STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION

Docket No. DE 19-064

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty Utilities
Distribution Service Rate Case

REBUTTAL TESTIMONY

OF

ANTHONY STRABONE

AND

HEATHER M. TEBBETTS

January 30, 2020

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I. INTRODUCTION AND BACKGROUND

Q. Mr. Strabone, please introduce yourself.

A. My name is Anthony Strabone, my business address is 9 Lowell Road, Salem, New Hampshire, and I am employed by Liberty Utilities Service Corp. I am the Manager of Electrical Engineering for Liberty and I am responsible for the electric capital work plan whereby I manage engineering and construction resources for capital projects. Please see the Direct Testimony of Joel Rivera, Anthony Strabone, and Heather M. Tebbetts, filed April 30, 2019, for a description of my educational background and work experience.

Q. Ms. Tebbetts, please state your full name, business address, and position.

A. My name is Heather M. Tebbetts, my business address is 15 Buttrick Road, Londonderry, New Hampshire, and I am employed by Liberty Utilities Service Corp. I am Manager of Rates and Regulatory Affairs and am responsible for providing rate-related services for the Company. Please see the Direct Testimony of Joel Rivera, Anthony Strabone, and Heather M. Tebbetts, filed April 30, 2019, for a description of my educational background and work experience.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. Our testimony is provided in rebuttal to the testimony of Staff witnesses Jay E. Dudley and Kurt Demmer related to cost recovery of various capital projects and step adjustments for capital investments in 2019 and beyond. Specifically, we address

Messrs. Dudley and Demmer's recommendations that the Commission disallow approximately $6 million of capital project spending that occurred during 2017 and 2018.

III. CAPITAL PROJECTS

Q. Has Staff recommended any disallowance of projects included in the Company's proposed revenue requirement?

A. Yes, Staff has recommended exclusion of approximately $6 million in capital project spending, which are described further in this testimony.

Q. Please explain, by project, why Staff's recommended disallowances are not appropriate.

A. Staff witness Dudley seeks to disallow the costs for the projects listed below for what he refers to as either an alleged lack of documentation or other reasons as will be described below.[1] However, the record shows that the Company provided the necessary documentation to support recovery of these project costs. In addition, some of the recommended cost disallowances are for projects that were not yet in service at the end of 2018 and, therefore, are not included in rate base or the Company's proposed revenue requirement, rendering Staff's recommended reduction wholly inappropriate for those cost amounts. For all of the reasons discussed herein, the recommended reductions should be rejected by the Commission as unwarranted.

[1] December 6, 2019, Direct Testimony of Jay E. Dudley at Bates 000060.

Project No.	Description	Year		Amount
8830-1832	Replace 6L2 No. Main Hanover	2018	$	1,070,593
8830-C42930	Install Service to Tuscan Village	2018	$	674,260
8830-C18620	Charlestown 32 Dline	2018	$	104,750
8830-1830	Misc. Capital Imprv. Londonderry	2018	$	25,649
8830-1865	Rockingham Sub Transmission**	2018	$	575,354
8830-1866	Salem Depot Feeder Getaways	2018	$	1,356,000
8830-1845	Golden Rock Dist. Feeders	2018	$	16,978
8830-1744	Golden Rock Substation	2018	$	309,324
8830-CD0291	Sky View URD	2017	$	49,394
8830-C18620	Charlestown 32 Dline	2017	$	183,289
8830-C36424	Mt. Support New 16L3 Feeder	2017	$	467,937
8830-C36425	Mt. Support New 16L5 Feeder	2017	$	555,143
8830-1867	Rockingham Sub Transmission	2017	$	175,504
8830-C42921	Install Splices 6L2 & 6L4	2017	$	203,305
		Total	$	5,767,480

Bates 000060 of Mr. Dudley's testimony: ** ***Note:*** *The total cost for the land purchase associated with Project #8830-1864 Rockingham Substation in the amount $1,568,870 is not included above. This amount is not currently in rate base but instead is posted on Liberty's books as "Plant held for future use." As discussed in Section V. above, Staff recommends that the Commission disallow the expenditure.* The Company includes this project in its discussion below.

Each of these capital projects is discussed below.

8830-1832 – Replace 6L2 No. Main Hanover

Mr. Dudley recommends disallowance of the costs for this project on the basis that: (1) the Company allegedly could not provide instances of failures of the cross-linked polyethylene ("XLPE") aluminum cables elsewhere; (2) the Company did not provide specific documentation evidencing failure in the Company's service territory; and (3) there are alleged defects in the 2018 business case, including that the business case was signed and dated in 2017. He also claims that there was not a need to replace these cables. However, none of these claims are correct or warranted.

First, Attachment ST-1 provides a history of failures since 2009 for different mainline primary underground cables. The 14L1, 14L2, 14L3, 13L2, 6L2, and 10L2 feeders were 1970s vintage, direct buried XLPE cable, known to be prone to electrical tree growth and to fail prematurely. The cables had previously failed — some on more than one occasion. Also, the Company replaced the Salem Depot underground cables because the cables were direct buried XLPE cables that will be repurposed as underground getaway cables for the new Rockingham Substation. The Pelham Substation underground cables were replaced as part of the substation upgrade project. Attachment ST-2 provides a summary of some of the problems experienced with the Company's direct buried XLPE cables. Moreover, these are the mainline exit cables for the feeders leaving a substation. Therefore, it is not considered acceptable practice for Liberty to subject customers to the repeated risk of cable failures and outages for the entire feeder. Attachment ST-3 provides additional details regarding replacement of the Hanover 6L2 cables. Replacement of the 13L2 cable getaways is still pending.

Second, there is no "imprudence" conclusion whatsoever that can reasonably be drawn from the fact that the business case for a 2018 project was signed in 2017. Without more specific reasoning, detail, or demonstration regarding an unreasonable action taken by the Company, such a claim of imprudence is completely unsubstantiated.

Third, Mr. Dudley has not explained or demonstrated reasoned justification describing why a particular cable should or should not be replaced from an engineering perspective, which is the perspective that is embedded in the Company's entire capital planning effort.

A challenge to the Company's replacement decisions must arise from or relate to the engineering basis for the replacement. If the Company's replacement decision can be invalidated without reference to any engineering analysis or justification, then the Company is constrained from moving forward *with any project* on the basis of engineering judgment, which would paralyze the electric system.

Conversely, the Company has demonstrated the prudence of the project and none of Mr. Dudley's claims undermine this showing. By way of background, Dartmouth College was combining its north and west campuses and installing its own connections in the area. The Company worked with the College and the Town of Hanover to replace this cable as it was 1970s vintage, prone to failure, and provides the backup supply to Dartmouth's north and west campuses. This cable is a significantly important piece of the Company's infrastructure in Hanover.

Due to the significant costs of paving, it made sense for the Company to replace the cable prior to the College completing its work, which saved paving costs and continued to provide safe and reliable service to the campus without placing the vintage cables at risk of failure in the near future. The Company eliminated a second stage of the project slated to be completed in 2018 on Maynard Street in Hanover because neither the town nor the College were working in the area. The Company would have incurred substantial paving and other road-related costs if it performed the work without others sharing the costs of working in the street at the same time. Thus, the Company canceled the second phase of

the project and shifted the dollars slated for that phase of the project to the initial phase 1 of the project.

Lastly, it should be noted that, in September 2019, there was a failure on the same cable further down Maynard Street, which then required the Company to splice and make repairs to the cable until phase 2 is undertaken. The fact that this very same cable failed is complete affirmation that the Company's concerns about the cable were valid and that its replacement was prudent.

8830-C18620 Charlestown 32 Dline

Mr. Dudley cited a documentation deficiency as the basis for his recommendation to disallow the costs of this project. As explained below, Mr. Dudley has an incorrect view as to whether a 2018 business case was required for this project.

The Company provided explanations for the increased cost of the project. In 2017, the business case noted an estimate of $316,992, which was generated using our internal estimating tool. The final bids from contractors came in higher than expected and, thus, the total project cost was higher due to no fault of the Company. The project close-out form and change order form, which were both provided to Staff, provided the explanation for the higher costs. That is, the 2018 costs were associated with materials for the project charged in 2018, rather than in 2017, although the project went into service in 2017. As such, a 2018 business case was not required for the 2018 costs because the project was completed. The 2018 project close-out form was provided to Staff. Under these

circumstances, there was no unreasonable action taken by the Company and no foundation for a finding of "imprudence" and associated cost disallowance.

8830-C42930 Install Service to Tuscan Village

Mr. Dudley again cited a documentation deficiency related to this project.

The original budget for this project as provided in the 2018 business case was $900,000, which matches the amount shown on the 2018 E-22 form filed with the Commission. The final project close-out form shows the total actual cost was **under budget** by $225,739.88. The Company explained during a technical session that the amount shown in its attachment to a discovery response (Attachment Staff 1-2.xlsx) should have shown $900,000, not $400,000, but nevertheless Staff disregarded this clerical error and included this project in its list of project costs to be disallowed. Again, without an unreasonable action taken by the Company, there is no valid claim of "imprudence" and cost disallowance.

8830-1830 Misc. Capital Imprv. Londonderry

Mr. Dudley cites a lack of change orders related to this project. As provided in the Company's response to Staff TS 1-14, the original budget was a place holder for projects that have the potential to arise during the year. Change order forms were not required for this project number because the project scope did not change. That is, the capital expenditure form attached to the business case describes the project as being for improvements to the location that may include work on the building and/or systems required to operate the Londonderry facilities. The LU Capital Expenditure Planning and

Management Policy effective October 23, 2018, Section 6.3 Change Orders, requires a change order when the spend change is due to a factor outside of the original scope of work. These work orders were within the scope of work, and thus *no change orders were required*.

