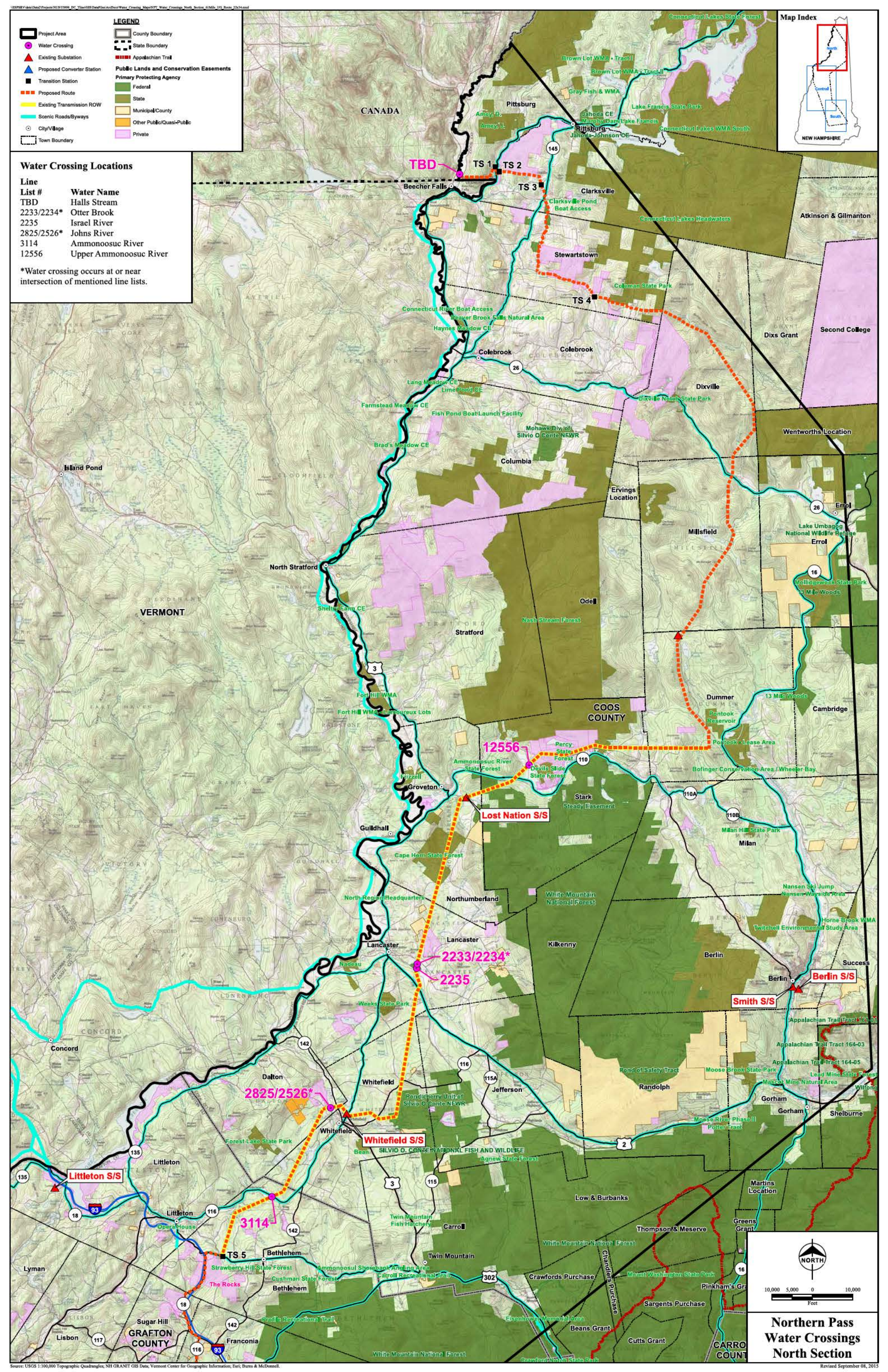
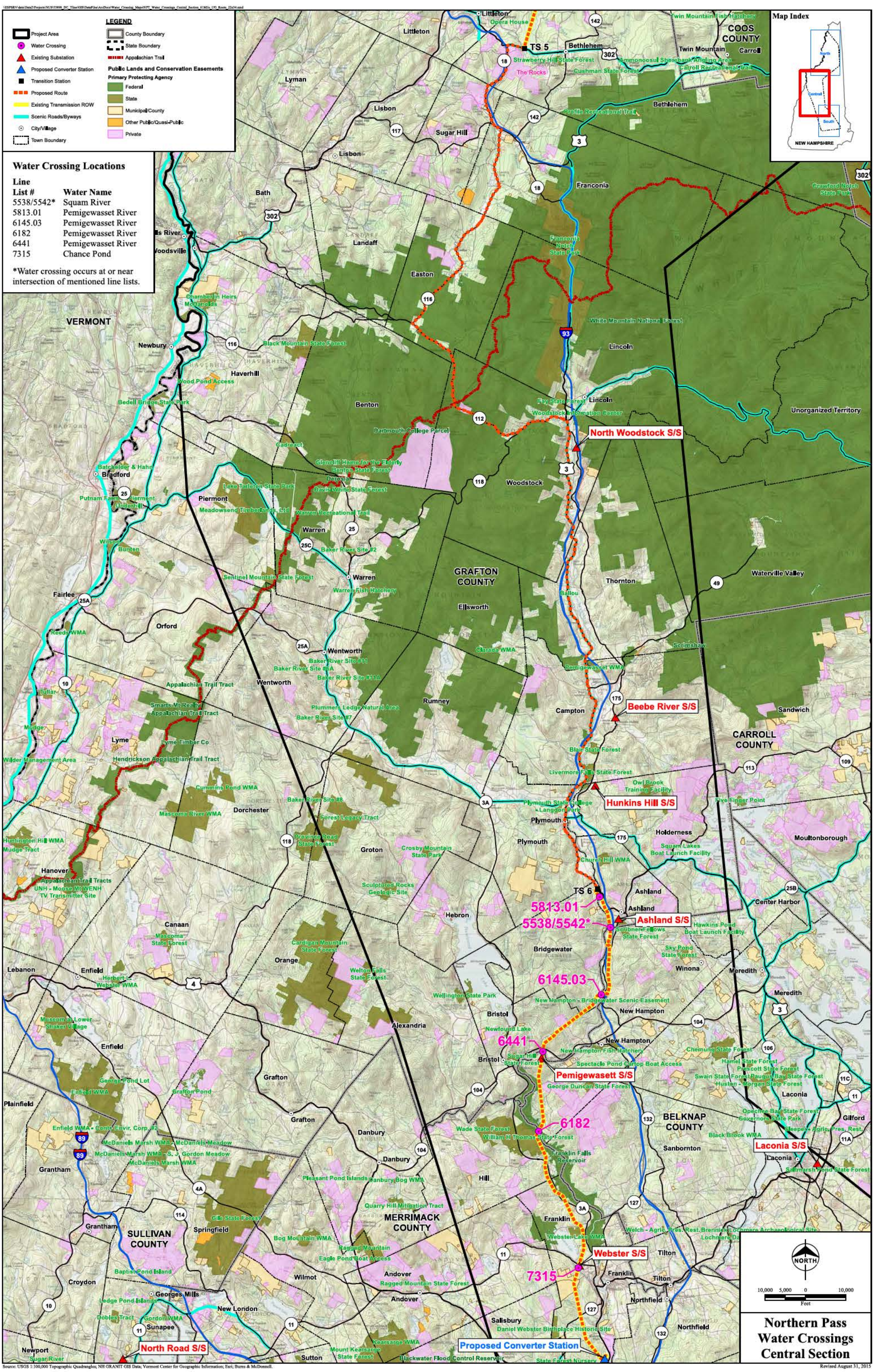
ATTACHMENT A

PROJECT MAPS


LEGEND
Project Area
Water Crossing
Existing Substation
Proposed Converter Station
Transition Station
Proposed Route
Existing Transmission ROW
Scenic Roads/Byways
City/Village
Town Boundary
County Boundary
State Boundary
Appalachian Trail
Public Lands and Conservation Easements
Primary Protecting Agency
Federal
State
Municipal/County
Other Public/Quasi-Public
Private
Map Index
North
Central
South
NEW HAMPSHIRE
Water Crossing Locations
Line List #
Water Name
TBD Halls Stream
2233/2234* Otter Brook
2235 Israel River
2825/2526* Johns River
3114 Ammonoosuc River
12556 Upper Ammonoosuc River
*Water crossing occurs at or near intersection of mentioned line lists.
CANADA
TBD
TS 1
TS 2
TS 3
TS 4
TS 5
Lost Nation S/S
Whitefield S/S
Littleton S/S
Berlin S/S
Smith S/S
12556
2233/2234*
2235
2825/2526*
3114
Pittsburg
Beecher Falls
Clarksville
Stewartstown
Colebrook
Island Pond
North Stratford
VERMONT
Stratford
Columbia
Ervings Location
Millsfield
Odell
Dummer
Cambridge
Errol
Wentworths Location
Dixville
Dixs Grant
Second College
Atkinson & Gilmanton
Groveton
Guildhall
Stark
Milan
Northumberland
Lancaster
Berlin
Success
Gorham
Shelburne
Randolph
Jefferson
Whitefield
Dalton
Concord
Littleton
Lisbon
Sugar Hill
Franconia
Lyman
Bethlehem
Twin Mountain
Carroll
Low & Burbanks
Martins Location
Greens Grant
Thompson & Meserve
Crawfords Purchase
Pinkham's Grant
Sargents Purchase
Beans Grant
Cutts Grant
Kilkenny
GRAFTON COUNTY
COOS COUNTY
CARROLL COUNTY
Connecticut Lakes State Forest
Brown Lot WMA - Tract II
Gray Fish & WMA
Lake Francis State Park
Connecticut Lakes WMA South
Connecticut Lakes Headwaters
Clarksville Pond Boat Access
Coleman State Park
Connecticut River Boat Access
Beaver Brook Falls Natural Area
Haynes Meadow CE
Lang Meadow CE
Lime Pond CE
Farmstead Meadow CE
Fish Pond Boat Launch Facility
Mohawk Div. of Silvio O Conte NFWR
Brad's Meadow CE
Dixville Notch State Park
Lake Umbagog National Wildlife Refuge
Wollidgewock State Park
13 Mile Woods
Nash Stream Forest
Shelter Farm CE
Fort Hill WMA
Fort Hill WMA - Lamoureux Lots
Pontook Reservoir
Pontook - Lease Area
Percy State Forest
Devils Slide State Forest
Ammonoosuc River State Forest
Bofinger Conservation Area / Wheeler Bay
Milan Hill State Park
Cape Horn State Forest
North Region Headquarters
White Mountain National Forest
Nansen Ski Jump
Nansen Wayside Area
Horne Brook WMA
Twitchell Environmental Study Area
Nadeau
Weeks State Park
Pond of Safety Tract
Moose Brook State Park
Lead Mine State Forest
Mascot Mine Natural Area
Gorham
Moose River Phase II Potter Tract
Pondicherry Unit of Silvio O Conte NFWR
Forest Lake State Park
Bean
SILVIO O. CONTE NATIONAL FISH AND WILDLIFE
Agnew State Forest
Twin Mountain Fish Hatchery
Opera House
Strawberry Hill State Forest
Cushman State Forest
The Rocks
Ammonoosul Shorebank Angling Area
Carroll Recreational Trail
Profile Recreational Trail
Eisenhower Memorial Area
Chandlers Purchase
Mount Washington State Park
Crawford Notch State Park
Appalachian Trail Tract 161-01
Appalachian Trail Tract 164-03
Appalachian Trail Tract 164-05
Jahoda CE
Murphy Dam Lake Francis
Jahoda-Johnson CE
Amey, D.
Amey, L.
NORTH
10,000 5,000 0 10,000
Feet
Northern Pass
Water Crossings
North Section
Source: USGS 1:100,000 Topographic Quadrangles; NH GRANIT GIS Data; Vermont Center for Geographic Information; Esri; Burns & McDonnell.
Revised September 08, 2015


LEGEND
Project Area
Water Crossing
Existing Substation
Proposed Converter Station
Transition Station
Proposed Route
Existing Transmission ROW
Scenic Roads/Byways
City/Village
Town Boundary
County Boundary
State Boundary
Appalachian Trail
Public Lands and Conservation Easements
Primary Protecting Agency
Federal
State
Municipal/County
Other Public/Quasi-Public
Private
Map Index
North
Central
South
NEW HAMPSHIRE
Water Crossing Locations
Line List #
Water Name
5538/5542* Squam River
5813.01 Pemigewasset River
6145.03 Pemigewasset River
6182 Pemigewasset River
6441 Pemigewasset River
7315 Chance Pond
*Water crossing occurs at or near intersection of mentioned line lists.
North Woodstock S/S
Beebe River S/S
Hunkins Hill S/S
Webster S/S
Ashland S/S
Laconia S/S
Pemigewasset S/S
North Road S/S
Proposed Converter Station
TS 5
TS 6
5813.01
5538/5542*
6145.03
6441
6182
7315
Littleton
Bethlehem
Twin Mountain
Carroll
Lisbon
Sugar Hill
Bath
Landaff
Franconia
Easton
Lincoln
Haverhill
Benton
Woodstock
Piermont
Warren
Thornton
Waterville Valley
Ellsworth
Wentworth
Rumney
Campton
Sandwich
Plymouth
Holderness
Ashland
Hebron
Bridgewater
Bristol
New Hampton
Meredith
Winona
Laconia
Gilford
Alexandria
Danbury
Grafton
Orford
Lyme
Hanover
Enfield
Lebanon
Plainfield
Grantham
Croydon
Newport
Sunapee
Georges Mills
New London
Andover
Wilmot
Springfield
Franklin
Tilton
Northfield
Salisbury
Canaan
Orange
Dorchester
Groton
Hill
Sutton
Fairlee
Bradford
Newbury
VERMONT
COOS COUNTY
GRAFTON COUNTY
CARROLL COUNTY
SULLIVAN COUNTY
MERRIMACK COUNTY
BELKNAP COUNTY
Unorganized Territory
Opera House
Twin Mountain Fish Hatchery
Strawberry Hill State Forest
The Rocks
Ammonoosuc Shorebank Angling Area
Carroll Recreational Trail
Cushman State Forest
Profile Recreational Trail
Crawford Notch State Park
Franconia Notch State Park
White Mountain National Forest
Fay State Forest
Woodstock Information Center
Dartmouth College Parcel
Glencliff Home for the Elderly
Benton State Forest
Davis-White State Forest
Lake Tarleton State Park
Meadowsend Timberlands, LLC
Warren Recreational Trail
Baker River Site #2
Sentinel Mountain State Forest
Warren Fish Hatchery
Baker River Site #11
Baker River Site #5A
Baker River Site #11A
Appalachian Trail Tract
Smarts Mt Realty Appalachian Trail Tract
Plummers Ledge Natural Area
Baker River Site #7
Lyme Timber Co
Hendrickson Appalachian Trail Tract
Cummins Pond WMA
Baker River Site #8
Mascoma River WMA
Forest Legacy Tract
Province Road State Forest
Crosby Mountain State Park
Sculptured Rocks Geologic Site
Appalachian Trail Tracts
UNH - Moose Mt WENH TV Transmitter Site
Mascoma State Forest
Cardigan Mountain State Forest
Welton Falls State Forest
Wellington State Park
New Hampton - Bridgewater Scenic Easement
Newfound Lake
New Hampton Fish Hatchery
Spectacle Pond Carrop Boat Access
Sugar Hill State Forest
George Duncan State Forest
Wade State Forest
William H Thomas State Forest
Franklin Falls Reservoir
Pleasant Pond Islands
Danbury Bog WMA
Quarry Hill Mitigation Tract
Bog Mountain WMA
Ragged Mountain
Eagle Pond Boat Access
Ragged Mountain State Forest
Webster Lake WMA
Welch - Agric. Pres. Rest. Brennick Lochmere Archaeological Site
Lochmere Dam
Baptist Pond Island
Ledge Pond Islands
Dobles Tract
Gordon WMA
Kearsarge WMA
Mount Kearsarge State Forest
Blackwater Flood Control Reservoir
State Forest Nursery
Daniel Webster Birthplace Historic Site
Scribner-Fellows State Forest
Hawkins Pond Boat Launch Facility
Sky Pond State Forest
Chemung State Forest
Hamel State Forest
Prescott State Forest
Swain State Forest
Paugus Bay State Forest
Huston - Morgan State Forest
Opechee Bay State Forest
Governors State Park
Sleeper - Agric. Pres. Rest.
Black Brook WMA
Saltmarsh Pond State Forest
Blair State Forest
Livermore Falls State Forest
Owl Brook Training Facility
Plymouth State College - Langdon Park
Five Finger Point
Church Hill WMA
Squam Lakes Boat Launch Facility
Moultonborough
Center Harbor
Meredith
Laconia
Tilton
Northfield
Franklin
Plymouth
Holderness
Ashland
Bristol
New Hampton
Winona
Bridgewater
Hebron
Andover
Wilmot
Danbury
Grafton
Enfield
Lebanon
Plainfield
Grantham
Croydon
Newport
Sunapee
Georges Mills
New London
Springfield
Sutton
Canaan
Orange
Dorchester
Groton
Hill
Fairlee
Bradford
Newbury
Haverhill
Bath
Lisbon
Littleton
Lyman
Woodsville
Chamberlin Heirs McDonalds
Black Mountain State Forest
Wood Pond Access
Bedell Bridge State Park
Batchelder & Hahn
Putnam Farm
Piermont Underhill
Wilson
Bunten
Reeds WMA
Tullar
Mudge
Wilder Management Area
Huntington Hill WMA
Mudge Tract
Enfield WMA
Georges Pond Lot
Grafton Pond
Enfield WMA - Contr. Envir. Corp. #2
McDaniels Marsh WMA - McDaniels Meadow
McDaniels Marsh WMA - S. J. Gordon Meadow
McDaniels Marsh WMA
Gile State Forest
Baptist Pond Island
Ragged Mountain State Forest
Andover
Northfield
Salisbury
Daniel Webster Birthplace Historic Site
Kearsarge WMA
Mount Kearsarge State Forest
Blackwater Flood Control Reservoir
State Forest Nursery
Sugar River
Scrimshaw
Pemigewasset WMA
Clarada WMA
Ballou
Thornton
Waterville Valley
Sandwich
Campton
Rumney
Wentworth
Ellsworth
Orford
Fairlee
Bradford
Piermont
Warren
Haverhill
Benton
Woodstock
Lincoln
Franconia
Bethlehem
Littleton
Lisbon
Bath
Landaff
Easton
Sugar Hill
Twin Mountain
Carroll
COOS COUNTY
Unorganized Territory
NORTH
10,000 5,000 0 10,000
Feet
Northern Pass
Water Crossings
Central Section
Revised August 31, 2015
Source: USGS 1:100,000 Topographic Quadrangles; NH GRANIT GIS Data; Vermont Center for Geographic Information; Esri; Burns & McDonnell.

