (a decrease of 36%). The number of customers interrupted decreased from 42,703 in 2015, to 30,108 in 2016 (a decrease of 29%), while the customer-hours interrupted decreased from 62,485 in 2015, to 43,452 in 2016 (a decrease of 30%).

In 2016, excluding major storms, the Central Region experienced 8 substation interruptions. These interruptions accounted for 0.4% of the region's total interruptions (8 of 2,201), 8% of the region's total customers interrupted, (24,009 of 312,792), and 4% (21,302 of 580,947) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 0.89 hours, and a SAIFI of 0.09 interruptions.

The number of substation-related interruptions remained the same at 12 from 2015 to 2016. The number of customers interrupted decreased from 69,009 in 2015, to 37,981 in 2016 (a decrease of 45%), while the customer-hours interrupted decreased from 90,893 in 2015, to 23,663 in 2016 (a decrease of 74%).

In 2016, excluding major storms, the Central Region experienced 2,175 distribution interruptions. These interruptions accounted for 99% of the region's total interruptions (2,175 of 2,201), 78% of the region's total customers interrupted, (244,703 of 312,792), and 88% (513,832 of 580,947) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 2.0 hours, and a SAIFI of 0.92 interruptions.

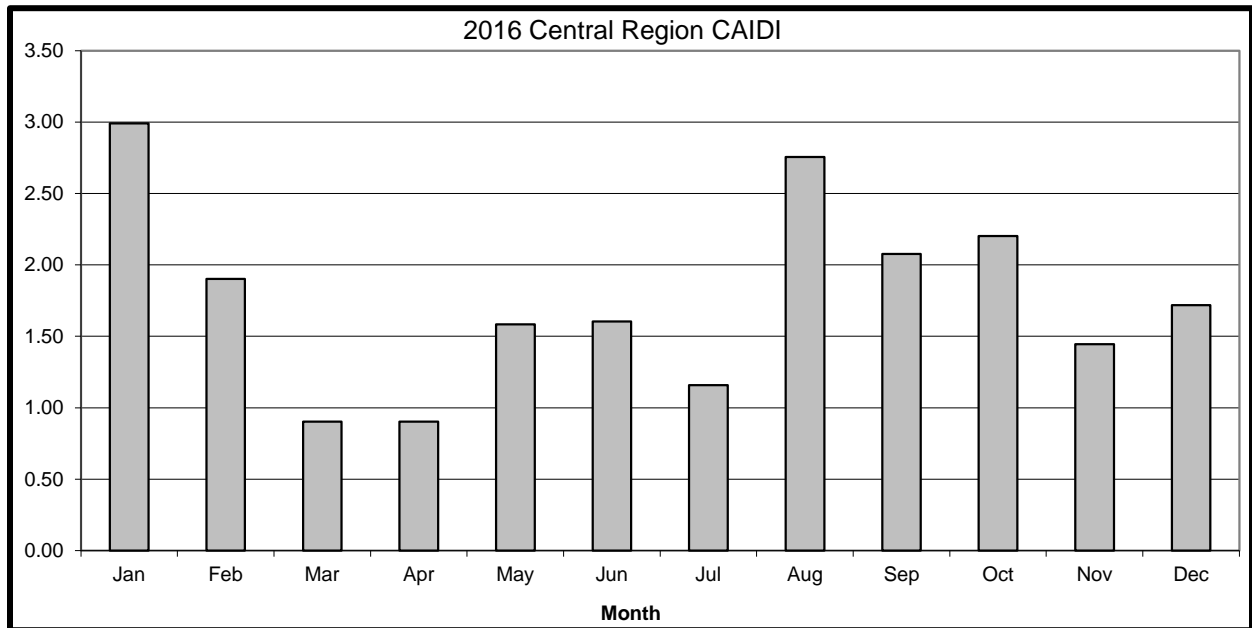
The number of distribution-related interruptions increased from 1,989 to 2,175 from 2015 to 2016 (an increase of 10%). The number of customers interrupted increased from 220,991 in 2015, to 244,703 in 2016 (an increase of 11%), while the customer-hours interrupted increased from 454,133 in 2015, to 513,832 in 2016 (an increase of 13%).

c. MONTHLY CAIDI AND SAIFI GRAPHS

The following graphs show the monthly CAIDI and SAIFI for the Central Region for 2016 (Excluding Major Storms). Regional CAIDI exceeded the PSC target of 2.00 hours in January (2.99), August (2.75) and October (2.20). CAIDI in January and August was influenced by Minor Storms. These storms were on January 10th and August 13th. It should be noted that the neighboring region (Mohawk Valley) qualified for PSC Major Storms on these dates. CAIDI in October was influenced by a number of recloser and fuse operations, with trees being the main cause of interruption.

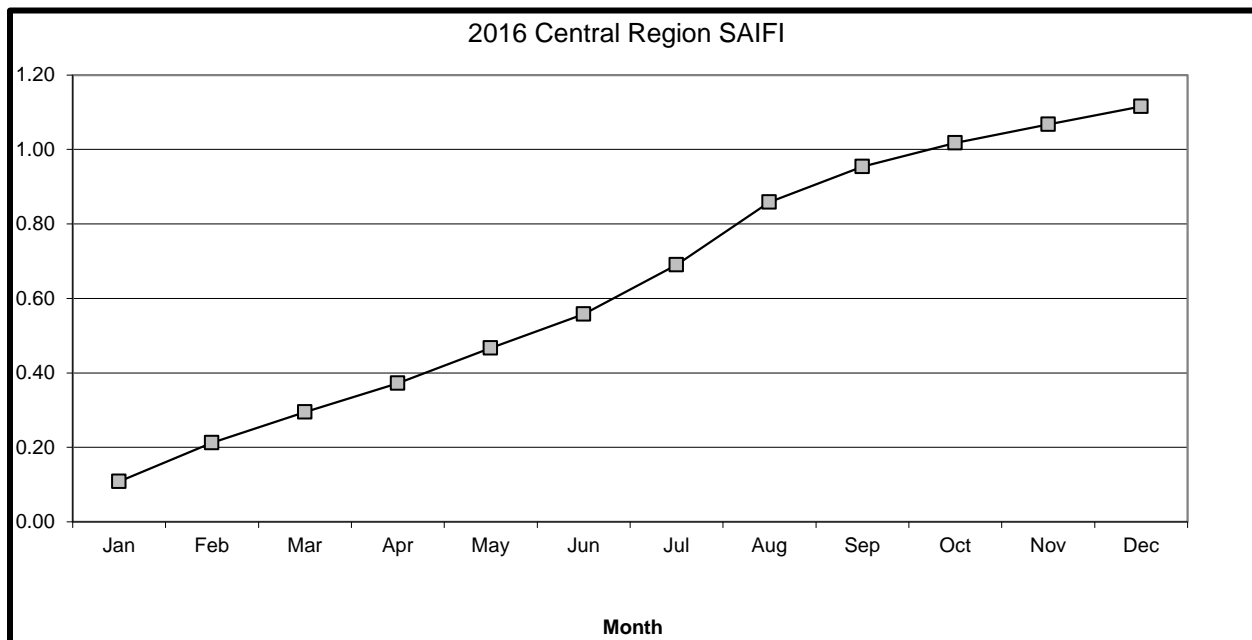
Regional SAIFI was above the monthly targets in January (0.11), February (0.10), July (0.13) and August (0.17). The SAIFI was above target in January, July and August due to Minor Storms. The storm dates were: January 10th, July 23rd and August 13th. Mohawk Valley (the neighboring region) qualified for PSC Major Storms on these dates. February was above target due to multiple feeder lockouts on the third, all of which were due to trees.

GRAPH OF MONTHLY CAIDI AND SAIFI FOR CENTRAL REGION



PSC CAIDI Goal:	
Minimum	2.00
2016 Actual	1.86

PSC SAIFI Goal:	
Minimum	1.00
2016 Actual	1.12



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	142	33	409	380	125	0
02 Tree Contacts	601	497	507	535	532	475
03 Overloads	33	32	25	33	32	63
04 Operator Error	9	9	9	6	7	4
05 Equipment	624	628	640	629	608	714
06 Accidents	473	428	411	352	444	419
07 Prearranged	93	106	82	174	182	142
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	69	81	110	84	112	127
10 Unknown	299	242	245	208	229	278
Total	2,343	2,056	2,438	2,401	2,271	2,222

2) Customers Interrupted by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	21,105	14,716	65,205	81,627	17,547	0
02 Tree Contacts	82,511	86,352	81,930	72,955	77,244	74,531
03 Overloads	9,503	1,391	3,670	480	706	2,780
04 Operator Error	6,906	6,175	4,230	789	11,132	127
05 Equipment	88,358	89,296	128,070	93,388	111,441	103,315
06 Accidents	58,636	91,555	67,309	53,813	52,876	69,028
07 Prearranged	30,806	8,615	7,569	11,300	8,589	7,386
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	5,758	11,966	26,026	2,535	4,527	14,393
10 Unknown	30,314	37,353	32,051	17,505	39,750	35,696
Total	333,897	347,419	416,060	334,392	323,812	307,256

3) Customer-Hours Interrupted by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	72,404	38,937	468,164	324,027	61,652	0
02 Tree Contacts	229,527	164,131	161,109	167,700	200,554	164,509
03 Overloads	3,906	8,713	3,264	1,424	2,594	7,432
04 Operator Error	2,533	4,872	3,269	504	14,535	109
05 Equipment	156,231	181,996	225,310	159,341	183,810	195,094
06 Accidents	88,460	146,486	80,295	78,103	82,070	100,221
07 Prearranged	18,852	14,772	17,794	15,622	11,059	12,826
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	10,353	32,644	32,684	8,740	16,306	35,258
10 Unknown	71,086	53,898	43,376	33,359	90,320	47,348
Total	653,352	646,449	1,035,264	788,820	662,900	562,798

4) Interruptions, Customers Interrupted and Customer-Hours Interrupted - 2016

Cause Code	Interruptions		Customers Interrupted		Customer-Hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	142	6.1%	21,105	6.3%	72,404	11.1%
02 Tree Contacts	601	25.7%	82,511	24.7%	229,527	35.1%
03 Overloads	33	1.4%	9,503	2.8%	3,906	0.6%
04 Operator Error	9	0.4%	6,906	2.1%	2,533	0.4%
05 Equipment	624	26.6%	88,358	26.5%	156,231	23.9%
06 Accidents	473	20.2%	58,636	17.6%	88,460	13.5%
07 Prearranged	93	4.0%	30,806	9.2%	18,852	2.9%
08 Customer Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	69	2.9%	5,758	1.7%	10,353	1.6%
10 Unknown	299	12.8%	30,314	9.1%	71,086	10.9%
Total	2,343	100.0%	333,897	100.0%	653,352	100.0%

e. INTERRUPTION REVIEW BY PSC CAUSE CODES

Cause Code 01 - Major Storms

In 2016, Major Storms accounted for 6% of interruptions, 6% of customers interrupted, and 11% of Customer-Hours Interrupted.

Interruptions due to Major Storm were up 330% from 2015, and down 25% over the 5 year average. Customers interrupted due to Major Storms were up 43% from 2015, and down 41% over the 5 year average. Customer-Hours interrupted were up 86% from 2015 and down 59% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 27% of interruptions, 26% of customers interrupted, and 40% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 21% from 2015, and up 18% over the 5 year average. Customers interrupted due to Tree Contacts were down 4% from 2015, and up 5% over the 5 year average. Customer-Hours interrupted were up 40% from 2015 and up 34% over the 5 year average.

Tree Contacts were the 2nd largest cause of interruptions in 2016.

Sixty-one percent of the tree interruptions were due to fallen trees, which accounted for 73% of the customers interrupted and 77% of the customer-hours interrupted due to trees. Twenty-eight percent of the tree interruptions were due to broken limbs, which accounted for 27% of the customers interrupted and 22% of the customer-hours interrupted.

One of the tree interruptions affected a transmission line and two affected sub-transmission lines.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 1% of interruptions, 3% of customers interrupted, and 1% of Customer-Hours Interrupted.

Interruptions due to Overloads were up 3% from 2015, and down 11% over the 5 year average. Customers interrupted due to Overloads were up 583% from 2015, and up 426% over the 5 year average. Customer-Hours interrupted were down 55% from 2015 and down 17% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 0% of interruptions, 2% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Operator Error were flat at 0% from 2015, and up 29% over the 5 year average. Customers interrupted due to Operator Error were up 12% from 2015, and up 54% over the 5 year average. Customer-Hours interrupted were down 48% from 2015 and down 46% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

One of the operating errors affected a transmission line. This event accounted of 48% of the customers interrupted due to Operator Error.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 28% of interruptions, 28% of customers interrupted, and 27% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were down 1% from 2015, and down 3% over the 5 year average. Customers interrupted due to Equipment Failure were down 1% from 2015, and down 16% over the 5 year average. Customer-Hours interrupted were down 14% from 2015 and down 17% over the 5 year average.

Equipment Failures were the largest cause of interruptions in 2016.

There were five substation interruptions (10,177 customers interrupted, 15,100 customer-hours) due to equipment failures. There were six transmission interruptions (12,864 customers interrupted, 16,850 customer-hours) due to equipment failures. The remaining interruptions due to equipment failures were on the distribution system.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 21% of interruptions, 19% of customers interrupted, and 15% of Customer-Hours Interrupted.

Interruptions due to Accidents were up 11% from 2015, and up 15% over the 5 year average. Customers interrupted due to Accidents were down 36% from 2015, and down 12% over the 5 year average. Customer-Hours interrupted were down 40% from 2015 and down 9% over the 5 year average.

Accidents were the 3rd largest cause of interruptions in 2016.

There was one substation interruption (1,645 customers interrupted, 164 customer-hours interrupted). There were two transmission interruptions (3,098 customers interrupted, 8,534 customer-hours), one of which was due to an Animal and the other was due to a fire. The remaining interruptions due to accidents were on the distribution system.

Animal-related accidents accounted for 288 interruptions (61% of all accidents), 19,484 customers interrupted (33%) and 24,224 customer-hours interrupted (27%). The Company installs animal guards on transformers impacted by animal interruptions, while performing maintenance work. The Company also installs animal guards on all new transformers which are purchased to be installed.

Motor vehicle accidents accounted for 136 interruptions (29%), 32,417 customers interrupted (55%) and 58,270 customer-hours interrupted (66%). The Company investigates all poles which are involved in vehicle accidents in order to identify hazardous locations and evaluate possible pole relocations, as necessary.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 4% of interruptions, 10% of customers interrupted, and 3% of Customer-Hours Interrupted.

Interruptions due to Prearranged were down 12% from 2015, and down 32% over the 5 year average. Customers interrupted due to Prearranged were up 258% from 2015, and up 254% over the 5 year average. Customer-Hours interrupted were up 28% from 2015 and up 31% over the 5 year average.

Prearranged was the 5th largest cause of interruptions in 2016.

Four of the prearranged interruptions were at New Haven substation. These four substation events accounted for 45% of the customers interrupted due to Prearranged.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 3% of interruptions, 2% of customers interrupted, and 2% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 15% from 2015, and down 33% over the 5 year average. Customers interrupted due to Lightning were down 52% from 2015, and down 52% over the 5 year average. Customer-Hours interrupted were down 68% from 2015 and down 59% over the 5 year average.

Lightning was the 6th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 14% of interruptions, 10% of customers interrupted, and 12% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 24% from 2015, and up 25% over the 5 year average. Customers interrupted due to Unknown causes were down 19% from 2015, and down 7% over the 5 year average. Customer-Hours interrupted were up 32% from 2015 and up 32% over the 5 year average.

Unknown causes were the 4th largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2015/16 SPENDS

The Company continues to work on capital projects in the Central Region in order to maintain customer satisfaction and future reliability. Some specific projects that were constructed in either CY16 or will be constructed in CY17 are listed below. Additional descriptions of other major infrastructure projects will follow.

There are several projects where lines are being rebuilt or reconductored. These projects are either the result of engineering reliability reviews (ERRs) conducted on the Worst Performing Circuits or are the responses to customer inquiries via the Quick Resolution System (QRS). There are several sub-transmission line rebuild projects and a number of distribution line rebuild projects in progress.

Some of the distribution rebuild projects include reconductoring approximately 5,000 feet on the Niles 51 feeder, reconductoring approximately 7,500 feet on the Lords Hill 15066 feeder, and reconductoring approximately 26,000 feet on the Lighthouse Hill 6144 feeder.

There are additional load relief projects scheduled to be completed throughout the Region. Most of these load relief projects are ratio transformer replacements or voltage conversions. Line reconductoring is also included in the voltage conversions, where appropriate.

There are also a number of substation projects that were completed or are either under way or slated to begin in 2017. All but one of these projects are load relief projects. These projects include constructing new substations or replacing transformers. The new substation will be located in Cicero. The substation slated for transformer replacement is Gilbert Mills.

Major Capital Projects for Central Region:

Region	Project Name	Project Type	Fin Sys Project No.	Finish	Total Spend
Central	Mortimer - Solvay 5 - 69kV removal - C049335	Sub-T Line	C049335	05/02/16	\$2,007,732
Central	18759 UG Cable Repl Temple Street Fdr 24358	Dist Line	CD00914	06/01/16	\$1,674,557

g. DISCUSSION OF REGIONAL PERFORMANCE OF LVAC (LOW VOLTAGE AC) NETWORK DISTRIBUTION SYSTEM(S)

City of Syracuse - Ash Street LVAC Network

The Ash Street LVAC Network serves the northern downtown area and James Street of the City of Syracuse. This system is supplied by ten 11.5kV feeders that originate from the Ash Street substation. This system serves approximately 1,800 customer accounts and experienced a peak load of approximately 26.432 MVA in 2016.

The table below lists the breaker operations in 2016 that were a result of a fault and/or failure.

Substation	Feeder Number	Breaker Number	Breaker Number	# Breaker Operations from Failures
Ash Street	22340	R400	R4505	0
Ash Street	22341	R410	R4155	1
Ash Street	22342	R420	R4265	0
Ash Street	22343	R430	R4375	0
Ash Street	22344	R440	R4485	0
Ash Street	22345	R450	R4505	0
Ash Street	22346	R460	R4265	1
Ash Street	22347	R470	R4375	0
Ash Street	22348	R480	R4485	0
Ash Street	22349	R490	R4295	0

As shown above, the Ash Street LVAC Network experienced a total of two feeder outages in 2016. These outages caused zero customers to be interrupted. There were no customer interruptions and at no time was this network operated beyond its double contingency (N-2) design criteria.

There were no major events associated with the network in 2016.

Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections and network protector operation checks.

Equipment maintenance, in 2016, consisted of manhole and vault inspections, network protector and transformer inspections and network protector operation checks.

At this time, there are no major projects being designed and/or under construction.

City of Syracuse – Temple Street LVAC Network

The Temple Street LVAC Network serves the southern downtown area of the City of Syracuse with several spot network services in the northern area. This network is supplied by seven 13.2kV feeders that originate from the Temple Street substation. This system serves approximately 284 customer accounts and experienced a peak load of approximately 20.577 MVA in 2016.

The table below lists the breaker operations in 2016 that were a result of a fault and/or failure.

Substation	Feeder	Breaker	Breaker	# Breaker Operations from Failures
Temple Street	24349	R490	R4895	0
Temple Street	24350	R500	R5015	0
Temple Street	24353	R530	R5235	0
Temple Street	24354	R540	R5455	0
Temple Street	24356	R560	R5675	0
Temple Street	24357	R570	R5675	2
Temple Street	24358	R580	R5895	0

As shown above the Temple Street LVAC Network experienced two feeder outages in 2016. These outages caused zero customers to be interrupted. There were no customer interruptions and at no time was this network operated beyond its double contingency (N-2) design criteria.

There were no major events associated with the network in 2016.

Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections and network protector operation checks.

Equipment maintenance in 2016 consisted of manhole and vault inspections, network protector and transformer inspections and network protector operation checks.

There is one major project being designed and/or under construction:

1. **13.2kV Feeder 24358 Cable Replacement** – Per the Company's Cable Replacement Program, the first of the ten feeders has begun the replacement of the existing paper-insulated, lead-covered cable with rubber cable. The project was completed in 2016.

City of Cortland LVAC Network

The Cortland LVAC Network serves the downtown area of the City of Cortland along Main Street from Lincoln Avenue to Port Watson Street. This network is supplied by three 4.8kV feeders: two feeders from the Cortland Substation and one feeder from the Miller Street Substation. This system serves approximately 380 customer accounts and experienced a peak load of approximately 1.98 MVA in 2016.

The table below lists the breaker operations in 2016 that were a result of a fault and/or failure.

Substation	Feeder Number	Breaker Number	# Breaker Operations from Failures
Cortland	50201	R010	0
Cortland	50204	R040	0
Miller Street	11705	R050	0

As shown above the Cortland LVAC Network experienced zero feeder outages in 2016. There were no customer interruptions and at no time was this network operated beyond its single contingency (N-1) design criteria.

No major events occurred in 2016.

No major projects have been recently installed, being currently designed, or being currently installed.

Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections and network protector operation checks.

Equipment maintenance in 2016 consisted of manhole and vault inspections, network protector and transformer inspections and network protector operation checks.

The Company has decided to transform this LVAC Network system into a LVAC Radial system. The project to disassemble the network is scheduled to begin in 2019.

2. OPERATING CIRCUIT LISTS

The next three (3) tables will provide the following information for the Central Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by # of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

CENTRAL REGION

FEEDER #	A CUST. SERVED	B TOTAL INTER.	C # CUST. INTER.	D CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
LIGHTHOUSE HILL 6144	2,179	64	11,426	22,279	5.24	10.22	1.95	0
WEST CLEVELAND 32651	722	30	3,659	9,644	5.07	13.36	2.64	4
SOUTHWOOD 24452	1,762	23	8,528	25,624	4.84	14.54	3.00	3
COLOSSE 32151	2,510	37	5,826	17,690	2.32	7.05	3.04	5
NEW HAVEN 25652	1,347	26	8,328	7,647	6.18	5.68	0.92	0
GRANBY CENTER 29351	1,825	17	5,949	22,869	3.26	12.53	3.84	0
WEST MONROE 27451	1,963	32	5,344	10,116	2.72	5.15	1.89	4
LORDS HILL 15067	751	26	2,140	6,088	2.85	8.11	2.84	0
TULLY CENTER 27851	2,095	35	6,286	7,195	3.00	3.43	1.14	2
CONSTANTIA 1923	724	22	1,655	5,502	2.29	7.60	3.32	4
ROCK CUT ROAD 28653	3,418	12	13,572	22,300	3.97	6.52	1.64	3
JEWETT ROAD 29155	784	15	2,790	6,048	3.56	7.71	2.17	5
SORRELL HILL 26953	961	13	3,498	8,289	3.64	8.63	2.37	3
NILES 29451	1,285	38	1,532	7,727	1.19	6.01	5.04	0
WETZEL ROAD 690055	1,328	13	3,119	8,901	2.35	6.70	2.85	4
SANDY CREEK 6652	1,684	22	3,587	6,838	2.13	4.06	1.91	0
NEW HAVEN 25653	1,954	31	8,787	4,806	4.50	2.46	0.55	0
FABIUS 5561	470	15	952	5,338	2.03	11.36	5.61	0
JEWETT ROAD 29156	324	13	1,243	3,262	3.84	10.07	2.62	2
JEWETT ROAD 29154	1,009	11	3,078	5,990	3.05	5.94	1.95	2

Regional Goals:
CAIDI Min. 2.00
SAIFI Min. 1.00

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES

CENTRAL REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
LIGHTHOUSE HILL 6144	1.95	3.23	4.09	1.42	5.24	1.62	2.01	1.86
WEST CLEVELAND 32651	2.64	1.36	1.35	3.15	5.07	2.42	6.55	4.31
SOUTHWOOD 24452	3.00	1.92	2.59	2.48	4.84	1.42	2.99	2.90
COLOSSE 32151	3.04	0.79	0.79	2.16	2.32	4.01	5.32	1.31
NEW HAVEN 25652	0.92	2.16	1.07	1.22	6.18	2.56	1.30	1.31
GRANBY CENTER 29351	3.84	0.86	3.43	2.02	3.26	1.43	0.90	0.34
WEST MONROE 27451	1.89	0.92	1.76	1.96	2.72	1.51	1.62	1.69
LORDS HILL 15067	2.84	5.16	4.75	1.37	2.85	4.31	2.82	3.57
TULLY CENTER 27851	1.14	2.48	2.80	3.39	3.00	0.46	4.71	0.81
CONSTANTIA 1923	3.32	1.37	1.14	1.68	2.29	1.72	1.84	1.63
ROCK CUT ROAD 28653	1.64	5.10	2.11	3.66	3.97	0.16	2.09	0.08
JEWETT ROAD 29155	2.17	1.97	2.97	3.78	3.56	3.44	0.13	2.29
SORRELL HILL 26953	2.37	3.86	2.69	1.71	3.64	0.13	0.85	1.00
NILES 29451	5.04	2.65	2.09	2.45	1.19	2.88	3.38	1.89
WETZEL ROAD 690055	2.85	N/A	N/A	N/A	2.35	N/A	N/A	N/A
SANDY CREEK 6652	1.91	3.01	0.52	2.29	2.13	0.84	2.60	0.60
NEW HAVEN 25653	0.55	2.11	1.07	1.97	4.50	3.62	1.14	2.23
FABIUS 5561	5.61	1.82	4.80	2.23	2.03	4.76	3.00	0.77
JEWETT ROAD 29156	2.62	2.46	5.58	5.19	3.84	1.35	0.88	5.93
JEWETT ROAD 29154	1.95	4.26	4.51	2.01	3.05	1.08	0.86	4.46

Regional Goals:
CAIDI Min. 2.00
SAIFI Min. 1.00

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

CENTRAL REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

This year, 2016, the Central Region is required to analyze and report on twenty of the worst performing circuits. The list consists of sixteen 13.2kV circuits, one 12kV circuit and two 4.8kV circuits and one 4.16kV circuit.

The PSC minimum goals for the Central Region are 2.00 hours for CAIDI and 1.00 interruptions for SAIFI.

1. LIGHTHOUSE HILL 6144 - 12.0kV

Profile: 2,179 Customers, 158.0 Circuit Miles
Indices: CAIDI = 1.95, SAIFI = 5.24

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	31	48.44%	7,970	69.75%	18,521	83.13%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	1.56%	187	1.64%	78	0.35%
5	EQUIPMENT	9	14.06%	313	2.74%	1,161	5.21%
6	ACCIDENTS	4	6.25%	153	1.34%	151	0.68%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	4	6.25%	2,224	19.46%	776	3.48%
10	UNKNOWN	15	23.44%	579	5.07%	1,591	7.14%
Totals		64	100.00%	11,426	100.00%	22,279	100.00%

Problem Analysis:

- There were no substation interruptions in 2016.
- There was a transmission interruption on August 13th due to lightning. This event resulted in 2,168 customers interrupted (19% of the total), and 687 customer-hours interrupted (3% of the total).
- There was a feeder lockout on January 10th due to a fallen tree. This event resulted in 2,160 customers interrupted (19% of the total), and 3,888 customer-hours interrupted (17% of the total).
- The recloser on County 2 was interrupted on January 10th, May 11th and August 12th, all due to trees. These events resulted in 3077 customers interrupted (27% of the total), and 3852 customer-hours interrupted (17% of the total).
- The recloser on Tubbs Rd locked out on August 10th due to a broken tree limb. This event resulted in 442 customers interrupted (4% of the total), and 538 customer-hours interrupted (2% of the total).
- The tap fuses on pole 61 N Osceola Rd experienced four interruptions in 2016. The events on July 23rd was due to trees and resulted in 52 customers interrupted (0.5% of the total) and 123 customer-hours interrupted (0.6% of the total). The events on July 19th and October 20th were due to an unknown cause and resulted in 103 customers interrupted (0.9% of the total) and 401 customer-hours interrupted (2% of the total). The event on September 8th was due to lightning and resulted in 52 customers interrupted (0.5% of the total), and 80 customer-hours interrupted (0.4% of the total).
- The tap fuse on pole 98 Osceola Rd blew due to multiple fallen trees on June 20th. This event resulted in 71 customers interrupted (0.6% of the total), and 1,132 customer-hours interrupted (5% of the total).

- The tap fuses to Kasog Lake were interrupted on July 18th, October 23rd and November 3rd, all due to trees. These events resulted in 394 customers interrupted (3% of the total), and 1,605 customer-hours interrupted (7% of the total).
- The tap fuse on pole 19 Ricard Rd experienced tree events on October 21st and 23rd. These events results in 278 customers interrupted (2% of the total), and 1,070 customer-hours interrupted (5% of the total).
- The tap fuses on P1 County 39 blew due to a fallen tree on October 24th which resulted in 241 customers interrupted (2% of the total), and 2,277 customer-hours interrupted (10% of the total).

Action Taken:

- The I&M inspection (foot patrol) of the feeder was completed in November 2015.
- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by November 2016.
- Distribution Forestry completed hazard tree removal on the feeder in FY2017 (255 trees were removed).

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by November 2018.
- Rebuild N Osceola Rd in FY2019.
- Rebuild County Route 47 in FY2019.

2. WEST CLEVELAND 32651 - 13.2kV

Profile: 722 Customers, 35.6 Circuit Miles
Indices: CAIDI = 2.64, SAIFI = 5.07

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	13	43.33%	892	24.38%	3,649	37.84%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	20.00%	737	20.14%	1,446	15.00%
6	ACCIDENTS	2	6.67%	20	0.55%	52	0.54%
7	PREARRANGED	2	6.67%	695	18.99%	281	2.91%
8	CUST. EQUIP.gt	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.33%	411	11.23%	2,035	21.11%
10	UNKNOWN	6	20.00%	904	24.71%	2,180	22.61%
Totals		30	100.00%	3,659	100.00%	9,644	100.00%

Problem Analysis:

- There was one substation interruption in 2016. This event was on October 28th and was due to the high side fuse failing. This event resulted in 659 customers interrupted (18% of the total) and 1,217 customer-hours interrupted (13% of the total).
- There was one transmission interruption in 2016 on February 17th that was due to an unknown cause. This event resulted in 715 customers interrupted (20% of the total) and 1,776 customer-hours interrupted (18% of the total).
- There were two drop and pick (planned) interruption on October 28th to return the feeder to normal after the high side fuses were repaired. These events resulted in 695 customers interrupted (19% of the total) and 281 customer-hours interrupted (3% of the total).
- On June 9th, the tap fuses on P185 on County 17 operated due to a fallen tree. This event resulted in 348 customers interrupted (10% of the total) and 1,079 customer-hours interrupted (11% of the total).
- On August 12th, the fuses on P1 County 17 were interrupted due to lightning. This event resulted in 411 customers interrupted (11% of the total) and 2,035 customer-hours interrupted (21% of the total).
- On October 27th, the switches on P138 County 17 to clear a tree that fell. This resulted in 289 customers interrupted (8% of the total) and 1,546 customer-hours interrupted (16% of the total).

Action Taken:

- The I&M inspection (foot patrol) of the feeder was completed in October 2015.
- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by October 2016.

Action Plan:

- Distribution Forestry to monitor the feeder.
- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by October 2018.

3. SOUTHWOOD 24452 - 13.2kV

Profile: 1,762 Customers, 75.1 Circuit Miles
Indices: CAIDI = 3.00, SAIFI = 4.84

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	10	43.48%	5,461	64.04%	20,259	79.06%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	17.39%	1,859	21.80%	2,472	9.65%
6	ACCIDENTS	3	13.04%	959	11.25%	1,915	7.48%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	4.35%	11	0.13%	52	0.20%
10	UNKNOWN	5	21.74%	238	2.79%	926	3.62%
Totals		23	100.00%	8,528	100.00%	25,624	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- There were four feeder lockouts in 2016. Three of the events (February 3rd, August 13th and 15th) were due to trees, which resulted in 5,281 customers interrupted (62% of the total) and 19,577 customer-hours interrupted (76% of the total). The fourth event was on February 24th due to a broken insulator that resulted in 1,748 customers interrupted (20% of the total) and 1,884 customer-hours interrupted (7% of the total).
- The recloser on Broadfield Rd was interrupted on December 14th due to a MVA. This event resulted in 836 customers interrupted (10% of the total) and 1,821 customer-hours interrupted (7% of the total).

Action Taken:

- The I&M inspection (foot patrol) of the feeder was completed in April 2016.
- Distribution Forestry cycle pruned the feeder in FY2017.

Action Plan:

- Complete all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by April 2017.
- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by April 2019.
- Distribution Forestry to monitor the feeder.

4. COLOSSE 32151 - 13.2kV

Profile: 2,510 Customers, 139.0 Circuit Miles
Indices: CAIDI = 3.04, SAIFI = 2.32

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	16	43.24%	2,021	34.69%	5,293	29.92%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	16.22%	2,893	49.66%	11,307	63.92%
6	ACCIDENTS	6	16.22%	340	5.84%	342	1.94%
7	PREARRANGED	1	2.70%	211	3.62%	21	0.12%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	2.70%	159	2.73%	133	0.75%
10	UNKNOWN	7	18.92%	202	3.47%	593	3.35%
Totals		37	100.00%	5,826	100.00%	17,690	100.00%

Problem Analysis:

- There was one substation interruptions on August 11th when one of the transformers high side bushings failed. This resulted in 2,516 customers interrupted (43% of the total) and 9,726 customer-hours interrupted (55% of the total). In conjunction with this, there was a planned drop and pick to restore a small portion of the feeder after the bushing was replaced. This planned event resulted in 211 customers interrupted (4% of the total) and 21 customer-hours interrupted (0.1% of the total).
- There were no transmission interruptions in 2016.
- The recloser on U.S. 11 locked out on February 29th due to a fallen tree. This event resulted in 1,239 customers interrupted (21% of the total) and 3,164 customer-hours interrupted (18% of the total).
- The recloser on pole 175 NYS 69 locked out on June 27th, due to a fallen tree. This event resulted in 534 customers interrupted (9% of the total) and 1,130 customer-hours interrupted (6% of the total).
- There was a MVA on County 45 that resulted in two separate interruptions on August 13th. These two events resulted in 274 customers interrupted (5% of the total) and 114 customer-hours interrupted (0.6% of the total).
- On November 30th, a failed insulator on NYS 69 resulted in 214 customers interrupted (4% of the total) and 877 customer-hours interrupted (5% of the total).

Action Taken:

- The I&M inspection (foot patrol) of the feeder was completed in October 2016.
- Distribution Forestry completed hazard tree removal on the feeder in FY2017.
- Distribution Forestry cycle pruned the feeder in FY2017.
- High side bushing was replaced in August 2016.

Action Plan:

- Distribution Forestry to monitor the circuit.
- Complete all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by October 2017.
- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by October 2019.

5. NEW HAVEN 25652 – 13.2kV

Profile: 1,347 Customers, 70.2 Circuit Miles
Indices: CAIDI = 0.92, SAIFI = 6.18

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	30.77%	185	2.22%	984	12.87%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	3.85%	1,351	16.22%	113	1.47%
5	EQUIPMENT	3	11.54%	15	0.18%	36	0.48%
6	ACCIDENTS	2	7.69%	24	0.29%	33	0.43%
7	PREARRANGED	4	15.38%	5,376	64.55%	918	12.01%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.85%	1	0.01%	9	0.11%
10	UNKNOWN	7	26.92%	1,376	16.52%	5,553	72.62%
Totals		26	100.00%	8,328	100.00%	7,647	100.00%

Problem Analysis:

- There were four substation interruptions in 2016. All four interruptions were prearranged events to either install or remove the mobile transformer for work on the 115kV side of the station transformer. All planned outages are classified as Distribution outages due to a limitation in the IDS reporting system. These events accounted for 5,376 customers interrupted (65% of the total) and 918 customer-hours (12% of the total).
- There was one transmission event on May 4th due to an operating error that resulted in 1,351 customers interrupted (16% of the total) and 113 customer-hours (1% of the total).
- There was one feeder lockout on January 10th due to an unknown cause during a minor storm. This event resulted in 1,335 customers interrupted (16% of the total) and 5,318 customer-hours interrupted (70% of the total).
- The tap fuse on County Route 35 experienced one interruption in 2016 due to a fallen tree. This event was on January 11th and resulted in 68 customers interrupted (0.8% of the total) and 528 customer-hours interrupted (7% of the total).

Action Taken:

- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by March 2014.
- Completed all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by March 2016.
- Distribution Forestry completed hazard tree removal on the feeder in FY2016.
- Repaired 115kV switches at the substation in April 2016.

Action Plan:

- Monitor 115kV work.

6. GRANBY CENTER 29351 - 13.2kV

Profile: 1,825 Customers, 67.8 Circuit Miles
Indices: CAIDI = 3.84, SAIFI = 3.26

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	47.06%	3,134	52.68%	6,640	29.03%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	2	11.76%	3	0.05%	22	0.10%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	7	41.18%	2,812	47.27%	16,208	70.87%
Totals		17	100.00%	5,949	100.00%	22,869	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- There were two feeder lockouts in 2016. The first event was on January 10th that was due to an unknown cause during a minor storm that resulted in 1,817 customers interrupted (31% of the total) and 14,213 customer-hours interrupted (62% of the total). The second event was due to a fallen tree on August 13th and resulted in 1,815 customers interrupted (31% of the total) and 1,966 customer-hours interrupted (9% of the total).
- The recloser on pole 134 on County 8 experienced three events in 2016. The events on August 13th and December 18th were due to trees and resulted in 1,072 customers interrupted (18% of the total) and 3,971 customer-hours interrupted (17% of the total). The third event was on November 23rd due to an unknown cause and resulted in 536 customers interrupted (9% of the total) and 634 customer-hours interrupted (3% of the total).
- The recloser on pole 4 County 8 had one unknown interruption which resulted in 437 customers interrupted (7% of the total) and 1,238 customer-hours interrupted (5% of the total).

Action Taken:

- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by May 2015.

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by May 2017.
- Routine tree trimming/pruning to be completed in FY2018.
- Distribution forestry to review the feeder for hazard tree in FY2018.
- Convert County Route 8 to the north and create feeder tie with Paloma in FY2022.

7. WEST MONROE 27451 - 13.2kV

Profile: 1,963 Customers, 87.6 Circuit Miles
Indices: CAIDI = 1.89, SAIFI = 2.72

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	17	53.13%	2,663	49.83%	7,695	76.07%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	3.13%	1	0.02%	6	0.06%
5	EQUIPMENT	6	18.75%	2,194	41.06%	1,044	10.32%
6	ACCIDENTS	6	18.75%	236	4.42%	604	5.97%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	6.25%	250	4.68%	767	7.58%
Totals		32	100.00%	5,344	100.00%	10,116	100.00%

Problem Analysis:

- There were no substation interruptions in 2016.
- There was one transmission interruption on February 17th due to fallen tree. This event resulted in 1,952 customers interrupted (37% of the total) and 4,847 customer-hours interrupted (48% of the total).
- There was one feeder lockout on April 19th due to a switch failure. This event resulted in 1,944 customers interrupted (36% of the total) and 194 customer-hours interrupted (2% of the total).
- The main line fuses at pole 73 ½, on NYS 49 blew due to a fallen tree. This event resulted in 224 customers interrupted (4% of the total) and 208 customer-hours interrupted (2% of the total).
- The tap fuses on pole 48, Toad Harbor Rd had three interruptions in 2016. Two were due to fallen trees. These events were on July 14th and September 18th and resulted in 175 customers interrupted (3% of the total) and 1,331 customer-hours interrupted (13% of the total). The third event was on June 20th due to a broken crossarm which resulted in 55 customers interrupted (1% of the total) and 521 customer-hours interrupted (5% of the total).
- The tap fuse on pole ½, Toad Harbor Rd was interrupted on August 4th due to a bird. This event resulted in 147 customers interrupted (3% of the total) and 245 customer-hours interrupted (2% of the total).
- The tap fuse on pole 1, County 23 was interrupted on January 10th due to a broken tree limb. This events resulted in 107 customers interrupted (2% of the total) and 687 customer-hours interrupted (7% of the total).

- The fuse on pole 128, County 23A was interrupted on June 4th with no cause found. This event resulted in 193 customers interrupted (4% of the total) and 283 customer-hours interrupted (3% of the total).
- The tap fuse on Slosson Rd had an unknown interruption on October 23rd. This event resulted in 57 customers interrupted (1% of the total) and 484 customer-hours interrupted (5% of the total).
- There were 11 individual transformer interruptions throughout the year. While these events accounted for 34% of the total number of interruptions, they only resulted in 26 customers interrupted (0.5% of the total) and 109 customer-hours interrupted (1% of the total).

Action Taken:

- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by August 2014.
- Completed all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by August 2016.
- Distribution Forestry cycle pruned the feeder in FY2015.
- Distribution Forestry completed hazard tree removals in FY2014.

Action Plan:

- Distribution forestry to monitor the feeder.

8. LORDS HILL 15067 - 4.8kV

Profile: 751 Customers, 54.2 Circuit Miles
Indices: CAIDI = 2.84, SAIFI = 2.85

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	13	50.00%	388	18.13%	1,679	27.57%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	23.08%	43	2.01%	277	4.54%
6	ACCIDENTS	1	3.85%	750	35.05%	2,363	38.81%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	7.69%	45	2.10%	125	2.05%
10	UNKNOWN	4	15.38%	914	42.71%	1,646	27.03%
Totals		26	100.00%	2,140	100.00%	6,088	100.00%

Problem Analysis:

- There was one transmission interruptions on December 15th where a beaver dropped a tree on the subtransmission tap to Lords Hill. This event resulted in 750 customers interrupted (35% of the total) and 2,363 customer-hours interrupted (39% of the total).
- There were no substation interruptions in 2016.
- There was a feeder lockout on August 16th where the cause was not found. This event resulted in 749 customers interrupted (35% of the total) and 1,373 customer-hours interrupted (23% of the total).
- Amber Rd experienced three interruptions in 2016. The events on February 3rd and 24th were due to trees and resulted in 89 customers interrupted (4% of the total) and 480 customer-hours interrupted (8% of the total). The third event was on October 20th due to lightning which resulted in 44 customers interrupted (2% of the total) and 124 customer-hours interrupted (2% of the total).
- The tap fuse on pole 1, Canty Hill Rd was interrupted on July 13th due to a fallen tree. This event resulted in 107 customers interrupted (5% of the total) and 348 customer-hours interrupted (6% of the total).
- The tap fuse on pole 10, Fox Rd experience tree events on August 18th and October 22nd. These events resulted in 106 customers interrupted (5% of the total) and 332 customer-hours interrupted (5% of the total).

Action Taken:

- The I&M inspection (foot patrol) of the feeder was completed in March 2016.

- Distribution Forestry cycle pruned the feeder in FY2015.
- Distribution Forestry completed hazard tree removals in FY2015.

Action Plan:

- Complete all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by March 2017.
- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by March 2019.
- Distribution forestry to monitor the feeder.
- Create feeder tie with Tully Center via a Ratio in 2017.

9. TULLY CENTER 27851 - 13.2kV

Profile: 2,095 Customers, 108.9 Circuit Miles
Indices: CAIDI = 1.14, SAIFI = 3.00

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	22.86%	2,324	36.97%	1,640	22.79%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	15	42.86%	3,936	62.62%	5,438	75.58%
6	ACCIDENTS	2	5.71%	2	0.03%	9	0.12%
7	PREARRANGED	2	5.71%	2	0.03%	23	0.32%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	6	17.14%	18	0.29%	73	1.01%
10	UNKNOWN	2	5.71%	4	0.06%	12	0.17%
Totals		35	100.00%	6,286	100.00%	7,195	100.00%

Problem Analysis:

- There were no substation interruptions in 2016.
- There were no transmission interruptions in 2016.
- There were three feeder lockouts in 2016. The first event was on February 14th from a downed conductor which resulted in 1,512 customers interrupted (24% of the total) and 3,872 customer-hours interrupted (54% of the total). The second event was on February 16th due to a transformer that failed which resulted in 2,090 customers interrupted (33% of the total) and 1,230 customer-hours interrupted (17% of the total). The last event was on August 16th due to a tree limb and resulted in 2,089 customers interrupted (33% of the total) and 1,114 customer-hours interrupted (15% of the total).
- There were 18 individual transformer interruptions in 2016. These events resulted in 51% of the interruption, but only 21 customers interrupted (0.3% of the total) and 141 customer-hours interrupted (2% of the total).

Action Taken:

- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by November 2014.
- Completed all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by November 2016.
- Distribution Forestry completed hazard tree removals in FY2017.

Action Plan:

- Distribution Forestry to monitor the feeder.

10. CONSTANTIA 1923 - 4.16kV

Profile: 724 Customers, 26.2 Circuit Miles
Indices: CAIDI = 3.32, SAIFI = 2.29

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	50.00%	1,015	61.33%	3,507	63.74%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	22.73%	237	14.32%	658	11.95%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	1	4.55%	12	0.73%	25	0.45%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	4.55%	76	4.59%	613	11.14%
10	UNKNOWN	4	18.18%	315	19.03%	700	12.72%
Totals		22	100.00%	1,655	100.00%	5,502	100.00%

Problem Analysis:

- There were no substation interruptions in 2016.
- There was one transmission interruptions on February 17th due to a tree which resulted in 722 customers interrupted (44% of the total) and 1,793 customer-hours interrupted (33% of the total).
- The tap fuses on pole 1, Johnson Rd blew three times in 2016. The events on February 17th and October 13th were due to equipment failures resulted in 165 customers interrupted (10% of the total) and 582 customer-hours interrupted (11% of the total). The last event was on November 11th and was due to a fallen tree which resulted in 125 customers interrupted (8% of the total) and 352 customer-hours interrupted (6% of the total).
- The tap fuses on pole 11, Salt Rd were interrupted on February 21st and September 22nd due to an unknown cause. These events resulted in 228 customers interrupted (14% of the total) and 534 customer-hours interrupted (10% of the total).
- The tap fuse on pole 6, Kibby Lake Rd was interrupted three times in 2016. On August 12th due to a fallen tree and resulted in 47 customers interrupted (3% of the total) and 617 customer-hours interrupted (11% of the total). On June 20th, lightning blew the fuse and resulted in 76 customers interrupted (5% of the total) and 613 customers-hours interrupted (11% of the total). The third event was due to an unknown cause on May 12th and resulted in 75 customers interrupted (5% of the total) and 118 customer-hours interrupted (2% of the total).

Action Plan:

- Routine tree trimming/pruning to be completed in FY2018.
- The I&M inspection (foot patrol) of the feeder will be conducted 2017.

11. ROCK CUT ROAD 28653 - 13.2kV

Profile: 3,418 Customers, 22.5 Circuit Miles
Indices: CAIDI = 1.64, SAIFI = 3.97

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	4	33.33%	5,845	43.07%	7,249	32.51%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	33.33%	7,574	55.81%	14,887	66.76%
6	ACCIDENTS	4	33.33%	153	1.13%	164	0.73%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	0	0.00%	0	0.00%	0	0.00%
Totals		12	100.00%	13,572	100.00%	22,300	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- There were two feeder lockouts in 2016. On April 12th a switch failed and resulted in 4,859 customers interrupted (36% of the total) and 5,702 customer-hours interrupted (26% of the total). On September 26th a tree fell and resulted in 4,288 customers interrupted (32% of the total) and 4,359 customer-hours interrupted (20% of the total).
- On September 26th a switch on Comstock Ave failed which resulted in 2,711 customers interrupted (20% of the total) and 9,172 customer-hours interrupted (41% of the total).
- On August 10th, switches on Buckingham Ave were open to clear a tree limb. These event resulted in 1,555 customers interrupted (11% of the total) and 2,880 customer-hours interrupted (13% of the total).

Action Taken:

- Distribution Forestry cycle pruned the feeder in FY2014.
- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by May 2015.

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by May 2017.
- Distribution forestry to review the feeder for hazard tree removals.

12. JEWETT ROAD 29155 - 13.2kV

Profile: 784 Customers, 34.8 Circuit Miles
Indices: CAIDI = 2.17, SAIFI = 3.56

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	40.00%	139	4.98%	1,032	17.06%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	33.33%	816	29.25%	2,042	33.76%
6	ACCIDENTS	2	13.33%	266	9.53%	252	4.17%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	13.33%	1,569	56.24%	2,723	45.01%
Totals		15	100.00%	2,790	100.00%	6,048	100.00%

Problem Analysis:

- There was one substation interruption in 2016 due to an unknown cause at the 34.5kV station that feeds the 34.5kV line to Jewett. This event was on September 18th and resulted in 782 customers interrupted (28% of the total) and 899 customer-hours interrupted (15% of the total).
- There were two transmission interruptions in 2016. The first event was due to an unknown cause on May 29th. This event resulted in 787 customers interrupted (28% of the total) and 1,823 customer-hours interrupted (30% of the total). The second event was on September 19th due to a tap that burnt-up on a switch that resulted in 786 customers interrupted (28% of the total) and 1,847 customer-hours interrupted (31% of the total).
- The recloser on Seneca Tpke locked out due to a motor vehicle accident on June 15th and resulted in 241 customers interrupted (9% of the total) and 179 customer-hours interrupted (3% of the total).
- The main line fuses on East Lake Rd operated on October 21st due to a tree limb. This resulted in 86 customers interrupted (3% of the total) and 592 customer-hours interrupted (10% of the total).

Action Taken:

- Bushing on circuit breaker at Elbridge was replaced in August 2016.
- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by April 2015.

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by April 2017.
- Routine tree trimming/pruning to be performed in FY2018.

13. SORRELL HILL 26953 – 13.2kV

Profile: 961 Customers, 53.5 Circuit Miles
Indices: CAIDI = 2.37, SAIFI = 3.64

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	38.46%	179	5.12%	584	7.05%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	38.46%	2,866	81.93%	6,745	81.37%
6	ACCIDENTS	2	15.38%	451	12.89%	948	11.43%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	7.69%	2	0.06%	12	0.15%
Totals		13	100.00%	3,498	100.00%	8,289	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- There were three feeder lockouts, with the January 10th event due to failed insulator and the events on January 26th and February 3rd due to riser pole failures. These events resulted in 2,862 customers interrupted (82% of the total) and 6,733 customer-hours interrupted (81% of the total).
- A motor vehicle accident on NYS 370 on January 14th resulted in 449 customers interrupted (13% of the total) and 933 customer-hours interrupted (11% of the total).

Action Taken:

- The I&M inspection (foot patrol) of the feeder was completed in October 2016.
- Riser pole for the feeder was re-built in 2016.
- Distribution Forestry cycle pruned the feeder in FY2015.
- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by February 2014.

Action Plan:

- Complete all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by October 2017.
- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by October 2019.
- Routine tree trimming/pruning to be completed in FY2018.

14. NILES 29451 – 13.2kV

Profile: 1,285 Customers, 105.7 Circuit Miles
Indices: CAIDI = 5.04, SAIFI = 1.19

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	15	39.47%	429	28.00%	2,594	33.57%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	8	21.05%	687	44.84%	2,920	37.79%
6	ACCIDENTS	5	13.16%	331	21.61%	1,807	23.38%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	2.63%	1	0.07%	8	0.10%
10	UNKNOWN	9	23.68%	84	5.48%	399	5.16%
Totals		38	100.00%	1,532	100.00%	7,727	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- On May 21st, a motor vehicle accident on Rockefeller Rd resulted in 122 customers interrupted (8% of the total) and 1,027 customer-hours interrupted (13% of the total).
- The recloser on Twelve Corners Rd failed on January 12th which resulted in 332 customers interrupted (22% of the total) and 1,184 customer-hours interrupted (15% of the total).
- The tap fuse on Appletree Point Rd was interrupted on February 24th due to a broken pole. This resulted in 125 customers interrupted (8% of the total) and 514 customer-hours interrupted (7% of the total).
- The tap fuse to Twelve Corners Rd and Globe Rd experienced three events in 2016 before it was replaced. The events January 10th and February 19th were due to trees and resulted in 62 customers interrupted (4% of the total) and 660 customer-hours interrupted (9% of the total). The event on February 2nd was due to an unknown cause and resulted in 31 customers interrupted (2% of the total) and 185 customer-hours interrupted (2% of the total).
- The new tap fuse on pole 185 Globe Rd had three interruptions in 2016. Unknown causes were on April 3rd and December 15th which resulted in 38 customers interrupted (2% of the total) and 145 customer-hours interrupted (2% of the total). A tree limb on December 15th resulted in 21 customers interrupted (1% of the total) and 50 customer-hours interrupted (0.7% of the total).
- The tap fuses on pole 14 Appletree Point had tree interruptions on April 1st and 3rd. These events resulted in 98 customers interrupted (6% of the total) and 678 customer-hours interrupted (9% of the total).

- On January 10th, there was a broken pole on Glen Haven Rd that resulted in 58 customers interrupted (4% of the total) and 440 customer-hours interrupted (6% of the total).
- The tap fuse to Fire Lane 50 experienced events on July 18th due to a fallen tree July 19th, due to non-company activities. These events resulted in 158 customers interrupted (10% of the total) and 840 customer-hours interrupted (11% of the total).
- The main line fuse on pole 44, NYS 38A was interrupted due to down conductors. This event resulted in 70 customers interrupted (5% of the total) and 495 customer-hours interrupted (6% of the total).

Action Taken:

- Complete all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by July 2015.
- Distribution Forestry completed hazard tree removal on the feeder in FY2016.
- Distribution Forestry cycle pruned the feeder in FY2016.
- Additional fuses were installed in the area of Twelve Corners Rd and Globe Rd in April, 2016

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by July 2017.
- Rebuild Dolphin Point Rd in FY2020.
- Install fuses on CSP transformers on Globe Rd in 2017.
- Install mid-span poles on Globe Rd to shorten span lengths in 2017.

15. WETZEL ROAD 690055 – 13.2kV

Profile: 1,328 Customers, 45.8 Circuit Miles
Indices: CAIDI = 2.85, SAIFI = 2.35

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	2	15.38%	21	0.67%	91	1.02%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	46.15%	561	17.99%	2,259	25.37%
6	ACCIDENTS	2	15.38%	1,185	37.99%	3,572	40.13%
7	PREARRANGED	1	7.69%	113	3.62%	339	3.81%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	15.38%	1,239	39.72%	2,641	29.67%
Totals		13	100.00%	3,119	100.00%	8,901	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- There were two feeder lockouts in 2016. On January 1st, a motor vehicle accident resulted in 1,184 customers interrupted (38% of the total) and 3,570 customer-hours interrupted (40% of the total). The second lockout was due to an unknown cause during and minor storm on January 10th and resulted in 1,191 customers interrupted (38% of the total) and 2,561 customer-hours interrupted (29% of the total).
- A motor vehicle accident on Caughdenoy Rd on April 27th resulted in 439 customers interrupted (14% of the total) and 1,789 customer-hours interrupted (20% of the total).

Action Plan:

- Distribution Forestry to monitor the feeder.
- Recloser to be installed on Maple Rd in 2017.

16. SANDY CREEK 6652 – 13.2kV

Profile: 1,684 Customers, 55.2 Circuit Miles
Indices: CAIDI = 1.91, SAIFI = 2.13

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	40.91%	612	17.06%	2,655	38.82%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	18.18%	1,346	37.52%	848	12.40%
6	ACCIDENTS	6	27.27%	1,579	44.02%	3,211	46.96%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	13.64%	50	1.39%	124	1.81%
Totals		22	100.00%	3,587	100.00%	6,838	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- The switches on NYS 3 were opened twice for events in 2016. The first event on March 19th was due to a motor vehicle accident and resulted in 755 customers interrupted (21% of the total) and 1,246 customer-hours interrupted (18% of the total). The event on March 24th was due to a broken crossarm and resulted in 757 customers interrupted (21% of the total) and 580 customer-hours interrupted (8% of the total).
- The recloser on County 15 experienced two events in 2016. On August 23rd a switch failed and resulted in 581 customers interrupted (16% of the total) and 184 customer-hours interrupted (3% of the total). A motor vehicle accident on October 29th resulted in 573 customers interrupted (16% of the total) and 1,404 customer-hours interrupted (21% of the total).
- The tap fuses to Rainbow Shores Rd were interrupted twice. A squirrel on July 25th resulted in 204 customers interrupted (6% of the total) and 459 customer-hours interrupted (7% of the total). A fallen tree on August 16th resulted in 205 customers interrupted (6% of the total) and 1,138 customer-hours interrupted (17% of the total).
- A tree fell on Seber Shores Rd on January 10th and resulted in 126 customers interrupted (4% of the total) and 344 customer-hours interrupted (5% of the total).
- A tree fell on Weaver Rd on January 10th and resulted in 43 customers interrupted (1% of the total) and 347 customer-hours interrupted (5% of the total).
- A tree fell on W Shore Rd on July 10th and resulted in 50 customers interrupted (1% of the total) and 380 customer-hours interrupted (6% of the total).

Action Taken:

- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by December 2015.

- Distribution Forestry cycle pruned the feeder in FY2017.

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by December 2017.

17. NEW HAVEN 25653 - 11.1kV

Profile: 1,954 Customers, 77.0 Circuit Miles
Indices: CAIDI = 0.55, SAIFI = 4.50

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	14	45.16%	592	6.74%	2,083	43.35%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	3.23%	1,943	22.11%	162	3.37%
5	EQUIPMENT	6	19.35%	27	0.31%	76	1.58%
6	ACCIDENTS	2	6.45%	51	0.58%	82	1.70%
7	PREARRANGED	3	9.68%	5,856	66.64%	1,078	22.42%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	5	16.13%	318	3.62%	1,326	27.58%
Totals		31	100.00%	8,787	100.00%	4,806	100.00%

Problem Analysis:

- There were three substation interruptions in 2016. All three interruptions were prearranged events to either install or remove the mobile transformer for work on the 115kV side of the station transformer. All planned outages are classified as Distribution outages due to a limitation in the IDS reporting system. These events accounted for 5,856 customers interrupted (67% of the total) and 1,078 customer-hours (22% of the total).
- There was a transmission interruption on May 4th due to an operating error. This event resulted in 1,943 customers interrupted (22% of the total) and 162 customer-hours interrupted (3% of the total).
- A tree fell on North Rd on January 10th and resulted in 230 customers interrupted (3% of the total) and 514 customer-hours interrupted (11% of the total).
- A tree fell on Maiden Lane on January 10th and resulted in 57 customers interrupted (0.6% of the total) and 337 customer-hours interrupted (7% of the total).
- The tap fuses on County 51 blew due to an unknown cause on January 10th. This event resulted in 53 customers interrupted (0.6% of the total) and 290 customer-hours interrupted (6% of the total).
- The tap fuse on pole 19 Hickory Dr. had two interruptions in 2016. On June 7th a tree fell and resulted in 38 customers interrupted (0.4% of the total) and 77 customer-hours interrupted (2% of the total). An unknown cause on December 15th resulted in 82 customers interrupted (0.9% of the total) and 510 customer-hours interrupted (11% of the total).

Action Taken:

- Complete all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by August 2014.

- Completed all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by August 2016.
- Distribution Forestry completed hazard tree removal on the feeder in FY2016.
- 115kV switches were repaired in April 2016.

Action Plan:

- Routine tree trimming/pruning to be completed in FY2018.

18. FABIUS 5561 – 4.8kV

Profile: 470 Customers, 37.2 Circuit Miles
Indices: CAIDI = 5.61, SAIFI = 2.03

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	40.00%	907	95.27%	5,191	97.24%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	33.33%	38	3.99%	122	2.29%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	26.67%	7	0.74%	25	0.46%
Totals		15	100.00%	952	100.00%	5,338	100.00%

Problem Analysis:

- There were no substation or transmission interruptions in 2016.
- There was a feeder lockout on August 13th due to a fallen tree during a localized storm. This event resulted in 461 customers interrupted (48% of the total) and 4,633 customer hours interrupted (87% of the total).
- The main line fuses on NYS 91 experienced interruption on February 3rd and October 22nd due to trees. These events resulted in 360 customers interrupted (38% of the total) and 339 customer-hours interrupted (6% of the total).
- Seven (47% of the total) of the interruptions were individual transformers. These events resulted in 12 customers interrupted (1% of the total) and 81 customer-hours interrupted (2% of the total).

Action Taken:

- Distribution Forestry completed hazard tree removal on the feeder in FY2014.
- Distribution Forestry cycle pruned the feeder in FY2016.

Action Plan:

- Distribution Forestry to monitor the feeder.
- The I&M inspection (foot patrol) of the feeder will be conducted 2017.

19. JEWETT ROAD 29156 – 13.2kV

Profile: 324 Customers, 26.4 Circuit Miles
Indices: CAIDI = 2.62, SAIFI = 3.84

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	3	23.08%	53	4.26%	97	2.98%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	38.46%	387	31.13%	1,232	37.78%
6	ACCIDENTS	2	15.38%	18	1.45%	154	4.71%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	23.08%	785	63.15%	1,778	54.52%
Totals		13	100.00%	1,243	100.00%	3,262	100.00%

Problem Analysis:

- There was one substation interruption in 2016 due to an unknown cause at the 34.5kV station that feeds the 34.5kV line to Jewett. This event was on September 18th and resulted in 324 customers interrupted (26% of the total) and 373 customer-hours interrupted (11% of the total).
- There were two transmission interruptions in 2016. The first event was due to an unknown cause on May 29th. This event resulted in 325 customers interrupted (26% of the total) and 753 customer-hours interrupted (23% of the total). The second event was on September 19th due to a tap that burnt-up on a switch that resulted in 325 customers interrupted (26% of the total) and 764 customer-hours interrupted (23% of the total).
- The recloser on NYS 321 locked out due to an unknown cause on October 21st. This resulted in 136 customers interrupted (11% of the total) and 653 customer-hours interrupted (20% of the total).
- A broken insulator on Stump Rd on December 18th resulted in 58 customers interrupted (5% of the total) and 370 customer-hours interrupted (11% of the total).

Action Taken:

- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by April 2015.
- Bushing was replaced on the circuit breaker at Elbridge in August 2016.

Action Plan:

- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by April 2017.

- Routine tree trimming/pruning to be completed in FY2018.

20. JEWETT ROAD 29154 – 13.2kV

Profile: 1,009 Customers, 39.2 Circuit Miles
Indices: CAIDI = 1.95, SAIFI = 3.05

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	4	36.36%	19	0.62%	83	1.38%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	1	9.09%	1,010	32.81%	2,374	39.62%
6	ACCIDENTS	2	18.18%	8	0.26%	26	0.44%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	36.36%	2,041	66.31%	3,508	58.56%
Totals		11	100.00%	3,078	100.00%	5,990	100.00%

Problem Analysis:

- There was one substation interruption in 2016 due to an unknown cause at the 34.5kV station that feeds the 34.5kV line to Jewett. This event was on September 18th and resulted in 1,010 customers interrupted (33% of the total) and 1,162 customer-hours interrupted (19% of the total).
- There were two transmission interruptions in 2016. The first event was due to an unknown cause on May 29th. This event resulted in 1,011 customers interrupted (33% of the total) and 2,325 customer-hours interrupted (39% of the total). The second event was on September 19th due to a tap that burnt-up on a switch that resulted in 1,010 customers interrupted (33% of the total) and 2,374 customer-hours interrupted (40% of the total).