8830-1866 – Salem Depot Feeder Getaways

Staff's testimony states that this project should be disallowed because the getaway cables cannot be repurposed once Rockingham Substation is in service. However, this is a matter of engineering analysis and judgment, which Mr. Dudley has not refuted.

More specifically, Mr. Dudley's observation is incorrect as these feeders will be repurposed to be the main line out of Rockingham Substation because the end point of the feeders is in Tuscan Village. For the 9L2 feeder, 1020 feet were installed and 180 feet will be retired, leaving 840 feet (82%) in service. For the 9L3 feeder, 1395 feet were installed and 200 feet will be retired once Rockingham Substation is built, leaving 1195 feet (or 85%) in service. The Company chose to complete this project now, rather than wait until Rockingham Substation was built, because gas and water services are to be installed in the area and it was most cost effective for Liberty to install these cables when the road was open, thus saving substantially on road restoration and paving costs, even though very small sections would need to be retired once the new substation was built. Mr. Dudley has not demonstrated that any action taken by the Company was unreasonable or unwarranted.

Mr. Dudley also notes in his testimony that this capital investment was not included in the list of capital projects in the 2018 budget. As described in Ms. Fleck's testimony, and as mentioned above in relation to the Maynard Street project in Hanover, the Company occasionally has projects that arise during the year on an unexpected basis, requiring a decision to reduce or cancel other projects to obtain funding within budget parameters. Though this particular project was not in the original 2018 budget, it was included in the budget in June 2018, which was provided to Staff in a response to a data request (Attachment Staff 9-3.9.xlsx). To fund this project in 2018, the following projects were canceled or reduced in scope, for a total reallocation of $1,130,000 used to fund the Salem Depot feeder getaways project:

- 8830-1856 Install 13L3-9L3 Feeder Tie: $180,000
- 8830-1841 Feeder Getaway Cable Replacement: $250,000
- 8830-1839 IE-NN URD Cable Replacement: $500,000
- 8830-1849 NN ERR/Pockets of Poor Perf: $100,000
- 8830-1842 Amerductor Replacement Program: $100,000

8830-CD0291 – Sky View URD

Staff contends that it was not provided the data for the customer's Contributions in Aid of Construction (CIAC) and the breakdown of the work orders associated with the project, and thus concluded that the project costs should be disallowed. In fact, the Company *did* provide the information to Staff on November 5, 2019; however, it appears that a file handling issue occurred on Staff's end. The Company was unaware that Staff could not locate the response until Staff so advised the Company during the January 14, 2020, technical session. This issue would have been avoided had Staff earlier notified the

Company of not having Attachment Staff TS 2-10. The Company immediately provided the subject discovery response and attachment during the technical session. Immediately following the January 14, 2020, technical session, the Company also provided Staff with proof that the Company had timely uploaded the discovery response to the Staff's discovery site on November 5, 2019. The Company does not know what may have happened with the files after they were uploaded to the Commission's site, but certainly no penalty is warranted for these circumstances.

Given that that the supporting documentation exists and was properly provided to Staff, and Staff has the necessary information, Staff's recommendation to disallow the costs related to this project is unwarranted.

8830-C36424 – Mt. Support New 16L3 Feeder/8830-C36425 – Mt. Support New 16L5 Feeder

Although it is not clear in Mr. Dudley's testimony, it appears he is recommending disallowance of the costs of these feeder projects due to alleged documentation deficiencies. As discussed with Staff during the 2016 rate case proceedings, the Company provided justification for the Mt. Support feeders as the feeders were recommended in the Lebanon Area Study Report. Pages 4 and 5 of the Study discuss the area problems that are addressed by the study recommendation, including the installation of two additional feeders at Mt. Support substation. The additional feeder capacity provided by the project is one of the key solutions to a number of operating problems that occur under normal and emergency conditions. System redundancy is the primary driver

of the project as reflected in the Lebanon Area Study. However, system redundancy provides other planning, operations, and maintenance flexibilities including reduction of customers exposed to a single contingency, flexibility of system maintenance requiring circuit outages, and speed of outage restoration. The solutions recommended in the study would not be possible without the additional feeder capacity.[2]

Mr. Dudley does not challenge the engineering conclusions of the study, which have to be addressed by the Company. Mr. Dudley has made no connection between the alleged documentation "deficiency" and the execution of the project for it to be "imprudent" and warranting cost disallowance. Without such a connection, any alleged concern about a documentation deficiency related to this project has no impact on the necessity for the project, nor the Company's prudent execution of the project construction and completion.

8830-C42921 – Install Splices 6L2 & 6L4

Mr. Demmer's testimony argues that the splices should not have been capitalized because it is his opinion that the splices do not extend the life of the cables. However, there have been seven reported lockouts on Hanover Substation feeders due to failures on underground equipment. The history of outages, condition of equipment, and issues with workmanship have led the Company to replace XLPE direct buried underground cables on the 6L2 and splices on the 6L2/6L4. Attachment ST-1 provides a history of the outages. In response to Staff TS 2-9, the Company provided the accounting backup for these types of devices. Accordingly, the Company has correctly capitalized the cost of

[2] DE 16-383 Distribution Service Rate Case, Staff Data Requests – Set 4, Response to Staff 4-26.

these installations and Mr. Dudley has not provided any facts or documentation substantiating his assertion that the splices do not extend the life of the cable. It is not sufficient for the claim to be alleged. To support cost disallowance, the claim must be substantiated with facts, engineering expertise, or other documentation.

8830-1845 – Golden Rock Dist. Feeders/8830-1744 – Golden Rock Substation

Staff's testimony recommended that the costs related to this project should be disallowed because, in Staff's view, the project was unnecessary. However, this project is not yet in service and is not included in the Company's proposed rate base or associated revenue requirement. Liberty understands that Staff now agrees its recommendation on this topic is without merit. These projects were placed in service in 2019, which is part of the request for the 2019 step adjustment.

8830-1864 – Rockingham Substation

Staff testified that the Company's purchase of a parcel of land within the Tuscan development to locate the Rockingham Substation was imprudent. The costs associated with this purchase are not part of this rate case as the Rockingham Substation has not been built and is not in service. The Company will present, in its next rate case, evidence showing that the Company evaluated other sites for the Rockingham substation and that its selection of this particular site was prudent.

8830-1865/1867 - Rockingham Sub Transmission (2017 & 2018)

This is another project that is not in rate base as the line has not been built. The project is only in the engineering phase. Mr. Dudley's reduction of rate base for the costs of this

project is thus improper. Although Staff testified as to its views regarding the necessity of the project, those costs are not presented in this case for review.

IV. STEP ADJUSTMENT/MULTI-YEAR RATE PLAN (MYRP)

Q. What is Staff's position regarding the Company's proposed Multi-Year Rate Plan?

A. Staff contends the 2019 step adjustment is inappropriate because they have not had the chance to review the 2019 projects since, at the time of Staff's testimony, the calendar year 2019 had not ended and thus final amounts for projects in service at the end of 2019 were not available. Staff also contends there was not enough time for an audit prior to the end of this case. Further, Staff opposes the Company's proposed MYRP including future step adjustments.

Q. Does the Company agree with Staff's position?

A. No. Staff does not agree with MYRPs and does not explain why MYRPs would be detrimental to ratepayers' interests. Step adjustments are key components of multi-year rate plans and provide utilities with the financial flexibility to do necessary and significant plant construction beyond the rate year without the need to file for an immediate base rate increase. Customers benefit in many ways too. Multi-year rate plans provide customers with rate stability and predictability. Multi-year rate plans avoid rate shock by providing for smaller annual increases rather than larger increases at greater intervals. They also keep costs down by delaying or avoiding resource intensive base rate reviews. The Commission retains its full authority to review capital projects for prudency and, by reviewing projects annually, can complete its review more quickly.

Customers are protected because recovery is permitted only after the respective projects have been placed into service and are used and useful.

Q. Have there been other rate cases where the Staff has agreed to step increases for capital projects that were completed during the pendency of the rate case?

A. Yes, in the Company's prior rate case (Docket No. DE 16-383, which used a 2015 test year), the Commission approved a Settlement Agreement that provided for recovery of certain capital investments put into service over each of the three years following the test year. *See* Orders No. 26,005 (Apr. 21, 2017), No. 26,141 (June 1, 2018), and No. 26,424 (Apr. 30, 2019). The Commission reviewed the Company's targeted investments and held an abbreviated proceeding prior to authorizing the Company to increase rates to recover its prudently incurred costs.

Q. As a general premise, has the Commission supported step increases as part of MYRPs in other situations?

A. Yes. There are numerous examples. There is recent precedent for MYRPs in New Hampshire for both of the other electric distribution utilities regulated by the Commission.3 The Commission approved a MYRP for Public Service Company of New Hampshire in Docket No. DE 09-035 for an annual change to rate levels to recover 80% of changes to non-REP net plant for 2011, 2012, and 2013. Order No. 25,123 (June 28, 2010).

[3] See the Rebuttal Testimony of Steven E. Mullen for additional information on MYRPs approved in New Hampshire.

The Commission approved a similar plan for Unitil in Docket No. 16-384. *See* Order No. 26,007 at 8 (Apr. 20, 2017) ("The [second] step adjustment will be for the revenue requirement associated with 80 percent of changes in Net Plant in Service made in calendar year 2017. Similarly, the 2019 Step Adjustment will recover no more than 80 percent of changes in Net Plant in Service made in calendar year 2018. The sum of the 2017, 2018, and 2019 Step Adjustments will not exceed $4.5 million."). The order established a process to implement these step increases,[4] and contained a "stay out" provision and an earnings sharing mechanism to protect customers. The Company is open to discussing those provisions and other potential terms as part of a MYRP.

These and similar MYRPs have been the norm in New Hampshire over the past 20 years. *See* Rebuttal Testimony of Steven E. Mullen.