Source: USGS 1:100,000 Topographic Quadrangles; NH GRANIT GIS Data; Vermont Center for Geographic Information; Esri; Burns & McDonnell.

Revised August 31, 2015

ATTACHMENT B

MASTER INDEX

LL NUMBER AND OWNER NAME		NORTHERN PASS CIRCUIT						EVERSOURCE CIRCUIT					EVERSOURCE CIRCUIT				
Line List	Site Address	PLS MODEL	CIRCUIT NO.	Appendix #	FILE NAME	BACK STRUCTURE	AHEAD STRUCTURE	CIRCUIT NO.	APPENDIX #	FILE NAME	BACK STRUCTURE	AHEAD STRUCTURE	CIRCUIT NO.	APPENDIX #	FILE NAME	BACK STRUCTURE	AHEAD STRUCTURE
TBD	Halls Stream	N1	DC	1	372099912	DC- HQ-1	DC-1										
12556	Upper Ammonoosuc River	N2	DC	2	372099908	DC-434	DC-435	O154	1	O15443901	O154-81	O154-82					
2233/2234*	Otter Brook	N2	DC	3	372099911	DC-536	DC-537	D142	2	D14243901	D142-373	D142-376					
2235	Israel River	N2	DC	4	372099911	DC-538	DC-539	D142	3	D14243901	D142-373	D142-376					
2825/2826*	Johns River	C1	DC	5	372099909	DC-621	DC-622A	348X	4	B-7627-901	348X-013	348X-017					
3114	Ammonoosuc River	C1	DC	6	372099901	DC-662	DC-663										
5813.01	Pemigewasset River	C2	DC	7	372099903	DC-1099	DC-1101										
5538/5542*	Squam river	C2	DC	8	372099910	DC-1113	DC-1114										
6145.03	Pemigewasset River	C2	DC	9	372099904	DC-1144	DC-1145	E115	5	E11543902	E115-168	E115-167					
6441	Pemigewasset River	C2	DC	10	372099906	DC-1174	DC-1175	E115	6	E11543901	E115-123	E115-122					
6182	Pemigewasset River	C2	DC	11	372099905	DC-1205	DC-1206	A111	7	A11143902	A111-80A	A111-80					
7315	Chance Pond	C2	DC	12	372099907	DC-1271	DC-1272	M127	8	M12743901	M127-1	M127-2	F139	9	F13943902	F139-342	F139-341
7077	Merrimack River	S1	3132	13	313299905	3132-4	3132-5	F139	10	F13943901	F139-281	F139-280					
8076	Turtle Pond	S1	3132	14	313299901	3132-112	3132-117	318	11	B-6128-901	318-70	318-52	P145	12	P14543902	P145-134	P145-128
8951	Soucook River	S1	3132	15	313299903	3132-159	3132-160	P145	13	P14543901	P145-73	P145-72	C189	14	C18943901	C189-32	C189-31
8950	Suncook River	S1	3132	16	313299902	3132-218	3132-220										
9702**	Lamprey River	S1	3132	17	313299904	3132-295	3132-296	G146	15	G14643901	G146-27	G146-26					

APPENDICES

PART A

OVERHEAD CROSSINGS

APPENDIX 1
3720/3731 DC LINE
STRUCTURES HQ-1 TO DC-1
HALLS STREAM
CANADA / PITTSBURG, NH

1. This crossing is shown on attached drawing 372099912

2. The location of the 3720/3731 line is shown on attached maps titled Line List TBD

3. The 3720/3731 line will cross Halls Stream on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. HQ-1 & DC-1 will be structures with strain insulators. The energized conductors are separated approximately 36 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 9.5 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 51 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for Hall Stream were based on information in FEMA Flood Insurance Rate Map (FIRM) #33007C0195D Panel 195 of 1300. This document has an effective date of February 20, 2013. Based on the information provided in the FIRM, the section of the Halls Stream where the 3720/3731 line crosses is in an area labeled "Zone A". From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of Halls River, Northern Pass Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the

elevation at this section of Halls River was 1073 feet and elevation of the top of the river bank was 1077 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 12 acres (100 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by 3^0 5 =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.3 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

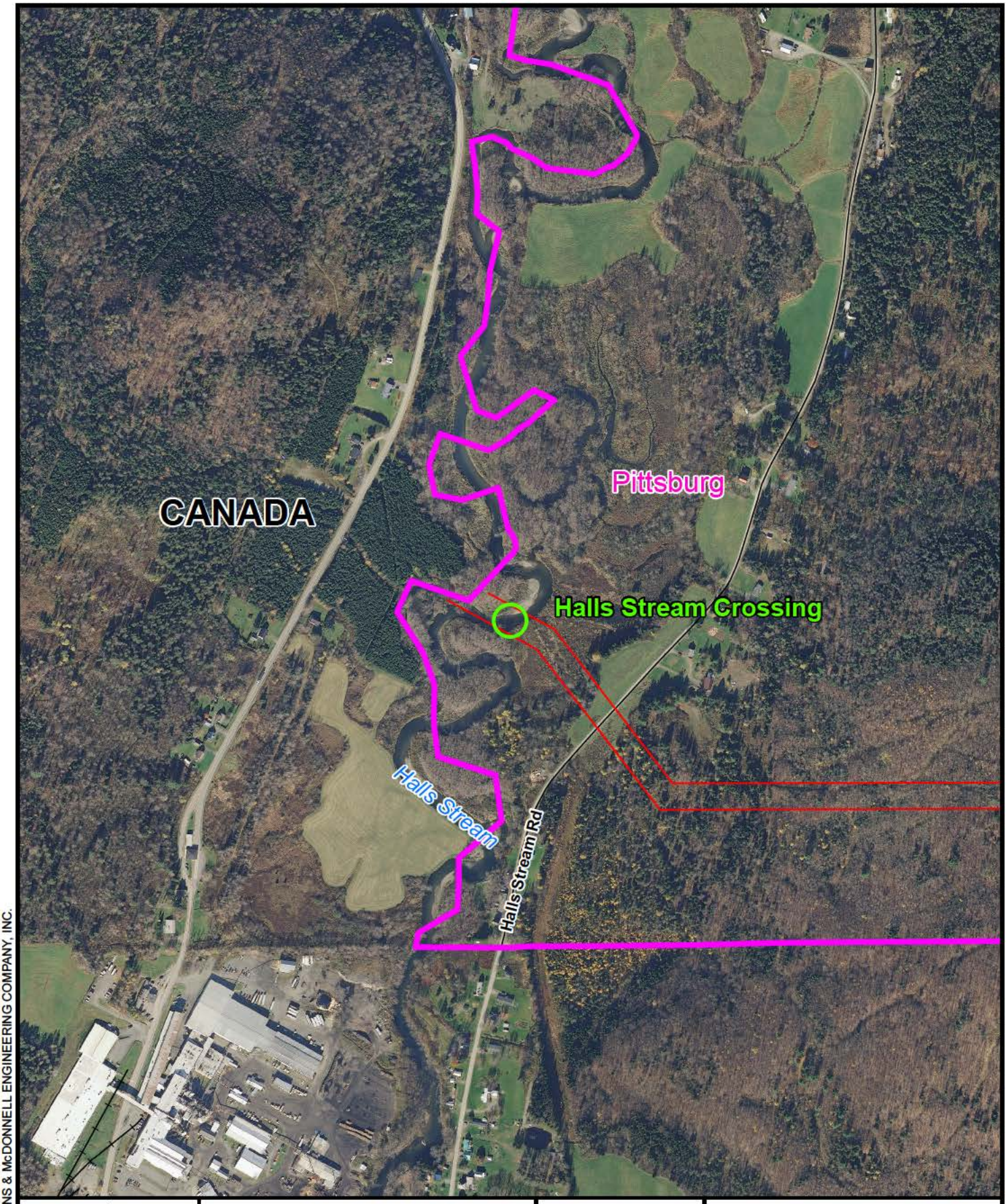
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    a. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    b. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    c. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 47 feet, this exceeds the minimum required clearance of 35.7 feet.

    d. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 22.2 feet vertically and 9.4 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

THE NORTHERN PASS

Line List TBD
Halls Stream
Water Crossing Permit
Location Map

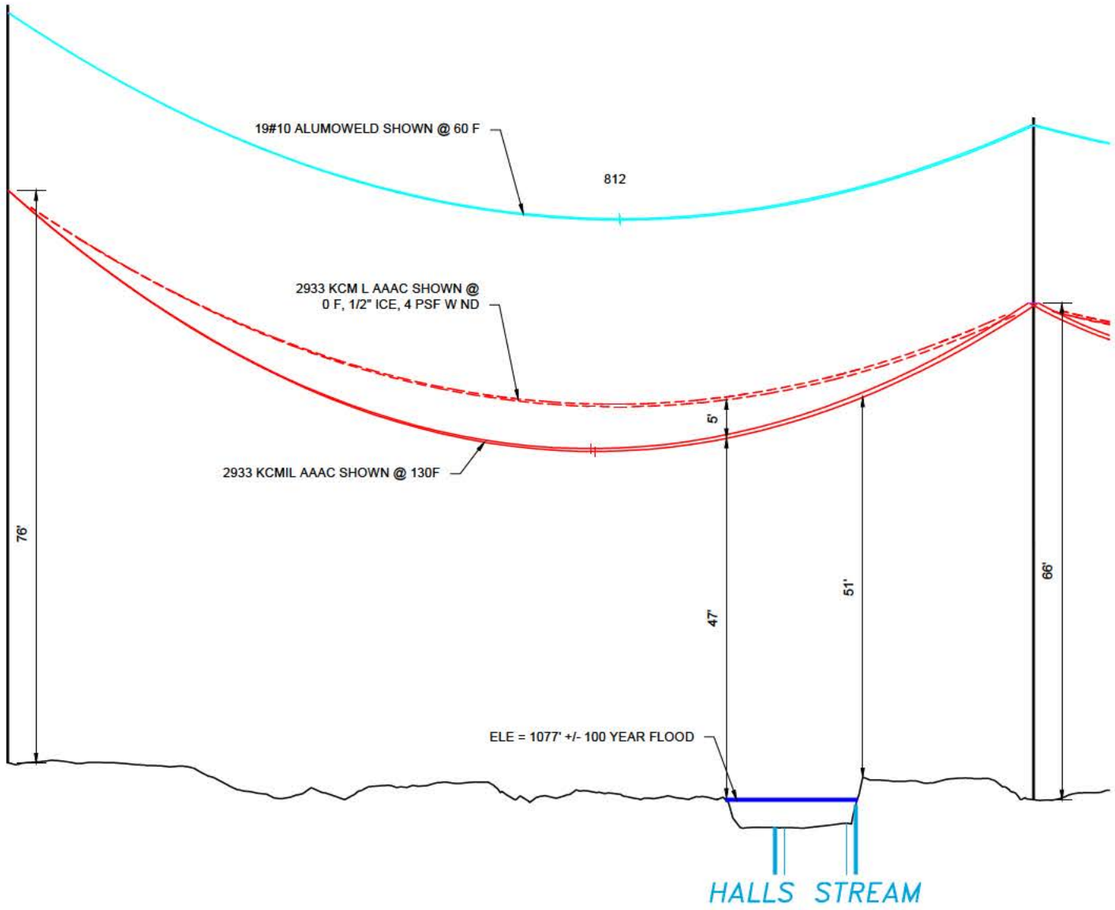
Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

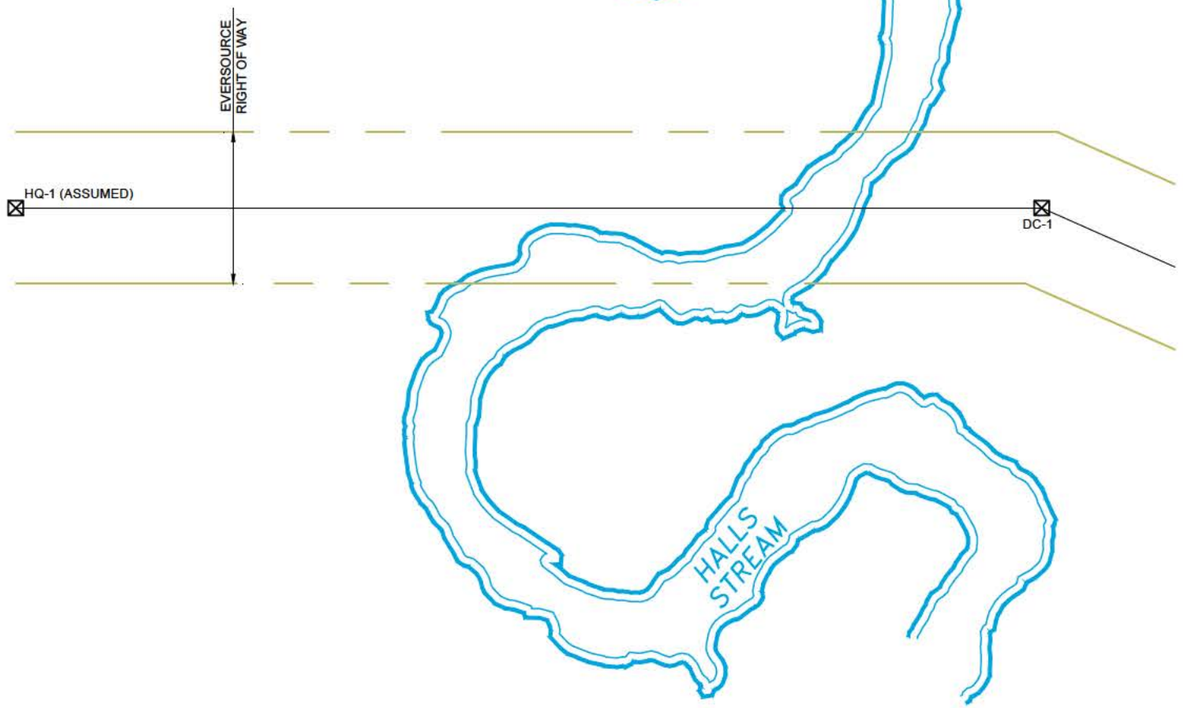
August 25, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_TBD_Halls_Stream_Lettersize.mxd rfraser 8/25/2015

HQ-1 (ASSUMED)
STA=0+00.00
HT=100.00
ELE=1081.36
LAT=45.01834541
LONG=-71.50161267

DC-1
STA=8+12.48
HT=90.00
ELE=1076.50
LAT=45.01726272
LONG=-71.4988587





RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

120.0 ft. Horiz. Scale
20.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: N1 LL TBD 3720/3731 HALLS STREAM

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099912.DWG

09/08/2015 12:54pm – mspepich – N:\NUSCO\58479 – NPT\Overhead\Cadd\01-Record Worksheets\02 Permits\Water Cross Permits\372099912.dwg

APPENDIX 2
3720/3731 DC LINE
STRUCTURES DC-434 TO DC-535
UPPER AMMONOOSUC RIVER
STARK, NH

1. This crossing is shown on attached drawing 372099908

2. The location of the 3720/3731 line is shown on attached map titled Line List 12556.

3. The 3720/3731 line will cross the Upper Ammonoosuc River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a vertical configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structure will have 1 ground wire. It will be OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-434 & DC-435 will be structures with V-string insulators. The energized conductors are separated approximately 0 feet horizontally and 26 feet vertically in a vertical configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet and horizontally by 8.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 47 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Upper Ammonoosuc River were based on information in FEMA Flood Insurance Rate Map (FIRM) # 33007C0760D Panel 760 of 1300. This document has an effective date of February 20, 2013. Based on 33007C0760D the information provided in the FIRM, the section of the Upper Ammonoosuc River where the 3720/3731 line crosses is in an area labeled “Zone A”. From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of the Upper Ammonoosuc River, Northern Pass Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the elevation at this section of the Upper Ammonoosuc River was 929 feet and elevation of the top of the river bank was 934

feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 143 acres (1180 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0\,5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

