

THE STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE SITE EVALUATION COMMITTEE
DOCKET NO. 2015-06

SUPPLEMENTAL PRE-FILED DIRECT TESTIMONY OF KENNETH BOWES
(TRACK 2 TOPICS ONLY)

IN SUPPORT OF THE
APPLICATION OF NORTHERN PASS TRANSMISSION LLC
AND PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
D/B/A EVERSOURCE ENERGY
FOR A CERTIFICATE OF SITE AND FACILITY TO CONSTRUCT A NEW HIGH
VOLTAGE TRANSMISSION LINE AND RELATED FACILITIES IN NEW
HAMPSHIRE

April 17, 2017

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Personal Background

Q. Please state your name, title, and business address.

A. My name is Kenneth Bowes. I am a Vice President of Transmission Performance at Eversource Energy (“Eversource”), currently assigned to the Northern Pass Transmission Project (“Northern Pass” or the “Project”) being developed by Northern Pass Transmission LLC, an Eversource company (“NPT” or the “Applicant”). My business address is 107 Selden Street, Berlin, Connecticut, 06037.

Q. What is the purpose of your supplemental testimony?

A. The purpose of my testimony is to provide an update on the Project and what has transpired since filing my Pre-filed Direct Testimony dated February 26, 2016, in which I substituted as a witness for Mr. Jerry Fortier. I provide a further update on: the status of the Project’s contracts with PAR Electric and other contractors, land rights, additional methods the Applicants have considered to avoid, minimize, and/or mitigate potential impacts from the Project, survey information, and decommissioning.

Contractual Updates

Q. Describe the qualifications and role of the contractors selected to construct the Project.

A. The roles of the contractors selected for this project have not materially changed. In my pre-filed direct testimony dated February 26, 2016 at page 9, I stated that “[t]he preliminary design was developed by Burns and McDonnell (“BMcD”). BMcD has also been contracted to engineer the final design under a contract with PAR Electrical Contractors, Inc. (“PAR”). A blend of BMcD and PAR resources will oversee the project management and the construction management roles.”

The role of BMcD has been modified. PAR remains responsible for engineering the final design under its contract with NPT. BMcD will now be contracted directly with NPT and will have the dual role of Owner’s Representative and Owner’s Engineer. BMcD will report directly to the NPT Project Director. In its dual role, BMcD will be an extension of the NPT and Eversource staff assisting in the overall management of the project and will review the engineering drawings and calculations provided by PAR during its design effort.

1 technical sessions, and as required by the NHDOT Recommended Approval with Permit
2 Conditions, in general the Project will be installed beneath existing utilities or other community
3 infrastructure, except as otherwise permitted or directed by NHDOT. If unanticipated utilities
4 are encountered within the road right-of-way, the Project will be installed in the configuration as
5 directed by NHDOT; NPT will, to the extent practicable, limit the exceptions it may seek from
6 NHDOT from NHDOT's general requirement that the Project be installed beneath existing utility
7 and other community infrastructure.

8 **Avoidance, Minimization, Mitigation**

9 **Q. Please describe any additional avoidance, minimization, and/or mitigation**
10 **efforts considered since October 2015.**

11 A. Whether received as part of the NHSEC process or through the Project's ongoing
12 outreach activities, as part of the Applicants' ongoing effort to avoid, minimize, and mitigate
13 potential Project impacts, we have continued to listen to the comments and feedback provided by
14 host communities, businesses, landowners, and residents who are located along the Project
15 corridor, as well as those provided by other stakeholders. The comments received by the
16 Applicants were carefully reviewed and considered, and accommodated through design changes
17 where practicable. Below, I describe cases where accommodating such comments through
18 design changes would trigger other impacts on neighboring properties, aesthetics, or natural
19 resources. For example, lowering a structure height in one location could result in the addition
20 of another structure; relocating one structure could result in longer spans and an increase in
21 structure height; moving one structure away from a road crossing could increase permanent or
22 temporary impacts to a wetland, etc. In those cases, the Subcommittee may wish to evaluate the
23 impacts and may have the option of requiring a design change as a condition of its approval of
24 the Certificate of Site and Facility. The Applicants will evaluate and consider practicable
25 measures to reduce Project impacts identified by the Subcommittee as conditions in the
26 Certificate.

27 **Q. Please describe any specific avoidance, minimization, and/or mitigation**
28 **efforts suggested by experts retained by Counsel for the Public or other parties.**

29 A. Testimony from experts retained by Counsel for the Public and by other parties,
30 as well as testimony of other witnesses have identified additional avoidance, minimization,

1 and/or mitigation measures, including, the use of non-specular conductors in particularly
2 sensitive locations, use of planting or screening plans, moving certain structures, relocating
3 structures farther from road crossings, using an alternative finish on certain structures, changing
4 a lattice structure to a monopole structure or vice versa, using a different route, and burying
5 additional segments of the Project.

6 **Q. Please provide a description of non-specular conductors, and the Project's**
7 **view on their use.**

8 A. Non-specular conductors are either mechanically or chemically treated to reduce
9 reflectivity. The conductor surface of a non-specular conductor generally has a smooth matte
10 gray finish. The non-specular finish is typically made by passing the finished conductor through
11 a sand blasting machine in which the conductor surface is treated with a very fine mild abrasive
12 grit producing a dull matte gray finish. This process does not affect the mechanical
13 characteristics of the conductor.

14 The Applicants have extensive experience with untreated conductors, which are used
15 throughout the Eversource transmission system. As a general matter, while new, untreated
16 conductors such as the ones proposed in the Application will initially have higher reflectivity
17 than non-specular conductors, their reflectivity fades over a few years until they achieve a
18 reflectivity that is the same or similar to that of non-specular conductors. For this reason, the
19 Applicants do not propose to use non-specular conductors for the Project.

20 **Q. Are there specific locations where the use of non-specular conductors has**
21 **been suggested?**

22 A. TJ Boyle Associates ("TJ Boyle"), an expert retained by Counsel for the Public,
23 has suggested that the use of non-specular conductors would mitigate visual impacts in the
24 following locations: Route 26 the Moose Path Scenic Byway (Millsfield), Bear Brook State Park
25 (Allenstown), Little Dummer Pond and Big Dummer Pond (Dummer), Coleman State Park /
26 Little Diamond Pond (Stewartstown), Diamond Pond Road crossing near Coleman State Park
27 (Stewartstown), Mountain View Grand Resort (Whitefield), Slim Baker – Inspiration Point
28 (Bristol), Route 110 Woodland Heritage Scenic Byway (Stark), Deerfield Road / Middle Road
29 (Allenstown/Deerfield), Hall Stream Road (Pittsburg), Route 3 Connecticut River Byway near
30 Howland Road (Clarksville), North Road (Lancaster), Northside Road (Stark), Route 28

1 Pembroke Road (Pembroke), Route 302 Presidential Range Trail Scenic Byway (Bethlehem),
2 Route 116 Presidential Range Trail Scenic Byway / Ammonoosuc River (Bethlehem), Boyce
3 Road (Canterbury), Loudon Road (Concord), Pembroke Road (Concord), Turtle Pond (Concord),
4 Nottingham Road (Deerfield), Deerfield Center (Deerfield), Pontook Reservoir / Rt 16 Moose
5 Path Scenic Byway (Dummer), Interstate I-93 at mile 72 (New Hampton), Cross Country Road
6 (Pembroke), and the Cohos Trail (Stark). It is my understanding that not all of these sites qualify
7 as scenic resources under the NHSEC rules.