Action Taken:

- Bushing was replaced on the circuit breaker at Elbridge in August 2016.
- Completed all level 2 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by August 2015.
 - Distribution Forestry completed hazard tree removal on the feeder in FY2015.
 - Distribution Forestry cycle pruned the feeder in FY2015.

Action Plan:

- Distribution Forestry to monitor the feeder.
- Complete all level 3 maintenance work that was identified by the I&M inspection (foot patrol) on the feeder by August 2017.

2. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Feeder	Year	Action plan	Compl. Date	Est. Cost	Comments
Lighthouse Hill	6144	2018	Level 3 maintenance	11/2018	\$515,000	
Lighthouse Hill	6144	2019	Rebuild N Osceola Rd	03/2019	\$192,000	
Lighthouse Hill	6144	2019	Rebuild County Route 47	03/2019	\$349,000	
West Cleveland	32651	2018	Level 3 maintenance	10/2018	\$61,000	
West Cleveland	32651	2017	Forestry monitoring	12/2017	\$1,000	
Southwood	24454	2017	Level 2 maintenance	04/2017	\$298,000	
Southwood	24454	2019	Level 3 maintenance	04/2019	\$61,000	
Southwood	24454	2017	Forestry monitoring	12/2017	\$1,000	
Colosse	32151	2017	Level 2 maintenance	10/2017	\$135,000	
Colosse	32151	2019	Level 3 maintenance	10/2019	\$1,500	
Colosse	32151	2017	Forestry monitoring	12/2017	\$1,000	
New Haven	25652	2017	Monitor 115kV work	12/2017		
Granby Center	29351	2018	Routine trimming	03/2018		
Granby Center	29351	2017	Level 3 maintenance	05/2017	\$108,000	
Granby Center	29351	2017	Forestry to review for hazard tree removal	12/2017	\$5,000	Cost for review only
Granby Center	29351	2022	Convert CR 8 and create tie	03/2022	\$680,000	
West Monroe	27451	2017	Forestry monitoring	12/2017	\$1,000	
Lords Hill	15067	2017	Level 2 maintenance	10/2017	\$3,750	
Lords Hill	15067	2019	Level 3 maintenance	10/2019	\$251,000	
Lords Hill	15067	2017	Forestry monitoring	12/2017	\$1,000	
Lords Hill	15067	2017	Create feeder tie	06/2017	\$75,000	
Tully Center	27851	2017	Forestry monitoring	12/2017	\$1,000	
Constantia	1923	2018	Routine trimming	03/2018		
Constantia	1923	2017	Maintenance Patrol	12/2017		Cost dependent on field conditions
Rock Cut Road	28653	2017	Level 3 maintenance	05/2017	\$91,000	
Rock Cut Road	28653	2017	Forestry to review for hazard tree removal	12/2017	\$5,000	Cost for review only
Jewett Road	29155	2017	Level 3 maintenance	04/2017	\$26,500	
Jewett Road	29155	2018	Routine trimming	03/2018		
Sorrell Hill	26953	2018	Routine trimming	03/2018		
Sorrell Hill	26953	2017	Level 2 maintenance	10/2017	\$8,000	
Sorrell Hill	26953	2019	Level 3 maintenance	10/2019	\$110,000	
Niles	29451	2017	Level 3 maintenance	07/2017	\$441,000	
Niles	29451	2017	Fuse CSP transformers	04/2017	\$25,000	
Niles	29451	2017	Install mid-span poles	06/2017	\$75,000	
Niles	29451	2020	Rebuild Dolphin Point Rd	03/2020	\$300,000	
Wetzel Road	690055	2017	Install recloser	06/2017	\$70,000	
Wetzel Road	690055	2017	Forestry monitoring	12/2017	\$1,000	
Sandy Creek	6652	2017	Level 3 maintenance	12/2017	\$121,000	
New Haven	25653	2018	Routine trimming	03/2018		
Fabius	5561	2017	Forestry monitoring	12/2017	\$1,000	
Fabius	5561	2017	Maintenance Patrol	12/2017		Cost dependent on field conditions
Jewett Road	29156	2017	Level 3 maintenance	04/2017	\$9,300	
Jewett Road	29156	2018	Routine trimming	03/2018		
Jewett Road	29154	2017	Forestry monitoring	12/2017	\$1,000	
Jewett Road	29154	2017	Level 3 maintenance	08/2017	\$81,000	

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Year	Action plan	Compl. Date	Est. Cost	Comments
New Haven	25653	2016	Level 3 maintenance	02/2016	\$54,000	
New Haven	25653	2017	Routine trimming	03/2017		
Bridgeport	16852	2016	Install Trip Savers			Trip saver program was suspended
Bridgeport	16852	2017	Level 3 maintenance	08/2017	\$166,000	
Bridgeport	16852	2016	Place Distribution Automation in-service			Did not place back in-service per agreement with PSC
Lords Hill	16057	2016	Maintenance Patrol	12/2016		Cost dependent on field conditions
Lords Hill	16057	2016	Investigate building tie with Tully Center	06/2016	\$1,000	Tie to be built in 2017 via Ratios
Ballina	22151	2016	Replace failed recloser	05/2016	\$25,000	
Ballina	22151	2016	Sub-transmission Level 3 maintenance	07/2016		
Ballina	22151	2017	Maintenance Patrol	03/2017		Cost dependent on field conditions
Whitaker	29652	2017	Level 3 maintenance	11/2017	\$688,000	
Paloma	25456	2017	Level 3 maintenance	11/2017	\$339,000	
Niles	29451	2016	Dolphin Point Road rebuild	03/2020	\$225,000	
Niles	29451	2017	Level 3 maintenance	12/2017	\$589,000	
Paloma	25455	2016	Level 2 maintenance	08/2016	\$40,000	
Paloma	25455	2018	Level 3 maintenance	08/2018	\$25,000	
Truxton	7473	2016	Level 2 maintenance	04/2016	\$135,000	
Truxton	7473	2018	Level 3 maintenance	04/2018	\$202,000	
Truxton	7473	2016	Fusing	12/2016	\$7,500	
Bridgeport	16853	2016	Maintenance Patrol	12/2016		Cost dependent on field conditions
Bridgeport	16853	2016	Place Distribution Automation in-service			Did not place back in-service per agreement with PSC
Bridgeport	16852	2016	Install Trip Savers			Trip saver program was suspended
Sandy Creek	6651	2017	Routine trimming	03/2017		
Sandy Creek	6651	2020	Rebuild Wart Rd	03/2020	\$99,000	
Lords Hill	15066	2016	Maintenance Patrol	12/2016	?	Cost dependent on patrol results
Lords Hill	15066	2019	Rebuild Pleasant Valley Road	04/2019	\$280,000	
Paloma	25458	2016	Level 3 maintenance	03/2016	\$104,000	
Colosse	32151	2016	Maintenance Patrol	12/2016		Cost dependent on field conditions
Colosse	32151	2017	Routine trimming	03/2017		
Lighthouse Hill	6144	2016	Level 2 maintenance	08/2016	\$6,000	
Lighthouse Hill	6144	2018	Level 3 maintenance	08/2018	\$41,000	
East Pulaski	32451	2017	Routine trimming	03/2017		
East Pulaski	32451	2017	Frank Lacey Rd Minor Storm Hardening	03/2017	\$240,000	
East Pulaski	32451	2016	Extend 3-phase into Brennan's Beach	06/2016	\$125,000	
Third Street	21672	2016	Level 2 maintenance	06/2016	\$30,000	
Third Street	21672	2018	Level 3 maintenance	06/2018	\$180,000	
New Haven	25652	2016	Level 3 maintenance	02/2016	\$129,000	
Fabius	5561	2016	Transmission forestry to cycle trim the 34.5kV	12/2016		
Fabius	5561	2016	Transmission forestry to perform danger tree removals on the 34.5kV	12/2016		
Bridgeport	16854	2017	Level 3 maintenance	07/2017	\$234,000	
Bridgeport	16854	2016	Place Distribution Automation in-service			Did not place back in-service per agreement with PSC

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS WHICH CAUSED THE BELOW MINIMUM PERFORMANCE

The Central Region's 2016 SAIFI of 1.12 was higher than the PSC minimum goal of 1.00. The 2016 SAIFI of 1.12 decreased by 6% from 2015's SAIFI of 1.19. The 2016 SAIFI was 1% greater than the 5-year average of SAIFI of 1.11.

Excluding Major Storms, the 2016 data indicates that the number of interruptions was 5% above the previous 5-year average, the customers interrupted was 1% above the previous 5-year average, while the customer-hours of interruption was 3% above the previous 5-year average. The ratio between the number of customers interrupted and the number of customers served is the SAIFI (System Average Interruption Frequency Index) reliability measurement.

Reviewing the 2016 SAIFI data by facility type:

Excluding major storms, the 2016 transmission facilities contributed 0.11 to the regional SAIFI; this is less than the 5-year average of 0.15. In 2016, the number of transmission-related interruptions decreased by 36% from 2015. There were fourteen transmission interruptions in 2016; three on the 115kV system and eleven on the 34.5kV system, accounting for 30,108 customers interrupted out of 280,348 served in 2016.

In 2016, substation facilities contributed 0.09 to the regional SAIFI; this is less than the previous 5-year average of 0.18. The 2016 substation facilities' SAIFI decreased 64% from the 2015 score of 0.25. In 2016, there were eight substation interruptions that accounted for 24,009 customers interrupted.

In 2016, distribution contributed 0.92 to the regional SAIFI; 17% above the 5-year average of 0.78. The 2016 SAIFI for distribution increased 16% from 2015 (0.79).

Reviewing the 2016 SAIFI data by cause codes that were greater than the previous year's results (excluding Major Storms):

(03) Overloads

The overall SAIFI for Overloads was 0.03 in 2016; which is 423% above the previous 5-year average (0.006) and 579% above the 2015 SAIFI of 0.005 for Overload interruptions. There were 33 interruptions caused by Overload that accounted for 3% of the total number of customers interrupted (9,503 of 312,792). One of the interruptions occurred on the Substation facilities and interrupted service to 9,259.

There was an increase in interruptions caused by Overloads from 2015 to 2016. Interruptions increased 3% and customers interrupted increased 583% from 2015.

(07) Prearranged

The overall SAIFI for Prearranged was 0.11 in 2016, which is 252% above the previous 5-year average (0.03) and 255% above the 2015 SAIFI of 0.03 for prearranged interruptions. There were 93 interruptions caused by accidents that accounted for 10% of the total number of customers interrupted (30,806 of 312,792).

Interruptions decreased 12% and customers interrupted increased 258% from 2015.

Four of the prearranged interruptions occurred in substations. These outages interrupted service to 13,972 customers.

b. **PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES**

The Company is continuing its efforts in the Central Region to maintain reliability. These efforts include: distribution patrols, maintenance programs, line recloser installations, protection coordination studies, lightning protection installations, and tree trimming programs. All of these programs and corrective actions not only will reduce the number of outages and/or customers interrupted but also the restoration times. The Company will continue to stay on schedule for tree trimming and believes that this maintained schedule for tree trimming and miles trimmed will reduce both the incidence and duration of tree-related outages.

Substation Improvements

- 1) When substation equipment is being maintained, animal guards are being installed.
- 2) When opportunities arise, feeder-ties will be constructed to temporarily transfer load onto adjacent substations. This will improve reliability for the associated substation.
- 3) The Company's ongoing maintenance program for substations should help reduce the potential for substation problems that drove SAIFI higher in 2015. This program includes:
 - Circuit breaker diagnostic tests
 - Circuit breaker mechanism checks
 - Load tap changer internal inspections
 - Dissolved gas analysis on load tap changers and transformers.
 - Calibration/inspections on relay positions and communication packages
 - Functional testing of relays
 - Battery maintenance
- 4) Network - Annual program for Syracuse area networks to review and change out transformers and protectors due to deterioration, as needed. The Syracuse area has approximately 200 vaults containing network transformers and protectors. The goal of this program is to replace the equipment before failure occurs.

Engineering Reliability Reviews (ERR)

In a separate initiative based on primary distribution interruptions only, each region of the company was presented with a list of worst performing feeders. The purpose of this review was to identify corrective measures that would improve that feeder's reliability statistics, determine the associated incremental reliability improvement, and also determine each corrective measure's associated cost.

In addition to these preventative maintenance measures, the Company will take the following actions in the Central Region.

- 1) Complete any outstanding feeder hardening / maintenance program work on feeders listed in this report (if applicable).

As a follow up to ERR, the Company plans to sectionalize more feeders in the Central Region. This will help reduce the number of customers that are impacted by incidents that cannot be avoided. One method of sectionalizing will be the use of single phase, cut-out mounted reclosers. The installation of radial line reclosers has a positive impact on the Company's SAIFI performance by reducing the number of customer interruptions. Further benefits can be realized to the extent that these devices provide remote monitoring and control which provide a platform for future automation schemes.

To help minimize outages caused by animal contact, the Company will continue to install animal guards on all new transformer installations and retrofit animal guards on existing transformers in areas which are plagued with animal-related interruptions in the Central Region.

Taken together, the Company believes that these preventative actions will help minimize the potential for unplanned interruptions and also improve the Central Region's SAIFI and CAIDI performance.

E. FRONTIER REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS Info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 1.75)	1.85	1.73	1.74	1.74	1.74	1.81
SAIFI (Target 0.60)	0.47	0.46	0.44	0.45	0.38	0.45
SAIDI	0.86	0.80	0.77	0.78	0.67	0.81
Interruptions	1,413	1,527	1,481	1,582	1,653	1,551
Customers Interrupted	149,808	148,020	141,217	142,492	122,222	142,571
Customer-Hours Interrupted	276,669	255,499	245,553	248,147	212,618	258,182
Customers Served	320,995	320,700	320,191	319,694	318,950	318,815
Customers Per Interruption	106.02	96.94	95.35	90.07	73.94	91.92
Availability Index	99.9902	99.9909	99.9912	99.9911	99.9924	99.9908
Interruptions/1,000 Customers	4.40	4.76	4.63	4.95	5.18	4.86

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Frontier Region did not meet its CAIDI reliability target and met its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 0.47 interruptions, 22% below the PSC goal of 0.60 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.85 in 2016, 6% above the PSC's regional target of 1.75 hours.

The 2016 CAIDI result was 7% above the 2015 result of 1.73 hours, and 6% above the previous 5-year average of 1.75 hours. The 2016 SAIFI was 2% above the 2015 result of 0.46 interruptions, and 7% above the previous 5-year average of 0.44 interruptions.

In 2016, excluding major storms, the Frontier Region experienced 13 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (13 of 1,413), 30% of the region's total customers interrupted (CI), (45,181 of 149,808), and 26% (70,982 of 276,669) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 1.57 hours, and a SAIFI of 0.14 interruptions.

The number of transmission-related interruptions increased from 7 in 2015 to 13 in 2016 (an increase of 86%). The number of customers interrupted increased from 9,043 in 2015, to 45,181 in 2016 (an increase of 400%), while the customer-hours interrupted increased from 8,241 in 2015, to 70,982 in 2016 (an increase of 761%).

In 2016, excluding major storms, the Frontier Region experienced 5 substation interruptions. These interruptions accounted for 0.4% of the region's total interruptions (5 of 1,413), 4% of the region's total customers interrupted, (6,415 of 149,808), and 3% (7,414 of 276,669) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.16 hours, and a SAIFI of 0.02 interruptions.

The number of substation-related interruptions decreased from 9 to 5 from 2015 to 2016 (a decrease of 44%). The number of customers interrupted decreased from 14,562 in 2015, to 6,415 in 2016 (a decrease of 56%), while the customer-hours interrupted decreased from 39,972 in 2015, to 7,414 in 2016 (a decrease of 81%).

In 2016, excluding major storms, the Frontier Region experienced 1,395 distribution interruptions. These interruptions accounted for 99% of the region's total interruptions (1,395 of 1,413), 66% of the region's total customers interrupted, (98,212 of 149,808), and 72% (198,273 of 276,669) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 2.02 hours, and a SAIFI of 0.31 interruptions.

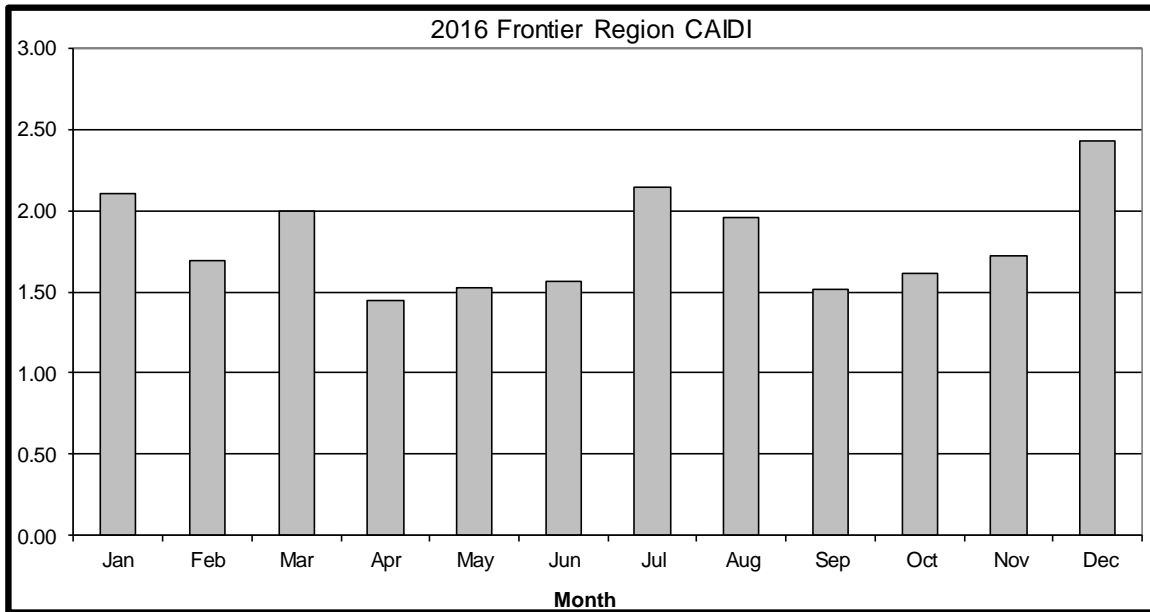
The number of distribution-related interruptions decreased from 1,511 to 1,395 from 2015 to 2016 (a decrease of 8%). The number of customers interrupted decreased from 124,415 in 2015, to 98,212 in 2016 (a decrease of 21%), while the customer-hours interrupted decreased from 207,286 in 2015, to 198,273 in 2016 (a decrease of 4%).

c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and SAIFI for the Frontier Region for 2016. The months of July (0.07) & August (0.13) were the highest contributors to SAIFI for 2016, with 43% of the Frontier Region's SAIFI occurring during these two months. The best six months for SAIFI were January (0.02), February (0.02), April (0.02), May (0.02), November (0.2) and December (0.02). The interruptions that occurred during these six months contributed 26% of the Frontier Region's SAIFI.

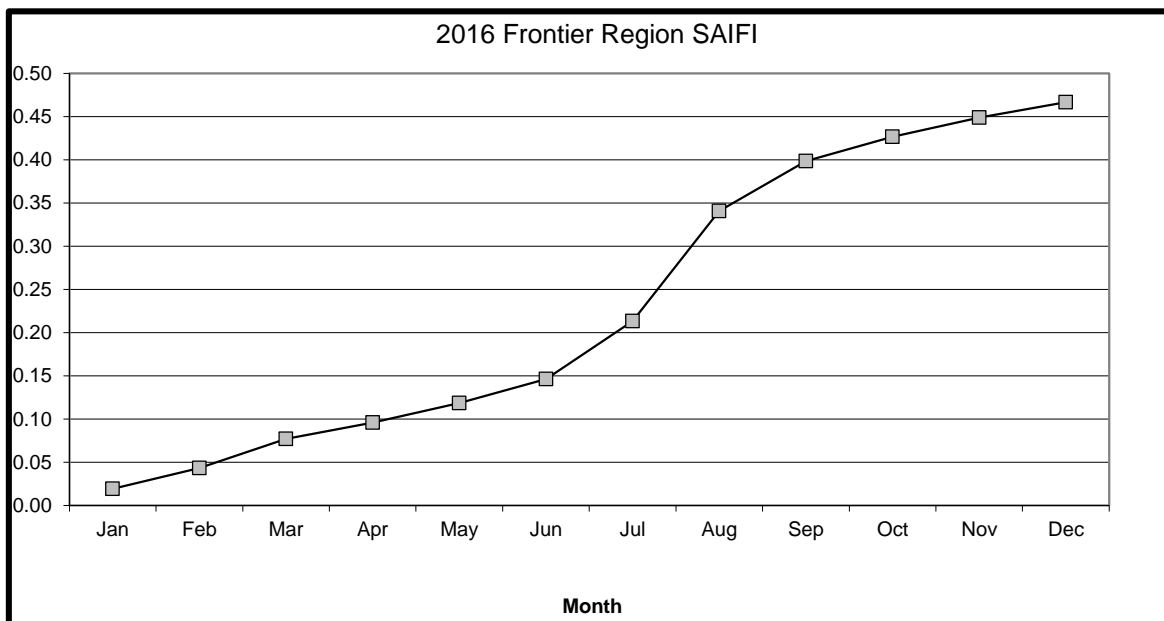
During seven months, CAIDI was at or below the 2016 PSC minimum goal of 1.75, with the best three months being April (1.44), May (1.53) and September (1.52). The five months that exceeded the goal were Jan (2.11), March (1.99), July (2.14), August (1.96) and December (2.44).

GRAPH OF MONTHLY CAIDI AND SAIFI FOR FRONTIER REGION



PSC CAIDI Goal:	
Minimum	1.75
2016 Actual	1.85

PSC SAIFI Goal:	
Minimum	0.60
2016 Actual	0.47



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	0	0	0	984	0	366
02 Tree Contacts	308	276	339	321	352	239
03 Overloads	27	30	9	54	66	73
04 Operator Error	17	30	18	18	24	25
05 Equipment	588	717	672	769	744	668
06 Accidents	222	206	205	167	169	201
07 Prearranged	70	73	51	74	129	104
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	52	75	63	46	25	118
10 Unknown	129	120	124	133	144	123
Total	1,413	1,527	1,481	2,566	1,653	1,917

2) Customers Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	0	0	0	150,825	0	55,071
02 Tree Contacts	20,087	28,088	30,894	26,110	20,109	12,630
03 Overloads	685	1,110	227	1,343	1,865	1,433
04 Operator Error	4,388	6,672	984	5,140	3,515	22,384
05 Equipment	57,700	60,836	55,759	66,771	52,083	50,270
06 Accidents	42,524	16,231	17,137	19,158	12,399	19,771
07 Prearranged	4,677	13,089	6,633	6,222	7,398	5,836
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	9,228	9,060	5,221	7,772	5,253	13,942
10 Unknown	10,519	12,934	24,362	9,976	19,600	16,305
Total	149,808	148,020	141,217	293,317	122,222	197,642

3) Customer-Hours Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	0	0	0	1,087,267	0	395,914
02 Tree Contacts	43,979	52,970	69,493	45,776	54,090	30,492
03 Overloads	1,184	1,770	630	2,840	3,936	4,312
04 Operator Error	5,374	1,881	1,029	6,077	3,542	35,362
05 Equipment	115,715	123,702	105,612	120,275	96,110	102,746
06 Accidents	75,974	20,924	26,560	35,148	14,070	28,245
07 Prearranged	7,485	10,919	9,251	7,176	7,148	5,117
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	9,811	25,403	10,148	16,756	8,152	33,440
10 Unknown	17,147	17,932	22,829	14,095	25,569	18,469
Total	276,670	255,501	245,551	1,335,411	212,617	654,096

4) Interruptions, Customers Interrupted, and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer-Hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	0	0.0%	0	0.0%	0	0.0%
02 Tree Contacts	308	21.8%	20,087	13.4%	43,979	15.9%
03 Overloads	27	1.9%	685	0.5%	1,184	0.4%
04 Operator Error	17	1.2%	4,388	2.9%	5,374	1.9%
05 Equipment	588	41.6%	57,700	38.5%	115,714	41.8%
06 Accidents	222	15.7%	42,524	28.4%	75,974	27.5%
07 Prearranged	70	5.0%	4,677	3.1%	7,485	2.7%
08 Customer Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	52	3.7%	9,228	6.2%	9,811	3.5%
10 Unknown	129	9.1%	10,519	7.0%	17,147	6.2%
Total	1,413	100.0%	149,808	100.0%	276,669	100.0%

e. INTERRUPTION REVIEW BY PSC CAUSE CODES

All data in section (e) only are calculated with major storms *excluded*

Cause Code 01 - “Major Storm”

There were no Major Storms experienced in the Frontier Region during 2016.

The follow PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 22% of interruptions, 13% of customers interrupted, and 16% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 12% from 2015, and up 1% over the 5 year average. Customers interrupted due to Tree Contacts were down 28% from 2015, and down 15% over the 5 year average. Customer-Hours interrupted were down 17% from 2015 and down 13% over the 5 year average.

Tree Contacts were the 2nd largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 2% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were down 10% from 2015, and down 41% over the 5 year average. Customers interrupted due to Overloads were down 38% from 2015, and down 43% over the 5 year average. Customer-Hours interrupted were down 33% from 2015 and down 56% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 1% of interruptions, 3% of customers interrupted, and 2% of Customer-Hours Interrupted.

Interruptions due to Operator Error were down 43% from 2015, and down 26% over the 5 year average. Customers interrupted due to Operator Error were down 34% from 2015, and down 43% over the 5 year average. Customer-Hours interrupted were up 186% from 2015 and down 44% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 42% of interruptions, 39% of customers interrupted, and 42% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were down 18% from 2015, and down 18% over the 5 year average. Customers interrupted due to Equipment Failure were down 5% from 2015, and up 1% over the 5 year average. Customer-Hours interrupted were down 6% from 2015 and up 5% over the 5 year average.

Equipment Failures were the largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 16% of interruptions, 28% of customers interrupted, and 27% of Customer-Hours Interrupted.

Interruptions due to Accidents were up 8% from 2015, and up 17% over the 5 year average. Customers interrupted due to Accidents were up 162% from 2015, and up 151% over the 5 year average. Customer-Hours interrupted were up 263% from 2015 and up 204% over the 5 year average.

Accidents were the 3rd largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 5% of interruptions, 3% of customers interrupted, and 3% of Customer-Hours Interrupted.

Interruptions due to Prearranged were down 4% from 2015, and down 19% over the 5 year average. Customers interrupted due to Prearranged were down 64% from 2015, and down 40% over the 5 year average. Customer-Hours interrupted were down 31% from 2015 and down 6% over the 5 year average.

Prearranged was the 5th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 4% of interruptions, 6% of customers interrupted, and 4% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 31% from 2015, and down 20% over the 5 year average. Customers interrupted due to Lightning were up 2% from 2015, and up 12% over the 5 year average. Customer-Hours interrupted were down 61% from 2015 and down 48% over the 5 year average.

Lightning was the 6th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 9% of interruptions, 7% of customers interrupted, and 6% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 8% from 2015, and flat at 0% over the 5 year average. Customers interrupted due to Unknown causes were down 19% from 2015, and down 37% over the 5 year average. Customer-Hours interrupted were down 4% from 2015 and down 13% over the 5 year average.

Unknown causes were the 4th largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2016/17 SPENDS:

The Company continues to work on capital-related projects in the Frontier Region to maintain customer satisfaction and future reliability. Some specific projects that were constructed in 2016 or will be constructed in 2017 are discussed below. An additional table of major infrastructure projects completed in 2016 follows. This includes distribution, sub-transmission, and transmission-related projects.

A number of ongoing projects are related to the program for reconstructing indoor Buffalo substations. This work is being done to upgrade the aging infrastructure within the Buffalo system, much of which is made up of 1920-30's vintage equipment that is at or beyond the end of its expected lifecycle. This effort is in place to maintain reliability and maintain the ability to serve our customers in the City of Buffalo. Reconstruction of Substations 27 & 29 is complete, while efforts continue to rebuild substation numbers 37 and 59. These efforts represent projects completed in recent years, those now in progress, and those planned to start in the upcoming year or are in design phase.

Reconstruction of station 93 has been completed. There are also substation projects for the upcoming year that are in design, planning, or start up phases to reconstruct open air stations 42 & 56. This effort is in place to maintain reliability and the ability to serve our customers in those areas.

There are also numerous distribution projects to rebuild or reconductor lines. These projects are the result of reliability reviews, responses to QRS inquiries, the result of implementing an asset strategy, or load-related issues.

Some specific reliability-related projects in the Frontier Region follow below:

Frankhauser Substation

The installation of a new 115kV/13.2kV substation located in Amherst, NY was completed in 2014. This substation will provide relief for various thermal overloads projected for feeders in the Amherst area. Frankhauser Substation will provide relief to the following substations: Buffalo Substation 21, Buffalo Substation 54, Buffalo Substation 58, Buffalo Substation 124, Buffalo Substation 130, Buffalo Substation 140, and Sweet Home Road Substation 224. New feeders from the station are expected to be in service during the fourth quarter of 2017.

Substation 49 New Feeders

A new ductbank has been installed on the Buffalo Niagara Medical Campus for new feeders to provide additional capacity/relief to the area. The future new feeders will provide relief to distribution feeders 4961, 4967, 4971, and 4973 which will incorporate additional resiliency into the distribution system in the Buffalo Medical Corridor. Cable installation of the new feeders was completed June of 2016.

Ohio Street Duct Banks

This new duct bank infrastructure was installed in partnership with the City of Buffalo in connection with their Ohio Street Modernization Project. Approximately 1.5 miles of duct and manhole system was installed to prepare the area for growth anticipated through various market intelligence regarding that area. This project facilitates the undergrounding of some existing facilities for improved system resiliency and also sets the stage for the future rebuild of substation 42 which will introduce 13.2kV distribution into south Buffalo. Feeders were installed into this duct system and put in service September 2016.

Station 42 MITS (Modular Integrated Transformer Station)

Furthering the process of introducing 13.2kV distribution onto south Buffalo will be the installation of a MITS station at site of station 42 on Ohio Street, known as Station 2154. This will bring 2 feeders into the area in preparation of future rebuild of the full station. These feeders will support the continued growth in the south Buffalo area and expected activity on the Outer Harbor property. Project was completed September 2016.

Refurbish Lines 27H, 28H, 33H Phase 1

Replace poles and some areas of small conductor that cover about 4.2 miles of 23kV lines that originate at Sawyer and extend to Willowdale Sub. Many poles are 60+ years old and this project will increase the resiliency of the system in this area of Tonawanda. This project is expected to be completed by the 4th quarter of FY18.

Major Capital Projects for Frontier Region:

Region	Project Name	Project Type	Fin Sys Proj. No.	Finish	Total Spend
Frontier	Beck-Harper L105 Removal	Sub T Line	C036195	1/8/16	\$1,625,760
Frontier	Buffalo Station 49 – UG Upgrades	D Line	CD01128	6/3/16	\$7,642,250
Frontier	DOT PIN 5757.18 Kenmore Ave	D Line	C054523	6/13/16	\$1,767,938
Frontier	Station 42 34.5-13.2kV Dline Work	D Line	C055352	10/16/16	\$1,803,988
Frontier	Richardson Center Corp, Buffalo	D Line	C060666	10/7/16	\$1,635,781
Frontier	Lockport – Maple Rd L92E&W Removal	Sub T Line	C036200	11/10/16	\$2,095,440
Frontier	Huntley 230kV Cap Banks	T Sub	C066926	5/31/16	\$5,188,168
Frontier	Military Road #210 – Dist Substation (Low side equipment & transformer)	D Sub	C036056	6/30/16	\$2,498,075
Frontier	Mountain – Upgrade 115-34.5kV Transformer	T Sub	C044359	3/2/2016	\$4,480,142
Frontier	Packard Series Reactors	T Sub	C063627	10/22/16	\$8,378,752
Frontier	Shawnee Rd 76 – Install Second Transformer Bank	D Sub	C036059	9/30/16	\$5,284,410
Frontier	Niagara-Lockport 101/102 Damage Failure	T Line	C074642	12/27/16	\$2,190,229

g. DISCUSSION OF REGIONAL PERFORMANCE OF LVAC NETWORK DISTRIBUTION SYSTEM(S)

Buffalo LVAC Network

Background

The Elm Street 230/23 kV Station that serves Buffalo's network area has twenty 23kV cables, which supply 146 general network vaults, 130 spot network vaults, nine primary commercial customers, three National Grid distribution stations and has the ability to serve five additional distribution stations via normally open tie switches. General network vaults supply the low voltage network which serves approximately 1,140 National Grid customers. Spot network vaults serve 353 commercial customers. Elm Street station peaked at 115 MW during 2016.

Performance

The table below lists the breaker operations at Elm Street in 2016 that were a result of a fault or a failure on either the primary cable or a piece of network equipment (transformer, high voltage switch or protector):

2016 ELM ST 23KVNETWORK PERFORMANCE					
STATION	CABLE	BKR	BKR	# OF OPERATIONS DUE TO FAILURES	CUSTOMERS AFFECTED
ELM	1E	R122	R125	1	0
ELM	2E	R222	R225	2	0
ELM	3E	R335	R338	0	0
ELM	4E	R435	R438	2	0
ELM	5E	R145	R148	0	0
ELM	6E	R332	R335	1	0
ELM	7E	R125	R128	1	0
ELM	8E	R225	R228	0	0
ELM	9E	R325	R238	1	0
ELM	10E	R432	R435	1	0
ELM	11E	R322	R325	0	0
ELM	12E	R325	R328	0	0
ELM	14E	R422	R425	0	0
ELM	15E	R425	R428	0	0
ELM	16E	R142	R145	1	0
ELM	17E	R242	R245	0	0
ELM	18E	R232	R235	0	0
ELM	23E	R248	R245	0	0
ELM	27E	R132	R135	0	0
ELM	35E	R138	R135	2	0

Improvements

In 2016 New York West replaced the high voltage switches, network transformers and network protectors in the following vaults; 4-01, 4-146, 5-88, 5-125, 6-28, 6-106, 7-15, 8-15, 8-80, 8-122, 10-82, 17-01, 17-22, 23-39, 35-110, and 35-115. A network transformer only was replaced in vault 3595 due to a failed internal high voltage switch. All this equipment was identified as in need of replacement via the I&M process or it failed in service. At this time the I&M process has identified 9 additional vaults requiring equipment change-outs that are planned for future years.

A primary “NMVI” switch was installed on vault 3-131, allowing for more efficient switching at this location and removing the need to switch other customers off their redundant source to take this vault out of service.

In 2016, one major improvement was completed to a spot network located at the Key Center Building. A third 2500kVA transformer was installed, adding redundancy and additional capacity to their service.

A new general network vault number 35-70 was installed on Washington Street north of Mohawk, further reinforcing the capacity of the general network in that area.

One notable customer project served off Buffalo’s Elm Street general network was completed in 2016. 512 Pearl St upgraded from a 400 to 1200 Amp service. This required reinforcement to several sections of the low voltage network cable in order to reliably serve this additional load.

2. OPERATING CIRCUIT LISTS

The next three tables will provide the following information for the Frontier Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by # of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

FRONTIER REGION

FEEDER #	A	B	C	D	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
	CUST. SERVED	TOTAL INTER.	#CUST. INTER.	CUST. HRS. INTER.				
SHAWNEE RD 7652	1,957	15	4,250	11,441	2.17	5.85	2.69	0
SHAWNEE RD 7651	1,130	13	3,137	5,221	2.78	4.62	1.66	2

Regional Goals:
CAIDI Min. 1.75
SAIFI Min. 0.60

b. NATIONAL GRID WORST CIRCUIT PERFORMING CIRCUITS WITH A 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES

FRONTIER REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
SHAWNEE RD 7652	2.69	2.32	1.16	1.37	2.17	0.25	2.02	1.37
SHAWNEE RD 7651	1.66	2.38	2.70	2.48	2.78	0.76	1.16	1.35

Regional Goals:
CAIDI Min. 1.75
SAIFI Min. 0.60

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

FRONTIER REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Circuit/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

This year, the Frontier Region's list of Worst Feeders consists of two 13.2kV feeders.

For the Frontier Region, the PSC minimum CAIDI is 1.75 hours and the PSC minimum SAIFI is 0.60 interruptions. As discussed previously, the Frontier Region failed to meet the PSC minimum target for CAIDI, with 1.85 hours reported. However, the SAIFI target was met with 0.47 interruptions.

1. SHAWNEE RD 7652 - 13.2kV

Profile: 1,957 Customers, 58.4 Circuit Miles
Indices: CAIDI = 2.69, SAIFI = 2.17

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	4	26.67%	63	1.48%	66	0.58%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	3	20.00%	2,078	48.89%	6,634	57.99%
6	ACCIDENTS	1	6.67%	111	2.61%	159	1.39%
7	PREARRANGED	1	6.67%	1	0.02%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	4	26.67%	21	0.49%	56	0.49%
10	UNKNOWN	2	13.33%	1,976	46.49%	4,525	39.55%
	Totals	15	100.00%	4,250	100.00%	11,441	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 89th worst feeder and the Frontier Region's worst feeder.
- On July 14th, Shawnee Station 76 experienced an outage due to transmission pole failures on Line 102 which interrupted service to all 1,949 customers on the feeder. This event contributed 6,009 customer-hours interrupted to the feeder.
- On August 28th the station feeder breaker locked out for an unknown cause. This interrupted service to 1,954 customers and contributed 4,494 customer-hours interrupted to the feeder.

Action Taken:

- A distribution line inspection was last completed in 2015. All Level 1 & Level 2 work has been completed.
- Full Cycle distribution tree trimming was completed in FY17.
- Overloaded ratios on Ridge Road were relieved via one mile of 13.2kV rebuild and splitting load onto 2 large ratio locations.

Action Plan:

- Distribution line inspection was last completed in 2015, Level 3 work scheduled for completion by 2018.
- Line 102 improvements to add dead-end points at road crossings and utilize Osmose Truss installations to increase pole strength on remaining poles in that line, FP075782.

2. SHAWNEE RD 7651 - 13.2kV

Profile: 1,130 Customers, 43.2 Circuit Miles
Indices: CAIDI = 1.66, SAIFI = 2.78

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	0	0.00%	0	0.00%	0	0.00%
3	OVERLOADS	1	7.69%	133	4.24%	213	4.08%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	38.46%	1,824	58.14%	4,582	87.78%
6	ACCIDENTS	1	7.69%	3	0.10%	5	0.10%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	4	30.77%	65	2.07%	269	5.15%
10	UNKNOWN	2	15.38%	1,112	35.45%	151	2.89%
	Totals	13	100.00%	3,137	100.00%	5,221	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 129th worst feeder and the Frontier Region's second worst feeder.
- On July 14th, Shawnee Station 76 experienced an outage due to transmission pole failures on Line 102 which interrupted service to all 1,125 customers on the feeder. This event contributed 3,450 customer-hours interrupted.
- On August 28th, a downed conductor caused a portion of the feeder to be de-energized, resulting in an interruption to 635 customers for 1.5 hours. This event accounted for 942 customer-hours interrupted.

Action Taken:

- A distribution line inspection was last completed in 2015. All Level 1 & Level 2 work has been completed.
- Full Cycle distribution tree trimming was completed in FY17.

Action Plan:

- Distribution line inspection was last completed in 2015, Level 3 work scheduled for completion by 2018.
- Line 102 improvements to add dead-end points at road crossings and utilize Osmose Truss installations to increase pole strength on remaining poles in that line, FP C075782.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Completion Date	Cost	Comments
Shawnee	7652	2017	Complete I&M Level 3 Work	2018	TBD	
Shawnee	7651	2017	Complete I&M Level 3 Work	2018	TBD	
Shawnee	7651& 7652	2017	Install Dead-end points at road crossings on Line 101/102	2017	TBD	WR#23279165
Shawnee	7651& 7652	2017	Install Osmose Pole Trusses on Line 101/102	2017	TBD	WR#23279836

b. SUMMARY OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Completion Date	Cost	Comments
Oakwood	23251	2015	Perform Engineering Reliability Review (ERR)	2015	\$1,000	Completed 12/31/15
Maple Road	14053	2015	Complete Cycle Trimming	2015	\$88,000	Completed ahead of schedule in FY15
Maple Road	14053	2015	Complete Level 3 I&M Work	2016	\$1,000	Completed 5/2016

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS WHICH CAUSED THE BELOW MINIMUM PERFORMANCE

In 2016, the Frontier Region did not meet the PSC minimum goal for CAIDI of 1.75 hours, ending the year with a total CAIDI of 1.85 hours. This was an increase over the CAIDI of 1.73 hours in 2015. This indicates that the average length of time to restore the region's customers increased in 2016.

Additionally, the Frontier Region did meet the PSC minimum goal for SAIFI of 0.60 interruptions, ending the year with a total SAIFI of 0.47 interruptions. This was an increase over the SAIFI of 0.46 interruptions per customer in 2015. This indicates that the frequency or number of times the region's customers experienced an interruption increased from the previous year.

The 2016 data indicates that the number of customers interrupted was 8% above the 5-year average, and that the number of customer-hours interrupted was 13% above the 5-year average. As compared to 2015, the number of customers interrupted increased by 1,788 (1%) and the number of customer-hours interrupted increased by 21,170 (8%).

There were 13 events on the transmission system during 2016 which were responsible for a significant portion of the reliability performance. These events caused 30% of the customer interruptions that occurred as well as 26% of the total customer-hours interrupted.

The CAIDI result was significantly influenced by local storm events not categorized as Major Storms. Due to their widespread and severe nature, these events contributed much longer response times than what would be typical for a similar outage during an average day. The worst event occurred on July 14 during a localized windstorm with winds over 60MPH. During this period, 6,981 customers were interrupted, resulting in 21,443 customer-hours interrupted in the Frontier Region. This represented 8% of the customer-hours interrupted for the region. Some of the outages lasted more than 7 hours, with the average per event of 4.9 hours. Many of these events were blown fuses due to lightning, or trees breaking conductors. Under normal conditions, typical restoration times for these types of events would be significantly lower and often can be restored at or below the CAIDI target. However, under severe volume of interruptions during a large and local weather event, this was not the case and the overall CAIDI impact was significant.

Reviewing the 2016 CAIDI and SAIFI data by facility type:

The 2016 CAIDI for transmission facilities was 1.57 hours, below the PSC target value of 1.75 hours for the Region. This consisted of 13 interruptions, which made up 30% of total customers interrupted and 26% of total customer-hours interrupted. The 2016 SAIFI for transmission facilities contributed 0.14 interruptions (30%) of the 2016 total SAIFI for the Region of 0.47 interruptions.

The 2016 CAIDI for substation facilities was 1.16 hours, below the PSC target value of 1.75 hours. This consisted of 5 outages and resulted in 4% of the total number of customers interrupted for the year with 6,415 customers being interrupted by these outages. The 2016 SAIFI for substation facilities contributed 0.02 interruptions (4%) of the 2016 total SAIFI for the Region of 0.47 interruptions.

The 2016 CAIDI for distribution facilities was 2.02 hours, above the PSC target of 1.75 hours. This consisted of 1,395 interruptions, which resulted in 72% of the total number of customer-hours interrupted. The 2016 SAIFI for distribution facilities contributed 0.31 interruptions (66%) to the 2016 total SAIFI for the Region of 0.47 interruptions.

Reviewing the 2016 CAIDI data by cause codes which had a CAIDI greater than the Region's PSC target:

(02) Tree--

The tree CAIDI was 2.19 hours, above the 1.75 hour target. Tree-related outages contributed to 16% of the total number of customer-hours interrupted for the Region. One particular incident with a high number of customer-hours interrupted had a significant impact on the total CAIDI for tree-related outages as well as on the total CAIDI for the Region. On August 13, a fallen tree caused downed conductors near the intersection of Niagara Falls Blvd. and Walmore Road on Walmore Road Feeder 21754. The 476 customers interrupted were restored about 5 hours. This event alone accounted for 2,460 customer-hours interrupted, about 6% of the customer-hours interrupted from Tree related outages.

(05) Apparatus or Equipment Failure–

The Apparatus or Equipment Failure CAIDI was 2.01 hours, above the 1.75 hour target. These interruptions contributed 42% of the total number of customer-hours interrupted for the Region, which suggests that equipment failure outages were a large factor in determining why the Region did not meet the PSC target for CAIDI. There was one event in particular that had an impact on the Apparatus or Equipment Failure CAIDI for 2016. On July 14th, transmission pole failures on Line 102 caused the 4 feeders at Shawnee Road Station to be interrupted. There were 4,624 customers interrupted for just over 3 hours. This contributed 16,278 customer-hours interrupted in 2016, about 15% of customer-hours interrupted from equipment failure.

(06) Accidents or Events not under the Utility Control–

The CAIDI for Accidents or Events not under the Utility Control was 1.79 hours, above the 1.75 hour target. These outages contributed 27% of the total number of customer-hours interrupted for the Region, which suggests that accident related outages were a large factor in determining why the Region did not meet the PSC target for CAIDI. One major interruption that had a significant impact on the CAIDI in the Frontier Region for 2016 involved a motor vehicle accident. On July 14th a motor vehicle accident caused a broken cross arm and conductor contact between Sub-Transmission lines 34H & 36H. This resulted in an interruption to all four feeders from Buffalo Station 126 involving 2,470 customers for about 3 hours, contributing 7,651 customer-hours interrupted in 2016.

b. PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES

The Company is continuing its efforts to improve reliability in the Frontier Region. This includes distribution patrols, maintenance programs, line recloser installations, Cutout Mounted Recloser (Tripsaver) installations, protection coordination studies, lightning protection installations, and a tree trimming program. All of these programs and corrective actions will not only reduce the number of outages and/or customers interrupted, but will also reduce the restoration times. The Operations Department plans to continue the use of One Person Crews for coverage during off-hours, the prearrangement of crews for pending storm events, and the posting of CAIDI results at work locations to give visibility to the field personnel.

The Company's ongoing substation inspection and maintenance program is an effort to keep those facilities operating at a high level. This program will help minimize the likelihood of a substation outage resulting in a significant interruption to customers.

In 2016, the substation maintenance team in New York West performed 50 circuit breaker diagnostic tests and 116 circuit breaker mechanism checks. Dissolved gas analysis was performed on 327 load tap changer units and 404 transformers. Transformer diagnostic tests were performed on 7 units. Thermographic inspections were performed at 265 substations. There were 1,710 substation inspections performed. Battery and charger diagnostic tests were performed on 172 installations. The relay groups in New York West completed calibration/inspections on 1,312 relay packages (1,187 Distribution Substations and 125 on 115kV Transmission). Any problems that were identified were repaired as soon as possible, preventing these problems from resulting in interruptions to customers.

A similar number of maintenance activities will be performed in 2017. This work will be identified, prioritized, and tracked in the Company's Cascade Equipment maintenance database, as discussed in the summary of this report. These ongoing maintenance activities on substations will help to minimize the likelihood of a substation outage resulting in a significant interruption to customers.

Miscellaneous:

Sub-Transmission Improvements

There is a project to maintain and upgrade a portion of the 701 Line expected in 2017. It will involve replacement of some UG sections and rebuilding a section with oil filled AE cable.

Transmission Improvements

There is a project to increase the resiliency of L101/102 by adding Osmose Pole Trusses to many poles for additional strength.

F. GENESEE REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS Info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 2.00)	1.62	1.98	1.96	1.96	2.22	1.90
SAIFI (Target 1.00)	0.70	1.11	0.96	1.01	1.19	0.92
SAIDI	1.14	2.19	1.87	1.97	2.64	1.75
Interruptions	939	971	980	1,115	1,228	946
Customers Interrupted	68,897	108,060	93,313	98,101	115,254	89,493
Customer-Hours Interrupted	111,862	213,627	182,527	192,406	256,367	170,201
Customers Served	98,282	97,540	97,376	97,512	97,184	97,137
Customers Per Interruption	73.37	111.29	95.22	87.98	93.86	94.60
Availability Index	99.9870	99.9750	99.9786	99.9775	99.9700	99.9800
Interruptions/1000Customers	9.55	9.95	10.06	11.43	12.64	9.74

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Genesee Region met its CAIDI reliability target and met its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 0.70 interruptions, 30% below the PSC goal of 1.00 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.62 in 2016, 19% below the PSC's regional target of 2.00 hours.

The 2016 CAIDI result was 18% below the 2015 result of 1.98 hours, and 19% below the previous 5-year average of 2.01 hours. The 2016 SAIFI was 37% below the 2015 result of 1.11 interruptions, and 33% below the previous 5-year average of 1.04 interruptions.

In 2016, excluding major storms, the Genesee Region experienced 6 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (6 of 939), 19% of the region's total customers interrupted (CI), (12,844 of 68,897), and 16% (18,247 of 111,860) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 1.42 hours, and a SAIFI of 0.13 interruptions.

The number of transmission-related interruptions decreased from 12 in 2015 to 6 in 2016 (a decrease of 50%). The number of customers interrupted decreased from 21,131 in 2015, to 12,844 in 2016 (a decrease of 39%), while the customer-hours interrupted decreased from 34,302 in 2015, to 18,247 in 2016 (a decrease of 47%).

In 2016, excluding major storms, the Genesee Region experienced 2 substation interruptions. These interruptions accounted for 0.2% of the region's total interruptions (2 of 939), 2% of the region's total customers interrupted, (1,124 of 68,897), and 1% (1,128 of 111,860) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.00 hours, and a SAIFI of 0.01 interruptions.

The number of substation-related interruptions decreased from 4 to 2 from 2015 to 2016 (a decrease of 50%). The number of customers interrupted decreased from 17,251 in 2015, to 1,124 in 2016 (a decrease of 93%), while the customer-hours interrupted decreased from 37,500 in 2015, to 1,128 in 2016 (a decrease of 97%).

In 2016, excluding major storms, the Genesee Region experienced 931 distribution interruptions. These interruptions accounted for 99% of the region's total interruptions (931 of 939), 80% of the region's total customers interrupted, (54,929 of 68,897), and 83% (92,485 of 111,860) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 1.68 hours, and a SAIFI of 0.56 interruptions.

The number of distribution-related interruptions decreased from 955 to 931 from 2015 to 2016 (a decrease of 3%). The number of customers interrupted decreased from 69,678 in 2015, to 54,929 in 2016 (a decrease of 21%), while the customer-hours interrupted decreased from 141,825 in 2015, to 92,485 in 2016 (a decrease of 35%).

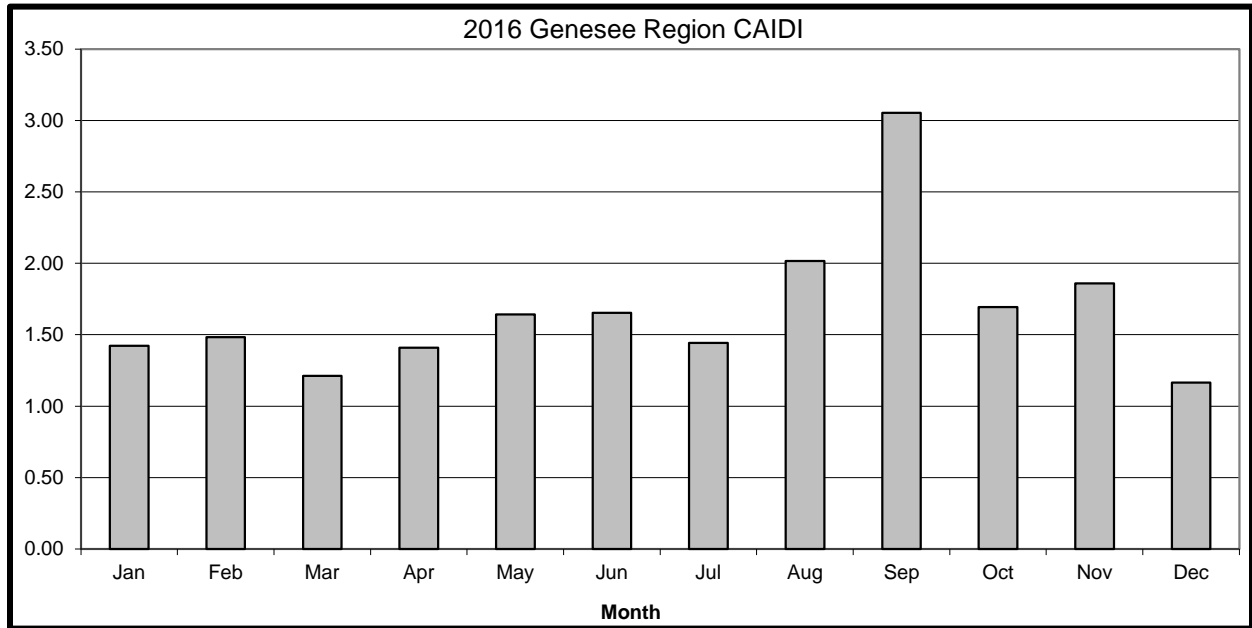
c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and SAIFI for the Genesee Region for 2016.

CAIDI was below the PSC minimum goal of 2.00 for ten months in 2016. The two months that exceeded the goal were in August (2.02) and September (3.05).

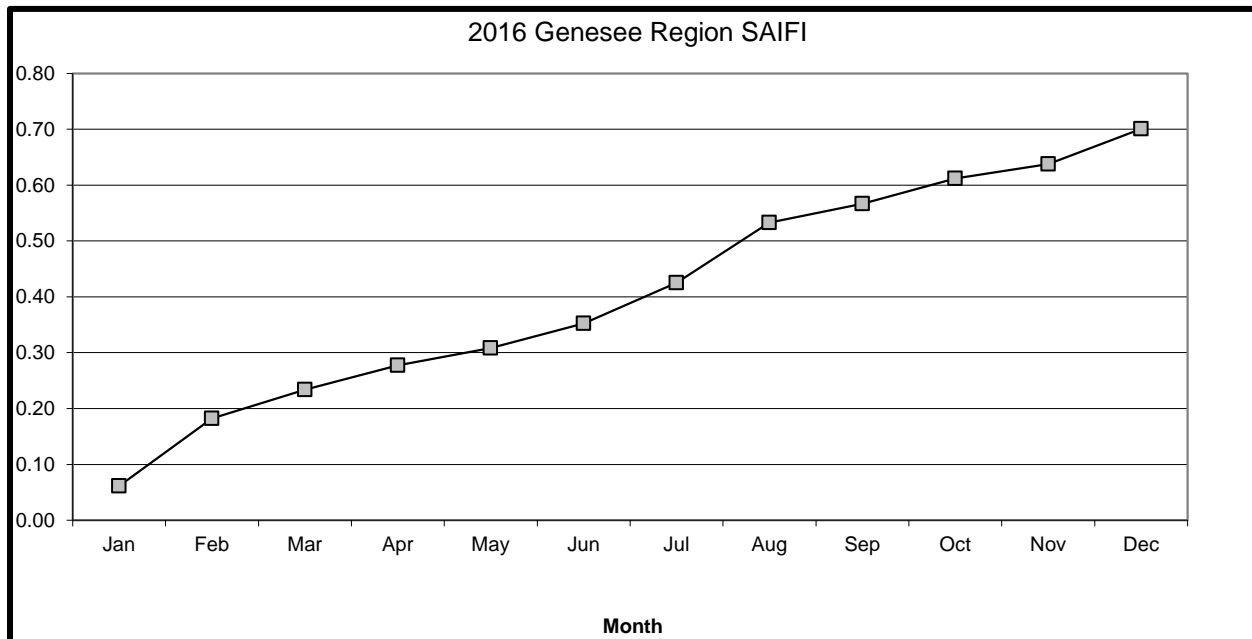
SAIFI was below the PSC minimum goal of 1.00 in 2016, and showed the greatest increase during the months of February (0.12) and August (0.11). These two months accounted for 33% of Genesee Region's annual SAIFI metric. In contrast, the months of May (0.03), September (0.03) and November (0.03) were the best three months and contributed only 13% to the Region's SAIFI.

GRAPH OF MONTHLY CAIDI AND SAIFI FOR THE GENESEE REGION



PSC CAIDI Goal:	
Minimum	2.00
2016 Actual	1.62

PSC SAIFI Goal:	
Minimum	1.00
2016 Actual	0.70



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	0	0	52	361	0	196
02 Tree Contacts	192	248	190	227	229	132
03 Overloads	4	2	9	9	11	17
04 Operator Error	7	6	2	5	4	5
05 Equipment	270	289	311	338	319	284
06 Accidents	231	200	206	193	222	185
07 Prearranged	32	16	20	15	27	18
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	65	85	102	90	123	113
10 Unknown	138	125	140	238	293	192
Total	939	971	1,032	1,476	1,228	1,142

2) Customers Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	0	0	10,068	41,836	0	17,479
02 Tree Contacts	11,050	21,597	19,227	20,243	30,385	12,122
03 Overloads	5	43	26	1,326	57	412
04 Operator Error	309	422	702	7,405	95	15
05 Equipment	20,972	41,535	43,653	30,205	33,058	34,975
06 Accidents	12,882	14,298	13,023	18,639	18,772	12,392
07 Prearranged	2,022	1,382	1,282	2,288	2,920	1,653
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	2,032	11,842	5,545	5,190	8,760	18,519
10 Unknown	19,625	16,941	9,855	12,805	21,207	9,405
Total	68,897	108,060	103,381	139,937	115,254	106,972

3) Customer-Hours Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	0	0	129,105	433,724	0	185,979
02 Tree Contacts	24,567	51,784	44,894	48,537	77,724	29,025
03 Overloads	10	78	84	1,069	211	690
04 Operator Error	309	673	1,041	5,111	157	12
05 Equipment	29,921	82,719	83,918	55,476	93,682	68,478
06 Accidents	18,892	29,206	21,768	38,920	30,623	19,978
07 Prearranged	1,568	1,536	1,009	1,966	3,422	1,238
08 Customer Equip.	0	0	0	0	0	0
09 Lightning	4,840	15,404	13,075	17,506	13,188	31,446
10 Unknown	31,755	32,228	16,739	23,819	37,359	19,334
Total	111,861	213,627	311,633	626,128	256,365	356,181

4) Interruptions, Customers Interrupted and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer Hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	0	0.0%	0	0.0%	0	0.0%
02 Tree Contacts	192	20.4%	11,050	16.0%	24,567	22.0%
03 Overloads	4	0.4%	5	0.0%	10	0.0%
04 Operator Error	7	0.7%	309	0.4%	309	0.3%
05 Equipment	270	28.8%	20,972	30.4%	29,921	26.7%
06 Accidents	231	24.6%	12,882	18.7%	18,892	16.9%
07 Prearranged	32	3.4%	2,022	2.9%	1,568	1.4%
08 Customer Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	65	6.9%	2,032	2.9%	4,840	4.3%
10 Unknown	138	14.7%	19,625	28.5%	31,755	28.4%
Total	939	100.00%	68,897	100.00%	111,861	100.00%

e. INTERRUPTION REVIEW BY PSC CAUSE CODES

Cause Code 01 - "Major Storms"

In 2016, the Genesee Region did not experience any PSC Major Storms.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 20% of interruptions, 16% of customers interrupted, and 22% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were down 23% from 2015, and down 6% over the 5 year average. Customers interrupted due to Tree Contacts were down 49% from 2015, and down 47% over the 5 year average. Customer-Hours interrupted were down 53% from 2015 and down 51% over the 5 year average.

Tree Contacts were the 3rd largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 0% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were up 100% from 2015, and down 60% over the 5 year average. Customers interrupted due to Overloads were down 88% from 2015, and down 99% over the 5 year average. Customer-Hours interrupted were down 87% from 2015 and down 98% over the 5 year average.

Overloads were the 8th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 1% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Operator Error were up 17% from 2015, and up 75% over the 5 year average. Customers interrupted due to Operator Error were down 27% from 2015, and down 82% over the 5 year average. Customer-Hours interrupted were down 54% from 2015 and down 78% over the 5 year average.

Operator Error was the 7th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 29% of interruptions, 30% of customers interrupted, and 27% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were down 7% from 2015, and down 12% over the 5 year average. Customers interrupted due to Equipment Failure were down 50% from 2015, and down 43% over the 5 year average. Customer-Hours interrupted were down 64% from 2015 and down 61% over the 5 year average.

Equipment Failures were the largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 25% of interruptions, 19% of customers interrupted, and 17% of Customer-Hours Interrupted.

Interruptions due to Accidents were up 16% from 2015, and up 15% over the 5 year average. Customers interrupted due to Accidents were down 10% from 2015, and down 16% over the 5 year average. Customer-Hours interrupted were down 35% from 2015 and down 33% over the 5 year average.

Accidents were the 2nd largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 3% of interruptions, 3% of customers interrupted, and 1% of Customer-Hours Interrupted.

Interruptions due to Prearranged were up 100% from 2015, and up 68% over the 5 year average. Customers interrupted due to Prearranged were up 46% from 2015, and up 6% over the 5 year average. Customer-Hours interrupted were up 2% from 2015 and down 14% over the 5 year average.

Prearranged was the 6th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 7% of interruptions, 3% of customers interrupted, and 4% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 24% from 2015, and down 37% over the 5 year average. Customers interrupted due to Lightning were down 83% from 2015, and down 80% over the 5 year average. Customer-Hours interrupted were down 69% from 2015 and down 73% over the 5 year average.

Lightning was the 5th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 15% of interruptions, 28% of customers interrupted, and 28% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 10% from 2015, and down 30% over the 5 year average. Customers interrupted due to Unknown causes were up 16% from 2015, and up 40% over the 5 year average. Customer-Hours interrupted were down 1% from 2015 and up 23% over the 5 year average.

Unknown causes were the 4th largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2016/17 SPENDS:

The Company continues to work on capital projects in the Genesee Region to maintain customer satisfaction and maintain future reliability. Some specific projects that were either constructed in 2016 or planned for construction in 2017 are discussed below. An additional table of major infrastructure projects completed in 2016 follows. This includes distribution, transmission, and substation-related projects.

Some projects on the list or discussed below are substation-related projects located throughout the Region to address loading concerns or equipment condition issues, including West Hamlin #82.

There are numerous distribution projects to rebuild or re-conductor lines. These projects are the result of reliability reviews, response to a QRS inquiry, the result of implementing an asset strategy, or load-related issues.

Some specific reliability-related projects in the Genesee Region follow below:

West Hamlin Substation #82

West Hamlin Substation is a 115kV/13.2kV substation with a single transformer bank which serves over 7,100 customers. As a result of a load relief study in the Genesee North area, a project to add a second bank and two new feeders in the West Hamlin substation is currently being constructed. The additional bank is one part of a two part solution to relieve contingency overloading at Brockport Substation #74. The second part will be to construct a new 115kV/13.2kV West Sweden substation to completely provide load relief for the Brockport substation and the surrounding area. The second transformer bank and two new feeders at West Hamlin Substation #82 are expected to be completed in 2017. This will improve reliability and service by providing load relief, the ability for future feeder ties, and operational flexibility.