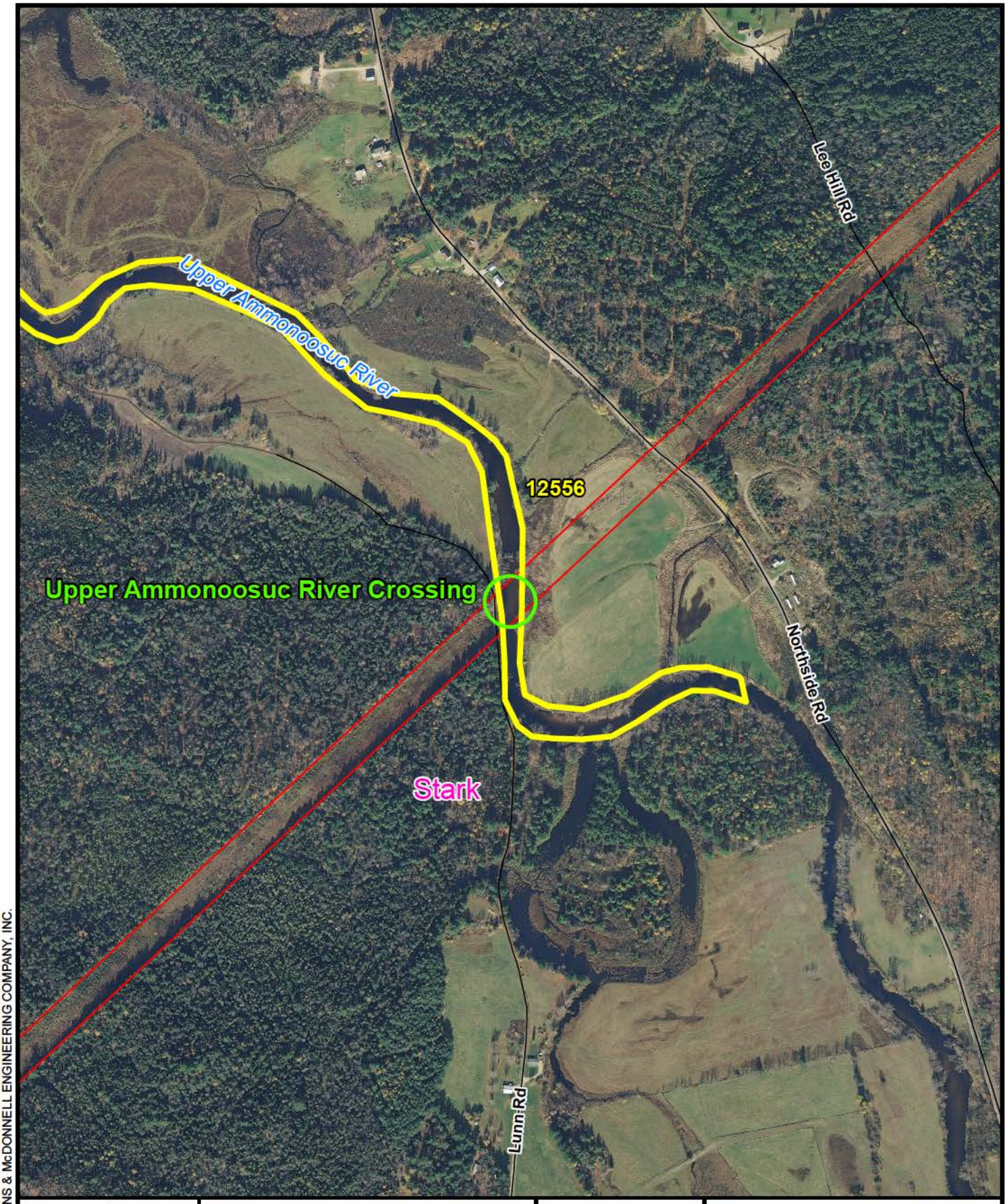
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 39 feet, this exceeds the minimum required clearance of 35.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 22.8 feet vertically and 8.7 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

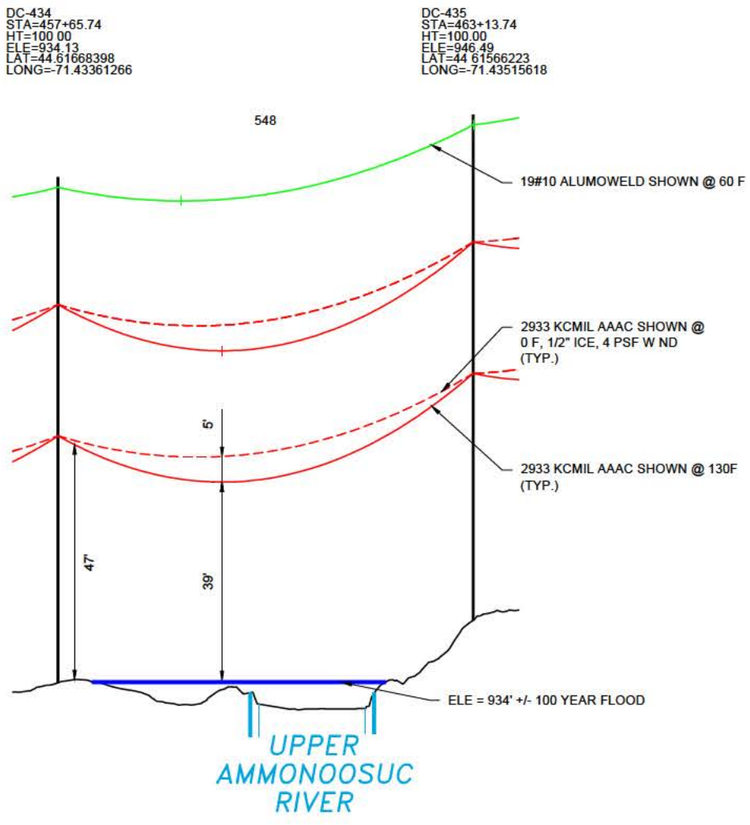
THE NORTHERN PASS

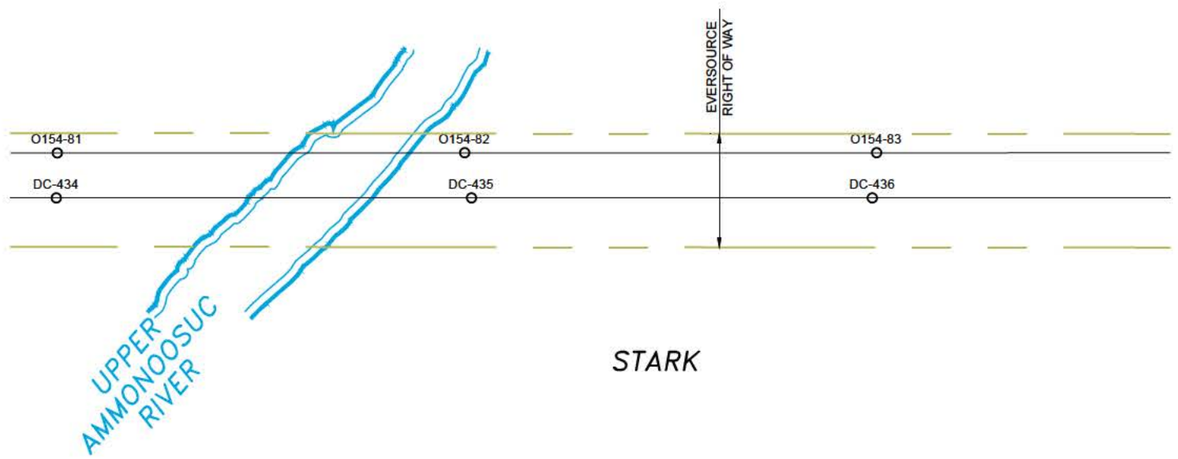
Line List 12556
Upper Ammonoosuc River
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL12556_Upper_Ammonoosuc_River_Lettersize.mxd rfraser 8/26/2015

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: N2 LL 12556 3720/3731 UPPER AMMONOOSUC RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099908.DWG

APPENDIX 3
3720/3731 DC LINE
STRUCTURES DC-536 TO DC-539
ISRAEL RIVER / OTTER BROOK
LANCASTER, NH

1. This crossing is shown on attached drawing 372099911

2. The location of the 3720/3731 line is shown on attached maps titled Line List 2233/2234

3. The 3720/3731 line will cross Israel River & Otter Brook on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-536 through DC-539 will be structures with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 55 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. At the point of line crossing, the Israel River and Otter Brook are parallel to each other and approximately 1,200’ apart, however during the 100 year flood the 2 water bodies join. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood elevations are based on FEMA FIRM Map FM33007C0906D Panel 906 of 1300. The 100 year flood elevation for this portion of the rivers is approximately 926 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 182 acres (1500 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0.5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.3 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

    g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

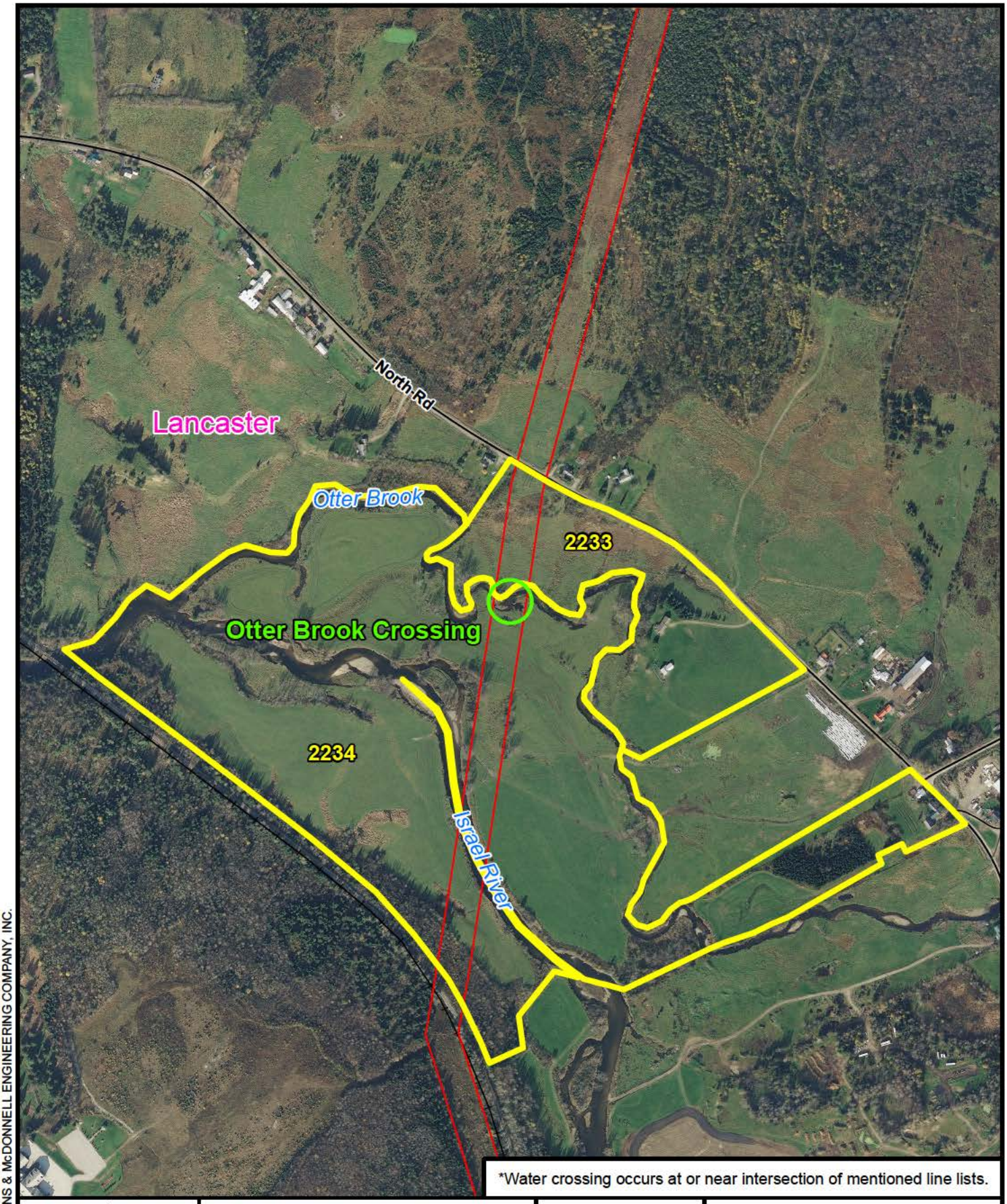
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    a. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    b. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    c. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 38 feet, this exceeds the minimum required clearance of 35.7 feet

    d. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 21.9 feet vertically and 8.7 feet horizontally from the ground wires to the closest energized conductor.



*Water crossing occurs at or near intersection of mentioned line lists.

NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

THE NORTHERN PASS

Line List 2233/2234*
Otter Brook
Water Crossing Permit
Location Map

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL2233-2234_Otter_Brook_Lettersize.mxd rfraser 8/26/2015

DC-536
STA=2507+49.60
HT=85.00
ELE=943.52
LAT=44.48251782
LONG=-71.54096765

DC-537
STA=2514+26.45
HT=85.00
ELE=920.25
LAT=44.48068379
LONG=-71.54137087

DC-538
STA=2519+24.14
HT=95.00
ELE=920.00
LAT=44.47933522
LONG=-71.54166735

DC-539
STA=2527+57.66
HT=90.00
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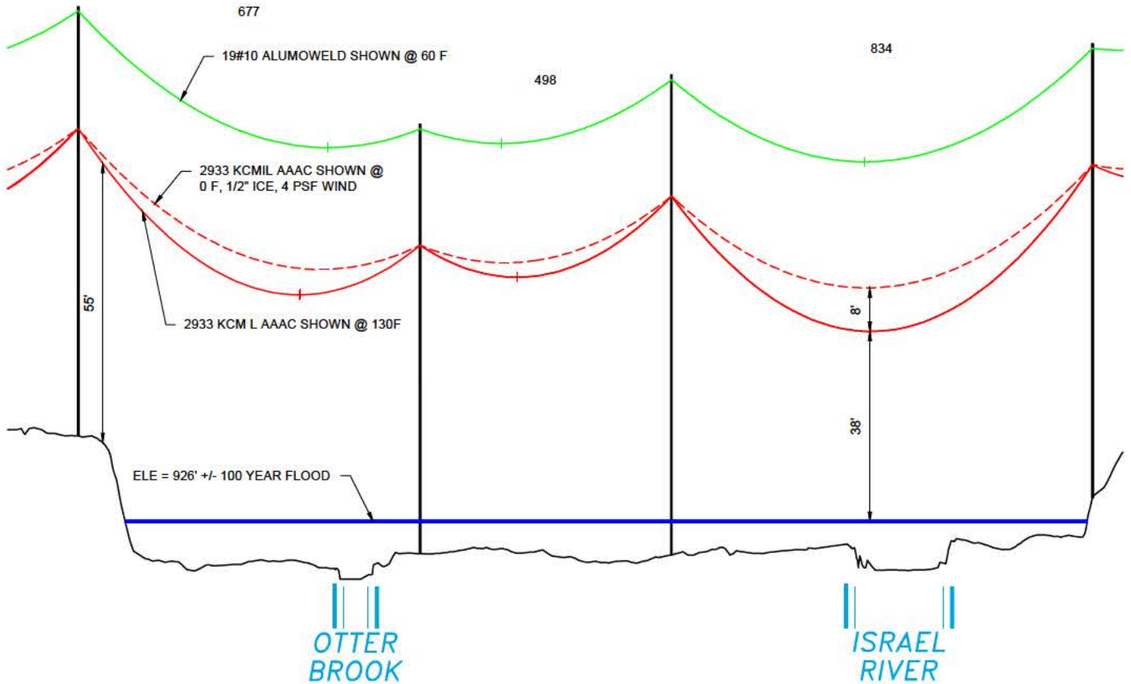
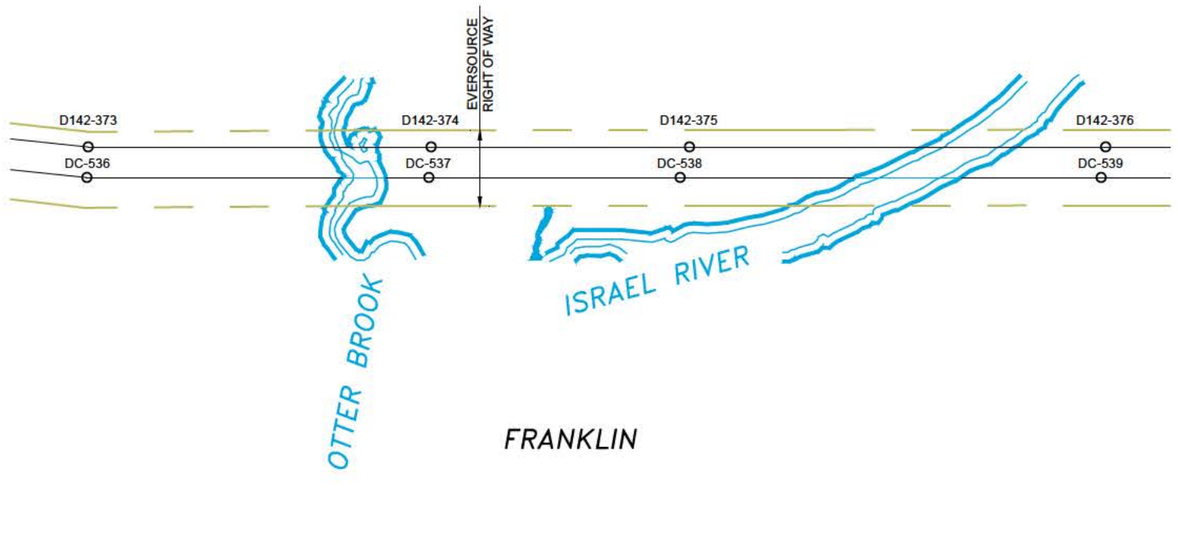




RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

300.0 ft. Horiz. Scale
30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–		–	–
A	4/30/15	ISSUED FOR REVIEW		MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE N2 LL 2233/2234 & 2235 3720/3731
OTTER BROOK & ISRAEL RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099911.DWG