Q. Did the OCA's consultant Mr. Nelson also reject a MYRP for Liberty beyond 2019?

A. Yes. Mr. Nelson stated in his testimony that a MYRP "beyond 2019 is a significant regulatory change." As provided in April 30, 2019, joint Direct Testimony of Joel Rivera, Anthony Strabone, and Heather Tebbetts, in the Rebuttal Testimony of Mr.

[4] For each of the Step Adjustments, Unitil will submit compliance filings on the last day of February of 2017, 2018, and 2019. The compliance filing for the Step Adjustment to be effective with rates on May 1, 2017, in the amount of $900,194 is shown in Attachment 1 to the Settlement Agreement. The step adjustment will recover the distribution revenue requirement associated with 80 percent of the annual change in Net Plant in Service.2 The Step Adjustment revenue will be the sum of (1) the Pre-Tax Rate of Return applied to the annual change in Net Plant in Service, multiplied by the factor of 80 percent; (2) Depreciation expense on annual Plant Additions multiplied by the factor of 80 percent; and (3) property taxes on the Change in Net Plant in Service multiplied by the factor of 80 percent. The Settling Parties agreed that the amount of the step adjustments is subject to review by Staff and the OCA, and subject to the approval of the Commission.

Order No. 26,007 at 10.

Mullen, and as stated above, that is clearly not the case. The other two investor-owned electric utilities in New Hampshire, and many other utilities regulated by the Commission, have received approval for multiple step increases going back decades. Approval of an MYRP is not a significant regulatory change.

V. CONCLUSION

Q. Please summarize the Company's position on Staff's disallowance of the presented projects.

A. There is no valid basis for a disallowance in relation to any of the projects cited by Staff. In each case, the Company has presented the requisite information documenting the reasons that projects were undertaken and how the costs were accounted for. Without a showing that the Company has taken an unreasonable action to cause the costs of the project at issue to be unwarranted, there is no basis for a claim of imprudence. It is not sufficient for Staff to make broad, vague claims that something is wrong with a given project or a group of projects. For a claim of imprudence to be substantiated, there must be a demonstration of a specific action or decision that the Company has taken or made that was unreasonable under the particular circumstances and that caused the costs to be higher than necessary. There is absolutely no instance raised by Staff that meets this standard. Moreover, for the projects that Staff has included as reductions to the revenue requirement that were not included in the Company's rate base calculation, there is no basis whatsoever for a cost disallowance.

Q. Does this conclude your testimony?

A. Yes.

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ADHOC INTERRUPTION SEARCH RESULTS

SEARCH CRITERIA

FROM DATE	07/01/2009 00:00:00
TO DATE	07/31/2014 23:59:59
FEEDER OUTAGE	Yes
REGULATORY MAJOR STORMS	Yes
COMPANY	Granite State Electric
Regulatory Criteria	Yes

1 **Event ID:** 7518033 **District :** Salem
Date: 11/30/2010 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L1	A	SALEM		20:50	21:02	0 : 12	116	23	0.003	--	OLDE TROLLEY 18
42-18L1	BA	SALEM	MALL AT THE PKWY	20:50	21:39	0 : 50	1	1	0	0132-0005-00	
42-18L1	BA	SALEM	MALL AT THE PKWY	19:26	20:38	1 : 12	1	1	0	0132-0005-00	
42-18L1	BB	SALEM	MALL AT THE PKWY	19:26	01:24	5 : 58	22	131	0.015	0132-0009-00	
42-18L1	BB	SALEM	MALL AT THE PKWY	17:40	01:24	7 : 44	11	85	0.01	0132-0009-00	
					Event Totals		138	239	0.028		

Reportable Totals

Event Description :
ROCKINGHAM MALL: SWGR D HAD BLOWN A PHASE FUSE (1 OF 3) GOING TO TRANSFORMER PAD T9. FIRE DEPARTMENT REQUESTED AREA DE-ENERGIZED DUE TO SOME SMOKE PRESENT AT SWITCHGEAR AND CREW MANUALLY OPENED D1 LB IN SWGR TO ISOLATE. WHEN ATTEMPTING TO RESTORE SWGR D / T9, THE 18L1 STATION CIRCUIT BREAKER LOCKED OPEN AT OLD TROLLEY SUB. ISOLATED AREA AGAIN BY OPENING D1 LB AND CLOSED STATION BREAKER BACK IN. AFTER EXTENSIVE TESTING OF PRIMARY CABLE, TRANSFORMERS AND SECONDARY CABLES, CREWS FOUND FAILED UG CABLE BETWEEN T5 & T9, ISOLATED CABLE AND RESTORED CUSTOMERS. PowerOn Order Id: 1494830-1

Prepared By : Bodo, Richard J
Relay Targets:

2 **Event ID:** 7552887 **District :** Lebanon
Date: 03/18/2011 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L3	A	HANOVER		04:42	07:05	2 : 23	0	0	0	--	HANOVER 6
41-6L3	A	LEBANON		04:42	07:05	2 : 23	2105	5017	0.578	--	
41-6L3	D	HANOVER	LEBANON ST	04:42	06:45	2 : 2	1496	3042	0.35	--	
					Event Totals		754	4839	0.557		

Reportable Totals

Event Description :
6L3 feeder lockout at Hanover Sub - cause UG fault P7-1 Hovey Ln to P11 Lebanon St - H connector failed - switched to isolate and restore customers, picked up end of the feeder on 16L1. PowerOn Order Id: 1546845-1

Prepared By : Bourque, Paul D
Relay Targets:

3 **Event ID:** 7588917 **District :** Salem
Date: 06/08/2011 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L1	A	SALEM		07:07	07:53	0 : 46	0	0	0	--	OLDE TROLLEY 18
42-18L1	AB	SALEM	MALL AT THE PKWY	07:07	07:58	0 : 51	75	64	0.007	--	
42-18L1	AC	SALEM	MALL AT THE PKWY	07:07	08:18	1 : 11	28	33	0.004	--	
42-18L1	B	SALEM	MALL AT THE PKWY	07:07	08:43	1 : 36	33	53	0.006	--	
					Event Totals		137	150	0.017		

Reportable Totals

Event Description : 18L1 feeder locked out at Old Trolley Sub, swapped load onto alternate cables (feeds Rockingham Mall). UG cable fault MH1 to MH2, cable replaced. PowerOn Order Id: 1571187-1

Prepared By : Bodo, Richard J
Relay Targets:

4 **Event ID:** 7678802 **District :** Salem
Date: 04/09/2012 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L1	A	SALEM		17:53	19:12	1 : 19	0	0	0	--	OLDE TROLLEY 18
42-18L1	AB	SALEM	MALL AT THE PKWY	17:53	18:56	1 : 3	74	78	0.009	--	
42-18L1	AC	SALEM	MALL AT THE PKWY	17:53	19:51	1 : 57	28	55	0.006	--	
42-18L1	B	SALEM	MALL AT THE PKWY	17:53	19:29	1 : 36	34	54	0.006	--	
					Event Totals		138	189	0.021		
					Reportable Totals		138	189	0.021		

Event Description : 18L1 feeder lockout at Old Trolley Sub. Cable fault in getaway. Swapped 4 switchgears at Rockingham Mall to alternate supplies. PowerOn Order Id: 1811485-1

Prepared By : Bodo, Richard J
Relay Targets:

5 **Event ID:** 7679476 **District :** Lebanon
Date: 04/21/2012 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-16L1	A	HANOVER		01:19	03:24	2 : 5	35	73	0.008	--	WILDER 16 SWYD
41-16L1	A	LEBANON		01:19	03:24	2 : 5	0	0	0	--	
41-6L3	D	HANOVER	LEBANON ST	01:19	03:47	2 : 28	680	1677	0.193	--	HANOVER 6
41-6L3	E	HANOVER	LEBANON ST	01:19	03:24	2 : 5	797	1660	0.191	--	
					Event Totals		1512	3411	0.392		
					Reportable Totals		1512	3411	0.392		

Event Description : 16L1 Circuit breaker locked out at Mt Support Sub due to cable fault on 6L3 between Pole 7-1 Hovey Lane and Pole 11 Lebanon St, Hanover. Section of the 6L3 feeder was being carried by the 16L1 feeder for planned work at Hanover #6 Sub. Load past pole 1.5 Greensboro Rd on 16L1 had been mostly offloaded to 1L3 and was not affected. 16L1 & 6L3 feeders were sectionalized and customers were restored as patrolling was completed by crews. Dartmouth Hitchcock Medical Center remained alive via 16L4 feeder - Targets @ 16L1 - B phase & ground 2 counts. PowerOn Order Id: 1813575-1

Prepared By : Bourque, Paul D
Relay Targets:

6 **Event ID:** 7684688 **District :** Lebanon
Date: 06/13/2012 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L2	A	HANOVER		13:40	16:30	2 : 50	40	113	0.013	--	HANOVER 6
41-6L2	CA	HANOVER	EAST SOUTH ST	13:40	16:10	2 : 29	32	79	0.009	--	
41-6L2	D	HANOVER	WEST SOUTH ST	13:40	16:18	2 : 38	46	121	0.014	--	
41-6L2	E	HANOVER	WEST SOUTH ST	13:40	15:57	2 : 17	571	1304	0.15	--	
					Event Totals		689	1618	0.186		
					Reportable Totals		689	1618	0.186		

Event Description : 6L2 feeder locked out at Hanover Sub due to failed Modular Joint in UG cable Express Section on 6L2 along South Main St by Dorrance Place Hanover NH. MH 1 was the Location of the fault. Manually switched to isolate area for repairs and restore customers. Fault indicators did not work properly and OH patrol found no cause, proceeded to sectionalize and shoot feeder to determine location of problem. PowerOn Order Id: 1826317-1

Prepared By : Bourque, Paul D
Relay Targets:

7 **Event ID:** 7751698 **District :** Lebanon
Date: 07/16/2013 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration	# Custs	Cust.	Rel. Min.	Transformer	Substation