8 **Q. Please describe visual buffer plantings or screening plans, and the Project's**
9 **potential use of such plantings and plans.**

10 A. In general, visual buffer plantings, consisting of native species, may be installed
11 at certain locations along the Project corridor to minimize views into cleared transmission line
12 corridors and to offset some of the visual changes from Project activities. At most such locations
13 doing so would require agreement with the underlying landowner. It may be, for example, that
14 plantings would be incompatible with the landowner's objectives for using the land. The
15 Applicants, however, will continue to work with underlying landowners before and after
16 construction to reach agreement on practicable visual buffer plantings at specific locations, such
17 as those listed below, where such agreement is possible.

18 **Q. Are there specific locations where the installation of visual buffer plantings**
19 **have been suggested?**

20 A. TJ Boyle has suggested additional vegetative screening measures at the following
21 locations: Route 26 the Moose Path Scenic Byway (Millsfield), North Road (Lancaster),
22 Northside Road (Stark), Route 28 Pembroke Road (Pembroke), Route 302 Presidential Range
23 Trail Scenic Byway (Bethlehem), Route 116 Presidential Range Trail Scenic Byway /
24 Ammonoosuc River (Bethlehem), Boyce Road (Canterbury), Loudon Road (Concord),
25 Pembroke Road (Concord), Turtle Pond (Concord), Nottingham Road (Deerfield), Interstate I-93
26 at mile 72 (New Hampton), Cross Country Road (Pembroke), and Cohos Trail (Stark).

27 **Q. Have the Applicants considered replacing more lattice structures with**
28 **monopole structures?**

29 A. Yes, the Applicants considered replacing additional lattice structures with
30 monopole structures. Prior to filing the Application, as part of the design review process, the

1 Project took a multi-disciplinary approach to the decision of what structure types should be used.
2 That approach began with an engineering judgment as to whether a lattice structure or monopole
3 structure was appropriate at any given location. That design was then evaluated by
4 environmental, historic and aesthetics resource experts, and, based on their recommendations,
5 many lattice structures were replaced with monopoles. After the Application was filed, these
6 experts were asked to evaluate replacing additional lattice structures with monopoles at specific
7 locations recommended by others in this proceeding; however, the Applicants concluded that
8 such replacements were not warranted because the Project as proposed would not have a
9 significant effect on aesthetics at those locations.

10 **Q. At what specific locations were monopole structures for lattice replacements**
11 **considered?**

12 A. Monopole for lattice structure replacements were considered at the following
13 locations: two structures along Route 145, 21 structures in the vicinity of the Cohos Trail and
14 Route 110 a.k.a. the Woodland Heritage Byway in Stark; two structures along North Road in
15 Lancaster; 18 structures near Weeks State Park; four structures along Route 116 a.k.a the
16 Presidential Range Trail Scenic Byway in Bethlehem; five structures along Peaked Hill Road in
17 Bristol; and three structures at the Pemigewasset Crossing at Franklin Falls Reservoir. The
18 Applicants further considered the use of monopoles at I-93, Dana Hill Road, Cross Country
19 Road, and Nottingham Road, but concluded that monopoles at these locations would not provide
20 significant benefits because these locations are not scenic resources.

21 **Q. An expert for Counsel for the Public suggested that the Project apply a**
22 **Natina (or equivalent) finish on lattice structures. Are you familiar with Natina finish on**
23 **transmission line structures?**

24 A. Yes, I am familiar with the finish. Natina is a proprietary product and is generally
25 a dull brown finish coating that can be applied to proposed structures in certain instances. It may
26 be helpful in blending some structures into background landscapes. It is my understanding that
27 the application of Natina finish must occur when the ambient air temperature is above 60 degrees
28 Fahrenheit and humidity is very low, or that it take place in a special oven that would bake the
29 product onto the steel parts. It may be, therefore, that the Natina finish is more appropriate for
30 use in arid landscapes. I am not aware of any case where the Natina finish has been used in New

1 England. It is not clear that such a finish could be successfully applied in this environment, or
2 how it would perform. As a general matter, such a first time, perhaps even experimental, use
3 raises significant concerns regarding the impact on the manufacturer's warranty on structures
4 treated with such a finish, and impacts to schedule from having to fabricate and ship structures to
5 be treated with that finish, as well as the overall impact to Project costs of using this novel
6 mitigation method. The Applicants did consider the use of this finish on certain structures, but in
7 the end could not justify the risks to warranty, Project schedule and Project cost engendered by a
8 product that has not been used in New England as part of the Eversource transmission system.

9 **Q. What other avoidance, minimization, and mitigation measures did the**
10 **Applicants further consider?**

11 A. Although the review of potential route alternatives for this Project is not properly
12 before the Site Evaluation Committee for consideration in this proceeding, the Applicants
13 received considerable feedback from certain parties, including from experts retained by Counsel
14 for the Public, regarding siting the Project in a different location or using a different alignment
15 within the corridor. All such alignments were previously considered during the initial design
16 phase and it was determined that the proposed route and alignment is the least impactful, most
17 practicable solution that could be achieved using the land rights that the Applicants acquired or
18 could acquire. In addition, potential alignment options were limited by the existing structures in
19 the right-of-way and specific electrical requirements, such as clearances, structure heights, span
20 lengths, etc., as governed by the National Electrical Safety Code ("NESC"). The Applicants
21 have proposed a route and alignment that can be achieved based on site control and design and
22 cost considerations. Any other route or alignment simply is not practicable.

23 **Q. Please list any additional specific locations where the Applicants considered**
24 **additional avoidance, minimization, and mitigation measures.**

25 A. The following is a list of specific locations where the Applicants considered
26 additional avoidance, minimization, and mitigation measures:

27 1. Route 26, Moose Path Scenic Byway, Millsfield: The Applicants considered
28 relocating a portion of the corridor to make it less visible, but concluded it was not practicable
29 due to numerous factors such as steep slopes, impacts to scenic public lands, including Dixville
30 Notch State Park, and impacts to substantial wetlands along Clear Stream.

1 2. Bear Brook State Park, Allenstown: The Applicants considered widening the
2 corridor and lowering structures in Allenstown and Deerfield. This would- have required,
3 however, the acquisition of additional easement rights through both towns, and the expansion of
4 the transmission corridor through the Park. Given the challenges of acquiring such easement
5 rights over such a long distance, and the challenges of expanding the transmission corridor into
6 preserved lands, it was not possible to lower the structure heights in this area.