APPENDIX 4
3720/3731 DC LINE
STRUCTURES DC-536 TO DC-539
ISRAEL RIVER / OTTER BROOK
LANCASTER, NH

1. This crossing is shown on attached drawing 372099911

2. The location of the 3720/3731 line is shown on attached maps titled Line List 2235

3. The 3720/3731 line will cross Israel River & Otter Brook on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-536 through DC-539 will be structures with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 55 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. At the point of line crossing, the Israel River and Otter Brook are parallel to each other and approximately 1,200’ apart, however during the 100 year flood the 2 water bodies join. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood elevations are based on FEMA FIRM Map FM33007C0906D Panel 906 of 1300. The 100 year flood elevation for this portion of the rivers is approximately 926 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 182 acres (1500 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0.5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.3 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

    g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

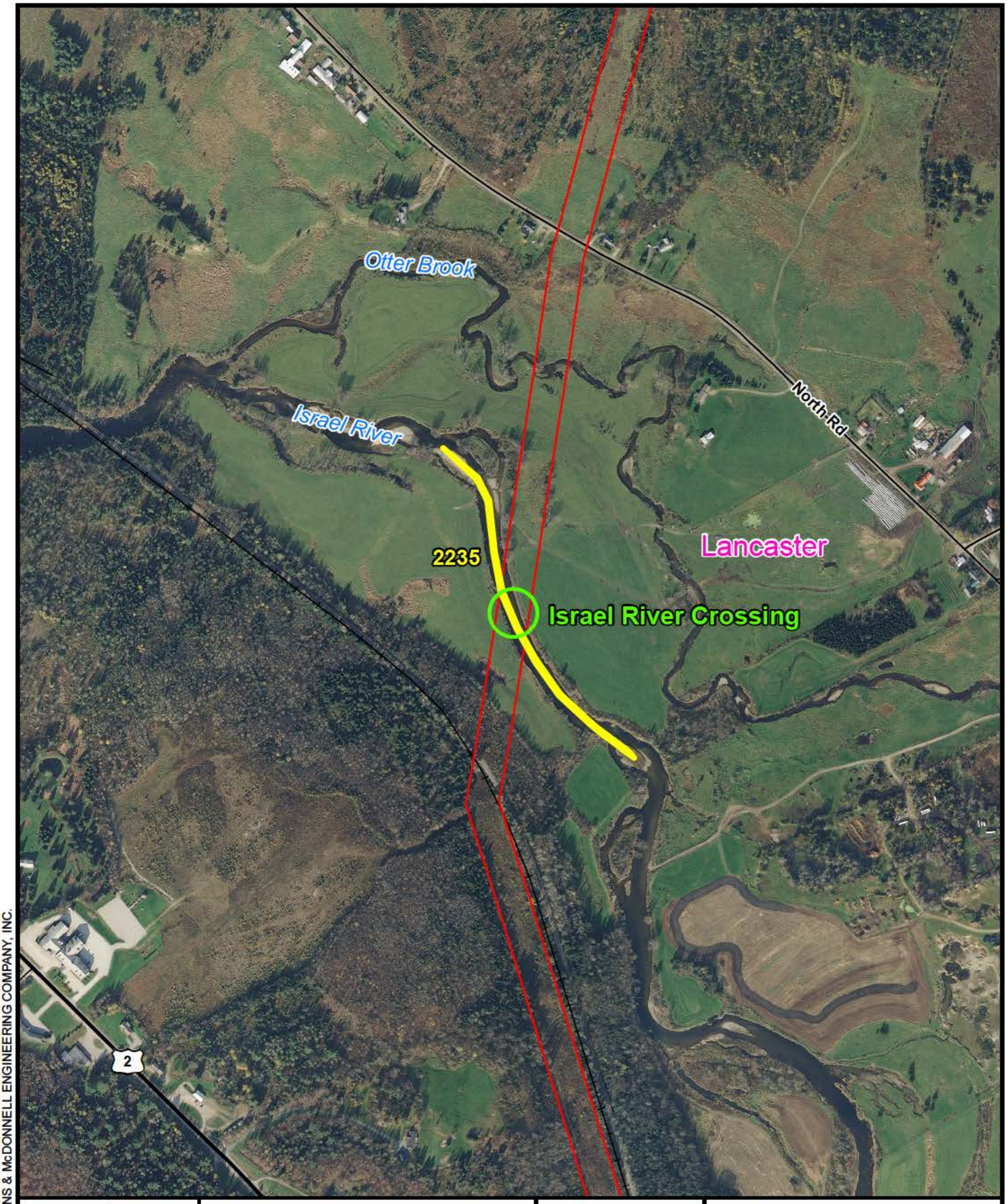
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    a. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    b. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    c. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 38 feet, this exceeds the minimum required clearance of 35.7 feet

    d. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 21.9 feet vertically and 8.7 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

THE NORTHERN PASS

Line List 2235
Israel River
Water Crossing Permit
Location Map

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 25, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL2235_Israel_River_Lettersize.mxd rfraser 8/25/2015

DC-536
STA=2507+49.60
HT=85.00
ELE=943.52
LAT=44.48251782
LONG=-71.54096765

DC-537
STA=2514+26.45
HT=85.00
ELE=920.25
LAT=44.48068379
LONG=-71.54137087

DC-538
STA=2519+24.14
HT=95.00
ELE=920.00
LAT=44.47933522
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DC-539
STA=2527+57.66
HT=90.00
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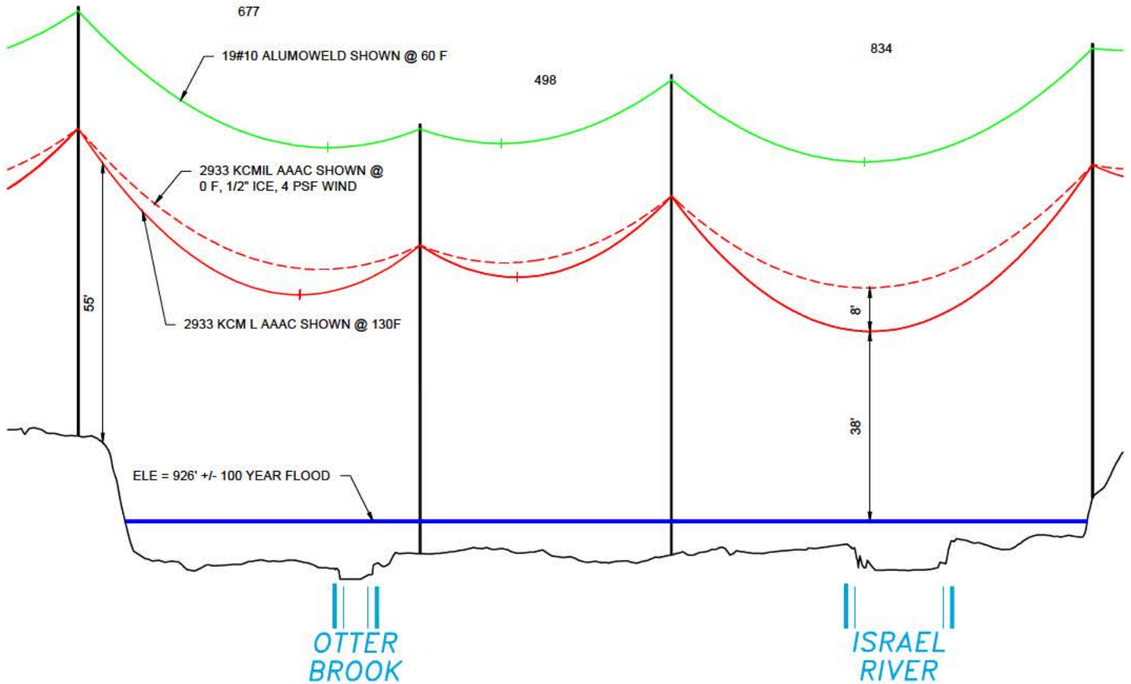
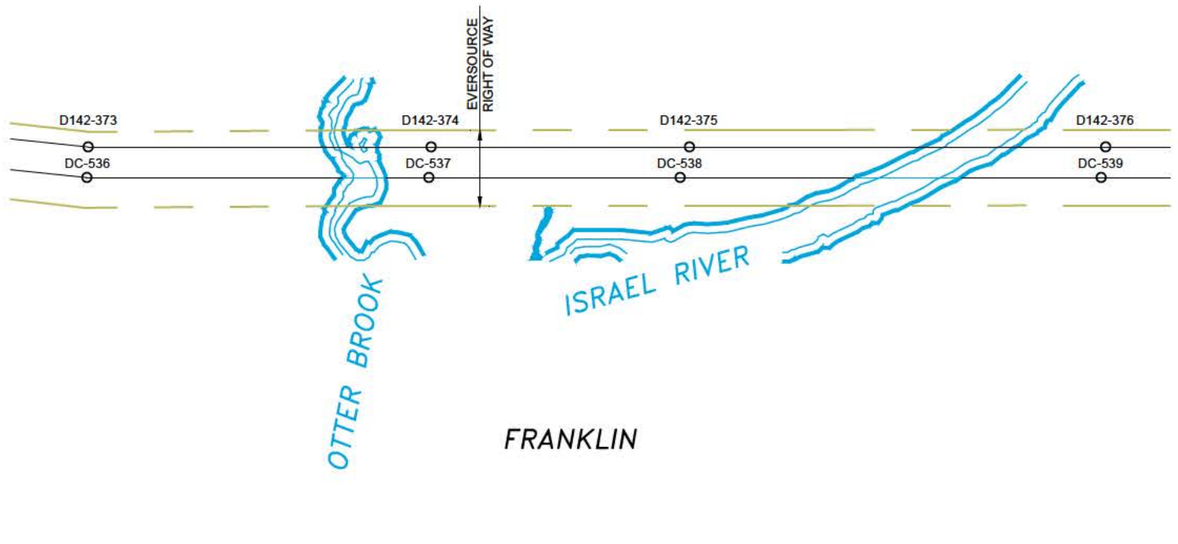




RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

300.0 ft. Horiz. Scale
30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–		–	–
A	4/30/15	ISSUED FOR REVIEW		MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE N2 LL 2233/2234 & 2235 3720/3731
OTTER BROOK & ISRAEL RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099911.DWG

APPENDIX 5
3720/3731 DC LINE
STRUCTURES DC-621 TO DC-622A
JOHNS RIVER
DALTON, NH

1. This crossing is shown on attached drawing 372099909

2. The location of the 3720/3731 line is shown on attached map titled Line List 2825/2826.

3. The 3720/3731 line will cross the Johns River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) roles from a horizontal to vertical configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have at minimum 1 continuous ground wire, an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-621 will be a structure with strain insulators. The energized conductors are separated approximately 36 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 9.5 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

    b. DC-622 will be a structure with strain insulators. The energized conductors are separated approximately 0 feet horizontally and 26 feet vertically in a vertical configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW and energized conductor are separated vertically by approximately 27 feet and horizontally by 9.5 feet.

    c. DC-622A will be a structure with V-string insulators. The energized conductors are separated approximately 0 feet horizontally and 26 feet vertically in a vertical configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet and horizontally by 8.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 52 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Johns River were based on information in FEMA Flood Insurance Rate Map (FIRM) # 33007C0915D Panel 915 of 1300. This document has an effective date of February 20, 2013. Based on the information provided in the FIRM, the section of the Johns River where the 3720/3731 line crosses is in an area labeled "Zone A". From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of the Johns River, Northern Pass Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the elevation at this section of the Johns River was 865 feet and elevation of the top of the river bank was 871 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 30 acres (245 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by 3^$^{0\,5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire

ii. 15.82 feet is required between 320 kV DC energized conductors
iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
   i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
   ii. 16.88 feet is required between 320 kV DC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
   i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
   ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

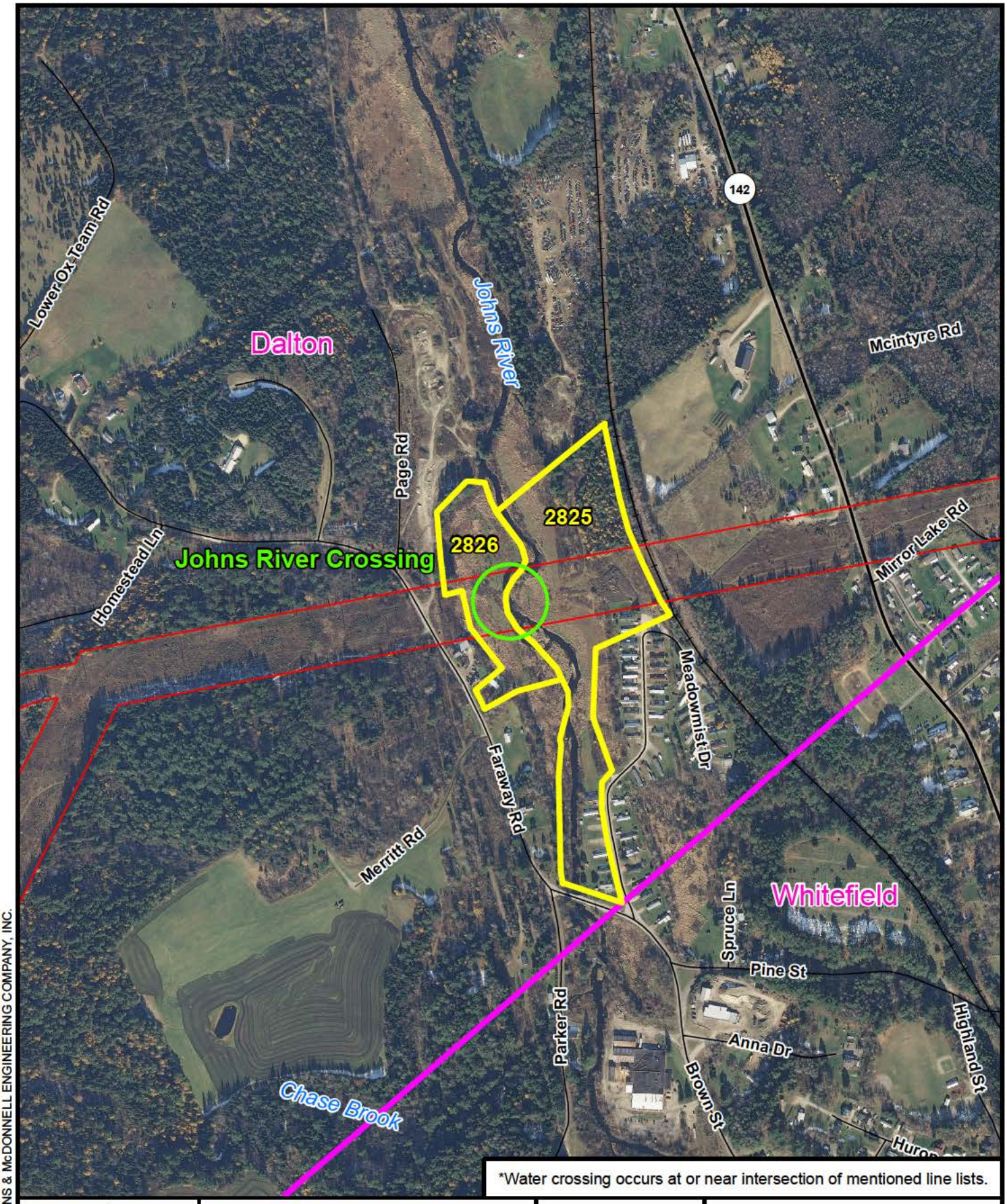
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 51 feet, this exceeds the minimum required clearance of 35.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 22.8 feet vertically and 8.9 feet horizontally from the ground wires to the closest energized conductor.



*Water crossing occurs at or near intersection of mentioned line lists.

NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

THE NORTHERN PASS

Line List 2825/2826*
Johns River
Water Crossing Permit
Location Map

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

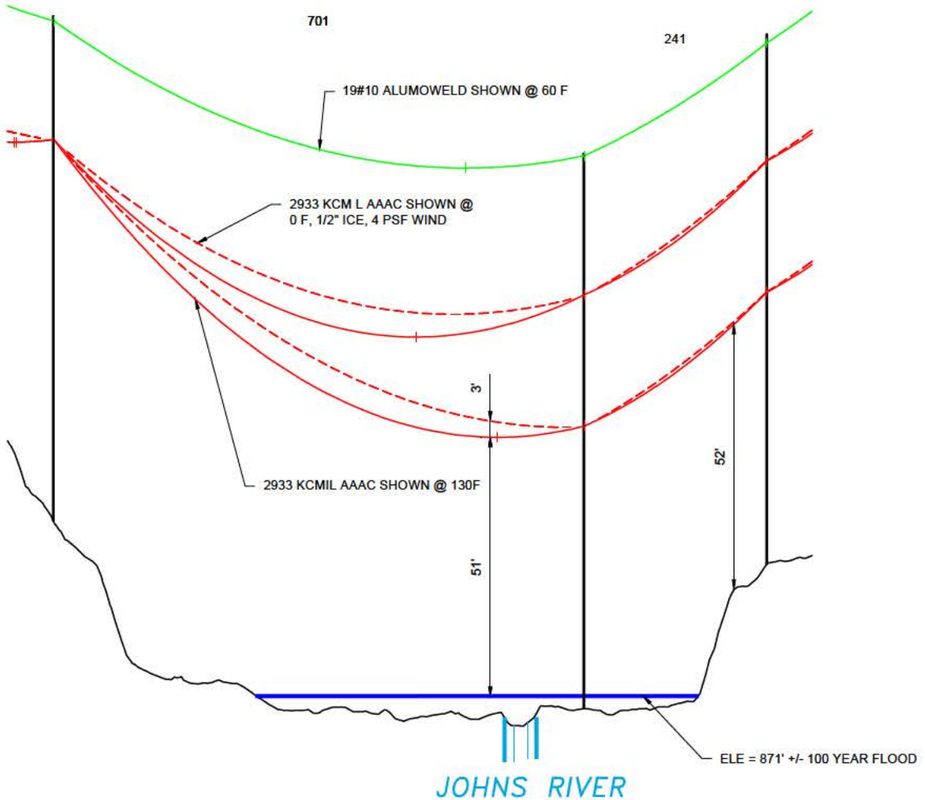
August 26, 2015

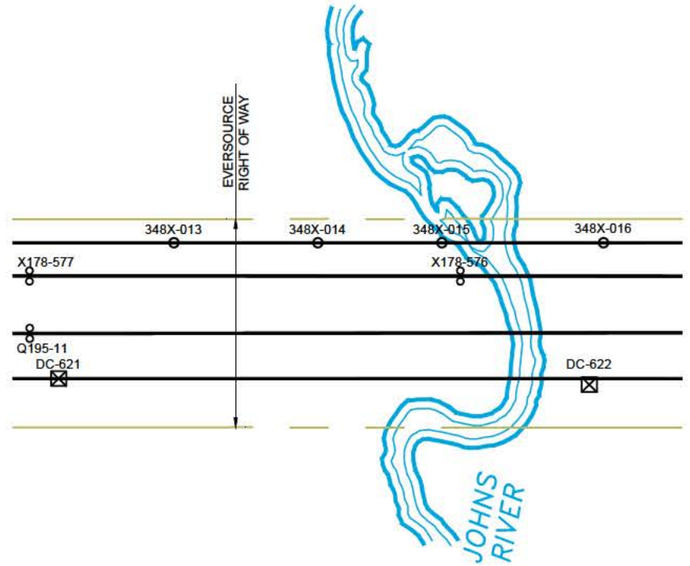
Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL2825-2826_Johns_River_Lettersize.mxd rfraser 8/26/2015