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L2	A	HANOVER		08:14	09:35	1 : 21	532	718	0.082	--	HANOVER 6
41-6L2	F	HANOVER	WEST WHEELOCK ST	08:14	09:42	1 : 28	152	223	0.025	--	
					Event Totals		684	941	0.107		
					Reportable Totals		684	941	0.107		

Event Description :
6L2 feeder lock out (C-Phase and Ground Targets / 2 Counts) at Hanover Sub / Cause was faulted U/G on the 6L2 getaway cable / Sectionalized with loadbreak @ P1.5 W. Wheelock St, Hanover. Front half of feeder picked up on 6L4 via LB @ MH 3 E. South St SWGR. Back half of feeder picked up on 6L3 via LB @ P2 N. College St. PowerOn Order Id: 2024234-1

Prepared By : Mota, Blaine M
Relay Targets:

8 **Event ID:** 7795603 **District :** Lebanon
Date: 01/06/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L4	A	HANOVER		09:52	11:53	2 : 0	51	102	0.012	--	HANOVER 6
41-6L4	D	HANOVER	EAST SOUTH ST	09:52	11:36	1 : 44	82	142	0.016	--	
					Event Totals		133	243	0.028		
					Reportable Totals		133	243	0.028		

Event Description :
6L4 FEEDER LOCKED OUT AT HANOVER SUB DUE TO UNDERGROUND CABLE FAULT AT MANHOLE 3 SARGENT PL. MANUALLY SWITCHED TO ISOLATE FAILED UNDERGROUND CABLE FOR REPAIR AND RESTORE CUSTOMERS THROUGH ALTERNATE FEEDER SUPPLIES. B, C PHASE & GND TARGETS. PowerOn Order Id: 2072848-1

Prepared By : Bourque, Paul D
Relay Targets:

9 **Event ID:** 7820623 **District :** Salem
Date: 03/02/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-13L2	A	SALEM		14:04	16:21	2 : 17	0	0	0	--	SPICKET RIVER 13
42-13L2	DB	SALEM	MILLVILLE ST	14:04	14:31	0 : 28	973	446	0.052	--	
42-13L2	DBA	SALEM	ZION HILL RD	14:04	15:15	1 : 11	352	417	0.048	--	
42-13L2	DBA	WINDHAM	ZION HILL RD	14:04	15:15	1 : 11	42	50	0.006	--	
* 42-13L2	F	SALEM	BLUFF ST	14:04	14:08	0 : 4	327	22	0.003	--	
* 42-13L2	F	WINDHAM	BLUFF ST	14:04	14:08	0 : 4	381	26	0.003	--	
					Event Totals		2461	1833	0.212		
					Reportable Totals		1753	1784	0.207		

Event Description :
13L2 circuit breaker locked out at Spickett River Sub due to a faulted getaway cable (XLPE DIRECT BURIED CABLES) from the substation. Remotely and manually switched to restore customers to alternate feeder supplies. C phase and Ground targets, 3 operations. PowerOn Order Id: 2085678-1

Prepared By : Bourque, Paul D
Relay Targets:

10 **Event ID:** 7848007 **District :** Salem
Date: 04/23/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L4	A	PELHAM		21:06	22:06	1 : 0	3	3	0	--	
42-9L1	A	SALEM		21:06	01:36	4 : 30	952	4281	0.486	--	
42-9L3	A	SALEM		21:06	01:30	4 : 24	412	1815	0.206	--	
42-18L1	A	SALEM		21:06	01:06	4 : 0	163	653	0.074	--	
42-18L3	A	SALEM		21:06	01:35	4 : 30	644	2894	0.329	--	OLDE TROLLEY 18
42-9L2	A	SALEM		21:06	01:37	4 : 31	129	582	0.066	--	
42-18L4	A	SALEM		21:06	22:06	1 : 0	837	844	0.096	--	
42-18L2	A	SALEM		21:06	00:43	3 : 37	0	0	0	--	
42-9L3	A	WINDHAM		21:06	01:30	4 : 24	0	0	0	--	

42-18L4	A	WINDHAM		21:06	22:06	1 : 0	1	1	0	
42-18L2	G	SALEM	CLUFF CROSSING RD	21:06	00:59	3 : 53	1119	4345	0.494	--
42-9L3	H	SALEM	NORTH POLICY ST	21:06	23:08	2 : 3	142	290	0.033	--
42-9L3	H	WINDHAM	NORTH POLICY ST	21:06	23:08	2 : 3	507	1035	0.118	--
						Event Totals	5596	19303	2.194	
						Reportable Totals	5596	19303	2.194	

Event Description :

1T115 circuit switcher locked out at Golden Rock Sub. Auto bus transfer started but did not succeed, neither 2393 nor 2352 was picked up from West Methuen 23kV. Barron Ave Sub transferred OK to 2353 line. For planned work, the 2393 line was out from Barron Ave Sub 93-4 loadbreak to Salem Depot Sub. This resulted in loss of supply to Salem Depot and Old Trolley Subs. Via SCADA, closed 52-53 tie breaker at Golden Rock and it locked out. Closed 93-76 tie breaker at Golden Rock successfully, but no load was restored due to system configuration. Picked up 4 feeders at Old Trolley Sub on feeder ties. Cleared red tags, closed 2394 line to Salem Depot to restore 3 feeders. Closed 2393 PTR to re-energize Old Trolley, and it locked out (assuming faulted arrester or U/G cable). Successfully re-energized 1T at Golden Rock. Patrol of 2352 found no fault. Isolating and testing 2352 U/G getaway cable at Golden Rock, possible close-in fault tripped circuit switcher. **follow-up notes: 2352 getaway at Golden Rock Sub had two terminations replaced - 2393 cable from PTR to Old Trolley Sub, found failed joint, which was re-made - also after second lockout on 4/25, found the TNG on 1TR was set too close to 2352 ground inst, relays re-adjusted. This first interruption would have resulted in a customer outage, without the relay issue, 2393 out planned, 2352 cable fault.*** PowerOn Order Id: 2099610-1 PowerOn Order Id: 2099622-1 PowerOn Order Id: 2099620-1 PowerOn Order Id: 2099607-1 PowerOn Order Id: 2099631-1 PowerOn Order Id: 2099606-1

Prepared By : Bodo, Richard J

Relay Targets:

11 **Event ID:** [7848670]

District : Salem

Date: 04/25/2014

Feeder Outage : Yes

Distribution Type :

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L4	A	PELHAM		03:20	03:43	0 : 22	3	1	0	--	
42-9L1	A	SALEM		03:20	03:38	0 : 18	952	289	0.033	--	
42-9L3	A	SALEM		03:20	03:38	0 : 18	554	168	0.019	--	
42-18L1	A	SALEM		03:20	03:38	0 : 18	163	49	0.006	--	
42-18L3	A	SALEM		03:20	03:42	0 : 22	644	238	0.027	--	
42-9L2	A	SALEM		03:20	03:38	0 : 18	129	39	0.004	--	
42-18L4	A	SALEM		03:20	03:43	0 : 22	837	313	0.036	--	
42-18L2	A	SALEM		03:20	03:42	0 : 22	1652	593	0.067	--	
42-9L3	A	WINDHAM		03:20	03:38	0 : 18	12	4	0	--	
42-18L4	A	WINDHAM		03:20	03:43	0 : 22	1	0	0	--	
						Event Totals	4947	1666	0.189		
						Reportable Totals	4947	1666	0.189		

Event Description :

1T115 circuit switcher locked out at Golden Rock Sub (also locked out on 4/23 - see other IDS event). Auto bus transfer did not initiate, as the station was abnormal. At the time of the interruption, the 2352 breaker had been closed to energize U/G feeder getaway section that had been repaired, but there was an additional U/G fault. The 1TR trip resulted in loss of supply via 2393 which was carrying Salem Depot and Old Trolley Subs. Barron Ave Sub was still supplied from 2353 from the initial fault on 4/23 and was not affected. Via SCADA, closed 1T115 CS and 2393 breaker at Golden Rock to restore service. Further investigation found an additional fault on the 2352 U/G cable getaway, plus the 1TR TNG relay set too close to the 2352 ground relay, resulting in overtrips for close-in to substation faults. The 2352 lockout should not have affected any customers, but the improper transformer lockout resulted in a loss of supply. Note: 9L3 has a reduced customer count, because some of the feeder was left supplied from 13L2 after the switching on 4/23. PowerOn Order Id: 2100356-1 PowerOn Order Id: 2100355-1 PowerOn Order Id: 2100354-1 PowerOn Order Id: 2100353-1 PowerOn Order Id: 2100350-1 PowerOn Order Id: 2100349-1 PowerOn Order Id: 2100348-1

Prepared By : Bodo, Richard J

Relay Targets:

Search criteria:	NH ADHOC INTERRUPTION SEARCH RESULTS		
Begin Time:	5/1/2015 0:00	End Time:	10/1/2019 23:59

Event ID	Time Outage	Time Restored	Duration	Town	Feeder ID	Customers	Cause
21671	5/1/2015 14:57	5/1/2015 17:51	127.2		18L1	158	Insulation Failure - Cable
				Salem town			
Dispatch Remarks: 18L1 Breaker locked out due to UG cable fault at MH 35 Rockingham Mall.							
22480	6/20/2015 0:57	6/20/2015 3:49	172		10L2	284	Insulation Failure - Cable
				Salem town			
Dispatch Remarks: 10L2 Circuit Breaker locked out due to underground getaway cable fault. XLPE Direct Buried Cable							
26001	2/6/2016 19:39	2/7/2016 0:24	243.4		6L4	140	Insulation Failure - Cable
				Hanover town			
Dispatch Remarks: Hanover 6L4 Circuit Breaker locked out due to cable failure at MH6 South St.							
31743	1/10/2017 20:33	1/10/2017 21:22	127.7		39L2	529	Insulation Failure - Cable
				Lebanon city			
Dispatch Remarks: Slayton Hill 39L2 circuit breaker locked out due to an underground cable failure at Airport Rd							
34158	5/1/2017 15:47	5/3/2017 4:21	68.5		18L1	148	Insulation Failure - Other
				Salem town			
Dispatch Remarks: Circuit breaker 18L1 locked out due to failed T-splice in MH-35 Rockingham Mall							
35522	7/18/2017 15:07	7/19/2017 20:50	113		18L1	148	Insulation Failure - Other
				Salem town			
Dispatch Remarks: Olde Trolley circuit breaker 18L1 locked out due to underground cable failure.							
54677	8/28/2019 15:36	9/6/2019 13:17	40.7		6L2	158	Insulation Failure - Cable
				Hanover town			
Dispatch Remarks: PTR 755105 W. WEELOCK LOCKED OUT / UNDERGROUND CABLE FAULT BETWEEN P9 N MAIN AND P10 N COLLEGE. XLPE CABLES							

Heather Tebbetts

From: Joel Rivera
Sent: Monday, July 6, 2015 12:41 PM
To: Kurt Demmer; Chris Brouillard; Michael Pazzanese
Cc: Robert Blank; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: RE: Barron Ave getaway cable

See comments in green.