7 3. Big Dummer Pond and Little Dummer Pond, Dummer: The Applicants
8 considered relocating a portion of the corridor to make it less visible. However, this could not be
9 accomplished because: (1) land ownership is constrained by the property line at the top of the
10 ridge; (2) there are extensive wetlands and riparian areas associated with Dummer Pond and
11 Pond Brook lower on the landscape; and (3) the Applicants are required to leave enough space
12 between the existing transmission line to provide space for future expansion by the generator.

13 4. Coleman State Park and Little Diamond Pond, Stewartstown: The Applicants
14 considered relocating a portion of the corridor, but could not acquire the needed land rights. A
15 case could be made for using lattice structures instead of monopole structures in this location,
16 given that lattice structures, because they have less mass, may blend more easily into the sky as
17 seen in a few locations within the Park and by recreational users on Little Diamond Pond.

18 5. Diamond Pond Road (roadway crossing), Stewartstown: The Applicants
19 considered relocating a portion of the corridor. In this location, the Applicants could have
20 moved the corridor further to the south, but the topography is the same. The current location
21 puts the Project structures against the backdrop of the forest, which helps to obscure their
22 visibility. The Applicants could move structure DC-128 an additional 50' from the roadway
23 crossing to make the structure less visible for passing motorists, but doing so would increase
24 temporary wetland impacts. Given the nature of the change in connection with such an in
25 increase in wetlands impacts, it is not clear that this relocation can be justified.

26 6. Mountain View Grand Hotel, Whitefield: The Applicants considered lowering
27 the structures in this location; however, reducing structure heights would increase the number of
28 structures needed and also increase permanent impacts to wetlands.

29 7. Slim Baker – Inspiration Point, Bristol: The Applicants considered reducing
30 structure heights by widening and reconfiguring the corridor, but doing so would have required

1 expanding the corridor into preserved state lands, or would have required acquisition of
2 additional easement rights over some distance. Given the challenges of accomplishing either, a
3 widening of the corridor was not possible. The Applicants also considered lowering structure
4 heights by adding more structures; however, a slight lowering in height would not make any
5 additional significant reduction in Project visibility according to the Project's visual experts.

6 8. Deerfield Road/Middle Road, Allenstown: The Applicants considered alternative
7 structure configurations. However, potential alternative configurations were limited because of
8 the existing right-of-way width and presence of an existing 115 kV line. Collocation of the NPT
9 line and existing 115 kV line was not considered as it would not result in a reduced structure
10 height.

11 9. Halls Stream Road, Pittsburg. The Applicants also considered relocating the
12 structure at the Halls Stream Road Crossing 50 feet further away from the roadway which would
13 somewhat reduce visibility from the roadway. Doing so would, however, increase permanent
14 and temporary wetlands impacts. Since Halls Stream Road is not a scenic resource under the
15 NHSEC rules, it is not clear that such a relocation can be justified.

16 10. North Road, Lancaster: The Applicants considered lowering structures and
17 alternating the structure type in this location. The Project, however, cannot lower the relocated
18 115 kV structure heights by using a delta configuration because the right-of-way is too narrow
19 for that configuration. The Applicants could reduce structure visibility somewhat by moving
20 DC-536 and D142-373 approximately 40' south, a shift that would increase structure heights by
21 approximately 5', and that could increase temporary impacts to wetlands. Given the limited
22 ability to move structures, and the fact that it would somewhat increase both structure heights
23 and temporary wetlands impacts, it is not clear that the relocation can be justified.

24 11. Northside Road, Stark: The Applicants considered relocating structures (DC-
25 433/O154-82) and reducing structure heights in this location, but ROW easement restrictions
26 limit the number of structures that can be constructed in the "field", and any shift in these
27 structures would place them in the "field" in violation of the easement restrictions. In addition, if
28 the Committee requires, the Applicants are able to move both structures approximately 40'
29 southwest to reduce potential visual impacts. The structure move should also result in a minor

1 decrease in temporary wetland impacts and shift the structure further away from the Upper
2 Ammonossuc River.

3 12. Boyce Road, Canterbury: The Applicants considered altering the structure
4 configuration into a delta formation for the relocated 115kV circuit. The Applicants considered
5 and chose not alter structure configuration due to existing encroachments in the ROW and
6 because this configuration would require additional tree removal. TJ Boyle also suggested using
7 wood poles in this location; however, the Applicants are not proposing to use wood structures for
8 this Project at any location. Eversource has standardized design protocols to use steel poles for
9 their transmission structures across its operating region. The standardization to use steel poles is
10 driven by a number of factors, which include lower total life cost, lack of availability of large
11 quality round wood poles, improved constructability and improved reliability. The use of steel
12 poles results in savings to the New England customers through reduced construction costs,
13 reduced maintenance costs, reduced spare pole inventory, extended life and increased reliability.
14 Steel poles also have environmental benefits due to their use of recycled materials. In an effort to
15 accommodate a “wood” appearance for the steel structures, a weathered steel structure can be
16 installed to better blend in with the environment. The weathered steel structure is brownish in
17 color and has the same qualities of the galvanized silver colored steel structure.

18 The Applicants could somewhat reduce visibility of the structure to drivers travelling
19 along Boyce Road by shifting the structures at this crossing 50’ northwest. This would increase
20 one structure by approximately 5’, and place one structure closer to the abutting home and barn
21 that encroaches on the ROW, but would also increase permanent wetlands impacts to some
22 extent. Given the nature of the reduced visibility in relation to the increased wetlands impacts
23 and structure heights, it is not clear that this shift can be justified.

24 13. Pembroke Road, Concord: The Applicants evaluated engineering options for
25 lowering structure heights in this area, but the ROW is too narrow to accommodate those
26 options.

27 14. Turtle Pond, Concord: The Applicants considered relocating a portion of the
28 corridor and altering the alignment. However, this could not be accomplished because there is
29 not adequate space in the right-of-way for an altered alignment. The work would also take
30 longer, thus increasing temporary impacts to wetland-dependent wildlife, and required much

1 more difficult restoration work. To further reduce impacts, the Applicants will use a H-Frame
2 structure in place of a 3-pole monopole at structure 3132-114.

3 15. Nottingham Road, Deerfield: The Applicants evaluated engineering options for
4 lowering structure heights in this area, but the ROW is too narrow to accommodate those
5 options.

6 16. Deerfield Center, Deerfield: The Applicants evaluated engineering options for
7 lowering structure heights in this area, but the ROW is too narrow to accommodate those
8 options. The Applicants also considered relocating structure numbers 3132-287 and G146-35 to
9 the west side of Church Street. However, the structure relocation would increase the height of
10 the structure by 5' and would increase temporary impacts to wetlands.

11 17. Pontook Reservoir / Route 16 Moose Path Scenic Byway, Dummer: The
12 Applicants considered relocating a portion of the corridor to make it less visible. Based on
13 available data, it appears that siting the structures lower on the landscape (to the east) would
14 likely entail similar or greater impacts to wetlands, streams, vernal pools, and a deer wintering
15 area. Given the possibility of additional impacts to resources that such a corridor relocation
16 would cause, the Applicants determined that it was not practicable.