DC-621
STA=3074+06.32
HT=100.00
ELE=905.95
LAT=44.38368698
LONG=-71.62130903

DC-622
STA=3081+06.89
HT=110.00
ELE=868.75
LAT=44.3833521
LONG=-71.62394791

DC-622A
STA=3083+48.02
HT=105.00
ELE=897.35
LAT=44.3832294
LONG=-71.62485425





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

N

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–		–	–
A	4/30/15	ISSUED FOR REVIEW		MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE C1 LL 2825/2826 3720/3731 JOHNS RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099909.DWG

09/10/2015 8:36am – mspepich – N:\NUSCO\58479 – NPT\Overhead\Cadd\01-Record Worksheets\02 Permits\Water Cross Permits\372099909.dwg

APPENDIX 6
3720/3731 DC LINE
STRUCTURES DC-662 TO DC-663
AMMONOOSUC RIVER
BETHLEHEM, NH

1. This crossing is shown on attached drawing 372099901

2. The location of the 3720/3731 line is shown on attached map titled Line List 3114.

3. The 3720/3731 line will cross the Ammonoosuc River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-662 & DC-663 will be structures with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 51 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Ammonoosuc River were based on information in FEMA Flood Insurance Rate Map (FIRM) #3309C0135E Panel 135 of 1185. This document has an effective date of February 20, 2008. Based on the information provided in the FIRM, the section of the Ammonoosuc River where the 3720/3731 line crosses is in an area labeled “Zone A”. From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of the Ammonoosuc River, Northern Pass Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the elevation at this section of the Ammonoosuc River was 970 feet and

elevation of the top of the river bank was 982 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 36 acres (300 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0\,5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

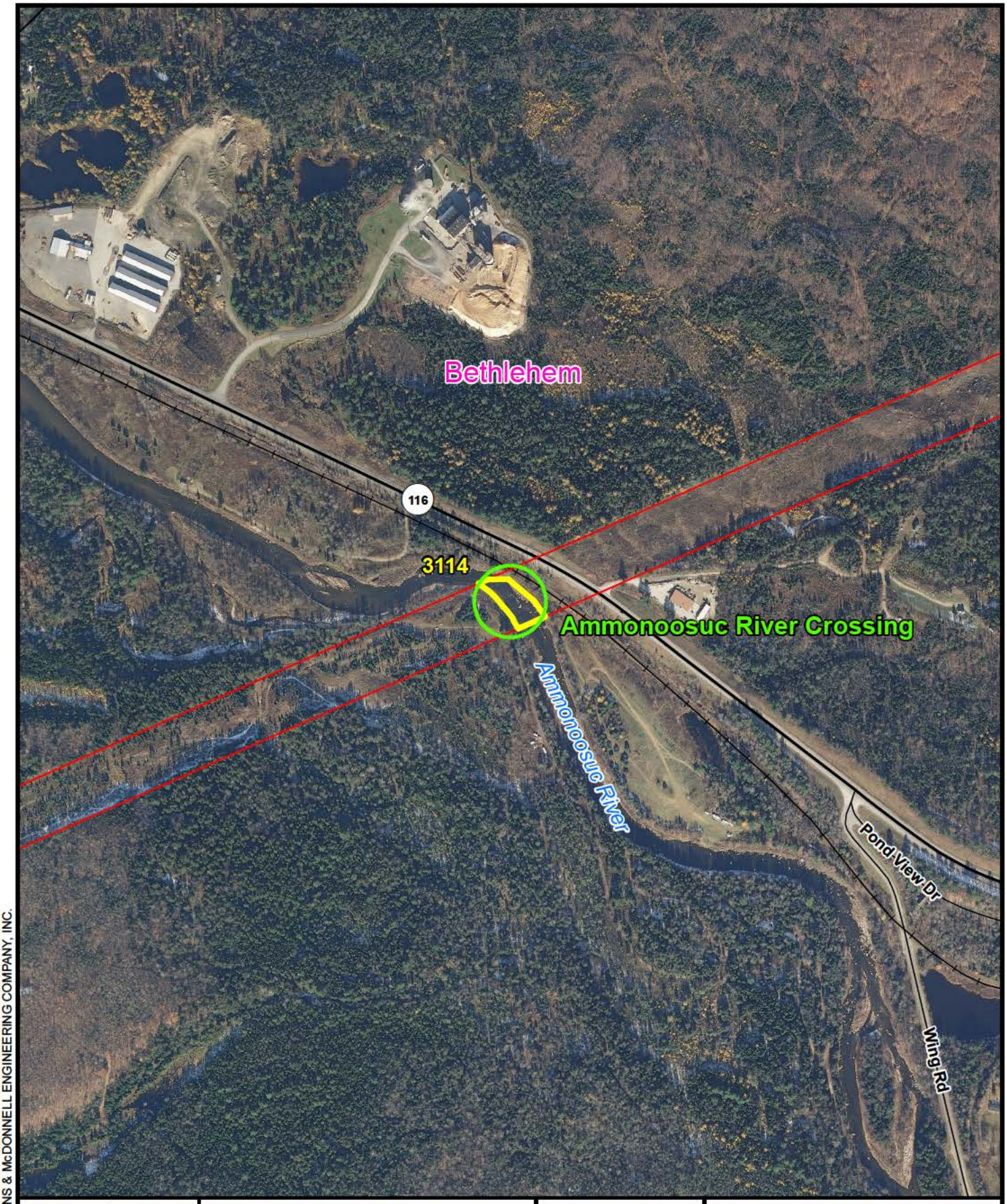
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 67 feet, this exceeds the minimum required clearance of 35.7 feet

k. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 23 feet vertically and 8.7 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

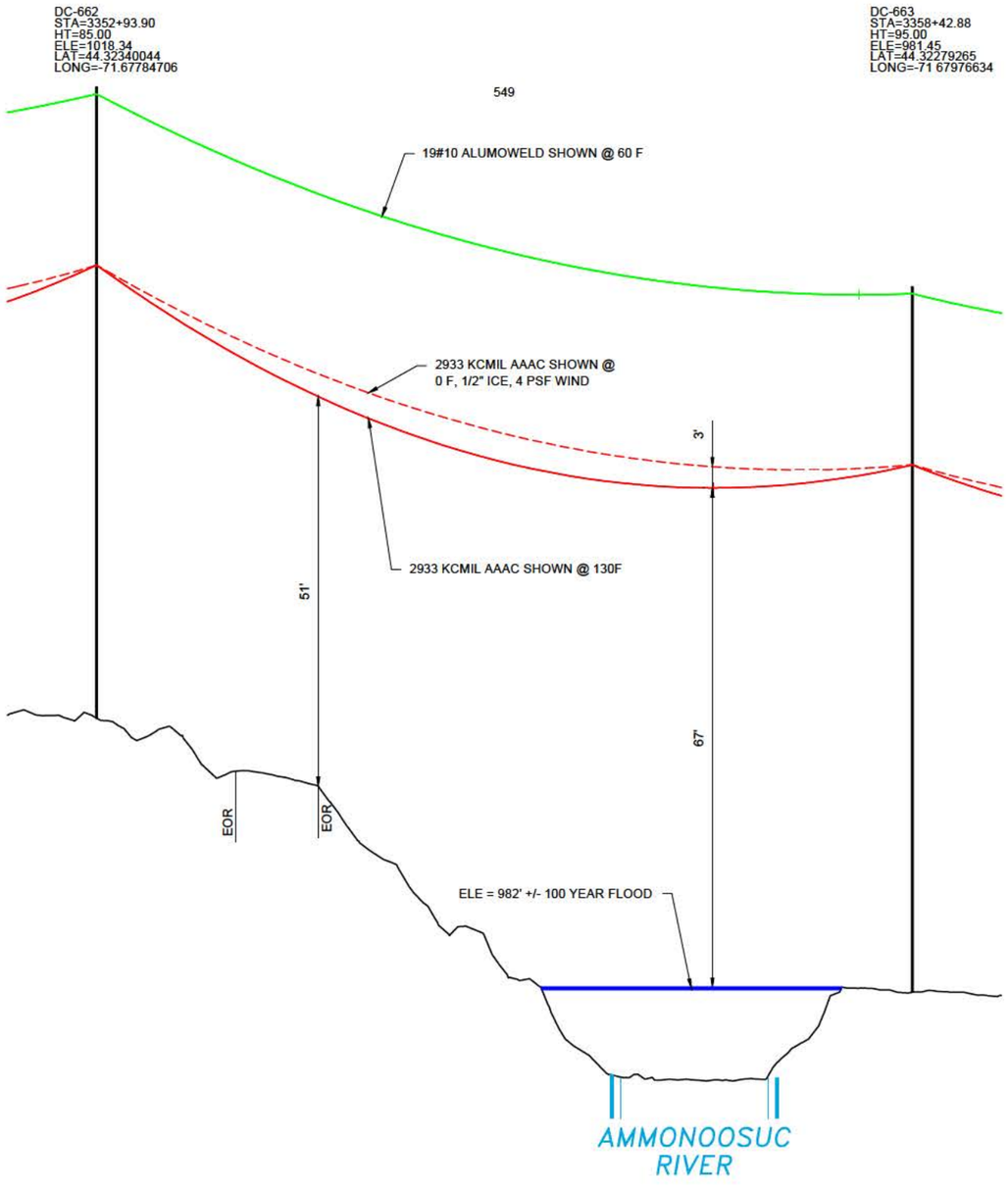
THE NORTHERN PASS

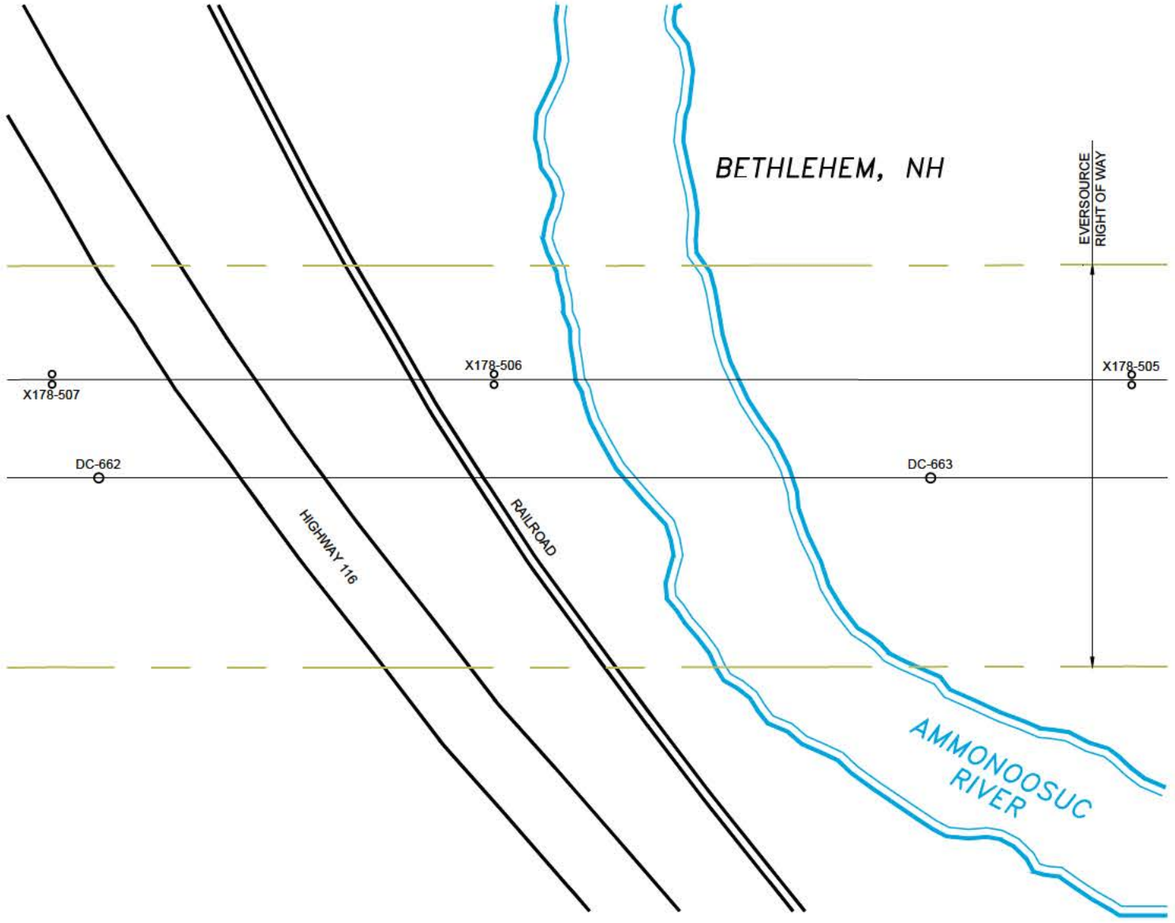
Line List 3114
Ammonoosuc River
Water Crossing Permit
Location Map

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

September 08, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL3114_Ammonoosuc_River_Lettersize.mxd rfraser 9/8/2015





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

100.0 ft. Horiz. Scale

20.0 ft. Vert. Scale

N

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: C1 LL 3114 3720/3731
AMMONOOSUC RIVER WATER CROSSING BETHLEHEM, NH

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099901.DWG

APPENDIX 7
3720/3731 DC LINE
STRUCTURES DC-1099 TO DC-1101
PEMIGEWASSET RIVER
ASHLAND/BRIDGEWATER, NH

1. This crossing is shown on attached drawing 372099903

2. The location of the 3720/3731 line is shown on attached map titled Line List 5813.01.

3. The 3720/3731 line will cross the Pemigewasset River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-1099 through DC-1101 will be structures with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 37 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Pemigewasset River were based on information in FEMA Flood Insurance Rate Map (FIRM) 33009C1010E Panel 1010 of 1185. This document has an effective date of February 20, 2008. The 100 year flood elevation for this portion of the river is approximately 480 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 50 acres (410 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ =

392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{0.5}$ =237.6

a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV) x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

    i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
    ii. 16.59 feet is required between 320 kV DC energized conductors

d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

    i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
    ii. 15.82 feet is required between 320 kV DC energized conductors
    iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
    i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
    ii. 16.88 feet is required between 320 kV DC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
    i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
    ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

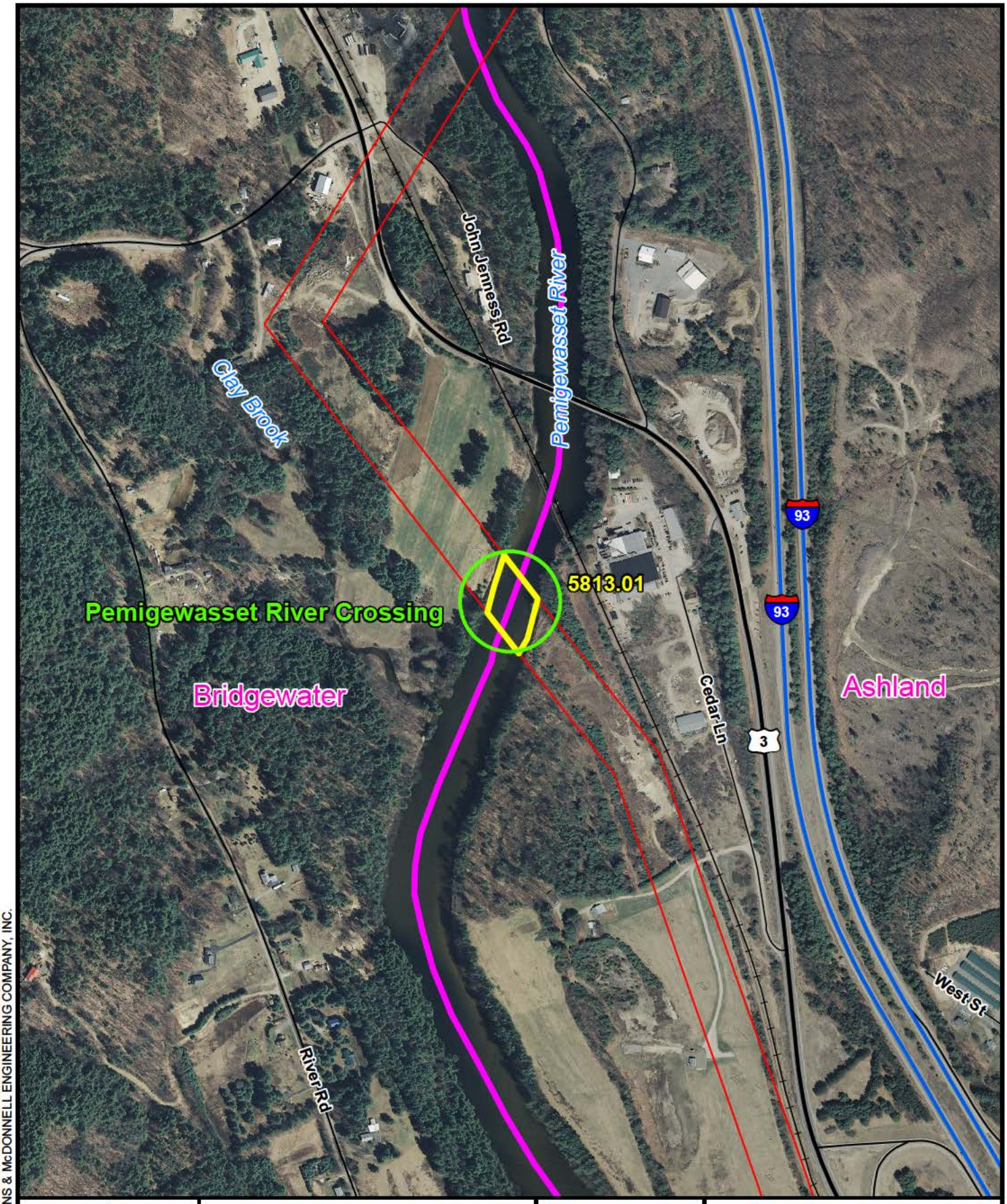
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 41 feet, this exceeds the minimum required clearance of 35.7 feet

k. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 21.1 feet vertically and 8.7 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