Middleport 7765 – Reconductor Project

This project involves reconductoring and removing small # 4 copper wires from the distribution mainline of Middleport F7765 on Kelly Ave in the Village of Middleport. This upgrade will improve the voltage profile, available fault current, and reliability on the circuit. The project is expected to be completed in FY19.

Sub-Transmission Infrastructure Projects

The 34.5kV system in the Genesee Region consists of several very long loops which traverse rural territory in the Western Division. A number of the projects which were completed in 2016 or which are planned for 2017 will maintain and upgrade the system, including projects to replace sectionalizers on sub-transmission line (312). These projects will improve asset condition and reliability.

Furthermore, there are plans to install Distribution Automation (DA) switches on sub-transmission line (301) in the Genesee Region in 2017. The DA switches will improve reliability by sectionalizing portions of the lines during interruptions.

Major Capital Projects for Genesee Region:

Region	Project Name	Project Type	Fin Sys Proj No.	Finish	Total Spend
	The Genesee Region did not have any major projects over \$1Million completed in 2016.				

2. OPERATING CIRCUIT LISTS

The next three tables will provide the following information for the Genesee Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by # of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

GENESEE REGION

	A	B	C	D				
FEEDER #	CUST. SERVED	TOTAL INTER.	#CUST. INTER.	CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NO OF MOMENTARIES
The Genesee Region did not have any feeders which qualified on the Worst Performing Feeder Circuit List in 2016.								

Regional Goals:
CAIDI Min. 2.00
SAIFI Min. 1.00

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH A 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES

GENESEE REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
The Genesee Region did not have any feeders which qualified on the Worst Performing Feeder Circuit List in 2016.								

Regional Goals:
CAIDI Min. 2.00
SAIFI Min. 1.00

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

GENESEE REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

For 2016, the Genesee Region did not have any feeders which qualified on the Worst Performing Feeder Circuit List.

For the Genesee Region, the PSC minimum CAIDI is 2.00 and the PSC minimum SAIFI is 1.00. As discussed previously, the Genesee Region met the PSC minimum CAIDI with 1.62 and SAIFI with 0.70.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

The Genesee Region did not have any feeders which qualified on the Worst Performing Feeder Circuit List in 2016.

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Compl. Date	Estimated Cost	Comments
Orangeville	1961	2016	Install Fusing WR#21174435	2016	\$17,000	Completed November 2016
Orangeville	1961	2016	Distribution Line Inspection	2016	TBD	Completed July 2016
Orangeville Wethersfield	1961 2361	2016	Sub-T Line #209 Cycle Tree Trimming	2016	\$47,702	Completed 2016
Mumford	5051	2016	Distribution Hazard Tree Inspection/Removal	2016	\$253,809	Completed December 2016
Mumford	5051 5053	2016	T-Line #119 Cycle Tree Trimming	2016	\$176,910	Completed 2016
Wethersfield	2361	2016	Distribution Line Inspection	2016	TBD	Completed August 2016
Mumford	5053	2016	Distribution Line Inspection	2016	TBD	Completed April 2016
Mumford	5053	2016	Distribution Hazard Tree Inspection/Removal	2016	\$185,362	Completed February 2017
Geneseo	5552	2016	Install DA switches on Sub-T Line #218	2016	TBD	Completed November 2016
Geneseo	5552	2016	Distribution Line Inspection	2017	TBD	To be completed in 2017
Geneseo	5552	2016	Sub-T Line #218 Floor & Side Tree Trimming	2016	\$62,835	Completed 2016
Attica	1261	2016	Perform ERR	2016	\$1,000	Completed March 2017
Elba	2062	2016	Sub-T Line #201 Line Inspection	2016	TBD	Completed March 2016
East Batavia	2855	2016	Distribution Line Inspection	2016	TBD	Completed August 2016
Attica	1262	2016	Perform ERR	2016	\$1,000	Completed March 2017

G. MOHAWK VALLEY REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 2.50)	1.94	1.87	2.21	1.93	2.05	2.20
SAIFI (Target 1.20)	2.03	1.24	1.12	1.24	1.03	1.30
SAIDI	3.94	2.32	2.48	2.39	2.11	2.86
Interruptions	1,346	1,149	1,181	1,327	1,224	1,516
Customers Interrupted	277,767	168,459	152,330	168,438	139,837	177,119
Customer-Hours Interrupted	538,746	315,796	336,451	324,437	287,238	389,740
Customers Served	136,729	135,883	135,510	135,967	136,002	136,177
Customers Per Interruption	206.36	146.61	128.98	126.93	114.25	116.83
Availability Index	99.9551	99.9735	99.9717	99.9728	99.9760	99.9673
Interruptions/1000 Customers	9.84	8.46	8.72	9.76	9.00	11.13

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Mohawk Valley Region met its CAIDI reliability target and did not meet its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 2.03 interruptions, 69% above the PSC goal of 1.20 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.94 in 2016, 22% below the PSC's regional target of 2.50 hours.

The 2016 CAIDI result was 4% above the 2015 result of 1.87 hours, and 5% below the previous 5-year average of 2.05 hours. The 2016 SAIFI was 64% above the 2015 result of 1.24 interruptions, and 71% above the previous 5-year average of 1.19 interruptions.

In 2016, excluding major storms, the Mohawk Valley Region experienced 14 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (14 of 1,346), 24% of the region's total customers interrupted (CI), (67,224 of 277,767), and 31% (169,661 of 538,744) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 2.25 hours, and a SAIFI of 0.49 interruptions.

The number of transmission-related interruptions decreased from 15 in 2015 to 14 in 2016 (a decrease of 7%). The number of customers interrupted increased from 44,804 in 2015, to 67,224 in 2016 (an increase of 50%), while the customer-hours interrupted increased from 112,357 in 2015, to 169,661 in 2016 (an increase of 51%).

7 of the 14 transmission related events involved a radial, 46kV line which runs from Boonville to Raquette Lake. This line then continues north into NYSEG territory. In 2016 these 46kV line interruptions accounted for 55% of the total customer-hours interrupted due to transmission events. National Grid is in the process of reviewing non-wires alternatives to address reliability on the Alder Creek to Raquette Lake 46kV line. A possibly second feed into the area is also being evaluated.

In 2016, excluding major storms, the Mohawk Valley Region experienced 12 substation interruptions. These interruptions accounted for 1% of the region's total interruptions (12 of 1,346), 22% of the region's total customers interrupted, (61,139 of 277,767), and 15% (78,923 of 538,744) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.29 hours, and a SAIFI of 0.45 interruptions.

The number of substation-related interruptions increased from 0 to 12 from 2015 to 2016. The number of customers interrupted increased from 0 in 2015, to 61,139 in 2016, while the customer-hours interrupted increased from 0 in 2015, to 78,923 in 2016.

The largest interruption occurred on May 27th when a bushing on breaker R210 failed in Boonville Station interrupting 7,646 customers for 8 hours. This breaker protects the Boonville - Alder Creek #21, 46kV sub-transmission line which is radial, running through the Adirondack Park.

The second largest substation interruption occurred on December 22nd when a transformer cable termination at Boonville Substation failed. This interruption accounted for 26% of the total customer hours interrupted by a substation event. The failed cable has been replaced with overhead conductor.

In 2016, excluding major storms, the Mohawk Valley Region experienced 1,320 distribution interruptions. These interruptions accounted for 98% of the region's total interruptions (1,320 of 1,346), 54% of the region's total customers interrupted, (149,404 of 277,767), and 54% (290,160 of 538,744) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 1.94 hours, and a SAIFI of 1.09 interruptions.

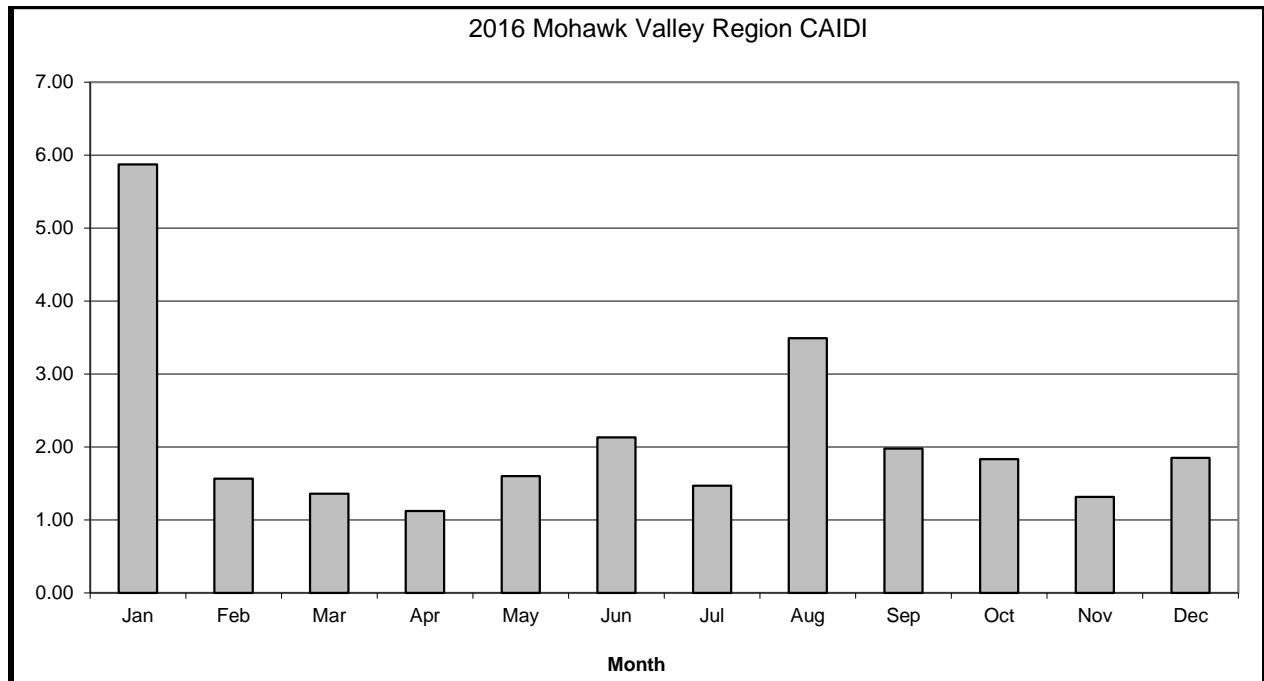
The number of distribution-related interruptions increased from 1,134 to 1,320 from 2015 to 2016 (an increase of 16%). The number of customers interrupted increased from 123,655 in 2015, to 149,404 in 2016 (an increase of 21%), while the customer-hours interrupted increased from 203,440 in 2015, to 290,160 in 2016 (an increase of 43%).

c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and SAIFI for the Mohawk Valley Region for 2016 (Excluding Major Storms).

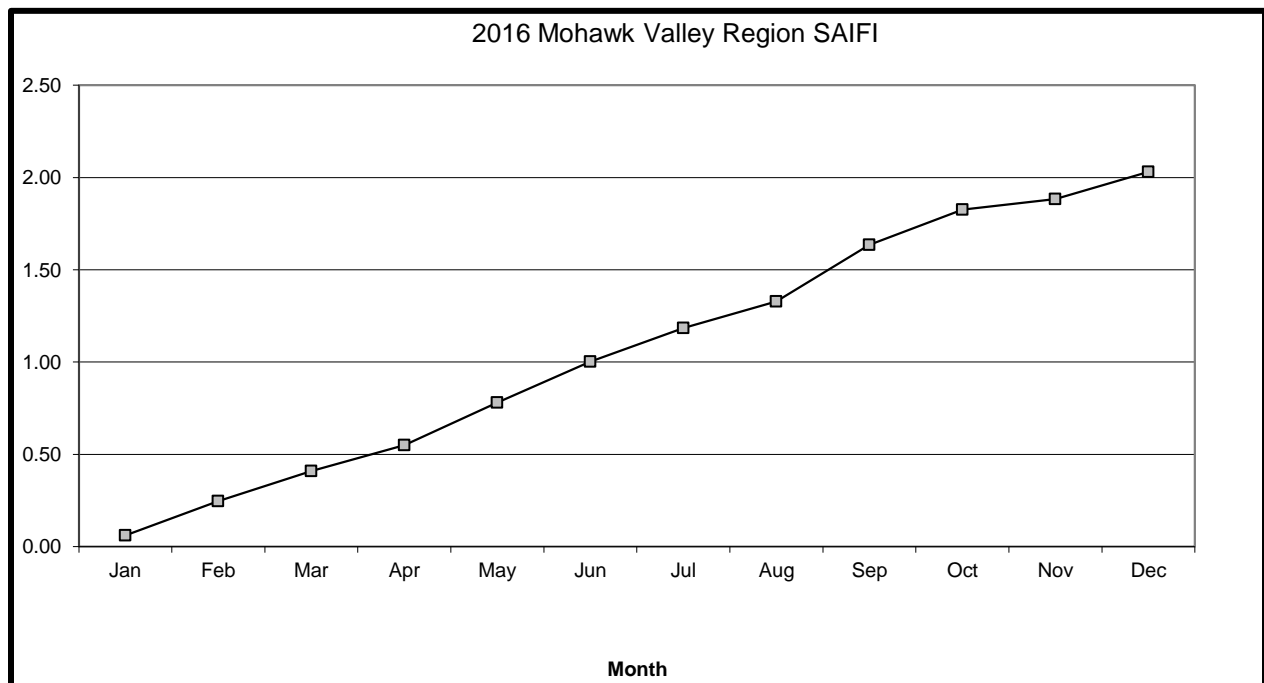
- The CAIDI graph shows the individual CAIDI by month. The Mohawk Valley Region was below the PSC minimum CAIDI of 2.50 hours for ten months of the year, with January being the highest month with a CAIDI of 5.87 hours, accounting for 4% of the number of interruptions (56 of 1,346), 2% of the total number of customers interrupted (6,483 of 277,767) and 8% of the total customer-hours interrupted (43,875 of 538,746). The Mohawk Valley Region ended the year at 1.94 for its overall CAIDI.
- The SAIFI graph shows the cumulative SAIFI by month for 2016. The Mohawk Valley Region was above the minimum SAIFI goal of 1.20 for 2016. September was the worst performing month with regard to customers interrupted per month with a SAIFI of 0.31, accounting for 8% of the number of interruptions (101 of 1,346), 15% of the total number of customers interrupted (41,929 of 277,767), and 15% of the total customer-hours interrupted (82,936 of 538,746). The Mohawk Valley Region ended the year with a SAIFI of 2.03.

GRAPH OF MONTHLY CAIDI AND SAIFI INDICES FOR THE MOHAWK VALLEY



PSC CAIDI Goal:	
Minimum	2.50
2016 Actual	1.94

PSC SAIFI Goal:	
Minimum	1.20
2016 Actual	2.03



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

IDS info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	360	57	386	362	204	239
02 Tree Contacts	490	375	357	504	351	438
03 Overloads	14	10	6	15	14	41
04 Operator Error	3	7	4	5	6	5
05 Equipment	375	340	386	384	371	436
06 Accidents	199	192	171	160	173	180
07 Prearranged	40	22	17	27	49	72
08 Customer Equip.	0	0	0	0	1	0
09 Lightning	45	51	61	94	96	177
10 Unknown	180	152	179	138	163	183
Total	1,706	1,206	1,567	1,689	1,431	1,771

2) Customers Interrupted by Cause – Historical

IDS info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	40,140	2,514	68,648	52,242	13,455	25,152
02 Tree Contacts	70,991	36,270	29,262	53,207	31,953	51,504
03 Overloads	181	1,317	629	238	141	1,060
04 Operator Error	1,036	5,727	5,562	7,365	1,753	1,032
05 Equipment	120,816	64,356	66,929	72,992	36,420	71,243
06 Accidents	28,403	19,967	24,868	14,467	39,099	23,944
07 Prearranged	32,315	26,930	663	1,559	11,266	3,113
08 Customer Equip.	0	0	0	0	3	0
09 Lightning	5,578	4,936	6,763	10,300	11,699	11,744
10 Unknown	18,447	8,956	17,654	8,310	7,503	15,749
Total	317,907	170,973	220,978	220,680	153,292	204,541

3) Customer-Hours Interrupted by Cause – Historical

IDS info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	254,438	10,721	431,524	263,352	81,615	172,838
02 Tree Contacts	177,297	79,833	79,150	140,082	87,932	174,046
03 Overloads	485	847	443	621	316	3,684
04 Operator Error	211	1,352	4,882	4,161	2,341	2,523
05 Equipment	239,291	160,144	159,704	124,309	50,944	112,516
06 Accidents	66,573	33,379	43,736	23,573	80,104	29,627
07 Prearranged	22,706	12,184	581	3,119	3,769	2,312
08 Customer Equip.	0	0	0	0	4	0
09 Lightning	10,686	12,549	14,751	14,930	45,669	38,229
10 Unknown	21,497	15,511	33,203	13,643	16,160	31,027
Total	793,183	326,518	767,974	587,790	368,853	566,802

4) Interruptions, Customers Interrupted, and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer-Hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	360	21.1%	40,140	12.6%	254,438	32.1%
02 Tree Contacts	490	28.7%	70,991	22.3%	177,297	22.4%
03 Overloads	14	0.8%	181	0.1%	485	0.1%
04 Operator Error	3	0.2%	1,036	0.3%	211	0.0%
05 Equipment	375	22.0%	120,816	38.0%	239,291	30.2%
06 Accidents	199	11.7%	28,403	8.9%	66,573	8.4%
07 Prearranged	40	2.3%	32,315	10.2%	22,706	2.9%
08 Customer Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	45	2.6%	5,578	1.8%	10,686	1.3%
10 Unknown	180	10.6%	18,447	5.8%	21,497	2.7%
Total	1,706	100.0%	317,907	100.0%	793,183	100.0%

e. **INTERRUPTION REVIEW BY PSC CAUSE CODES**

Cause Code 01 - Major Storms

In 2016, Major Storms accounted for 21% of interruptions, 13% of customers interrupted, and 32% of Customer-Hours Interrupted.

Interruptions due to Major Storm were up 532% from 2015, and up 44% over the 5 year average. Customers interrupted due to Major Storms were up 1497% from 2015, and up 24% over the 5 year average. Customer-Hours interrupted were up 2273% from 2015 and up 33% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 36% of interruptions, 26% of customers interrupted, and 33% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 31% from 2015, and up 21% over the 5 year average. Customers interrupted due to Tree Contacts were up 96% from 2015, and up 76% over the 5 year average. Customer-Hours interrupted were up 122% from 2015 and up 58% over the 5 year average.

Tree Contacts were the largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 1% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were up 40% from 2015, and down 18% over the 5 year average. Customers interrupted due to Overloads were down 86% from 2015, and down 73% over the 5 year average. Customer-Hours interrupted were down 43% from 2015 and down 59% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 0% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Operator Error were down 57% from 2015, and down 40% over the 5 year average. Customers interrupted due to Operator Error were down 82% from 2015, and down 76% over the 5 year average. Customer-Hours interrupted were down 84% from 2015 and down 93% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 28% of interruptions, 43% of customers interrupted, and 44% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were up 10% from 2015, and down 2% over the 5 year average. Customers interrupted due to Equipment Failure were up 88% from 2015, and up 94% over the 5 year average. Customer-Hours interrupted were up 49% from 2015 and up 97% over the 5 year average.

Equipment Failures were the 2nd largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 15% of interruptions, 10% of customers interrupted, and 12% of Customer-Hours Interrupted.

Interruptions due to Accidents were up 4% from 2015, and up 14% over the 5 year average. Customers interrupted due to Accidents were up 42% from 2015, and up 16% over the 5 year average. Customer-Hours interrupted were up 99% from 2015 and up 58% over the 5 year average.

Accidents were the 3rd largest cause of interruptions in 2016.

Cause Code 07 – Prearranged

In 2016, Prearranged accounted for 3% of interruptions, 12% of customers interrupted, and 4% of Customer-Hours Interrupted.

Interruptions due to Prearranged were up 82% from 2015, and up 8% over the 5 year average. Customers interrupted due to Prearranged were up 20% from 2015, and up 271% over the 5 year average. Customer-Hours interrupted were up 86% from 2015 and up 417% over the 5 year average.

Prearranged was the 6th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 – Lightning

In 2016, Lightning accounted for 3% of interruptions, 2% of customers interrupted, and 2% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 12% from 2015, and down 53% over the 5 year average. Customers interrupted due to Lightning were up 13% from 2015, and down 39% over the 5 year average. Customer-Hours interrupted were down 15% from 2015 and down 58% over the 5 year average.

Lightning was the 5th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 13% of interruptions, 7% of customers interrupted, and 4% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 18% from 2015, and up 10% over the 5 year average. Customers interrupted due to Unknown causes were up 106% from 2015, and up 59% over the 5 year average. Customer-Hours interrupted were up 39% from 2015 and down 2% over the 5 year average.

Unknown causes were the 4th largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2015/16 SPENDS:

The Mohawk Valley Region continues to work on capital-related projects in order to maintain customer satisfaction and future reliability. Some specific projects that were constructed in either CY16 or will be constructed in CY17 are listed below. A list of major infrastructure projects follows.

Boonville-Raquette Lake 46kV

The 46kV, Boonville-Raquette Lake sub-transmission line is a radial source to all of the stations northeast of Boonville. This line has experienced 7 interruptions in 2016 which effected 50% of the worst performing feeders in the Mohawk Valley. This project will address asset condition issues with single pin angle structures that have experienced insulator failures due to side loading. A future project will replace sections of bare overhead conductor with covered Hendrix conductor in areas that are repeatedly damaged by fallen trees in the Adirondack Park where trimming rights are severely limited.

Completion – FY22

Major Capital Projects for Mohawk Valley Region:

Region	Project Name	Project Type	Fin Sys Proj No.	Finish	Total Spend
	Oneida Substation Rebuild	Substation	C034443	FY21	\$1,320,000
	Porter 230kV-Upgrade Brks/Disc/PT's	Substation	C036866	FY22	\$24,344,000
	Schuyler - replace Oil Circuit Breakers	Substation	C049562	FY19	\$967,000
	Yahnundasis - Mobile Disconnects replacement	Substation	C049564	FY18	\$108,000
	Boonville Station Rebuild	Substation	C049903	FY22	\$2,850,000
	Terminal Station metal clad and feeder getaway replacement	Substation/ D Line	C076242	FY22	\$5,900,000
	Lehigh Station – 2 nd transformer	Substation/ D Line	C074607	FY19	\$4,250,000
	BOONVILLE-RACQUETTE LAKE 46 KV improvements	T Line	C072528	FY18	\$750,000
	DEERFIELD-SCHUYLER 22-46KV rebuild	T Line	C050288	FY19	\$1,387,000
	ALDER CREEK-ADD EMS	Substation	C075024	FY20	\$793,000
	ALDER CREEK-OLD FORGE #23, 46kV Install Hendrix conductor	T Line	C074002	FY19	\$900,000
	RAQUETTE LAKE TRANSFORMER UPGRADE	Substation	CD01139	FY20	\$700,000
	TRENTON-WHITESBORO 25, 46KV REBUILD	T Line	C058579	FY20	\$3,942,000
	TURIN 65355 & 56 TIE CREATION	D Line	C050002	FY21	\$1,400,000
	Wooden enclosure and cable replacement program – Raquette Lake	D Line	C026977	FY22	\$1,500,000
	YAHNUNDASIS-CLINTON 27, 46KV REBUILD	T Line	C055143	FY21	\$470,000
	TRENTON-PROSPECT 23-46KV	T Line	C046448	FY21	\$469,000
	MV-LEHIGH 51 & 54 TIE CREATION	D Line	C050004	FY21	\$328,000
	MV-ROME 54-LAUTHER RD - RECONDUCTOR	D Line	C050086	FY21	\$433,000
	MV-ROME 54 -HOGSBACK RD RECONDUCTOR	D Line	C050097	FY22	\$260,000
	MV-POLAND 62258 ROUTE 8 RECONDUCTOR	D Line	CD00885	FY22	\$500,000
	YAHNUNDASIS-CLINTON 24 -46KV REBUILD	T Line	C046449	FY22	\$1,100,000
	DEERFIELD-WHITESBORO 26-46KV REBUILD	T Line	C046459	FY22	\$2,000,000
	MV-ROME 76254-HWY 49 RECONDUCTOR	D Line	C050005	FY22	\$640,000

g. DISCUSSION OF REGIONAL PERFORMANCE OF LVAC (LOW VOLTAGE AC) NETWORK DISTRIBUTION SYSTEM(S):

City Of Utica – Terminal Street LVAC Network

The Utica LVAC Network serves the downtown area, mainly Genesee Street and Lafayette Street. This network is supplied by 4 – 13.2kV feeders that originate from the Terminal Substation. This system serves approximately 680 customer accounts and experienced a peak load of approximately 7.4 MVA in 2016.

The table below lists the breaker operations in 2016 that were a result of a fault and/or failure.

Substation	Feeder Number	Breaker Number	Breaker Number	# Breaker Operations from Failures
Terminal	65144	R440	R815	0
Terminal	65145	R450	R825	1
Terminal	65146	R460	R825	0
Terminal	65147	R470	R845	0

As shown above the Utica LVAC Network experienced one feeder outage in 2016. There were no customer interruptions and at no time was this network operated beyond its single contingency (N-1) design criteria.

There were no major events in 2016.

Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

Equipment maintenance in 2016 consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

There is one major project that has been installed, is being designed and/or is being installed:

Replace Lead-Covered Feeder Cable

The paper-insulated, lead-covered cable replacement began in 2012 and is still continuing.

Due to the Harbor Point Area contamination, the cables in this area will be delayed until Terminal Station ES651's 13.2kV bus is relocated and/or replaced. The new cables will be located in a less hazardous location.

2. OPERATING CIRCUIT LIST

The next three tables will provide the following information for the Mohawk Valley Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by number of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

MOHAWK VALLEY REGION

FEEDER #	A CUST. SERVED	B TOTAL INTER.	C # CUST. INTER.	D CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
EAGLE BAY 38272	1,037	37	12,125	26,764	11.69	25.81	2.21	1
RAQUETTE LAKE 39861	494	32	7,349	26,593	14.88	53.83	3.62	1
ALDER CREEK 70152	1,035	35	11,409	18,128	11.02	17.52	1.59	1
OLD FORGE 38362	726	27	9,414	19,221	12.97	26.48	2.04	1
POLAND - UTICA 62258	1,550	46	7,554	15,513	4.87	10.01	2.05	2
EAGLE BAY 38271	881	23	11,142	31,419	12.65	35.66	2.82	1
ALDER CREEK 70161	677	27	7,014	11,318	10.36	16.72	1.61	0
OLD FORGE 38361	604	24	7,657	14,566	12.68	24.12	1.90	1
OLD FORGE 38364	858	20	11,224	18,580	13.08	21.65	1.66	1
WHITE LAKE 39963	953	19	9,493	19,628	9.96	20.60	2.07	0
DEBALSO 68452	3,034	25	13,718	20,497	4.52	6.76	1.49	1
TURIN RD 65356	1,292	25	3,714	16,729	2.87	12.95	4.50	2
SALISBURY 67857	1,004	27	3,760	8,741	3.75	8.71	2.32	1
SHERMAN 33351	1,445	32	5,520	7,416	3.82	5.13	1.34	2
CHADWICKS 66851	1,826	36	3,679	14,519	2.01	7.95	3.95	0
ONEIDA 50151	1,805	26	4,274	10,113	2.37	5.60	2.37	1
TURIN RD 65355	1,432	19	5,468	8,404	3.82	5.87	1.54	3
STITTVILLE 67052	1,693	27	3,910	9,029	2.31	5.33	2.31	1
SHERMAN 33352	1,752	33	4,816	7,319	2.75	4.18	1.52	1
OLD FORGE 38363	374	13	4,483	7,965	11.99	21.3	1.78	1

Regional Goals:
CAIDI Min. 2.50
SAIFI Min. 1.20

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH 3 YEAR HISTORY FOR CAIDI & SAIFI INDICES

MOHAWK VALLEY REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
EAGLE BAY 38272	2.21	2.81	4.25	2.91	11.69	5.57	3.83	3.14
RAQUETTE LAKE 39861	3.62	3.39	4.39	2.72	14.88	7.11	4.73	3.06
ALDER CREEK 70152	1.59	6.29	4.19	2.24	11.02	0.71	3.38	1.19
OLD FORGE 38362	2.04	2.90	4.57	2.42	12.97	6.17	2.83	2.64
POLAND - UTICA 62258	2.05	2.98	3.37	2.97	4.87	4.26	8.03	3.24
EAGLE BAY 38271	2.82	2.11	3.83	2.55	12.65	6.78	3.23	2.29
ALDER CREEK 70161	1.61	2.66	4.24	3.57	10.36	0.40	3.22	0.53
OLD FORGE 38361	1.90	3.32	3.85	2.54	12.68	5.77	3.40	2.53
OLD FORGE 38364	1.66	2.67	4.47	1.79	13.08	5.12	2.07	1.36
WHITE LAKE 39963	2.07	2.90	3.94	1.97	9.96	0.71	2.86	1.61
DEBALSO 68452	1.49	1.71	2.83	0.99	4.52	0.84	0.03	1.44
TURIN RD 65356	4.50	0.91	1.14	2.61	2.87	3.57	1.35	2.63
SALISBURY 67857	2.32	3.48	2.55	1.74	3.75	0.94	1.72	1.47
SHERMAN 33351	1.34	2.31	1.40	2.05	3.82	4.77	4.02	2.04
CHADWICKS 66851	3.95	0.80	3.41	2.96	2.01	2.75	0.72	1.45
ONEIDA 50151	2.37	1.93	2.20	1.70	2.37	0.17	0.26	2.83
TURIN RD 65355	1.54	0.89	0.76	2.17	3.82	1.52	2.66	1.73
STITTVILLE 67052	2.31	1.82	2.64	2.84	2.31	1.87	1.76	1.42
SHERMAN 33352	1.52	2.75	1.85	4.22	2.75	3.44	3.50	0.79
OLD FORGE 38363	1.78	3.05	4.41	1.81	11.99	5.02	2.01	1.10

Regional Goals:
CAIDI Min. 2.50
SAIFI Min. 1.20

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

MOHAWK VALLEY REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

This list consists of circuits that have ten or more momentaries.

d. WORST PERFORMING CIRCUIT ANALYSIS

For 2016, the Mohawk Valley Region is required to analyze and report on 20 of the worst performing circuits. The list consists of eleven 13.2kV, and nine 4.8kV circuits.

The PSC minimum goals for the Mohawk Valley Region are 2.50 for CAIDI and 1.20 for SAIFI.

1. EAGLE BAY 38272 – 4.8kV

Profile: 1,037 Customers, 47.87 Circuit Miles

Indices: CAIDI = 2.21, SAIFI = 11.69

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	20	54.05%	1,433	11.82%	4,922	18.39%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	12	32.43%	8,290	68.37%	15,849	59.22%
6	ACCIDENTS	2	5.41%	293	2.42%	4,961	18.53%
7	PREARRANGED	1	2.70%	1,041	8.59%	677	2.53%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	5.41%	1,068	8.81%	355	1.33%
Totals		37	100.00%	12,125	100.00%	26,764	100.00%

Problem Analysis:

- There were five sub-transmission related interruptions that affected the Eagle Bay 38272 in 2016. These five interruptions accounted for 36% (4,406 of 12,125) of the total customers interrupted and 62% (16,612 of 26,764) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center-phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (1,026 of 12,125) of the total customers interrupted and 29% (7,644 of 26,764) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 8% (1,024 of 12,125) of the total customers interrupted and 2% (563 of 26,764) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 8% (1,025 of 12,125) of the total customers interrupted and 3% (769 of 26,764) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on August 12th when motor vehicle struck pole 251 on the Old Forge-Raquette Lake #23 line along route 28. This interruption accounted for 2% (282 of 12,125) of the total customers interrupted and 18% (4,874 of 26,764) of the total customer-hours interrupted for this circuit.

- The fifth occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 9% (1,049 of 12,125) of the total customers interrupted and 10% (2,762 of 26,764) of the total customer-hours interrupted for this circuit.
- There were six substation related interruptions in 2016. These six interruptions accounted for 51% (6,223 of 12,125) of the total customers interrupted and 25% (6,731 of 26,764) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (1,025 of 12,125) of the total customers interrupted and 4% (1,042 of 26,764) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 8% (1,023 of 12,125) of the total customers interrupted and 4% (989 of 26,764) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 9% (1,041 of 12,125) of the total customers interrupted and 11% (2,811 of 26,764) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 9% (1,046 of 12,125) of the total customers interrupted and 1% (296 of 26,764) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 9% (1,050 of 12,125) of the total customers interrupted and 0.3% (88 of 26,764) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 9% (1,038 of 12,125) of the total customers interrupted and 6% (1,505 of 26,764) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Eagle Bay 38272 in 2016.
- Nineteen of the twenty-six distribution related interruptions were tree related accounting for 3% (384 of 12,125) of the total customers interrupted and 8% (2,160 of 26,764) of the total customer-hours interrupted for this circuit.
- The largest distribution interruption was a planned drop and pick for feeder maintenance which occurred on June 1st. This interruption accounted for 9% (1,041 of 12,125) of the total customers interrupted and 3% (676 of 26,764) of the total customer-hours interrupted for this circuit.

Action Taken:

- Hazard tree removal was completed on the Poland 62258 in FY15
- Cycle pruning was last performed in 2012 on Poland 62258.
- Phase 1 of the Route 8 rebuild was completed in late summer of 2015, which reconductored a major portion of feeder where most tree interruptions had been occurring.

Action Plan:

- Routine trimming FY18
- Targeted trimming on repeat offending roads with tree interruptions
- Complete I&M Foot patrol by October 2017
- Complete Level 2 I&M by October 2018
- Complete Level 3 I&M by October 2020

2. RAQUETTE LAKE 39861 – 4.8kV

Profile: 494 Customers, 37.4 Circuit Miles

Indices: CAIDI = 3.62, SAIFI = 14.88

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	15.63%	1,539	20.94%	5,241	19.71%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	21	65.63%	4,260	57.97%	13,620	51.22%
6	ACCIDENTS	1	3.13%	498	6.78%	6,914	26.00%
7	PREARRANGED	1	3.13%	494	6.72%	321	1.21%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	12.50%	558	7.59%	497	1.87%
Totals		32	100.00%	7,349	100.00%	26,593	100.00%

Problem Analysis:

- There were six sub-transmission related interruptions that affected the Raquette Lake 39861 in 2016. These six interruptions accounted for 40% (2,960 of 7,349) of the total customers interrupted and 51% (13,622 of 26,593) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center-phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 7% (490 of 7,349) of the total customers interrupted and 14% (3,651 of 26,593) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 7% (491 of 7,349) of the total customers interrupted and 1% (270 of 26,593) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 7% (490 of 7,349) of the total customers interrupted and 1% (368 of 26,593) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on June 13th when a tree fell near pole 515 on Route 28, locking out the Eagle Bay recloser on the Old Forge-Raquette Lake #22 line. This interruption accounted for 7% (495 of 7,349) of the total customers interrupted and 4% (1,114 of 26,593) of the total customer-hours interrupted for this circuit.

- The fifth interruption occurred on August 12th when motor vehicle struck pole 251 on the Old Forge-Raquette Lake #23 line along route 28. This interruption accounted for 7% (498 of 7,349) of the total customers interrupted and 26% (6,914 of 26,593) of the total customer-hours interrupted for this circuit.
- The sixth interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 7% (496 of 7,349) of the total customers interrupted and 5% (1,306 of 26,593) of the total customer-hours interrupted for this circuit.
- There were six substation related interruptions in 2016. These six interruptions accounted for 40% (2,961 of 7,349) of the total customers interrupted and 12% (3,203 of 26,593) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 7% (490 of 7,349) of the total customers interrupted and 2% (498 of 26,593) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 7% (491 of 7,349) of the total customers interrupted and 2% (475 of 26,593) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 7% (494 of 7,349) of the total customers interrupted and 5% (1,334 of 26,593) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 7% (496 of 7,349) of the total customers interrupted and 0.5% (141 of 26,593) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 7% (497 of 7,349) of the total customers interrupted and 0.2% (41 of 26,593) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 7% (493 of 7,349) of the total customers interrupted and 3% (715 of 26,593) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Raquette Lake 39861 in 2016.
- There were twenty distribution related interruptions on the Raquette Lake 39861 in 2016. The interruptions accounted for 19% (1,431 of 7,349) of the total customers interrupted and 37% (9,767 of 26,593) of the total customer-hours interrupted for this circuit.

- The largest interruption occurred on September 4th, when a ratio transformer failed on pole 53 on Antlers Rd. This interruption accounted for 2% (171 of 7,349) of the total customers interrupted and 16% (4,326 of 26,593) of the total customer-hours interrupted for this circuit.

Action Taken:

- An I&M foot patrol was completed on 10/1/2015.
- Enhanced hazard tree mitigation was completed in 2015.
- A Hazard Tree removal on 46kV Old Forge-Raquette Lake #22 was completed in 2016.
- Level 2 I&M completed 10/1/2016.

Action Plan:

- Complete cycle tree pruning in FY18.
- Complete Level 3 I&M by 10/1/2018.

3. ALDER CREEK 70152 – 13.2kV

Profile: 1,035 Customers, 84.6 Circuit Miles

Indices: CAIDI = 1.59, SAIFI = 11.02

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	15	42.86%	1,895	16.61%	7,156	39.47%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	8	22.86%	5,437	47.66%	6,129	33.81%
6	ACCIDENTS	2	5.71%	747	6.55%	599	3.31%
7	PREARRANGED	2	5.71%	2,073	18.17%	3,202	17.66%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	2.86%	4	0.04%	28	0.16%
10	UNKNOWN	7	20.00%	1,253	10.98%	1,014	5.59%
Totals		35	100.00%	11,409	100.00%	18,128	100.00%

Problem Analysis:

- There was one sub-transmission related interruption that affected the Alder Creek 70152 in 2016. This interruption accounted for 9% (1,042 of 11,409) of the total customers interrupted and 15% (2,744 of 18,128) of the total customer-hours interrupted for this circuit.
 - This interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line.
- There were five substation related interruptions in 2016. These five interruptions accounted for 45% (5,179 of 11,409) of the total customers interrupted and 31% (5,678 of 18,128) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 9% (1,024 of 11,409) of the total customers interrupted and 6% (1,041 of 18,128) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 9% (1,033 of 11,409) of the total customers interrupted and 15% (2,737 of 18,128) of the total customer-hours interrupted for this circuit.

- The third interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 9% (1,030 of 11,409) of the total customers interrupted and 2% (292 of 18,128) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 9% (1,043 of 11,409) of the total customers interrupted and 0.5% (87 of 18,128) of the total customer-hours interrupted for this circuit.
 - The fifth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 9% (1,049 of 11,409) of the total customers interrupted and 8% (1,521 of 18,128) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Alder Creek 70152 in 2016.
 - There were twenty-six distribution related interruptions on the Alder Creek 70152 in 2016. The interruptions accounted for 45% (5,188 of 11,409) of the total customers interrupted and 54% (9,706 of 18,128) of the total customer-hours interrupted for this circuit.
 - The largest interruption occurred on August 13th. It was a planned interruption to transfer load to the 46kV TB2 at Boonville for maintenance on TB3. This interruption accounted for 9% (1,040 of 11,409) of the total customers interrupted and 14% (2,531 of 18,128) of the total customer-hours interrupted for this circuit.
 - Fourteen of the twenty interruptions were tree related accounting for 7% (853 of 11,409) of the total customers interrupted and 24% (4,412 of 18,128) of the total customer-hours interrupted for this circuit.

Action Taken:

- An I&M foot patrol was completed on 12/1/2014.
- Level 2 I&M was completed 12/1/2015.
- Cycle pruning was completed in 2013.
- Hazard tree removal was completed in FY15.

Action Plan:

- Complete Level 3 I&M by 12/1/2017.
- Complete cycle pruning in FY19.

4. OLD FORGE 38362 – 4.8kV

Profile: 726 Customers, 36.6 Circuit Miles

Indices: CAIDI = 2.04, SAIFI = 12.97

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	33.33%	1,371	14.56%	4,982	25.92%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	14	51.85%	5,833	61.96%	11,503	59.84%
6	ACCIDENTS	1	3.70%	14	0.15%	100	0.52%
7	PREARRANGED	2	7.41%	1,463	15.54%	2,429	12.64%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	3.70%	733	7.79%	208	1.08%
Totals		27	100.00%	9,414	100.00%	19,221	100.00%

Problem Analysis:

- There were four sub-transmission related interruptions that affected the Old Forge 38362 in 2016. These four interruptions accounted for 31% (2,887 of 9,414) of the total customers interrupted and 43% (8,211 of 19,221) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center-phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (718 of 9,414) of the total customers interrupted and 28% (5,349 of 19,221) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 8% (717 of 9,414) of the total customers interrupted and 2% (394 of 19,221) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 8% (720 of 9,414) of the total customers interrupted and 3% (540 of 19,221) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (732 of 9,414) of the total customers interrupted and 10% (1,928 of 19,221) of the total customer-hours interrupted for this circuit.

- There were six substation related interruptions in 2016. These six interruptions accounted for 46% (4,355 of 9,414) of the total customers interrupted and 24% (4,708 of 19,221) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (718 of 9,414) of the total customers interrupted and 4% (730 of 19,221) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 8% (718 of 9,414) of the total customers interrupted and 4% (694 of 19,221) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (728 of 9,414) of the total customers interrupted and 10% (1,966 of 19,221) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 8% (733 of 9,414) of the total customers interrupted and 1% (208 of 19,221) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 8% (734 of 9,414) of the total customers interrupted and 0.3% (61 of 19,221) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 8% (724 of 9,414) of the total customers interrupted and 5% (1,050 of 19,221) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Old Forge 38362 in 2016.
- There were seventeen distribution related interruptions on the Old Forge 38362 in 2016. These interruptions accounted for 23% (2,172 of 9,414) of the total customers interrupted and 33% (6,302 of 19,221) of the total customer-hours interrupted for this circuit.
 - Eight of the seventeen interruptions were tree related accounting for 7% (639 of 9,414) of the total customers interrupted and 16% (3,054 of 19,221) of the total customer-hours interrupted for this circuit.

Action Taken:

- Hazardous tree removal was completed in 2013.
- Completed an I&M foot patrol 07/28/2016.

Action Plan:

- Complete cycle pruning in FY18.
- Complete level 2 I&M by 07/28/2017.
- Complete level 3 I&M by 07/28/2019.

5. POLAND 62258 – 13.2kV

Profile: 1,550 Customers, 133.3 Circuit Miles
Indices: CAIDI = 2.05, SAIFI = 4.87

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	24	52.17%	4,670	61.82%	12,288	79.21%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	9	19.57%	1,586	21.00%	2,246	14.48%
6	ACCIDENTS	1	2.17%	1	0.01%	2	0.01%
7	PREARRANGED	5	10.87%	1,068	14.14%	329	2.12%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	7	15.22%	229	3.03%	648	4.17%
Totals		46	100.00%	7,554	100.00%	15,513	100.00%

Problem Analysis:

- There were two sub-transmission related interruptions that affected the Poland 62258 in 2016. These two interruptions accounted for 41% (3,067 of 7,554) of the total customers interrupted and 17% (2,606 of 15,513) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on March 16th when conductor between structures 46, 47, and 48 failed due to overload on the 46kV Trenton-Whitesboro #25 line. Two parallel lines were out for service at the time. This interruption accounted for 20% (1,532 of 7,554) of the total customers interrupted and 12% (1,889 of 15,513) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on April 14th when a tree fell on the Trenton-Whitesboro #25 line, near plank rd. Two parallel lines were out for service at the time. This interruption accounted for 20% (1,535 of 7,554) of the total customers interrupted and 5% (716 of 15,513) of the total customer-hours interrupted for this circuit.
- There were no substation related interruptions in 2016.
- There were forty-four distribution interruptions on the Poland 62258 feeder in 2016. These interruptions accounted for 59% (4,487 of 7,554) of the total customers interrupted and 83% (12,907 of 15,513) of the total customer-hours interrupted for this circuit.
- Over half of the distribution interruptions were tree related. The largest tree interruption occurred on October 22nd when a tree took down conductors at pole 222 on route 8, locking out recloser R6220. This interruption accounted for 9% (658 of 7,554) of the total customers interrupted and 19% (2,871 of 15,513) of the total customer-hours interrupted for this circuit.
- All other events were relatively small in nature and are spread out along the feeder side taps. Tree trimming is difficult along much of this feeder as it is in the Adirondack Park.

Action Taken:

- Hazard tree removal was completed on the Poland 62258 in FY15.
- Cycle pruning was last performed in FY10 on Poland 62258.
- An I&M foot patrol completed 10/26/2015.
- Level 2 I&M completed October 2016.

Action Plan:

- Routine trimming to be done in FY18.
- Conduct targeted trimming on repeat offending roads with tree interruptions.
- Complete Level 3 I&M by October 2018.

6. EAGLE BAY 38271 – 4.8kV

Profile: 881 Customers, 28.8 Circuit Miles

Indices: CAIDI = 2.82, SAIFI = 12.65

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	34.78%	1,380	12.39%	4,238	13.49%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	43.48%	6,999	62.82%	13,225	42.09%
6	ACCIDENTS	3	13.04%	982	8.81%	13,124	41.77%
7	PREARRANGED	1	4.35%	893	8.01%	580	1.85%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	4.35%	888	7.97%	252	0.80%
Totals		23	100.00%	11,142	100.00%	31,419	100.00%

Problem Analysis:

- There were five sub-transmission related interruptions that affected the Eagle Bay 38271 in 2016. These five interruptions accounted for 39% (4,381 of 11,142) of the total customers interrupted and 71% (22,441 of 31,419) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (860 of 11,142) of the total customers interrupted and 20% (6,407 of 31,419) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 8% (862 of 11,142) of the total customers interrupted and 2% (474 of 31,419) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 8% (862 of 11,142) of the total customers interrupted and 2% (647 of 31,419) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on August 12th when motor vehicle struck pole 251 on the Old Forge-Raquette Lake #23 line along route 28. This interruption accounted for 8% (905 of 11,142) of the total customers interrupted and 40% (12,564 of 31,419) of the total customer-hours interrupted for this circuit.

- The fifth occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (892 of 11,142) of the total customers interrupted and 7% (2,349 of 31,419) of the total customer-hours interrupted for this circuit.
- There were six substation related interruptions in 2016. These six interruptions accounted for 47% (5,276 of 11,142) of the total customers interrupted and 18% (5,708 of 31,419) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (860 of 11,142) of the total customers interrupted and 3% (874 of 31,419) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 8% (861 of 11,142) of the total customers interrupted and 3% (832 of 31,419) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (893 of 11,142) of the total customers interrupted and 8% (2,411 of 31,419) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 8% (888 of 11,142) of the total customers interrupted and 0.8% (252 of 31,419) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 8% (903 of 11,142) of the total customers interrupted and 0.2% (75 of 31,419) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 8% (871 of 11,142) of the total customers interrupted and 4% (1,263 of 31,419) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Eagle Bay 38271 in 2016.
- There were twelve distribution related interruptions on the Eagle Bay 38271 in 2016. These interruptions accounted for 13% (1,485 of 11,142) of the total customers interrupted and 10% (3,271 of 31,419) of the total customer-hours interrupted for this circuit.
 - The largest interruption occurred on August 16th when a felled tree caused recloser R68931 on Route 28 to lock out. This interruption accounted for 4% (476 of 11,142) of the total customers interrupted and 6% (1,788 of 31,419) of the total customer-hours interrupted for this circuit.

Action Taken:

- Cycle pruning was completed in 2012.
- Level 2 I&M was completed 9/1/2013.
- Level 3 I&M was completed 9/1/2015.
- Hazard trees removal since FY15.

Action Plan:

- Complete I&M foot patrol by 8/1/2017.
- Cycle pruning to begin FY18.

7. ALDER CREEK 70161 – 4.8kV

Profile: 677 Customers, 40.1 Circuit Miles

Indices: CAIDI = 1.61, SAIFI = 10.36

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	12	44.44%	1,289	18.38%	4,877	43.09%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	9	33.33%	3,648	52.01%	3,948	34.88%
6	ACCIDENTS	1	3.70%	1	0.01%	1	0.01%
7	PREARRANGED	2	7.41%	1,338	19.08%	2,047	18.08%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.70%	29	0.41%	133	1.17%
10	UNKNOWN	2	7.41%	709	10.11%	313	2.76%
Totals		27	100.00%	7,014	100.00%	11,318	100.00%

Problem Analysis:

- There were no sub-transmission related interruptions that affected the Alder Creek 70161 in 2016.
- There were five substation related interruptions in 2016. These five interruptions accounted for 48% (3,354 of 7,014) of the total customers interrupted and 33% (3,693 of 11,318) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 9% (661 of 7,014) of the total customers interrupted and 6% (672 of 11,318) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 10% (678 of 7,014) of the total customers interrupted and 16% (1,797 of 11,318) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 9% (661 of 7,014) of the total customers interrupted and 2% (187 of 11,318) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 10% (678 of 7,014) of the total customers interrupted and 0.5% (57 of 11,318) of the total customer-hours interrupted for this circuit.

- The fifth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 10% (676 of 7,014) of the total customers interrupted and 9% (980 of 11,318) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Alder Creek 70161 in 2016.
- There were twenty-two distribution related interruptions on the Alder Creek 70161 in 2016. The interruptions accounted for 52% (3,660 of 7,014) of the total customers interrupted and 67% (7,626 of 11,318) of the total customer-hours interrupted for this circuit.
 - Tree interruptions continue to be a dominant cause of interruptions in 2016.
 - The largest distribution interruption occurred on August 13th. It was a planned interruption to transfer load to the 46kV TB2 at Boonville for maintenance on TB3. This interruption accounted for 9% (1,660 of 7,014) of the total customers interrupted and 14% (1,606 of 11,318) of the total customer-hours interrupted for this circuit.
- Twelve of the twenty interruptions were tree related; which accounted for 18% (1289 of 7,014) of the total customers interrupted and 43% (4,877 of 11,318) of the total customer-hours interrupted for this circuit.

Action Taken:

- Cycle pruning was completed in 2013.
- An I&M Foot Patrol was completed 4/30/2014.
- Level 2 I&M was completed 4/30/2015.
- Hazard tree removal was completed in FY15.

Action Plan:

- Complete Level 3 I&M by 4/30/2017.
- Cycle pruning to begin FY19.
- Monitor tree outages.

8. OLD FORGE 38361 – 4.8kV

Profile: 604 Customers, 33.5 Circuit Miles
Indices: CAIDI = 1.90, SAIFI = 12.68

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	33.33%	783	10.23%	2,843	19.52%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	11	45.83%	4,847	63.30%	9,033	62.01%
6	ACCIDENTS	1	4.17%	11	0.14%	8	0.05%
7	PREARRANGED	2	8.33%	1,212	15.83%	2,016	13.84%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	8.33%	804	10.50%	667	4.58%
Totals		24	100.00%	7,657	100.00%	14,566	100.00%

Problem Analysis:

- There were four sub-transmission related interruptions that affected the Old Forge 38361 in 2016. These four interruptions accounted for 31% (2,406 of 7,657) of the total customers interrupted and 47% (6,825 of 14,566) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center-phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (596 of 7,657) of the total customers interrupted and 30% (4,440 of 14,566) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 8% (600 of 7,657) of the total customers interrupted and 2% (330 of 14,566) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 8% (601 of 7,657) of the total customers interrupted and 3% (451 of 14,566) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (609 of 7,657) of the total customers interrupted and 11% (1,604 of 14,566) of the total customer-hours interrupted for this circuit.

- There were six substation related interruptions in 2016. These six interruptions accounted for 47% (3,617 of 7,657) of the total customers interrupted and 27% (3,914 of 14,566) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (596 of 7,657) of the total customers interrupted and 4% (606 of 14,566) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 8% (598 of 7,657) of the total customers interrupted and 4% (578 of 14,566) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (603 of 7,657) of the total customers interrupted and 11% (1,628 of 14,566) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 8% (603 of 7,657) of the total customers interrupted and 1% (171 of 14,566) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 8% (610 of 7,657) of the total customers interrupted and 0.3% (51 of 14,566) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 8% (607 of 7,657) of the total customers interrupted and 6% (880 of 14,566) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Old Forge 38362 in 2016.
- There were fourteen distribution related interruptions on the Old Forge 38361 in 2016. These interruptions accounted for 21% (1,634 of 7,657) of the total customers interrupted and 26% (3,827 of 14,566) of the total customer-hours interrupted for this circuit.
 - The largest distribution interruption occurred on August 13th. This was a planned interruption to restore load to TB#3 at Boonville. This interruption accounted for 8% (609 of 7,657) of the total customers interrupted and 11% (1,624 of 14,566) of the total customer-hours interrupted for this circuit.

Action Taken:

- An I&M foot patrol was completed 8/31/2016.
- Cycle pruning was completed 2012.
- Hazard tree removal was completed 2013.

Action Plan:

- Complete cycle pruning in FY18
- Complete I&M Level 2 maintenance by 8/31/2017

- Complete I&M Level 3 maintenance by 8/31/2019.

9. OLD FORGE 38364 – 4.8kV

Profile: 858 Customers, 26.0 Circuit Miles

Indices: CAIDI = 1.66, SAIFI = 13.08

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	30.00%	902	8.04%	2,544	13.69%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	5.00%	852	7.59%	156	0.84%
5	EQUIPMENT	8	40.00%	6,808	60.66%	12,700	68.35%
6	ACCIDENTS	1	5.00%	1	0.01%	1	0.01%
7	PREARRANGED	2	10.00%	1,731	15.42%	2,864	15.41%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	10.00%	930	8.29%	315	1.70%
Totals		20	100.00%	11,224	100.00%	18,580	100.00%

Problem Analysis:

- There were four sub-transmission related interruptions that affected the Old Forge 38364 in 2016. These four interruptions accounted for 30% (3,388 of 11,224) of the total customers interrupted and 52% (9,634 of 18,580) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center-phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (842 of 11,224) of the total customers interrupted and 34% (6,273 of 18,580) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 8% (842 of 11,224) of the total customers interrupted and 2% (463 of 18,580) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 8% (844 of 11,224) of the total customers interrupted and 3% (633 of 18,580) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (860 of 11,224) of the total customers interrupted and 12% (2,265 of 18,580) of the total customer-hours interrupted for this circuit.

- There were six substation related interruptions in 2016. These six interruptions accounted for 46% (5,138 of 11,224) of the total customers interrupted and 30% (5,574 of 18,580) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (842 of 11,224) of the total customers interrupted and 5% (856 of 18,580) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 7% (841 of 11,224) of the total customers interrupted and 4% (813 of 18,580) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (869 of 11,224) of the total customers interrupted and 13% (2,346 of 18,580) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 8% (858 of 11,224) of the total customers interrupted and 1% (243 of 18,580) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 8% (871 of 11,224) of the total customers interrupted and 0.4% (73 of 18,580) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 8% (857 of 11,224) of the total customers interrupted and 7% (1,243 of 18,580) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Old Forge 38364 in 2016.
- There were ten distribution related interruptions on the Old Forge 38364 in 2016. These interruptions accounted for 24% (2,698 of 11,224) of the total customers interrupted and 18% (3,372 of 18,580) of the total customer-hours interrupted for this circuit.
 - The largest distribution interruption occurred on August 13th. This was a planned interruption to restore load to TB#3 at Boonville. This interruption accounted for 8% (862 of 11,224) of the total customers interrupted and 12% (2,299 of 18,580) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M foot patrol was completed 09/09/2015.
- Level 2 I&M was completed 10/1/2016.

Action Plan:

- Complete level 3 I&M by 10/1/2018
- Perform Cycle pruning in FY18.

10. WHITE LAKE 39963 – 4.8kV

Profile: 953 Customers, 36.6 Circuit Miles

Indices: CAIDI = 2.07, SAIFI = 9.96

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	42.11%	1,088	11.46%	3,132	15.96%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	31.58%	5,482	57.75%	12,910	65.77%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	2	10.53%	1,920	20.23%	3,200	16.30%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	15.79%	1,003	10.57%	386	1.97%
Totals		19	100.00%	9,493	100.00%	19,628	100.00%

Problem Analysis:

- There were two sub-transmission related interruptions that affected the White Lake 39963 in 2016. These two interruptions accounted for 18% (1,676 of 9,493) of the total customers interrupted and 49% (9,545 of 19,628) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (722 of 9,493) of the total customers interrupted and 36% (7,033 of 19,628) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 10% (954 of 9,493) of the total customers interrupted and 13% (2,512 of 19,628) of the total customer-hours interrupted for this circuit.
- There were six substation related interruptions in 2016. These six interruptions accounted for 60% (5,717 of 9,493) of the total customers interrupted and 31% (6,149 of 19,628) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 10% (944 of 9,493) of the total customers interrupted and 5% (960 of 19,628) of the total customer-hours interrupted for this circuit.

- The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 10% (945 of 9,493) of the total customers interrupted and 5% (914 of 19,628) of the total customer-hours interrupted for this circuit.
- The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 10% (960 of 9,493) of the total customers interrupted and 13% (2,544 of 19,628) of the total customer-hours interrupted for this circuit.
- The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 10% (957 of 9,493) of the total customers interrupted and 1% (271 of 19,628) of the total customer-hours interrupted for this circuit.
- The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 10% (959 of 9,493) of the total customers interrupted and 0.4% (80 of 19,628) of the total customer-hours interrupted for this circuit.
- The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 10% (952 of 9,493) of the total customers interrupted and 7% (1,380 of 19,628) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on White Lake 39963 in 2016.
- There were eleven distribution related interruptions on the White Lake 39963 in 2016. These interruptions accounted for 22% (2,100 of 9,493) of the total customers interrupted and 20% (3,935 of 19,628) of the total customer-hours interrupted for this circuit.
 - The largest distribution interruption occurred on August 13th. This was a planned interruption to restore load to TB#3 at Boonville. This interruption accounted for 10% (960 of 9,493) of the total customers interrupted and 13% (2,560 of 19,628) of the total customer-hours interrupted for this circuit.

Action Taken:

- Cycle pruning was completed 2011.
- Enhanced hazard tree mitigation was completed FY15.

Action Plan:

- Complete I&M foot patrol by 7/1/2017.
- Complete Level 2 I&M by 7/1/2018.
- Complete Level 3 I&M by 7/1/2020.
- Complete cycle pruning in FY18.

11. DEBALSO 68452 – 13.2kV

Profile: 3,034 Customers, 25.0 Circuit Miles
Indices: CAIDI = 1.49, SAIFI = 4.52

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	4	16.00%	140	1.02%	1,050	5.12%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	40.00%	8,415	61.34%	17,075	83.31%
6	ACCIDENTS	5	20.00%	105	0.77%	125	0.61%
7	PREARRANGED	2	8.00%	3,037	22.14%	416	2.03%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	16.00%	2,021	14.73%	1,832	8.94%
Totals		25	100.00%	13,718	100.00%	20,497	100.00%

Problem Analysis:

- There were two transmission related interruptions that affected the Debalso 68452 in 2016. These interruptions accounted for 44% (6,060 of 13,718) of the total customers interrupted and 59% (12,120 of 20,497) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on September 24th when a splice failed on the 115kV, Porter-Yahnundasis #3 line. The failed phase came in contact with the lower 115kV, Oneida-Yahnundasis #6 line causing a loss of supply to Debalso and Chadwicks stations. This interruption accounted for 22% (3,030 of 13,718) of the total customers interrupted and 49% (10,050 of 20,497) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on September 27th when a splice failed on the Porter-Yahnundasis #3 where it crosses the NYS Thruway. Salt intrusion caused the splice to fail. This interruption accounted for 22% (3,030 of 13,718) of the total customers interrupted and 10% (2,017 of 20,497) of the total customer-hours interrupted for this circuit.
- There was one substation related interruption that affected the Debalso 68452 in 2016 which occurred on November 27th. A mobile transformer was connected at Debalso Station, while TB#1 was out of service for LTC maintenance. The mobile locked out due to temperature alarms when beaker that feeds the cooling pumps failed. This interruption accounted for 15% (1,994 of 13,718) of the total customers interrupted and 39% (1,795 of 20,497) of the total customer-hours interrupted for this circuit.
- There were twenty-two distribution related interruptions that affected the Debalso 68452 in 2016. These interruptions accounted for 41% (5,664 of 13,718) of the total customers interrupted and 32% (6,583 of 20,497) of the total customer-hours interrupted for this circuit.

- One feeder lockout occurred on September 8th when a guy wire at pole 21 on Campion Rd broke and recoiled into the primary near Debalso Station. This interruption accounted for 14% (1,986 of 13,718) of the total customers interrupted and 21% (4,303 of 20,497) of the total customer-hours interrupted for this circuit.
- There was a planned interruption on October 21st to connect the mobile transformer so the TB#1 LTC could be maintained. This interruption accounted for 22% (3,030 of 13,718) of the total customers interrupted and 2% (404 of 20,497) of the total customer-hours interrupted for this circuit.
- On December 12th, conductor failed between poles 21 and 22 on Hartford Rd, blowing the protecting fuses on pole 12.

Action Taken:

- I&M foot patrol was completed 10/25/2016.
- Cycle pruning was completed 2014.
- Hazard tree removal was completed 2015.

Action Plan:

- Complete level 2 I&M by 10/25/2017.
- Complete level 3 I&M by 10/25/2019.
- Hazard Tree removal scheduled to be completed in FY18.

12. TURIN RD 65356 – 13.2kV

Profile: 1,292 Customers, 96.9 Circuit Miles
Indices: CAIDI = 4.50, SAIFI = 2.87

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	12	48.00%	1,580	42.54%	13,392	80.05%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	2	8.00%	33	0.89%	66	0.39%
6	ACCIDENTS	5	20.00%	1,740	46.85%	2,923	17.47%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	6	24.00%	361	9.72%	348	2.08%
Totals		25	100.00%	3,714	100.00%	16,729	100.00%

Problem Analysis:

- There were no transmission related interruptions on the Turin Rd 65356 in 2016.
- There was one substation related interruptions on the Turin Rd 65356 in 2016 that occurred on May 3rd when a squirrel caused R25 to lockout TB#3. This interruption accounted for 35% (1,289 of 3,714) of the total customers interrupted and 16% (2,664 of 16,729) of the total customer-hours interrupted for this circuit.
- There was one lockout on the Turin Rd 65356 in 2016, which occurred on June 20th when a fallen tree on Lee Center Rd, took down conductor between poles 301 and 303. Pole 170 was broken and replaced as well. This event occurred during a localized storm. This interruption accounted for 35% (1,293 of 3,714) of the total customers interrupted and 75% (12,545 of 16,729) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M foot patrol was completed 09/08/2014.
- Level 2 I&M was completed 10/1/2015.
- Hazard tree removal was completed FY14.