From: Kurt Demmer
Sent: Thursday, July 02, 2015 2:43 PM
To: Joel Rivera; Chris Brouillard; Michael Pazzanese
Cc: Robert Blank; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: RE: Barron Ave getaway cable

Comments in red

Kurt

****Please note my new office number and mailing address****

Kurt Demmer | **Liberty Utilities**
Director of Engineering and Electric Operations – NH
P: 603-216-3556 | C: 978-360-6740
E: kurt.demmer@libertyutilities.com
15 Buttrick Road, Londonderry, NH 03053

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From: Joel Rivera
Sent: Thursday, July 02, 2015 1:32 PM
To: Chris Brouillard; Kurt Demmer; Michael Pazzanese
Cc: Robert Blank; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: RE: Barron Ave getaway cable

Hello Chris
I have provided estimates for addressing all 3 feeders: Please take a look at the excel sheet. There is a sketch for each feeder.

- 10L2
  - I would not like to use the 23kV ROW for this given that there is a good chance we will need the pole space in the future. (Salem Study) I think the issue with Mrs Mullen may be increased with doing a lot of work in front of her house. As far as the railroad, we have the ability to do back to back spacer cable per 23kV pole, that's 4 circuits. You are also assuming that Barron ave will still be there. As a small not, you mention 9L2 in the 10L2 sketch. The pole set would be at her neighbors. We would have to set an anchor pretty close to her property but not sure where the property line is. We would still need the pole space for potential feeders based on the salem study. Also we have not decided which station from Baron/Salem Depot stays. I rather stay away from the ROW but that is my opinion.
  - Seems easier to head west and re route the feeder up Bagnell anyways. No new UG required.
  - $32,160
- 9L2/9L3

- Would need to build an UG conduit system from station to W Main St and 2 – 1000kCMIL Cu. Figured might as well go with a 3X2 system. Why not go underground a short way out the side and put in poles along the dirt lot outside the station and use the poles going down central street. Again, this seems cheap and dirty but I don't foresee a lot of years coming out of Salem Depot Sub. I like this and think this is something we can definitely look into. Double ckt on Central St and part of W Main St. I will talk to Bob/Pat/Mike .
- W Main St is very busy, especially at proposed riser pole.
- Would also need to install dbl ckt from P5-P9 to get to the 9L2.
- $263,350 seems high but you can take a look at my assumptions and adjust if needed. Good thing is that we can take care of 2 feeders.

- 13L2
  - Would need to build an UG conduit system from station to existing MH1 and 1 – 1000kCMIL Cu. Figured might as well go with a 3X2 system and add a 3 way MH in case in the future we need to head east with new feeders. Good Plan
  - $106,100, however if we have existing spare duct space when they build UG getaway for the 13L3 then we could consider using that. I have no UG data or manhole views.

Let me know you would like to proceed and if there are any questions.

Thanks

Joel

From: Chris Brouillard
Sent: Wednesday, June 24, 2015 8:45 PM
To: Kurt Demmer; Michael Pazzanese
Cc: Robert Blank; Dan Saad; Patrick O'Neill; Anthony Strabone; Robert Johnson; Joel Rivera
Subject: RE: Barron Ave getaway cable

Joel and Anthony - please prepare estimates (conceptual grade +/- 25% is fine) for installing a short UG run for 10L2 and rise on the 23kV poles with spacer cable to the end point. Also prepare similar estimates for 9L2 and 13L2. The Pelham feeder we pick up as part of the Pelham substation rebuild. I'll then work with Joel to figure out if we have any movement in projects in remainder of 2016 and 2017 to accommodate and phase in some of this work, beginning with 10L2.

Chris

Chris Brouillard | **Liberty Utilities**
Director of Engineering
P: 603-216-3636 | C: 603-475-7965
E: chris.brouillard@libertyutilities.com
15 Buttrick Rd, Londonderry, NH

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From: Kurt Demmer
Sent: Wednesday, June 24, 2015 5:05 PM
To: Michael Pazzanese
Cc: Chris Brouillard; Robert Blank; Dan Saad; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: Re: Barron Ave getaway cable

I am in favor of the under built option rather than the conduit option for the 10L2. The others are more reasonable replacement projects. At a minimum if we were strapped for capital to do all three then install the duct and install the cable at a staged approach based on age and neutral conductivity

Kurt Demmer
Sent from my mobile phone

On Jun 24, 2015, at 2:50 PM, Michael Pazzanese <Michael.Pazzanese@libertyutilities.com> wrote:

> Chris spoke with Rob and based on condition of this cable, we need to come up with a replacement plan ASAP. Cable grounding shield is in bad condition or does not exist. We will be back there again this year in my view. We also have several others getaways of the same year vintage 1973/1974, unjacketed concentric neutral at the following:
>
> - Barron Ave 10L2 DB getaway-950' conduit/3 MH's or shorten UG run and rise on 23 pole in ROW, run 477 to Kelly Rd.
> - Salem Depot-9L2 DB getaway 125' with new pole hardware
> - Spicket River 13L2 DB getaway. 200' with conduit and new MH that would tie in to new MH/conduit put in several years ago
> - Pelham 14L1 DB Getaway-defer until Project begins, but same type/year cable with similar issues
>
> Olde Trolley, Golden Rock and the 9L3, 13L3 are newer cable/installations with Olde Trolley and GR in conduit/MH system. First 3 are top priorities. Up north we are in much better shape.
>
> Mike
>
> Michael Pazzanese-**Liberty Utilities**- Electrical Substation Supervisor
> Cell: 603-475-6936
> michael.pazzanese@libertyutilities.com
> 9 Lowell Rd. Salem NH 03079
>
> ---
>
> **From:** Chris Brouillard
> **Sent:** Monday, June 22, 2015 7:57 PM
> **To:** Robert Blank; Patrick O'Neill; Michael Pazzanese
> **Cc:** Dan Saad; Kurt Demmer
> **Subject:** RE: Barron Ave getaway cable
>
> Thank you, Pat, Mike, Kurt, and Rob for your input and leadership during the repair process. I'm hoping that over our capital plan period we can proactively treat or replace the highest risk runs.
>
> Chris **Brouillard** | **Liberty Utilities**
> Director of Engineering
> P: 603-216-3636 | C: 603-475-7965
> E: chris.brouillard@libertyutilities.com
> 15 Buttrick Rd, Londonderry, NH
>
> Follow us on Twitter and Facebook.
>
> ---
>
> **From:** Robert Blank
> **Sent:** Monday, June 22, 2015 7:51 PM
> **To:** Patrick O'Neill; Michael Pazzanese
> **Cc:** Dan Saad; Kurt Demmer; Chris Brouillard
> **Subject:** Barron Ave getaway cable
>
> Report from Mike Pazz in the field is that Barron Ave substation cable has been repaired, blacktop has been laid down, and switching to restore feeder will commence shortly. Great job

to Pat and his guys for finding the initial failed cable, and Mike and all that were involved, for sticking through with the repairs and seeing it through to the end.

Great job guys, much appreciated.

Thank you,

Robert Blank | Liberty Utilities
Director of Electric Operations
P: 603-306-8238 | C: 603-327-7910
E:Robert.Blank@Libertyutilities.com
15 Buttrick Road, Londonderry, NH 03053

Sent from my iPhone

Liberty Utilities

TO: Chris Brouillard
FROM: Joel A Rivera
COPY: D. Champy, J. Scarpone, K. Demmer
DATE: July 18, 2013
SUBJECT: WR 15298088 - Replacement of Hanover 6L2 get-away cable

---

The Hanover 6L2 feeder supplies approximately 700 Customers in the town of Hanover NH. It supplies a mix of residential and commercial customers along South Main Street, Maple Street, School Street, North Main Street and College Street including Dartmouth College and the Department of Public Works. Engineering recommends the replacement of approximately 1600 feet of underground get-away cable for an estimated cost of $800,000. This replacement is recommended for the following reasons:

- The underground get-away cable on this feeder has experienced 3 failures in the past 5 years. The latest failure occurred on July 16, 2013. Underground primary cable failures typically take longer to repair as compared to other failures. In addition, multiple failures pose a risk of damage to the company's reputation and subsequent regulatory intervention. There is an additional limited risk that as load continues to grow there will be no capacity to pick up all interrupted customers on feeder ties including Dartmouth College.
- The existing underground cable is 500 kCMIL Al XLPE of 1970's vintage and is installed in a direct buried arrangement. The cross linked polyethylene (XLPE) insulated cables of this vintage have a high failure rate. At that time, it was not known that voids and contamination in the insulation and shields as well as other design and manufacturing deficiencies, leads to voltage stress concentrations within the cable. These voltage stresses, combined with moisture creates water trees. These water trees degrade insulation over time, ultimately causing the cables to fail.
- The existing underground cable get-away strategy dictates that upon the first failure of a direct buried get-away cable, the cable is to be repaired as an emergency. Upon the second failure of a direct buried get-away cable, the cable should be repaired as an emergency and the cable should be replaced. Any replacement of direct buried cables should be with a duct lay cable system in accordance with current company construction standards.
- On average each failure event on the 6L2 feeder resulting from an underground get-away failure adds approximately .02 to system SAIFI and 2 minutes to system SAIDI.