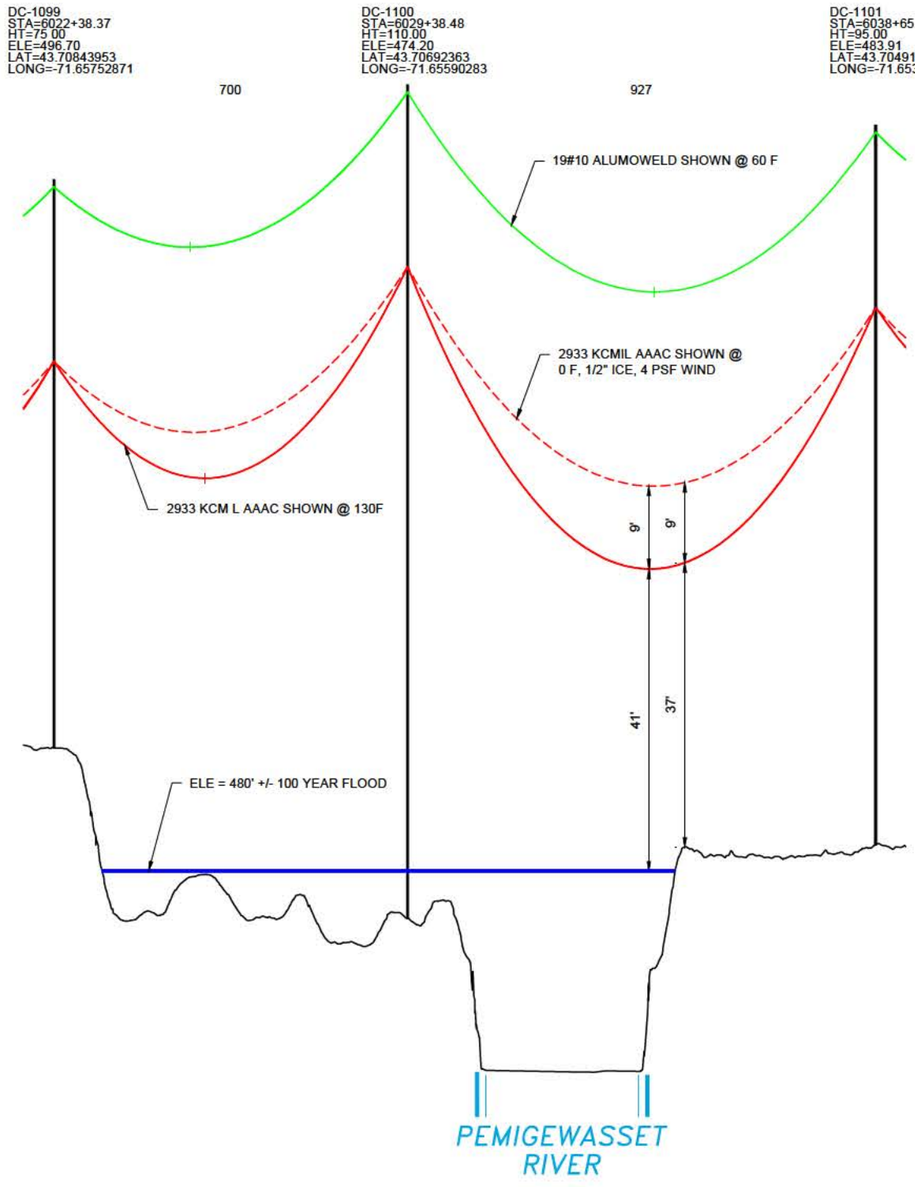
THE NORTHERN PASS

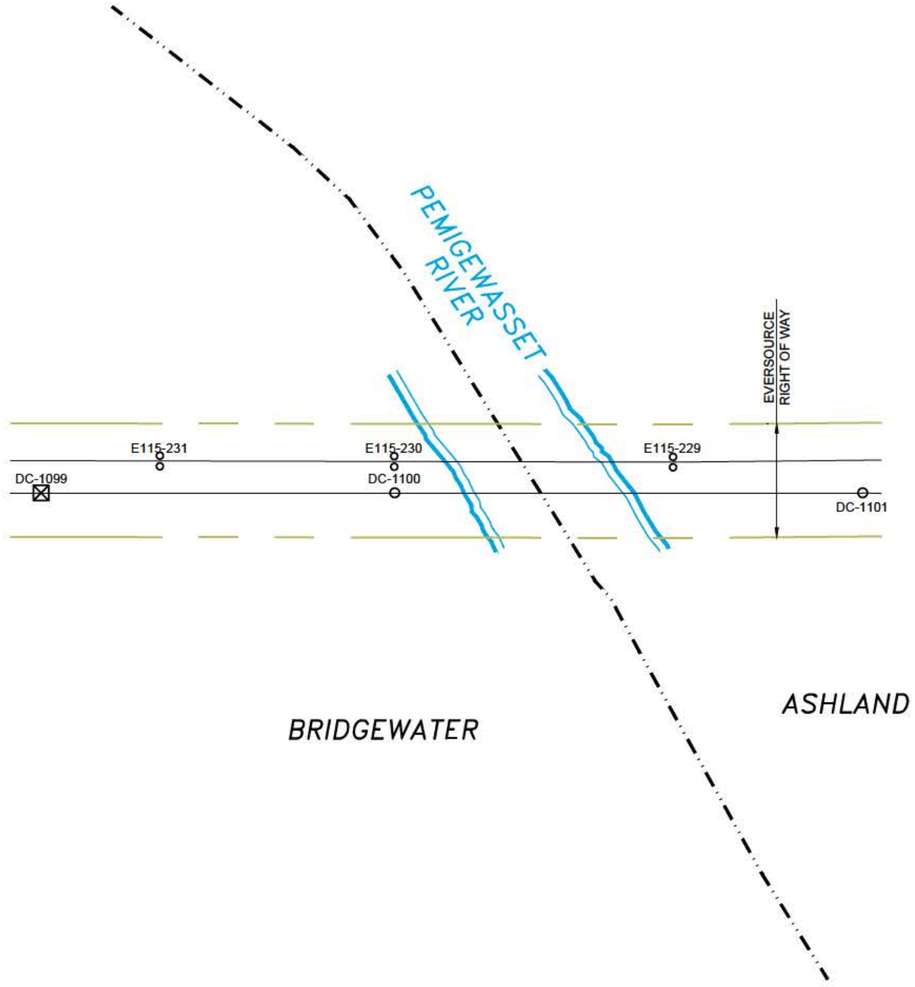
Line List 5813.01
Pemigewasset River
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL5813.01_Pemigewasset_River_Lettersize.mxd rfraser 8/25/2015

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 25, 2015





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

300.0 ft. Horiz. Scale

20.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–	–	–	
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB	

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: C2 LL 5813.01 3720/3731 PEMIGEWASSET RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099903.DWG

APPENDIX 8
3720/3730 DC LINE
STRUCTURES DC-1113 TO DC-1114
SQUAM RIVER
ASHLAND/ NEW HAMPTON, NH

1. This crossing is shown on attached drawing 37209910

2. The location of the 3720/3731 line is shown on attached map titled Line List 5538/5542.

3. The 3720/3731 line will cross the Squam River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-1113 will be structures with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

    b. DC-1114 will be a structure with strain insulators. The energized conductors are separated approximately 36 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 9.5 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 35 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Squam River were based on information in FEMA Flood Insurance Rate Map (FIRM) # 33009C1020E Panel 1020 of 1185. This document has an effective date of February 20, 2008. Based on the information provided in the FIRM, the section of the Squam River where the 3720/3731 line crosses is in an

area labeled “Zone A”. From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Approximately 1500 feet downstream of crossing the Squam River enters into the Pemigewasset River. The Pemigewasset River has 100 year flood elevations calculated. For this area it is approximately 476 feet. For this crossing the project has assumed that flooding elevations would be controlled by backwater from the Pemigewasset River. The area of the crossing, as required by the Section 232 of the NESC is approximately 24 acres (200 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by 3^0 5 =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
    i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
    ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

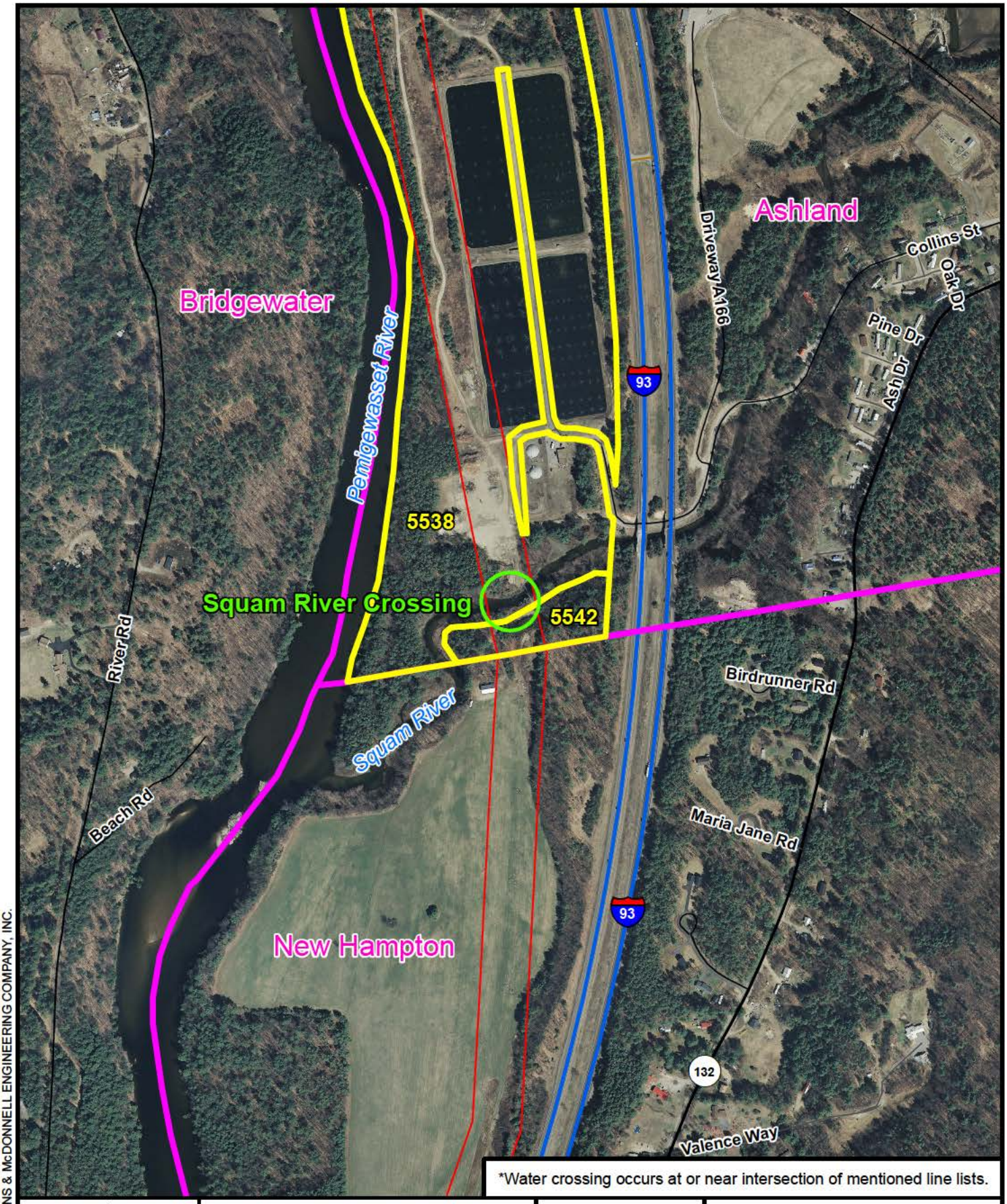
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 48 feet, this exceeds the minimum required clearance of 35.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 23.0 feet vertically and 9.2 feet horizontally from the ground wires to the closest energized conductor. As described above these clearances exceed both requirements.



*Water crossing occurs at or near intersection of mentioned line lists.

NORTH

0 300 600

Feet

LEGEND

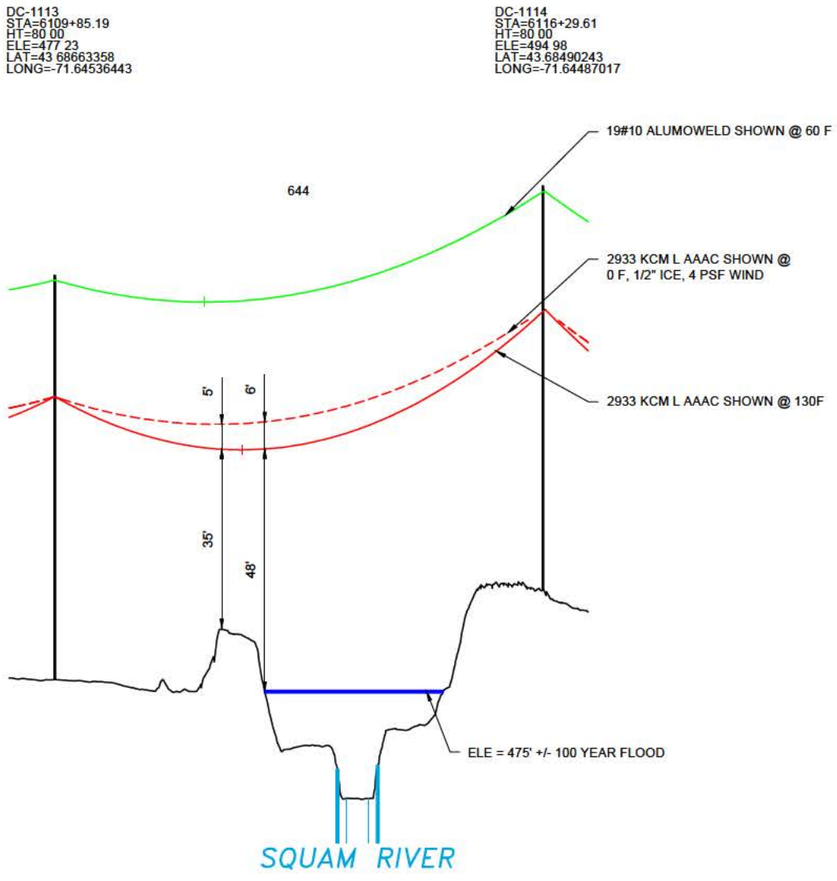
- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

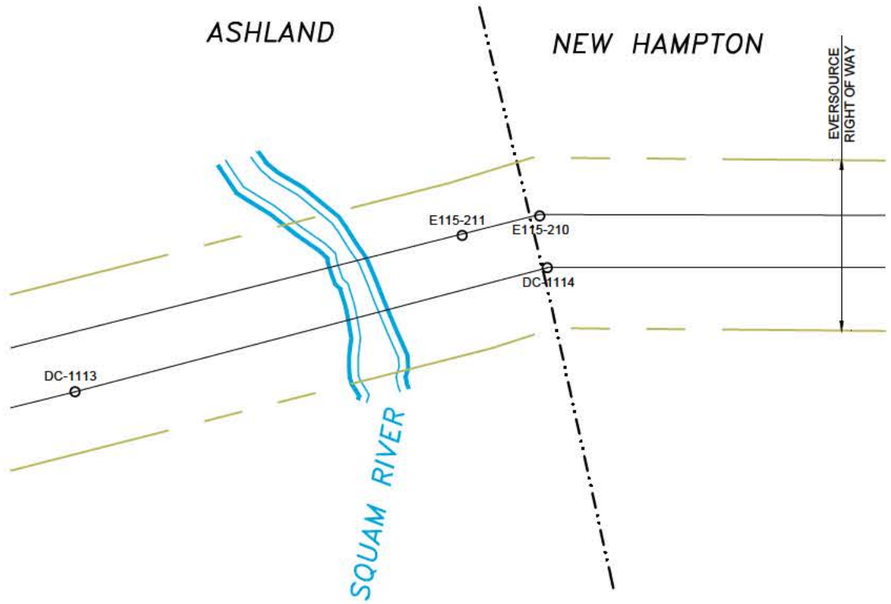
THE NORTHERN PASS

Line List 5538/5542*
Squam River
Water Crossing Permit
Location Map

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

N

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–	–	–	
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB	

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE C2 LL 5538/5542 3720/3731 SQUAM RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099910.DWG

APPENDIX 9
3720/3731 DC LINE
STRUCTURES DC-1144 TO DC-1145
PEMIGEWASSET RIVER
BRIDGEWATER/NEW HAMPTON, NH

1. This crossing is shown on attached drawing 372099904

2. The location of the 3720/3731 line is shown on attached map titled Line List 6145.03.

3. The 3720/3731 line will cross the Pemigewasset River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-1144 & DC-1145 will be structures with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 33 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Pemigewasset River were based on information in FEMA Flood Insurance Rate Map (FIRM) 33009C1020E Panel 1020 of 1185. This document has an effective date of February 20, 2008. The 100 year flood elevation for this portion of the river is approximately 469 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 50 acres (410 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ =

392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0.5}$ =237.6

a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV) x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

    i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
    ii. 16.59 feet is required between 320 kV DC energized conductors

d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

    i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
    ii. 15.82 feet is required between 320 kV DC energized conductors
    iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
    i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
    ii. 16.88 feet is required between 320 kV DC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
    i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
    ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