17 18. Cohos Trail, Stark: The Applicants evaluated engineering options for lowering
18 115 kV structure heights in this area, but the ROW is too narrow to accommodate those options.
19 The HVDC line is in an already in the shortest possible structure configuration.

20 Decommissioning

21 **Q. Please provide an overview of the Project's commitment to decommissioning**
22 **the Project.**

23 A. It is extremely rare for transmission owners to decommission and completely
24 remove a network of transmission facilities. While it is common for existing high voltage
25 transmission lines to be re-conducted and refurbished, it is only under unusual circumstances
26 that they are removed completely.

27 However, to comply with the Committee's rules regarding decommissioning, NPT
28 contracted with GZA GeoEnvironmental, Inc. ("GZA") to prepare a decommissioning plan that
29 was submitted to the SEC on July 22, 2016 (the "Plan"). The Plan provides further evidence of
30 technical and managerial capabilities necessary to construct and operate the Project.

1 **Q. What are GZA’s qualifications?**

2 A. GZA is an independent, employee-owned consulting firm that provides
3 geotechnical, environmental, water, ecological, and construction management services to a wide
4 array of private and public clients. GZA has extensive experience preparing and implementing
5 decommissioning plans. GZA also has a long track record of overseeing the construction
6 management associated with all aspects of facility decommissioning and demolition.

7 **Q. Please describe the decommissioning plan.**

8 A. The Plan was prepared by GZA to address the technical requirements found in
9 Site 301.08(d)(2). The financial aspects of decommissioning have been addressed by Michael
10 Auseré in both his Pre-filed Direct Testimony, dated October 16, 2015, and his Supplemental
11 Pre-filed Testimony, dated March 24, 2017.

12 As it is impossible to predict the regulatory regime and Project conditions at the time of
13 decommissioning, the Plan is based on a number of assumptions that serve as performance
14 standards, and which are listed at page 2 of the Plan. The assumptions include, but are not
15 limited to: (1) all transformers will be transported off-site for recycling; (2) all below-ground
16 infrastructure at overhead transmission line support locations shall be removed to a depth of at
17 least 48 inches below grade; (3) all underground infrastructure at depths greater than 48 inches
18 below finished grade shall be abandoned in place; (4) underground transmission lines within the
19 disturbed area adjacent to State and local highways will be decommissioned by accessing and
20 removing cables via existing accessible concrete splice enclosures, conduits will be capped in the
21 enclosures and remain in place, concrete enclosures will be removed to at least 48 inches below
22 grade and backfilled with sand or gravel, which in accessible, soil backfilled splice locations will
23 be abandoned in place; and (5) underground transmission lines passing under waterways will be
24 accessed via the adjacent concrete access enclosures, cables will be removed and the conduits
25 will be grouted in-place, while enclosures will be removed to four feet below grade.

26 The Plan covers the necessary stages of decommissioning, from access planning and
27 permitting, to the sequenced removal of the conductors, cables, insulators, ground and static
28 wires, guy wires, concrete enclosures, structures and foundations, to the plugging of underground
29 and underwater conduits, to the off-site transportation of materials for salvage or disposal, to
30 restoration of the right-of-way.

1 Franklin—approximately 25 miles; and, Franklin to Deerfield—approximately 34 miles. *See*
2 NHPUC Docket DE 15-464. The Applicants understand that any approval from the Committee
3 would be conditioned on receiving the necessary approvals from the NHPUC for the lease. The
4 NHPUC issued an order on April 6, 2017, directing its Staff to work with the parties to that
5 proceeding to develop a procedural schedule with the goal of issuing a final order by year end.

6 In addition, as previously discussed, the Applicants are currently working with NHDOT.
7 On April 3, 2017, the NHDOT issued a Recommended Approval with Permit Conditions. As
8 part of the iterative process with NHDOT, the Applicants will provide a certified survey report to
9 NHDOT completed by a licensed land surveyor, which will include surveys for both the locally
10 maintained roads and State highways as well. The report will include notations of all the records
11 and plans used as well as the monumentation used to identify right-of-way lines.

12 **Q. What work was performed that resulted in the certified survey report?**

13 A. The surveyor researched multiple town, county and state offices to obtain right of
14 way information including highway layouts, recorded property plans and surveys as well as
15 current deeds. Existing boundary monuments along the route were located in the field and
16 identified on base mapping by the survey company. The right of way lines were determined
17 using all the available documents such as record plans, highway layouts and the boundary
18 evidence located in the field along the corridor.

19 **Q. Have you reviewed the claims and allegations made by the towns of Easton
20 and Franconia regarding road lay out? If so, how do you respond?**

21 A. Yes, I have. The claims made by the towns of Easton and Franconia are based on
22 documentation that they provided, including some from the 1800's. There are 16 pages of
23 information statements and historic pictures. The towns argue that the roadway width displayed
24 on the Project plans is larger, in spots, than what actually exists. The Project has reviewed each
25 location to pinpoint each spot on the ground to evaluate the towns' assertions. In general, the
26 towns have correctly identified the 1833 layout as 4-rods (66 feet).

27 The Project's surveyors have performed research that confirms the widths of the ROW
28 that are represented on the plans. ROW certainty was determined by actual deeds, location of
29 survey pins in the ground marking the edge of ROW or defaulting to a baseline width. A stick

1 drawing of the ROW for the entire underground portion of the Project will be completed and
2 submitted to the NHDOT.

3 **Q. What work has the Project undertaken to survey the underground portion of**
4 **the Project and how was this data incorporated in the underground design?**

5 A. PAR Electric subcontractors, BL Companies, Inc., Arago Land Consultants, and
6 Meridian Land Services, performed a roadway survey for the underground portions of the
7 Project.

8 Generally speaking, a combination of GPS (global positioning system) and conventional
9 land surveying methods were used to establish a horizontal and vertical control network along
10 the Project corridor and to establish a baseline survey. Records research was conducted at each
11 town, county and state office to obtain right-of-way information, highway layouts, property
12 owner information, current deeds and any filed plans for properties along the project corridor.
13 Research was also conducted at the NHDOT, Grafton and Coos county registries, local town
14 offices, and the New Hampshire state archives.

15 A survey team was used to determine monumentation and conduct field surveys along the
16 Project's underground route. Using the NHDOT plans and adjacent private property plans
17 recovered during the research, the ROW lines were established and then adjusted to the
18 monumentation found and field surveys conducted. The resulting accuracies of these lines were
19 labeled and included in the Project's design. The Project has made every effort to adjust the
20 design to remain entirely within the developed ROW. To the extent there are any inaccuracies of
21 the ROW width in the Project's design submittals, these drawings will be updated to reflect an
22 alignment within the road ROW.