For these reasons, engineering is recommending that we replace the existing direct buried 500 kCMIL Al XLPE cable with new 750 kCMIL AL EPR in a new underground conduit system along South Main Street. We will begin the engineering, design, and preliminary permitting activities associated with this project in parallel with seeking the necessary internal approvals to move forward with construction.

Signature…….. Date……
Chris Brouillard, Director of Engineering

Signature…….. Date……

Daniel Saad, Vice President Operations & Engineering

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ADHOC INTERRUPTION SEARCH RESULTS

SEARCH CRITERIA

FROM DATE	07/01/2009 00:00:00
TO DATE	07/31/2014 23:59:59
FEEDER OUTAGE	Yes
REGULATORY MAJOR STORMS	Yes
COMPANY	Granite State Electric
Regulatory Criteria	Yes

1 **Event ID:** 7518033 **District :** Salem
Date: 11/30/2010 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L1	A	SALEM		20:50	21:02	0 : 12	116	23	0.003	--	OLDE TROLLEY 18
42-18L1	BA	SALEM	MALL AT THE PKWY	20:50	21:39	0 : 50	1	1	0	0132-0005-00	
42-18L1	BA	SALEM	MALL AT THE PKWY	19:26	20:38	1 : 12	1	1	0	0132-0005-00	
42-18L1	BB	SALEM	MALL AT THE PKWY	19:26	01:24	5 : 58	22	131	0.015	0132-0009-00	
42-18L1	BB	SALEM	MALL AT THE PKWY	17:40	01:24	7 : 44	11	85	0.01	0132-0009-00	
					Event Totals		138	239	0.028		

Reportable Totals

Event Description :
ROCKINGHAM MALL: SWGR D HAD BLOWN A PHASE FUSE (1 OF 3) GOING TO TRANSFORMER PAD T9. FIRE DEPARTMENT REQUESTED AREA DE-ENERGIZED DUE TO SOME SMOKE PRESENT AT SWITCHGEAR AND CREW MANUALLY OPENED D1 LB IN SWGR TO ISOLATE. WHEN ATTEMPTING TO RESTORE SWGR D / T9, THE 18L1 STATION CIRCUIT BREAKER LOCKED OPEN AT OLD TROLLEY SUB. ISOLATED AREA AGAIN BY OPENING D1 LB AND CLOSED STATION BREAKER BACK IN. AFTER EXTENSIVE TESTING OF PRIMARY CABLE, TRANSFORMERS AND SECONDARY CABLES, CREWS FOUND FAILED UG CABLE BETWEEN T5 & T9, ISOLATED CABLE AND RESTORED CUSTOMERS. PowerOn Order Id: 1494830-1

Prepared By : Bodo, Richard J
Relay Targets:

2 **Event ID:** 7552887 **District :** Lebanon
Date: 03/18/2011 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L3	A	HANOVER		04:42	07:05	2 : 23	0	0	0	--	HANOVER 6
41-6L3	A	LEBANON		04:42	07:05	2 : 23	2105	5017	0.578	--	
41-6L3	D	HANOVER	LEBANON ST	04:42	06:45	2 : 2	1496	3042	0.35	--	
					Event Totals		754	4839	0.557		

Reportable Totals

Event Description :
6L3 feeder lockout at Hanover Sub - cause UG fault P7-1 Hovey Ln to P11 Lebanon St - H connector failed - switched to isolate and restore customers, picked up end of the feeder on 16L1. PowerOn Order Id: 1546845-1

Prepared By : Bourque, Paul D
Relay Targets:

3 **Event ID:** 7588917 **District :** Salem
Date: 06/08/2011 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L1	A	SALEM		07:07	07:53	0 : 46	0	0	0	--	OLDE TROLLEY 18
42-18L1	AB	SALEM	MALL AT THE PKWY	07:07	07:58	0 : 51	75	64	0.007	--	
42-18L1	AC	SALEM	MALL AT THE PKWY	07:07	08:18	1 : 11	28	33	0.004	--	
42-18L1	B	SALEM	MALL AT THE PKWY	07:07	08:43	1 : 36	33	53	0.006	--	
					Event Totals		137	150	0.017		

Reportable Totals

Event Description : 18L1 feeder locked out at Old Trolley Sub, swapped load onto alternate cables (feeds Rockingham Mall). UG cable fault MH1 to MH2, cable replaced. PowerOn Order Id: 1571187-1

Prepared By : Bodo, Richard J
Relay Targets:

4 **Event ID:** 7678802 **District :** Salem
Date: 04/09/2012 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L1	A	SALEM		17:53	19:12	1 : 19	0	0	0	--	OLDE TROLLEY 18
42-18L1	AB	SALEM	MALL AT THE PKWY	17:53	18:56	1 : 3	74	78	0.009	--	
42-18L1	AC	SALEM	MALL AT THE PKWY	17:53	19:51	1 : 57	28	55	0.006	--	
42-18L1	B	SALEM	MALL AT THE PKWY	17:53	19:29	1 : 36	34	54	0.006	--	
					Event Totals		138	189	0.021		
					Reportable Totals		138	189	0.021		

Event Description : 18L1 feeder lockout at Old Trolley Sub. Cable fault in getaway. Swapped 4 switchgears at Rockingham Mall to alternate supplies. PowerOn Order Id: 1811485-1

Prepared By : Bodo, Richard J
Relay Targets:

5 **Event ID:** 7679476 **District :** Lebanon
Date: 04/21/2012 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-16L1	A	HANOVER		01:19	03:24	2 : 5	35	73	0.008	--	WILDER 16 SWYD
41-16L1	A	LEBANON		01:19	03:24	2 : 5	0	0	0	--	
41-6L3	D	HANOVER	LEBANON ST	01:19	03:47	2 : 28	680	1677	0.193	--	HANOVER 6
41-6L3	E	HANOVER	LEBANON ST	01:19	03:24	2 : 5	797	1660	0.191	--	
					Event Totals		1512	3411	0.392		
					Reportable Totals		1512	3411	0.392		

Event Description : 16L1 Circuit breaker locked out at Mt Support Sub due to cable fault on 6L3 between Pole 7-1 Hovey Lane and Pole 11 Lebanon St, Hanover. Section of the 6L3 feeder was being carried by the 16L1 feeder for planned work at Hanover #6 Sub. Load past pole 1.5 Greensboro Rd on 16L1 had been mostly offloaded to 1L3 and was not affected. 16L1 & 6L3 feeders were sectionalized and customers were restored as patrolling was completed by crews. Dartmouth Hitchcock Medical Center remained alive via 16L4 feeder - Targets @ 16L1 - B phase & ground 2 counts. PowerOn Order Id: 1813575-1

Prepared By : Bourque, Paul D
Relay Targets:

6 **Event ID:** 7684688 **District :** Lebanon
Date: 06/13/2012 **Feeder Outage :** Yes **Distribution Type :** Overhead

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L2	A	HANOVER		13:40	16:30	2 : 50	40	113	0.013	--	HANOVER 6
41-6L2	CA	HANOVER	EAST SOUTH ST	13:40	16:10	2 : 29	32	79	0.009	--	
41-6L2	D	HANOVER	WEST SOUTH ST	13:40	16:18	2 : 38	46	121	0.014	--	
41-6L2	E	HANOVER	WEST SOUTH ST	13:40	15:57	2 : 17	571	1304	0.15	--	
					Event Totals		689	1618	0.186		
					Reportable Totals		689	1618	0.186		

Event Description : 6L2 feeder locked out at Hanover Sub due to failed Modular Joint in UG cable Express Section on 6L2 along South Main St by Dorrance Place Hanover NH. MH 1 was the Location of the fault. Manually switched to isolate area for repairs and restore customers. Fault indicators did not work properly and OH patrol found no cause, proceeded to sectionalize and shoot feeder to determine location of problem. PowerOn Order Id: 1826317-1

Prepared By : Bourque, Paul D
Relay Targets:

7 **Event ID:** 7751698 **District :** Lebanon
Date: 07/16/2013 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration	# Custs	Cust.	Rel. Min.	Transformer	Substation

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L2	A	HANOVER		08:14	09:35	1 : 21	532	718	0.082	--	HANOVER 6
41-6L2	F	HANOVER	WEST WHEELOCK ST	08:14	09:42	1 : 28	152	223	0.025	--	
					Event Totals		684	941	0.107		
					Reportable Totals		684	941	0.107		

Event Description :
6L2 feeder lock out (C-Phase and Ground Targets / 2 Counts) at Hanover Sub / Cause was faulted U/G on the 6L2 getaway cable / Sectionalized with loadbreak @ P1.5 W. Wheelock St, Hanover. Front half of feeder picked up on 6L4 via LB @ MH 3 E. South St SWGR. Back half of feeder picked up on 6L3 via LB @ P2 N. College St. PowerOn Order Id: 2024234-1

Prepared By : Mota, Blaine M
Relay Targets:

8 **Event ID:** 7795603 **District :** Lebanon
Date: 01/06/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
41-6L4	A	HANOVER		09:52	11:53	2 : 0	51	102	0.012	--	HANOVER 6
41-6L4	D	HANOVER	EAST SOUTH ST	09:52	11:36	1 : 44	82	142	0.016	--	
					Event Totals		133	243	0.028		
					Reportable Totals		133	243	0.028		