Action Plan:

- Complete level 3 I&M by 10/1/2017.
- Cycle prune FY18.

13. SALISBURY 67857 – 13.2kV

Profile: 1,004 Customers, 88.6 Circuit Miles
Indices: CAIDI = 2.32, SAIFI = 3.75

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	16	59.26%	1,608	42.77%	5,026	57.50%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	18.52%	1,025	27.26%	1,820	20.82%
6	ACCIDENTS	3	11.11%	1,102	29.31%	1,850	21.17%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	11.11%	25	0.66%	45	0.52%
Totals		27	100.00%	3,760	100.00%	8,741	100.00%

Problem Analysis:

- There were no transmission related interruptions on the Salisbury 67857 in 2016.
- There was one substation related interruptions on the Salisbury 67857 in 2016 that occurred on November 5th when a squirrel caused R525 to lockout the 13.2kV Bus 92. This interruption accounted for 27% (1,017 of 3,760) of the total customers interrupted and 19% (1,695 of 8,741) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts on the Salisbury 67857 in 2016.
- There were 26 distribution interruptions that affected the Salisbury 67857. These interruptions accounted for 73% (2,746 of 3,760) of the total customers interrupted and 81% (7,046 of 8,741) of the total customer-hours interrupted for this circuit.
 - The largest distribution interruption occurred on March 2nd when a tree fell into primary conductors at pole #111 on NYS Route 29, opening the upstream recloser. This interruption accounted for 23% (870 of 3,760) of the total customers interrupted and 19% (1,682 of 8,741) of the total customer-hours interrupted for this circuit.
 - The second largest distribution interruption occurred on August 10th when recloser R8300 was opened to de-energize and replace broken pole #92 on NYS Route 29. This interruption accounted for 23% (877 of 3,760) of the total customers interrupted and 16% (1,424 of 8,741) of the total customer-hours interrupted for this circuit.
 - The third largest interruption occurred on October 18th when a tree fell during a storm, bringing down conductors at pole 78 on NYS Route 29A. This interruption accounted for 6% (212 of 3,760) of the total customers interrupted and 14% (1,211 of 8,741) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M Foot Patrol completed 09/02/2015.
- Level 2 I&M completed 09/2/2016.
- Completed cycle pruning in FY13.
- Hazard tree removal completed 2011.

Action Plan:

- Perform enhanced hazard tree mitigation FY18.
- Complete level 3 I&M by 09/02/2018.

14. SHERMAN 33351 – 13.2kV

Profile: 1,445 Customers, 97.9 Circuit Miles
Indices: CAIDI = 1.34, SAIFI = 3.82

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	13	40.63%	1,800	32.61%	2,085	28.11%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	1	3.13%	183	3.32%	52	0.70%
5	EQUIPMENT	12	37.50%	3,274	59.31%	4,758	64.16%
6	ACCIDENTS	1	3.13%	102	1.85%	122	1.65%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.13%	12	0.22%	20	0.28%
10	UNKNOWN	4	12.50%	149	2.70%	379	5.11%
Totals		32	100.00%	5,520	100.00%	7,416	100.00%

Problem Analysis:

- There were three sub-transmission related interruptions that affected the Sherman 33351 in 2016. These three interruptions accounted for 78% (4,325 of 5,520) of the total customers interrupted and 56% (4,154 of 7,416) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on March 6th when conductor at structure #3 failed during heavy winds on the 46kV, Trenton-Deerfield #21 line, coming in contact with the underbuilt distribution. This interruption accounted for 26% (1,438 of 5,520) of the total customers interrupted and 23% (1,702 of 7,416) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 16th when conductor between structures 46, 47, and 48 failed due to overload on the 46kV Trenton-Whitesboro #25 line. Two parallel lines were out for service at the time. This interruption accounted for 26% (1,442 of 5,520) of the total customers interrupted and 24% (1,778 of 7,416) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th when a tree fell on the Trenton-Whitesboro #25 line, near plank rd. Two parallel lines were out for service at the time. This interruption accounted for 26% (1,445 of 5,520) of the total customers interrupted and 9% (674 of 7,416) of the total customer-hours interrupted for this circuit.
- There were no substation related interruptions in 2016.
- There were twenty-nine distribution interruptions on the Sherman 33351 feeder in 2016. These interruptions accounted for 22% (1,199 of 5,520) of the total customers interrupted and 44% (3,262 of 7,416) of the total customer-hours interrupted for this circuit.

- The largest interruption occurred on March 18th when switch 7149 on Partridge Hill Rd was opened to isolate downstream switch #7154 for emergency replacement. This interruption accounted for 4% (216 of 5,520) of the total customers interrupted and 3% (209 of 7,416) of the total customer-hours interrupted for this circuit.

Action Taken:

- Level 2 I&M completed 6/1/2014.
- Level 3 I&M completed 6/1/2016.
- Cycle pruning completed in 2014.
- Hazard Tree removal completed FY15.

Action Plan:

- Complete cycle pruning FY20.

15. CHADWICKS 66851 – 13.2kV

Profile: 1,826 Customers, 90.3 Circuit Miles
Indices: CAIDI = 3.95, SAIFI = 2.01

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	22.22%	498	13.54%	1,751	12.06%
3	OVERLOADS	1	2.78%	5	0.14%	33	0.23%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	13	36.11%	2,788	75.78%	12,107	83.39%
6	ACCIDENTS	6	16.67%	89	2.42%	80	0.55%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	8	22.22%	299	8.13%	549	3.78%
Totals		36	100.00%	3,679	100.00%	14,519	100.00%

Problem Analysis:

- There was one transmission related interruptions that affected the Chadwicks 66851 in 2016. This interruption occurred on September 24th when a splice failed on the 115kV, Porter-Yahnundasis #3 line. The failed phase came in contact with the lower 115kV, Oneida-Yahnundasis #6 line causing a loss of supply to Debalso and Chadwicks stations. This interruption accounted for 50% (1,834 of 3,679) of the total customers interrupted and 64% (9,326 of 14,519) of the total customer-hours interrupted for this circuit.
- There were no substation related interruptions on the Chadwicks 66851 in 2016.
- There were thirty-five distribution related interruptions on the Chadwicks 66851 feeder in 2016. These interruptions accounted for 50% (1,845 of 3,679) of the total customers interrupted and 36% (5,193 of 14,519) of the total customer-hours interrupted for this circuit.
 - The largest interruption occurred on September 19th when switch 7073 on pole 3 was opened to de-energize and repair dead-end insulators on pole 2 on Church Rd. This interruption accounted for 9% (324 of 3,679) of the total customers interrupted and 2% (221 of 14,519) of the total customer-hours interrupted for this circuit.
 - On June 20th, fused disconnects were opened at pole 231 on Albany Rd. to isolate and repair burned off transformer taps at pole 160 due to corrosion. This interruption accounted for 6% (229 of 3,679) of the total customers interrupted and 11% (1,616 of 14,519) of the total customer-hours interrupted for this circuit.
- Eight of the thirty-five distribution interruptions were unknown. Tree branch contacts are suspected in all 8 instances.

Action Taken:

- I&M foot patrol was completed 11/17/2015

- Level 2 I&M was completed 11/17/2016.
- Hazard tree removal was completed FY14.

Action Plan:

- Complete level 3 I&M by 11/17/2018.
- Hazard tree removal scheduled for FY18.
- Cycle prune in FY19.

16. ONEIDA 50151 – 13.2kV

Profile: 1,805 Customers, 95.4 Circuit Miles
Indices: CAIDI = 2.37, SAIFI = 2.37

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	34.62%	3,839	89.82%	9,127	90.25%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	15.38%	66	1.54%	170	1.69%
6	ACCIDENTS	5	19.23%	225	5.26%	534	5.28%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	7.69%	8	0.19%	17	0.17%
10	UNKNOWN	6	23.08%	136	3.18%	265	2.62%
Totals		26	100.00%	4,274	100.00%	10,113	100.00%

Problem Analysis:

- There were no transmission related interruptions on the Oneida 50151 in 2016.
- There were no substation related interruptions on the Oneida 50151 in 2016.
- There were 2 distribution feeder lockouts that affected the Oneida 50151 in 2016
 - The largest interruption occurred on May 29th when a tree fell during a minor storm on State Hwy 365. Pole #28 was broken with conductor down just outside Oneida Station. The line was sectionalized and repairs made. This interruption accounted for 40% (1,711 of 4,274) of the total customers interrupted and 45% (4,588 of 10,113) of the total customer-hours interrupted for this circuit.
 - The second feeder lockout occurred on September 18th when a tree limb came in contact with overhead 3-phase conductors on County Route 46, one span ahead of recloser R68638. This interruption accounted for 42% (1,796 of 4,274) of the total customers interrupted and 40% (4,041 of 10,113) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M foot patrol was completed 12/12/2013.
- Level 2 I&M was completed 12/12/2014.
- Level 3 I&M was completed 12/12/2016.
- Hazard tree removal was completed FY15.
- Cycle pruning was completed in FY15.

Action Plan:

- Cycle prune in FY21.

17. TURIN RD 65355 – 13.2kV

Profile: 1,432 Customers, 49.6 Circuit Miles
Indices: CAIDI = 1.54, SAIFI = 3.82

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	47.37%	3,903	71.38%	5,876	69.92%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	26.32%	22	0.40%	86	1.02%
6	ACCIDENTS	3	15.79%	1,536	28.09%	2,434	28.96%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	10.53%	7	0.13%	9	0.10%
Totals		19	100.00%	5,468	100.00%	8,404	100.00%

Problem Analysis:

- There were no transmission related interruptions on the Turin Rd 65355 in 2016.
- There was one substation related interruptions on the Turin Rd 65355 in 2016 that occurred on May 3rd when a squirrel caused R25 to lockout TB#3. This interruption accounted for 26% (1,423 of 5,468) of the total customers interrupted and 21% (1,802 of 8,404) of the total customer-hours interrupted for this circuit.
- There were two lockouts on the Turin Rd 65355 in 2016. These two interruptions were both tree events and accounted for 52% (2,861 of 5,468) of the total customers interrupted and 52% (4,437 of 8,404) of the total customer-hours interrupted for this circuit.
 - The first feeder lockout occurred on June 20th when a tree fell in high winds on Hawkins Corners Rd. Conductor came down in several locations, breaking multiple crossarms. This interruption accounted for 26% (1,427 of 5,468) of the total customers interrupted and 45% (3,816 of 8,404) of the total customer-hours interrupted for this circuit.
 - The second feeder lockout occurred on June 27th when a tree limb across three phases of primary conductor on Thomas Dr. This interruption accounted for 26% (1,434 of 5,468) of the total customers interrupted and 7% (621 of 8,404) of the total customer-hours interrupted for this circuit.
- Another large tree incident occurred on September 8th when a tree fell at pole 220 on Rome-Taberg Rd, tripping recloser R68671 during an isolated storm. This interruption accounted for 9% (472 of 5,468) of the total customers interrupted and 6% (480 of 8,404) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M foot patrol was completed 07/30/2013
- Level 2 I&M was completed 07/30/2014

- Level 3 I&M was completed 07/30/2016.
- Hazard tree removal was completed FY14.

Action Plan:

- Cycle prune in FY18.

18. STITTVILLE 67052 – 13.2kV

Profile: 1,693 Customers, 66.2 Circuit Miles

Indices: CAIDI = 2.31, SAIFI = 2.31

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	12	44.44%	2,602	66.55%	5,863	64.94%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	22.22%	61	1.56%	160	1.77%
6	ACCIDENTS	4	14.81%	1,084	27.72%	2,589	28.67%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	7.41%	47	1.20%	187	2.07%
10	UNKNOWN	3	11.11%	116	2.97%	230	2.55%
Totals		27	100.00%	3,910	100.00%	9,029	100.00%

Problem Analysis:

- There were no transmission related interruptions on the Stittville 67052 in 2016.
- There were no substation related interruptions on the Stittville 67052 in 2016.
- There was one feeder lockout on the Stittville 67052 in on September 8th when a tree fell during a localized storm, between poles 45 and 46 on NYS Route 365. This interruption accounted for 43% (1,676 of 3,910) of the total customers interrupted and 30% (2,682 of 9,029) of the total customer-hours interrupted for this circuit.
- On March 29th, a motor vehicle accident damaged pole 40 on NYS Route 365. This interruption accounted for 24% (934 of 3,910) of the total customers interrupted and 25% (2,242 of 9,029) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M foot patrol was completed 11/16/2016.

Action Plan:

- Complete level 2 I&M by 11/16/2017.
- Complete level 3 I&M by 11/16/2019.
- Cycle prune FY20.
- Hazard Tree removal FY18.

19. SHERMAN 33352 – 13.2kV

Profile: 1,752 Customers, 110.5 Circuit Miles
Indices: CAIDI = 1.52, SAIFI = 2.75

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	19	57.58%	2,740	56.89%	4,432	60.55%
3	OVERLOADS	1	3.03%	1	0.02%	4	0.06%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	18.18%	1,883	39.10%	2,413	32.97%
6	ACCIDENTS	1	3.03%	11	0.23%	8	0.11%
7	PREARRANGED	2	6.06%	36	0.75%	20	0.27%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	12.12%	145	3.01%	443	6.05%
Totals		33	100.00%	4,816	100.00%	7,319	100.00%

Problem Analysis:

- There were two sub-transmission related interruptions that affected the Sherman 33352 in 2016. These two interruptions accounted for 72% (3,486 of 4,816) of the total customers interrupted and 40% (2,942 of 7,319) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on March 16th when conductor between structures 46, 47, and 48 failed due to overload on the 46kV Trenton-Whitesboro #25 line. Two parallel lines were out for service at the time. This interruption accounted for 36% (1,726 of 4,816) of the total customers interrupted and 29% (2,129 of 7,319) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on April 14th when a tree fell on the Trenton-Whitesboro #25 line, near plank rd. Two parallel lines were out for service at the time. This interruption accounted for 36% (1,742 of 4,816) of the total customers interrupted and 11% (813 of 7,319) of the total customer-hours interrupted for this circuit.
- There were no substation related interruptions in 2016.
- There were no feeder lockouts on the Sherman 33352 in 2016.
- There were thirty-one distribution interruptions that affected the Sherman 33352 in 2016. These interruptions accounted for 28% (1,348 of 4,816) of the total customers interrupted and 60% (4,378 of 7,319) of the total customer-hours interrupted for this circuit.
 - The largest interruption occurred on August 17th when a tree fell between poles 14 and 15 on Star Hill Rd, opening the upstream recloser. This interruption accounted for 12% (568 of 4,816) of the total customers interrupted and 22% (1,631 of 7,319) of the total customer-hours interrupted for this circuit.

Action Taken:

- Cycle pruning was completed in 2014.

- Hazardous tree removal was completed in FY16.
- Completed I&M foot patrol on 11/1/2015.
- Completed Level 2 I&M 11/1/2016.

Action Plan:

- Cycle pruning FY20.
- Complete Level 3 I&M by 11/1/2018.

20. OLD FORGE 38363 – 4.8kV

Profile: 374 Customers, 2.9 Circuit Miles

Indices: CAIDI = 1.78, SAIFI = 11.99

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	1	7.69%	373	8.32%	982	12.33%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	9	69.23%	2,988	66.65%	5,637	70.77%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	2	15.38%	748	16.69%	1,240	15.57%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	7.69%	374	8.34%	106	1.33%
Totals		13	100.00%	4,483	100.00%	7,965	100.00%

Problem Analysis:

- There were four sub-transmission related interruptions that affected the Old Forge 38363 in 2016. These four interruptions accounted for 33% (1,484 of 4,483) of the total customers interrupted and 53% (4,220 of 7,965) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on January 26th due to a failed 46kV insulator on pole 528 of the Old Forge-Raquette Lake #23 line on Route 28. The center-phase conductor came in contact with the pole necessitating replacement. This interruption accounted for 8% (370 of 4,483) of the total customers interrupted and 35% (2,757 of 7,965) of the total customer-hours interrupted for this circuit.
 - The second interruption occurred on March 1st after opening the white Lake, 46kV recloser on the Old Forge-Raquette Lake #23 line on Route 28 to repair a broken insulator at pole 962. This interruption accounted for 8% (371 of 4,483) of the total customers interrupted and 3% (204 of 7,965) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on April 14th due to a failed insulator on the Old Forge-Raquette Lake #23 line at pole 895. This interruption accounted for 8% (370 of 4,483) of the total customers interrupted and 3% (278 of 7,965) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on October 6th when a tree fell between structures 413 and 414 on the Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (373 of 4,483) of the total customers interrupted and 12% (982 of 7,965) of the total customer-hours interrupted for this circuit.

- There were six substation related interruptions in 2016. These six interruptions accounted for 50% (2,244 of 4,483) of the total customers interrupted and 31% (2,431 of 7,965) of the total customer-hours interrupted for this circuit.
 - The first interruption occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas. This breaker protects the 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (370 of 4,483) of the total customers interrupted and 5% (376 of 7,965) of the total customer-hours interrupted for this circuit.
 - The second interruption also occurred on February 14th when extreme cold caused R230 at Alder Creek to trip on low gas, four hours after the first interruption. This interruption accounted for 8% (370 of 4,483) of the total customers interrupted and 4% (358 of 7,965) of the total customer-hours interrupted for this circuit.
 - The third interruption occurred on May 27th due to a bushing failure on R270 at Boonville station which feeds the radial, 46kV, Old Forge-Raquette Lake #23 line. This interruption accounted for 8% (374 of 4,483) of the total customers interrupted and 13% (1,010 of 7,965) of the total customer-hours interrupted for this circuit.
 - The fourth interruption occurred on July 1st when the circuit switcher 38 on the primary side of TB3 opened due to a momentary interruption on the Old Forge-Raquette Lake #23 line. R210 was out of service due to a bushing failure at the time so there was no reclose ability. This interruption accounted for 8% (374 of 4,483) of the total customers interrupted and 1% (106 of 7,965) of the total customer-hours interrupted for this circuit.
 - The fifth interruption occurred on September 16th. This was a planned interruption to restore R210 at Boonville Station which was repaired after a bushing failure. This interruption accounted for 8% (377 of 4,483) of the total customers interrupted and 0.4% (31 of 7,965) of the total customer-hours interrupted for this circuit.
 - The sixth event occurred on December 22nd, when a 115kV cable termination failed on the 115kV side of Boonville TB#3. This interruption accounted for 8% (379 of 4,483) of the total customers interrupted and 7% (550 of 7,965) of the total customer-hours interrupted for this circuit.
- There were no feeder lockouts that occurred on Old Forge 38363 in 2016.
- There were three distribution related interruptions on the Old Forge 38363 in 2016. These interruptions accounted for 17% (755 of 4,483) of the total customers interrupted and 17% (1,315 of 7,965) of the total customer-hours interrupted for this circuit.

Action Taken:

- I&M foot patrol completed 04/28/2015.
- Level 2 I&M completed 04/28/2016.
- Hazard tree removal completed 2015.

Action Plan:

- Complete level 3 I&M by 04/28/2018.
- Cycle prune FY18.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Compl. Date	Cost	Comments
Eagle Bay	38272	2016	Cycle pruning	FY18		
		2016	Targeted spot trimming based on outages	FY19		
		2016	Complete I&M Foot Patrol	10/17		
		2016	Complete Level 2 I&M	10/18		
		2016	Complete Level 3 I&M	10/20		
Raquette Lake	39861	2016	Cycle Pruning	FY18		
		2016	Complete Level 3 I&M	10/1/18		
Alder Creek	70152	2016	Complete Level 3 I&M	12/1/17		
		2016	Cycle Pruning	FY19		
Old Forge	38362	2016	Cycle Pruning	FY18		
		2016	Complete Level 3 I&M	7/28/17		
		2016	Complete Level 3 I&M	7/28/19		
Poland	62258	2016	Cycle Pruning	FY18		
		2016	Targeted spot trimming based on outages	FY19		
		2016	Complete Level 3 I&M	10/2018		
Eagle Bay	38271	2016	Complete I&M Foot Patrol	8/1/17		
		2016	Cycle Pruning	FY18		
Alder creek	70161	2016	Complete Level 3 I&M	4/30/17		
		2016	Cycle Pruning	FY19		
		2016	Monitor tree conditions			
Old Forge	38361	2016	Cycle Pruning	FY18		
		2016	Complete Level 2 I&M	8/31/17		
		2016	Complete Level 3 I&M	8/31/19		
Old Forge	38364	2016	Complete Level 3 I&M	10/1/18		
		2016	Cycle Pruning	FY18		
White Lake	39963	2016	Complete I&M Foot Patrol	7/1/17		
		2016	Complete Level 2 I&M	7/1/18		
		2016	Complete Level 3 I&M	7/1/20		
		2016	Cycle Pruning	FY18		
Debalso	68452	2016	Complete Level 2 I&M	10/25/17		
		2016	Complete Level 3 I&M	10/25/19		
		2016	Hazard Tree Removal	FY18		
Turin Rd	65356	2016	Complete Level 3 I&M	10/1/17		
		2016	Cycle Pruning	FY18		
Salisbury	67857	2016	Enhanced Tree Mitigation	FY18		
		2016	Complete Level 3 I&M	9/2/18		
Sherman	33351	2016	Cycle Pruning	FY20		
Chadwicks	66851	2016	Complete Level 3 I&M	11/17/18		
		2016	Cycle Pruning	FY19		
Oneida	50151	2016	Cycle Pruning	FY21		
Turin Rd	65355	2016	Cycle Pruning	FY18		
Stittville	67052	2016	Complete Level 2 I&M	11/16/17		
		2016	Complete Level 3 I&M	11/16/19		

Station	Feeder	Report Year	Action Plan	Projected Compl. Date	Cost	Comments
		2016	Cycle Pruning	FY20		
		2016	Hazard Tree Removal	FY18		
Sherman	33352	2016	Cycle Pruning	FY20		
		2016	Complete Level 3 I&M	11/1/18		
Old Forge	38363	2016	Complete Level 3 I&M	4/28/18		
		2016	Cycle Pruning	FY18		

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Compl. Date	Cost	Comments
Poland	62258	2015	Routine trimming	12/31/2018		
Poland	62258	2015	Monitor reliability around rebuild section			
Poland	62258	2015	Targeted trimming on repeat offending roads with tree interruptions	12/31/2016		
Poland	62258	2015	Complete Level 2 I&M	10/1/2016	\$13,841	
Poland	62258	2015	Complete Level 3 I&M	10/1/2018	\$293,190	
Eagle Bay	38272	2015	Start I&M foot patrol	12/31/2017		
Eagle Bay	38272	2015	Cycle prune	12/31/2017		
Eagle Bay	38272	2015	Comprehensive analysis of 46kV supply in this area	12/31/2016		
Sherman	33351	2015	Complete Level 3 I&M	6/1/2016	\$9,091	
Sherman	33351	2015	Complete hazard tree removal	12/31/2017		
Poland	62257	2015	I&M foot patrol	12/31/2016		
Poland	62257	2015	Routine trimming	12/31/2017		
Old Forge	38362	2015	Complete cycle pruning	12/31/2018		
Old Forge	38362	2015	Comprehensive analysis of 46kV supply in this area	12/31/2016		
Old Forge	38362	2015	Complete I&M foot patrol	12/31/2016		
Sherman	33352	2015	Complete hazardous tree removal	12/31/2017		
Sherman	33352	2015	Complete Level 2 I&M	11/1/2016	\$82,445	
Sherman	33352	2015	Complete Level 3 I&M	11/1/2018	\$194,235	
Eagle Bay	38271	2015	Complete I&M foot patrol	12/31/2017		
Eagle Bay	38271	2015	Cycle pruning	12/31/2018		
Eagle Bay	38271	2015	Comprehensive analysis of 46kV supply in this area	12/31/2016		
Old Forge	38361	2015	Complete I&M foot patrol	12/31/2016		
Old Forge	38361	2015	Complete cycle pruning	12/31/2018		
Old Forge	38361	2015	Comprehensive analysis of 46kV supply in this area	12/31/2016		
Lehigh	66951	2015	Complete Hazard tree mitigation	12/31/2017		
Lehigh	66951	2015	Complete I&M foot patrol	12/31/2017		
Lehigh	66951	2015	Review recloser settings and locations	12/31/2016		
Raquette Lake	39861	2015	Comprehensive analysis of 46kV supply in this area	12/31/2016		
Raquette Lake	39861	2015	Complete Level 2 I&M	10/1/2016	\$561	
Raquette Lake	39861	2015	Complete Level 3 I&M	10/1/2018	\$421	
Rock City	62370	2015	Complete level 3 I&M	5/1/2016	\$10,610	
Yahnundasis	64659	2015	Complete I&M foot patrol	12/31/2017		
Yahnundasis	64659	2015	Complete cycle pruning	12/31/2018		
Lehigh	66954	2015	Perform enhanced hazard tree mitigation	12/31/2016		
Lehigh	66954	2015	Complete level 3 I&M	10/1/2017		
Lehigh	66954	2015	Review recloser locations	12/31/2016		
Old Forge	38364	2015	Comprehensive inspection and maintenance of the 46kV radial supply	12/31/2016		
Old Forge	38364	2015	Complete level 2 I&M	10/1/2016	\$10,264	
Old Forge	38364	2015	Complete level 3 I&M	10/1/2018	\$48,070	
Old Forge	38364	2015	Perform Cycle pruning	12/31/2018		
Old Forge	38364	2015	Complete hazard tree removal	12/31/2016		
Old Forge-Raquette Lake	#22	2015	Hazard Tree Removal	8/1/2016		
Turin Rd	65356	2015	Complete level 3 I&M	10/1/2017	\$324,772	
Turin Rd	65356	2015	Cycle prune	12/31/2017		

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS THAT CAUSED THE BELOW MINIMUM PERFORMANCE.

An unusually large number of substation and sub-transmission outages on the 46kV system in 2016 significantly increased the number of customers interrupted and the customer-hours interrupted 50% of the feeders reported in 2016.

Ten of the 20 worst performing feeders in the Mohawk Valley were impacted by the radial 46kV source and radial line from Boonville. In most cases, the 46kV supply is responsible for nearly 75% of the customers interrupted and 75% of customer-hours interrupted.

In general, most distribution interruptions are 1% or less of the total customers interrupted and customer-hours interrupted for each feeder reported. The small percentage of large distribution interruptions were mitigated by the upstream recloser in 50% the large interruptions reported.

b. PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES

The Company is continuing its efforts to improve reliability in the Mohawk Valley. This includes: transmission and distribution patrols, maintenance programs, line recloser installations, protection coordination studies, lightning protection installations and the tree trimming program.

An extensive rebuild of the 46kV radial feed to these stations will start in FY18 and run through FY22. Alternatives for a second source into Eagle Bay are also being evaluated in order to loop the 46kV in the area.

Boonville station recently had a 115kV cable termination failure between the 115kV bus and the 115:46kV transformer that feeds the area of Old Forge. An alternative overhead bus configuration has been constructed in order to improve reliability and restoration time. Boonville Station is scheduled for a complete rebuild in FY22

H. NORTHEAST REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 2.50)	2.83	3.00	2.10	2.23	2.49	2.04
SAIFI (Target 1.20)	1.21	1.25	1.36	1.28	1.23	1.09
SAIDI	3.41	3.73	2.85	2.85	3.07	2.23
Interruptions	2,414	2,326	2,296	2,360	2,196	2,247
Customers Interrupted	263,757	269,030	293,464	275,938	265,240	234,762
Customer-Hours Interrupted	745,318	805,885	616,217	616,530	659,912	478,853
Customers Served	218,439	216,005	216,347	216,316	215,193	214,602
Customers Per Interruption	109.26	115.66	127.82	116.92	120.78	104.48
Availability Index	99.9612	99.9574	99.9675	99.9675	99.9651	99.9745
Interruptions/1000 Customers	11.05	10.77	10.61	10.91	10.20	10.47

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Northeast Region did not meet its CAIDI reliability target and did not meet its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 1.21 interruptions, 1% above the PSC goal of 1.20 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 2.83 in 2016, 13% above the PSC's regional target of 2.50 hours.

The 2016 CAIDI result was 6% below the 2015 result of 3.00 minutes, and 19% above the previous 5-year average of 2.37 hours. The 2016 SAIFI was 3% below the 2015 result of 1.25 interruptions, and 2% below the previous 5-year average of 1.24 interruptions.

In 2016, excluding major storms, the Northeast Region experienced 17 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (17 of 2,414), 17% of the region's total customers interrupted (CI), (45,485 of 263,757), and 24% (178,034 of 745,317) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 3.91 hours, and a SAIFI of 0.21 interruptions.

The number of transmission-related interruptions increased from 15 in 2015 to 17 in 2016 (an increase of 13%). The number of customers interrupted decreased from 69,837 in 2015, to 45,485 in 2016 (a decrease of 35%), while the customer-hours interrupted decreased from 255,757 in 2015, to 178,034 in 2016 (a decrease of 30%).

In 2016, excluding major storms, the Northeast Region experienced 3 substation interruptions. These interruptions accounted for 0.1% of the region's total interruptions (3 of 2,414), 5% of the region's total customers interrupted, (12,460 of 263,757), and 2% (13,798 of 745,317) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.11 hours, and a SAIFI of 0.06 interruptions.

The number of substation-related interruptions decreased from 4 to 3 from 2015 to 2016 (a decrease of 25%). The number of customers interrupted increased from 10,518 in 2015, to 12,460 in 2016 (an increase of 18%), while the customer-hours interrupted decreased from 18,875 in 2015, to 13,798 in 2016 (a decrease of 27%).

In 2016, excluding major storms, the Northeast Region experienced 2,394 distribution interruptions. These interruptions accounted for 99% of the region's total interruptions (2,394 of 2,414), 78% of the region's total customers interrupted, (205,812 of 263,757), and 74% (553,485 of 745,317) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 2.69 hours, and a SAIFI of 0.94 interruptions.

The number of distribution-related interruptions increased from 2,307 to 2,394 from 2015 to 2016 (an increase of 4%). The number of customers interrupted increased from 188,675 in 2015, to 205,812 in 2016 (an increase of 9%), while the customer-hours interrupted increased from 531,251 in 2015, to 553,485 in 2016 (an increase of 4%).

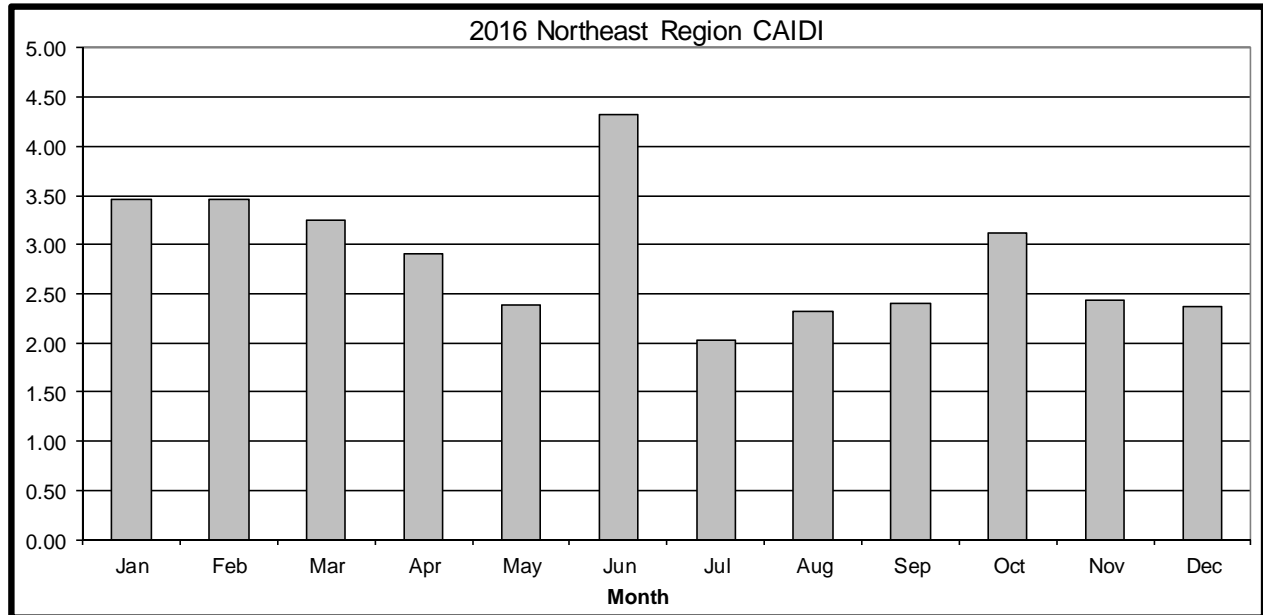
c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and SAIFI for the Northeast Region for 2016.

The CAIDI index in the Northeast Region experienced six months with a CAIDI in excess of the 2.50 target with a peak of 4.33 in June. The remaining six months the CAIDI was below 2.50 but no month was below 2.02 which made it difficult to bring the average back down to the annual goal of 2.50. Overall, the Northeast Region started the year above the CAIDI goal of 2.50 hours and was unable to recover throughout the year finishing 13% above the goal at 2.83 hours.

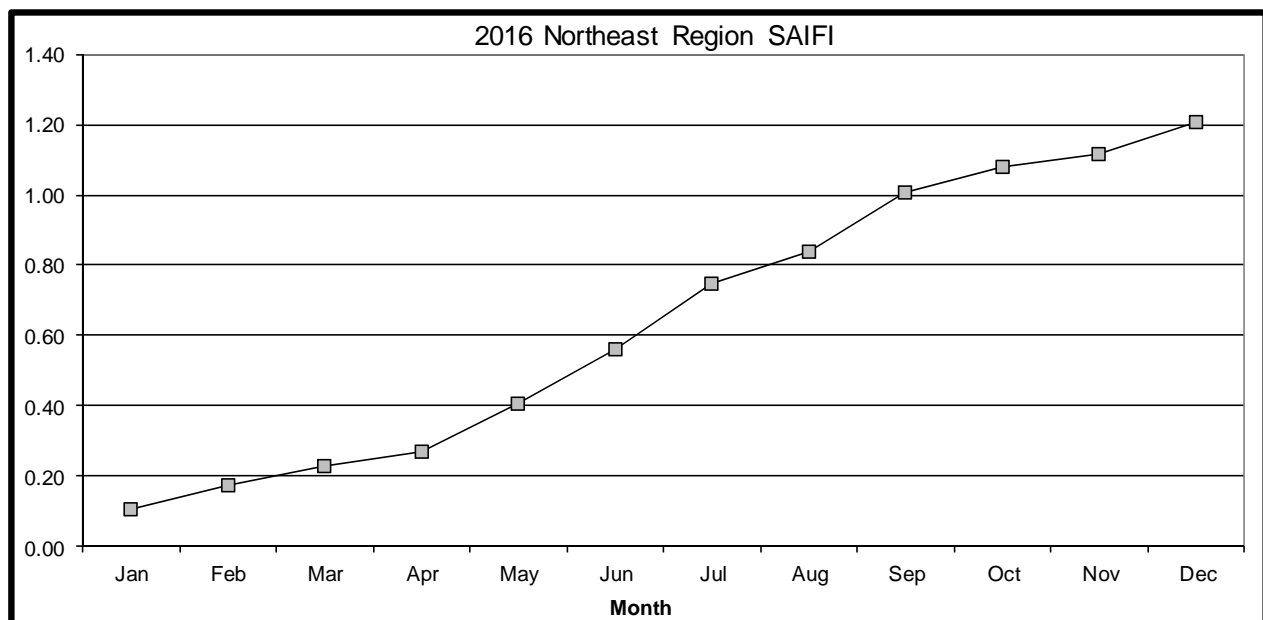
The Northeast Region was above the targeted SAIFI goal of 1.20 after the summer months which were above average. However, a good month of October and November put the SAIFI goal of 1.20 back within reach needing a monthly SAIFI for December of 0.08 to obtain the goal. However, December was slightly above average at 0.09 which pushed the annual SAIFI to just above target at 1.21.

GRAPH OF MONTHLY CAIDI AND SAIFI FOR THE NORTHEAST REGION



PSC CAIDI Goal:	
Minimum	2.50
2016 Actual	2.83

PSC SAIFI Goal:	
Minimum	1.20
2016 Actual	1.21



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

IDS info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	917	0	1,333	564	947	2,722
02 Tree Contacts	984	808	771	840	667	701
03 Overloads	12	13	8	29	25	24
04 Oper. Error	6	8	13	9	17	8
05 Equipment	430	477	453	477	475	575
06 Accidents	397	445	416	320	438	405
07 Prearranged	38	60	68	107	73	66
08 Cust. Equip.	0	0	0	0	0	0
09 Lightning	67	98	138	188	113	130
10 Unknown	480	417	429	390	388	338
Total	3,331	2,326	3,629	2,924	3,143	4,969

2) Customers Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	103,347	0	99,145	69,279	97,601	328,269
02 Tree Contacts	122,616	79,096	73,190	91,208	91,367	66,079
03 Overloads	1,007	1,601	103	1,209	2,212	2,251
04 Oper. Error	292	5,067	6,035	1,027	3,654	2,479
05 Equipment	48,476	89,490	76,678	55,310	73,618	80,742
06 Accidents	53,800	53,734	44,971	42,000	54,283	48,962
07 Prearranged	2,422	21,668	6,327	22,473	12,042	6,200
08 Cust. Equip.	0	0	0	0	0	0
09 Lightning	10,816	2,626	17,806	20,088	6,244	4,616
10 Unknown	24,328	15,748	68,354	42,623	21,820	23,433
Total	367,104	269,030	392,609	345,217	362,841	563,031

3) Customer-Hours Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	576,910	0	772,816	334,841	718,661	4,682,474
02 Tree Contacts	374,189	276,325	229,044	282,025	248,520	167,679
03 Overloads	3,633	1,272	261	2,346	4,943	2,307
04 Oper. Error	741	3,061	2,973	326	5,057	9,885
05 Equipment	135,239	308,977	193,245	131,862	128,563	151,502
06 Accidents	111,538	149,889	82,782	85,975	174,615	89,912
07 Prearranged	2,708	11,227	7,052	11,328	20,802	6,314
08 Cust. Equip.	0	0	0	0	0	0
09 Lightning	73,058	7,712	39,370	42,415	18,243	13,919
10 Unknown	44,213	47,418	61,492	60,254	59,167	37,335
Total	1,322,228	805,881	1,389,035	951,370	1,378,572	5,161,326

4) Interruptions, Customers Interrupted and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer Hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	917	27.5%	103,347	28.2%	576,910	43.6%
02 Tree Contacts	984	29.5%	122,616	33.4%	374,189	28.3%
03 Overloads	12	0.4%	1,007	0.3%	3,633	0.3%
04 Oper. Error	6	0.2%	292	0.1%	741	0.1%
05 Equipment	430	12.9%	48,476	13.2%	135,239	10.2%
06 Accidents	397	11.9%	53,800	14.7%	111,538	8.4%
07 Prearranged	38	1.1%	2,422	0.7%	2,708	0.2%
08 Cust. Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	67	2.0%	10,816	2.9%	73,058	5.5%
10 Unknown	480	14.4%	24,328	6.6%	44,213	3.3%
Total	3,331	100.0%	367,104	100.0%	1,322,228	100.0%

e. INTERRUPTION REVIEW BY PSC CAUSE CODES

Cause Code 01 - Major Storms

The Northeast Region experienced five severe weather conditions in 2016 that qualified as Major Storms.

In 2016, Major Storms accounted for 28% of interruptions, 28% of customers interrupted, and 44% of Customer-Hours Interrupted.

Interruptions due to Major Storm were - from 2015, and down 18% over the 5 year average. Customers interrupted due to Major Storms were - from 2015, and down 13% over the 5 year average. Customer-Hours interrupted were - from 2015 and down 56% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 41% of interruptions, 46% of customers interrupted, and 50% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 22% from 2015, and up 30% over the 5 year average. Customers interrupted due to Tree Contacts were up 55% from 2015, and up 53% over the 5 year average. Customer-Hours interrupted were up 35% from 2015 and up 55% over the 5 year average.

Tree Contacts were the largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 0% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were down 8% from 2015, and down 40% over the 5 year average. Customers interrupted due to Overloads were down 37% from 2015, and down 32% over the 5 year average. Customer-Hours interrupted were up 186% from 2015 and up 63% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 0% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Operator Error were down 25% from 2015, and down 45% over the 5 year average. Customers interrupted due to Operator Error were down 94% from 2015, and down 92% over the 5 year average. Customer-Hours interrupted were down 76% from 2015 and down 83% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 18% of interruptions, 18% of customers interrupted, and 18% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were down 10% from 2015, and down 12% over the 5 year average. Customers interrupted due to Equipment Failure were down 46% from 2015, and down 36% over the 5 year average. Customer-Hours interrupted were down 56% from 2015 and down 26% over the 5 year average.

Equipment Failures were the 3rd largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 16% of interruptions, 20% of customers interrupted, and 15% of Customer-Hours Interrupted.

Interruptions due to Accidents were down 11% from 2015, and down 2% over the 5 year average. Customers interrupted due to Accidents were up 0% from 2015, and up 10% over the 5 year average. Customer-Hours interrupted were down 26% from 2015 and down 4% over the 5 year average.

Accidents were the 4th largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 2% of interruptions, 1% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Prearranged were down 37% from 2015, and down 49% over the 5 year average. Customers interrupted due to Prearranged were down 89% from 2015, and down 82% over the 5 year average. Customer-Hours interrupted were down 76% from 2015 and down 76% over the 5 year average.

Prearranged was the 6th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 3% of interruptions, 4% of customers interrupted, and 10% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 32% from 2015, and down 50% over the 5 year average. Customers interrupted due to Lightning were up 312% from 2015, and up 5% over the 5 year average. Customer-Hours interrupted were up 847% from 2015 and up 200% over the 5 year average.

Lightning was the 5th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 20% of interruptions, 9% of customers interrupted, and 6% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 15% from 2015, and up 22% over the 5 year average. Customers interrupted due to Unknown causes were up 54% from 2015, and down 29% over the 5 year average. Customer-Hours interrupted were down 7% from 2015 and down 17% over the 5 year average.

Unknown causes were the 2nd largest cause of interruptions in 2016.

f. **DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2016/17 SPENDS**

The Company continues to work on capital projects in the Northeast Region to maintain customer satisfaction and future reliability. Engineering works with Operations to address localized concerns raised through PSC complaints and other customer inquiries in the Northeast Region. These solutions were varied and included fusing, adding tree wire, small rebuilds, adding animal guards and tree trimming.

Some of the specific projects that were either constructed in CY2016 or are scheduled to be designed and/or constructed in CY2017 are listed below.

Construct New Queensbury 29551 Feeder

A multi-year project to rebuild the Queensbury substation was completed in 2016 which provided a significant amount of additional distribution capacity by replacing the two old 22.4 MVA, 115/13.2 kV transformers with a pair of new 40 MVA, 115/13.2 kV transformers. In order to tap into that additional capacity and help relieve the load on surrounding distribution feeders, a project was constructed in 2016. This project consisted of a rebuild of Woodvale Road and Glenwood Avenue between the Queensbury substation and Bay Road in order to double circuit build a new express feed. This circuit was built with 477 MCM AL conductor in the top position to create a new distribution feeder, the Queensbury 29551. Construction was completed in 2016 and the new feeder was placed in service in February of 2017.

Delanson 51 – Route 7 Rebuild/Conversion

The Tennessee Gas compressor station on Westfall Road is served at 13.2 kV on the 13.2 kV Delanson 26951 feeder. However, there was a nearly 2 mile section of State Highway 7 between the Delanson substation and Westfall Road that was 4.8 kV with a 1,000 kVA, 13.2/4.8 kV step down ratio on State Highway 7 and a 750 kVA 4.8/13.2 kV step up ratio on Sheldon Road. According to a recloser on the source side of the 1,000 kVA ratio transformer, the load on this ratio was nearing capacity and Tennessee Gas was looking to increase their load. This project rebuilt approximately 2 miles of distribution on State Highway 7 between pole 130 and 179 with 336.4 MCM AL phase conductor and 1/0 neutral conductor, installed a 1,500 kVA, 3 phase 13.2/4.8 kV step down ratio transformer in the vicinity of pole 179 on State Highway 7 and a single phase, 167 kV, 7.62/4.8 kV step down ratio on Sheldon Road north of State Highway 7. Additionally, the 3 phase ratio transformers on pole 130 on State Highway 7 and pole 1 on Sheldon Road were removed and this section of the distribution was converted to 13.2 kV. This project was completed in June of 2016.

Hudson Falls 08851 – Convert Broadway to 13.2 kV

The distribution to the south of the Hudson Falls substation was 4.8 kV through a 1,500 kVA, 13.2/4.8 kV step down ratio transformer located directly outside the substation. The ratio transformer was overloaded in the summer of 2015 and with a new supermarket locating downstream of the ratio transformer conversion of the distribution to 13.2 kV became more important. This project rebuilt the 3-phase mainline on Lower Allen Street, Park Avenue, and Broadway as necessary, to convert to 13.2 kV operation. This project was completed in July of 2016.

Port Henry 52 – Moriah Road Rebuild/Conversion

The Lakeview Avenue tap is the largest single phase tap on the Port Henry 38852. It is a 4.8 kV, single phase tap which is in excess of 14 miles in length, has 181 customers on it, and over 1.8 MVA of connected load. Less than 1.5 miles from the beginning of this tap there is a 3,000 foot section of rear lot with limited access which is heavily treed and crosses a ravine. This project will provide the 180 customers downstream of this rear lot section to be served from a different direction isolating them from any problems which may occur in the rear lot. In addition, the load on the 3 phase, 13.2/4.8 kV step down ratio transformer serving this single phase tap is out of balance due to the load of this tap and is approaching the capacity of the transformer. This project will rebuild and convert Moriah Road to 7.62 kV from the ratio at pole 110 to Henry Allen Road, rebuild and convert Edgemont Rd. from Moriah Road to Fisk Rd., close a distribution gap on Edgemont Rd. east of Lakeview Ave. between poles 10 and 13 and remove rear lot distribution between poles 2 and 5 on Lakeview Ave. and poles 3 & 7 on Harry Allen Rd. Construction is scheduled to begin on this project in the spring of 2017.

Brook Road 36955 – Coy Road Rebuild/Conversion

The Belle Estates URD is being built on Humes Road in the Town of Greenfield off of Coy Road. Coy Road is single phase 4.16 kV ungrounded wye through a 500 kVA ratio transformer on Sand Hill Road that is already loaded to approximately 105% of capacity. The new URD will add an additional 100 kVA of load pushing the load on the ratio transformer to approximately 125% of capacity. This project will construct approximately 2,600 feet of new 7.62 kV distribution on Coy Road, convert about 1,900 feet of existing 4.16 kV distribution on Coy Road to 7.62 kV and remove about 4,440 feet of rear lot distribution adjacent to Coy Road. This project was originally expected to be completed before the end of 2016, however, there has been some difficulty in obtaining the necessary easements which has delayed construction of the project to at least the middle of 2017.

Northeast Region Capital Projects in Excess of \$1M Completed in 2016:

Region	Project Name	Project Type	Fin Sys Proj No.	Finish Date	Total Spend
Northeast	Whitehall 51 Conversion.	D Line	CD00831	02/19/2016	\$1,477,673

g. DISCUSSION OF REGIONAL PERFORMANCE OF LVAC NETWORK DISTRIBUTION SYSTEM(S)

Glens Falls LVAC Network

The Glens Falls Secondary Network serves the area of Glen Street between Mohican and Glen Streets. This network is supplied by 4 – 4.160 KV feeders from the Glens Falls and Henry Street Substations. This system serves approximately 290 customer accounts and experienced an estimated / simulated peak load of approximately 2.38 MVA in 2016.

The table below lists each distribution circuit serving the Glens Falls Secondary Network with the number of events that caused an operation of the Substation Breaker.

Substation	Feeder	# Breaker Operations from Faults / Failures
Glens Falls	07505	0
Glens Falls	07507	0
Henry Street	31638	0
Henry Street	31639	0

As shown above the Glens Falls Secondary Network experienced no unplanned distribution circuit outages in 2016.

Equipment maintenance in 2016 consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

2. OPERATING CIRCUIT LISTS

This section includes the following three tables and worst performing feeder analysis for the Northeast Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI & SAIFI Indices
- c. Worst Performing Circuits by # of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

NORTHEAST REGION

FEEDER #	A CUST. SERVED	B TOTAL INTER.	C # CUST. INTER.	D CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
GILMANTOWN ROAD 15451	2,001	35	13,899	63,965	6.95	31.97	4.60	2
CHESTERTOWN 04252	2,225	53	8,566	18,615	3.85	8.37	2.17	0
HAGUE ROAD 41853	2,130	29	6,567	22,918	3.08	10.76	3.49	1
NORTHVILLE 33252	2,356	47	5,444	33,264	2.31	14.12	6.11	1
FORT GAGE 31954	1,844	19	7,234	27,536	3.92	14.93	3.81	2
SCHROON LAKE 42951	2,209	42	8,528	10,832	3.86	4.90	1.27	0
NORTHVILLE 33251	1,624	18	5,811	30,864	3.58	19.00	5.31	0
UNION STREET 37654	593	20	2,530	7,058	4.27	11.9	2.79	0
BROOK ROAD 36954	2,027	23	5,864	13,325	2.89	6.57	2.27	6
SCOFIELD ROAD 45053	1,390	31	3,541	8,945	2.55	6.44	2.53	1
WELLS 20881	847	15	2,917	20,401	3.44	24.09	6.99	5
BOLTON 28451	2,097	29	4,616	12,617	2.20	6.02	2.73	3
POTTERSVILLE 42451	1,070	19	3,836	8,399	3.59	7.85	2.19	0
WHITEHALL 18751	1,742	24	5,238	9,245	3.01	5.31	1.77	1
INDIAN LAKE 31075	759	20	2,343	5,950	3.09	7.84	2.54	6
INDIAN LAKE 31076	716	28	1,444	6,686	2.02	9.34	4.63	3
BROOK ROAD 36955	3,175	58	5,355	15,531	1.69	4.89	2.90	0
RIPARIUS 29395	448	14	1,962	7,316	4.38	16.33	3.73	0
UNION STREET 37652	913	18	3,224	5,882	3.53	6.44	1.82	1
WILTON 32952	1,524	14	5,073	11,118	3.33	7.30	2.19	3

Regional Goals:
CAIDI Min. 2.50
SAIFI Min. 1.20

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES

NORTHEAST REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
GILMANTOWN ROAD 15451	4.60	4.25	3.08	2.14	6.95	8.44	2.18	3.60
CHESTERTOWN 04252	2.17	2.11	2.31	2.03	3.85	1.13	4.83	2.21
HAGUE ROAD 41853	3.49	3.48	1.39	3.20	3.08	1.80	3.10	0.13
NORTHVILLE 33252	6.11	3.07	2.12	1.95	2.31	0.39	0.64	1.89
FORT GAGE 31954	3.81	2.48	2.60	2.00	3.92	2.31	3.63	3.77
SCHROON LAKE 42951	1.27	4.11	1.81	3.22	3.86	2.53	4.15	4.32
NORTHVILLE 33251	5.31	1.73	1.26	2.84	3.58	0.25	1.26	0.48
UNION STREET 37654	2.79	3.15	3.32	3.94	4.27	1.29	2.56	3.84
BROOK ROAD 36954	2.27	2.49	1.43	1.55	2.89	1.35	0.34	2.23
SCOFIELD ROAD 45053	2.53	2.88	8.96	3.06	2.55	1.62	0.38	0.69
WELLS 20881	6.99	4.07	4.46	2.96	3.44	6.73	1.09	0.15
BOLTON 28451	2.73	2.07	2.50	1.45	2.20	2.79	0.92	4.09
POTTERSVILLE 42451	2.19	4.69	1.78	2.79	3.59	2.46	4.75	3.31
WHITEHALL 18751	1.77	2.79	1.48	4.66	3.01	0.76	1.32	0.30
INDIAN LAKE 31075	2.54	5.78	4.76	8.98	3.09	1.19	0.86	1.85
INDIAN LAKE 31076	4.63	5.21	5.80	9.49	2.02	1.77	0.51	1.40
BROOK ROAD 36955	2.90	3.53	3.92	2.22	1.69	2.33	0.19	3.41
RIPARIUS 29395	3.73	3.47	3.21	5.22	4.38	1.53	1.89	2.72
UNION STREET 37652	1.82	2.30	2.34	2.17	3.53	0.86	3.43	3.60
WILTON 32952	2.19	4.50	N/A	N/A	3.33	2.18	N/A	N/A

Regional Goals:
CAIDI Min. 2.50
SAIFI Min. 1.20

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

NORTHEAST REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

For 2016, the Company is reporting on the 20 Worst Performing Feeders in the Northeast Region. This year, the Northeast Region's list of Worst Performing Feeders consists of sixteen 13.2 kV feeders and four 4.8 kV feeder.

For the Northeast Region, the PSC minimum CAIDI is 2.50 hours and the PSC minimum SAIFI is 1.20 interruptions.

1. GILMANTOWN ROAD 15451 – 13.2 kV

Profile: 2,001 Customers, 78.6 Circuit Miles
Indices: CAIDI = 4.60, SAIFI = 6.95

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	26	74.29%	9,241	66.49%	30,424	47.56%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	3	8.57%	2,400	17.27%	12,776	19.97%
6	ACCIDENTS	4	11.43%	170	1.22%	477	0.75%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	2.86%	2,013	14.48%	20,164	31.52%
10	UNKNOWN	1	2.86%	75	0.54%	125	0.20%
Totals		35	100.00%	13,899	100.00%	63,965	100.00%

Problem Analysis:

- There were five transmission interruptions that affected the Gilmantown Road 15451 in 2016 that accounted for 72% of the total amount of customers interrupted (10,063 of 13,899) and 86% of the total customer-hours (55,162 of 63,965).
 - The first interruption occurred on May 25th when the Northville Substation locked out due to a broken insulator at pole 209 on the Northville-Wells #1, 23kV transmission line. This interruption accounted for 14% of the total amount of customers interrupted (2,003 of 13,899) and 20% of the total customer-hours interrupted (12,719 of 63,965).
 - The second interruption occurred on June 21st when the Northville-Mayfield #8, 69kV transmission line locked out. This was due to a broken insulator and cross arm at pole 137 and a broken insulator at pole 132 on the #8 line. This interruption accounted for 14% of the total amount of customers interrupted (2,013 of 13,899) and 32% of the total customer-hours interrupted (20,164 of 63,965).
 - The third interruption occurred on August 1st when a tree fell on the Gilmantown-Wells #2, 23kV transmission line. The R220 on the #2 line sectionalized the line, preventing Charley Lake, Wells, and the Algonquin Hydro from seeing a sustained outage. The interruption accounted for 15% of the total amount of customers interrupted (2,018 of 13,899) and 2% of the total customer-hours interrupted (1,547 of 63,965).

- The fourth interruption occurred on September 16 when the Mayfield Substation locked out due to a tree falling on the Northville-Mayfield #8, 69kV transmission line. This resulted in all substations north of the Mayfield Substation being de-energized. This interruption accounted for 15% of the total amount of customer interrupted (2,021 of 12,934) and 20% of the total customer-hours interrupted (12,934 of 63,965).
- The fifth interruption occurred on December 18th when a tree fell on the Gilmantown-Wells #2, 23kV transmission line. The R220 on the #2 line sectionalized the line, preventing Charley Lake, Wells, and the Algonquin Hydro from seeing a sustained outage. The interruption accounted for 14% of the total amount of customers interrupted (2,008 of 13,899) and 12% of the total customer-hours interrupted (7,798 of 63,965).
- There were two other interruptions on the Gilmantown Road 15451 in 2016 that involved 3-phase mainline facilities, but not associated with the station breaker, which affected one hundred or more customers. The isolating devices for these interruptions were both pole top reclosers. These interruptions accounted for 14% of the total amount of customers interrupted (2,000 of 13,889) and 9% of the total amount of customer-hours interrupted (5,592 of 63,965).
 - The first interruption occurred on April 19th as a result of tree conditions. A tree took primary conductor down at pole 128, causing the pole top recloser at pole 120 State Highway 8 to lockout. Crews repaired the conductor and closed the recloser back in, restoring power to all the customers. This interruption accounted for 7% of the total amount of customers interrupted (995 of 13,889) and 6% of the total amount of customer-hours interrupted (3,632 of 63,964).
 - The second interruption occurred on June 12th as a result of tree conditions. A tree fell at pole 123 State Highway 8, causing the pole top recloser at pole 120 State Highway 8 to lockout. Crews repaired the conductor and closed the recloser back in, restoring power to all the customers. This interruption accounted for 7% of the total amount of customers interrupted (1,005 of 13,889) and 3% of the total amount of customer-hours interrupted (1,960 of 63,965).
- The 30 interruptions on the Gilmantown Road 15451 attributed to the distribution system interrupted 3,836 customers (28%) and accounted for 8,803 customer-hours interrupted (14%) for a distribution SAIFI of 1.92 and CAIDI of 2.29.
- Trees were the largest cause of customers interrupted on the Gilmantown Road 15451 in 2016, interrupting service to 9,241 customers (66%) and accounting for 30,424 customer-hours interrupted (48%).
- Equipment failure was the second largest cause of customers interrupted on the Gilmantown Road 15451 in 2016, interrupting service to 2,400 customers (17%) and accounting for 12,776 customer-hours interrupted (20%).
- Eighteen of the thirty-five interruptions (51%) experienced on the Gilmantown Road 15451 in 2016 affected ten or fewer customers.

Actions Taken:

- Following a detailed investigation into the cause of the multiple outages on the 23 kV sub-transmission lines that feed Gilmantown, Road, Wells & Charley Lake Substations, a large capital improvement project was completed in October 2015 to replace 198 of the horizontal post insulators on 66 light angle structures on the Northville–Wells #1 and Wells–Gilmantown #2, 23 kV sub-transmission lines.
- Seven pole top reclosers were installed on the Gilmantown Road 15451. The reclosers have proven to be beneficial to the reliability of the feeder, as two of the 3-phase mainline interruptions were isolated by a recloser instead of affecting the entire feeder. These reclosers have minimized customers interrupted and customer hours interrupted over the past year for the Gilmantown Road 15451.
- A 23 kV sectionalizer was placed in service on the Wells-Gilmantown #2, 23 kV transmission line just outside of Wells Substation.
- A maintenance foot patrol of the Wells–Gilmantown #2, 23kV sub-transmission line was conducted in 2015 and all maintenance has been completed.
- A maintenance foot patrol of the Northville–Mayfield #8, 69kV sub-transmission line was conducted in 2013 and all maintenance has been completed.
- A maintenance foot patrol was performed on the Gilmantown Road 15451 in 2013 and all maintenance has been completed.
- Tree trimming was performed on the Northville-Mayfield #8, 69kV transmission line in FY2016
- Tree trimming and a hazard tree review which removed 386 danger trees was completed on the Gilmantown Road 15451 in FY2015.

Action Plan:

- The existing Cooper Type VWE 3-phase recloser with Form 4C control will be replaced on pole 147 County Highway 11 with a radial G&W recloser with integrated potential transformers and Schweitzer SEL-651R control. These will allow remote control of the recloser and remote access to recloser data.
- The existing Cooper Type VWE 3-phase recloser with Form 4C control will be replaced on pole 204 State Route 8 with a radial G&W recloser with integrated potential transformers and Schweitzer SEL-651R control. These will allow remote control of the recloser and remote access to recloser data.
- A project to continue replacing all 1995 era Lapp insulators on the Northville-Wells #1 and the Wells-Gilmantown #2, 23kV transmission lines is scheduled to begin construction in 2018. These insulators have been substantially cracking in the first skirt from the steel connection, ultimately leading to its failure. Approximately 436 Lapp insulators have been identified.
- The Northville-Mayfield #8, 69kV transmission line is inspected aurally once a year to look for mid-cycle danger trees.

2. CHESTERTOWN 04252 – 13.2 kV

Profile: 2,225 Customers, 121.2 Circuit Miles
Indices: CAIDI = 2.17, SAIFI = 3.85

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	38	71.70%	4,801	56.05%	15,882	85.32%
3	OVERLOADS	1	1.89%	4	0.05%	11	0.06%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	8	15.09%	1,256	14.66%	2,143	11.51%
6	ACCIDENTS	3	5.66%	241	2.81%	304	1.63%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	5.66%	2,264	26.43%	274	1.47%
Totals		53	100.00%	8,566	100.00%	18,615	100.00%

Problem Analysis:

- While trees were the number one cause of interruptions on the Chestertown 04252 in 2016, accounting for 38 of the 53 interruptions (72%), the largest tree-related interruption in terms of customers interrupted was actually the result of a tree on the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line. This interruption impacted all 2,225 customers (26%) and accounted for 2,994 customer-hours interrupted (16%).
- There was a second interruption on the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line in 2016, this one of unknown cause. This interruption impacted 2,239 customers (26%) but was only 6 minutes in duration accounting for only 224 customer-hours of interruption.
- These two transmission-related interruptions combined accounted for only 4% of the interruptions on the Chestertown 04252 in 2016, but they interrupted 4,464 customers (52%) and accounted for 3,218 customer-hours of interruption (17%).
- The 51 interruptions on the Chestertown 04252 in 2016 attributed to the distribution system interrupted 4,102 customers (48%) and accounted for 15,396 customer-hours interrupted (83%) for a distribution SAIFI of 1.84 and CAIDI of 3.75.
- The largest tree-related interruption on the Chestertown 04252 in 2016 in terms of customer-hours of interruption occurred when a tree fell breaking a pole on State Highway 8 causing a distribution line recloser to lock out interrupting 1,149 customers (13%) and accounting for 7,047 customer-hours interrupted (38%).
- The two sub-transmission interruptions when combined with the largest distribution related interruption listed above accounted for only 6% of the interruptions experienced on the Chestertown 04252 in 2016, but they affected 5,613 customers (66%) and accounted for 10,265 customer-hours interrupted (55%).
- Twenty-five of the 53 interruptions on the Chestertown 04252 in 2016 (47%) affected ten customers or less, and 13 of those affected only one customer.