23 **Q. What steps has NPT taken to avoid conflicts with private property outside**
24 **the right of ways lines?**

25 A. In the few instances where right of way lines could not be located with precision
26 due to a lack of historic information, the surveyor chose a more conservative (narrow) line,
27 which resulted in minor deviations from historic rights of way measuring four rods (66 feet) or
28 three rods (49.5 feet). In other words, the surveyor erred on the side of protecting private
29 property.

1 Furthermore, NPT has located the facility well inside the right of way lines in these
2 locations and within the established disturbed areas of the highways to avoid any potential
3 conflict with private property.

4 **Q. Concerns have been raised regarding potential impacts to existing**
5 **encroachments or encumbrances within the State-maintained right-of-way. Does the**
6 **Project intend to disturb these encroachments or encumbrances?**

7 A. No. The Project has not identified any locations where it intends to disturb any
8 existing encroachments or encumbrances within the width of the State-maintained ROW.

9 **Q. Is there anything else further you would like to add at this time?**

10 A. Yes. I have reviewed the NHDES final permit and conditions dated March 1,
11 2017. The Project will comply with all NHDES permit conditions.

12 **Q. Does this conclude your supplemental pre-filed testimony?**

13 A. Yes, it does.

**NORTHERN PASS TRANSMISSION
NHSEC DOCKET #2015-06**

RECOMMEND APPROVAL WITH THE FOLLOWING PERMIT CONDITIONS:

PROJECT DESCRIPTION:

This is a 192 mile high voltage electrical transmission line project submitted as a joint application by Northern Pass Transmission LLC (NPT) and Public Service Company of New Hampshire d/b/a Eversource Energy (Eversource), hereinafter referred to jointly as the Applicant. The project includes the construction of aerial and underground electric transmission lines, including related conduit, cable, wires, poles, structures and devices across, over, under and along certain state highways and railroads.

Aerial Crossings: The proposal includes sixty six (66) aerial crossings over state maintained highways. These include twenty nine (29) existing crossings owned by Public Service of New Hampshire (PSNH) and thirty seven (37) are new proposed crossings owned by Northern Pass Transmission (NPT). The proposal includes six (6) aerial crossings of state-owned railroad corridors.

Underground Installations within State-maintained Highways: The proposal includes approximately 56 miles of underground conduit construction impacting several segments of roadway within state—maintained highways. These locations are as follows:

Highway Maintenance District 1

- Beecher Falls Rd in Pittsburg from the proposed transition station access road to the intersection of US Route 3
- US Route 3 in Pittsburg from the intersection of Beecher Falls Road to the Clarksville/Pittsburg town line.
- US Route 3 in Clarksville from the Clarksville/Pittsburg town line to a point approximately 650 south of the town line.
- NH Route 145 in Clarksville from a point approximately 1200 feet north of the intersection with Old County Road to the intersection of Old County Road
- Bear Rock Road in Stewartstown from the intersection of North Hill Road to the easterly limit of NHDOT maintenance responsibility.
- US Route 302 /NH Route 10 in Bethlehem from a point approximately 800 feet east of Brook Road to the intersection of NH Route 18/NH Route 116
- NH Route 18/NH Route 116 in Bethlehem from the intersection of Us Route 302/NH Route 10 to the Bethlehem/Sugar Hill town line.
- NH Route 18/NH Route 116 in Sugar Hill from the Bethlehem/Sugar Hill own line to the Sugar Hill/Franconia town line
- NH Route 18/NH Route 116 in Franconia from the Sugar Hill/Franconia town line to the intersection of NH Route 18/NH Route 116 and Wallace Hill Road.
- NH Route 116 in Franconia from the intersection of NH Route 18 and Wallace Hill Road to the Franconia/Easton town line.

- NH Route 116 in Easton from the Franconia/Easton town line to the intersection of NH Route 112.
- NH Route 112 in Easton from the intersection of NH Route 116 to the Easton/Woodstock town line.
- NH Route 112 in Woodstock from the Easton/Woodstock town line to the intersection of US Route 3.
- US Route 3 in Woodstock from the intersection of NH Route 112 to the intersection of NH Route 175.

Highway Maintenance District 3

- US Route 3 in Woodstock from the intersection of NH Route 175 to the Woodstock/Thornton town line.
- US Route 3 in Thornton from the Woodstock/Thornton town line to the Thornton/Campton town line.
- US Route 3 in Campton from the Thornton/Campton town line to the Campton/Plymouth town line.
- US Route 3 in Plymouth from the Campton/Plymouth town line to the intersection of NH Route 25 and NH Route 3A.
- US Route 3/NH Route 25 in Plymouth from the intersection of US Route 3, NH Route 3A and NH Route 25 to the Plymouth/Bridgewater town line.
- US Route 3/NH Route 25 in Bridgewater from the Plymouth/Bridgewater town line to a point 350 feet south of John Jenness Road.

GENERAL CONDITIONS OF APPROVAL:

The NH Department of Transportation is reviewing the proposed Electrical Transmission line projects for conformance to the Utility Accommodation Manual (UAM), which provides guidance for the placement and construction of public utilities within NHDOT Right-of-way (ROW), and the Highway Maintenance District permits, which provide guidelines for construction within the NHDOT Right-of-Way. These guidelines and permits are intended to protect public safety, mobility and the economic investment made to the roadway infrastructure within the State's highway Right-of-Ways. The Department does not review and issue permits based on permit plans. They instead rely on the actual construction plans for permit review and approval. Due to the scope and size of the proposed project, the construction plans are still in development and they will continue to be reviewed and revised as the project proceeds through the design process. Based on the initial design reviews, the location of the transmission corridor within the Department's ROW will require some fine tuning to better conform to the UAM. However, assuming the final construction plans and specifications address the Department's concerns, meet the design guidelines, or documentation is provided and approved by the Department to justify specific exceptions to the guidelines, the Department would issue permit approval for the project construction within the Department's Right-of-Way.

As noted above the Project construction plans and specifications are still in development, therefore, the following Conditions of Approval are intended to provide additional clarification and further guidance for the project design in order to obtain Department construction permit approvals.

1. The applicant shall execute a Use and Occupancy Agreement (U&O) with the NHDOT prior to final issuance of other Department permits and licenses. The applicant shall be bound to the requirements of each permit as outlined in the individual permit instructions. The general conditions are intended to highlight major issues that need to be addressed as well as serve as part of the permit process, but are not intended to summarize all requirements. The final approved plans and specifications used to obtain the Department permits shall clarify conflicts between the various design guidelines referenced during the design process.
2. The applicant shall modify their plans and address all NHDOT review comments, including the preliminary NHDOT comments dated December 2, 2106 and general and segment specific comments dated February 10, 2017 and March 24, 2017 respectively.
3. Final construction plans shall be submitted to and approved by NHDOT prior to final issuance of other Department permits and licenses. This shall include Department review to evaluate the limits of construction impact, general and location specific constructability issues and traffic control requirements.
4. The Applicant shall provide a certified survey report delineating means and methods of determining the right of way shown on the plans. The report shall include notations on all records and plans used and the monumentation held to control the right-of-way lines. The report will be certified by the Licensed Land Surveyor in charge that the right-of-way lines shown on the submitted plans are accurate locations defined by ground survey and all pertinent research.
5. The Applicant shall be responsible for the acquisition of all other applicable permits and compliance with all local, state or federal rules, ordinances, and regulations.
6. The Applicant shall obtain driveway permits for all temporary and permanent access points from the state highway system at aerial crossing locations.
7. The Applicant shall complete the Environmental Documentation Checklist for each excavation and driveway permit. This shall include a copy of the Stormwater Pollution Prevention Plan (SWPPP) for each permit.
8. The Applicant shall reimburse NHDOT for the cost of all State inspection services and administrative overhead assigned to this project. Based on the project scale and schedule the Department may need to use outside inspection and administration services to handle the construction oversight.
9. All work shall be conducted in a manner that maintains safety and minimizes inconvenience to the travelling public.