Event Description :
6L4 FEEDER LOCKED OUT AT HANOVER SUB DUE TO UNDERGROUND CABLE FAULT AT MANHOLE 3 SARGENT PL. MANUALLY SWITCHED TO ISOLATE FAILED UNDERGROUND CABLE FOR REPAIR AND RESTORE CUSTOMERS THROUGH ALTERNATE FEEDER SUPPLIES. B, C PHASE & GND TARGETS. PowerOn Order Id: 2072848-1

Prepared By : Bourque, Paul D
Relay Targets:

9 **Event ID:** 7820623 **District :** Salem
Date: 03/02/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-13L2	A	SALEM		14:04	16:21	2 : 17	0	0	0	--	SPICKET RIVER 13
42-13L2	DB	SALEM	MILLVILLE ST	14:04	14:31	0 : 28	973	446	0.052	--	
42-13L2	DBA	SALEM	ZION HILL RD	14:04	15:15	1 : 11	352	417	0.048	--	
42-13L2	DBA	WINDHAM	ZION HILL RD	14:04	15:15	1 : 11	42	50	0.006	--	
* 42-13L2	F	SALEM	BLUFF ST	14:04	14:08	0 : 4	327	22	0.003	--	
* 42-13L2	F	WINDHAM	BLUFF ST	14:04	14:08	0 : 4	381	26	0.003	--	
					Event Totals		2461	1833	0.212		
					Reportable Totals		1753	1784	0.207		

Event Description :
13L2 circuit breaker locked out at Spickett River Sub due to a faulted getaway cable (XLPE DIRECT BURIED CABLES) from the substation. Remotely and manually switched to restore customers to alternate feeder supplies. C phase and Ground targets, 3 operations. PowerOn Order Id: 2085678-1

Prepared By : Bourque, Paul D
Relay Targets:

10 **Event ID:** 7848007 **District :** Salem
Date: 04/23/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L4	A	PELHAM		21:06	22:06	1 : 0	3	3	0	--	
42-9L1	A	SALEM		21:06	01:36	4 : 30	952	4281	0.486	--	
42-9L3	A	SALEM		21:06	01:30	4 : 24	412	1815	0.206	--	
42-18L1	A	SALEM		21:06	01:06	4 : 0	163	653	0.074	--	
42-18L3	A	SALEM		21:06	01:35	4 : 30	644	2894	0.329	--	OLDE TROLLEY 18
42-9L2	A	SALEM		21:06	01:37	4 : 31	129	582	0.066	--	
42-18L4	A	SALEM		21:06	22:06	1 : 0	837	844	0.096	--	
42-18L2	A	SALEM		21:06	00:43	3 : 37	0	0	0	--	
42-9L3	A	WINDHAM		21:06	01:30	4 : 24	0	0	0	--	

42-18L4	A	WINDHAM		21:06	22:06	1 : 0	1	1	0	
42-18L2	G	SALEM	CLUFF CROSSING RD	21:06	00:59	3 : 53	1119	4345	0.494	--
42-9L3	H	SALEM	NORTH POLICY ST	21:06	23:08	2 : 3	142	290	0.033	--
42-9L3	H	WINDHAM	NORTH POLICY ST	21:06	23:08	2 : 3	507	1035	0.118	--
						Event Totals	5596	19303	2.194	
						Reportable Totals	5596	19303	2.194	

Event Description :

1T115 circuit switcher locked out at Golden Rock Sub. Auto bus transfer started but did not succeed, neither 2393 nor 2352 was picked up from West Methuen 23kV. Barron Ave Sub transferred OK to 2353 line. For planned work, the 2393 line was out from Barron Ave Sub 93-4 loadbreak to Salem Depot Sub. This resulted in loss of supply to Salem Depot and Old Trolley Subs. Via SCADA, closed 52-53 tie breaker at Golden Rock and it locked out. Closed 93-76 tie breaker at Golden Rock successfully, but no load was restored due to system configuration. Picked up 4 feeders at Old Trolley Sub on feeder ties. Cleared red tags, closed 2394 line to Salem Depot to restore 3 feeders. Closed 2393 PTR to re-energize Old Trolley, and it locked out (assuming faulted arrester or U/G cable). Successfully re-energized 1T at Golden Rock. Patrol of 2352 found no fault. Isolating and testing 2352 U/G getaway cable at Golden Rock, possible close-in fault tripped circuit switcher. **follow-up notes: 2352 getaway at Golden Rock Sub had two terminations replaced - 2393 cable from PTR to Old Trolley Sub, found failed joint, which was re-made - also after second lockout on 4/25, found the TNG on 1TR was set too close to 2352 ground inst, relays re-adjusted. This first interruption would have resulted in a customer outage, without the relay issue, 2393 out planned, 2352 cable fault.*** PowerOn Order Id: 2099610-1 PowerOn Order Id: 2099622-1 PowerOn Order Id: 2099620-1 PowerOn Order Id: 2099607-1 PowerOn Order Id: 2099631-1 PowerOn Order Id: 2099606-1

Prepared By : Bodo, Richard J

Relay Targets:

11 **Event ID:** 7848670 **District :** Salem

Date: 04/25/2014 **Feeder Outage :** Yes **Distribution Type :**

Feeder	Branch	Town	Street	Time Off	Time On	Duration (hh:mm)	# Custs Affected	Cust. Out.	Rel. Min.	Transformer	Substation
42-18L4	A	PELHAM		03:20	03:43	0 : 22	3	1	0	--	
42-9L1	A	SALEM		03:20	03:38	0 : 18	952	289	0.033	--	
42-9L3	A	SALEM		03:20	03:38	0 : 18	554	168	0.019	--	
42-18L1	A	SALEM		03:20	03:38	0 : 18	163	49	0.006	--	
42-18L3	A	SALEM		03:20	03:42	0 : 22	644	238	0.027	--	
42-9L2	A	SALEM		03:20	03:38	0 : 18	129	39	0.004	--	
42-18L4	A	SALEM		03:20	03:43	0 : 22	837	313	0.036	--	
42-18L2	A	SALEM		03:20	03:42	0 : 22	1652	593	0.067	--	
42-9L3	A	WINDHAM		03:20	03:38	0 : 18	12	4	0	--	
42-18L4	A	WINDHAM		03:20	03:43	0 : 22	1	0	0	--	
						Event Totals	4947	1666	0.189		
						Reportable Totals	4947	1666	0.189		

Event Description :

1T115 circuit switcher locked out at Golden Rock Sub (also locked out on 4/23 - see other IDS event). Auto bus transfer did not initiate, as the station was abnormal. At the time of the interruption, the 2352 breaker had been closed to energize U/G feeder getaway section that had been repaired, but there was an additional U/G fault. The 1TR trip resulted in loss of supply via 2393 which was carrying Salem Depot and Old Trolley Subs. Barron Ave Sub was still supplied from 2353 from the initial fault on 4/23 and was not affected. Via SCADA, closed 1T115 CS and 2393 breaker at Golden Rock to restore service. Further investigation found an additional fault on the 2352 U/G cable getaway, plus the 1TR TNG relay set too close to the 2352 ground relay, resulting in overtrips for close-in to substation faults. The 2352 lockout should not have affected any customers, but the improper transformer lockout resulted in a loss of supply. Note: 9L3 has a reduced customer count, because some of the feeder was left supplied from 13L2 after the switching on 4/23. PowerOn Order Id: 2100356-1 PowerOn Order Id: 2100355-1 PowerOn Order Id: 2100354-1 PowerOn Order Id: 2100353-1 PowerOn Order Id: 2100350-1 PowerOn Order Id: 2100349-1 PowerOn Order Id: 2100348-1

Prepared By : Bodo, Richard J

Relay Targets:

Search criteria:	NH ADHOC INTERRUPTION SEARCH RESULTS		
Begin Time:	5/1/2015 0:00	End Time:	10/1/2019 23:59

Event ID	Time Outage	Time Restored	Duration	Town	Feeder ID	Customers	Cause
21671	5/1/2015 14:57	5/1/2015 17:51	127.2		18L1	158	Insulation Failure - Cable
				Salem town			
Dispatch Remarks: 18L1 Breaker locked out due to UG cable fault at MH 35 Rockingham Mall.							
22480	6/20/2015 0:57	6/20/2015 3:49	172		10L2	284	Insulation Failure - Cable
				Salem town			
Dispatch Remarks: 10L2 Circuit Breaker locked out due to underground getaway cable fault. XLPE Direct Buried Cable							
26001	2/6/2016 19:39	2/7/2016 0:24	243.4		6L4	140	Insulation Failure - Cable
				Hanover town			
Dispatch Remarks: Hanover 6L4 Circuit Breaker locked out due to cable failure at MH6 South St.							
31743	1/10/2017 20:33	1/10/2017 21:22	127.7		39L2	529	Insulation Failure - Cable
				Lebanon city			
Dispatch Remarks: Slayton Hill 39L2 circuit breaker locked out due to an underground cable failure at Airport Rd							
34158	5/1/2017 15:47	5/3/2017 4:21	68.5		18L1	148	Insulation Failure - Other
				Salem town			
Dispatch Remarks: Circuit breaker 18L1 locked out due to failed T-splice in MH-35 Rockingham Mall							
35522	7/18/2017 15:07	7/19/2017 20:50	113		18L1	148	Insulation Failure - Other
				Salem town			
Dispatch Remarks: Olde Trolley circuit breaker 18L1 locked out due to underground cable failure.							
54677	8/28/2019 15:36	9/6/2019 13:17	40.7		6L2	158	Insulation Failure - Cable
				Hanover town			
Dispatch Remarks: PTR 755105 W. WEELOCK LOCKED OUT / UNDERGROUND CABLE FAULT BETWEEN P9 N MAIN AND P10 N COLLEGE. XLPE CABLES							

Heather Tebbetts

From: Joel Rivera
Sent: Monday, July 6, 2015 12:41 PM
To: Kurt Demmer; Chris Brouillard; Michael Pazzanese
Cc: Robert Blank; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: RE: Barron Ave getaway cable

See comments in green.