Actions Taken:

- There are five 3-phase reclosers and three single-phase reclosers on the Chestertown 04252 which were installed between 1999 and 2011.
- An I&M foot patrol was performed on the Chestertown 04252 in 2012 and all identified maintenance has been completed.
- An Engineering Reliability Review (ERR) was performed on the Chestertown 04252 in 2008 and the recommended fuse changes were completed in 2009 at a cost of \$255,568.
- A capital project was completed in 2010 at a cost of \$1,335,489 to rebuild and convert to 13.2 kV County Highway 64 between State Highway 8 and U.S. Route 9 to create a 3-phase feeder tie between the Chestertown 04252 and the Pottersville 42451 which was subsequently automated through the installation of loop scheme reclosers.
- A capital project was completed in 2012 to rebuild Palisades Road along the road and convert it to 13.2 kV at a cost of \$752,485.
- A single-phase tie was constructed in 2013 from County Highway 64 to County Highway 55 across Short Street at a cost of \$56,656.
- Tree trimming and a hazard tree review which removed 1,082 danger trees was completed on the Chestertown 04252 in FY2015.
- An I&M foot patrol of the Warrensburg-Chestertown #6, and Chestertown–North Creek #2, 34.5 kV sub-transmission lines was completed in 2016.
- The Warrensburg–Chestertown #6, 34.5 kV sub-transmission line was widened in 2011 at a cost of about \$850,000.

Action Plan:

- An I&M foot patrol of the Chestertown 04252 is scheduled for 2017.
- Minor Storm Hardening is scheduled to be performed on the Chestertown 04252 in FY2018 by rebuilding approximately 2.5 miles of 4.8 kV single-phase distribution along Palisades Road with new 7.62 kV single-phase distribution.
- Complete all identified maintenance on the Warrensburg-Chestertown #6, 34.5 kV and Chestertown–North Creek #2, 34.5 kV sub-transmission lines.
- Integrated Vegetation Management is scheduled on the Warrensburg–Chestertown #6, 34.5 kV sub-transmission line in FY2018.
- Integrated Vegetation Management is scheduled on the Chestertown–North Creek #2, 34.5 kV sub-transmission line in FY2018.

3. HAGUE ROAD 41853 - 13.2 kV

Profile: 2,130 Customers, 75.4 Circuit Miles
Indices: CAIDI = 3.49, SAIFI = 3.08

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	16	55.17%	6,161	93.82%	22,213	96.92%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	17.24%	15	0.23%	66	0.29%
6	ACCIDENTS	6	20.69%	358	5.45%	584	2.55%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	6.90%	33	0.50%	55	0.24%
Totals		29	100.00%	6,567	100.00%	22,918	100.00%

Problem Analysis:

- Trees were the number one cause of interruptions on the Hague Road 41853 in 2016, accounting for 55% of the interruptions, 94% of the customer interrupted and 97% of the customer-hours of interruption.
- The largest interruption in terms of customers interrupted on the Hague Road 41853 in 2016 occurred when a tree fell on the three phase primary near the Hague Road substation causing the station breaker to lock out interrupting all 2,138 customers (33%) for less than an hour accounting for 1,924 customer-hours interrupted (8%).
- The largest interruption in terms of customer-hours of interruption on the Hague Road 41853 in 2016 occurred during a winter snow storm when heavy, wet snow brought down multiple trees along State Highway 9N interrupting 1,160 customers (18%) and accounting for 13,995 customer-hours interrupted (61%).
- There were 3 additional tree related interruptions on the Hague Road 41853 in 2016 which interrupted just fewer than 1,000 customers and accounted for over 1,000 customer-hours of interruption each. Each interruption causing the same line recloser on State Highway 9N to either open or need to be opened to make repairs. These three tree related events combined impacted 2,682 customers (41%) and accounted for 5,794 customer-hours interrupted (25%).
- These five large tree interruptions listed above when combined accounted for only 17% of the interruptions experienced on the Hague Road 41853 in 2016, but they affected 5,980 customers (91%) and accounted for 21,713 customer-hours interrupted (95%).
- Eighteen of the 29 interruptions (62%) experienced on the Hague Road 41853 in 2016 affected ten or fewer customers and nine of those affected only one or two customers.

Actions Taken:

- There are four 3-phase reclosers and one single-phase recloser on the Hague Road 41853. Three 3-phase reclosers were installed in the early to mid-1990's (one of which was replaced in 2007) and all were brought up to current National Grid standards in 2010. The fourth 3-phase recloser was installed in 2014, while the single phase recloser was installed in 2008.
- An I&M foot patrol of the Hague Road 41853 was conducted in 2013 and all maintenance has been completed.
- Tree trimming and a hazard tree review which removed 50 danger trees was completed on the Hague Road 41853 in FY2014.
- A Minor Storm Hardening project was completed in 2014 at a cost of \$959,928 to rebuild and convert about 7,000 feet of Baldwin Road to 13.2 kV and install a new line recloser to protect the tap.
- An I&M foot patrol of the Ticonderoga-Republic #2, 115 kV transmission line was completed in 2013 and all identified maintenance has been completed.
- An I&M foot patrol of the Ticonderoga-Whitehall #3, 115 kV transmission line was completed in 2015 and all identified maintenance has been completed.
- Integrated Vegetation Management was completed on the Ticonderoga-Republic #2, 115 kV transmission line in FY2014.

Action Plan:

- An I&M foot patrol of the Hague Road 41853 is scheduled for 2018.
- Tree trimming and a hazard tree review are scheduled to be performed on the Hague Road 41853 in FY2019.
- A small capital improvement project is scheduled for FY2018 to convert Lord Howe Street to 7.62 kV.
- A capital improvement project is budgeted for FY2021 to replace the submarine cable which traverses Lake George at Friends Point.
- A capital improvement project is budgeted for FY2021 to convert the east side of Lake George to 13.2 kV to create a feeder tie to the Hague Road 41852.
- Integrated Vegetation Management is scheduled on the Ticonderoga-Whitehall #3, 115 kV transmission line in FY2018.

4. NORTHVILLE 33252 – 13.2 kV

Profile: 2,356 Customers, 94.5 Circuit Miles
Indices: CAIDI = 6.11, SAIFI = 2.31

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	23	48.94%	3,235	59.42%	15,340	46.12%
3	OVERLOADS	0	0.00%		0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	21.28%	361	6.63%	165	0.50%
6	ACCIDENTS	3	6.38%	55	1.01%	104	0.31%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	4.26%	1,734	31.85%	17,328	52.09%
10	UNKNOWN	9	19.15%	59	1.08%	327	0.98%
Totals		47	100.00%	5,444	100.00%	33,264	100.00%

Problem Analysis:

- There were two transmission interruptions that affected the Northville 33252 in 2016 that accounted for 64% of the total amount of customers interrupted (3,468 of 5,444) and 86% of the total customer-hours (28,445 of 33,264).
 - The first interruption occurred on June 21st when the Northville-Mayfield #8, 69kV transmission line locked out. This was due to a broken insulator and cross arm at pole 137 and a broken insulator at pole 132 on the #8 line. This interruption accounted for 32% of the total amount of customers interrupted (1,728 of 5,444) and 52% of the total customer-hours interrupted (17,309 of 33,264).
 - The second interruption occurred on September 16th when the Mayfield Substation locked out due to a tree falling on the Northville-Mayfield #8, 69kV transmission line. This resulted in all substations north of the Mayfield Substation being de-energized. This interruption accounted for 32% of the total amount of customers interrupted (1,740 of 5,444) and 33% of the total customer-hours interrupted (11,136 of 33,264).
- There was one interruption on the Northville 33252 that involved 3-phase mainline, but which was not associated with the circuit breaker. This occurred July 17th when trees fell across phases at pole 2 on Route 113. Recloser 95486 at pole 1 ½ on Main Street locked open, and the loop scheme recloser at 200 ½ Shore Rd that ties the Northville 33252 with the EJ West 03851 feeder closed to pick up approximately 1,786 customers. Crews removed the trees and brought the feeder back to its normal configuration. This interruption accounted for 18% of the total amount of customers interrupted (988 of 5,444) and 7% of the total customer-hours interrupted (2,256 of 33,264).

- The 45 interruptions on the Northville 33252 attributed to the distribution system interrupted 1,976 customers (36%) and accounted for 4,819 customer-hours interrupted (14%) for a distribution SAIFI of 0.84 and CAIDI of 2.44.
- Trees were the largest cause of interruptions on the Northville 33252 in 2016, interrupting service to 3,235 customers (59%) and accounting for 15,340 customer-hours interrupted (46%).
- Lightning was the second largest cause of interruptions on the Northville 33252 in 2016, interrupting service to 1,734 customers (32%) and accounting for 17,328 customer-hours interrupted (52%).
- Twenty-eight of the forty-seven interruptions (53%) experienced on the Northville 33252 in 2016 affected ten or fewer customers.

Actions Taken:

- Following a detailed investigation into the cause of the multiple outages on the 23 kV sub-transmission lines that feed Gilmantown, Wells & Charley Lake Substations, a large capital improvement project was completed in October 2015 to replace 198 of the horizontal post insulators on 66 light angle structures on the Northville–Wells #1 and Wells–Gilmantown #2, 23 kV sub-transmission lines.
- An I&M foot patrol of the Northville-Mayfield #8, 69kV transmission line was completed in 2013.
- An I&M foot patrol of the Northville 33252 was completed in 2016 and all identified level 1 maintenance has been completed.
- Tree trimming was performed on the Northville-Mayfield #8, 69kV transmission line in FY2016

Action Plan:

- Complete all identified maintenance on the Northville 33252.
- Tree trimming is scheduled to be performed on the Northville 33252 in FY2018.
- A project to continue replacing all 1995 era Lapp insulators on the Northville-Wells #1 and the Wells-Gilmantown #2, 23kV transmission lines is scheduled to begin construction in 2018. These insulators have been substantially cracking in the first skirt from the steel connection, ultimately leading to its failure. Approximately 436 Lapp insulators have been identified.
- The Northville-Mayfield #8, 69kV transmission line is inspected aurally once a year to look for mid-cycle danger trees.

5. FORT GAGE 31954 – 13.2 kV

Profile: 1,844 Customers, 47.0 Circuit Miles
Indices: CAIDI = 3.81, SAIFI = 3.92

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	31.58%	1,724	23.83%	4,643	16.86%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	21.05%	2,521	34.85%	14,944	54.27%
6	ACCIDENTS	3	15.79%	66	0.91%	119	0.43%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	6	31.58%	2,923	40.41%	7,829	28.43%
Totals		19	100.00%	7,234	100.00%	27,536	100.00%

Problem Analysis:

- Trees were tied with unknowns as the number one cause of interruptions on the Fort Gage 31954 in 2016, accounting for 6 of the 19 interruptions (32%). The largest tree-related interruption caused a 3 phase line recloser to lock out impacting 1,588 customers (22%) and accounting for 2,832 customer-hours interrupted (10%). The second largest tree related interruption on the Fort Gage 31954 in 2016 only impacted 112 customers (2%), however, the tree broke a pole in a remote area requiring over 16 hours to replace accounting for 1,609 customer-hours of interruption (6%).
- There were also 6 interruptions of unknown origin on the Fort Gage 31954 in 2016. Two of those interruptions caused line reclosers to lock out (a different line recloser for each event) impacting a combined 2,847 customers (39%) and accounting for a combined 7,636 customer-hours interrupted (28%). An investigation was performed after both of these events which determined that both of the line reclosers involved operated properly.
- While equipment was the third largest cause of interruptions on the Fort Gage 31954 in 2016, the two largest interruptions in terms of customer-hours of interruption were the result of equipment failure. In both cases a primary conductor burned down locking out the same 3 phase line recloser. The first of these events impacted 1,237 customers (17%) and accounted for 7,979 customer-hours interrupted (29%) while the second event impacted 1,253 customers (17%) and accounted for 6,766 customer-hours interrupted (25%).
- These six major interruptions listed above when combined accounted for only 32% of the interruptions experienced by the Fort Gage 31954 in 2016, but they affected 7,037 customers (97%) and accounted for 26,822 customer-hours interrupted (97%).
- Six of the 19 interruptions (32%) experienced on the Fort Gage 31954 in 2016 affected four customers or less.

Actions Taken:

- There are five 3-phase reclosers and two single-phase reclosers on the Fort Gage 31954. One of the 3-phase reclosers was originally installed in the mid 1990's but its controller has recently been upgraded. Three other 3-phase reclosers and the single-phase reclosers were all installed between 2006 and 2009. The fifth 3-phase recloser was relocated in early 2013 to better split the zones of protection on the feeder.
- The Fort Gage 31954 was reconfigured in late 2010 as part of a load relief project to reduce the summer peak load on the Fort Gage substation transformer. This project reduced the circuit miles of the Fort Gage 31954 feeder by 13.2 miles and reduced the customers served by about 420.
- Feeder hardening fusing was completed on the Fort Gage 31954 in 2009.
- Tree trimming and a hazard tree review which removed 61 danger trees was completed on the Fort Gage 31954 in FY2017.
- A review of the Fort Gage 31954 for animal guards was completed in 2011 and animal guards were installed where needed.
- A distribution automation project was completed in 2014 on the Fort Gage-Queensbury #2, Warrensburg-Fort Gage #8, and Warrensburg-Queensbury #9, 34.5 kV sub-transmission lines to automatically sectionalize the 34.5 kV system to isolate faults while maintaining service to as many of the substations served from this system as possible.
- Animal guards were installed in the Fort Gage substation in 2015.
- An I&M foot patrol was completed on the Fort Gage 31954 in 2015 and all level 1 and 2 maintenance has been completed.
- An I&M foot patrol of the Fort Gage-Queensbury #2, 34.5 kV sub-transmission line was completed in 2016 and all level 1 and 2 maintenance has been completed.
- An I&M foot patrol of the Warrensburg-Fort Gage #8, 34.5 kV sub-transmission line and the tap to the Bolton substation was completed in 2012 and all identified maintenance has been completed.
- Integrated Vegetation Management was completed on the Fort Gage-Queensbury #2, Warrensburg-Fort Gage #8, and the Warrensburg-Queensbury #9, 34.5 kV sub-transmission lines in FY2014.

Action Plan:

- Complete all identified level 3 maintenance on the Fort Gage 31954.
- A capital improvement project is budgeted for FY2019 to rebuild State Route 9L from pole 215 to pole 265 to allow the conversion to 13.2 kV and the creation of a feeder tie with the Cedar 45351 which could potentially be automated with loop scheme reclosers.
- Complete all identified level 3 maintenance on the Fort Gage-Queensbury #2, 34.5 kV sub-transmission line.
- A maintenance foot patrol of the Warrensburg-Fort Gage #8, 34.5 kV sub-transmission line is scheduled for 2017.

6. SCHROON LAKE 42951 – 13.2 kV

Profile: 2,209 Customers, 125.5 Circuit Miles

Indices: CAIDI = 1.27, SAIFI = 3.86

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	21	50.00%	4,763	55.85%	5,978	55.19%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	7	16.67%	1,420	16.65%	3,657	33.76%
6	ACCIDENTS	4	9.52%	24	0.28%	129	1.19%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	10	23.81%	2,321	27.22%	1,068	9.86%
Totals		42	100.00%	8,528	100.00%	10,832	100.00%

Problem Analysis:

- While trees were the number one cause of interruptions on the Schroon Lake 42951 in 2016, accounting for 21 of the 42 interruptions (50%), the largest tree-related interruption in terms of customers interrupted was actually the result of a tree on the Warrensburg-Chestertown #6, 34.5 kV transmission line. This interruption impacted all 2,241 customers (26%) and accounted for 2,839 customer-hours interrupted (26%).
- There was a second interruption on the Warrensburg-Chestertown #6, 34.5 kV line in 2016 which impacted the Schroon Lake 42951, this one of unknown cause. This interruption impacted 2,250 customers (26%) but was short in duration accounting for only 891 customer-hours of interruption.
- These two transmission-related interruptions combined accounted for only 5% of the interruptions on the Schroon Lake 42951 in 2016, but they interrupted 4,491 customers (53%) and accounted for 3,730 customer-hours of interruption (34%).
- The 40 interruptions on the Schroon Lake 42951 in 2016 attributed to the distribution system interrupted 4,037 customers (47%) and accounted for 7,103 customer-hours interrupted (66%) for a distribution SAIFI of 1.83 and CAIDI of 1.76.
- The largest distribution related interruption on the Schroon Lake 42951 in 2016 was the result of spacer cable which burned open affecting 1,374 customers (16%) and accounting for 3,389 customer-hours interrupted (31%).
- The two largest tree related interruptions on the Schroon Lake 42951 in 2016 attributed to the distribution system both locked out the same 3 phase line recloser affecting a combined 1,933 customers (23%) and accounting for a combined 1,815 customer-hours interrupted (17%).

- These three large distribution interruptions when combined with the two events on the sub-transmission system accounted for only 12% of the interruptions on the Schroon Lake 42951 in 2016, but they interrupted 7,798 customers (91%) and accounted for 8,934 customer-hours interrupted (82%).
- Twenty-eight of the 42 interruptions (67%) experienced on the Schroon Lake 42951 in 2016 affected ten or fewer customers.

Actions Taken:

- There are four 3-phase reclosers and five single-phase reclosers on the Schroon Lake 42951. Three of the 3-phase reclosers have been in service since the mid 1990's but recently were reprogrammed with new settings. The fourth 3-phase recloser is an open tie recloser which is part of the Pottersville 51/Schroon Lake 51 loop scheme that was installed in 2010, and which automatically restores service to 969 of the 2,181 customers on the Schroon Lake 42951 (44%) in the event of a transmission or substation outage. All the single-phase reclosers were installed in FY2007 in conjunction with the addition of fuses on the single-phase taps they protect.
- A capital project was completed in 2010 at a cost of \$84,961 to extend 3-phase, 13.2 kV distribution on State Route 74 from U.S. Route 9 to Paradox Lake to split the load on the north and south sides of the lake providing better voltage and reliability.
- A capital project was completed in 2010 at a cost in excess of \$237,000 to close distribution gaps along Hoffman and Potash Hill Roads, thereby allowing the retirement of a significant amount of heavily wooded rear lot distribution.
- A capital project was completed in 2014 at a cost in excess of \$423,000 to rebuild approximately one mile of Blue Ridge Road along the road allowing the retirement of approximately one mile of heavily wooded rear lot distribution.
- An Engineering Reliability Review (ERR) was performed on the Schroon Lake 42951 in 2009. The fuse additions and all other changes recommended therein were completed in 2010.
- An I&M foot patrol was performed on the Schroon Lake 42951 in 2014 and all level 1 and 2 maintenance has been completed.
- Tree trimming and a hazard tree review which removed 666 danger trees was completed on the Schroon Lake 42951 in FY2016.
- An I&M foot patrol of the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line was completed in 2016.
- An I&M foot patrol of the Chestertown-Schroon #3, 34.5 kV sub-transmission line was completed in 2015 and all level 1 and 2 maintenance has been completed.
- The Warrensburg-Chestertown #6, 34.5kV sub-transmission line was widened in 2011 at a cost of approximately \$850,000.
- Integrated Vegetation Management was completed on the Chestertown-Schroon #3, 34.5 kV sub-transmission line in FY14.

Action Plan:

- Complete all identified level 3 maintenance on the Schroon Lake 42951.
- A Minor Storm Hardening project is scheduled to be performed on the Schroon Lake 42951 in FY2017 by rebuilding approximately 2 miles of rear lot 4.8 kV single-phase distribution near Hoffman Road with new 7.62 kV single-phase distribution along the road.
- A second Minor Storm Hardening project is scheduled to be performed on the Schroon Lake 42951 in FY2021 by rebuilding approximately 3 miles of rear lot 4.8 kV single-phase distribution near Blue Ridge Road with new 7.62 kV single-phase distribution along the road.
- Complete all identified level 3 maintenance on the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line.
- Integrated Vegetation Management is scheduled on the Warrensburg–Chestertown #6, 34.5 kV sub-transmission line in FY2018.

7. NORTHVILLE 33251 – 13.2 kV

Profile: 1,624 Customers, 62.4 Circuit Miles
Indices: CAIDI = 5.31, SAIFI = 3.58

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	61.11%	2,342	40.30%	12,489	40.47%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	0	0.00%	0	0.00%	0	0.00%
6	ACCIDENTS	4	22.22%	1,651	28.41%	1,721	5.58%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	11.11%	1,626	27.98%	16,279	52.75%
10	UNKNOWN	1	5.56%	192	3.30%	374	1.21%
Totals		18	100.00%	5,811	100.00%	30,864	100.00%

Problem Analysis:

- There were two transmission interruptions that affected the Northville 33251 in 2016 that accounted for 56% of the total amount of customers interrupted (3,267 of 5,811) and 87% of the total customer-hours interrupted (26,786 of 30,864).
 - The first interruption occurred on June 21st when the Northville-Mayfield #8, 69kV transmission line locked out. This was due to a broken insulator and cross arm at pole 137 and a broken insulator at pole 132 on the #8 line. This interruption accounted for 28% of the total amount of customers interrupted (1,625 of 5,811) and 53% of the total customer-hours interrupted (16,277 of 30,864).
 - The second interruption occurred on September 16th when the Mayfield Substation locked out due to a tree falling on the Northville-Mayfield #8, 69kV transmission line. This resulted in all substations north of the Mayfield Substation being de-energized. This interruption accounted for 28% of the total amount of customers interrupted (1,642 of 5,811) and 34% of the total customer-hours interrupted (10,509 of 30,864).
- The distribution circuit breaker for the Northville 33251 experienced one operation (lockout) that led to a sustained interruption. It occurred on September 6th as a result of a motor vehicle accident. A vehicle hit pole 4 on State Route 30, causing the station breaker to lockout. Crews isolated and replaced the broken pole, thereby restoring power to all customers. The interruption accounted for 28% of the total amount of customers interrupted (1,622 of 5,811) and 5% of the total amount of customer-hours interrupted (1,676 of 30,864).

- Sixteen interruptions on the Northville 33251, which were attributed to the distribution system interrupted 2,544 customers (44%) and accounted for 4,078 customer-hours interrupted (13%) for a distribution SAIFI of 1.57 and CAIDI of 1.60.
- Trees were the largest cause of interruptions on the Northville 33251 in 2016, interrupting service to 2,342 customers (40%) and accounting for 12,489 customer-hours interrupted (40%).
- Accidents were the second largest cause of interruptions on the Northville 33251 in 2016, interrupting service to 1,651 customers (28%) and accounting for 1,721 customer-hours interrupted (6%).
- Six of the eighteen interruptions (33%) experienced on the Northville 33251 in 2016 affected ten or fewer customers.

Actions Taken:

- Following a detailed investigation into the cause of the multiple outages on the 23kV transmission lines that feed Gilmantown, Wells & Charley Lake Substations, a large capital improvement project was completed in October 2015 to replace 198 of the horizontal post insulators on 66 light angle structures on the Northville–Wells #1 and Wells–Gilmantown #2, 23 kV transmission lines.
- An I&M foot patrol of the Northville-Mayfield #8, 69kV transmission line was completed in 2013.
- An I&M foot patrol of the Northville 33251 was completed in 2016 and all identified level 1 and 2 maintenance has been completed.
- Tree trimming was performed on the Northville-Mayfield #8, 69kV transmission line in FY2016
- Tree trimming was performed on the Northville 33251 in FY2016.

Action Plan:

- Complete all identified level 3 maintenance on the Northville 32251.
- A project to continue replacing all 1995 era Lapp insulators on the Northville-Wells #1 and the Wells-Gilmantown #2, 23kV transmission lines is scheduled to begin construction in 2018. These insulators have been substantially cracking in the first skirt from the steel connection, ultimately leading to its failure. Approximately 436 Lapp insulators have been identified.
- The Northville-Mayfield #8, 69kV transmission line is inspected aurally once a year to look for mid-cycle danger trees.

8. UNION STREET 37654 – 13.2 kV

Profile: 593 Customers, 50.8 Circuit Miles
Indices: CAIDI = 2.79, SAIFI = 4.27

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	40.00%	766	30.28%	1,909	27.05%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	9	45.00%	619	24.47%	1,625	23.02%
6	ACCIDENTS	1	5.00%	568	22.45%	2,590	36.69%
7	PREARRANGED	1	5.00%	562	22.21%	871	12.34%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	5.00%	15	0.59%	64	0.90%
Totals		20	100.00%	2,530	100.00%	7,058	100.00%

Problem Analysis:

- Equipment was the number one cause of interruptions on the Union Street 37654 in 2016 accounting for nine of the 20 interruptions (45%), however, only one of these interruptions affected more than 21 customers or accounted for more than 50 customer-hours interrupted. That interruption occurred on the Cement Mountain-Cambridge #2, 34.5 kV sub-transmission line when a conductor from the North Troy-Hoosick #5, 115 kV line fell across the sub-transmission causing the line to lock out. This event impacted 591 customers (22%) and accounted for 1,497 customer-hours interrupted (21%).
- The 19 interruptions on the Union Street 37654 in 2016 attributed to the distribution system interrupted 1,939 customers (77%) and accounted for 5,561 customer-hours interrupted (79%) for a distribution SAIFI of 3.27 and CAIDI of 2.87.
- The largest distribution related interruption on the Union Street 37654 in 2016 was the result of a motor vehicle accident which caused a 3 phase line recloser to lock out affecting 568 customers (23%) and accounting for 2,590 customer-hours interrupted (37%).
- Trees were the second largest cause of interruption on the Union Street 37654 in 2016 accounting for eight of the 20 interruptions (40%). The largest tree related interruption occurred when a tree fell on Turnpike Road caused a 3 phase line recloser to lock out. This event impacted 565 customers (22%) and accounted for 1,742 customer-hours interrupted (25%).
- The prearranged interruption on the Union Street 37654 in 2016 was necessary to change an overloaded 1,500 kVA, 13.2/4.8 kV step down transformer to a new 2,500 kVA transformer which was installed a few sections away. Even though this interruption affected 562 customers (22%) it was done in just over 1½ hours keeping the customer-hours of interruption down to 871 (12%).

- These three large distribution interruptions when combined with the interruption on the sub-transmission system accounted for only 20% of the interruptions on the Union Street 37654 in 2016, but they interrupted 2,286 customers (90%) and accounted for 6,700 customer-hours of interruption (95%).
- Eleven of the 20 interruptions (55%) experienced in 2016 affected only one or two customers.

Actions Taken:

- There is one 3-phase recloser on the Union Street 37654 which was installed in 2011.
- An ERR was performed on the Union Street 37654 in 2008 and the recommended fuse changes were completed in 2011 at a cost of approximately \$270,500.
- The 1,500 kVA, 13.2/4.8 kV step down transformer on Turnpike Road which was load to 167% of nameplate was replaced with a new 2,500 kVA, 13.2/4.8 kV step down transformer in 2016 at a cost of \$163,206.
- A maintenance foot patrol of the Union Street 37654 was completed in 2015 and all level 1 and 2 maintenance has been completed.
- Tree trimming and a hazard tree review which removed 209 danger trees was completed on the Union Street 37654 in FY2016.
- An I&M foot patrol on the Cement Mountain-Cambridge #2, 34.5 kV sub-transmission line was completed in 2014 and all level 1 and 2 maintenance has been completed.
- An I&M foot patrol on the Cambridge-Hoosick #3, 34.5 kV sub-transmission line was completed in 2016.
- Integrated Vegetation Management was completed on the Cambridge-Hoosick #3, 34.5 kV transmission line in FY2015.
- Integrated Vegetation Management was completed on the Cement Mountain-Cambridge #2, 34.5 kV transmission line in FY2015.

Action Plan:

- Complete all identified level 3 maintenance on the Union Street 37654.
- A project to rebuild the 3 phase mainline on Turnpike Road, Brownell Corners Road and State Highway 22, as necessary, to convert to 13.2 kV is scheduled for FY20.
- Phase one of a project to rebuild sections of rear lot single phase distribution near Lincoln Hill Road with new single phase distribution along the road is scheduled for FY20.
- Complete all identified level 3 maintenance on the Cement Mountain-Cambridge #2, 34.5 kV sub-transmission line.
- Complete all maintenance on the Cambridge-Hoosick #3, 34.5 kV sub-transmission line.

9. BROOK ROAD 36954 – 13.2 kV

Profile: 2,027 Customers, 42.6 Circuit Miles
Indices: CAIDI = 2.27, SAIFI = 2.89

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	26.09%	1,965	33.51%	7,522	56.45%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	9	39.13%	1,531	26.11%	763	5.73%
6	ACCIDENTS	5	21.74%	2,302	39.26%	4,893	36.72%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	13.04%	66	1.13%	147	1.10%
Totals		23	100.00%	5,864	100.00%	13,325	100.00%

Problem Analysis:

- While equipment was the number one cause of interruptions on the Brook Road 36954 in 2016 only one equipment related event made a significant contribution to customers interrupted or customer-hours interrupted. That event was a pole fire on Duplainville Road which impacted 1,369 customers (23%) and accounted for 593 customer-hours of interruption (4%).
- The largest interruption on the Brook Road 36955 in 2016 was the result of a motor vehicle accident where a tractor trailer took down a pole and wires on Cady Hill Boulevard within the Grande Industrial Park causing a feeder lock-out interrupting all 2,027 customers (35%) most of whom were back on in about 2 hours, but 65 customers were out for over 11 hours while repairs could be made accounting for a total of 4,530 customer-hours interrupted (34%).
- Three of the tree related interruptions on the Brook Road 36954 in 2016 interrupted over 600 customers. Combined, these three events interrupted 1,962 customers (33%) and accounted for 7,497 customer-hours of interruption (56%).
 - The largest of these interruptions occurred when a tree fell on Old Ballston Road causing a 3 phase line recloser to lock out impacting 696 customers (12%) and accounting for 3,031 customer-hours interrupted (23%).
 - The second largest of these interruptions occurred when a tree fell on Ballston Avenue breaking multiple poles impacting 663 customers (11%) and accounting for 2,648 customer-hours interrupted (20%).
 - The last of these interruptions was the result of a tree falling on Hathorn Boulevard which impacted 603 customers (10%) and accounted for 1,819 customer-hours interrupted (14%).

- The three large tree related interruptions, combined with the large equipment and motor vehicle accident interruptions events listed previously accounted for only 5 of the 23 interruptions (22%) on the Brook Road 36954 in 2016, but combined, they interrupted a total of 5,358 customers (92%) and accounted for 12,620 customer-hours of interruption (95%).
- Thirteen of the 23 interruptions (57%) on the Brook Road 36954 in 2016 affected four or fewer customers, and eleven of those affected only a single customer.

Actions Taken:

- There are two 3 phase reclosers on the Brook Road 36954 both of which were installed in 2011.
- Tree trimming and a hazard tree review was completed on the Brook Road 36954 in FY2014.
- A major project was completed on the Brook Road 36954 in 2013 to construct a new feeder getaway at a total cost of \$963,799.
- A small project to install a new set of switches on Cady Hill Boulevard and to refuse some taps within the Grande Industrial Park was completed in 2016 at a cost of \$12,363.
- A project to replace the underground cable serving the Geyser Road Elementary School, which had failed multiple times, was completed in early 2017 at a cost of \$55,741.
- An I&M foot patrol was performed on the Brook Road 36954 in 2012 and all identified maintenance has been completed.
- A review of the Brook Road 36954 for animal guards was completed in 2011 and animal guards were installed where needed.

Action Plan:

- An I&M foot patrol of the Brook Road 36954 is scheduled for 2017.
- Tree trimming and a hazard tree review are scheduled for the Brook Road 36954 in FY2019.
- Install an open tie recloser on Geyser Road to create a loop scheme between the Brook Road 36954 and the Brook Road 36958 providing a means to automatically back-up 718 customers (35.4 %) should there be an interruption impacting the entire feeder.
- A project is scheduled in FY2021 to convert State Highway 50 south of East North Street to 13.2 kV and rebuild Rowland Street as necessary to convert to 13.2 kV.
- A project is scheduled in FY2021 to rebuild and convert Old Ballston Avenue to 7.62 kV.

10. SCOFIELD ROAD 45053 – 13.2 kV

Profile: 1,390 Customers, 88.6 Circuit Miles

Indices: CAIDI = 2.53, SAIFI = 2.55

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	18	58.06%	2,547	71.93%	6,056	67.70%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	16.13%	670	18.92%	1,721	19.24%
6	ACCIDENTS	3	9.68%	160	4.52%	737	8.24%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.23%	3	0.08%	11	0.13%
10	UNKNOWN	4	12.90%	161	4.55%	420	4.69%
Totals		31	100.00%	3,541	100.00%	8,945	100.00%

Problem Analysis:

- Trees were the number one cause of interruptions on the Scofield Road 45053 in 2016. However, three of these tree related interruptions interrupted over 600 customers, for a combined total of 1,997 customers (56%) and accounting for a total of 3,168 customer-hours of interruption (35%).
 - The first of these interruptions occurred when a tree fell at pole 113 Stony Creek Road locking out the 3-phase line recloser on pole 31 Stony Creek Road, impacting 656 customers (19%) and accounting for 1,093 customer-hours interrupted (12%).
 - The second of these interruptions occurred when a tree took down the B phase conductor at pole 155 Hadley Road locking out the same 3-phase line recloser on pole 31 Stony Creek Road, impacting 665 customers (19%) and accounting for 1,523 customer-hours interrupted (17%).
 - The last of these interruptions also resulted in locking out the 3-phase line recloser on pole 31 Stony Creek Road interrupting 676 customers (19%) and accounting for 552 customer-hours interrupted (6%).
- One of the five equipment related interruptions on the Scofield Road 45053 in 2016 resulted in conductors down on Old Corinth Road locking out the line recloser on pole 7 Stony Creek Road, affecting 626 customers (18%) and accounting for 1,668 customer-hours of interruption (19%).
- The four major distribution interruptions listed above when combined accounted for only 13% of the interruptions experienced by the Scofield Road 45053 in 2016, but they affected 2,623 customers (74%) and accounted for 4,836 customer-hours of interruption (54%).

- Twelve of the 31 interruptions (39%) experienced in 2016 affected ten or fewer customers.

Actions Taken:

- There are three 3 phase reclosers and three single phase reclosers on the Scofield Road 45053. Two of the 3 phase reclosers were originally installed in 1997 while the single phase reclosers were installed in 2006. The third 3 phase recloser is an open tie recloser which is part of the Corinth 51/Scofield Road 53 loop scheme that was installed in 2011.
- Tree trimming and a hazard tree review were completed on the Scofield Road 45053 in FY2013.
- An I&M foot patrol was performed on the Scofield Road 45053 in 2014 and all identified level 1 and 2 maintenance has been completed with the exception of three level 2 poles that were not replaced because they are scheduled to be retired as part of a Storm Hardening rebuild project.
- An Engineering Reliability Review (ERR) was performed on the Scofield Road 45053 in 2008 and the recommended fuse changes were completed in 2010 at a cost of approximately \$323,000. All other work recommended within the ERR has also been completed with the exception of one small project which was cancelled due to the inability to obtain the necessary easements.
- A capital improvement project to rebuild and convert Hadley and Harrisburg Lake Roads to 7.62/13.2 kV was completed in 2010 at a total cost of over \$1,400,000.
- A capital improvement project to construct a 3 phase feeder tie between the Scofield Road 45053 and the Corinth 28551 was completed in early 2011 at a cost in excess of \$1,100,000. This project included the upgrade of one of the existing reclosers on the Scofield Road 45053 and the installation of an open tie recloser to allow this feeder tie to be automated.
- A capital improvement project was completed on the adjacent EJ West 03851 feeder in early 2014, and which transferred approximately 25 circuit miles of the Scofield Road 45053 feeder serving an estimated 359 customers to the EJ West 03851.

Action Plan

- Complete all identified level 3 maintenance on the Scofield Road 45053.
- Tree trimming and a hazard tree review are scheduled for the Scofield Road 45053 in FY2019.
- A project has been designed to better balance the loads on the Stony Creek and Hadley Road section of the Scofield Road and to address elevated voltage and interference on the telephone system.
- A Minor Storm Hardening project is scheduled to be performed on the Scofield Road 45053 in FY2020 to rebuild approximately 5,500 feet of rear lot 4.8 kV single-phase distribution near Harrisburg Road with new 7.62 kV single-phase distribution along the road.

11. WELLS 20881 – 4.8 kV

Profile: 847 Customers, 38.6 Circuit Miles

Indices: CAIDI = 6.99, SAIFI = 3.44

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	73.33%	1,028	35.24%	6,170	30.24%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	1	6.67%	853	29.24%	5,417	26.55%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	6.67%	851	29.17%	8,524	41.78%
10	UNKNOWN	2	13.33%	185	6.34%	291	1.42%
Totals		15	100.00%	2,917	100.00%	20,401	100.00%

Problem Analysis:

- There were three transmission interruptions that affected the Wells 20881 in 2016 that accounted for 88% of the total amount of customers interrupted (2,555 of 2,917) and 95% of the total customer-hours interrupted (19,387 of 20,401).
 - The first interruption occurred on May 25th when the Northville Substation locked out due to a broken insulator at pole 209 on the Northville-Wells #1, 23kV transmission line. This interruption accounted for 29% of the total amount of customers interrupted (853 of 2,917) and 27% of the total customer-hours interrupted (5,417 of 20,401).
 - The second interruption occurred on June 21st when the Northville-Mayfield #8, 69kV transmission line locked out. This was due to a broken insulator and cross arm at pole 137 and a broken insulator at pole 132 on the #8 line. This interruption accounted for 29% of the total amount of customers interrupted (851 of 2,917) and 42% of the total customer-hours interrupted (8,524 of 20,401).
 - The third interruption occurred on September 16th when the Mayfield Substation locked out due to a tree falling on the Northville-Mayfield #8, 69kV transmission line. This resulted in all substations north of the Mayfield Substation being de-energized. This interruption accounted for 29% of the total amount of customer interrupted (851 of 2,917) and 27% of the total customer-hours interrupted (5,446 of 20,401).
- The twelve interruptions on the Wells 20881 attributed to the distribution system interrupting 362 customers (12%) and accounted for 1,014 customer-hours interrupted (5%) for a distribution SAIFI of 0.43 and CAIDI of 2.80.

- Trees were the largest cause of customers interrupted on the Wells 20881 in 2016, interrupting service to 1,028 customers (35%) and accounting for 6,170 customer-hours interrupted (30%).
- Equipment Failure was the second largest cause of customers interrupted on the Wells 20881 in 2016, interrupting service to 853 customers (29%) and accounting for 5,417 customer-hours interrupted (27%).
- Six of the fifteen interruptions (47%) experienced on the Wells 20881 in 2016 affected ten or fewer customers.

Actions Taken:

- Following a detailed investigation into the cause of the multiple outages on the 23kV transmission lines that feed Gilmantown, Wells & Charley Lake Substations, and a large capital improvement project was completed in October 2015 to replace 198 of the horizontal post insulators on 66 light angle structures on the Northville–Wells #1 and Wells–Gilmantown #2, 23kV transmission lines.
- An I&M foot patrol of the Northville-Mayfield #8, 69kV transmission line was completed in 2013.
- An I&M foot patrol of the Wells 20881 was completed in 2015 and all identified level 1 and 2 maintenance has been completed.
- Tree trimming was performed on the Northville-Mayfield #8, 69kV transmission line in FY2016.
- Tree trimming was performed on the Wells 20881 in FY2013.

Action Plan:

- Complete all identified level 3 maintenance on the Wells 20881.
- Tree trimming is scheduled to be performed on the Wells 20881 in FY2019.
- A project to continue replacing all 1995 era Lapp insulators on the Northville-Wells #1 and the Wells-Gilmantown #2, 23kV transmission lines is scheduled to begin construction in 2018. These insulators have been substantially cracking in the first skirt from the steel connection, ultimately leading to its failure. Approximately 436 Lapp insulators have been identified
- The Northville-Mayfield #8, 69kV transmission line is inspected aerially once a year to look for mid-cycle danger trees.

12. BOLTON 28451 – 13.2 kV

Profile: 2,097 Customers, 58.8 Circuit Miles

Indices: CAIDI = 2.73, SAIFI = 2.20

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	37.93%	2,160	46.79%	6,883	54.56%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	20.69%	63	1.36%	318	2.52%
6	ACCIDENTS	4	13.79%	2,170	47.01%	4,636	36.74%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	8	27.59%	223	4.83%	780	6.18%
Totals		29	100.00%	4,616	100.00%	12,617	100.00%

Problem Analysis:

- While trees were the largest cause of interruptions on the Bolton 28451 in 2016 the largest tree related interruption was the result of a tree condition on the Bolton Tap off the Warrensburg-Fort Gage #8, 34.5 kV sub-transmission line which de-energized the entire Bolton substation for three hours interrupting 1,991 customers on the Bolton 28451 (43%) and accounting for 5,973 (47%) customer-hours interrupted.
- One of the accident related interruptions on the Bolton 28451 in 2016 was the result of a squirrel on the 13.2 kV bus in the Bolton substation which caused all the 13.2 kV breakers in the Bolton substation to lock-out impacting 2,158 customers (47%) on the Bolton 28451 and accounting for 4,604 customer-hours interrupted (36%).
- The two non-distribution related interruptions on the Bolton 28451 in 2016 listed above accounted of only 7% of the interruptions the Bolton 28451 experienced in 2016 but they impacted 4,149 customers (90%) and accounted for 10,577 customer-hours interrupted (84%).
- There were 27 interruptions on the Bolton 28451 attributable to the distribution system which interrupted 467 customers (10%) and accounted for 2,040 customer-hours interrupted (16%) for a distribution SAIFI of 0.22 and CAIDI of 4.37.
- The largest interruption on the Bolton 28451 in 2016 on the distribution system in terms of customers interrupted was an interruption of unknown origin which impacted 128 customers (3%) and accounted for 269 customer-hours interrupted while the largest distribution interruption in terms of customer-hours interrupted was the result of a tree falling on Three Oaks Drive which interrupted 65 customers (1%) and accounted for 546 customer-hours of interruption (4%).
- Seventeen of the 29 interruptions (59%) experienced on the Bolton 28451 in 2016 affected ten or fewer customers.

Actions Taken:

- There is one 3-phase recloser and three single phase reclosers on the Bolton 28451. The 3-phase recloser was originally installed in 2000 but the recloser controller was replaced in 2008. Two of the single phase reclosers were installed in 2000 and the third was installed in 2011.
- Two single phase cut-out mounted reclosers were installed on the Bolton 28451 in 2015.
- The Bolton 28451 was reconfigured in late 2016 transferring the 7.25 miles of distribution and 159 customers on Stone Schoolhouse and Flat Rock Roads from the Bolton 28451 to the Birch Avenue 32252.
- A voltage study was performed on the Bolton 28451 in 2013. Voltage regulators and capacitors were added to the feeder, and the feeder was better balanced to improve the voltage performance.
- A capital project to construct a single phase feeder tie between the Bolton 28451 and Bolton 28452 by converting Potter Hill Road to 13.2 kV was completed in 2015 at a cost of \$256,244.
- A distribution automation project was placed in service in 2014 on the Fort Gage-Queensbury #2, Warrensburg-Fort Gage #8, and Warrensburg-Queensbury #9, 34.5 kV sub-transmission lines to automatically sectionalize the 34.5 kV system to isolate faults while maintaining service to as many of the substations served from this system as possible, including the Bolton substation which is served from a tap off the Warrensburg-Fort Gage #8 line.
- An Engineering Reliability Review (ERR) was performed on the Bolton 28451 in 2009 and the recommended fuse changes were completed in 2012 at a cost of approximately \$169,000.
- Tree trimming and a hazard tree review, which removed 161 danger trees was completed on the Bolton 28451 in FY13.
- An I&M foot patrol of the Bolton 28451 was completed in 2016.
- A review of the Bolton 28451 for animal guards was completed in 2011 and animal guards were installed where needed.
- An I&M foot patrol of the Fort Gage-Queensbury #2, 34.5 kV sub-transmission line was completed in 2016 and only one bad pole was identified.

Action Plan:

- Complete all identified maintenance on the Bolton 28451.
- Tree trimming and a hazard tree review are scheduled for the Bolton 28451 in FY2018.
- A project is budgeted for FY18 to rebuild Trout Lake Road from U.S. Highway 9 to Coolidge Hill Road to 3-phase and convert to 13.2 kV which will create a 3 phase feeder tie between the Bolton 28451 and Bolton 28452 feeders and transfer approximately 16 miles of distribution and 440 customers from the Bolton 28451 feeder to the much smaller Bolton 28452.
- A project is budgeted for FY19 to construct a 13.2 kV, 3-phase feeder tie between the Bolton 28451 and the Warrensburg 32151 on Diamond Point – Bakers Road which will be automated by the use of loop scheme reclosers.
- Complete the replacement of the bad pole identified during the maintenance foot patrol of the Fort Gage-Queensbury #2, 34.5 kV sub-transmission line.
- A maintenance foot patrol of the Warrensburg-Fort Gage #8, 34.5 kV sub-transmission line and the tap to the Bolton substation is scheduled for 2017.

13. POTTERSVILLE 42451 – 13.2 kV

Profile: 1,070 Customers, 44.3 Circuit Miles

Indices: CAIDI = 2.19, SAIFI = 3.59

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	57.89%	1,805	47.05%	5,029	59.88%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	26.32%	715	18.64%	1,805	21.49%
6	ACCIDENTS	1	5.26%	157	4.09%	421	5.02%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	2	10.53%	1,159	30.21%	1,143	13.61%
Totals		19	100.00%	3,836	100.00%	8,399	100.00%

Problem Analysis:

- While trees were the number one cause of interruptions on the Pottersville 42451 in 2016, accounting for 11 of the 19 interruptions (58%), the largest tree-related was actually the result of a tree on the Warrensburg-Chestertown #6, 34.5 kV transmission line. This interruption impacted all 1,075 customers (28%) and accounted for 1,362 customer-hours interrupted (16%).
- There was a second interruption on the Warrensburg-Chestertown #6, 34.5 kV line in 2016 which impacted the Pottersville 42451, this one of unknown cause. This interruption impacted 1,084 customers (28%) and accounted for 874 customer-hours of interruption (10%).
- These two transmission-related interruptions combined accounted for only 11% of the interruptions on the Pottersville 42451 in 2016, but they interrupted 2,159 customers (56%) and accounted for 2,236 customer-hours of interruption (27%).
- The seventeen interruptions on the Pottersville 42451 in 2016, which were attributable to the distribution system interrupted 1,677 customers (44%) and accounted for 6,163 customer-hours interrupted (73%) for a distribution SAIFI of 1.57 and CAIDI of 3.67.
- There were three tree related interruptions on the Pottersville 42451 distribution system in 2016 which impacted 99 or more customers and accounted for over 500 customer-hours interrupted. All three were caused by trees falling in the rear lot right-of-way adjacent to East Shore Road. Combined these three events interrupted 430 customers (11%) and accounted for 2,665 customer-hours interrupted (32%).
- There were two equipment related interruptions on the Pottersville 42451 in 2016 which impacted approximately 167 customers and accounted for over 500 customer-hours interrupted. Combined these two events interrupted 699 customers (18%) and accounted for 1,731 customer-hours interrupted (21%).

- The five interruptions on the Pottersville 42451 distribution system listed above when combined with the two interruptions on the sub-transmission system accounted for only 37% of the interruptions on the Pottersville 42451 in 2016, but they interrupted 3,288 customers (86%) and accounted for 6,632 customer-hours interrupted (79%).
- Five of the 19 interruptions (26%) experienced on the Pottersville 42451 in 2016 affected eleven or fewer customers.

Actions Taken:

- There are five 3-phase reclosers on the Pottersville 42451. Two were originally installed in the mid-1990's and upgraded to loop scheme reclosers in 2010. One of the reclosers was installed in early 2011. The fourth and fifth 3-phase reclosers are both open tie reclosers discussed below.
- An Engineering Reliability Review (ERR) was performed on the Pottersville 42451 in 2009 and the recommended fuse changes were completed in 2010 at a cost of \$154,000.
- The Pottersville 42451 has a 3-phase feeder tie with the Schroom Lake 42951 which has been automated with loop scheme reclosers to automatically restore service to approximately 158 of the 1,070 customers (15%) in the event of a future interruption at or near the substation.
- A capital improvement project was completed in 2010 to rebuild and convert to 13.2 kV, a 3-phase feeder tie to the Chestertown 04252 along East Schroom River Road at a cost around \$1,335,489. Upon completion, this feeder tie was automated using loop scheme reclosers which automatically restore service to about 773 of the 1,070 customers (72%) in the event of a future interruption at or near the substation.
- Tree trimming and a hazard tree review which removed 247 danger trees was completed on the Pottersville 42451 in FY2014.
- A maintenance foot patrol was performed on the Pottersville 42451 in 2016.
- A maintenance foot patrol of the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line was completed in 2016.
- A maintenance foot patrol of the Chestertown-Schroom #3, 34.5 kV sub-transmission line was completed in 2015 and all level 1 and 2 maintenance has been completed.
- The Warrensburg-Chestertown #6, 34.5kV sub-transmission line was widened in 2011 at a cost of about \$850,000.
- Integrated Vegetation Management was completed on the Chestertown-Schroom #3, 34.5 kV sub-transmission line in FY14.

Action Plan:

- Complete all identified maintenance on the Pottersville 42451.
- Tree trimming is scheduled on the Pottersville 42451 in FY2020.
- A small capital improvement project has been designed to create a single-phase feeder tie between the Pottersville 42451 and the Riparius 29395, along U.S. Highway 9. Construction will begin after all necessary easements have been obtained.
- A capital improvement project is budgeted for FY2022 to convert County Highway 15 on the east shore of Schroom Lake to 13.2 kV from County Highway 64 to Beaver Pond Road.
- Complete all identified level 3 maintenance on the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line.
- Integrated Vegetation Management is scheduled on the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line in FY2018.

14. WHITEHALL 18751 – 13.2 kV

Profile: 1,742 Customers, 108.3 Circuit Miles

Indices: CAIDI = 1.77, SAIFI = 3.01

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	33.33%	803	15.33%	4,183	45.25%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	3	12.50%	10	0.19%	35	0.38%
6	ACCIDENTS	5	20.83%	4,204	80.26%	4,407	47.67%
7	PREARRANGED	1	4.17%	179	3.42%	370	4.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	7	29.17%	42	0.80%	250	2.71%
Totals		24	100.00%	5,238	100.00%	9,245	100.00%

Problem Analysis:

- Trees were the largest cause of interruption on the Whitehall 18751 in 2016 accounting for eight of the 24 interruptions (33%). The largest tree related interruption occurred when a tree took down the primary at pole 48 ½ County Highway 18 causing the 3-phase line recloser on County Highway 18 to lock-out, thereby interrupting 687 customers (13%) and accounting for 2,932 customer-hours interrupted (32%).
- Three of the accident related interruptions on the Whitehall 18751 in 2016 were motor vehicle accidents which interrupted over 600 customers. Combined, these three events interrupted 4,181 customers (80%) and accounted for 4,344 customer-hours of interruption (47%).
 - The first of these interruptions was the result of a 911 call and the station breaker was operated remotely in response. The feeder was subsequently sectionalized to return service to as many customers as possible while the motor vehicle accident was cleared. This event interrupted 1,735 customers (33%) and accounted for 2,633 customer-hours interrupted (28%).
 - The second of these interruptions occurred when a Washington County dump truck pulled down pole 8-1 on County Highway 18 causing the station breaker to lock-out impacting 1,748 customers (33%) and accounting for 745 customer-hours interrupted (8%).
 - The last of these interruptions was the result of a motor vehicle accident on County Highway 18 which broke pole 62 and caused a 3-phase line recloser to lock-out, thereby interrupting 698 customers (13%) and accounting for 966 customer-hours interrupted (10%).

- These four distribution related interruptions, when combined, accounted for only 8% of the interruptions in 2016, but together they interrupted 4,868 customers (93%) and accounted for 7,276 customer-hours of interruption (79%).
- Seventeen of the 24 interruptions on the Whitehall 18751 in 2016 (71%) affected fifteen customers or less.

Actions Taken:

- There are four 3-phase reclosers on the Whitehall 18751, all of which were installed in 2009.
- An Engineering Reliability Review (ERR) was performed on the Whitehall 18751 in 2009 and the recommended fuse changes were completed in 2010 at a cost of \$246,765.
- A capital project was completed in 2011 to convert U.S. Route 4 east of County Hwy. 21 to 3-phase, 13.2 kV, to relieve an overloaded ratio transformer.
- A capital project was completed in 2013 at a cost of \$121,301 to rebuild County Highway 10 from Stalker Road to Dodge Road and convert to 7.62 kV.
- A major capital project was completed in 2016 at a cost of \$1,477,673 to convert the 3-phase mainline within the Village of Whitehall to 13.2 kV to relieve the overloaded 1,500 kVA ratio transformer on pole 130 on Williams Street.

Action Plan:

- An I&M foot patrol of the Whitehall 18751 is scheduled for 2017.
- Tree trimming and a hazard tree review are scheduled for the Whitehall 18751 in FY2018.
- A small capital improvement project has been designed to relocate rear lot distribution adjacent to County Highway 7 between Anna Babcock Road and Howard Barber Road to new poles set by Verizon along the road. Construction will begin after Verizon has completed their work.
- A 6,900 foot, 3-phase line extension on U.S. Highway 4 and Golf Course Road is scheduled in FY18 to serve a new 3-phase customer on Golf Course Road.

15. INDIAN LAKE 31075 – 4.8 kV

Profile: 759 Customers, 42.2 Circuit Miles

Indices: CAIDI = 2.54, SAIFI = 3.09

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	18	90.00%	1,962	83.74%	3,193	53.66%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	1	5.00%	379	16.18%	2,754	46.29%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	5.00%	2	0.09%	3	0.05%
Totals		20	100.00%	2,343	100.00%	5,950	100.00%

Problem Analysis:

- Trees were the number one cause of interruptions on the Indian Lake 31075 in 2016. However, three of these tree related interruptions locked out the station breaker or a 3-pase line recloser combining for a total of 1,787 customers interrupted(76%) and accounting for 2,194 customer-hours of interruption (37%).
 - The first of these interruptions occurred during a winter storm when a tree fell at pole 20 County Highway 4 knocking one phase conductor onto the cross arm locking out the station breaker, thereby impacting 748 customers (32%) and accounting for 1,097 customer-hours interrupted (18%).
 - The second of these interruptions occurred during the same winter storm as the first when multiple tree conditions caused the station breaker to lock-out impacting the same 748 customers (32%), and this time accounting for 912 customer-hours interrupted (15%).
 - The last of these interruptions occurred when the recloser on pole 11 County Highway 4 was opened manually in order to remove a tree from the primary at pole 49 County Highway 4. This event interrupted 291 customers (12%) for less than 40 minutes, accounting for 184 customer-hours interrupted (3%).
- The equipment related interruption on the Indian Lake 31075 in 2016 resulted in conductors down at pole 41 on State Highway 30 locking out the line recloser on pole 26 State Highway 30 Stony Creek Road affecting 379 customers (16%) and taking over 7 hours to repair, accounting for 2,754 customer-hours of interruption (46%).
- The four major distribution interruptions listed above when combined accounted for only 20% of the interruptions experienced by the Indian Lake 31075 in 2016, but they affected 2,166 customers (92%) and accounted for 4,948 customer-hours of interruption (83%).

- Thirteen of the 20 interruptions (65%) experienced the Indian Lake 31075 in 2016 affected thirteen or fewer customers.

Actions Taken:

- There are two line reclosers on the Indian Lake 31075 which were installed in 2010.
- An Engineering Reliability Review (ERR) was performed on the Indian Lake 31075 in 2008 and the recommended fuse changes were completed in 2011 at a cost of about \$67,000.
- Tree trimming and a hazard tree review of the Indian Lake 31075 was completed in FY2014.
- An I&M foot patrol of the Indian Lake 31075 was completed in 2015 and all level 1 and 2 maintenance has been completed.
- A project was completed in 2015 to replace the Indian Lake station transformer which had been leaking.
- Three 34.5 kV line reclosers and 10 sets of fault indicators were installed on the Indian Lake-North Creek #1, 34.5 kV sub-transmission line in 2012.
- A maintenance foot patrol was performed on the Indian Lake-North Creek #1, 34 kV sub-transmission line in 2013 and all identified maintenance has been completed.
- A helicopter patrol was performed on the Indian Lake-North Creek #1, 34 kV sub-transmission line in 2014.

Action Plan:

- Complete all identified level 3 maintenance on the Indian Lake 31075.
- Tree trimming and a hazard tree review are scheduled for the Indian Lake 31075 in FY2020.
- An I&M foot patrol is scheduled on the Indian Lake-North Creek #1, 34 kV sub-transmission line in 2018.

16. INDIAN LAKE 31076 – 4.8 kV

Profile: 716 Customers, 36.9 Circuit Miles

Indices: CAIDI = 4.63, SAIFI = 2.02

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	19	67.86%	1,084	75.07%	5,489	82.09%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	14.29%	33	2.29%	84	1.25%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.57%	30	2.08%	55	0.82%
10	UNKNOWN	4	14.29%	297	20.57%	1,059	15.84%
Totals		28	100.00%	1,444	100.00%	6,686	100.00%

Problem Analysis:

- Trees were the number one cause of interruptions on the Indian Lake 31076 in 2016. However, only three of these tree related interruptions affected more than 100 customers. When combined, these three events interrupted a total of 426 customers (30%) and accounted for 2,657 customer-hours of interruption (40%).
 - The first of these interruptions occurred when a tree fell at pole 18 County Highway 12 blowing line fuses at pole 3, thereby impacting 104 customers (7%) and accounting for 362 customer-hours interrupted (5%).
 - The second of these interruptions occurred when a tree fell at pole 62 Blue Mountain Lake Road blowing a fuse at pole 31, thereby impacting 158 customers (11%) and accounting for 669 customer-hours interrupted (10%).
 - The last of these interruptions also caused the fuse on pole 31 Blue Mountain Lake Road to blow which occurred when a tree fell breaking pole 62. This event interrupted 164 customers (11%) but lasted for nearly 10 hours while the pole was being replaced, accounting for 1,626 customer-hours interrupted (24%).
- One of the four interruptions of unknown cause blew a line fuse at pole 22 State Highway 28 impacting 256 customers (18%) and accounting for 631 customer-hours of interruption (9%).
- The four major distribution interruptions listed above when combined accounted for only 14% of the interruptions experienced by the Indian Lake 31076 in 2016, but they affected 682 customers (47%) and accounted for 3,289 customer-hours of interruption (49%).
- Ten of the 28 interruptions (36%) experienced the Indian Lake 31076 in 2016 affected twelve or fewer customers.

Actions Taken:

- There are no line reclosers on the Indian Lake 31076.
- Tree trimming and a hazard tree review of the Indian Lake 31076 was completed in FY2014.
- An I&M foot patrol of the Indian Lake 31076 was completed in 2015 and all level 1 and 2 maintenance has been completed.
- A project was completed in 2015 to replace the Indian Lake station transformer.
- Three 34.5 kV line reclosers and 10 sets of fault indicators were installed on the Indian Lake-North Creek #1, 34.5 kV sub-transmission line in 2012.
- An I&M foot patrol was performed on the Indian Lake-North Creek #1, 34 kV sub-transmission line in 2013 and all identified maintenance has been completed.
- A helicopter patrol was performed on the Indian Lake-North Creek #1, 34 kV sub-transmission line in 2014.

Action Plan:

- Complete all identified level 3 maintenance on the Indian Lake 31076.
- Tree trimming and a hazard tree review are scheduled for the Indian Lake 31076 in FY2020.
- Review the Indian Lake 31076 for the possible installation of line reclosers.
- A maintenance foot patrol is scheduled on the Indian Lake-North Creek #1, 34 kV sub-transmission line in 2018.

17. BROOK ROAD 36955 – 13.2 kV

Profile: 3,175 Customers, 144.8 Circuit Miles

Indices: CAIDI = 2.90, SAIFI = 1.69

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	24	41.38%	1,824	34.06%	9,292	59.83%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	17.24%	1,568	29.28%	3,545	22.82%
6	ACCIDENTS	14	24.14%	1,861	34.75%	2,449	15.77%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	10	17.24%	102	1.90%	245	1.58%
Totals		58	100.00%	5,355	100.00%	15,531	100.00%

Problem Analysis:

- While tree were the largest cause of interruptions on the Brook Road 36955 in 2016 accounting for 24 of the 58 interruptions, only one tree related interruption affected more than 80 customers. That event was caused by a tree taking down primary near pole 41 on Middle Grove Road which caused the 3-phase line recloser on pole 4 Middle Grove Road to lock-out, thereby interrupting 1,247 customers (23%) for over 5 hours and accounting for 6,318 customer-hours interrupted (41%).
- Only two of the 10 equipment related interruptions on the Brook Road 36955 in 2016 interrupted over 12 customers. Combined, these two events interrupted 1,546 customers (29%) and accounted for 3,459 customer-hours of interruption (22%).
 - The first of these interruptions was the result of a broken connector on State Highway 9N which brought down the primary between poles 134 and 135, thereby requiring the opening of the switch at pole 130 while repairs were made. This event interrupted 1,437 customers (27%) and accounted for 2,347 customer-hours interrupted (15%).
 - The second of these interruptions was the result of the failure of a single phase, 7.62/4.8 kV step down transformer which only impacted 109 customers (2%) but took over 10 hours to replace accounting for 1,112 customer-hours interrupted (7%).
- Accidents were the second largest cause of interruptions on the Brook Road 36955 in 2016, however, only one accident related event impacted more than 80 customers. That event was the result of a motor vehicle accident near pole 117 on State Highway 9N which locked out a 3-phase line recloser at pole 107 State Highway 9N interrupting service to 1,665 customers (31%) and accounting for 2,220 customer-hours interrupted (14%).

- The four major distribution interruptions listed above, when combined, accounted for only 7% of the interruptions experienced by the Brook Road 36955 in 2016, but they affected 4,458 customers (83%) and accounted for 11,997 customer-hours of interruption (77%).
- Forty of the 58 interruptions (69%) experienced on the Brook Road 36955 in 2016 affected twelve or fewer customers, and twenty-one of those affected only one or two customers.

Actions Taken:

- There are four 3-phase reclosers and one single-phase recloser on the Brook Road 36955. Two of the 3-phase reclosers were originally installed in 1996 and were both upgraded in 2009 while the other two 3-phase reclosers were installed in 2007. The single phase recloser was installed in 2008.
- A project was completed in 2010 to rebuild Murray Road along the road and it was converted to 7.62 kV in 2011 at a total cost of approximately \$194,000.
- A project was completed in 2011 to rebuild and convert Middle Grove Road to 13.2 kV at a cost of approximately \$328,500.
- A project to rebuild Young Road between Lake Desolation Road and Boy Haven Road along the road and convert it to 7.62 kV was completed in 2013 at a cost of approximately \$142,746.
- A project was completed in 2013 to rebuild a section of Greene Road to move it to the road at a cost of approximately \$85,858.
- A project was completed in 2015 to construct a 13.2 kV feeder tie between the Brook Road 36955 and the Corinth 28551 along State Highway 9N at a total cost of about \$1,253,676. This feeder tie was used to help reduce the length of the interruption that the Brook Road 36955 experienced during the motor vehicle accident described within the Problem Analysis.
- A project was completed in early 2016 to extend 3-phase, 13.2 kV on Wilton Road at a cost of approximately \$70,145
- An ERR was performed on the Brook Road 36955 in 2007 and the fuse additions and changes recommended therein were completed in 2008 at a cost of approximately \$300,000.
- An I&M foot patrol was performed on the Brook Road 36955 in 2012 and all maintenance has been completed.
- Tree trimming and a hazard tree review which removed 646 danger trees was completed on the Brook Road 36955 in FY2017.