10. The NHDOT permits concern only the type and manner of work to be performed within the NHDOT Right of Way (ROW). The Department cannot and does not grant permission to enter upon or use any privately owned land.
11. The Applicant agrees to defend, indemnify and hold harmless the NHDOT, its agents and employees, from and against any and all claims arising from or which can be claimed to arise from performance under this permit.
12. In accordance with the UAM, underground facilities shall be located outside of pavement areas and as close to the ROW line as practicable. Where construction activity is adjacent to or under paved surfaces, roadway and traffic maintenance become a major concern. The Department has invested heavily in the roadway infrastructure and needs to preserve and maximize the life of the roadway system. As noted in Section 1 of the UAM, "Utilities locating and operating facilities within the ROW must accept responsibility to protect the public investment in ROW, roadbed and structure." The initial utility construction and facility maintenance can impact and degrade the operations, safety and longevity of the roadway. Therefore, any impacts to the paved roadway shall require documentation and justification for why the impacts cannot be avoided and how the applicant will mitigate both initial construction and then maintenance (both planned and unplanned) impacts to the roadway and traffic. Differential settlement and frost heaving of the roadway can adversely impact winter maintenance activities as well as the drivability of the roadway. It could also lead to increased damage claims from motorist that encounter pavement distress. The Department will be looking for the Applicant to implement pavement distress mitigation/ preventative measures to address differential settlement and heaving where structures and equipment are placed under paved surfaces. Mitigation or preventative measures could include, but are not limited to, placement of the equipment and structures below frost levels, stabilizing the roadway structure above and around the structures to create a more homogeneous roadway base and subbase to resist the differential frost impacts, or rehabilitation of the roadway pavement structure to reduce moisture in the subbase and to improve its resistance to differential settlement.
13. The minimum horizontal and vertical design criteria for the location of underground power lines are outlined in the UAM. Any variation from these minimum requirements shall be accompanied by an exception request for each location the UAM requirements cannot be met as well as documentation to support/justify the variance from the design criteria as outlined in the UAM. As outlined in the UAM the Department prefers to locate underground facilities where they will not conflict with highway improvements or planned and unplanned maintenance.
14. For safety and future maintenance considerations, all proposed underground electrical conduit or electrical equipment shall at least meet the separation and cover requirements set forth in the UAM. Unless exceptions are granted the minimum depth to the top of the facility shall be no less than eighteen (18) inches below the bottom of the roadway structural box, which are the granular soil layers supporting the pavement structure. The top of the facility shall be considered to be the top of the protective layer (AKA Lean Concrete) above the proposed facility. For the purposes of this application, the bottom of the roadway structural box is considered

to be thirty-six (36) inches below the bottom of the pavement for Tier 2 highways including shoulders and twenty-four (24) inches below the bottom of the pavement for Tier 3 and 4 highways. When recommended minimum pavement depths are included, the minimum depth to the protective layer will be fifty-nine (59) inches and forty-six (46) inches respectively.

15. The top of the proposed facility shall be placed under all existing utilities and drainage structures to the maximum extent feasible. Minimum separation shall meet standard code requirements, but in no case be less than a minimum of twenty-four (24) inches below any existing utility or drainage structure that they directly cross or that will be constructed within four (4) feet of the existing structure. This recommendation is to address safety and long term maintenance concerns by minimizing potential future excavation and construction conflicts with the high voltage electrical lines during roadway, drainage and utility maintenance and/or replacement of existing underground structures. An exception shall be required for any location the proposed facility cannot be placed under the existing facilities.
16. Underground facilities near bridge structures shall be located to eliminate the need for adjustment to the proposed facility for bridge maintenance or replacement. Existing bridge information must be shown on the plans to adequately address potential conflicts with bridge substructures. The Applicant/Owner understands that they will be solely responsible to relocate their facilities, at their own cost, if their facility adversely impacts future maintenance, repair or replacement of a bridge.
17. Aerial crossings near bridge structures shall be located as far away as feasible to eliminate the need for adjustment to the proposed facility for bridge maintenance or replacement. The Applicant/Owner understand that they will be solely responsible to relocate their facilities, at their own cost, if their facility adversely impacts future maintenance, repair or replace of a bridge.
18. Unless exceptions are granted, the facility shall not be permitted to be attached to Department structures.
19. In general, when excavation below paved surfaces is permitted (i.e. roadway crossing or minor shoulder encroachment); the Applicant shall replace with acceptable materials the existing pavement and roadway base structure to match the depth found in the roadway. Pavement shall be placed in lifts of base, binder and wearing course as appropriate, using Department approved asphalt mixes and binders. Where complete lane reconstruction is needed, pavement designs shall be prepared by the Applicant in conformance with the NHDOT Highway Design manual to reflect the project location, traffic and roadway class. The designs shall be submitted to the Department for review and approval before a permit will be issued. All rehabilitation/replacement pavement designs shall be the sole responsibility of the Applicant.
20. In order to minimize the construction impacts to paved surfaces the following are general guidelines for replacement of roadway surfaces. The actual pavement remediation may vary and shall be defined as part of the approved construction plans needed to obtain construction permits.