From: Kurt Demmer
Sent: Thursday, July 02, 2015 2:43 PM
To: Joel Rivera; Chris Brouillard; Michael Pazzanese
Cc: Robert Blank; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: RE: Barron Ave getaway cable

Comments in red

Kurt

****Please note my new office number and mailing address****

Kurt Demmer | **Liberty Utilities**
Director of Engineering and Electric Operations – NH
P: 603-216-3556 | C: 978-360-6740
E: kurt.demmer@libertyutilities.com
15 Buttrick Road, Londonderry, NH 03053

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From: Joel Rivera
Sent: Thursday, July 02, 2015 1:32 PM
To: Chris Brouillard; Kurt Demmer; Michael Pazzanese
Cc: Robert Blank; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: RE: Barron Ave getaway cable

Hello Chris
I have provided estimates for addressing all 3 feeders: Please take a look at the excel sheet. There is a sketch for each feeder.

- 10L2
  - I would not like to use the 23kV ROW for this given that there is a good chance we will need the pole space in the future. (Salem Study) I think the issue with Mrs Mullen may be increased with doing a lot of work in front of her house. As far as the railroad, we have the ability to do back to back spacer cable per 23kV pole, that's 4 circuits. You are also assuming that Barron ave will still be there. As a small not, you mention 9L2 in the 10L2 sketch. The pole set would be at her neighbors. We would have to set an anchor pretty close to her property but not sure where the property line is. We would still need the pole space for potential feeders based on the salem study. Also we have not decided which station from Baron/Salem Depot stays. I rather stay away from the ROW but that is my opinion.
  - Seems easier to head west and re route the feeder up Bagnell anyways. No new UG required.
  - $32,160
- 9L2/9L3

- Would need to build an UG conduit system from station to W Main St and 2 – 1000kCMIL Cu. Figured might as well go with a 3X2 system. Why not go underground a short way out the side and put in poles along the dirt lot outside the station and use the poles going down central street. Again, this seems cheap and dirty but I don't foresee a lot of years coming out of Salem Depot Sub. I like this and think this is something we can definitely look into. Double ckt on Central St and part of W Main St. I will talk to Bob/Pat/Mike .
- W Main St is very busy, especially at proposed riser pole.
- Would also need to install dbl ckt from P5-P9 to get to the 9L2.
- $263,350 seems high but you can take a look at my assumptions and adjust if needed. Good thing is that we can take care of 2 feeders.

- 13L2
  - Would need to build an UG conduit system from station to existing MH1 and 1 – 1000kCMIL Cu. Figured might as well go with a 3X2 system and add a 3 way MH in case in the future we need to head east with new feeders. Good Plan
  - $106,100, however if we have existing spare duct space when they build UG getaway for the 13L3 then we could consider using that. I have no UG data or manhole views.

Let me know you would like to proceed and if there are any questions.

Thanks

Joel

From: Chris Brouillard
Sent: Wednesday, June 24, 2015 8:45 PM
To: Kurt Demmer; Michael Pazzanese
Cc: Robert Blank; Dan Saad; Patrick O'Neill; Anthony Strabone; Robert Johnson; Joel Rivera
Subject: RE: Barron Ave getaway cable

Joel and Anthony - please prepare estimates (conceptual grade +/- 25% is fine) for installing a short UG run for 10L2 and rise on the 23kV poles with spacer cable to the end point. Also prepare similar estimates for 9L2 and 13L2. The Pelham feeder we pick up as part of the Pelham substation rebuild. I'll then work with Joel to figure out if we have any movement in projects in remainder of 2016 and 2017 to accommodate and phase in some of this work, beginning with 10L2.

Chris

Chris Brouillard | **Liberty Utilities**
Director of Engineering
P: 603-216-3636 | C: 603-475-7965
E: chris.brouillard@libertyutilities.com
15 Buttrick Rd, Londonderry, NH

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From: Kurt Demmer
Sent: Wednesday, June 24, 2015 5:05 PM
To: Michael Pazzanese
Cc: Chris Brouillard; Robert Blank; Dan Saad; Patrick O'Neill; Anthony Strabone; Robert Johnson
Subject: Re: Barron Ave getaway cable

I am in favor of the under built option rather than the conduit option for the 10L2. The others are more reasonable replacement projects. At a minimum if we were strapped for capital to do all three then install the duct and install the cable at a staged approach based on age and neutral conductivity

Kurt Demmer
Sent from my mobile phone

On Jun 24, 2015, at 2:50 PM, Michael Pazzanese <Michael.Pazzanese@libertyutilities.com> wrote:

> Chris spoke with Rob and based on condition of this cable, we need to come up with a replacement plan ASAP. Cable grounding shield is in bad condition or does not exist. We will be back there again this year in my view. We also have several others getaways of the same year vintage 1973/1974, unjacketed concentric neutral at the following:
>
> - Barron Ave 10L2 DB getaway-950' conduit/3 MH's or shorten UG run and rise on 23 pole in ROW, run 477 to Kelly Rd.
> - Salem Depot-9L2 DB getaway 125' with new pole hardware
> - Spicket River 13L2 DB getaway. 200' with conduit and new MH that would tie in to new MH/conduit put in several years ago
> - Pelham 14L1 DB Getaway-defer until Project begins, but same type/year cable with similar issues
>
> Olde Trolley, Golden Rock and the 9L3, 13L3 are newer cable/installations with Olde Trolley and GR in conduit/MH system. First 3 are top priorities. Up north we are in much better shape.
>
> Mike
>
> Michael Pazzanese-**Liberty Utilities**- Electrical Substation Supervisor
> Cell: 603-475-6936
> michael.pazzanese@libertyutilities.com
> 9 Lowell Rd. Salem NH 03079

From: Chris Brouillard
Sent: Monday, June 22, 2015 7:57 PM
To: Robert Blank; Patrick O'Neill; Michael Pazzanese
Cc: Dan Saad; Kurt Demmer
Subject: RE: Barron Ave getaway cable

Thank you, Pat, Mike, Kurt, and Rob for your input and leadership during the repair process. I'm hoping that over our capital plan period we can proactively treat or replace the highest risk runs.

Chris **Brouillard** | **Liberty Utilities**
Director of Engineering
P: 603-216-3636 | C: 603-475-7965
E: chris.brouillard@libertyutilities.com
15 Buttrick Rd, Londonderry, NH

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From: Robert Blank
Sent: Monday, June 22, 2015 7:51 PM
To: Patrick O'Neill; Michael Pazzanese
Cc: Dan Saad; Kurt Demmer; Chris Brouillard
Subject: Barron Ave getaway cable

Report from Mike Pazz in the field is that Barron Ave substation cable has been repaired, blacktop has been laid down, and switching to restore feeder will commence shortly. Great job

to Pat and his guys for finding the initial failed cable, and Mike and all that were involved, for sticking through with the repairs and seeing it through to the end.

Great job guys, much appreciated.

Thank you,

Robert Blank | Liberty Utilities
Director of Electric Operations
P: 603-306-8238 | C: 603-327-7910
E:Robert.Blank@Libertyutilities.com
15 Buttrick Road, Londonderry, NH 03053

Sent from my iPhone

Liberty Utilities

TO: Chris Brouillard
FROM: Joel A Rivera
COPY: D. Champy, J. Scarpone, K. Demmer
DATE: July 18, 2013
SUBJECT: WR 15298088 - Replacement of Hanover 6L2 get-away cable

---

The Hanover 6L2 feeder supplies approximately 700 Customers in the town of Hanover NH. It supplies a mix of residential and commercial customers along South Main Street, Maple Street, School Street, North Main Street and College Street including Dartmouth College and the Department of Public Works. Engineering recommends the replacement of approximately 1600 feet of underground get-away cable for an estimated cost of $800,000. This replacement is recommended for the following reasons:

- The underground get-away cable on this feeder has experienced 3 failures in the past 5 years. The latest failure occurred on July 16, 2013. Underground primary cable failures typically take longer to repair as compared to other failures. In addition, multiple failures pose a risk of damage to the company's reputation and subsequent regulatory intervention. There is an additional limited risk that as load continues to grow there will be no capacity to pick up all interrupted customers on feeder ties including Dartmouth College.
- The existing underground cable is 500 kCMIL Al XLPE of 1970's vintage and is installed in a direct buried arrangement. The cross linked polyethylene (XLPE) insulated cables of this vintage have a high failure rate. At that time, it was not known that voids and contamination in the insulation and shields as well as other design and manufacturing deficiencies, leads to voltage stress concentrations within the cable. These voltage stresses, combined with moisture creates water trees. These water trees degrade insulation over time, ultimately causing the cables to fail.
- The existing underground cable get-away strategy dictates that upon the first failure of a direct buried get-away cable, the cable is to be repaired as an emergency. Upon the second failure of a direct buried get-away cable, the cable should be repaired as an emergency and the cable should be replaced. Any replacement of direct buried cables should be with a duct lay cable system in accordance with current company construction standards.
- On average each failure event on the 6L2 feeder resulting from an underground get-away failure adds approximately .02 to system SAIFI and 2 minutes to system SAIDI.

For these reasons, engineering is recommending that we replace the existing direct buried 500 kCMIL Al XLPE cable with new 750 kCMIL AL EPR in a new underground conduit system along South Main Street. We will begin the engineering, design, and preliminary permitting activities associated with this project in parallel with seeking the necessary internal approvals to move forward with construction.

Signature…….. Date……
Chris Brouillard, Director of Engineering

Signature…….. Date……

Daniel Saad, Vice President Operations & Engineering