Action Plan:

- An I&M foot patrol of the Brook Road 36955 is scheduled for 2017.
- A project is scheduled for FY18 that will rebuild over 2,000 feet of rear lot distribution along Coy Road and convert it to 7.62 kV.
- A project is budgeted for FY20 to rebuild a section of Barney Road along the road and convert it to 7.62 kV.
- Install loop scheme reclosers to automate the feeder tie between the Brook Road 36955 and the Corinth 28851.
- Rebuild Lake Desolation Road from Daketown Road to Kilmer Road to 3 phase and relocate to the road where feasible.

18. RIPARIUS 29395 – 4.8 kV

Profile: 448 Customers, 26.5 Circuit Miles

Indices: CAIDI = 3.73, SAIFI = 4.38

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	12	85.71%	1,084	55.25%	2,990	40.87%
3	OVERLOADS	1	7.14%	496	25.28%	2,129	29.10%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	1	7.14%	382	19.47%	2,197	30.03%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	0	0.00%	0	0.00%	0	0.00%
Totals		14	100.00%	1,962	100.00%	7,316	100.00%

Problem Analysis:

- While trees accounted for 12 of the 14 interruptions on the Riparius 29395 in 2016, one of those interruptions was actually the result of a tree on the Warrensburg-Chestertown #6, 34.5 kV sub-transmission line. This interruption impacted all 447 customers (23%) and accounted for 566 customer-hours interrupted (8%).
- The 13 interruptions on the Riparius 29395 in 2016 which were attributed to the distribution system interrupted 1,515 customers (77%) and accounted for 6,750 customer-hours interrupted (92%) for a distribution SAIFI of 3.38 and CAIDI of 4.46.
- There was only one tree-related interruption on the actual Riparius 29395 distribution feeder in 2016 that interrupted more than 100 customers. That event occurred when a tree took down primary on Igema Road blowing a fuse at pole 111 State Highway 8 thereby interrupting 136 customers (7%) and accounting for 303 customer-hours interrupted (4%). However, there were four tree related events on the Riparius 29395 distribution feeder in 2016 which interrupted between 91 and 95 customers. Those four events combined interrupted 370 customers (19%) and accounted for 1,517 customer-hours interrupted (21%).
- The interruption due to an overload was the largest interruption on the Riparius 29395 feeder in 2016. This event occurred on December 29th due to the large number of transient residents visiting during Christmas break, whose camps have electric heat. This event repeatedly blew the fuse at pole 130 State Highway 8 affecting 496 customers (25%) and accounting for 2,129 customer-hours interrupted (29%).
- The equipment related interruption on the Riparius 29395 in 2016 was caused by a failed insulator at pole 106 State Highway 8. This resulted in a wire laying on a cross arm which blew the fuse on pole 153 State Highway 8, thereby interrupting 382 customers (19%) and accounting for 2,197 customer-hours interrupted (30%).

Actions Taken:

- There are no line reclosers on the Riparius 29395.
- An I&M foot patrol was performed on the Riparius 29395 in 2013 and all identified maintenance has been completed.
- A fuse coordination study was performed on the Riparius 29395 in early 2017 and the recommended fuse changes and additions were forwarded to Design.
- An I&M foot patrol of the Warrensburg - Chestertown #6, and Chestertown – North Creek #2, 34.5 kV transmission lines was completed in 2016.
- The Warrensburg – Chestertown #6, 34.5 kV transmission line was widened in 2011 at a cost of approximately \$850,000.

Action Plan:

- An I&M foot patrol of the Riparius 29395 is scheduled for 2018.
- Tree trimming and a hazard tree review are scheduled for the Riparius 29395 in FY2018.
- Complete fuse changes and additions recommend within fusing study.
- A small capital improvement project has been designed to create a single-phase feeder tie between the Pottersville 42451 and the Riparius 29395 along U.S. Highway 9. Construction will begin after all necessary easements have been obtained.
- Complete all identified maintenance on the Warrensburg - Chestertown #6, 34.5 kV and Chestertown – North Creek #2, 34.5 kV transmission lines.
- Integrated Vegetation Management is scheduled on the Warrensburg – Chestertown #6, 34.5 kV transmission line in FY2018.
- Integrated Vegetation Management is scheduled on the Chestertown – North Creek #2, 34.5 kV transmission line in FY2018.

19. UNION STREET 37652 – 13.2 kV

Profile: 913 Customers, 73.7 Circuit Miles

Indices: CAIDI = 1.82, SAIFI = 3.53

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	50.00%	2,082	64.58%	2,503	42.55%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	27.78%	1,118	34.68%	3,305	56.19%
6	ACCIDENTS	1	5.56%	6	0.19%	13	0.22%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	16.67%	18	0.56%	62	1.05%
Totals		18	100.00%	3,224	100.00%	5,882	100.00%

Problem Analysis:

- Equipment was the second largest cause of interruptions on the Union Street 37652 in 2016, accounting for five of the 18 interruptions (28%). The largest equipment related interruption on the Union Street 37652 in 2016 occurred on the Cement Mountain-Cambridge #2, 34.5 kV sub-transmission line when a conductor from the North Troy-Hoosick #5, 115 kV line fell across the sub-transmission causing the line to lock out. This event impacted 908 customers (28%) and accounted for 2,285 customer-hours interrupted (39%).
- The seventeen interruptions on the Union Street 37652 in 2016 which were attributed to the distribution system interrupted 2,316 customers (72%) and accounted for 3,597 customer-hours interrupted (61%) for a distribution SAIFI of 2.54 and CAIDI of 1.55.
- Trees were the number one cause of interruptions on the Union Street 37652 in 2016. However, only three of these tree related interruptions affected more than 54 customers. When combined, these three events interrupted a total of 1,985 customers (62%) and accounted for 2,397 customer-hours of interruption (41%).
 - The first of these interruptions occurred when a tree fell between poles 3 and 4 on Academy Street causing the station breaker to lock-out impacting 910 customers (28%). However, power was restored to all customers in 30 minutes, thereby accounting for only 455 customer-hours interrupted (8%).
 - The second of these interruptions also locked-out the station breaker when a tree branch fell across two phases of 3-phase mainline at pole 20 Union Street less than 2,000 feet outside the substation. This event interrupted 906 customers (28%) and accounted for 1,087 customer-hours interrupted (18%).

- The last of these interruptions was caused by a tree which took down the rear lot primary adjacent to English Road blowing a fuse on pole 50 County Highway 59, thereby interrupting 169 customers (5%) and accounting for 855 customer-hours interrupted (15%).
- One of the five equipment related interruption on the Union Street 37652 in 2016 was the result of a distribution conductor loop burning open, thereby affecting 201 customers (6%) and accounting for 975 customer-hours of interruption (17%).
- These four large distribution interruptions when combined with the interruption on the sub-transmission system, accounted for only 22% of the interruptions on the Union Street 37652 in 2016, but interrupted 3,094 customers (96%) and accounted for 5,657 customer-hours of interruption (96%).
- Eleven of the 18 interruptions (61%) experienced on the Union Street 37652 in 2016 affected 10 or fewer customers.

Actions Taken:

- There are two 3-phase reclosers on the Union Street 37652 both of which were installed in 2009.
- An ERR was performed on the Union Street 37652 in 2009 and the recommended fuse changes were completed in 2011 at a cost of \$198,834.
- Tree trimming and a hazard tree review which removed 78 danger trees was completed on the Union Street 37652 in FY2017.
- A capital improvement project was completed in early 2015 at a cost of \$420,402, to rebuild and convert to approximately 1.3 miles of 3-phase 13.2 kV mainline on State Highway 372, in order to relieve an overloaded 13.2/4.8 kV step down transformer.
- A maintenance foot patrol of the Union Street 37652 was completed in 2015 and all level 1 and 2 maintenance has been completed.
- An I&M foot patrol on the Cement Mountain-Cambridge #2, 34.5 kV sub-transmission line was completed in 2014 and all level 1 and 2 maintenance has been completed.
- An I&M foot patrol on the Cambridge-Hoosick #3, 34.5 kV sub-transmission line was completed in 2016.
- Integrated Vegetation Management was completed on the Cambridge – Hoosick #3, 34.5 kV transmission line in FY2015.
- Integrated Vegetation Management was completed on the Cement Mountain – Cambridge #2, 34.5 kV transmission line in FY2015.

Action Plan:

- Complete all identified level 3 maintenance on the Union Street 37652.
- A capital improvement project is scheduled for FY2020 to construct approximately 2,600 feet of new 7.62 kV single-phase distribution on Content Farm and Wallace Roads to allow the removal of approximately 2,700 feet of rear lot distribution built during rural electrification.
- A capital improvement project is scheduled for FY2021 to construct 600 feet of new single-phase distribution on Center Cambridge Road and approximately 1,000 feet on Brownell Road, to allow the removal of an estimated 2,500 feet of inaccessible, rear lot distribution along Brownell Road.
- Complete all identified level 3 maintenance on the Cement Mountain-Cambridge #2, 34.5 kV sub-transmission line.
- Complete all maintenance on the Cambridge-Hoosick #3, 34.5 kV sub-transmission line.

20. WILTON 32952 – 13.2 kV

Profile: 1,524 Customers, 67.8 Circuit Miles
Indices: CAIDI = 2.19, SAIFI = 3.33

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	35.71%	2,077	40.94%	5,560	50.01%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	1	7.14%	9	0.18%	112	1.00%
6	ACCIDENTS	5	35.71%	2,747	54.15%	5,042	45.35%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	21.43%	240	4.73%	405	3.64%
Totals		14	100.00%	5,073	100.00%	11,118	100.00%

Problem Analysis:

- Trees were tied with accidents at five for the largest number of interruptions on the Wilton 32952 in 2016. The largest tree related interruption on the Wilton 32952 in 2016 was the result of a tree falling at pole 17 Mount McGregor Road which locked-out the station breaker, thereby impacting 1,530 customers (30%) and accounting for 4,248 customer-hours interrupted (38%).
- Two of the five accident related interruptions on the Wilton 32952 in 2016 were motor vehicle accidents which interrupted over 1,000 customers. Combined, these two events interrupted 2,524 customers (50%) and accounted for 4,575 customer-hours of interruption (41%).
 - The first of these interruptions was the result of a motor vehicle accident on County Highway 32, which broke pole 46. The switches at pole 64 County Highway 32 were opened to make the area safe while the motor vehicle accident was cleared, thereby interrupting 1,013 customers (20%) and accounting for 1,853 customer-hours interrupted (17%).
 - The second of these interruptions occurred when a motor vehicle accident broke pole 32 on Wilton-Gansevoort Road causing the station breaker to lock-out. The feeder was subsequently sectionalized to return service to as many customers as possible while the motor vehicle accident was cleared. This accident interrupted 1,502 customers (30%) and accounted for 2,722 customer-hours interrupted (24%).
- When combined, the three large interruptions listed above accounted for only 21% of the interruptions experienced on the Wilton 32952 in 2016, but they impacted a total of 4,045 customers (80%) and accounted for 8,823 customer-hours interrupted (79%).
- Three of the 14 interruptions (21%) experienced on the Wilton 32952 in 2016 affected ten or fewer customers.

Actions Taken:

- There are two 3-phase reclosers on the Wilton 32952 both of which were installed in 2007 and both of which had setting changes in 2014 to better coordinate with the new station breakers installed at that time.
- A project was completed in 2012 at a cost of \$22,368 to address an overloaded single-phase ratio transformer on U.S. Highway 9 by installing a second single phase ratio transformer on Washburn Road and reconfiguring the feeder to split the load between the two ratio transformers.
- A capital project was completed on the Wilton 32952 in 2013 at a cost of \$917,484 to rebuild approximately 7,600 feet of U.S. Highway 9 to 3-phase, 13.2 kV and another 5,200 feet to single phase, 7.62 kV to address major voltage issues along U.S. Highway 9 as the load in that area continued to grow beyond the capabilities of the distribution system.
- The 10/12.5 MVA, 34.5/13.2 kV substation transformer in the Wilton substation failed in early 2015 and was replaced with a new 12/16/20 MVA, 34.5/13.2 kV substation transformer. In addition, a 34.5 kV line recloser was installed on the source side of the new station transformer to replace the fuses which were used to protect the old transformer. The new substation transformer and recloser were placed in service in December of 2015.
- An I&M foot patrol was completed on the Wilton 32952 in 2013 and all identified maintenance has been completed.
- Tree trimming and a hazard tree review which removed 137 danger trees was completed on the Wilton 32952 in FY2016.

Action Plan:

- An I&M foot patrol of the Wilton 32952 is scheduled for 2018.
- A capital improvement project is budgeted for FY2022 to rebuild approximately 1.7 miles of State Highway 32 to relieve a soon to be overloaded single phase ratio transformer and create a feeder tie to the Wilton 32951 at the far east end of both feeders.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Feeder	Year	Action Plan	Est. Completion Date	Approx. Cost	Comments
Gilmantown Road	15451	2016	Replace County Hwy. 11 pole 147 recloser control.	Jul-17	\$41.7k	WR 17187649 Awaiting scheduling
Gilmantown Road	15451	2016	Replace State Hwy. 8 pole 204 recloser	Jul-17	\$44.2k	WR 20185209 Awaiting scheduling
Gilmantown Road	15451	2016	Replace Lapp Insulators on Northville-Wells #1 and Wells-Gilmantown #2, 23 kV sub-transmission lines.	TBD		
Gilmantown Road	15451	2016	Northville-Mayfield #8 helicopter patrol.	Dec-17		
Chestertown	04252	2016	Maintenance foot patrol.	Dec-17		
Chestertown	04252	2016	Minor Storm Hardening on Palisades Road.	Apr-18	\$555k	WR #17758670. Awaiting permits.
Chestertown	04252	2016	Complete Warrensburg-Chestertown #6 maintenance.	Feb-19		
Chestertown	04252	2016	Complete Chestertown-North Creek #2 maintenance.	Feb-19		
Chestertown	04252	2016	Warrensburg-Chestertown #6 IVM.	Apr-18		Aerial patrolled 7/22/2015.
Chestertown	04252	2016	Chestertown-North Creek #2 IVM.	Apr-18		Aerial patrolled 7/22/2015.
Hague Road	41853	2016	Maintenance foot patrol.	Dec-18		
Hague Road	41853	2016	Tree trimming and hazard tree review.	Apr-19		
Hague Road	41853	2016	Convert Lord Howe St. to 7.62 kV.	Apr-18	\$31.5k	WR #17505683
Hague Road	41853	2016	Replace Lake George submarine cable.	Apr-21	\$2.6M	Project C050522. In Design.
Hague Road	41853	2016	Construct feeder tie to Hague Road 52.	Apr-21	\$1.6M	Project C050717.
Hague Road	41853	2016	Ticonderoga-Whitehall #3 IVM.	Apr-18		
Northville	32252	2016	Complete level 2 maintenance.	Oct-17		
Northville	32252	2016	Complete level 3 maintenance.	Oct-19		
Northville	32252	2016	Tree trimming and hazard tree review.	Apr-18		
Northville	32252	2016	Replace Lapp Insulators on Northville-Wells #1 and Wells-Gilmantown #2, 23 kV sub-transmission lines.	TBD		
Northville	32252	2016	Northville-Mayfield #8 helicopter patrol.	Dec-17		
Fort Gage	31954	2016	Complete level 3 maintenance.	Nov-18		
Fort Gage	31954	2016	Rebuild State Highway 9L.	Apr-19	\$997	Project C050680. Design complete.
Fort Gage	31954	2016	Complete Fort Gage-Queensbury #2 level 3 maintenance.	Mar-19		
Fort Gage	31954	2016	Warrensburg-Fort Gage #8 maintenance foot patrol.	Dec-17		
Schroon Lake	42951	2016	Complete level 3 maintenance	Sep-17		
Schroon Lake	42951	2016	Minor Storm Hardening on Hoffman Road.	Apr-18	\$356k	Project C052252. Design complete.
Schroon Lake	42951	2016	Minor Storm Hardening on Blue Ridge Road.	Apr-19	\$1,076k	Project C052248. Awaiting APA permit.
Schroon Lake	42951	2016	Complete Warrensburg-Chestertown #6 maintenance.	Feb-19		
Schroon Lake	42951	2016	Warrensburg-Chestertown #6 IVM.	Apr-18		
Northville	32251	2016	Complete level 3 maintenance.	Jul-19		
Northville	32251	2016	Replace Lapp Insulators on Northville-Wells #1 and Wells-Gilmantown #2, 23 kV sub-transmission lines.	TBD		
Northville	32251	2016	Northville-Mayfield #8 helicopter patrol.	Dec-17		
Union Street	37654	2016	Complete level 3 maintenance.	Jun-18		
Union Street	37654	2016	Rebuild & convert Turnpike Road to 13.2 kV.	Apr-20	\$1.040M	Project C055735. In ROW.
Union Street	37654	2016	Lincoln Hill Road Rebuild Phase 1.	Apr-20	\$120k	Project C056625. Awaiting design.
Union Street	37654	2016	Complete Cement Mtn.-Cambridge #2 maintenance.	Nov-17		
Union Street	37654	2016	Complete Cambridge-Hoosick #3 maintenance.	Sep-19		
Brook Road	36954	2016	Maintenance foot patrol.	Dec-17		
Brook Road	36954	2016	Tree trimming and hazard tree review.	Apr-19		
Brook Road	36954	2016	Construct loop scheme with Brook Road 36958.	Apr-18	\$100k	

Station	Feeder	Year	Action Plan	Est. Completion Date	Approx. Cost	Comments
Brook Road	36954	2016	Rebuild & convert State Hwy. 50 to 13.2 kV.	Apr-21	\$844k	Project C048584. Design complete.
Brook Road	36954	2016	Rebuild and convert Old Ballston Ave.	Apr-21	\$143k	Project C068126. In design.
Scofield Road	45053	2016	Complete level 3 maintenance.	Oct-17		
Scofield Road	45053	2016	Tree trimming and hazard tree review.	Apr-19		
Scofield Road	45053	2016	Stony Creek/Hadley Road load balancing.	Dec-17	\$82.4k	WR #21358925. Design complete.
Scofield Road	45053	2016	Minor Storm Hardening on Harrisburg Road.	Apr-20	\$330k	Project C057289. In ROW.
Wells	20881	2016	Complete level 3 maintenance.	Jul-18		
Wells	20881	2016	Tree trimming and hazard tree review.	Apr-19		
Wells	20881	2016	Replace Lapp Insulators on Northville-Wells #1 and Wells-Gilmantown #2, 23 kV sub-transmission lines.	TBD		
Wells	20881	2016	Northville-Mayfield #8 helicopter patrol.	Dec-17		
Bolton	28451	2016	Complete level 2 maintenance.	Jul-17		
Bolton	28451	2016	Complete level 3 maintenance.	Jul-19		
Bolton	28451	2016	Tree trimming and hazard tree review.	Apr-18		
Bolton	28451	2016	Rebuild Trout Lake Road to transfer load to Bolton 28452.	Apr-18	\$574k	Project C049560. Awaiting construction.
Bolton	28451	2016	Construct 3Ø feeder tie to Warrensburg 32151.	Apr-19	\$1,068	Project CD00606. In ROW.
Bolton	28451	2016	Complete Fort Gage-Queensbury #2 maintenance.	Mar-19		
Bolton	28451	2016	Warrensburg-Fort Gage #8 maintenance foot patrol.	Dec-17		
Pottersville	42451	2016	Complete level 2 maintenance.	Jul-17		
Pottersville	42451	2016	Complete level 3 maintenance.	Jul-19		
Pottersville	42451	2016	Tree trimming and hazard tree review.	Apr-20		
Pottersville	42451	2016	Build single phase feeder tie to Riparius 29395.	Apr-18	\$93k	WR #13868440. In ROW.
Pottersville	42451	2016	Convert County Hwy. 15 to 13.2 kV.	Apr-20	\$1.184M	Project C050682. Design complete.
Pottersville	42451	2016	Complete Warrensburg-Chestertown #6 maintenance.	Feb-19		
Pottersville	42451	2016	Warrensburg-Chestertown #6 IVM.	Apr-18		
Whitehall	18751	2016	Maintenance foot patrol	Dec-17		
Whitehall	18751	2016	Tree trimming and hazard tree review.	Apr-18		
Whitehall	18751	2016	Rebuild County Hwy. 7 and convert to 7.62 kV.	Apr-18	\$80k	WR #23117426. Design complete.
Whitehall	18751	2016	3Ø line extension on U.S. Hwy. 4 and Golf Course Road.	Apr-18	\$199k	Project C074915. Design complete.
Indian Lake	31075	2016	Complete level 3 maintenance.	Nov-18		
Indian Lake	31075	2016	Tree trimming and hazard tree review.	Apr-20		
Indian Lake	31075	2016	Indian Lake-North Creek #1 maintenance foot patrol.	Dec-18		
Indian Lake	31076	2016	Complete level 3 maintenance.	Nov-18		
Indian Lake	31076	2016	Tree trimming and hazard tree review.	Apr-20		
Indian Lake	31076	2016	Review Indian Lake 30176 for possible reclosers.	Jun-17		
Indian Lake	31076	2016	Indian Lake-North Creek #1 maintenance foot patrol.	Dec-18		
Brook Road	36955	2016	Maintenance foot patrol.	Dec-17		
Brook Road	36955	2016	Rebuild and convert Coy Road to 7.62 kV.	Apr-17	\$173k	Project C064989. In ROW.
Brook Road	36955	2016	Rebuild and convert Barney Road to 7.62 kV.	Apr-20	\$331k	Project C047978. In ROW.
Brook Road	36955	2016	Automate feeder tie with Corinth 28851 on Route 9N.	Apr-18	\$85k	
Brook Road	36955	2016	Rebuild and convert Lake Desolation Road to 13.2 kV.	Apr-21	\$311	Project C050691. In ROW.
Riparius	29395	2016	Maintenance foot patrol	Dec-18		
Riparius	29395	2016	Tree trimming and hazard tree review.	Apr-18		

Station	Feeder	Year	Action Plan	Est. Completion Date	Approx. Cost	Comments
Riparius	29395	2016	Complete fuse changes and additions.	Dec-17	\$60k	WR #23400701. In Design.
Riparius	29395	2016	Build single phase feeder tie to Pottersville 42451.	Apr-18	\$93k	WR #13868440. In ROW.
Riparius	29395	2016	Complete Warrensburg-Chestertown #6 maintenance.	Feb-19		
Riparius	29395	2016	Complete Chestertown-North Creek #2 maintenance.	Feb-19		
Riparius	29395	2016	Warrensburg-Chestertown #6 IVM.	Apr-18		
Riparius	29395	2016	Chestertown-North Creek #2 IVM.	Apr-18		
Union Street	37652	2016	Complete level 3 maintenance.	Mar-18		
Union Street	37652	2016	Construct distribution on Content Farm and Wallace Rds.	Apr-20	\$125k	Project C056710. In Design.
Union Street	37652	2016	Rebuild Center Cambridge & Brownell Roads.	Apr-21	\$104k	Project C056657. In ROW.
Union Street	37652	2016	Complete Cement Mtn.-Cambridge #2 maintenance.	Nov-17		
Union Street	37652	2016	Complete Cambridge-Hoosick #3 maintenance.	Sep-19		
Wilton	32952	2016	Maintenance foot patrol	Dec-18		
Wilton	32952	2016	Rebuild and convert State Hwy. 32 to 3Ø.	Apr-22	\$680k	Project C019570. In Design.

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Year	Action Plan	Actual/Est. Completion Date	Actual/ Est. Cost	Comments
Gilmantown Road	15451	2015	Replace County Hwy. 11 pole 147 recloser control.	Apr-17	\$39k	WR 17187649 Delayed to FY18.
Gilmantown Road	15451	2015	Replace State Hwy. 8 pole 204 recloser	Apr-17	\$45k	WR 20185209 Delayed to FY18.
Gilmantown Road	15451	2015	Place the replacement 23 kV sectionalizer in service.	Mar-16		Completed 3/23/2016.
Gilmantown Road	15451	2015	Northville-Mayfield #8 level 3 maintenance.	Jun-16		10 pole replacements remaining.
Gilmantown Road	15451	2015	Wells-Gilmantown Road #2 level 3 maintenance.	Oct-16		Completed 10/14/2016.
Gilmantown Road	15451	2015	Complete level 3 maintenance.	Oct-16	\$110k	Completed 10/2/2016.
Gilmantown Road	15451	2015	Northville-Mayfield #8 IVM.	Apr-16		Completed.
Gilmantown Road	15451	2015	Northville-Wells #1 IVM.	Apr-17		Completed.
Gilmantown Road	15451	2015	Wells-Gilmantown Road #2 IVM.	Apr-17		
St. Johnsville	33551	2015	Relocate State Hwy. 5S pole 81 recloser.	Apr-17	\$41k	WR 20196696 Awaiting scheduling
St. Johnsville	33551	2015	Complete level 3 maintenance.	Jul-16	\$156k	Completed 7/13/2016.
St. Johnsville	33551	2015	Rebuild distribution along Paris Road.	Apr-19	\$90k	Project C055323. In design.
St. Johnsville	33551	2015	Rebuild distribution along Sanders Road.	Apr-21	\$304k	Project C029439. In ROW.
St. Johnsville	33551	2015	Rebuild 2,100 ft. of Bellinger Road.	Apr-23	\$105k	Project C050381.
Port Henry	38551	2015	Review Port Henry 38551 for animal guards.	Apr-17		In process.
Port Henry	38551	2015	Maintenance foot patrol.	Dec-17		On target.
Port Henry	38551	2015	Rebuild State Hwy. 9N between poles 195 & 205.	Apr-17	\$190k	Project CD00326. Under construction.
Port Henry	38551	2015	Ticonderoga-Republic #2. level 3 maintenance.	Nov-16		Completed 10/31/2016.
Port Henry	38551	2015	Ticonderoga-Whitehall #3 IVM.	Apr-18		
Schroon Lake	42951	2015	Complete level 3 maintenance	Sep-17	\$772k	On target.
Schroon Lake	42951	2015	Minor Storm Hardening on Hoffman Road.	Apr-17	\$417k	Project C052252. Delayed to FY18 due to ROW issue which is resolved.
Schroon Lake	42951	2015	Minor Storm Hardening on Blue Ridge Road.	Apr-21	\$1,076k	Project C052248. Awaiting APA permit.
Schroon Lake	42951	2015	Warrensburg-Chestertown #6 maintenance foot patrol.	Dec-16		Completed 2/25/2016.
Schroon Lake	42951	2015	Warrensburg-Chestertown #6 IVM.	Apr-18		
Smith Bridge	46453	2015	Tree trimming and hazard tree review.	Apr-17		Complete.
Smith Bridge	46453	2015	Complete level 3 maintenance.	Feb-17	\$91k	Completed 2/28/2017.
Clinton	36653	2015	Construct distribution along Cherry Valley Road.	Nov-16	\$155k	Project C046870. Completed 11/23/2016.
Clinton	36653	2015	Construct distribution along Baum & Burrell Roads.	Apr-19	\$230k	Project C050684. Securing ROW
Clinton	36653	2015	Build 3Ø feeder tie to Clinton 36654.	Apr-20	\$340K	Project C053628. Awaiting scheduling
Clinton	36653	2015	Maintenance foot patrol.	May-16		Completed 5/2/2016.
Brook Road	36955	2015	Maintenance foot patrol.	Dec-17		On target.
Brook Road	36955	2015	Tree trimming and hazard tree review.	Apr-17		Complete.
Brook Road	36955	2015	Rebuild & convert Coy Road to 7.62 kV.	Apr-17	\$160k	Project C064989. Delayed in ROW.
Brook Road	36955	2015	Rebuild & convert Barney Road to 7.62 kV.	Apr-20	\$327k	Project C047978. In ROW.
Brook Road	36955	2015	Automate feeder tie with Corinth 28851 on Route 9N.	Apr-18	\$85k	On target.
Brook Road	36955	2015	Rebuild and convert Lake Desolation Road to 13.2 kV.	Apr-22	\$311	Project C050691. In ROW.
Wells	20881	2015	Complete level 2 maintenance.	May-16	\$52k	Completed 5/18/2016.
Wells	20881	2015	Complete level 3 maintenance.	Jul-18	\$167k	On target.
Bolton	28451	2015	Maintenance foot patrol.	Jul-16		Completed 7/21/2016.
Bolton	28451	2015	Rebuild Trout Lake Road to transfer load to Bolton 28452.	Apr-19	\$574k	Project C049560. Moved up into FY18.
Bolton	28451	2015	Construct 3Ø feeder tie to Warrensburg 32151.	Apr-20	\$1,068	Project CD00606. In ROW.
Bolton	28451	2015	Fort Gage-Queensbury #2 maintenance foot patrol.	Mar-16		Completed 3/10/2016.

Station	Feeder	Year	Action Plan	Actual/Est. Completion Date	Actual/ Est. Cost	Comments
Bolton	28451	2015	Warrensburg-Fort Gage #8 maintenance foot patrol.	Dec-17		On target.
Burgoyne	33751	2015	Maintenance foot patrol	Sep-16		Completed 9/19/2016.
Burgoyne	33751	2015	Extend 3Ø on State Highway 40.	Apr-18	\$95k	WR# 18071911. Awaiting construction.
Burgoyne	33751	2015	Rebuild County Hwy. 46 & North Ridge Road.	Apr-20	\$72k	Project CD00208. Awaiting construction.
Burgoyne	33751	2015	Rebuild Durkeetown Road to 3Ø.	Apr-20	\$320k	Project CD00222. In ROW.
Burgoyne	33751	2015	Rebuild County Hwy. 41.	Apr-20	\$39k	Project C049790. Awaiting construction.
Wilton	32951	2015	Complete level 2 maintenance.	Aug-16	\$39k	Completed 8/11/2016.
Wilton	32951	2015	Complete level 3 maintenance.	Oct-18	\$15k	On target.
Wilton	32951	2015	Tree trimming and hazard tree review.	Apr-17		Complete.
Pottersville	42451	2015	Maintenance foot patrol.	Jul-16		Completed 7/21/2016.
Pottersville	42451	2015	Build single phase feeder tie to Riparius 29395.	Apr-17	\$90k	WR #13868440. Delayed to FY18 due to ROW.
Pottersville	42451	2015	Convert County Hwy. 15 to 13.2 kV.	Apr-24	\$530k	Project C050682. Preliminary design complete.
Pottersville	42451	2015	Warrensburg-Chestertown #6 maintenance foot patrol.	Feb-16		Completed 2/25/2016.
Pottersville	42451	2015	Warrensburg-Chestertown #6 IVM.	Apr-18		
Warrensburg	32152	2015	Complete level 3 maintenance.	Mar-16	\$110k	Completed 3/3/2016.
Warrensburg	32152	2015	Address overloaded ratio transformer on US Route 9.	May-16	\$2k	WR #21215972. Completed 5/9/2016.
Fort Gage	31954	2015	Complete level 2 maintenance.	May-16	\$12k	Completed 5/2/2016.
Fort Gage	31954	2015	Complete level 3 maintenance.	Nov-18		On target.
Fort Gage	31954	2015	Tree trimming and hazard tree review.	Apr-17		Complete.
Fort Gage	31954	2015	Rebuild State Highway 9L.	Apr-19	\$997	Project C050680. In ROW.
Fort Gage	31954	2015	Fort Gage-Queensbury #2 maintenance foot patrol.	Mar-16		Completed 3/10/2016.
Fort Gage	31954	2015	Warrensburg-Fort Gage #8 maintenance foot patrol.	Dec-17		On target.
Crown Point	24951	2015	Complete level 2 maintenance.	Mar-16	\$172k	Completed 3/23/2016.
Crown Point	24951	2015	Complete level 3 maintenance.	Jul-18	\$114k	On target.
Crown Point	24951	2015	Build single phase on Creek Rd. & remove cross lot.	Apr-20	\$76k	Project C048906. In ROW.
Crown Point	24951	2015	Ticonderoga-Republic #2. level 3 maintenance.	Oct-16		Completed 10/31/2016.
Crown Point	24951	2015	Ticonderoga-Whitehall #3 IVM.	Apr-18		
Hague Road	41853	2015	Complete level 3 maintenance.	Dec-16	\$39k	Completed 12/21/2015.
Hague Road	41853	2015	Convert Lord Howe St. to 7.62 kV.	Apr-17	\$20k	WR #17505683. Delayed to FY18..
Hague Road	41853	2015	Replace Lake George submarine cable.	Apr-21	\$740k	Project C050522. In Design.
Hague Road	41853	2015	Construct feeder tie to Hague Road 52.	Apr-23	\$900k	Project C050717. Preliminary design complete.
Hague Road	41853	2015	Ticonderoga-Republic #2 level 3 maintenance.	Oct-16		Completed 10/31/2016.
Hague Road	41853	2015	Ticonderoga-Whitehall #3 IVM.	Apr-18		
Schoharie	23452	2015	Complete level 3 maintenance.	Aug-16	\$151k	Completed 7/9/2016.
Schoharie	23452	2015	Tree trimming and hazard tree review.	Apr-17		Complete.
Wilton	32952	2015	Complete level 3 maintenance.	Apr-16	\$37k	Completed 4/1/2016.
Wilton	32952	2015	Rebuild and convert State Hwy. 32 to 13.2 kV.	Apr-22	\$680k	Project C019570. In design.
Vail Mills	39252	2015	Replace State Hwy. 29 recloser control at Honeywell Rd.	Apr-17	\$15k	WR 16818711 Delayed to FY18.
Vail Mills	39252	2015	Convert Honeywell Corners Road to 13.2 kV.	Apr-20	\$300k	WR 17276177 Awaiting scheduling
Vail Mills	39252	2015	Convert County Hwy. 16 to 13.2 kV to Shaw Corners.	Apr-20	\$235k	WR 17223613 Awaiting scheduling

Station	Feeder	Year	Action Plan	Actual/Est. Completion Date	Actual/ Est. Cost	Comments
Vail Mills	39252	2015	Maintenance foot patrol.	Dec-17		On target.
Vail Mills	39252	2015	Tree trimming and hazard tree review.	Apr-17		Complete.
Port Henry	38552	2015	Maintenance foot patrol.	Nov-16		Completed 11/9/2016.
Port Henry	38552	2015	Rebuild Moriah & Edgemont Roads & convert to 7.62 kV.	Apr-20	\$462k	Project C019070. Moved into FY18.
Port Henry	38552	2015	Convert Dalton Hill Rd. to 7.62 kV.	Apr-20	\$160k	Project C054284. In ROW.
Port Henry	38552	2015	Ticonderoga-Republic #2. leve1 3 maintenance.	Oct-16		Completed 10/31/2016.
Port Henry	38552	2015	Ticonderoga-Whitehall #3 IVM.	Apr-18		

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS THAT CAUSED THE BELOW MINIMUM PERFORMANCE.

For the fifth consecutive year, the Northeast Region failed to meet at least one of the PSC minimum requirements. While SAIFI in the Northeast Region got decreased again in 2016 reaching its lowest level since 2011, it still failed to meet the minimum goal of 1.20 for the fifth consecutive year with a SAIFI of 1.21. Meanwhile, the Northeast Region failed the CAIDI goal for just the second time since 2010 but was lower than 2015 with a CAIDI of 2.83.

In 2016, the Northeast Region experienced 2,414 interruptions. The vast majority of these interruptions (99%) occurred on the distribution system. However, 17 of these interruptions (0.7%) occurred on the transmission or sub-transmission systems interrupting 45,485 customers (17%) and accounting for 178,034 customer-hours interrupted (24%). The SAIFI and CAIDI of the transmission and sub-transmission systems in 2016 were 0.21 interruptions and 3.91 hours respectively. The impact of these 17 interruptions on SAIFI, having a SAIFI of 0.21 interruptions for just 17 interruptions or a SAIFI of 0.01 per interruption, versus a distribution SAIFI of 0.94 interruptions per year or 0.0004 per interruption was the reason the Northeast Region did not meet the SAIFI goal of 1.20 interruptions. In addition, the CAIDI of these 17 transmission-related interruptions was 3.91 hours compared to a distribution CAIDI of 2.69 hours which while still above the goal of 2.50 hours was driven even higher by the transmission interruptions.

There were also three substation-related interruptions in the Northeast Region in 2016 interrupting 12,460 customers (5%) and accounting for 13,798 customer-hours interrupted (2%). The SAIFI and CAIDI of substation-related interruptions in 2016 was 0.06 interruptions and 1.11 hours.

The distribution system accounted for 99% of the interruptions in the Northeast Region in 2016 interrupting 205,812 customers (78%) and accounting for 553,485 customer-hours interrupted (74%). The SAIFI of the distribution system in 2016 met the SAIFI goal for the Northeast Region with a distribution SAIFI of 0.94 interruptions but did not meet the CAIDI goal with a distribution CAIDI of 2.69 hours. This represents an increase in distribution SAIFI from 2015 when it was 0.87 interruptions and an decrease in distribution CAIDI which was 2.82 hours in 2015.

b. **PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES.**

Interruptions on the transmission and sub-transmission systems have a very significant impact on reliability in the Northeast Region. This is due to the fact that many of these lines are radial through heavily forested, environmentally sensitive, inaccessible areas. Many projects have been completed and more are planned to improve the performance of the transmission system. The Inspection & Maintenance program itself is also continually improving the sub-transmission and transmission systems by identifying equipment in need of replacement before it fails. In addition, the Forestry Department is widening the right-of-ways of many of the transmission and sub-transmission lines as much as easements and adjacent property owners will allow in an attempt to reduce the impact of trees in what is a very heavily forested area. It is expected that the combination of these efforts will make an improvement to the performance of the transmission and sub-transmission systems, however, no manner of improvements will eliminate all of these interruptions.

The contribution of substation outages is significant to the regional performance indices, as can be seen in the data provided in the previous section. It is very difficult to predict substation equipment failures in advance, and in a continued attempt to minimize these interruptions the Northeast Region, Power Delivery Group will continue to perform maintenance on circuit breakers, transformers, protection relay system equipment, and communication packages. In addition, functional testing on feeder and line positions will be continued in addition to the replacement of older equipment as scheduled and the evaluation of substations for animal protection if needed.

A Storm Hardening Program was created in 2013 in order to identify areas struck by a large number of non-reportable storms. The program will try to improve the infrastructure in these areas to better withstand these storms, without impacting our customers. This program will include the replacement of bare conductors with tree wire, the replacement of existing poles with larger diameter poles, the reduction of the distance between poles, and the moving of some rear lot facilities to the road.

The construction and automation of feeder ties will continue in the Northeast Region. Since 2010, 12 loop schemes or load transfer schemes have been placed in service in the Northeast Region to automate feeder ties, primarily to back-up radial sub-transmission. More feeder ties will be reviewed for possible automation in 2017.

Tree trimming around the distribution will remain a priority in 2017 in order to address what is typically the single largest contributor to customer interruptions within the Northeast Region. In addition, there is a list of distribution improvement capital projects to be designed and/or constructed in FY2017, which can be viewed in the 1.f section of this report.

Additional efforts to improve restoration times are listed below:

- The Divisional Reliability Team will continue to investigate and analyze outages impacting greater than 2,500 customers or more than 50,000 customer-minutes-interrupted (CMI). This effort will look at the interruptions impacting the greatest number of customers to see what could have been done better to reduce the length of the interruption or to have eliminated it altogether.
- A continued emphasis is being placed on switching priorities with all crews and supervisors. This effort is meant to develop in all personnel involved in outage restoration an ingrained approach to reduce restoration times by switching before fixing whenever possible.
- An ongoing emphasis to increase teamwork between dispatch groups and field crews should help to improve callout times.
- A continued focus on installing fault circuit indicators will be pursued in FY18 in an effort to help the Eastern Regional Control Center (ERCC) and Field Operations in order to reduce restoration times.

I. NORTHERN REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS Info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 2.25)	1.87	1.51	2.13	1.78	2.08	2.50
SAIFI (Target 1.00)	1.35	1.50	1.06	1.47	1.13	1.05
SAIDI	2.52	2.27	2.25	2.61	2.35	2.61
Interruptions	1,654	1,507	1,590	1,753	1,620	1,481
Customers Interrupted	182,146	201,982	141,476	197,152	150,786	139,291
Customers Hours Interrupted	340,842	305,632	301,519	350,148	313,515	348,001
Customers Served	135,005	134,501	134,091	133,987	133,357	133,141
Customers Per Interruption	110.12	134.03	88.98	112.47	93.08	94.05
Availability Index	99.9713	99.9741	99.9743	99.9702	99.9732	99.97
Interruptions/1000 Customers	12.25	11.20	11.86	13.08	12.15	11.12

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Northern Region met its CAIDI reliability target and did not meet its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 1.35 interruptions, 35% above the PSC goal of 1.00 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.87 in 2016, 17% below the PSC's regional target of 2.25 hours.

The 2016 CAIDI result was 24% above the 2015 result of 1.51 minutes, and 4% below the previous 5-year average of 1.95 hours. The 2016 SAIFI was 10% below the 2015 result of 1.5 interruptions, and 9% above the previous 5-year average of 1.24 interruptions.

In 2016, excluding major storms, the Northern Region experienced 19 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (19 of 1,654), 20% of the region's total customers interrupted (CI), (36,273 of 182,146), and 14% (47,102 of 340,841) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 1.3 hours, and a SAIFI of 0.27 interruptions.

The number of transmission-related interruptions decreased from 24 in 2015 to 19 in 2016 (a decrease of 21%). The number of customers interrupted decreased from 42,846 in 2015, to 36,273 in 2016 (a decrease of 15%), while the customer-hours interrupted increased from 39,149 in 2015, to 47,102 in 2016 (an increase of 20%).

In 2016, excluding major storms, the Northern Region experienced 10 substation interruptions. These interruptions accounted for 1% of the region's total interruptions (10 of 1,654), 12% of the region's total customers interrupted, (22,371 of 182,146), and 8% (28,470 of 340,841) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.27 hours, and a SAIFI of 0.17 interruptions.

The number of substation-related interruptions increased from 7 to 10 from 2015 to 2016 (an increase of 43%). The number of customers interrupted increased from 21,958 in 2015, to 22,371 in 2016 (an increase of 2%), while the customer-hours interrupted decreased from 29,589 in 2015, to 28,470 in 2016 (a decrease of 4%).

In 2016, excluding major storms, the Northern Region experienced 1,625 distribution interruptions. These interruptions accounted for 98% of the region's total interruptions (1,625 of 1,654), 68% of the region's total customers interrupted, (123,502 of 182,146), and 78% (265,269 of 340,841) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 2.15 hours, and a SAIFI of 0.91 interruptions.

The number of distribution-related interruptions increased from 1,476 to 1,625 from 2015 to 2016 (an increase of 10%). The number of customers interrupted decreased from 137,178 in 2015, to 123,502 in 2016 (a decrease of 10%), while the customer-hours interrupted increased from 236,893 in 2015, to 265,269 in 2016 (an increase of 12%).

c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and Year-to-Date SAIFI for the Northern Region for 2016.

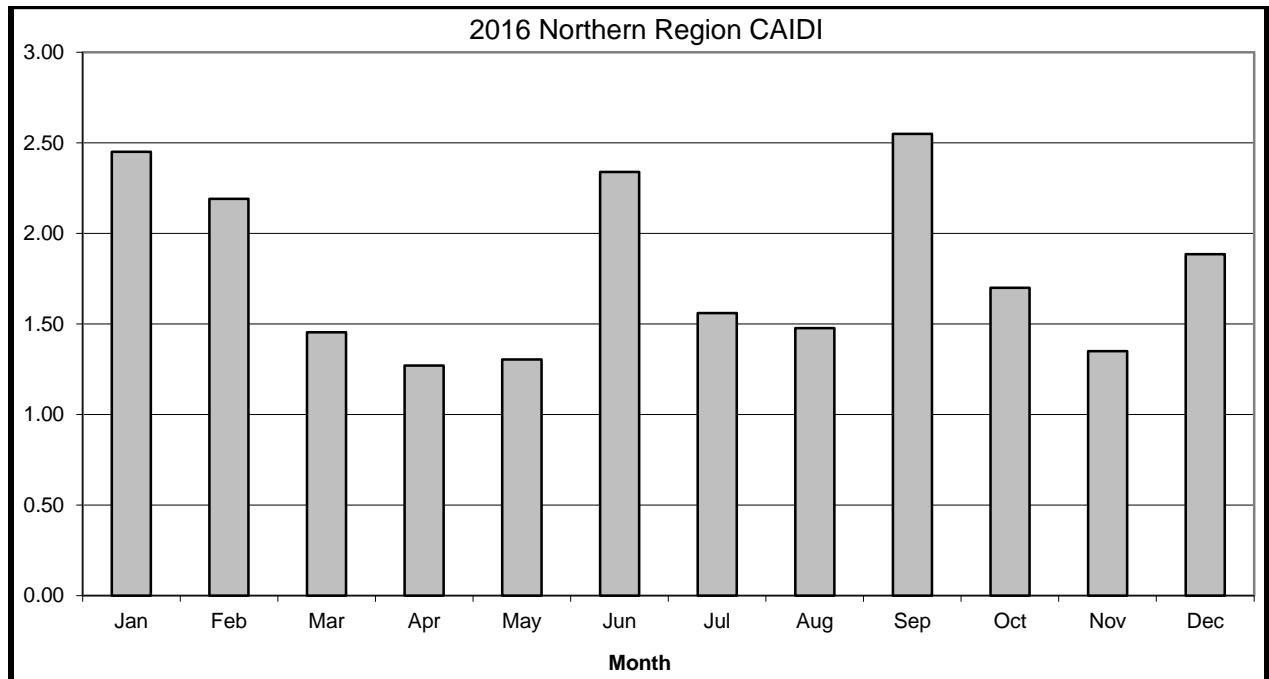
The CAIDI graph shows the individual CAIDI by month. The Northern Region was below the PSC minimum CAIDI of 2.25 hours for nine of the 12 months in 2016, with January, June, and September being the three months above target.

- Excluding Major Storms there were 2.45 hours of CAIDI for January which was mainly due to equipment failures and tree related outages. There were 74 interruptions due to trees during January. Trees accounted for 3% (5,942 of 182,146) customers interrupted and 6% (22,107 of 340,842) customer-hours interrupted. In total there were 9% (15,886 of 182,146) customers interrupted and 11% (38,913 of 340,842) customer-hours interrupted during January.
- Excluding Major Storms there were 2.34 hours of CAIDI for June which was mainly due to tree related outages. There were 98 interruptions due to trees during June. Tree related interruptions accounted for 9% (15,948 of 182,146) of the customers interrupted and 14% (46,564 of 340,842) customer-hours interrupted. In total there were 21% (38,917 of 182,146) customers interrupted and 27% (91,012 of 340,842) customer-hours interrupted during January.
- Excluding Major Storms there were 2.55 hours of CAIDI for September mainly due to equipment failures and tree related outages. There were 39 interruptions due to trees during September. Trees accounted for 1% (2,010 of 182,146) customers interrupted and 2% (5,420 of 340,842) customer-hours interrupted. In total there were 3% (6,289 of 182,146) customers interrupted and 5% (16,629 of 340,842) customer-hours interrupted during September.

The SAIFI graph shows the cumulative SAIFI by month. The Northern Region ended the year at 1.35 interruptions, above the minimum SAIFI target of 1.00 interruptions.

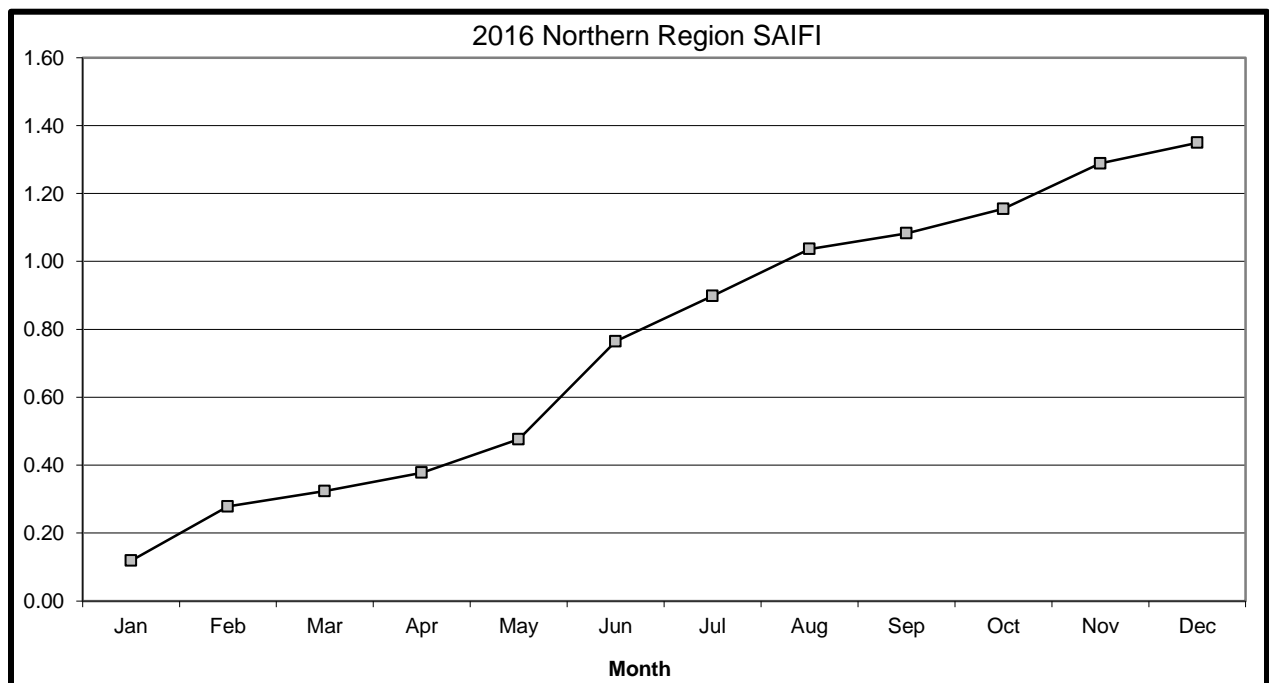
- Excluding Major Storms there were 88,452 customers interrupted from May to August. Between May through August SAIFI increased by 0.66. This is mainly due to the 23,255 customer interruptions caused by trees and the 19,417 customer interruptions caused by equipment failures. Equipment failures and tree interruptions from May through August were mostly due to Distribution outages and accounted for 13% (24,284 of 189,416) customers interrupted. Unknown causes during June, July, and August were mostly due to Substation and Transmission outages and accounted for 6% (17,723 of 305,632) customers interrupted.

GRAPH OF MONTHLY CAIDI AND SAIFI FOR THE NORTHERN REGION



PSC CAIDI Goal:	
Minimum	2.25
2016 Actual	1.87

PSC SAIFI Goal:	
Minimum	1.00
2016 Actual	1.35



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	109	0	271	1,680	621	544
02 Tree Contacts	550	535	423	648	523	441
03 Overloads	8	4	5	4	12	6
04 Oper. Error	4	6	5	7	4	5
05 Equipment	385	363	437	440	388	390
06 Accidents	245	221	223	203	225	208
07 Prearranged	36	24	27	44	32	41
08 Cust. Equip.	0	1	0	0	0	1
09 Lightning	61	62	104	113	92	173
10 Unknown	365	291	366	294	344	216
Total	1,763	1,507	1,861	3,433	2,241	2,025

2) Customers Interrupted by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	7,270	0	25,497	179,934	87,242	58,492
02 Tree Contacts	44,582	42,152	25,046	50,843	43,582	35,555
03 Overloads	49	22	23	11	51	10
04 Oper. Error	3,063	6,958	1,363	23,751	264	4,599
05 Equipment	65,689	61,693	58,753	54,385	47,888	45,612
06 Accidents	29,019	30,478	18,953	36,868	28,403	29,844
07 Prearranged	5,229	21,675	4,413	10,398	2,410	6,397
08 Cust. Equip.	0	158	0	0	0	10
09 Lightning	4,255	6,491	6,159	3,933	8,522	7,450
10 Unknown	30,260	32,355	26,766	16,963	19,666	9,814
Total	189,416	201,982	166,973	377,086	238,028	197,783

3) Customer-Hours Interrupted by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	51,793	0	191,989	1,869,757	437,346	243,363
02 Tree Contacts	126,982	86,194	58,157	116,268	131,574	84,829
03 Overloads	86	45	63	33	114	64
04 Oper. Error	1,719	6,249	6,396	23,989	235	2,458
05 Equipment	115,525	99,439	143,469	101,453	85,899	167,243
06 Accidents	38,178	39,607	30,680	49,951	37,665	51,590
07 Prearranged	4,545	12,702	6,222	16,334	4,365	5,988
08 Cust. Equip.	0	137	0	0	0	2
09 Lightning	7,665	11,100	18,996	10,494	16,995	16,807
10 Unknown	46,143	50,157	37,535	31,625	36,667	19,020
Total	392,635	305,361	493,506	2,219,905	750,860	591,364

4) Interruptions, Customers Interrupted and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer-hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	109	6.2%	7,270	3.8%	51,793	13.2%
02 Tree Contacts	550	31.2%	44,582	23.5%	126,982	32.3%
03 Overloads	8	0.5%	49	0.0%	86	0.0%
04 Oper. Error	4	0.2%	3,063	1.6%	1,719	0.4%
05 Equipment	385	21.8%	65,689	34.7%	115,525	29.4%
06 Accidents	245	13.9%	29,019	15.3%	38,178	9.7%
07 Prearranged	36	2.0%	5,229	2.8%	4,545	1.2%
08 Cust. Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	61	3.5%	4,255	2.2%	7,665	2.0%
10 Unknown	365	20.7%	30,260	16.0%	46,143	11.8%
Total	1,763	100.0%	189,416	100.0%	392,635	100.0%

e. **INTERRUPTION REVIEW BY PSC CAUSE CODES**

Cause Code 01 - Major Storms

In 2016, Major Storms accounted for 6% of interruptions, 4% of customers interrupted, and 13% of Customer-Hours Interrupted.

Interruptions due to Major Storm were up from 2015, and down 83% over the 5 year average. Customers interrupted due to Major Storms were down from 2015, and down 90% over the 5 year average. Customer-Hours interrupted were down 27% from 2015 and down 91% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 33% of interruptions, 24% of customers interrupted, and 37% of Customer-Hours Interrupted.

Interruptions due to Tree Contacts were up 3% from 2015, and up 7% over the 5 year average. Customers interrupted due to Tree Contacts were up 6% from 2015, and up 13% over the 5 year average. Customer-Hours interrupted were up 47% from 2015 and up 33% over the 5 year average.

Tree Contacts were the largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 0% of interruptions, 0% of customers interrupted, and 0% of Customer-Hours Interrupted.

Interruptions due to Overloads were up 100% from 2015, and up 29% over the 5 year average. Customers interrupted due to Overloads were up 123% from 2015, and up 109% over the 5 year average. Customer-Hours interrupted were up 91% from 2015 and up 35% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Errors accounted for 0% of interruptions, 2% of customers interrupted, and 1% of Customer-Hours Interrupted.

Interruptions due to Operator Error were down 33% from 2015, and down 25% over the 5 year average. Customers interrupted due to Operator Error were down 56% from 2015, and down 59% over the 5 year average. Customer-Hours interrupted were down 72% from 2015 and down 78% over the 5 year average.

Operator Error was the 8th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failure accounted for 23% of interruptions, 36% of customers interrupted, and 34% of Customer-Hours Interrupted.

Interruptions due to Equipment Failure were up 6% from 2015, and down 5% over the 5 year average. Customers interrupted due to Equipment Failure were up 6% from 2015, and up 22% over the 5 year average. Customer-Hours interrupted were up 16% from 2015 and down 3% over the 5 year average.

Equipment Failures were the 2nd largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 15% of interruptions, 16% of customers interrupted, and 11% of Customer-Hours Interrupted.

Interruptions due to Accidents were up 11% from 2015, and up 13% over the 5 year average. Customers interrupted due to Accidents were down 5% from 2015, and up 0% over the 5 year average. Customer-Hours interrupted were down 4% from 2015 and down 9% over the 5 year average.

Accidents were the 4th largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 2% of interruptions, 3% of customers interrupted, and 1% of Customer-Hours Interrupted.

Interruptions due to Prearranged were up 50% from 2015, and up 7% over the 5 year average. Customers interrupted due to Prearranged were down 76% from 2015, and down 42% over the 5 year average. Customer-Hours interrupted were down 64% from 2015 and down 50% over the 5 year average.

Prearranged was the 6th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 – Lightning

In 2016, Lightning accounted for 4% of interruptions, 2% of customers interrupted, and 2% of Customer-Hours Interrupted.

Interruptions due to Lightning were down 2% from 2015, and down 44% over the 5 year average. Customers interrupted due to Lightning were down 34% from 2015, and down 35% over the 5 year average. Customer-Hours interrupted were down 31% from 2015 and down 48% over the 5 year average.

Lightning was the 5th largest cause of interruptions in 2016.

Cause Code 10 – Unknown

In 2016, Unknown causes accounted for 22% of interruptions, 17% of customers interrupted, and 14% of Customer-Hours Interrupted.

Interruptions due to Unknown causes were up 25% from 2015, and up 21% over the 5 year average. Customers interrupted due to Unknown causes were down 6% from 2015, and up 43% over the 5 year average. Customer-Hours interrupted were down 8% from 2015 and up 32% over the 5 year average.

Unknown causes were the 3rd largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2015/2016 SPENDS:

The Northern Region continues to work on capital projects in order to maintain customer satisfaction and future reliability. Some specific projects that were constructed in either CY16 or will be constructed in CY17 are listed below, in addition to a description of a major infrastructure project.

There are load relief projects scheduled to be completed throughout the Northern Region. Most of these load relief projects are ratio transformer replacements or voltage conversions. Line reconductoring is also included in the voltage conversions where appropriate.

There are projects where lines are being rebuilt or reconductored. These projects are either the result of the company's Storm Hardening program, engineering reliability reviews (ERRs) conducted on the Worst Performing Circuits, or are the responses to customer inquiries via the Quick Resolution System (QRS).

Major Capital Projects for Northern Region:

Region	Project Name	Project Type	Fin Sys Proj. No.	Finish	Total Spend
Northern	Union-Franklin 24-46kV refurb.	Specific	C052510	06/2016	\$1.973M
Northern	06338 NR-Mill St-Failed Ductline	Specific	C032650	10/2016	\$1.499M
Northern	COFFEEN ST - TB4 D/F - C071047	Specific	C071047	06/2016	\$1.201M
Northern	SEWALL'S ISLAND #2 TRF REPLACEMENT - C058406	Specific	C058406	07/2016	\$1.144M

g. DISCUSSION OF REGIONAL PERFORMANCE OF LVAC NETWORK DISTRIBUTION SYSTEM(S):

City of Watertown – Mill Street LVAC Network

The Watertown LVAC Network serves the Public Square area of the City of Watertown as well as one or two blocks of the following streets: Court Street, Arsenal Street, Stone Street, Washington Street, Clinton Street, Franklin Street, and State Street. This network is supplied by 5 – 4.8kV feeders, all from the Mill Street Substation. This system serves approximately 440 customer accounts and experienced a peak load of approximately 4.26MVA in 2016.

The table below lists the breaker operations in 2016 that were a result of a fault and/or failure.

Substation	Feeder Number	Breaker Number	# Breaker Operations from Failures
Mill Street	74860	R600	0
Mill Street	74871	R710	0
Mill Street	74872	R720	0
Mill Street	74873	R730	0
Mill Street	74874	R740	0

As shown above, the Watertown LVAC Network experienced zero feeder outages in 2016. There were no customer interruptions, and at no time was the network operated beyond its single contingency (N-1) design criteria.

No major events associated with the network occurred in 2016.

Annual maintenance consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks. Equipment maintenance in 2016 consisted of manhole and vault inspections, network protector and transformer inspections, and network protector operation checks.

There are three major projects:

1. Mill Street Replace Ductline Project

During the field investigation to complete the design for the replacement of the remaining lead-covered 5kV cable that supplies the network, it was discovered that approximately 375 feet of ductline containing all five network feeders had swelled around the cables, preventing the removal of the old lead cable.

Furthermore, there are no spare conduits within which to install new cables. The ductline was replaced in 2015. The final portions of lead-covered primary cable were removed and new non-lead covered primary cable was installed in the new ductline in 2016. Also, new secondary cable was installed in the new ductline,

and the existing secondary cable was removed.

2. Mill Street - 2014 Upgrades - N-1 Project

Based upon the 04/2014 Network Study, 4.8kV Feeders 74872 and 74875 are to be reconnected onto Bus "E" to eliminate the loss of 3 network feeders for a 4.8kV station Bus "D" failure. In addition, N7322, N7403, & Vault 104 (Feeder 74860 source) will be transferred onto 74875 so that the feeder relay settings can be changed for Arc Flash Mitigation at the station. The project is scheduled to start in 2018.

3. Mill Street - 2014 Upgrades - N-2 Project

Based upon the 04/2014 Network Study, two 500kVA network transformers will be installed to support the general network during a double contingency condition, as follows: (1) install N6005 near the corner of Mill Street & Factory Avenue; (2) install N7405 near the corner of Franklin Street & Public Square. The project is scheduled to start in 2019.