- a) In areas where the project excavation impacts any portion of a paved shoulder the entire shoulder pavement and structural base material shall be replaced. The pavement shall be sawcut at the edge of the travel lane.
 - b) In sections where the excavation extends into the travel lane, the pavement shall be sawcut at the center line of the roadway. All roadway pavement will be replaced to the saw cut and structural base materials within the excavation limits may be required to be replaced.
 - c) In sections where the excavation extends into more than one travel lane, the entire width of the pavement shall be replaced. All base material within the excavation limits may be required to be replaced.
 - d) There are areas where the project may impact concrete roadways. In general reinforced concrete slabs are ten (10) feet wide and fifty (50) feet long. For longitudinal impacts, the entire concrete slabs are generally removed and replaced with appropriate sub-base and base materials. For transverse crossings, generally the reinforced concrete slab is replaced in-kind within the limits of disturbance. However, the actual treatment of the slabs will be evaluated and determined by the Department on a case by case basis. Where concrete slabs are removed, designs shall be prepared by the Applicant in conformance with the NHDOT Highway Design manual to reflect the project location, traffic and roadway class. The designs shall be submitted to the Department for review and approval as part of the construction plans before a permit will be issued.
 - e) In no case shall the excavation be located where it would impact more than a single lane of traffic at any one time without prior Department approval and implementation of appropriate traffic control measures.
21. Prior to the start of work the Applicant shall furnish to the Department a continuing Surety Bond guaranteeing the fulfillment of the provisions, instructions, and regulations prescribed herein, and any later instructions that may be issued by the Department during the performance of the work. Following the acceptance of the project by NHDOT, the bond amount may be reduced guaranteeing satisfactory maintenance of the disturbed areas for a period of two (2) years.
22. Traffic Control:
- a) Due to the project scale and the type of roadways to be impacted by the construction, the Applicant shall obtain approval of their Traffic Management Plan by the NHDOT Traffic Control Committee prior to issuance of Department permits and licenses.
 - b) A Traffic Management Plan shall be prepared for each construction phase and section of roadway impacted by construction. Any modification to the plans to match the Contractors means and methods shall require further review and approval of the revised plan prior to any construction. In order to determine the project's traffic impact significance, a project evaluation sheet must be completed along with a Work Zone ITS Needs Scoring Sheet. These shall be prepared by the Applicant prior to meeting with the Traffic Control

- Committee. The Traffic management plan shall be designed and stamped by a NH Professional Engineer with relevant Department and MUTCD experience in the preparation of Traffic Management Plans.
- c) Due to the scale and duration of the project, Work Zone ITS may be required for all or part of the construction where roadway and traffic impacts warrant. It will be the sole responsibility of the Applicant to pay for and implement the Work Zone ITS requirements. These shall include, but are not being limited to, keeping Traffic Systems Management & Operations as well as the appropriate Highway Maintenance District dispatch office informed of all construction locations, daily and weekly roadway and lane closures, and restrictions to travel.
 - d) Detour of state highway traffic requires prior approval by the Department and shall be in accordance with an approved Traffic Management Plan. The Department's review and approval of traffic control plans and measures apply to NHDOT roadways only.
 - e) Traffic must be maintained in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) as revised, during the performance of the work.
 - f) During performance of the work, traffic shall be protected by suitable barricades, standard warning and advance warning signs, uniformed officers as appropriate and/or flaggers, as well as proper lighting at night. All signs shall be kept clean and in good repair.
 - g) Approval of the Traffic Management Plan in no way transfers liability from the Applicant and/or his/her agents to the State of New Hampshire, its agents and/or employees.
23. Aerial Railroad Crossings – The Applicant shall execute a crossing agreement for each location with the NHDOT Bureau of Rail and Transit prior to final issuance of other department permits and licenses. All agreements will require Insurance and Indemnification of the State and the Operating Railroad, in a form acceptable to the Bureau of Rail and Transit.

CONSTRUCTION REQUIREMENTS:

24. Photographs or videos in sufficient detail to show the existing condition of the area to be disturbed within the ROW shall be furnished to the Department prior to the start of work. Photographs of all State underground structures shall be taken just prior to backfill and furnished to the Department.
25. The Applicant shall be responsible for the construction and maintenance of all necessary sediment and erosion control facilities required to minimize impacts to adjacent water resources from construction storm water runoff.
26. No work in the highway ROW shall be permitted during the following conditions unless prior approval is obtained from NHDOT:
 - Inclement weather
 - The hours of darkness

- Saturdays, Sundays, Holidays, or peak traffic times before and after holidays as determined by the Department
 - During the period from November 15th to April 15th.
27. A winter shutdown meeting will be required for each work site prior to October 15th of each year and any needed repairs and adjustments to the work areas shall be completed as directed by the Department prior to November 1st.
28. All temporary yellow centerline markers in place on two-way roadways prior to placement of full MUTCD standard pavement markings shall be removable. The temporary markers shall be placed in pairs, separated by a lateral space of approximately three (3) inches, using a maximum spacing of eighty (80) feet. On sections of roadway with severe curvature, lesser spacing should be used so that at least three (3) pairs of markers are visible to approaching traffic at all times. Temporary markers shall be removed following placement of standard pavement markings.
29. During the hours the job is inactive, a standby crew shall be available in case they are needed for the protection and maintenance of traffic. One or more telephone numbers, which will reach the standby crew, shall be furnished to the following people: local NHDOT Highway Maintenance District Dispatch, NHDOT Traffic Systems Management & Operation center, local police chief, local superintendent of public works or road agent (if the project is municipally owned), and the local NHDOT highway patrolman foreman.
30. In areas where the pavement is to be excavated, it shall be neatly and uniformly sawcut, with square edges by machine, at each side of all trenches. Every precaution shall be used to prevent undermining of the remaining pavement, utilizing sheeting as required, to prevent cave-in. Undermined areas inadvertently developed shall have the projecting pavement cut square and removed.
31. Excavation and handling of material shall be performed in a manner that will minimize trench width and the possibility of cave-ins. The pavement and base course materials are to be discarded appropriately. Excavation below subgrade is to be saved and used for backfill to prevent differential frost heaving. Any blasting required shall be cautiously performed to minimize disturbance beyond the trench limits. Overburden shall be removed prior to blasting. All blasting operations shall be performed in accordance with the NHDOT Standard Specifications for Road and Bridge Construction Section 203.
32. All backfill material in trenches and below base courses shall consist of excavated material suitable for backfill as defined in NHDOT Standard Specifications for Road and Bridge Construction, Section 603. All backfill shall be compacted at or near optimum moisture content, in layers not exceeding six (6) inches compacted thickness, using pneumatic tampers, vibratory compactors, or other approved means. The material shall be compacted to not less than ninety five (95) percent of maximum density as determined by AASHTO T99 (Standard Proctor Test). Water shall be uniformly applied during compaction in the amount necessary for proper compaction.