2. OPERATING CIRCUIT LISTS

This section includes the following three tables and Worst Performing Circuit analysis for the Northern Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with 3 Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by number of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

NORTHERN REGION

FEEDER #	A CUST. SERVED	B TOTAL INTER.	C # CUST. INTER.	D CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
NORTH CARTHAGE 81652	2,221	39	7,810	15,459	3.52	6.96	1.98	2
HIGLEY 92451	1,060	30	3,403	8,874	3.21	8.37	2.61	1
CHASM FALLS 85251	1,065	41	3,816	6,883	3.58	6.46	1.80	1
INDIAN RIVER 32358	1,749	29	4,868	8,468	2.78	4.84	1.74	5
W ADAMS 87554	2,445	52	6,739	9,387	2.76	3.84	1.39	1
BREMEN 81556	1,659	59	3,089	9,212	1.86	5.55	2.98	4
LOWVILLE 77354	2,621	56	5,553	10,522	2.12	4.01	1.89	1
FRANKLIN 84361	161	20	1,515	2,968	9.41	18.44	1.96	2
GILPIN BAY 95661	851	30	2,046	4,632	2.40	5.44	2.26	1
BLOOMINGDALE 84162	820	14	5,083	6,653	6.20	8.11	1.31	2
DEKALB 98455	1,129	29	1,805	6,523	1.60	5.78	3.61	2
MCADOO 91453	708	18	2,339	3,796	3.30	5.36	1.62	2
LAKE COLBY 92758	1,907	25	3,741	7,779	1.96	4.08	2.08	0
HIGLEY 92452	1,389	28	4,226	4,395	3.04	3.16	1.04	0
STAR LAKE 72762	651	13	1,401	7,225	2.15	11.10	5.16	1
THOUSAND ISL 81452	2,113	28	3,609	7,934	1.71	3.76	2.20	3
LOON LAKE 83761	186	11	1,280	3,658	6.88	19.67	2.86	3
THOUSAND ISL 81458	2,287	20	3,108	12,704	1.36	5.55	4.09	3
NICHOLVILLE 86062	1,110	15	2,483	6,295	2.24	5.67	2.54	2
RIVERVIEW 84762	231	13	1,892	2,869	8.19	12.42	1.52	3

Regional Goals:
CAIDI Min. 2.25
SAIFI Min. 1.00

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES

NORTHERN REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
NORTH CARTHAGE 81652	1.98	2.76	1.46	1.33	3.52	3.60	1.88	3.33
HIGLEY 92451	2.61	1.23	2.85	2.46	3.21	1.88	3.76	2.15
CHASM FALLS 85251	1.80	4.22	7.01	4.81	3.58	0.96	2.19	2.86
INDIAN RIVER 32358	1.74	4.33	3.52	3.47	2.78	0.09	0.47	1.24
W ADAMS 87554	1.39	2.11	1.82	1.30	2.76	0.96	1.06	6.77
BREMEN 81556	2.98	0.94	2.34	2.13	1.86	7.41	1.29	1.37
LOWVILLE 77354	1.89	1.33	8.87	2.11	2.12	3.06	1.15	2.64
FRANKLIN 84361	1.96	0.95	1.89	4.24	9.41	5.83	2.59	2.96
GILPIN BAY 95661	2.26	1.57	2.03	3.55	2.40	0.82	0.77	1.52
BLOOMINGDALE 84162	1.31	1.02	2.31	1.42	6.20	3.40	0.62	1.87
DEKALB 98455	3.61	1.04	0.66	1.50	1.60	1.11	2.27	1.08
MCADOO 91453	1.62	1.34	2.07	1.57	3.30	2.25	0.49	4.93
LAKE COLBY 92758	2.08	1.06	2.00	1.04	1.96	0.69	0.56	1.63
HIGLEY 92452	1.04	0.76	0.44	1.44	3.04	1.57	1.56	1.04
STAR LAKE 72762	5.16	1.61	3.75	3.31	2.15	2.37	0.25	0.06
THOUSAND ISL 81452	2.20	2.46	2.18	2.87	1.71	4.44	2.87	4.41
LOON LAKE 83761	2.86	1.73	4.01	1.21	6.88	8.30	3.80	6.28
THOUSAND ISL 81458	4.09	2.16	1.88	1.52	1.36	2.54	2.18	2.23
NICHOLVILLE 86062	2.54	2.16	1.90	2.12	2.24	1.40	1.75	1.37
RIVERVIEW 84762	1.52	1.20	2.65	1.51	8.19	5.38	1.60	4.30

Regional Goals:
CAIDI Min. 2.25
SAIFI Min. 1.00

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

NORTHERN REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

For 2016, the Company identified twenty Worst Performing Circuits in the Northern Region. The list consists of thirteen 13.2kV circuits, six 4.8kV circuits, and one 2.4kV circuit.

1. NORTH CARTHAGE 81652 – 13.2kV

Profile: 2,221 Customers, 158.5 Circuit Miles
Indices: CAIDI = 1.98, SAIFI = 3.52

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	17	43.59%	1,593	20.40%	10,288	66.55%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	25.64%	2,161	27.67%	612	3.96%
6	ACCIDENTS	4	10.26%	1,521	19.48%	988	6.39%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	8	20.51%	2,535	32.46%	3,572	23.10%
Totals		39	100.00%	7,810	100.00%	15,459	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There was one substation interruption in 2016, on North Carthage Station which accounted for 29% of the customers interrupted (2,235 of 7,810) and 20% of the customer-hours interrupted (3,017 of 15,459). The station breaker tripped and locked out due to an unknown cause.
- There were 38 distribution interruptions in 2016, which accounted for 71% of the customers interrupted (5,575 of 7,810) and 80% of the number of customer-hours interrupted (12,441 of 15,459):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had zero recloser operations in 2016.
 - The distribution circuit had one interruption on South Bonaparte Road due to a tree falling. This interruption accounted for 14% of the customers interrupted (1,080 of 7,810) and 56% of the customer-hours interrupted (8,658 of 15,459).
 - The distribution circuit had three interruptions on Hunter Road due to a tree falling, a device failure, and an unknown interruption. These interruptions accounted for 19% of the customers interrupted (1,482 of 7,810) and 6% of the customer-hours interrupted (857 of 15,459).

This is the fifth time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2016, the Regional Forestry Department completed scheduled distribution cycle pruning.
- In 2013, the Regional Forestry Department completed the extended hazard tree maintenance.
- In August 2014, an I&M foot patrol was completed.
- The level 2 maintenance work identified from the feeder inspection was completed in August 2015.

Action Plan:

- The level 3 maintenance work identified from the feeder inspection will be completed by August 2017.
- The next scheduled distribution cycle pruning will be completed in 2022.
- The next extended hazard tree maintenance will be completed in 2018.
- This feeder is scheduled to be inspected again in 2019.
- As part of the Company's "Minor Storm Hardening" Program, North Shore Road will be rebuilt. Seven Thousand feet of rebuild of small conductor to tree wire has been approved.

2. HIGLEY 92451 – 13.2kV

Profile: 1,060 Customers, 92.4 Circuit Miles

Indices: CAIDI = 2.61, SAIFI = 3.21

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	16	53.33%	1,681	49.40%	6,809	76.73%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	7	23.33%	1,559	45.81%	1,842	20.76%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	1	3.33%	84	2.47%	15	0.17%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	6	20.00%	79	2.32%	207	2.33%
Totals		30	100.00%	3,403	100.00%	8,874	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were thirty distribution interruptions in 2016, which accounted for 100% of the customers interrupted (3,403 of 3,403) and 100% of the number of customer-hours interrupted (8,874 of 8,874):
 - This distribution circuit had one breaker operation due to a tree falling, which accounted for 31% of the customers interrupted (1,056 of 3,403) and 45% of the customer-hours interrupted (4,014 of 8,874).
 - The distribution circuit had six interruptions on Cayey Road, which accounted for 63% of the customers interrupted (2,141 of 3,403) and 53% of the customer-hours interrupted (4,667 of 8,874). Three interruptions were due to trees and three were due to device failures.
- This circuit has been on the worst performing circuit list four times in the past five years.

Action Taken:

- In 2014, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2016, the Regional Forestry Department completed the scheduled extended hazard tree removal.
- In 2010, an Engineering Reliability Review (ERR) was completed.
- In September 2015, an I&M foot patrol was completed.
- All level 2 maintenance work identified from the feeder inspection was completed by September, 2016.

- The feasibility of relocating the off road spans along HWY 56 have been reviewed. No actions are required at this time.

Action Plan:

- The feasibility of constructing 15,600 feet of 3-phase mainline along NYS Hwy 56 from Number Nine Road to East Hill Road to provide a second parallel route from the 115kV ROW has been reviewed. A project has been submitted and approved.
- The feasibility of rebuilding the Joe Indian Area has been reviewed. A project to rebuild 13,000 feet of single phase 4.8kV line to tree wire spanning on the road has been approved.
- The feasibility of building from Joe Indian Road to Sterling Pond Road to create a new tie that will eliminate off road line to Sterling Pond Road has been reviewed. A project has been submitted and approved.
- All level 3 maintenance work identified from the feeder inspection was completed by September, 2018.
- The next I&M foot patrol is scheduled for 2020.
- In 2020, the Regional Forestry Department is scheduled to perform distribution cycle pruning.
- The feeder will be monitored for the need for extended hazard tree removal.
- There are no further actions required.

3. CHASM FALLS 85251 – 13.2kV

Profile: 1,065 Customers, 83.6 Circuit Miles
Indices: CAIDI = 1.80, SAIFI = 3.58

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	25	60.98%	829	21.72%	3,915	56.87%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	12.20%	2,161	56.63%	1,666	24.20%
6	ACCIDENTS	1	2.44%	181	4.74%	211	3.07%
7	PREARRANGED	1	2.44%	58	1.52%	46	0.67%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	2.44%	6	0.16%	63	0.92%
10	UNKNOWN	8	19.51%	581	15.23%	982	14.26%
Totals		41	100.00%	3,816	100.00%	6,883	100.00%

Problem Analysis:

- There was one transmission interruption in 2016, due to a floating phase on the Malone-Chasm #23 line which accounted for 28% of the customers interrupted (1,056 of 3,816) and 11% of the customer-hours interrupted (774 of 6,883).
- There were zero substation interruptions in 2016.
- There were forty distribution interruptions in 2016 which accounted for 72% of the customers interrupted (2,760 of 3,816) and 89% of the customer-hours interrupted (6,109 of 6,883):
 - The distribution circuit had one circuit breaker operation in 2016 due to a device failure, which accounted for 28% of the customers interrupted (1,056 of 3,816) and 12% of the customer-hours interrupted (792 of 6,883).
 - The distribution circuit had one recloser operation due to an unknown cause, which accounted for 10% of the customers interrupted (386 of 3,816) and 1% of the customer-hours interrupted (100 of 6,883).
- This is the fourth time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2008, an Engineering Reliability Review (ERR) was completed.
- In 2009, three new reclosers were installed, on Fayette Road near Webber Road, on Fayette Road, and on Duane Road.
- In 2009, fusing of un-fused side taps, re-fusing of existing fuses and installing fuses on thirty-six main-line CSP transformers was completed.
- In September 2016, an I&M foot patrol was completed.

- In 2015, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2014, the Regional Forestry Department performed hazard tree removal.

Action Plan:

- All level 2 maintenance work identified from the feeder inspection will be completed by September 2017.
- All level 3 maintenance work identified from the feeder inspection will be completed by September 2019.
- The next distribution cycle pruning is scheduled for 2021.
- The feeder will be monitored for the need for extended hazard tree removal.
- An I&M foot patrol will be completed in 2021.
- There are no further actions required.

4. INDIAN RIVER 32358 – 13.2kV

Profile: 1,749 Customers, 141.9 Circuit Miles

Indices: CAIDI = 1.74, SAIFI = 2.78

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	7	24.14%	329	6.76%	1,831	21.62%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	8	27.59%	1,422	29.21%	4,602	54.34%
6	ACCIDENTS	6	20.69%	673	13.83%	1,358	16.03%
7	PREARRANGED	4	13.79%	2,370	48.69%	504	5.95%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	3.45%	1	0.02%	3	0.04%
10	UNKNOWN	3	10.34%	73	1.50%	170	2.01%
Totals		29	100.00%	4,868	100.00%	8,468	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were twenty-nine distribution interruptions in 2016, which accounted for 100% of the customers interrupted (4,868 of 4,868) and 100% of the number of customer-hours interrupted (8,468 of 8,468):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had one recloser operation on River Road due to a device failure, which accounted for 26% of the customers interrupted (1,265 of 4,868) and 42% of the customer-hours interrupted (3,547 of 8,468).
 - The distribution circuit had two interruptions on Cottage Hill Road, one due to a device failure and one due to a tree falling, which accounted for 7% of the customers interrupted (362 of 4,868) and 29% of the customer-hours interrupted (2,429 of 8,468).
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2015, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2014, the Regional Forestry Department completed the scheduled hazard tree removal.
- An I&M foot patrol was completed in April 2013.
- All level 2 maintenance work identified from the feeder inspection was completed in 2014.

- All level 3 maintenance work identified from the feeder inspection will be completed by April 2016.

Action Plan:

- An I&M foot patrol will be completed in 2018.
- The feeder will be monitored for the need for pruning and extended hazard tree removal.

5. W ADAMS 87554 – 13.2kV

Profile: 2,445 Customers, 170.1 Circuit Miles
Indices: CAIDI = 1.39, SAIFI = 2.76

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	17	32.69%	467	6.93%	2,275	24.23%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	12	23.08%	4,760	70.63%	5,237	55.79%
6	ACCIDENTS	12	23.08%	1,163	17.26%	1,568	16.70%
7	PREARRANGED	1	1.92%	56	0.83%	17	0.18%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	3	5.77%	146	2.17%	131	1.39%
10	UNKNOWN	7	13.46%	147	2.18%	160	1.70%
Totals		52	100.00%	6,739	100.00%	9,387	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were fifty-two distribution interruptions in 2016, which accounted for 100% of the customers interrupted (6,739 of 6,739) and 100% of the number of customer-hours interrupted (9,387 of 9,387):
 - The distribution circuit had two circuit breaker operations in 2016, both due to device failures, which accounted for 68% of the customer interrupted (4,611 of 6,739) and 52% of the customer-hours interrupted (4,918 of 9,387).
 - This is the third time this circuit has been on the Worst Performing Circuits List in the past five years.

Action Taken:

- In 2013, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2011, the Regional Forestry Department completed the scheduled hazard tree removals.
- In August 2016, an I&M foot patrol was completed.

Action Plan:

- County RTE 189 and County RTE 95 are being rebuilt to single phase 7.62kV.
- By August 2017, the level 2 maintenance work identified from the feeder inspection will be completed.
- By August 2019, the level 3 maintenance work identified from the feeder inspection will be completed.

- The next I&M foot patrol is scheduled for 2021.
- The next Regional Forestry Department hazard tree removal is scheduled for 2018.
- The next Regional Forestry Department cycle pruning is scheduled for 2019.
- At this time, no further action is required.

6. BREMEN 81556 – 13.2kV

Profile: 1,659 Customers, 129.2 Circuit Miles
Indices: CAIDI = 2.98, SAIFI = 1.86

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	30	50.85%	1,865	60.38%	4,961	53.86%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	16.95%	401	12.98%	2,399	26.04%
6	ACCIDENTS	4	6.78%	116	3.76%	392	4.25%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	3	5.08%	66	2.14%	136	1.48%
10	UNKNOWN	12	20.34%	641	20.75%	1,324	14.37%
Totals		59	100.00%	3,089	100.00%	9,212	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were fifty-nine distribution interruptions in 2016, which accounted for 100% of the customers interrupted (3,089 of 3,089) and 100% of the number of customer-hours interrupted (9,212 of 9,212):
 - The distribution circuit had one recloser operation due to a device failure, which accounted for 4% of the customers interrupted (113 of 3,089) and 18% of the customer-hours interrupted (1,661 of 9,212).
 - The distribution circuit had six interruptions on Erie Canal Road, which accounted for 40% of the customers interrupted (1,231 of 3,089) and 8% of the customer-hours interrupted (730 of 9,212). One interruption is due to a tree falling, one interruption was due to a device failure, and three interruptions were due to an unknown cause.
- This is the third time this circuit has been on the Worst Performing Circuits List in the past five years.

Action Taken:

- In 2011, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2014, the Regional Forestry Department completed the Enhance Hazard Tree Mitigation (EHTM).
- In August 2012, an I&M foot patrol was completed.

- In 2013, the level 2 maintenance work identified was completed.
- In 2015, the level 3 maintenance work identified was completed.

Action Plan:

- The next I&M foot patrol is scheduled to be inspected in 2017.
- The next extended hazard tree maintenance is scheduled for 2017.

7. LOWVILLE 77354 – 13.2kV

Profile: 2,621 Customers, 171.6 Circuit Miles
Indices: CAIDI = 1.89, SAIFI = 2.12

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	22	39.29%	794	14.30%	2,700	25.66%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	12	21.43%	3,560	64.11%	6,204	58.96%
6	ACCIDENTS	9	16.07%	942	16.96%	1,097	10.43%
7	PREARRANGED	1	1.79%	1	0.02%	5	0.05%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	3	5.36%	35	0.63%	79	0.75%
10	UNKNOWN	9	16.07%	221	3.98%	437	4.15%
Totals		56	100.00%	5,553	100.00%	10,522	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were fifty-six distribution interruptions in 2016, which accounted for 100% of the customers interrupted (5,553 of 5,553) and 100% of the number of customer-hours interrupted (10,522 of 10,522):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had three recloser operations in 2016, which accounted for 72% of the customers interrupted (3,989 of 5,553) and 57% of the customer-hours interrupted (5,992 of 10,522). One was due to a vehicle accident and two were due to device failures.
- This is the fifth time the circuit has been on the Worst Performing Circuits list in the last five years.

Action Taken:

- In 2014, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2015, the Regional Forestry Department completed the scheduled hazard tree maintenance.
- In September 2016, an I&M foot patrol was completed.
- The installation of automated switching on the substation's 115kV switches is complete.
- Construction of an internal feeder tie along Pine Grove Road from Number Four Road to Otter Creek Road has been completed.

Action Plan:

- The level 2 maintenance work identified from the feeder inspection will be completed by September 2017.
- The level 3 maintenance work identified from the feeder inspection will be completed by September 2019.
- The next I&M foot patrol will be completed in 2021.
- The next distribution cycle pruning is scheduled for 2020.
- The feeder will be monitored for extended hazard tree removal.

8. FRANKLIN 84361 – 4.8kV

Profile: 161 Customers, 24.9 Circuit Miles

Indices: CAIDI = 1.96, SAIFI = 9.41

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	40.00%	355	23.43%	962	32.40%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	30.00%	653	43.10%	549	18.51%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	2	10.00%	321	21.19%	669	22.52%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	5.00%	14	0.92%	107	3.59%
10	UNKNOWN	3	15.00%	172	11.35%	682	22.97%
Totals		20	100.00%	1,515	100.00%	2,968	100.00%

Problems Analysis:

- There were five transmission interruptions in 2016, which accounted for 53% of the customers interrupted (804 of 1,515) and 39% of the customer-hours interrupted (1,161 of 2,968). Three interruptions were due to device failures between Lake Colby and Bloomingdale on the #31 line. One interruption was due to a tree falling on the Malone #5 line. One interruption was due to an unknown cause on the Union-Franklin #34 line.
- There was one substation interruption at Union Station in 2016, which accounted for 11% of the customers interrupted (162 of 1,515) and 1% of the customer-hours interrupted (35 of 2,968). This was due to a device failure from broken insulators at Union Station.
- There were fourteen distribution interruptions in 2016, which accounted for 36% of the customers interrupted (549 of 1,515) and 60% of the number of customer-hours interrupted (1,772 of 2,968):
 - The distribution circuit had two breaker operations that were prearranged for maintenance which accounted for 21% of the customers interrupted (321 of 1,515) and 23% of the customer-hours interrupted (669 of 2,968).
- This is the second time the circuit has been on the Worst Performing Circuits list in the last five years.

Action Taken:

- In October 2013, an I&M foot patrol was completed.
- The level 2 maintenance work identified from the feeder inspection was completed by October 2014.
- The level 3 maintenance work identified from the feeder inspection was completed by October 2016.
- In 2015, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2009, the Regional Forestry Department completed the hazard tree removal.

Action Plan:

- The next distribution cycle pruning is scheduled for 2021.
- The next extended hazard tree maintenance is scheduled for 2018.
- The next I&M foot patrol is scheduled to be completed in 2018.

9. GILPIN BAY 95661 – 4.8kV

Profile: 851 Customers, 56.4 Circuit Miles

Indices: CAIDI = 2.26, SAIFI = 2.40

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	22	73.33%	1,516	74.10%	3,080	66.50%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	2	6.67%	357	17.45%	894	19.31%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	6.67%	108	5.28%	451	9.74%
10	UNKNOWN	4	13.33%	65	3.18%	206	4.44%
Totals		30	100.00%	2,046	100.00%	4,632	100.00%

Problem Analysis:

- There was one transmission interruption in 2016, which accounted for 42% of the customers interrupted (867 of 2,046) and 2% of the customer-hours interrupted (72 of 4,632). This interruption was due to a tree falling on the Malone #5 line.
- There were zero substation interruptions in 2016.
- There were twenty-nine distribution interruptions in 2016, which accounted for 58% of the customers interrupted (1,179 of 2,046) and 98% of the customer-hours interrupted (4,559 of 4,632):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - Seven interruptions occurred on Church Pond Road, which accounted for 17% of the customers interrupted (352 of 2,046) and 50% of the customer-hours interrupted (2,296 of 4,632). Five interruptions were due to trees and two were due to lightning.
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2010, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2008, the Regional Forestry Department completed the extended hazard tree maintenance.
- In October 2013, an I&M foot patrol was completed.
- In 2014, the level 2 maintenance work identified from the feeder inspection was completed.
- In 2016, the level 3 maintenance work identified from the feeder inspection was completed.

Action Plan:

- The next distribution cycle pruning is scheduled for 2017.
- The next extended hazard tree maintenance is scheduled for 2018.
- The feeder is scheduled for an I&M foot patrol again in 2018.
- There are no further actions required.

10. BLOOMINGDALE 84162 – 4.8kV

Profile: 820 Customers, 38.5 Circuit Miles
Indices: CAIDI = 1.31, SAIFI = 6.20

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	42.86%	990	19.48%	624	9.37%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	35.71%	3,224	63.43%	2,563	38.52%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	7.14%	8	0.16%	52	0.78%
10	UNKNOWN	2	14.29%	861	16.94%	3,415	51.33%
Totals		14	100.00%	5,083	100.00%	6,653	100.00%

Problem Analysis:

- There were five transmission interruptions in 2016, which accounted for 79% of the customers interrupted (4,040 of 5,083) and 87% of the customer-hours interrupted (5,792 of 6,653). Two were due to device failures between Lake Colby and Bloomingdale on the #31 line. One was due to a fire between Bloomingdale and Gabriels on the #35 line. One was due to a tree falling on the Malone #5 line. One was due to an unknown cause on the #35 line.
- There was one substation interruption in 2016, which accounted for 16% of the customers interrupted (820 of 5,083) and 3% of the customer-hours interrupted (178 of 6,653). This interruption was due to a device failure at Union Station.
- There were eight distribution interruptions in 2016, which accounted for 4% of the customers interrupted (223 of 5,083) and 10% of the customer-hours interrupted (683 of 6,653):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - Five interruptions were due to trees, one interruption was due to lightning, one interruption was due to a device failure, and one was due to an unknown cause.
- This is the first time this circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2015, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2008, the Regional Forestry Department completed the scheduled hazard tree removals.

- In April 2012, an I&M foot patrol was completed.
- All level 2 maintenance work identified during the inspection was completed by April 2013.
- All level 3 maintenance work identified during the inspection was completed by April 2015.

Action Plan:

- The next distribution cycle pruning is scheduled for 2021.
- The next extended hazard tree maintenance is scheduled for 2018.
- The next I&M foot patrol is scheduled for 2017.

11. DEKALB 98455 – 13.2kV

Profile: 1,129 Customers, 108.5 Circuit Miles
Indices: CAIDI = 3.61, SAIFI = 1.60

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	8	27.59%	842	46.65%	2,651	40.64%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	20.69%	346	19.17%	2,419	37.08%
6	ACCIDENTS	2	6.90%	36	1.99%	126	1.93%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	6.90%	13	0.72%	111	1.71%
10	UNKNOWN	11	37.93%	568	31.47%	1,216	18.64%
Totals		29	100.00%	1,805	100.00%	6,523	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were twenty-nine distribution interruptions in 2016, which accounted for 100% of the customers interrupted (1,805 of 1,805) as well as 100% of the number of customer-hours interrupted (6,523 of 6,523):
 - The distribution circuit had one recloser operation due to a tree falling, which accounted for 22% of the customers interrupted (403 of 1,805) and 16% of the customer-hours interrupted (1,052 of 6,523).
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2013, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2006, the Regional Forestry Department completed the scheduled hazard tree maintenance.
- In November 2011, an I&M foot patrol was completed.
- All level 2 maintenance work identified during the inspection was completed in 2012.
- All level 3 maintenance work identified during the inspection was completed in 2014.

Action Plan:

- The next distribution cycle pruning is scheduled for 2019.
- The feeder will be monitored for extended hazard tree removal.
- The feeder is scheduled for an I&M foot patrol in 2017.

12. MCADOO 91453 – 13.2kV

Profile: 708 Customers, 80.7 Circuit Miles
Indices: CAIDI = 1.62, SAIFI = 3.30

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	6	33.33%	747	31.94%	579	15.27%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	3	16.67%	730	31.21%	1,568	41.30%
6	ACCIDENTS	3	16.67%	106	4.53%	193	5.08%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	5.56%	2	0.09%	2	0.06%
10	UNKNOWN	5	27.78%	754	32.24%	1,453	38.29%
Totals		18	100.00%	2,339	100.00%	3,796	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were eighteen distribution interruptions in 2016, which accounted for 100% of the customers interrupted (2,339 of 2,339) as well as 100% of the number of customer-hours interrupted (3,796 of 3,796):
 - The distribution circuit had two circuit breaker operations in 2016, which accounted for 61% of the customers interrupted (1,416 of 2,339) and 76% of the customer-hours interrupted (2,884 of 3,796). One interruption was due to an unknown cause and one interruption was due to a device failure.
 - The distribution circuit had two recloser operations on Irish Settlement Road which accounted for 4% of the customers interrupted (92 of 2,339) and 6% of the customer-hours interrupted (215 of 3,796). Both interruptions were due to trees falling.
- This is the second time this feeder has been on the worst performing feeder list in the past five years.

Action Taken:

- In 2014, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2014, the Regional Forestry Department completed the hazard tree removals.
- In October 2012, an I&M foot patrol was completed.
- In 2013, the level 2 maintenance work identified from the feeder inspection was completed.

- In 2015, the level 3 maintenance work identified from the feeder inspection was completed.

Action Plan:

- An I&M foot patrol is scheduled in 2017.
- The next distribution cycle pruning is scheduled for 2020.
- The feeder will be monitored for extended hazard tree removal.

13. LAKE COLBY 92758 – 13.2kV

Profile: 1,907 Customers, 53.6 Circuit Miles
Indices: CAIDI = 2.08, SAIFI = 1.96

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	36.00%	2,215	59.21%	6,267	80.56%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	6	24.00%	1,344	35.93%	1,225	15.75%
6	ACCIDENTS	6	24.00%	135	3.61%	218	2.80%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	4.00%	2	0.05%	8	0.10%
10	UNKNOWN	3	12.00%	45	1.20%	61	0.79%
Totals		25	100.00%	3,741	100.00%	7,779	100.00%

Problem Analysis:

- There was one transmission interruption in 2016, which accounted for 51% of the customers interrupted (1,911 of 3,741) and 73% of the customer-hours (5,702 of 7,779). This interruption was due to a tree falling on the Malone #5 line.
- There were zero substation interruptions in 2016.
- There were twenty-four distribution interruptions in 2016, which accounted for 49% of the customers interrupted (1,830 of 3,741) and 27% of the customer-hours (2,077 of 7,779):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had a switch failure on Pecks Corner Road, which accounted for 34% of the customers interrupted (1,279 of 3,741) and 13% of the customer-hours (1,023 of 7,779).
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2013, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2011, the Regional Forestry Department completed the scheduled hazard tree maintenance.
- In July 2014, an I&M foot patrol was completed.
- All level 2 maintenance work identified during the inspection was completed in 2015.

Action Plan:

- The next distribution cycle pruning is scheduled for 2019.
- The next extended hazard tree maintenance is scheduled for 2018.
- The feeder is scheduled for an I&M foot patrol again in 2019.
- All level 3 maintenance work identified during the inspection will be completed by July 2017.

14. HIGLEY 92452 – 13.2kV

Profile: 1,389 Customers, 78.7 Circuit Miles
Indices: CAIDI = 1.04, SAIFI = 3.04

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	17	60.71%	1,493	35.33%	3,242	73.77%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	17.86%	2,276	53.86%	399	9.08%
6	ACCIDENTS	2	7.14%	328	7.76%	305	6.95%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	4	14.29%	129	3.05%	449	10.21%
Totals		28	100.00%	4,226	100.00%	4,395	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were twenty-eight distribution interruptions in 2016, which accounted for 100% of the customers interrupted (4,226 of 4,226), as well as 100% of the number of customer-hours interrupted (4,395 of 4,395):
 - The distribution circuit had one circuit breaker operations in 2016 due to a device failure which accounted for 33% of the customers interrupted (1,394 of 4,226) and 5% of the customer-hours interrupted (209 of 4,395).
 - The distribution circuit had four recloser interruptions, which accounted for 29% of the customers interrupted (1,238 of 4,226) and 55% of the customer-hours interrupted (2,406 of 4,395). One interruption was due to a vehicle accident and three were due to trees.
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2014, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2001, the Regional Forestry Department completed the scheduled hazard tree maintenance.
- In October 2016, an I&M foot patrol was completed.

Action Plan:

- The next distribution cycle pruning is scheduled for 2020.
- The next extended hazard tree maintenance is scheduled for 2018.
- All level 2 maintenance work identified during the inspection was completed by October 2017.
- All level 3 maintenance work identified during the inspection was completed by October 2019.
- The feeder is scheduled for an I&M foot patrol again in 2021.

15. STAR LAKE 72762 – 4.8kV

Profile: 651 Customers, 36.4 Circuit Miles
Indices: CAIDI = 5.16, SAIFI = 2.15

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	7	53.85%	1,022	72.95%	5,762	79.75%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	3	23.08%	235	16.77%	880	12.18%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	23.08%	144	10.28%	583	8.07%
Totals		13	100.00%	1,401	100.00%	7,225	100.00%

Problem Analysis:

- There was one transmission interruption in 2016, which accounted for 47% of the customers interrupted (664 of 1,401) and 63% of the customer-hours (4,526 of 7,225). This interruption was due to a tree falling on the Browns Falls-Newton Falls #22 line.
- There were zero substation interruptions in 2016.
- There were twelve distribution interruptions in 2016, which accounted for 53% of the customers interrupted (737 of 1,401) and 37% of the customer-hours (2,699 of 7,225):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had five interruptions on Columbian Road, which accounted for 28% of the customers interrupted (398 of 1,401) and 16% of the customer-hours (1,180 of 7,225). Two interruptions were due to trees, two were due to unknown causes, and one was due to a device failure.
- This is the second time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2015, the Regional Forestry Department completed scheduled distribution cycle pruning.
- In 2013, the Regional Forestry Department completed hazard tree removals.
- In November 2012, an I&M foot patrol was completed.
- The maintenance work identified as level 2 from the feeder inspection was completed in 2013.
- The maintenance work identified as level 3 from the feeder inspection was completed in 2015.

Action Plan:

- The next scheduled distribution cycle pruning is 2021.
- The feeder will be monitored for the need for hazard tree removal.
- The next I&M foot patrol is scheduled for 2017.
- At this time, no further action is required.

16. THOUSAND ISL 81452 – 13.2kV

Profile: 2,113 Customers, 111.4 Circuit Miles
Indices: CAIDI = 2.20, SAIFI = 1.71

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	17.86%	117	3.24%	1,269	15.99%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	9	32.14%	160	4.43%	980	12.35%
6	ACCIDENTS	7	25.00%	2,689	74.51%	4,078	51.40%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	7	25.00%	643	17.82%	1,608	20.27%
Totals		28	100.00%	3,609	100.00%	7,934	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were twenty-eight distribution interruptions in 2016, which accounted for 100% of the customers interrupted (3,609 of 3,609), as well as 100% of the number of customer-hours interrupted (7,934 of 7,934):
 - The distribution circuit had one circuit breaker operation in 2016 due to an osprey nest, which accounted for 60% of the customers interrupted (2,181 of 3,609) and 27% of the customer-hours interrupted (2,108 of 7,934).
 - The distribution circuit had one recloser operation on Peel Dock Road due to an unknown cause, which accounted for 14% of the customers interrupted (502 of 3,609) and 12% of the customer-hours interrupted (929 of 7,934).
- This is the fifth time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2016, the Regional Forestry Department completed scheduled distribution cycle pruning.
- In 2015, the Regional Forestry Department completed the extended hazard tree maintenance.
- In December 2012, an I&M foot patrol was completed.
- All level 2 maintenance work identified from the feeder inspection was completed by December 2013.
- All level 3 maintenance work identified from the feeder inspection was completed by December 2015.
- The review for additional osprey platforms has been completed, resulting in the conclusion that additional osprey platforms are required. Field forces will request platforms as osprey nests are located.
- Based upon the FY10 ERR, the following list of corrective measures has been completed:
- Install fuses on thirty-nine main-line CSP transformers;
- Install arresters on four normally-open disconnect switches.

Action Plan:

- The feeder is scheduled for an I&M foot patrol in 2017.
- The next distribution cycle pruning is scheduled for 2022.
- The feeder will be monitored for the need for hazard tree removal.

17. LOON LAKE 83761 – 2.4kV

Profile: 186 Customers, 9.5 Circuit Miles
Indices: CAIDI = 2.86, SAIFI = 6.88

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	45.45%	362	28.28%	1,900	51.94%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	45.45%	727	56.80%	1,010	27.61%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	9.09%	191	14.92%	748	20.45%
Totals		11	100.00%	1,280	100.00%	3,658	100.00%

Problem Analysis:

- There were five transmission interruptions in 2016, which accounted for 72% of the customers interrupted (926 of 1,280) and 40% of the customer-hours interrupted (1,457 of 3,658). Four interruptions were on the Union-Lake Clear #35 line, three were due to device failures and one was due to an unknown cause. One interruption was on the Malone #5 line due to a tree falling.
- There was one substation interruption in 2016 due to a device failure at Union Station, which accounted for 14% of the customers interrupted (181 of 1,280) and 8% of the customer-hours interrupted (296 of 3,658).
- There were five distribution interruptions in 2016, which accounted for 14% of the customers interrupted (173 of 1,280) and 52% of the customer-hours interrupted (1,906 of 3,658):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had five interruptions on Port Kent-Hopkinton Turnpike, which accounted for 14% of the customers interrupted (173 of 1,280) and 52% of the customer-hours interrupted (1,906 of 3,658). Four interruptions were due to trees and one was due to a device failure.
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2015, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- The Regional Forestry Department is monitoring the need to perform hazard tree maintenance.
- In September 2013, an I&M foot patrol was completed.
- All level 2 maintenance work identified during the inspection was completed in 2014.
- All level 3 maintenance work identified during the inspection was completed in 2016.

Action Plan:

- The next distribution cycle pruning is scheduled for 2022.
- The feeder is scheduled for an I&M foot patrol again in 2018.

18. THOUSAND ISL 81458 – 13.2kV

Profile: 2,287 Customers, 134.7 Circuit Miles
Indices: CAIDI = 4.09, SAIFI = 1.36

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	3	15.00%	413	13.29%	1,249	9.83%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	13	65.00%	2,671	85.94%	11,392	89.68%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	1	5.00%	12	0.39%	34	0.26%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	3	15.00%	12	0.39%	29	0.23%
Totals		20	100.00%	3,108	100.00%	12,704	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There were zero substation interruptions in 2016.
- There were twenty distribution interruptions in 2016, which accounted for 100% of the customers interrupted (3,108 of 3,108), as well as 100% of the number of customer-hours interrupted (12,704 of 12,704):
 - The distribution circuit had one circuit breaker operation in 2016 due to a recloser failure, which accounted for 72% of the customers interrupted (2,224 of 3,108) and 72% of the customer-hours interrupted (9,208 of 12,704).
- This is the fourth time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2012, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2014, the Regional Forestry Department completed the scheduled hazard tree removal.
- An I&M foot patrol was completed in October 2014.
- All level 2 maintenance work identified from the feeder inspection was completed in 2015.

Action Plan:

- All level 3 maintenance work identified from the feeder inspection will be completed by October 2017.
- An I&M foot patrol will be performed again in 2019.
- The feeder will be monitored for the need for distribution cycle pruning and hazard tree maintenance.

19. NICHOLVILLE 86062 – 4.8kV

Profile: 1,110 Customers, 79.4 Circuit Miles
Indices: CAIDI = 2.54, SAIFI = 2.24

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	10	66.67%	262	10.55%	1,479	23.49%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	26.67%	2,215	89.21%	4,785	76.01%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	6.67%	6	0.24%	32	0.51%
Totals		15	100.00%	2,483	100.00%	6,295	100.00%

Problem Analysis:

- There were zero transmission interruptions in 2016.
- There was one substation interruption in 2016 at Nicholville Station due to broken insulators, which accounted for 45% of the customers interrupted (1,113 of 2,483) and 17% of the customer-hours interrupted (1,057 of 6,295).
- There were fourteen distribution interruptions in 2016, which accounted for 55% of the customers interrupted (1,370 of 2,483) and 83% of the customer-hours interrupted (5,238 of 6,295):
 - The distribution circuit had one circuit breaker operation in 2016 due to a device failure, which accounted for 44% of the customers interrupted (1,100 of 2,483) and 59% of the customer-hours interrupted (3,722 of 6,295).
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2011, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- In 2010, the Regional Forestry Department completed the scheduled hazard tree maintenance.
- In October 2014, an I&M foot patrol was completed.
- All level 2 maintenance work identified during the inspection was completed in 2015.

Action Plan:

- The feeder will be monitored for the need for distribution cycle pruning and hazard tree maintenance.
- The feeder is scheduled for an I&M foot patrol again in 2019.
- All level 3 maintenance work identified during the inspection is scheduled to be completed by October 2017.

20. RIVERVIEW 84762 – 4.8 kV

Profile: 231 Customers, 29.6 Circuit Miles
Indices: CAIDI = 1.52, SAIFI = 8.19

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	5	38.46%	512	27.06%	1,467	51.14%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	38.46%	1,141	60.31%	1,304	45.43%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	1	7.69%	8	0.42%	49	1.70%
10	UNKNOWN	2	15.38%	231	12.21%	50	1.73%
Totals		13	100.00%	1,892	100.00%	2,869	100.00%

Problem Analysis:

- There were five transmission interruptions in 2016, which accounted for 61% of the customers interrupted (1,146 of 1,892) and 27% of the customer-hours (772 of 2,869). Two interruptions were between Lake Colby and Bloomingdale on the #31 line due to device failures. One interruption occurred on the Union #36 line due to an unknown cause. One interruption occurred on the Malone #5 line due to a tree falling. One interruption occurred between Lake Colby and Gabriels on the #35 line.
- There were three substation interruptions in 2016, which accounted for 36% of the customers interrupted (691 of 1,892) and 66% of the customer-hours (1,907 of 2,869). One interruption was due to a device failure at Union Substation. One interruption was due to a tree falling at Riverview Substation. One interruption was due to a device failure at Riverview Substation.
- There were five distribution interruptions in 2016, which accounted for 3% of the customers interrupted (55 of 1,892) and 7% of the customer-hours (191 of 2,869):
 - The distribution circuit had zero circuit breaker operations in 2016.
 - The distribution circuit had three interruptions on Alder Brook Road, which accounted for 0.7% of the customers interrupted (14 of 1,892) and 3% of the customer-hours (76 of 2,869). One was due to an unknown cause, one was due to lightning, and one was due to a tree falling.
- This is the first time the circuit has been on the worst performing circuits list in the last five years.

Action Taken:

- In 2011, the Regional Forestry Department completed the scheduled distribution cycle pruning.
- The Regional Forestry Department is monitoring the need for hazard tree maintenance.
- In November 2012, an I&M foot patrol was completed.
- All level 2 maintenance work identified during the inspection was completed in 2013.
- All level 3 maintenance work identified during the inspection was completed in 2015.

Action Plan:

- The feeder is scheduled for an I&M foot patrol again in 2017.
- There are no further actions at this time.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Circuit	Report Year	Action Plan	Projected Completion Date	Estimated Cost	Comments
North Carthage	81652	2016	The level 3 maintenance work identified from the feeder inspection will be completed	08/2017	-----	-----
North Carthage	81652	2016	The next scheduled distribution cycle pruning will be completed in 2022.	2022	-----	-----
North Carthage	81652	2016	The next extended hazard tree maintenance will be completed	2018	-----	-----
North Carthage	81652	2016	This feeder is scheduled to be inspected	2019	-----	-----
North Carthage	81652	2016	As part of the Company's "Minor Storm Hardening" Program, North Shore Road will be rebuilt	TBD	-----	Needs to be budgeted
Higley	92451	2016	The feasibility of constructing 15,600 feet of 3-phase mainline along NYS Hwy 56 from Number Nine Road to East Hill Road to provide a second parallel route from the 115kV ROW has been reviewed	2017	\$900k	-----
Higley	92451	2016	The feasibility of rebuilding the Joe Indian Area has been reviewed. A project to rebuild 13,000 feet of single phase 4.8kV line to tree wire spanning on the road has been approved	TBD	-----	Needs to be budgeted
Higley	92451	2016	The feasibility of building from Joe Indian Road to Sterling Pond Road to create a new tie that will eliminate off road line to Sterling Pond Road has been reviewed. A project has been submitted and approved.	TBD	-----	Needs to be budgeted
Higley	92451	2016	All level 2 maintenance work identified from the feeder inspection will be completed	09/2017	-----	-----
Higley	92451	2016	All level 3 maintenance work identified from the feeder inspection was completed	09/2019	-----	-----
Higley	92451	2016	The next inspection is scheduled	2020	-----	-----
Higley	92451	2016	the Regional Forestry Department is scheduled to perform distribution cycle pruning	2020	-----	-----
Higley	92451	2016	The feeder will be monitored for the need for extended hazard tree removal	-----	-----	-----
Chasm	85251	2016	All level 2 maintenance work identified from the feeder inspection will be completed by September 2017.	09/2017	-----	-----
Chasm	85251	2016	All level 3 maintenance work identified from the feeder inspection will be completed	09/2019	-----	-----
Chasm	85251	2016	The next distribution cycle pruning is scheduled for 2021.	2021	-----	-----
Chasm	85251	2016	The feeder will be monitored for the need for extended hazard tree removal.	-----	-----	-----
Chasm	85251	2016	The circuit will be inspected again in 2021.	2021	-----	-----
Indian River	32358	2016	The feeder will be inspected again in 2018.	2018	-----	-----
Indian River	32358	2016	The feeder will be monitored for the need for pruning and extended hazard tree removal.	-----	-----	-----
West Adams	97554	2016	County RTE 189 and County RTE 95 are being rebuilt to single phase 7.62kV.	-----	-----	Needs to be budgeted
West Adams	97554	2016	By August 2017, the level 2 maintenance work identified from the feeder inspection will be completed.	08/2017	-----	-----
West Adams	97554	2016	By August 2019, the level 3 maintenance work identified from the feeder inspection will be completed.	08/2019	-----	-----
West Adams	97554	2016	The next inspection is scheduled for 2021.	2021	-----	-----

Station	Circuit	Report Year	Action Plan	Projected Completion Date	Estimated Cost	Comments
West Adams	97554	2016	The next Regional Forestry Department hazard tree removal is scheduled for 2018.	2018	-----	-----
West Adams	97554	2016	The next Regional Forestry Department cycle pruning is scheduled for 2019.	2019	-----	-----
Bremen	81556	2016	The feeder is scheduled to be inspected in 2017.	2017	-----	-----
Bremen	81556	2016	The next extended hazard tree maintenance is scheduled for 2017.	2017	-----	-----
Lowville	77354	2016	The level 2 maintenance work identified from the feeder inspection will be completed by September 2017.	09/2017	-----	-----
Lowville	77354	2016	The level 3 maintenance work identified from the feeder inspection will be completed by September 2019.	09/2019	-----	-----
Lowville	77354	2016	The feeder will be inspected again in 2021.	2021	-----	-----
Lowville	77354	2016	The next distribution cycle pruning is scheduled for 2020.	2020	-----	-----
Lowville	77354	2016	The feeder will be monitored for extended hazard tree removal.	-----	-----	-----
Franklin	84361	2016	The next distribution cycle pruning is scheduled for 2021.	2021	-----	-----
Franklin	84361	2016	The next extended hazard tree maintenance is scheduled for 2018.	2018	-----	-----
Franklin	84361	2016	The feeder is scheduled to be inspected again in 2018.	2018	-----	-----
Gilpin Bay	95651	2016	The next distribution cycle pruning is scheduled for 2017.	2017	-----	-----
Gilpin Bay	95651	2016	The next extended hazard tree maintenance is scheduled for 2018.	2018	-----	-----
Gilpin Bay	95651	2016	The feeder is scheduled for inspection again in 2018.	2018	-----	-----
Bloomingtondale	84162	2016	The next distribution cycle pruning is scheduled for 2021.	2021	-----	-----
Bloomingtondale	84162	2016	The next extended hazard tree maintenance is scheduled for 2018.	2018	-----	-----
Bloomingtondale	84162	2016	The next inspection is scheduled for 2017.	2017	-----	-----
Dekalb	98455	2016	The next distribution cycle pruning is scheduled for 2019.	2019	-----	-----
Dekalb	98455	2016	The feeder will be monitored for extended hazard tree removal.	-----	-----	-----
Dekalb	98455	2016	The feeder is scheduled to be inspected again in 2017.	2017	-----	-----
Mcadoo	91453	2016	The circuit will be inspected again in 2017.	2017	-----	-----
Mcadoo	91453	2016	The next distribution cycle pruning is scheduled for 2020.	2020	-----	-----
Mcadoo	91453	2016	The feeder will be monitored for extended hazard tree removal.	-----	-----	-----
Lake Colby	92758	2016	The next distribution cycle pruning is scheduled for 2019.	2019	-----	-----
Lake Colby	92758	2016	The next extended hazard tree maintenance is scheduled for 2018.	2018	-----	-----
Lake Colby	92758	2016	The feeder is scheduled to be inspected again in 2019.	2019	-----	-----
Lake Colby	92758	2016	All level 3 maintenance work identified during the inspection will be completed by July 2017.	07/2017	-----	-----
Higley	92452	2016	The next distribution cycle pruning is scheduled for 2020.	2020	-----	-----
Higley	92452	2016	The next extended hazard tree maintenance is scheduled for 2018.	2018	-----	-----
Higley	92452	2016	All level 2 maintenance work identified during the inspection was completed by October 2017.	10/2017	-----	-----
Higley	92452	2016	All level 3 maintenance work identified during the inspection was completed by October 2019.	10/2019	-----	-----
Higley	92452	2016	The feeder is scheduled to be inspected again in 2021.	2021	-----	-----
Star Lake	72762	2016	The next scheduled distribution cycle pruning is 2021.	2021	-----	-----
Star Lake	72762	2016	The feeder will be monitored for the need for hazard tree removal.	-----	-----	-----

Station	Circuit	Report Year	Action Plan	Projected Completion Date	Estimated Cost	Comments
Star Lake	72762	2016	The next inspection is scheduled for 2017.	2017	-----	-----
Thousand Islands	81452	2016	The feeder is scheduled to be inspected in 2017.	2017	-----	-----
Thousand Islands	81452	2016	The next distribution cycle pruning is scheduled for 2022.	2022	-----	-----
Thousand Islands	81452	2016	The feeder will be monitored for the need for hazard tree removal.	-----	-----	-----
Loon Lake	83761	2016	The next distribution cycle pruning is scheduled for 2022.	2022	-----	-----
Loon Lake	83761	2016	The feeder is scheduled to be inspected again in 2018.	2018	-----	-----
Thousand Islands	81458	2016	All level 3 maintenance work identified from the feeder inspection will be completed by October 2017.	10/2017	-----	-----
Thousand Islands	81458	2016	The feeder will be inspected again in 2019.	2019	-----	-----
Thousand Islands	81458	2016	The feeder will be monitored for the need for distribution cycle pruning and hazard tree maintenance	-----	-----	-----
Nicholville	86062	2016	The feeder will be monitored for the need for distribution cycle pruning and hazard tree maintenance.	-----	-----	-----
Nicholville	86062	2016	The feeder is scheduled to be inspected again in 2019.	2019	-----	-----
Nicholville	86062	2016	All level 3 maintenance work identified during the inspection is scheduled to be completed by October 2017.	10/2017	-----	-----
Riverview	84762	2016	The feeder is scheduled to be inspected again in 2017.	2017	-----	-----

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Circuit	Report Year	Action Plan	Projected Completion Date	Estimated Cost	Comments
Thousand Islands	81452	2015	Locations for lightning arresters are being reviewed.	10/2017	\$2k	Complete, no new installations needed
Thousand Islands	81452	2015	The feeder is scheduled to be inspected in 2017	12/2017	-----	-----
Thousand Islands	81452	2015	The next pruning and tree maintenance is scheduled for 2016	2016	-----	Completed
North Carthage	81652	2015	North Shore Road is being rebuilt for storm hardening	-----	-----	Being Budgeted
North Carthage	81652	2015	The feeder is scheduled to be inspected in 2019	2019	-----	-----
North Carthage	81652	2015	The next tree maintenance is scheduled for 2020	2020	-----	-----
North Carthage	81652	2015	The next pruning is scheduled for 2016	2016	-----	-----
North Carthage	81652	2015	The level 3 maintenance work identified from the feeder inspection will be completed by August 2017.	08/2017	\$51k	Spend to Date
North Carthage	81652	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
Bremen	81556	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
Bremen	81556	2015	The feeder is scheduled to be inspected in 2017	2017	-----	-----
Bremen	81556	2015	The next tree maintenance is scheduled for 2020	2020	-----	-----
Thousand Islands	81458	2015	All level 3 maintenance work identified from the feeder inspection will be completed by October 2017.	10/2017	\$306k	-----
Thousand Islands	81458	2015	Review the potential for loop scheme installations.	10/2017	\$2k	Completed, no new installations needed
Thousand Islands	81458	2015	The feeder is scheduled to be inspected in 2019	2019	-----	-----
Thousand Islands	81458	2015	The next pruning is scheduled for 2018	2018	-----	To monitor
Thousand Islands	81458	2015	The next tree maintenance is scheduled for 2021	2021	-----	To monitor
North Carthage	81653	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
North Carthage	81653	2015	The feeder is scheduled to be inspected in 2016	2016	-----	Completed
North Carthage	81653	2015	The next pruning is scheduled for 2020	2020	-----	-----
North Carthage	81653	2015	The next tree maintenance is scheduled for 2020	2020	-----	-----
Lowville	77354	2015	The feeder is scheduled to be inspected in 2016	2016	-----	Completed
Lowville	77354	2015	The next pruning is scheduled for 2020	2020	-----	-----
Lowville	77354	2015	The next tree maintenance is scheduled for 2019	2019	-----	To monitor
Lowville	77354	2015	An internal feeder tie along Pine Grove Road to Number Four Road has been approved	2022	\$700k	Project Completed
East Watertown	81756	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
East Watertown	81756	2015	The feeder is scheduled to be inspected in 2016	2016	-----	Completed
East Watertown	81756	2015	The next pruning is scheduled for 2020	2020	-----	-----
East Watertown	81756	2015	The next tree maintenance is scheduled for 2019	2019	-----	-----
Lawrence Ave	97655	2015	The feeder is scheduled to be inspected in 2016	2016	-----	Completed
Lawrence Ave	97655	2015	The next pruning is scheduled for 2016	2016	-----	Completed
Lawrence Ave	97655	2015	The next tree maintenance is scheduled for 2016	2016	-----	Completed
Lawrence Ave	97655	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	New Installation is approved
Lawrence Ave	97655	2015	Raquette River Crossing rebuild	FY17	\$145k	On track to be completed in 2017
Sunday Creek	87651	2015	The feeder is scheduled to be inspected in 2019	2019	----	-----

Station	Circuit	Report Year	Action Plan	Projected Completion Date	Estimated Cost	Comments
Sunday Creek	87651	2015	The next pruning is scheduled for 2021	2021	----	----
Sunday Creek	87651	2015	The next tree maintenance is scheduled for 2020	2020	----	----
Sunday Creek	87651	2015	Level 3 maintenance from previous inspection	2017	\$12k	Spend to Date
Sunday Creek	87651	2015	Stillwater Road Rebuild	2016	\$400k	Project Completed
East Watertown	81757	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
East Watertown	81757	2015	All level 2 maintenance work identified from the feeder inspection will be completed by August 2016.	02/2017	\$168k	Completed
East Watertown	81757	2015	All level 3 maintenance work identified from the feeder inspection will be completed by August 2018.	02/2017	\$308k	Spend to Date
East Watertown	81757	2015	The next pruning is scheduled for 2020	2020	----	----
East Watertown	81757	2015	The next tree maintenance is scheduled for 2016	2016	----	Completed
Paul Smiths	83462	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
Paul Smiths	83462	2015	The next pruning is scheduled for 2016	2016	----	Completed
Paul Smiths	83462	2015	The next tree maintenance is scheduled for 2017	2017	----	----
Paul Smiths	83462	2015	The feeder is scheduled to be inspected again in 2016	2016	----	Completed
McAdoo	91451	2015	Review the potential for a loop scheme installation.	02/2017	\$2k	Completed, no new installations needed
McAdoo	91451	2015	The next pruning is scheduled for 2017	2017	----	----
McAdoo	91451	2015	The next tree maintenance is scheduled for 2017	2017	----	----
McAdoo	91451	2015	The feeder is scheduled to be inspected again in 2016	2016	\$14k	Completed

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS WHICH CAUSED THE BELOW MINIMUM PERFORMANCE

In 2016 the SAIFI of 1.35 for the Northern Region was above the PSC's minimum goal of 1.00. The 2016 SAIFI of 1.35 was a decrease over the SAIFI in 2015 of 1.50. This indicates that the number of the regions' customers that were interrupted has decreased since 2015. The 2016 SAIFI of 1.35 is larger than the five year average for SAIFI of 1.24.

The 2016 data indicates that the region's total number of customers interrupted was 10% above the five-year average.

Reviewing the 2016 SAIFI data by facility type:

The 2016 SAIFI for transmission facilities accounted for 36,273 customers interrupted. This was a 15% decrease from 2015 which accounted for 42,846 customers interrupted which was 21% of the total customers interrupted. Transmission interruptions represented 20% of the customers interrupted in 2016.

The 2016 SAIFI for substation facilities accounted for 22,371 customers interrupted. This was a 2% increase from 2015 which accounted for 21,958 customers interrupted which was 11% of the total customers interrupted. Station interruptions represented 12% of the customers interrupted in 2016.

Reviewing the 2016 SAIFI data by top two cause codes:

In 2016, Equipment failures represented 36% of the customers interrupted (65,689 of 182,146). In 2015, Equipment failures represented 31% of the customers interrupted (61,693 of 201,982).

In 2016, Tree Contacts causes represented 24% of the customers interrupted (44,582 of 182,146). In 2015, Tree Contacts represented 21% of the customers interrupted (42,152 of 201,982).

The 5% (31% to 36%) increase in equipment failures and the 3% (21% to 24%) increase in tree interruptions is the primary reason why the Northern Region did not pass SAIFI for 2016.

A 47,142 Customer Interruption reduction would have resulted in the Northern Region passing the SAIFI criteria. An overall reduction of 26% of Customers Interrupted would have resulted in a passing SAIFI score.

2016 SAIFI Summary:

There appears to be a systemic SAIFI issue in the Northern Region. There are many events or types of event (e.g., transmission, substation, cause code tree, etc.) that attribute to the Northern Region not meeting SAIFI criteria.

In order to pass the SAIFI standard set forth by the NY PSC for 2017, the Customers Interrupted would need to be reduced by a minimum of 47,142 Customers interrupted.

Transmission and Substation interruptions accounted for 58,644 customers interrupted. If these interruptions had been eliminated, the Northern Region would have been under the SAFI goal of 1.00. Equipment Failures accounted for 65,689 customers interrupted. If Equipment Failures had been eliminated, Northern Region would have been under the SAFI goal of 1.00.

The Top twenty-seven events accounted for 48,181 customers interrupted. If these interruptions had been eliminated then the Northern Region would have passed the SAIFI standard. The top twenty-seven events were due to a variety of causes:

- Three events were due to trees, which accounted for 3% of the Customers Interrupted (4,652 of 182,146).
- One event was due to Operator Error, which accounted for 1% of the Customers Interrupted (2,134 of 182,146).
- Ten events were due to Device Failure, which accounted for 10% of the Customers Interrupted (17,533 of 182,146).
- Six events were due to Vehicles and animals, which accounted for 5% of the Customers Interrupted (9,895 of 182,146).
- Six events were due to unknown causes, which accounted for 6% of the Customers Interrupted (11,804 of 182,146).
- One event was due to lightning, which accounted for 1% of the Customers Interrupted (2,163 of 182,146).

The percentage breakdown of the top twenty-seven Events for Customers Interrupted illustrates that no single cause can attribute to the number of customers interrupted in the Northern Region

b. PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES

The Company is continuing with its efforts to improve reliability in the Northern Region. This includes: transmission and distribution patrols; maintenance programs; line recloser/sectionalizer installations; protection coordination studies; lightning protection installations; installation of animal guards; installation of external fuses on CSP transformers; installing fuses on un-fused side-taps; and the continuing tree trimming program. All of these programs and corrective actions will not only reduce the number of outages and/or the number of customers interrupted (SAIFI), but will also reduce the restoration times (CAIDI).

The Company has begun a “Minor Storm Hardening” Program to address the system’s performance during severe weather events that may not qualify as a Major Storm.

The Company has begun reviewing off road spans through heavily treed areas. The goal is to gain right of way, in order to relocate off-road locations to the road in an effort to try to alleviate customers interrupted due to tree-related interruptions.

As these programs develop, the Northern Region will incorporate any recommendations to improve its performance.

Substation Improvements

- 1) When substation equipment is being maintained, animal guards are being installed.
- 2) When opportunities arise, feeder-ties will be constructed to temporarily transfer load onto adjacent substations. This will improve reliability for the associated substation.
- 3) The Company’s ongoing maintenance program for substations should help reduce the potential for substation problems that drove SAIFI higher in 2016. This program includes:
 - Circuit breaker diagnostic tests.
 - Circuit breaker mechanism checks.
 - Load tap changer internal inspections.
 - Dissolved gas analysis on load tap changers and transformers.
 - Calibration/inspections on relay positions and communication packages.
 - Functional testing of relays.
 - Battery maintenance.

Engineering Reliability Reviews (ERR)

In a separate initiative based on primary distribution interruptions only, each region of the Company was presented with a list of worst performing feeders. The purpose of this review was to identify corrective measures that would improve that feeder’s reliability statistics,

determine the associated incremental reliability improvement, and also determine each corrective measure's associated cost.

The Company believes that these preventative actions will help minimize the potential for unplanned interruptions and also improve the Northern Region's SAIFI and CAIDI performance.

J. SOUTHWEST REGION

1. OPERATING REGIONAL PERFORMANCE

a. HISTORIC CAIDI AND SAIFI INDICES

IDS Info:

	2016	2015	2014	2013	2012	2011
CAIDI (Target 1.75)	1.91	2.47	1.91	2.02	1.79	1.81
SAIFI (Target 1.00)	1.01	0.94	0.96	1.21	1.01	1.31
SAIDI	1.93	2.31	1.82	2.43	1.81	2.36
Interruptions	1,146	1,106	1,090	1,154	1,014	1,353
Customers Interrupted	104,786	97,534	99,976	126,814	105,965	135,514
Customer-Hours Interrupted	200,502	241,053	190,481	255,709	189,272	245,228
Customers Served	103,764	104,190	104,610	105,044	104,566	103,787
Customers Per Interruption	91.44	88.19	91.72	109.89	104.50	100.16
Availability Index	99.9780	99.9736	99.9792	99.9722	99.9794	99.9730
Interruptions/1000 Customers	11.04	10.62	10.42	10.99	9.70	13.04

b. DISCUSSION OF REGIONAL PERFORMANCE

In 2016, the Southwest Region did not meet its CAIDI reliability target and did not meet its SAIFI reliability target as set forth by the New York Public Service Commission (PSC). The final System Average Interruption Frequency Index (SAIFI) result was 1.01 interruptions, 1% above the PSC goal of 1.00 interruptions. As shown in the table above, the Customer Average Interruption Duration index (CAIDI) was 1.91 in 2016, 9% above the PSC's regional target of 1.75 hours.

The 2016 CAIDI result was 23% below the 2015 result of 2.47 hours, and 4% below the previous 5-year average of 1.98 hours. The 2016 SAIFI was 7% above the 2015 result of 0.94 interruptions, and 6% below the previous 5-year average of 1.08 interruptions.

In 2016, excluding major storms, the Southwest Region experienced 13 transmission interruptions. These interruptions accounted for 1% of the region's total interruptions (13 of 1,146), 19% of the region's total customers interrupted (CI), (19,946 of 104,786), and 12% (24,250 of 200,502) of the region's total customer-hours interrupted (CHI). Overall, transmission interruptions had a CAIDI of 1.22 hours, and a SAIFI of 0.19 interruptions.

The number of transmission-related interruptions decreased from 22 in 2015 to 13 in 2016 (a decrease of 41%). The number of customers interrupted decreased from 32,255 in 2015, to 19,946 in 2016 (a decrease of 38%), while the customer-hours interrupted decreased from 69,005 in 2015, to 24,250 in 2016 (a decrease of 65%).

In 2016, excluding major storms, the Southwest Region experienced 4 substation interruptions. These interruptions accounted for 0.3% of the region's total interruptions (4 of 1,146), 9% of the region's total customers interrupted, (9,807 of 104,786), and 7% (13,142 of 200,502) of the region's total customer-hours interrupted. Overall, substation interruptions had a CAIDI of 1.34 hours, and a SAIFI of 0.09 interruptions.

The number of substation-related interruptions remained the same at 4 from 2015 to 2016 (no change). The number of customers interrupted increased from 2,598 in 2015, to 9,807 in 2016 (an increase of 277%), while the customer-hours interrupted increased from 8,661 in 2015, to 13,142 in 2016 (an increase of 52%).

In 2016, excluding major storms, the Southwest Region experienced 1,129 distribution interruptions. These interruptions accounted for 99% of the region's total interruptions (1,129 of 1,146), 72% of the region's total customers interrupted, (75,033 of 104,786), and 81% (163,110 of 200,502) of the region's total customer-hours interrupted. Overall, distribution interruptions had a CAIDI of 2.17 hours, and a SAIFI of 0.72 interruptions.

The number of distribution-related interruptions increased from 1,080 to 1,129 from 2015 to 2016 (an increase of 5%). The number of customers interrupted increased from 62,681 in 2015, to 75,033 in 2016 (an increase of 20%), while the customer-hours interrupted decreased from 163,387 in 2015, to 163,110 in 2016 (a decrease of 0.2%).