33. Within paved areas, crushed gravel, NHDOT Standard Specifications for Road and Bridge Construction Section 304, or approved equal to the existing gravel course, shall be placed in layers not exceeding six (6) inches compacted thickness, and thoroughly compacted. An approved bituminous plant mix, NHDOT Standard Specifications for Road and Bridge Construction Section 401, shall be placed the same day and carefully graded and rolled to the adjacent pavement grade, as a temporary patch unless an alternative temporary treatment to accommodate traffic is approved by the Department. Just before completion of the project and after suitable exposure of temporary patches to traffic compaction, the pavement shall be sawcut as directed, with a two (2) foot minimum overlap of the final pavement on undisturbed material. Within the sawcut limits, the existing pavement and temporary patch material shall be removed, the sawcut edges tack coated, and the material replaced with an equal depth, but not less than four (4) inches, of hot bituminous concrete, placed in lifts as directed, and compacted to meet the existing pavement edge exactly. Finished pavement grades must replicate the original pavement layout to the extent feasible or as directed by the Department including normal crown, superelevations, and breaks in superelevated shoulders. Sawcuts for final paving shall be as directed by the Department. In all cases, the utility trench shall be filled and/or covered to be flush with the existing pavement at the end of each working day.
34. Shoulders, other than paved, disturbed during the construction, shall be restored by providing a similar depth of crushed gravel, per NHDOT Standard Specification for Road and Bridge Construction Section 304, which shall be graded and compacted on a slope to match the cross slope of the existing roadway shoulder, or as directed by the Department.
35. In other areas disturbed by construction activity, the preconstruction surface type shall be restored, by placing similar material to a depth and quality equal to that existing before excavation. Reestablish existing grassland to equal what existed before excavation. Reestablish lawns to pre-construction condition, using a minimum of four (4) inches of loam, lime, fertilizer, similar seed, and mulch. The surface shall be reasonably smooth, free of stones larger than two (2) inches or debris, and be graded to drain.
36. No trench shall be left open at night or over weekends unless specifically approved by the Department. In general, steel plates are not permitted for temporary cover of excavation areas unless they are buried or otherwise stabilized.
37. Suitable unrestricted ingress and egress to properties abutting the highway shall be maintained at all times. The abutting property owners shall be notified in writing a minimum of two (2) working days before construction impacts that may impact the use of their access or driveway. Provisions for alternate access shall be the sole responsibility of the Applicant when maintenance of the existing access points is disrupted. Two-way traffic on adjacent roadways shall be maintained at all times during nights, weekends, and holidays unless alternative traffic control is reviewed and approved by the Department prior to implementation of said traffic control.

38. Any future surface distortion within the proposed utility trench area, due to settlement or other causes attributable to the construction, shall be corrected by the Applicant as required during construction and for a period of two (2) years following the acceptance of the project by NHDOT.
39. The roadway shall be cleared of all foreign material at the end of each working day or as directed by the Department.
40. Equipment must be removed to a minimum distance outside the clear zone as defined in the current edition of the AASHTO Roadside Design Guide, but in no case less than eight (8) feet from the edge of pavement during weekends, holidays, and periods of shutdown. Suitable barricades and illumination shall be erected to properly protect the work areas. Periodic maintenance of signs during periods of shutdown is required to restore blown over or missing signs, cones, and other traffic control devices. Routine NHDOT maintenance operations shall not be hindered by the Applicant's activities.
41. Pipe, equipment, and supplies shall not be stored within the NHDOT ROW without prior approval by the Department. Pipe or materials shall not be laid out ahead of construction without prior approval by the Department.
42. Excavation dewatering shall not be pumped onto the State highway pavement. Dewatering activities shall be conducted in accordance with State resource agency guidelines and require Department concurrence on location and impact when within the ROW. The Applicant is encouraged to look at the potential need for easements to accommodate the dewatering activities, as experience has shown the ROW may not be of adequate size for all this activity.
43. The Applicant will be required to plow, salt, and/or sand any portion of the State highway that becomes encumbered due to the Applicant's operations. The Applicant shall ensure that NHDOT snow removal and maintenance operations shall not be impeded in areas outside active utility construction areas.
44. The Department shall have the right to suspend any or all construction activities, which in the Department's opinion, are unsafe to the traveling public.
45. Damage to existing drainage structures and systems shall be repaired in a manner approved by the Department. Methods and materials utilized shall be subject to prior approval. Drainage structures or systems shall be cleaned of all material that has accumulated as a result of the work.
46. Damage resulting from work or detoured traffic to the roadway shall be repaired to the Department's satisfaction.
47. If a highway sign or guardrail must be moved to allow construction of the facility, said sign and guardrail shall be reinstalled or replaced at the location of removal at the end of each work day, or replaced by approved temporary devices pending permanent installation.
48. The Department or their designee may inspect, test, or monitor any and all of the Applicant's activities within the highway ROW to insure compliance with this permit.

49. Following completion of the construction activities, the Department or their designee will inspect the completed work. Final acceptance may be reasonably withheld should the work not be completed in an acceptable manner and in accordance with the terms of this permit.
50. The Owner shall, upon project completion, submit a complete set of "as-built" drawings to the Department.

EXCEPTIONS TO NHDOT STANDARDS AND GUIDELINES REQUESTED:

1. The Applicant has requested that Fluidized Thermal Backfill (FTB) be used instead of the material excavated from the trench as required by the NHDOT Standard Specifications for Road and Bridge Construction. The Department's construction standard is to reuse the existing excavated material in a trench below the pavement structure in order to limit differential settlement and heaving between adjacent materials. In order to evaluate this request, test sections of FTB were placed within state ROW. If the material performs in a manner acceptable to the Department, FTB may be allowed in the trench excavations for the electrical conduit in lieu of existing excavated material beneath the roadway structural material. A decision regarding the use of FTB will be rendered following evaluation of the performance of the test sections through the 2017 winter season. Frost heaving and differential settlement within the paved areas of roadways are a major concern for the Department on all construction projects. If allowed, it is likely that FTB will not be permitted within the frost susceptible area beneath the roadway and should not extend above the bottom of the roadway structure (see paragraph 14). Additionally, if used, the Applicant shall enter into an agreement with the NHDOT, to mitigate any detrimental impacts or roadway degradation related to the FTB and to replace all sections of pavement and base material distress related to the utility installation. Pavement heaving, cracking, and other deformations in the vicinity of the excavation areas compared to the adjacent non disturbed sections of roadway will be considered indications of roadway degradation.
2. UAM Section VIII General Highway Standards item A.2 and Section X Underground Power Lines, items A.5 – these standards require that longitudinal installations shall be located on a uniform alignment as near as practicable to the right-of-way line, so as to provide a safe environment for traffic operation and to preserve space for future highway improvements or other utility installations. There may be some discrete locations within the proposal where an exception to this provision may be permitted. Those locations will be determined as part of the final constructions plans submitted to and approved by NHDOT. Location specific documentation, as outlined in the UAM, shall be required for each discrete location the exception is requested.
3. UAM Section VIII General Highway Standards item A.3 and Section X Underground Power Lines, items A.2 – these standards require that to the extent feasible and practicable, utility line crossings of the highway shall cross on a line generally normal to the highway alignment. There may be some locations within

the proposal where an exception to this provision may be permitted due to the limitations in bending the cables and/or conduit, or to avoid conflicts with existing conditions. Those locations will be determined as part of the final construction plans submitted to and approved by NHDOT.

4. UAM Section X Underground Power Lines, items A.3 – requires that all underground power lines within the highway right-of-way shall be in conduit. Conduit placed below pavement structure limits shall equal or exceed Schedule 80 PVC-EPC (Electrical Plastic Conduit). Conduit placed beyond horizontal pavement structure limits shall equal or exceed Schedule 40 PVC-EPC. The Applicant has requested to use Schedule 40 PVC-EPC in all locations including under the pavement structure. Given the nature of the facility being proposed, this request is denied and Schedule 80 PVC-EPC shall be required within the roadway and shoulder limits.