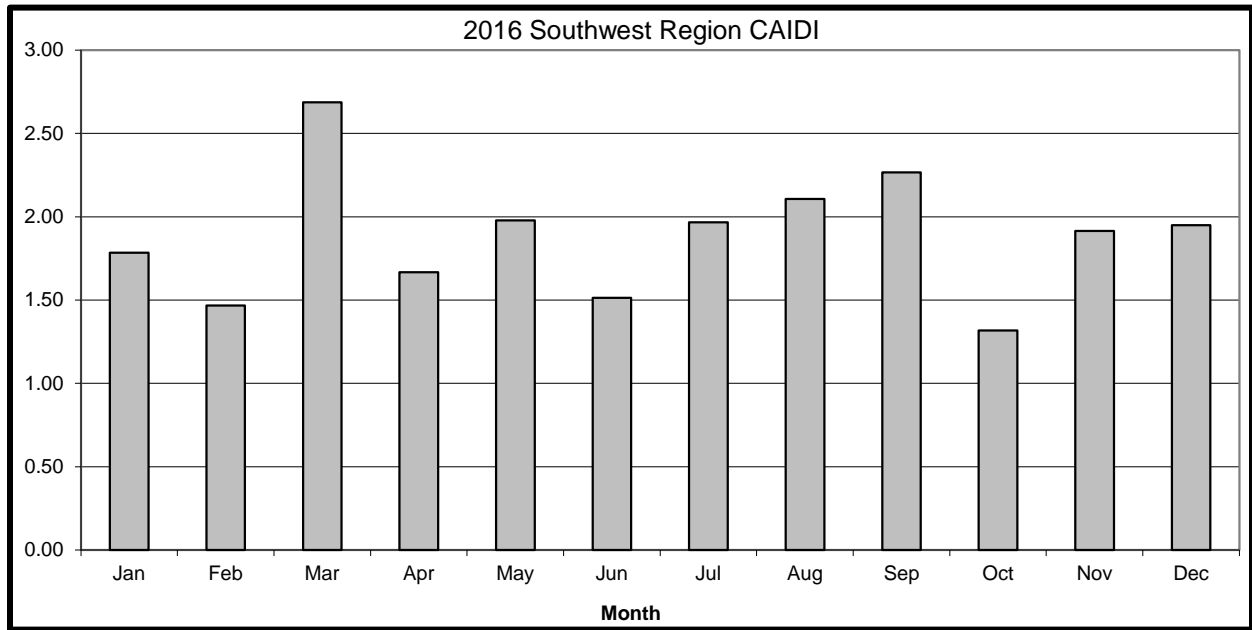
c. MONTHLY CAIDI AND SAIFI GRAPHS

The graphs on the following page show the monthly CAIDI and SAIFI for the Southwest Region for 2016.

Although the year-end CAIDI exceeded the PSC minimum level, the Southwest Region met the CAIDI target during four months, with the lowest two months being October (1.32) and February (1.47). CAIDI was above the PSC minimum for eight months in 2016: January (1.78), March (2.69), May (1.98), July (1.97), August (2.11), September (2.27), November (1.91) and December (1.95).

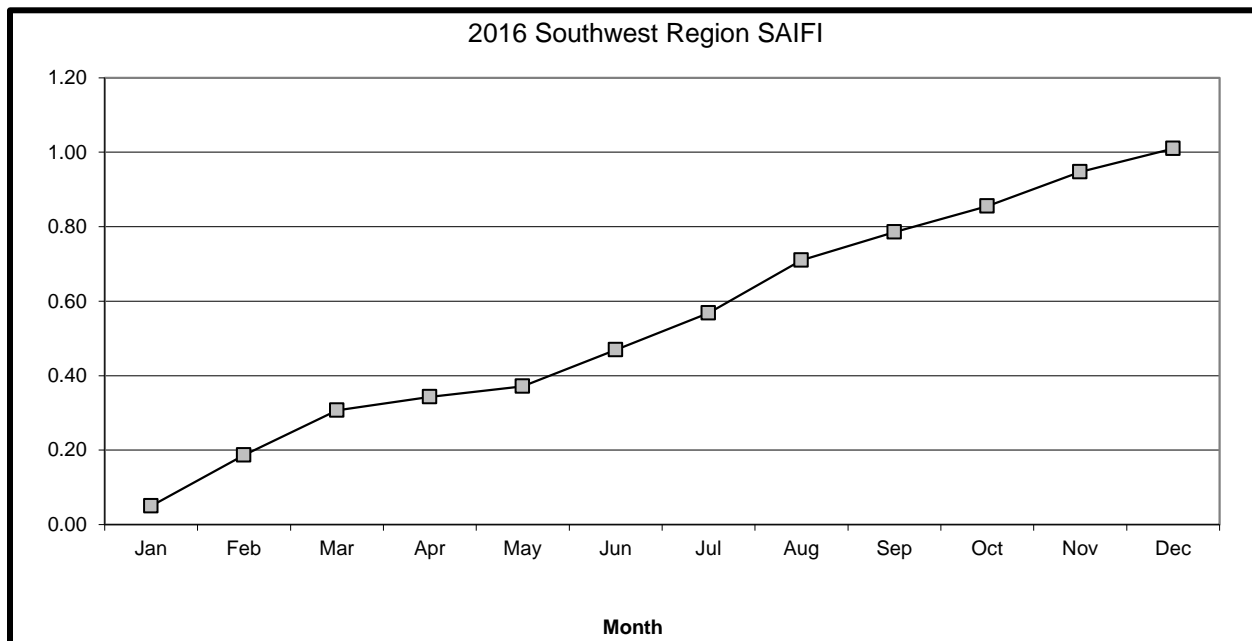
The year-end SAIFI for 2016 was above the PSC minimum level for the Southwest Region. It showed the greatest increase during the months of February (0.14), March (0.12), June (0.10), July (0.10) and August (0.14); 59% of the SAIFI was accrued during these four months. The lowest four months for SAIFI were January (0.05), April (0.04), May (0.03), and December (0.06); the interruptions which occurred during these four months contributed only 18% of the total SAIFI.

GRAPH OF MONTHLY CAIDI AND SAIFI FOR THE SOUTHWEST REGION



PSC CAIDI Goal:	
Minimum	1.75
2016 Actual	1.91

PSC SAIFI Goal:	
Minimum	1.00
2016 Actual	1.01



d. PSC CAUSE CODES

1) Number of Events by Cause – Historical

IDS Info:

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	52	91	48	0	224	0
02 Tree Contacts	495	460	391	404	339	349
03 Overloads	5	7	9	3	6	8
04 Oper. Error	5	7	10	7	5	5
05 Equipment	253	275	274	310	243	314
06 Accidents	130	136	124	112	130	145
07 Prearranged	18	7	21	28	21	16
08 Cust. Equip.	0	0	0	0	0	0
09 Lightning	98	69	139	135	106	256
10 Unknown	142	145	122	155	164	260
Total	1,198	1,197	1,138	1,154	1,238	1,353

2) Customers Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	10,626	11,145	12,137	0	30,970	0
02 Tree Contacts	40,125	32,423	28,730	42,659	22,726	34,310
03 Overloads	13	188	1,679	57	280	476
04 Oper. Error	2,498	419	1,305	1,499	5,269	1,146
05 Equipment	27,475	34,471	30,777	51,680	25,103	42,466
06 Accidents	12,340	9,110	7,263	4,814	18,345	17,720
07 Prearranged	3,297	404	2,230	2,165	2,858	1,601
08 Cust. Equip.	0	0	0	0	0	0
09 Lightning	11,284	4,834	10,728	13,637	11,502	19,323
10 Unknown	7,754	15,685	17,264	10,303	19,882	18,472
Total	115,412	108,679	112,113	126,814	136,935	135,514

3) Customer-Hours Interrupted by Cause – Historical

Cause Code	2016	2015	2014	2013	2012	2011
01 Major Storms	28,094	23,779	37,466	0	145,327	0
02 Tree Contacts	99,144	98,678	64,340	105,621	71,134	67,956
03 Overloads	38	360	4,930	188	408	403
04 Oper. Error	308	399	457	617	1,456	376
05 Equipment	43,388	85,464	49,377	96,258	45,250	80,077
06 Accidents	22,068	25,389	16,939	8,367	23,359	21,494
07 Prearranged	3,203	748	4,069	2,031	1,822	2,235
08 Cust. Equip.	0	0	0	0	0	0
09 Lightning	20,843	7,889	25,743	23,612	22,573	41,104
10 Unknown	11,512	22,127	24,624	19,015	23,268	31,584
Total	228,597	264,832	227,945	255,709	334,597	245,228

4) Interruptions, Customers Interrupted, and Customer-Hours Interrupted – 2016

Cause Code	Interruptions		Customers Interrupted		Customer Hours Interrupted	
	Number	% Total	Number	% Total	Number	% Total
01 Major Storms	52	4.3%	10,626	9.2%	28,094	12.3%
02 Tree Contacts	495	41.3%	40,125	34.8%	99,144	43.4%
03 Overloads	5	0.4%	13	0.0%	38	0.0%
04 Oper. Error	5	0.4%	2,498	2.2%	308	0.1%
05 Equipment	253	21.1%	27,475	23.8%	43,388	19.0%
06 Accidents	130	10.9%	12,340	10.7%	22,068	9.7%
07 Prearranged	18	1.5%	3,297	2.9%	3,203	1.4%
08 Cust. Equip.	0	0.0%	0	0.0%	0	0.0%
09 Lightning	98	8.2%	11,284	9.8%	20,843	9.1%
10 Unknown	142	11.9%	7,754	6.7%	11,512	5.0%
Total	1,198	100.0%	115,412	100.0%	228,597	100.0%

e. **INTERRUPTION REVIEW BY PSC CAUSE CODES**

Cause Code 01 - Major Storms

In 2016, Major Storms accounted for 4% of interruptions, 9% of customers interrupted, and 12% of customer-hours interrupted.

Interruptions due to Major Storm were down 43% from 2015, and down 29% over the 5 year average. Customers interrupted due to Major Storms were down 5% from 2015, and down 2% over the 5 year average. Customer-Hours interrupted were up 18% from 2015 and down 32% over the 5 year average.

The remaining PSC code descriptions do not include Major Storms in the percentages.

Cause Code 02 - Tree Contacts

In 2016, Tree Contacts accounted for 43% of interruptions, 38% of customers interrupted, and 49% of customer-hours interrupted.

Interruptions due to Tree Contacts were up 8% from 2015, and up 27% over the 5 year average. Customers interrupted due to Tree Contacts were up 24% from 2015, and up 25% over the 5 year average. Customer-hours interrupted were up 0% from 2015 and up 22% over the 5 year average.

Tree Contacts were the largest cause of interruptions in 2016.

Cause Code 03 - Overloads

In 2016, Overloads accounted for 0% of interruptions, 0% of customers interrupted, and 0% of customer-hours interrupted.

Interruptions due to Overloads were down 29% from 2015, and down 29% over the 5 year average. Customers interrupted due to Overloads were down 93% from 2015, and down 98% over the 5 year average. Customer-hours interrupted were down 90% from 2015 and down 97% over the 5 year average.

Overloads were the 7th largest cause of interruptions in 2016.

Cause Code 04 - Operator Error

In 2016, Operator Error accounted for 0% of interruptions, 2% of customers interrupted, and 0% of customer-hours interrupted.

Interruptions due to Operator Error were down 29% from 2015, and down 29% over the 5 year average. Customers interrupted due to Operator Error were up 496% from 2015, and up 30% over the 5 year average. Customer-hours interrupted were down 23% from 2015 and down 53% over the 5 year average.

Operator Error was the 7th largest cause of interruptions in 2016.

Cause Code 05 - Equipment Failure

In 2016, Equipment Failures accounted for 22% of interruptions, 26% of customers interrupted, and 22% of customer-hours interrupted.

Interruptions due to Equipment Failure were down 8% from 2015, and down 11% over the 5 year average. Customers interrupted due to Equipment Failure were down 20% from 2015, and down 26% over the 5 year average. Customer-hours interrupted were down 49% from 2015 and down 39% over the 5 year average.

Equipment Failures were the 2nd largest cause of interruptions in 2016.

Cause Code 06 - Accidents

In 2016, Accidents accounted for 11% of interruptions, 12% of customers interrupted, and 11% of customer-hours interrupted.

Interruptions due to Accidents were down 4% from 2015, and up 1% over the 5 year average. Customers interrupted due to Accidents were up 35% from 2015, and up 8% over the 5 year average. Customer-hours interrupted were down 13% from 2015 and up 15% over the 5 year average.

Accidents were the 4th largest cause of interruptions in 2016.

Cause Code 07 - Prearranged

In 2016, Prearranged accounted for 2% of interruptions, 3% of customers interrupted, and 2% of customer-hours interrupted.

Interruptions due to Prearranged were up 157% from 2015, and down 5% over the 5 year average. Customers interrupted due to Prearranged were up 716% from 2015, and up 78% over the 5 year average. Customer-hours interrupted were up 328% from 2015 and up 47% over the 5 year average.

Prearranged was the 6th largest cause of interruptions in 2016.

Cause Code 08 - Customer Equipment

There were no Customer Equipment interruptions in 2016.

Cause Code 09 - Lightning

In 2016, Lightning accounted for 9% of interruptions, 11% of customers interrupted, and 10% of customer-hours interrupted.

Interruptions due to Lightning were up 42% from 2015, and down 30% over the 5 year average. Customers interrupted due to Lightning were up 133% from 2015, and down 6% over the 5 year average. Customer-hours interrupted were up 164% from 2015 and down 14% over the 5 year average.

Lightning was the 5th largest cause of interruptions in 2016.

Cause Code 10 - Unknown

In 2016, Unknown causes accounted for 12% of interruptions, 7% of customers interrupted, and 6% of customer-hours interrupted.

Interruptions due to Unknown causes were down 2% from 2015, and down 16% over the 5 year average. Customers interrupted due to Unknown causes were down 51% from 2015, and down 52% over the 5 year average. Customer-hours interrupted were down 48% from 2015 and down 52% over the 5 year average. Unknown causes were the 3rd largest cause of interruptions in 2016.

f. DISCUSSION OF REGIONAL CAPEX PROJECTS WITH 2016/17 SPENDS:

The Southwest Region continues to work on capital-related projects in order to maintain customer satisfaction and future reliability. Some specific projects constructed either in 2016 or planned for construction in 2017 are discussed below. An additional table of major infrastructure projects follows and includes distribution, sub-transmission, and transmission-related projects.

Some projects on the list or discussed below are substation-related projects located throughout the Region to address loading concerns or equipment condition issues, including East Dunkirk #63.

There are numerous distribution projects where lines are being rebuilt or recondored. These projects resulted from reliability reviews, responses to QRS inquiries, results of implementing asset strategies, and/or responses to load-related issues.

Some specific reliability-related projects in the Southwest Region follow below:

East Dunkirk Substation #63

East Dunkirk substation is an 115kV/13.2kV substation with two transformer banks, which serves over 3,100 customers. A project is underway to replace both transformer banks due to age and asset condition. Transformer bank #1 is arcing and failing internally and the load tap changer (LTC) has failed providing limited voltage regulation. Also, the LTC on transformer bank #2 has failed and no longer provides automatic voltage regulation. This project will improve asset condition and reliability. The project is expected to be completed in the last quarter of 2017.

Sub-Transmission Infrastructure Projects:

The 34.5kV system in the Southwest Region consists of several very long loops, which traverse through some of the most rugged terrain in the Western Division. Additionally, there are numerous distribution circuits built below the sub-transmission circuits on shared poles. If either circuit fails, often times both are affected. A number of the projects planned for 2017/2018 will maintain and upgrade the system, including the projects on the following sub-transmission lines: Line 811 (Olean - Nile), Line 803/817 (N. Ashford – Nuclear Fuel Services), Line 817 (N. Ashford – Nuclear Fuels), Line 809 (Homer Hill – Ceres), Line 865 (S. Dow – Poland) and Line 857 (N. Angola – Baghdad). These projects will improve asset condition and reliability.

Furthermore, there are plans to install Distribution Automation (DA) switches on Line 801 (Delevan - Machias) in the Southwest Region beginning in 2017. The DA switches will improve reliability by sectionalizing portions of the lines during interruptions.

Major Capital Projects for Southwest Region:

Region	Project Name	Project Type	Fin Sys Proj No.	Finish	Total Spend
Southwest	Berry Road Station 153 Transformer #1 – (D/F)	Dist Sub	C071129	03/01/16	\$1,446,401

2. OPERATING CIRCUIT LISTS

This section includes the following three (3) tables and Worst Performing Circuit analysis for the Southwest Region.

- a. Worst Performing Circuit List
- b. Worst Performing Circuits with Three-Year History for CAIDI and SAIFI Indices
- c. Worst Performing Circuits by number of Momentary Interruptions

a. NATIONAL GRID WORST PERFORMING CIRCUIT LIST

SOUTHWEST REGION

FEEDER #	A CUST. SERVED	B TOTAL INTER.	C #CUST. INTER.	D CUST. HRS. INTER.	C/A SAIFI	D/A SAIDI	D/C CAIDI	NUMBER OF MOMENTARIES
DELAMETER 9354	2,951	27	9,706	12,745	3.29	4.32	1.31	2
HARTFIELD 7955	1,520	16	5,872	11,106	3.86	7.31	1.89	1
W VALLEY STA 2562	429	17	1,230	3,481	2.87	8.11	2.83	3
BAKER ST 15056	2,205	29	3,652	8,567	1.66	3.89	2.35	1
RESERVOIR STA 103 10361	200	10	928	4,637	4.64	23.19	5.00	2

Regional Goals:
CAIDI Min. 1.75
SAIFI Min. 1.00

b. NATIONAL GRID WORST PERFORMING CIRCUITS WITH A 3 YEAR HISTORY FOR CAIDI AND SAIFI INDICES.

SOUTHWEST REGION

FEEDER #	2016 CAIDI	2015 CAIDI	2014 CAIDI	2013 CAIDI	2016 SAIFI	2015 SAIFI	2014 SAIFI	2013 SAIFI
DELAMETER 9354	1.31	3.47	2.35	1.49	3.29	0.48	0.59	2.01
HARTFIELD 7955	1.89	3.27	1.29	1.22	3.86	0.74	1.96	1.44
W VALLEY STA 2562	2.83	3.67	2.23	1.79	2.87	1.85	2.25	2.24
BAKER ST 15056	2.35	3.09	2.02	1.96	1.66	0.45	2.12	0.65
RESERVOIR STA 103 10361	5.00	2.57	4.25	N/A	4.64	2.66	2.21	N/A

Regional Goals:
CAIDI Min. 1.75
SAIFI Min. 1.00

c. NATIONAL GRID WORST PERFORMING CIRCUITS BY # OF MOMENTARY INTERRUPTIONS

SOUTHWEST REGION

Feeders			Customer Momentaries				Ranks		
Volts (kV)	Station Name	Ckt/F No.	Substation	Transmission	Distribution	Total	Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.									

d. WORST PERFORMING CIRCUIT ANALYSIS

For 2016, the Company is reporting on the five worst performing feeders in the Southwest Region. The list consists of three 13.2kV feeders and two 4.8kV feeders.

For the Southwest Region, the PSC minimum CAIDI is 1.75 hours and the PSC minimum SAIFI is 1.00 interruptions. As discussed previously, the Southwest Region failed to meet the PSC minimum targets for CAIDI, with 1.91 hours and for SAIFI, with 1.01 interruptions reported.

1. DELAMETER 9354 – 13.2kV

Profile: 2,951 Customers, 64.9 Circuit Miles
Indices: CAIDI = 1.31, SAIFI = 3.29

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	10	37.04%	320	3.30%	995	7.81%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	10	37.04%	9,029	93.02%	11,061	86.79%
6	ACCIDENTS	4	14.81%	29	0.30%	97	0.76%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	2	7.41%	317	3.27%	548	4.30%
10	UNKNOWN	1	3.70%	11	0.11%	43	0.34%
Totals		27	100.00%	9,706	100.00%	12,745	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 40th worst feeder and the Southwest Region's worst feeder. It was the first time that this feeder has appeared on the Southwest Region's worst feeder list in the last five years.
- On March 28th, 34.5kV Sub-Transmission L856 wire fell down into feeder 9354 underbuilt on right-of-way near Delameter Rd, causing a feeder lockout and interrupting 2,945 customers for 1.05 hours. This contributed 3,092 customer-hours interrupted to the feeder.
- On June 22nd, a transformer blew and primary wires came down on right-of-way near Delameter Rd, causing a feeder lockout and interrupting 2,887 customers. The fault was isolated and 2,823 customers were restored after 55 minutes, 49 customers were restored after 1.49 hours and the remaining 15 customers were restored after 2.56 hours. This event contributed 2,652 customer-hours interrupted to the feeder.
- On December 16th, Station was de-energized on an emergency basis to repair an oil leak on the station transformer bank. This interruption to the feeder and affected 2,869 customers for 1.67 hours and contributed 4,782 customer-hours interrupted to the feeder.

Action Taken:

- Distribution cycle tree trimming was completed in 2016.
- An I&M foot patrol of the distribution line inspection was completed in October of 2013.
- There was no Level 1 maintenance. Level 2 maintenance was completed by October 2015 and Level 3 by October 2016.

Action Plan:

- Monitor feeder in 2017 for work completed in 2016.

2. HARTFIELD 7955 – 13.2kV

Profile: 1,520 Customers, 52.2 Circuit Miles
Indices: CAIDI = 1.89, SAIFI = 3.86

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	68.75%	3,691	62.86%	9,422	84.83%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	3	18.75%	672	11.44%	1,476	13.29%
6	ACCIDENTS	1	6.25%	3	0.05%	8	0.07%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	6.25%	1,506	25.65%	201	1.81%
Totals		16	100.00%	5,872	100.00%	11,106	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 48th worst feeder and the Southwest Region's 2nd worst feeder. It was the first time that this feeder has appeared on the Southwest Region's worst feeder list in the last five years.
- On March 2nd, a tree took down multiple sections of wire on State Hwy 430 that blew a fuse, causing an interruption to 302 customers. The fault was isolated and 73 customers were restored after 6.47 hours, 45 customers were restored after 7.13 hours and the remaining 184 customers were restored after 10.3 hours. This event contributed 2,688 customer-hours interrupted to the feeder.
- On March 28th, during a wind storm a tree took down wires and broke a pole on State Hwy 430 causing a feeder locked out and an interruption to 1,522 customers. The fault was isolated and 643 customers were restored after 2.07 hours, while the remaining 879 customers were restored after 5.02 hours. This event contributed 5,739 customer-hours interrupted to the feeder.
- On October 18th, a tree fell on 115kV Transmission L162 causing a locked out and loss of supply to Station 79 and feeder 7955. This resulted in an interruption to 1,516 customers for 14 minutes. This event contributed 354 customer-hours interrupted to the feeder.

Action Taken:

- Distribution cycle tree trimming was completed in 2014.
- A transmission line inspection was completed on Line #162 in March 2015.
- A distribution line inspection was completed in October of 2013.
- All Level 1 and Level 2 maintenance has been completed. Level 3 work completed by October 2016.
- Transmission tree trimming was completed on Line #162 in FY17.

Action Plan:

- Complete Level 2 and 3 Transmission Line Inspection work for Line #162 by March 2017 and March 2018, respectively.

3. W VALLEY 2562 – 4.8kV

Profile: 429 Customers, 36.5 Circuit Miles
Indices: CAIDI = 2.83, SAIFI = 2.87

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	12	70.59%	1,079	87.72%	2,909	83.57%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	4	23.53%	97	7.89%	421	12.08%
6	ACCIDENTS	0	0.00%	0	0.00%	0	0.00%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	1	5.88%	54	4.39%	151	4.34%
Totals		17	100.00%	1,230	100.00%	3,481	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 98th worst feeder and the Southwest Region's 3rd worst feeder. It was the first time that this feeder has appeared on the Southwest Region's worst feeder list in the last five years.
- On March 7th, a tree took wires down on Kruse Road, blowing a fuse and causing an interruption to 189 customers. The fault was isolated and 116 customers were restored after 1.40 hours, while the remaining 73 customers were restored after 4.24 hours. This event contributed 471 customer-hours interrupted to the feeder.
- On June 17th, a tree took wires down on Ellicottville Road, blowing fuses and causing an interruption to 190 customers. The fault was isolated and 178 customers were restored after 2.27 hours, while the remaining 12 customers were restored after 4.43 hours. This event contributed 457 customer-hours interrupted to the feeder.
- On August 16th, during a wind storm a tree limb fell across wires on Felton Hill Road causing a feeder locked out and an interruption to 429 customers for 2.14 hours. This event contributed 915 customer-hours interrupted to the feeder.

Action Taken:

- Distribution cycle tree trimming was completed in 2016.
- A distribution line inspection was completed in September 2016.

Action Plan:

- Complete Level 2 and 3 Distribution Line Inspection work by September 2018 and September 2019, respectively.

4. BAKER ST 15056 – 13.2kV

Profile: 2,205 Customers, 96.5 Circuit Miles
Indices: CAIDI = 2.35, SAIFI = 1.66

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	11	37.93%	2,451	67.11%	7,019	81.94%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	5	17.24%	72	1.97%	177	2.07%
6	ACCIDENTS	5	17.24%	68	1.86%	100	1.17%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	3	10.34%	954	26.12%	1,120	13.07%
10	UNKNOWN	5	17.24%	107	2.93%	150	1.75%
Totals		29	100.00%	3,652	100.00%	8,567	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 106th worst feeder and the Southwest Region's 4th worst feeder. It was the third time that this feeder has appeared on the Southwest Region's worst feeder list in the last five years.
- On August 11th, lightning caused a recloser to fail and lock out on Big Tree/Sugar Gro Road, resulting in an interruption to 951 customers. This interruption contributed 1,110 customer-hours interrupted on the feeder.
- On August 11th, a tree limb took wires down on Winch and Hunt Roads causing a feeder lockout, resulting in an interruption to 2,012 customers for 2.93 hours. This event accounted for 5,902 customer-hours interrupted.

Action Taken:

- A side tap fusing study was completed in July of 2013, with implementation completed in December 2013.
- A transmission line inspection was completed on Line #160 from Gardenville to Dunkirk in July of 2010 with level 1, 2, and 3 work completed by July of 2013.
- A transmission line inspection from Dunkirk to Falconer was completed in October of 2013, with Level 1 and 2 work completed by October of 2014 and Level 3 work completed by October 2016.
- Transmission hazard tree pruning for Line #160 was completed in 2014.
- Transmission cycle tree trimming & routine floor tree maintenance for Line #160 was completed in 2015.
- An animal fence was installed at the station in August of 2014
- Distribution hazard tree trimming was last completed in 2014.
- A distribution line inspection was completed in October 2013. All Level 1 and Level 2 maintenance has been completed, with Level 3 work completed by October 2016.
- Distribution cycle tree trimming was completed in 2016.

Action Plan:

- Monitor feeder in 2017 for work completed in 2016.

5. RESERVOIR 10361 – 4.8kV

Profile: 200 Customers, 26.6 Circuit Miles
Indices: CAIDI = 5.00, SAIFI = 4.64

CAUSE CODE PERFORMANCE TABLE

Code	Category	Interruptions		Customers Interrupted		Customer Hours	
		Number	% Total	Number	% Total	Number	% Total
2	TREE	9	90.00%	726	78.23%	3,961	85.41%
3	OVERLOADS	0	0.00%	0	0.00%	0	0.00%
4	OPER. ERROR	0	0.00%	0	0.00%	0	0.00%
5	EQUIPMENT	0	0.00%	0	0.00%	0	0.00%
6	ACCIDENTS	1	10.00%	202	21.77%	677	14.59%
7	PREARRANGED	0	0.00%	0	0.00%	0	0.00%
8	CUST. EQUIP.	0	0.00%	0	0.00%	0	0.00%
9	LIGHTNING	0	0.00%	0	0.00%	0	0.00%
10	UNKNOWN	0	0.00%	0	0.00%	0	0.00%
Totals		10	100.00%	928	100.00%	4,637	100.00%

Problem Analysis:

- In 2016, this feeder was the Company's 110th worst feeder and the Southwest Region's 5th worst feeder. It was the first time that this feeder has appeared on the Southwest Region's worst feeder list in the last five years.
- On March 1th, a tree took down wires and broke crossarms on Bailey Hill Road, which blew fuses and caused an interruption to 158 customers. The fault was isolated and 154 customers were restored after 4.45 hours, while the remaining 4 customers were restored after 8.12 hours. This event accounted for 718 customer-hours interrupted.
- On September 19th, an unknown person cut a tree down onto 34.5kV Sub-Transmission L804 causing a locked out and loss of supply to Reservoir Station 103. This resulted in an interruption to 202 customers on the entire feeder for 3.36 hours. This event contributed 677 customer-hours interrupted to the feeder.
- On June 22nd, a tree took down a wire and broke a crossarm on West Perimeter Road, which blew fuses and caused an interruption to 120 customers for 8.05 hours. This event contributed 966 customer-hours interrupted to the feeder.

Action Taken:

- Distribution hazard tree trimming was completed in 2011.
- Distribution cycle tree trimming was completed in 2016.
- A distribution line inspection was completed in June 2016.
- A sub-transmission line inspection was completed on Line #804 in March 2016.

Action Plan:

- Complete Level 2 & 3 Distribution Inspection work by June 2018 and 2019, respectively.
- Complete Level 2 & 3 Sub-transmission Inspection work by March 2018 and 2019, respectively.

3. ACTION PLAN SUMMARIES

a. SUMMARY OF ACTION PLANS FOR 2016 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Compl. Date	Cost	Comments
Hartfield	7955	2017	Complete Level 2 Inspection work on Line #160	2017	TBD	
Hartfield	7955	2017	Complete Level 2 Inspection work on Line #160	2018	TBD	

b. STATUS OF ACTION PLANS FOR 2015 WORST PERFORMING CIRCUITS

Station	Feeder	Report Year	Action Plan	Projected Compl. Date	Cost	Comments
Bennett Road	9954	2015	Evaluate additional feeder ties and isolation points	October 2015	TBD	Completed 2016
Cattaraugus	1562	2015	Complete Level 2 inspection work	December 2016	\$39,562	Completed
Cattaraugus	1562	2015	Complete Level 3 inspection work	December 2018	\$28,335	Completed
Cattaraugus	1562	2015	Implement fusing changes	December 2016	\$12,000	Complete 6/2016
Cattaraugus	1562	2015	Complete rebuild of feeder	March 2022	\$10,000	WR# 16639212
Cattaraugus	1562	2015	Complete Level 3 work on L816	November 2016	TBD	Completed November 2016
North Eden	8251	2015	Complete Level 3 inspection work	July 2017	\$253,035	Complete October 2016
North Eden	8251	2015	Complete Inspection of L860	December 2017	TBD	
North Eden	8251	2015	Complete Inspection of L861	December 2016	TBD	Completed March 2016
Findley Lake	7162	2015	Complete Level 3 inspection work	August 2016	\$115,307	Complete 5/2016
Findley Lake	7162	2015	Complete Inspection of L863	December 2016	TBD	Completed April 2016
Bemus Point	15961	2015	Evaluate additional feeder ties and isolation points	October 2015	TBD	Completed 2016
Bemus Point	15961	2015	Complete Inspection of L859	December 2018	TBD	
Berry Road	15353	2015	Evaluate additional feeder ties and isolation points	October 2015	TBD	Completed 2016
Findley Lake	7161	2015	Evaluate additional feeder ties and isolation points	October 2015	TBD	Completed 2016
Findley Lake	7161	2015	Complete Inspection of L863	December 2016	TBD	Completed April 2016
Bennett Road	9956	2015	Complete Level 3 inspection work	December 2018	\$68,376	WR# 20967805
Greenhurst	6063	2015	Complete Level 2 inspection work	January 2017	\$2,300	Complete 1/2017
Greenhurst	6063	2015	Complete Level 3 inspection work	January 2019	\$15,630	WR# 21221904
Greenhurst	6063	2015	Complete Inspection of L859	December 2018	TBD	

4. OPERATING REGION PERFORMANCE BELOW MINIMUM

a. MAINTENANCE HISTORY AND ANALYSIS OF FACTORS WHICH CAUSED THE BELOW MINIMUM PERFORMANCE

In 2016, the Southwest Region did not meet the PSC minimum goal for CAIDI of 1.75 hours, ending the year with a total CAIDI of 1.91 hours. This was a decrease under the CAIDI of 2.47 hours in 2015. This indicates that the average length of time to restore the region's customers decreased in 2016.

Additionally, the Southwest Region did not meet the PSC minimum goal for SAIFI of 1.00 interruptions, ending the year with a total SAIFI of 1.01 interruptions. This was an increase over the SAIFI of 0.94 interruptions per customer in 2015. This indicates that the frequency or number of times the region's customers experienced an interruption increased from the previous year.

The 2016 data indicates that the number of customers interrupted was 7% below the 5-year average, and that the number of customer-hours interrupted was 11% below the 5-year average. As compared to 2015, the number of customers interrupted increased by 7,252 (7%) and the number of customer-hours interrupted decreased by 40,551 (17%).

There were 13 events on the transmission system during 2016 which were responsible for a significant portion of the reliability performance. These events caused 19% of the customer interruptions that occurred as well as 12% of the total customer-hours interrupted.

The CAIDI result was significantly influenced by local storm events not categorized as Major Storms. Due to their widespread and severe nature, these events contributed much longer response times than what would be typical for a similar outage during an average day. The worst event occurred on November 20th during a localized windstorm. During this period, 5,345 customers were interrupted, resulting in 10,729 customer-hours interrupted in the Southwest Region. This represented 5% of the customer-hours interrupted for the region. Some of the outages lasted more than 12 hours, with the average per event of 4.1 hours. Many of these events were blown fuses due to lightning, or trees breaking conductors. Under normal conditions, typical restoration times for these types of events would be significantly lower and often can be restored at or below the CAIDI target. However, under severe volume of interruptions during a large and local weather event, this was not the case and the overall CAIDI impact was significant.

Reviewing the 2016 CAIDI and SAIFI data by facility type:

The 2016 CAIDI for transmission facilities was 1.22 hours, below the PSC target value of 1.75 hours for the Region. This consisted of 13 interruptions, which made up 19% of total customers interrupted and 12% of total customer-hours interrupted. The 2016 SAIFI for transmission facilities contributed 0.19 interruptions (19%) of the 2016 total SAIFI for the Region of 1.01 interruptions.

The 2016 CAIDI for substation facilities was 1.34 hours, below the PSC target value of 1.75 hours. This consisted of 4 outages and resulted in 9% of the total number of customers interrupted for the year with 9,807 customers being interrupted by these outages. The 2016 SAIFI for substation facilities contributed 0.09 interruptions (9%) of the 2016 total SAIFI for the Region of 1.01 interruptions.

The 2016 CAIDI for distribution facilities was 2.17 hours, above the PSC target of 1.75 hours. This consisted of 1,129 interruptions, which resulted in 81% of the total number of customer-hours interrupted. The 2016 SAIFI for distribution facilities contributed 0.72 interruptions (71%) to the 2016 total SAIFI for the Region of 1.01 interruptions.

Reviewing the 2016 CAIDI data by cause codes which had a CAIDI greater than the Region's PSC target:

(02) Tree–

The tree CAIDI was 2.47 hours, above the 1.75 hour target. Tree-related outages contributed to 43% of the total number of customer-hours interrupted for the Region, which suggests that tree-related outages were a large factor in determining why the Region did not meet the PSC target for CAIDI. One particular incident with a high number of customer-hours interrupted had a significant impact on the total CAIDI for tree-related outages as well as on the total CAIDI for the Region. On August 11th, a tree limb took wires down on Winch and Hunt Roads on Baker Street Feeder 15056. The 2,012 customers interrupted were restored in 3 hours. This event alone accounted for 5,902 customer-hours interrupted, and approximately 6% of the customer-hours interrupted from Tree related outages.

(03) Overload–

The overload CAIDI was 2.88 hours, above the 1.75 hour target. Overload-related outages contributed less than 1% of the total number of customer-hours interrupted for the Region. The most significant overload event occurred on September 14th, when an overhead transformer fuse blew due to overloading on Lakeview Feeder 18253. This caused an interruption to 4 customers for 5 hours. The event contributed a total of 21 customer-hours interrupted, which was 55% of the total customer-hours interrupted due to overloads in 2016.

(06) Accidents or Events not under the Utility Control–

The CAIDI for Accidents or Events not under the Utility Control was 1.79 hours, above the 1.75 hour target. These outages contributed 11% of the total number of customer-hours interrupted for the Region. There was one interruption in particular that had a significant impact in the CAIDI in the Southwest for 2016. On February 8th, a customer cut down a tree which brought down primary wires on Morgan Parkway on Cloverbank Feeder 9151. This caused an interruption to 1,469 customers for 3 hours. The event contributed a total of 4,192 customer-hours interrupted, which was 19% of the total customer-hours interrupted due to accidents or events not under the utility control in 2016.

(09) Lightning–

The Lightning CAIDI was 1.85 hours, above the 1.75 hour target. Outages with a cause of Lightning contributed 10% of the total number of customer-hours interrupted for the Region. There was one major interruption that had a significant impact on the CAIDI in the Region for 2016 due to lightning. On August 13th lightning caused Transmission line 157 to lockout resulting in an interruption to seven substations-(Cuba, Knights Creek, Andover, Petrolia, South Wellsville, Cuba Lake and Whitesville) and eleven feeders. This resulted in an interruption to 6,830 customers for about 3 hours, contributing 13,569 customer-hours interrupted and 65% of the total customer-hours interrupted due to lightning in 2016.

b. PLANNED PROGRAMS OR PLANNED CORRECTIVE ACTIONS AND PROPOSED IMPROVEMENTS TO THE PERFORMANCE INDICES

The Company is continuing its efforts to improve reliability in the Southwest Region. This includes distribution patrols, maintenance programs, line recloser installations, Cutout Mounted Recloser (Tripsaver) installations, protection coordination studies, lightning protection installations, and a tree trimming program. All of these programs and corrective actions will not only reduce the number of outages and/or customers interrupted, but will also reduce the restoration times. The operations department plans to continue the use of One Person Crews for coverage during off-hours, the prearrangement of crews for pending storm events, and the posting of CAIDI results at work locations to give visibility to the field personnel.

The Company's ongoing substation inspection and maintenance program is an effort to keep those facilities operating at a high level. This program will help minimize the likelihood of a substation outage resulting in a significant interruption to customers.

In 2016, the Substation Maintenance Team in New York West performed 50 circuit breaker diagnostic tests and 116 circuit breaker mechanism checks. Dissolved gas analysis was performed on 327 load tap changer units and 404 transformers. Transformer diagnostic tests were performed on 7 units. Thermographic inspections were performed at 265 substations. There were 1,710 substation inspections performed. Battery and charger diagnostic tests were performed on 172 installations. The Relay Groups in New York West completed calibration/inspections on 1,312 relay packages (1,187 Distribution Substations and 125 on 115kV Transmission). Any problems that were identified were repaired as soon as possible, thereby preventing these problems from causing interruptions to customers.

A similar number of maintenance activities will be performed in 2017. This work will be identified, prioritized, and tracked in the Company's Cascade Equipment maintenance database, as discussed in the Discussion of CAPEX Projects in this report. These ongoing maintenance activities on substations will help to minimize the likelihood of a substation outage resulting in a significant interruption to customers.

Miscellaneous:

Sub-Transmission Improvements

There are a number of projects to maintain and upgrade the sub-transmission system in the Southwest Region. In particular, the following lines will be addressed starting in 2017: Line 811 (Olean - Nile), Line 803/817 (N. Ashford – Nuclear Fuel Services), Line 817 (N. Ashford – Nuclear Fuels), Line 809 (Homer Hill – Ceres), Line 865 (S. Dow – Poland) and Line 857 (N. Angola – Baghdad).

There are several circuits scheduled to be upgraded in 2017. This is a process wherein circuits are rebuilt and reconductored, replacing dated poles and wires that could tentatively fail and cause an outage with newer, more resilient equipment.

Furthermore, there are plans to install Distribution Automation (DA) switches on Line 801 (Delevan - Machias) in the Southwest Region beginning in 2017. The effort to install DA switches in the Southwest area is nearly complete. The DA switches will improve reliability by sectionalizing portions of the lines during interruptions.

K. GLOSSARY

CAIDI - Customer Average Interruption Duration Index is the average service restoration time for customers interrupted. It is determined by dividing the sum of all customer interruption durations by the total number of customers interrupted in a year.

Customer Hours of Interruption - The hours of interruption duration multiplied by the number of customers interrupted for a given interruption.

Distribution Circuit - An electric feeder line serving customers and operating at voltage levels below 23,000 volts - Typically, 4.16, 4.8 or 13.2kV.

Failed Region - Any region whose indices exceed minimum level of CAIDI or SAIFI as set for that region by the Public Service Commission (PSC).

Fiscal Year – Beginning in 2002 the Company changed the cycle of its annual budgeting and reporting process from a calendar year beginning January 1st and ending December 31st to a fiscal year beginning April 1st and ending March 31st of the following year. Budget estimates for work to be performed on worst performing feeders will most likely reflect this shift in fiscal year budgeting while actual costs typically reflect work completed by the end of the calendar year.

Interruption - Loss of electric service for five minutes or more to one or more customers. This is a reliability issue rather than a power quality issue.

Major Storm - A storm that causes at least 10% of the metered customers in a region to be without service or a storm that results in metered customers to be without service for 24 hours or more.

Minimum Goal - As defined by the Company and the PSC, this is the level of service reliability below which a region fails and additional analysis is required.

Momentary Interruption - Loss of electric service for less than five minutes to one customer or more. This a power quality rather than a reliability issue.

Objective Goal - The target level of service reliability as defined by the Company and the PSC.

Power Quality - The performance of a circuit other than that defined by reliability. It is characterized by parameters such as the number of momentary (less than 5 minute) interruptions, steady state voltage sags, swells, surges, noise and harmonics.

Recloser - A loadbreak device that operates when a fault current of pre-determined level and duration flows through it.

Region - One of eight geographic areas within the Company's electric territory. For the purpose of this report, the eight regions are: Capital (Albany, Troy, Schenectady, Hudson); Central (Syracuse, Fulton, Oswego, Pulaski, Cortland); Frontier (Buffalo, Niagara Falls); Genesee (Batavia, Avon,

Albion, Medina); Mohawk Valley (Utica, Rome, Oneida, Herkimer); Northeast (Glens Falls, Saratoga, Ticonderoga); Northern (Watertown, Ogdensburg, Malone, Potsdam); And Southwest (Angola, Fredonia, Stow, Olean).

Reliability - The electric performance of a distribution circuit as experienced by its customers. It is based on interruptions of five (5) minutes or longer, their duration, frequency and number of customers affected.

SAI - System Availability Index is the percent of time that service was available during the year. The SAI is derived from the ratio of the total number of customer hours that service was available during the year (24/hour/day x 365 days/year - SAIDI) to the total customer hours available per year (8,760 = 24 hours/day x 365 days/year) multiplied by 100 percent.

SAIDI - System Average Interruption Duration Index is an average interruption duration per customers served per year. It is the ratio of the customer hours interrupted to the total number of customers served.

SAIFI - System Average Interruption Frequency Index is the average number of times that a customer is interrupted in a year. It is determined by dividing the number of customers interrupted in a year by the average number of customers connected during the year.

SECTIONALIZER - A non-loadbreak circuit device that works with substation breaker or a recloser to minimize the number of customers involved in an interruption.

Worst-Performing Circuits - Circuits in the system or a given region that are the worst performing based on the Company's combined rankings of:

- a. SAIFI
- b. SAIDI
- c. Number of Interruptions
- d. Number of Customer Hours Interrupted

NATIONALGRID
ELECTRIC SERVICE INTERRUPTION - ACTIVE FEEDER RANKING
DURING TIME PERIOD JAN 01, 2016 TO DEC 31, 2016
FACILITY TYPE(S) INCLUDE: DISTRIBUTION, SUBSTATION, AND TRANSMISSION
EXCLUDING PSC CODE(S): 01
REPORT # 4
SYSTEM REPORT

Region	Station Name	Ckt/F No.	No. Cst. Served	No. Intr.	Intr. Rank	Tot. Dur. Hours	Avg. Dur.	Max. Dur.	Cust. Intr.	Max. Cust.	Tot. Cust. Hours	Tot. CH Rank	SAIFI	SAIFI Rank	SAIDI	SAIDI Rank	CAIDI	Fdr Rank	Mmty Intr.
Northeast	Northville	35-33252	2356	47	2083	254.2	5.4	19.5	5444	1740	33263.83	2092	2.31	1929	14.12	2069	6.11	8173	1
Mohawk	White Lake	17-39963	953	19	1907	56.6	3	8.7	9493	960	19628.25	2077	9.96	2083	20.6	2080	2.07	8147	0
Mohawk	Debalso	17-68452	3034	25	1996	72.9	2.9	13.6	13718	3030	20497.15	2079	4.52	2062	6.76	2006	1.49	8143	1
Mohawk	Turin Rd	18-65356	1292	25	1996	87.8	3.5	11.4	3714	1293	16728.87	2069	2.87	1990	12.95	2065	4.5	8120	2
Northeast	Fort Gage	40-31954	1844	19	1907	98.7	5.2	17.2	7234	1597	27535.55	2089	3.92	2053	14.93	2071	3.81	8120	2
Northern	Higley	25-92451	1060	30	2045	102.4	3.4	14.3	3403	1056	8873.72	2012	3.21	2021	8.37	2033	2.61	8111	1
Mohawk	Salisbury	19-67857	1004	27	2020	115.9	4.3	14.7	3760	1017	8741.08	2010	3.75	2043	8.71	2037	2.32	8110	1
Northeast	Schroon Lake	41-42951	2209	42	2080	157.7	3.8	12.9	8528	2250	10832.22	2042	3.86	2051	4.9	1927	1.27	8100	0
Northeast	Northville	35-33251	1624	18	1889	52.3	2.9	10	5811	1642	30863.87	2090	3.58	2036	19	2078	5.31	8093	0
Central	Colosse	16-32151	2510	37	2070	142	3.8	17	5826	2516	17689.57	2071	2.32	1930	7.05	2011	3.04	8082	5
Northern	Chasm Falls	27-85251	1065	41	2078	147	3.6	10.6	3816	1056	6883.42	1972	3.58	2036	6.46	1990	1.8	8076	1
Capital	Front St	32-36053	1594	19	1907	91.7	4.8	20.9	7426	1595	14168.4	2060	4.66	2065	8.89	2040	1.91	8072	0
Central	New Haven	14-25652	1347	26	2002	100.8	3.9	9.5	8328	1351	7646.83	1989	6.18	2075	5.68	1968	0.92	8034	0
Mohawk	Sherman	17-33351	1445	32	2058	149.9	4.7	12.7	5520	1445	7416.47	1986	3.82	2046	5.13	1939	1.34	8029	2
Central	Granby Center	14-29351	1825	17	1858	92.3	5.4	19.5	5949	1817	22869.4	2084	3.26	2023	12.53	2063	3.84	8028	0
Northeast	Union St-Saratoga	39-37654	593	20	1929	122.8	6.1	19.3	2530	591	7058.45	1978	4.27	2057	11.9	2061	2.79	8025	0
Northeast	Brook Road	39-36954	2027	23	1973	146.4	6.4	14.4	5864	2027	13324.97	2059	2.89	1993	6.57	1995	2.27	8020	6
Northeast	Scofield	38-45053	1390	31	2052	158	5.1	19	3541	676	8945.13	2014	2.55	1965	6.44	1988	2.53	8019	1
Mohawk	Chadwicks	17-66851	1826	36	2068	129	3.6	14.9	3679	1834	14518.95	2062	2.01	1863	7.95	2025	3.95	8018	0
Mohawk	Eagle Bay	17-38272	1037	37	2070	210.4	5.7	18.7	12125	1050	26763.78	2088	11.69	2086	25.81	2086	2.21	8330	1
Mohawk	Raquette Lake	17-39861	494	32	2058	269.9	8.4	29.9	7349	498	26592.52	2087	14.88	2092	53.83	2092	3.62	8329	1
Northeast	Gilmantown	35-15451	2001	35	2066	145.4	4.2	10	13899	2021	63965	2093	6.95	2078	31.97	2090	4.6	8327	2
Central	Lighthouse Hill	16-6144	2179	64	2093	233.3	3.6	16.1	11426	2168	22278.8	2082	5.24	2070	10.22	2055	1.95	8300	0
Mohawk	Alder Creek	17-70152	1035	35	2066	112.4	3.2	10.2	11409	1049	18128.27	2072	11.02	2085	17.52	2076	1.59	8299	1
Mohawk	Old Forge	17-38362	726	27	2020	173.4	6.4	32.1	9414	734	19221.23	2076	12.97	2090	26.48	2087	2.04	8273	1
Mohawk	Poland - Utica	17-62258	1550	46	2082	196.3	4.3	18.2	7554	1535	15512.6	2066	4.87	2067	10.01	2052	2.05	8267	2
Northeast	Chestertown	40-04252	2225	53	2086	247.1	4.7	15.4	8566	2239	18614.6	2075	3.85	2049	8.37	2033	2.17	8243	0
Mohawk	Eagle Bay	17-38271	881	23	1973	112.3	4.9	17.5	11142	905	31419.03	2091	12.65	2088	35.66	2091	2.82	8243	1
Mohawk	Alder Creek	17-70161	677	27	2020	99.5	3.7	14.5	7014	678	11318.42	2049	10.36	2084	16.72	2075	1.61	8228	0
Mohawk	Old Forge	17-38361	604	24	1986	98.7	4.1	15.7	7657	610	14565.93	2063	12.68	2089	24.12	2085	1.9	8223	1
Capital	Altamont	30-28356	2311	49	2084	177.5	3.6	12.6	8867	2309	16272	2068	3.84	2048	7.04	2010	1.84	8210	1
Central	West Cleveland	11-32651	722	30	2045	119.5	4	10.2	3659	715	9643.72	2025	5.07	2069	13.36	2067	2.64	8206	4
Capital	Elnora	32-44256	2223	29	2039	167.5	5.8	20.3	8150	2223	20798.85	2080	3.67	2040	9.36	2046	2.55	8205	0
Capital	Bethlehem	30-02158	2737	31	2052	131.4	4.2	10.6	10195	2749	22039.13	2081	3.72	2042	8.05	2027	2.16	8202	2
Northeast	Hague Road	41-41853	2130	29	2039	104.7	3.6	14	6567	2138	22918.23	2085	3.08	2015	10.76	2056	3.49	8195	1
Central	Southwood	11-24452	1762	23	1973	101.3	4.4	12.5	8528	1763	25623.92	2086	4.84	2066	14.54	2070	3	8195	3
Northern	North Carthage	23-81652	2221	39	2075	138.6	3.6	14.5	7810	2235	15458.67	2065	3.52	2031	6.96	2009	1.98	8180	2
Mohawk	Old Forge	17-38364	858	20	1929	53.2	2.7	10.4	11224	871	18579.77	2074	13.08	2091	21.65	2082	1.66	8176	1
Central	West Monroe	11-27451	1963	32	2058	126.2	3.9	11.9	5344	1952	10115.65	2031	2.72	1975	5.15	1940	1.89	8004	4

Region	Station Name	Ckt/F No.	No. Cst. Served	No. Intr.	Intr. Rank	Tot. Dur. Hours	Avg. Dur.	Max. Dur.	Cust. Intr.	Max. Cust.	Tot. Cust. Hours	Tot. CH Rank	SAIFI	SAIFI Rank	SAIDI	SAIDI Rank	CAIDI	Fdr Rank	Mmty Intr.
Southwest	Delameter	07-9354	2951	27	2020	114.7	4.2	25.2	9706	2945	12744.58	2058	3.29	2025	4.32	1886	1.31	7989	2
Northeast	Wells	35-20881	847	15	1798	72.9	4.9	10	2917	853	20401.47	2078	3.44	2029	24.09	2084	6.99	7989	5
Capital	Blue Stores	33-30351	2124	38	2072	174.7	4.6	13.9	4090	2074	15126.87	2064	1.93	1837	7.12	2012	3.7	7985	6
Northeast	Bolton	40-28451	2097	29	2039	168.3	5.8	35.8	4616	2158	12616.52	2054	2.2	1908	6.02	1981	2.73	7982	3
Central	Lords Hill	11-15067	751	26	2002	146.7	5.6	21.8	2140	750	6088.13	1956	2.85	1988	8.11	2031	2.84	7977	0
Northeast	Pottersville	40-42451	1070	19	1907	95.7	5	17.9	3836	1084	8398.63	2006	3.59	2037	7.85	2024	2.19	7974	0
Northeast	Whitehall	38-18751	1742	24	1986	138.2	5.8	17.3	5238	1748	9245.45	2019	3.01	2009	5.31	1945	1.77	7959	1
Northern	Indian River	13-32358	1749	29	2039	117.7	4.1	16.4	4868	1265	8467.98	2008	2.78	1985	4.84	1923	1.74	7955	5
Southwest	Hartfield	09-7955	1520	16	1827	41.1	2.6	10.3	5872	1522	11106.07	2046	3.86	2051	7.31	2017	1.89	7941	1
Mohawk	Oneida	20-50151	1805	26	2002	80.9	3.1	16.4	4274	1796	10112.67	2030	2.37	1942	5.6	1964	2.37	7938	1
Mohawk	Turin Rd	18-65355	1432	19	1907	46.6	2.5	6.2	5468	1434	8404.48	2007	3.82	2046	5.87	1973	1.54	7933	3
Northern	W Adams	13-87554	2445	52	2085	189.6	3.6	19.8	6739	2390	9387.17	2021	2.76	1982	3.84	1832	1.39	7920	1
Northeast	Indian Lake	40-31075	759	20	1929	86.3	4.3	11.1	2343	748	5950.1	1952	3.09	2016	7.84	2023	2.54	7920	6
Mohawk	Stittville	17-67052	1693	27	2020	116.1	4.3	13.4	3910	1676	9028.77	2015	2.31	1929	5.33	1947	2.31	7911	1
Northeast	Indian Lake	40-31076	716	28	2029	160.6	5.7	17.1	1444	251	6686.22	1967	2.02	1867	9.34	2045	4.63	7908	3
Northern	Bremen	23-81556	1659	59	2092	194.6	3.3	20.8	3089	341	9211.9	2018	1.86	1829	5.55	1958	2.98	7897	4
Mohawk	Sherman	17-33352	1752	33	2061	172.1	5.2	17.4	4816	1742	7319.45	1985	2.75	1979	4.18	1872	1.52	7897	1
Mohawk	Old Forge	17-38363	374	13	1728	31.8	2.4	10.6	4483	379	7965.37	2000	11.99	2087	21.3	2081	1.78	7896	1
Northeast	Brook Road	39-36955	3175	58	2091	241.6	4.2	17.4	5355	1665	15531.03	2067	1.69	1794	4.89	1926	2.9	7878	0
Northeast	Riparius	40-29395	448	14	1759	68.2	4.9	12.4	1962	496	7316.02	1984	4.38	2059	16.33	2073	3.73	7875	0
Northern	Lowville	23-77354	2621	56	2089	178.2	3.2	13.9	5553	1643	10521.75	2037	2.12	1894	4.01	1850	1.89	7870	1
Northern	Franklin	24-84361	161	20	1929	69.5	3.5	7.7	1515	162	2968.07	1773	9.41	2082	18.44	2077	1.96	7861	2
Capital	Blue Stores	33-30352	1091	31	2052	181.6	5.9	23.2	1626	1086	9710.58	2026	1.49	1741	8.9	2041	5.97	7860	1
Northeast	Union St-Saratoga	39-37652	913	18	1889	71	3.9	10.9	3224	910	5882.38	1951	3.53	2032	6.44	1988	1.82	7860	1
Northeast	Wilton	38-32952	1524	14	1759	68.3	4.9	12.4	5073	1530	11118.45	2047	3.33	2027	7.3	2016	2.19	7849	3
Central	Tully Center	12-27851	2095	35	2066	177.4	5.1	21.8	6286	2090	7194.92	1980	3	2006	3.43	1796	1.14	7848	2
Northern	Gilpin Bay	24-95661	851	30	2045	127.5	4.3	12.8	2046	867	4631.57	1899	2.4	1945	5.44	1953	2.26	7842	1
Central	Constantia	11-1923	724	22	1959	99.9	4.5	13.9	1655	722	5501.72	1940	2.29	1924	7.6	2019	3.32	7842	4
Capital	Reynolds Rd	31-33452	1061	15	1798	49.4	3.3	10.9	4293	1065	7086.82	1979	4.05	2056	6.68	1999	1.65	7832	1
Northern	Bloomington	24-84162	820	14	1759	34.6	2.5	6.8	5083	822	6652.57	1966	6.2	2076	8.11	2031	1.31	7832	2
Central	Rock Cut Road	11-28653	3418	12	1689	33.6	2.8	7.2	13572	4859	22299.87	2083	3.97	2055	6.52	1993	1.64	7820	3
Capital	Swaggertown	32-36453	2123	31	2052	178.6	5.8	21.7	4109	1271	9538.23	2023	1.94	1839	4.49	1899	2.32	7813	0
Central	Jewett Road	11-29155	784	15	1798	94.2	6.3	17	2790	787	6048.2	1955	3.56	2033	7.71	2021	2.17	7807	5
Central	Sorrell Hill	11-26953	961	13	1728	64.8	5	13.4	3498	954	8288.83	2003	3.64	2039	8.63	2036	2.37	7806	3
Capital	Boydtonville	31-33351	1956	56	2089	287	5.1	22.2	4428	1950	6849.55	1970	2.26	1920	3.5	1804	1.55	7783	0
Capital	Trinity Place	30-16456	1183	13	1728	39.5	3	6.7	2759	1191	11419	2051	2.33	1934	9.65	2048	4.14	7761	2
Capital	Wolf Road	30-34451	2021	23	1973	70.2	3.1	13	4426	2020	8312.32	2005	2.19	1907	4.11	1863	1.88	7748	3
Northern	Dekalb	29-98455	1129	29	2039	91	3.1	9.7	1805	403	6522.93	1965	1.6	1773	5.78	1970	3.61	7747	2
Frontier	Shawnee Rd	03-7652	1957	15	1798	78.2	5.2	43.7	4250	1954	11440.72	2052	2.17	1905	5.85	1972	2.69	7727	0
Capital	Selkirk	30-14952	1579	18	1889	75.5	4.2	15.4	3951	1578	7002.47	1976	2.5	1959	4.43	1896	1.77	7720	1
Capital	Front St	32-36051	3284	33	2061	102.9	3.1	10.1	7495	3019	9095.03	2017	2.28	1923	2.77	1715	1.21	7716	4
Northern	Mcadoo	28-91453	708	18	1889	40.7	2.3	6.2	2339	710	3795.88	1846	3.3	2026	5.36	1948	1.62	7709	2
Capital	Hoosick	31-31451	1638	27	2020	158.1	5.9	14.9	4852	1612	5080.6	1926	2.96	1997	3.1	1760	1.05	7703	0
Southwest	W Valley Sta	10-2562	429	17	1858	65.8	3.9	8.1	1230	429	3480.55	1818	2.87	1990	8.11	2031	2.83	7697	3
Northern	Lake Colby	24-92758	1907	25	1996	62.8	2.5	6.2	3741	1911	7778.75	1995	1.96	1842	4.08	1859	2.08	7692	0
Northern	Higley	25-92452	1389	28	2029	60.2	2.1	4.3	4226	1394	4395.12	1881	3.04	2012	3.16	1766	1.04	7688	0
Central	Niles	11-29451	1285	38	2072	232	6.1	18.5	1532	332	7727.28	1993	1.19	1639	6.01	1980	5.04	7684	0

Region	Station Name	Ckt/F No.	No. Cst. Served	No. Intr.	Intr. Rank	Tot. Dur. Hours	Avg. Dur.	Max. Dur.	Cust. Intr.	Max. Cust.	Tot. Cust. Hours	Tot. CH Rank	SAIFI	SAIFI Rank	SAIDI	SAIDI Rank	CAIDI	Fdr Rank	Mnty Intr.
Central	Sandy Creek	16-6652	1684	22	1959	82.9	3.8	11.4	3587	757	6837.95	1969	2.13	1897	4.06	1857	1.91	7682	0
Central	Wetzel Road	11-690055	1328	13	1728	50.4	3.9	10.2	3119	1191	8900.83	2013	2.35	1938	6.7	2003	2.85	7682	4
Central	New Haven	14-25653	1954	31	2052	119.9	3.9	13	8787	1968	4806.32	1912	4.5	2061	2.46	1655	0.55	7680	0
Southwest	Baker St	09-15056	2205	29	2039	70.8	2.4	7.3	3652	2012	8566.82	2009	1.66	1788	3.89	1836	2.35	7672	1
Northern	Star Lake	29-72762	651	13	1728	50.3	3.9	7.6	1401	664	7225.43	1982	2.15	1902	11.1	2057	5.16	7669	1
Central	Fabius	11-5561	470	15	1798	88.6	5.9	26.5	952	461	5337.9	1935	2.03	1872	11.36	2058	5.61	7663	0
Northern	Thousand Isl	26-81452	2113	28	2029	190.1	6.8	29.4	3609	2181	7934.42	1998	1.71	1800	3.76	1826	2.2	7653	3
Southwest	Reservoir Sta 103	10-10361	200	10	1603	73.8	7.4	14.6	928	202	4637.32	1900	4.64	2064	23.19	2083	5	7650	2
Northern	Loon Lake	24-83761	186	11	1655	54.7	5	18.9	1280	191	3658.23	1833	6.88	2077	19.67	2079	2.86	7644	3
Northern	Thousand Isl	26-81458	2287	20	1929	108.3	5.4	15.2	3108	2224	12704	2057	1.36	1698	5.55	1958	4.09	7642	3
Capital	McClellan St	32-30452	3028	18	1889	48.9	2.7	6.5	7267	3291	9811.2	2027	2.4	1945	3.24	1778	1.35	7639	4
Northern	Nicholville	27-86062	1110	15	1798	69.2	4.6	14	2483	1113	6295.28	1959	2.24	1916	5.67	1966	2.54	7639	2
Northern	Riverview	24-84762	231	13	1728	37	2.8	7	1892	236	2869.28	1761	8.19	2081	12.42	2062	1.52	7632	3
Central	Jewett Road	11-29156	324	13	1728	136	10.5	76.5	1243	325	3261.67	1801	3.84	2048	10.07	2053	2.62	7630	2
Central	Jewett Road	11-29154	1009	11	1655	37.4	3.4	8.6	3078	1011	5990.45	1954	3.05	2013	5.94	1977	1.95	7599	2
Capital	Oathout Ln	30-40251	725	26	2002	121.4	4.7	21.3	1860	721	2915.58	1764	2.57	1968	4.02	1852	1.57	7586	2
Capital	Maplewood	31-30751	2746	14	1759	43	3.1	6.5	5863	2760	11276.68	2048	2.14	1901	4.11	1863	1.92	7571	4
Frontier	Shawnee Rd	03-7651	1130	13	1728	36	2.8	5.8	3137	1125	5220.52	1931	2.78	1985	4.62	1910	1.66	7554	2
Capital	Maplewood	31-30753	2183	16	1827	102.1	6.4	25.7	5042	2176	7619.17	1988	2.31	1929	3.49	1801	1.51	7545	2

2015 HIGHEST NUMBER OF MOMENTARIES CIRCUIT LIST
(Circuits with 10 or more Momentaries)

Region	Station Name	Ckt/F No.	Circuit kV	# of MI's	Rank		
					Within Region	Within System	Reliability Ranking
No circuits experienced 10 or more momentary interruptions in 2016.							