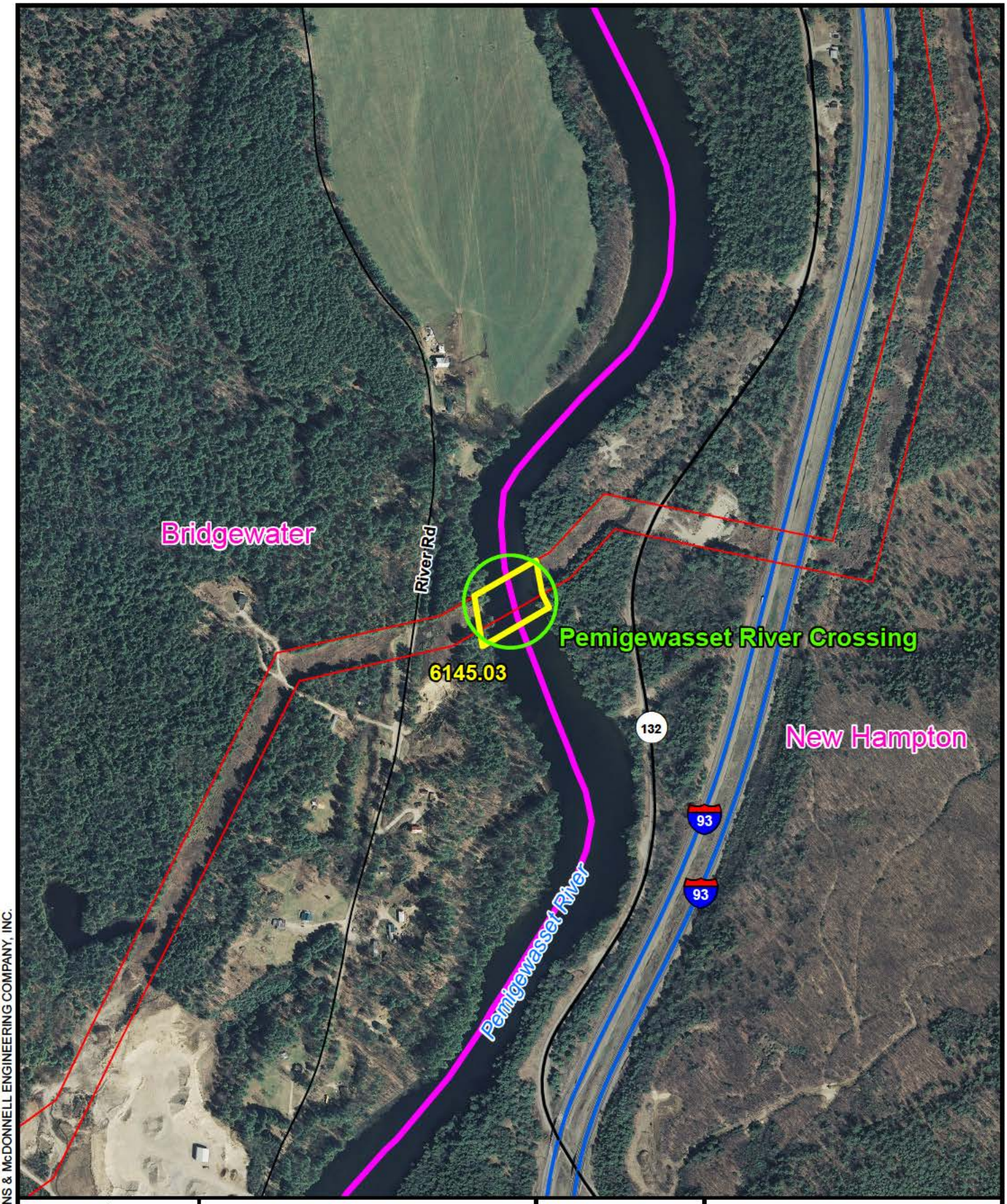
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 81 feet, this exceeds the minimum required clearance of 35.7 feet

k. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 21.4 feet vertically and 8.4 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

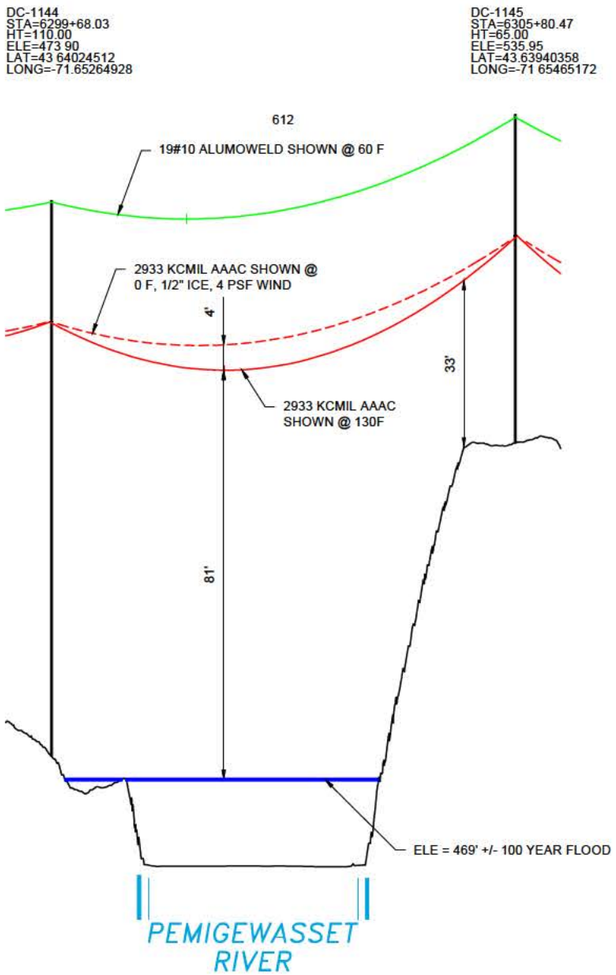
THE NORTHERN PASS

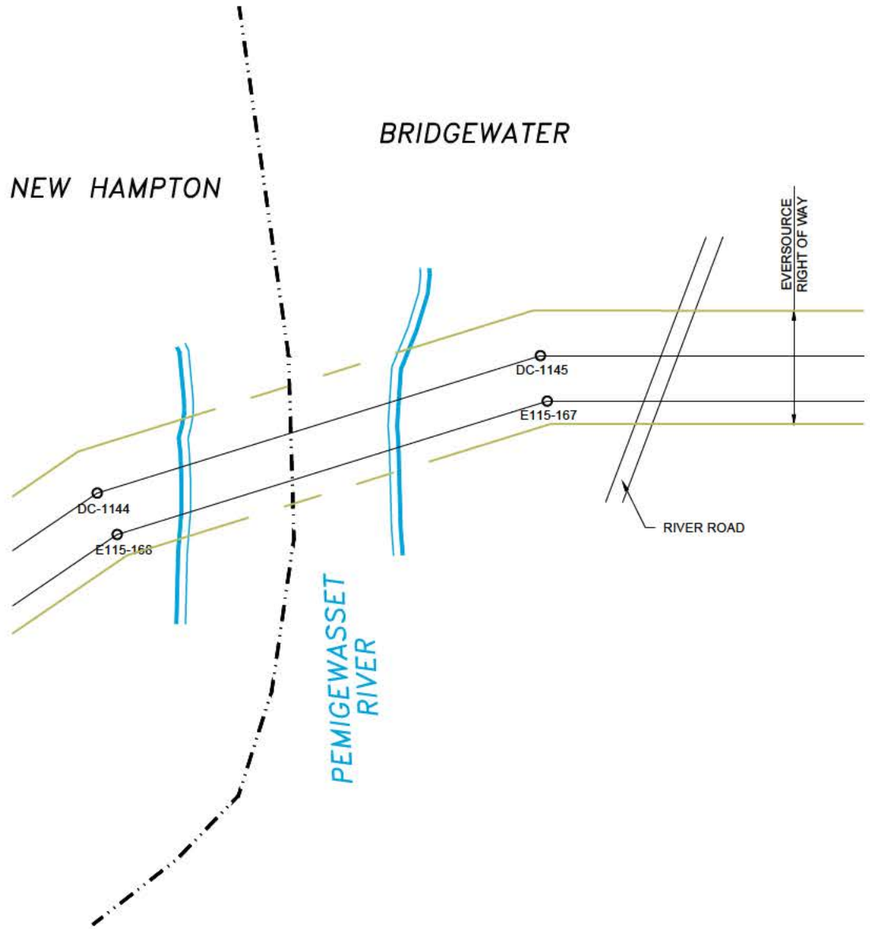
Line List 6145.03
Pemigewasset River
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL6145.03_Pemigewasset_River_Lettersize.mxd rfraser 8/25/2015

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 25, 2015





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

N

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–		–	–
A	4/30/15	ISSUED FOR REVIEW		MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE C2 LL 6145.03 3720/3731 PEMIGEWASSET RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099904.DWG

APPENDIX 10
3720/3731 DC LINE
STRUCTURES DC-1174 TO DC-1175
PEMIGEWASSET RIVER
NEW HAMPTON/BRISTOL, NH

1. This crossing is shown on attached drawing 372099906

2. The location of the 3720/3731 line is shown on attached map titled Line List 6441.

3. The 3720/3731 line will cross the Pemigewasset River on steel structures with foundations. The The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-1174 to DC-1175 will be structures with strain insulators. The energized conductors are separated approximately 36 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 9.5 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 66 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Pemigewasset River were based on information in FEMA Flood Insurance Rate Map (FIRM) # 33009C1180E Panel 1180 of 1185. This document has an effective date of February 20, 2008. Based on the information provided in the FIRM, the section of the Pemigewasset River where the 3720/3731 line crosses is in an area labeled “Zone A”. From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of the Pemigewasset River, Northern Pass Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the elevation at this section of the Pemigewasset River was 452

feet and elevation of the top of the river bank was 453 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 162 acres (1340 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0\,5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

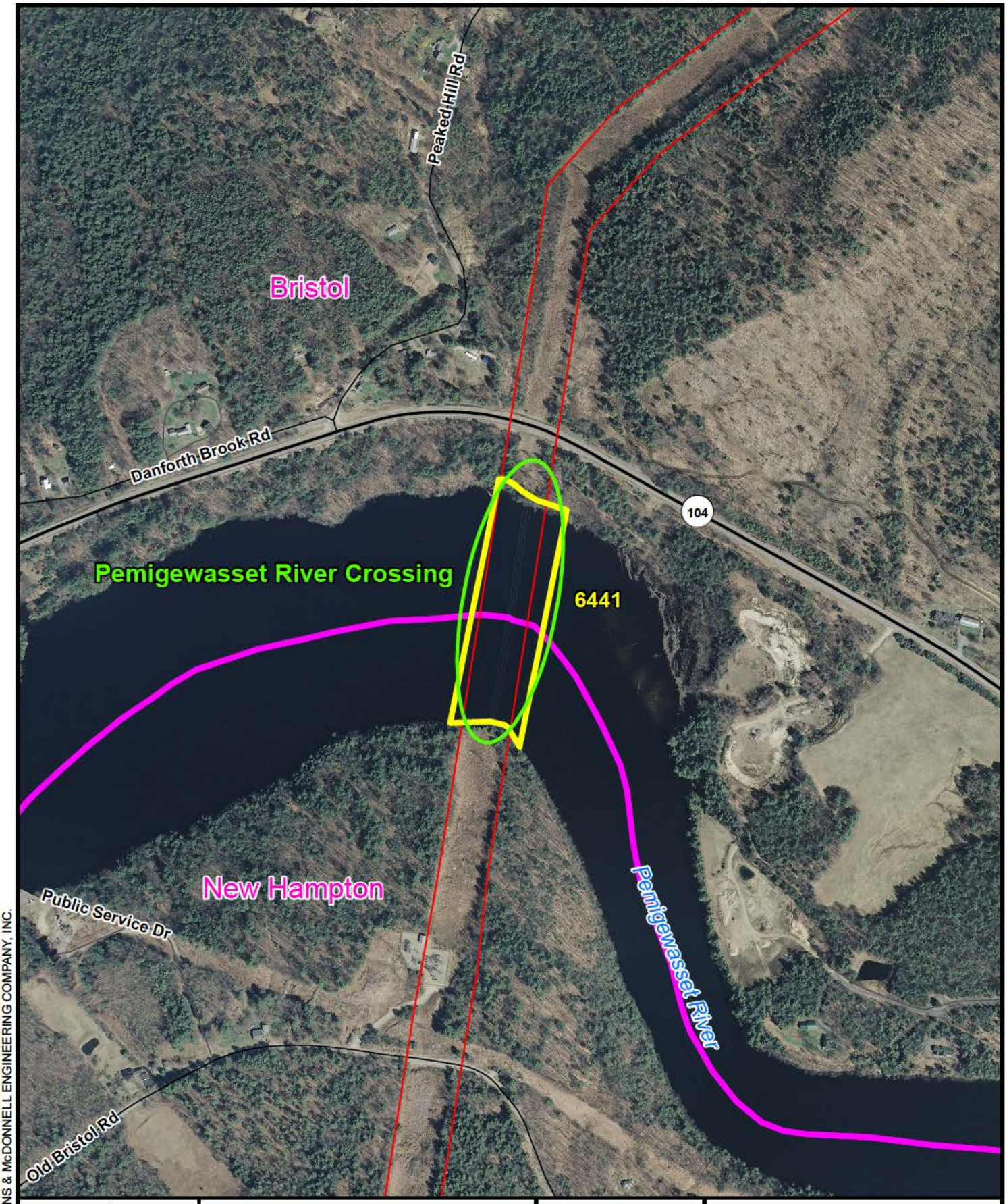
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 66 feet, this exceeds the minimum required clearance of 35.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 15.4 feet vertically and 9.5 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

THE NORTHERN PASS

Line List 6441
Pemigewasset River
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL6441_Pemigewasset_River_Lettersize.mxd rfraser 8/26/2015

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015

DC-1174
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ELE=530.10
LAT=43.60318548
LONG=-71.70768251

DC-1175
STA=6519+40.91
HT=125.00
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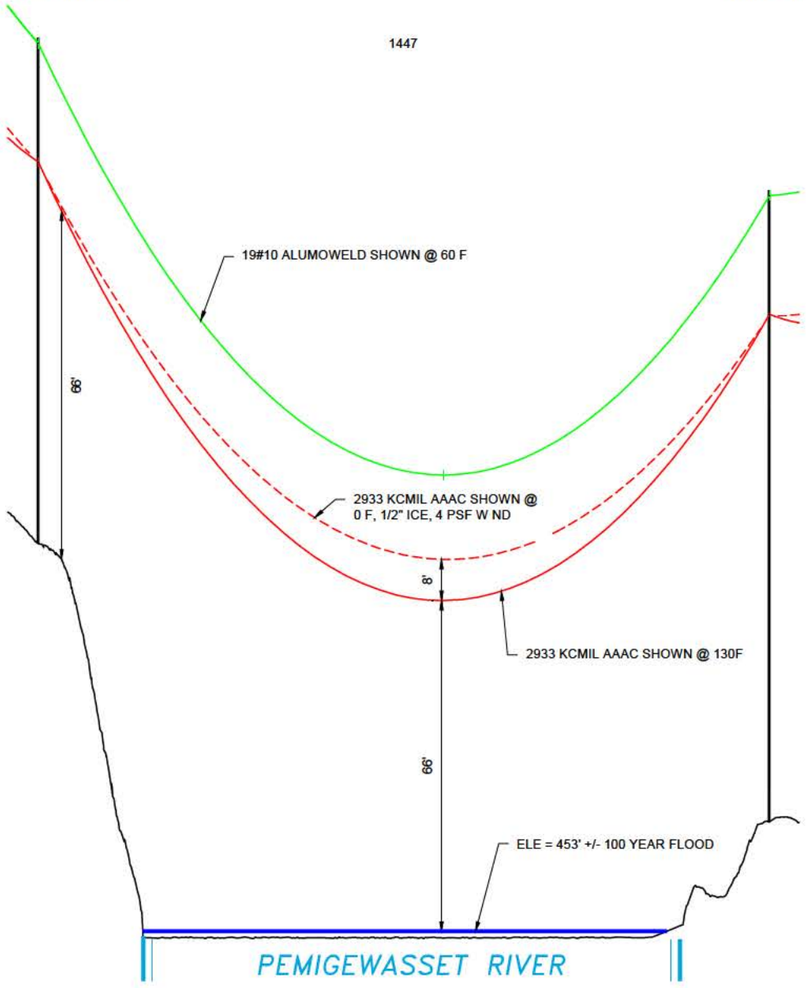
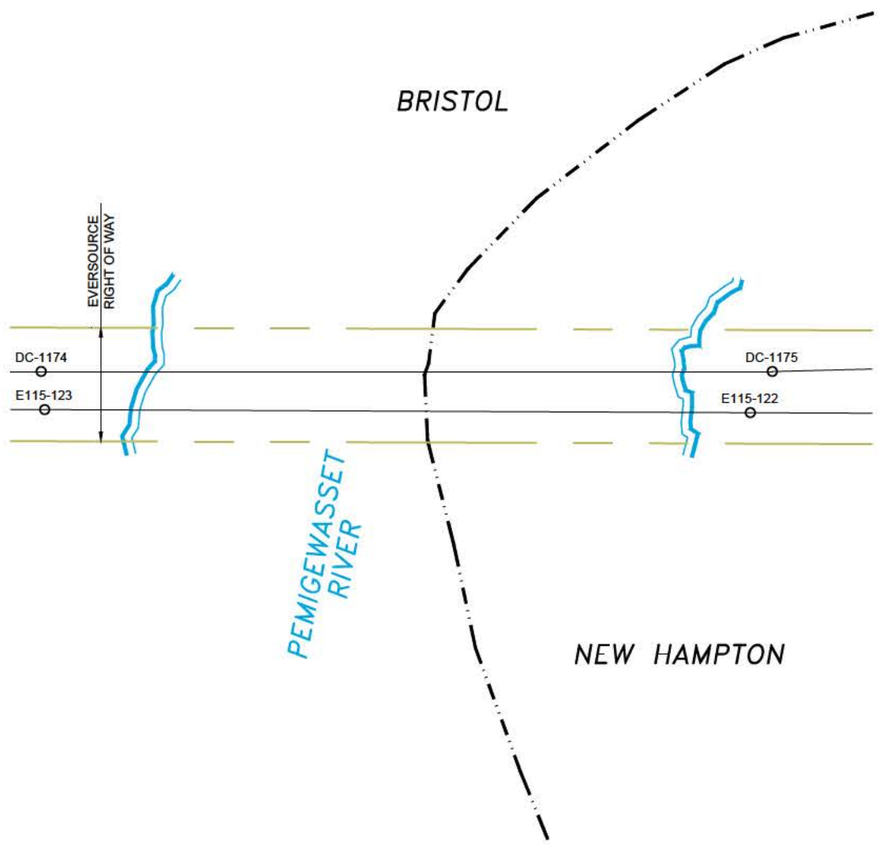




RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

300.0 ft. Horiz. Scale
30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: C2 LL 6441 3720/3731 PEMIGEWASSET RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099906.DWG

APPENDIX 11
3720/3731 DC LINE
STRUCTURES DC-1205 TO DC-1206
PEMIGEWASSET RIVER
NEW HAMPTON/HILL, NH

1. This crossing is shown on attached drawing 372099905

2. The location of the 3720/3731 line is shown on attached map titled Line List 6182.

3. The 3720/3731 line will cross the Pemigewasset River on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-1205 & DC-1206 will be structures with strain insulators. The energized conductors are separated approximately 36 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 9.5 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 65 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Pemigewasset River were based on information in FEMA Flood Insurance Rate Map (FIRM) #33013C0065E Panel 65 of 705. This document has an effective date of April 19, 2010. Based on the information provided in the FIRM, the section of the Pemigewasset River where the 3720/3731 line crosses is in an area labeled “Zone A”. From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of the Pemigewasset River, Northern Pass Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the elevation at this section of the Pemigewasset River was 309 feet and

elevation of the top of the river bank was 326 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 70 acres (580 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0\,5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.29 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

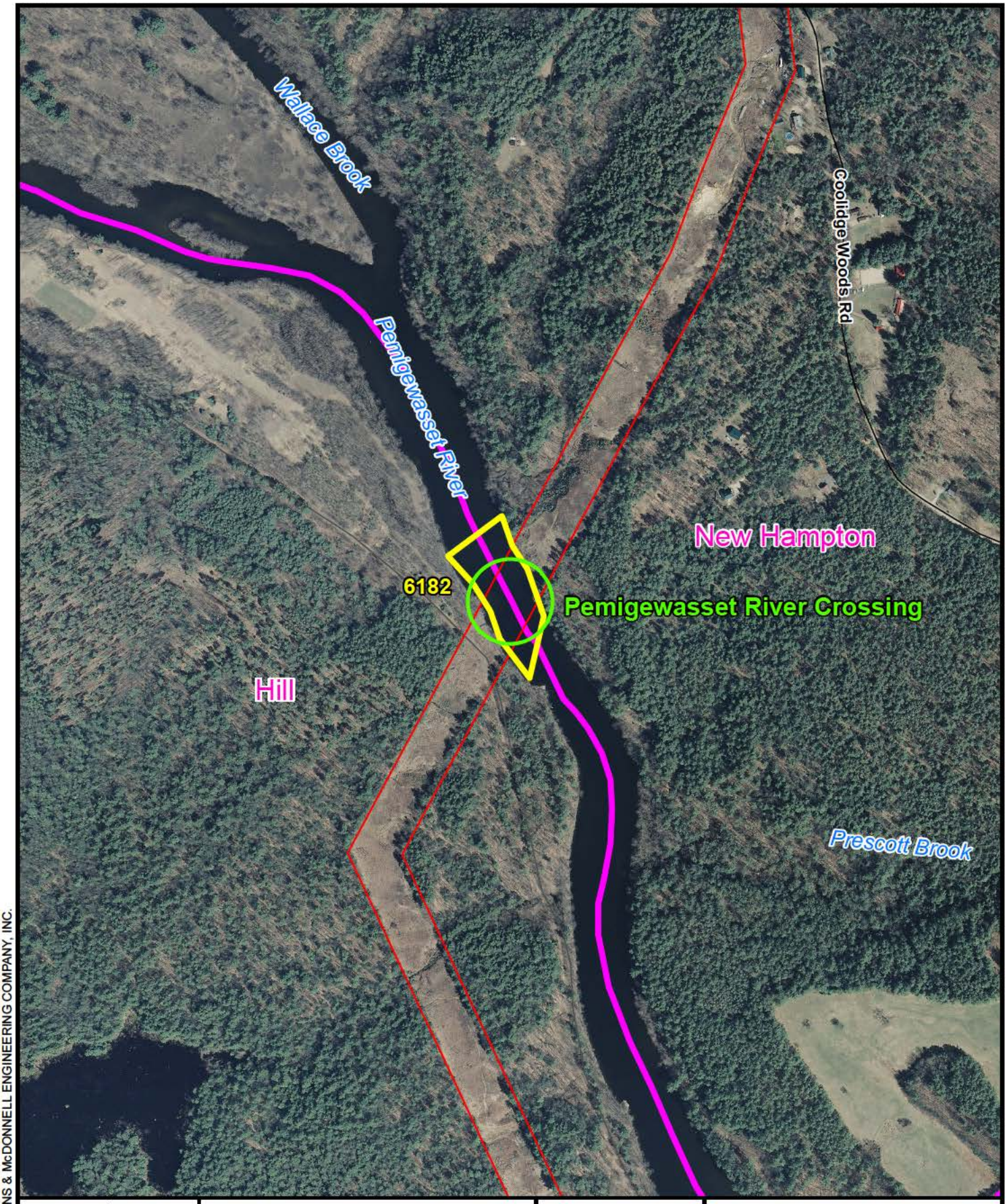
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    j. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 107 feet, this exceeds the minimum required clearance of 35.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 19.7 feet vertically and 9.5 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

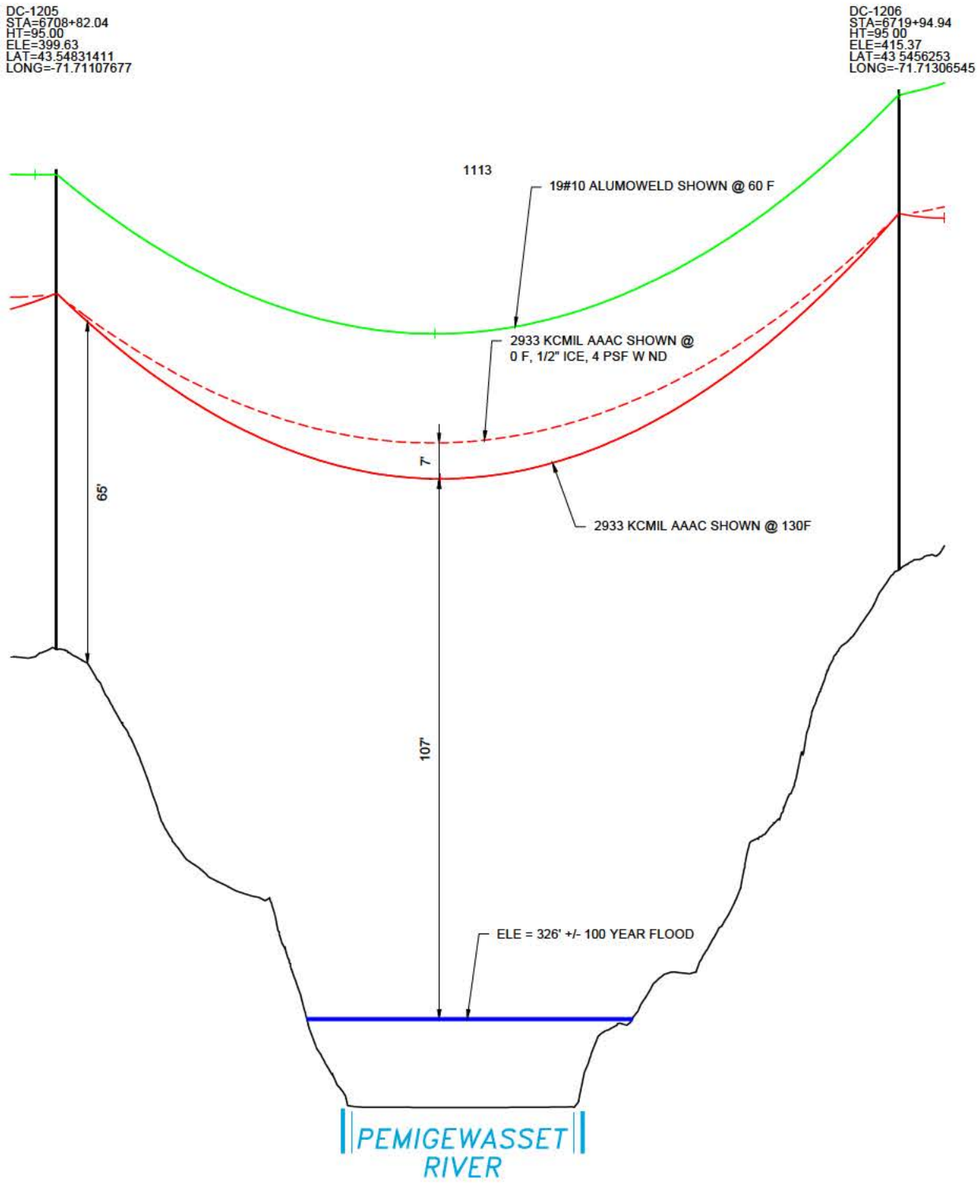
THE NORTHERN PASS

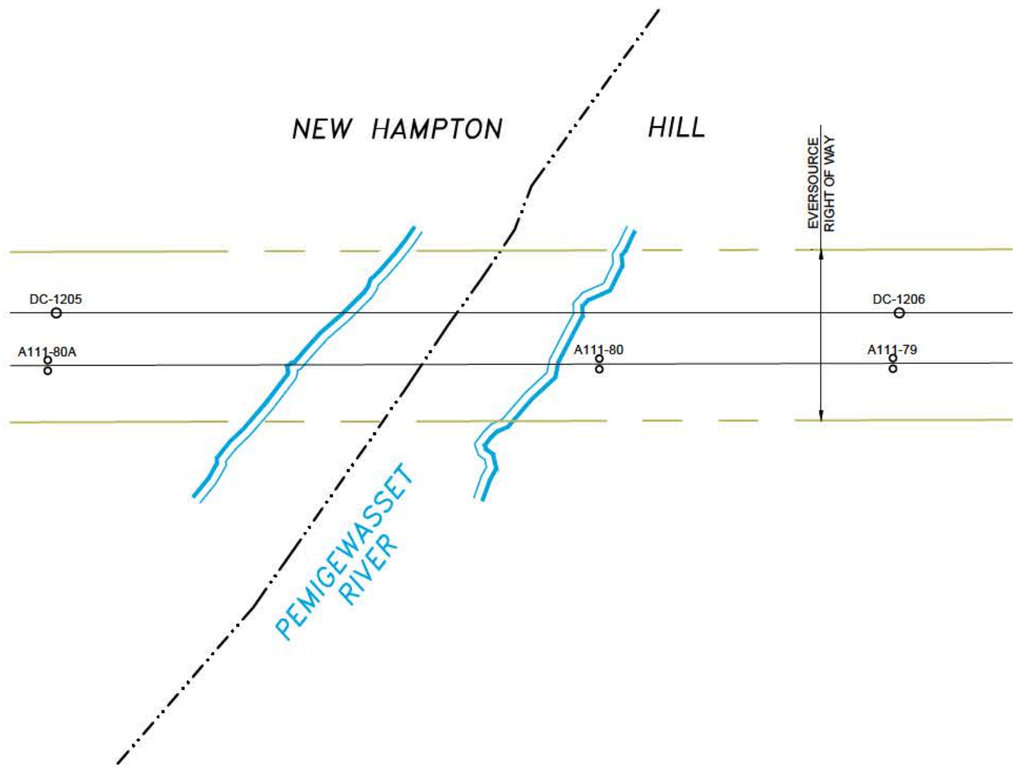
Line List 6182
Pemigewasset River
Water Crossing Permit
Location Map

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 25, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL6182_Pemigewasset_River_Lettersize.mxd rfraser 8/25/2015





RIGHT OF WAY

EOR EDGE OF ROAD

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: C2 LL 6182 3720/3731 PEMIGEWASSET RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099905.DWG

APPENDIX 12
3720/3731 DC LINE
STRUCTURES DC-1271 TO DC-1272
CHANCE POND
FRANKLIN, NH

1. This crossing is shown on attached drawing 372099907

2. The location of the 3720/3731 line is shown on attached map titled Line List 7315

3. The 3720/3731 line will cross Chance Pond on steel structures with foundations. The energized conductor (positive pole and negative pole for direct current) is in a horizontal configuration using a 2-bundle of 2933 kcmil AAAC for each pole. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. DC-1271 will be a structure with strain insulators. The energized conductors are separated approximately 36 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 9.5 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

    b. DC-1272 will be a structure with V-string insulators. The energized conductors are separated approximately 28 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 12 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 11 feet. The ground/OPGW and energized conductor are separated vertically by approximately 23.5 feet.

4. Energized conductors will have a maximum tension of 20,000 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 65 feet between the energized conductor and ground has been achieved, which is greater than required 21.7 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for Chance Pond were based on information in FEMA Flood Insurance Rate Map (FIRM) 33013C0158E Panel 158 of 705. This document has an effective date of April 19, 2010. The 100 year flood elevation for this portion

of the river is approximately 400 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 40 acres (330 feet x 5280 feet / 43560 square feet/acre).

7. The 3720/3731 line is a 320 kV direct current (DC) line. Per NESC 230 the required clearances are applicable for both alternating and direct currents. To convert 320 kV DC to a corresponding alternating current (AC) voltage (for purposes of calculating clearances) take 320 kV x $3^{0.5}$ / $2^{0.5}$ = 392 kV. The equivalent phase to ground is calculated by taking 392 x 105% (voltage adder) divided by $3^{\wedge 0\,5}$ =237.6

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 7.19 feet or [(237.6 kV-22 kV)x 0.4]/12 is needed for 392 kV, which brings the total required minimum clearance to 35.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 8.67 feet is required between 320 kV DC energized conductor and ground wire
        ii. 16.59 feet is required between 320 kV DC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.88 feet is required between 320 kV DC energized conductors and ground wire
        ii. 15.82 feet is required between 320 kV DC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.96 feet is required between 320 kV DC energized conductors and ground wire
        ii. 16.88 feet is required between 320 kV DC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 8.3 feet are required between 320 kV DC energized conductors and ground wire
        ii. 16.21 feet are required between 320 kV DC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

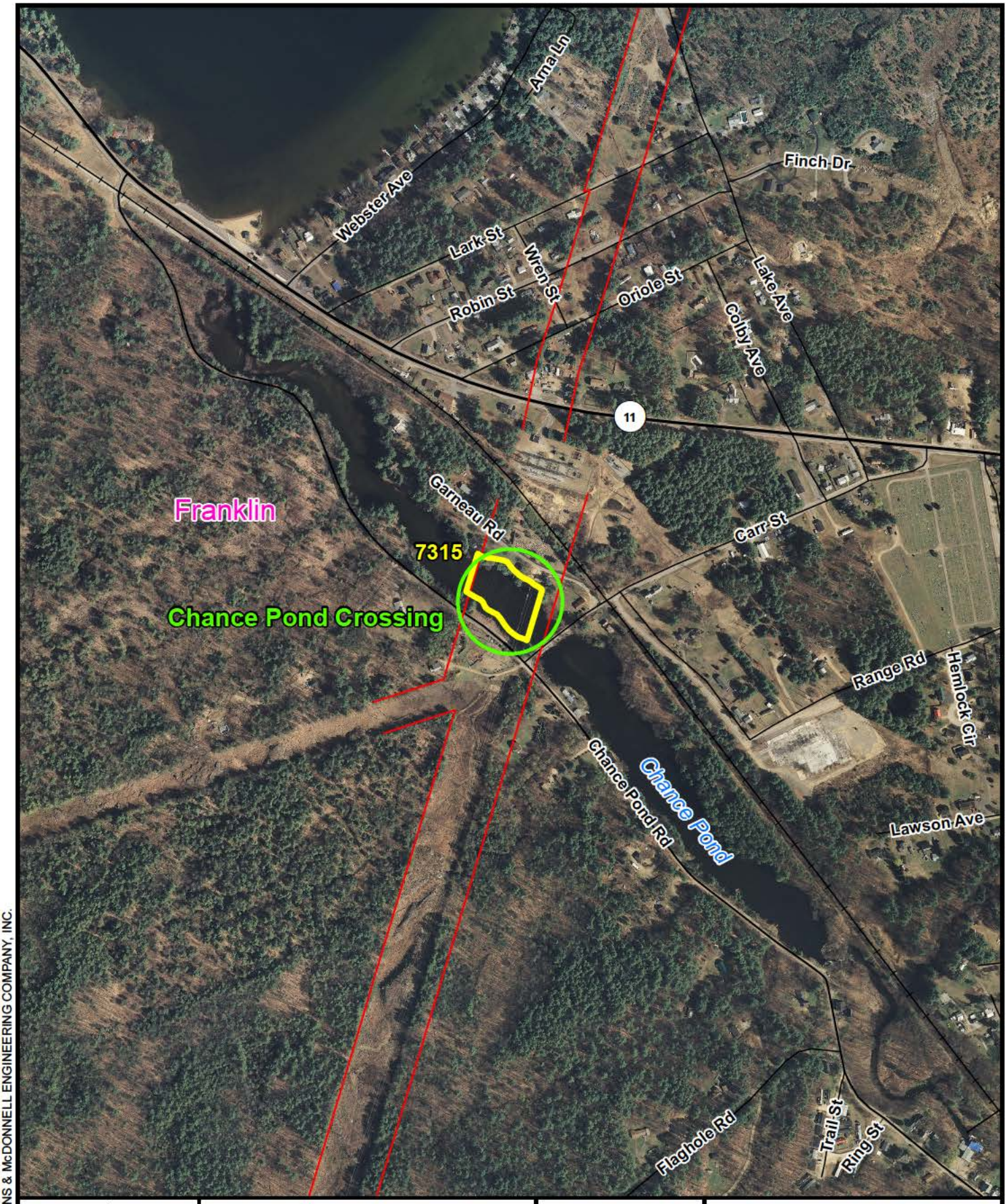
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

   a. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

   b. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

   c. 130 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 79 feet, this exceeds the minimum required clearance of 35.7 feet

   d. Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 23.4 feet vertically and 8.5 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

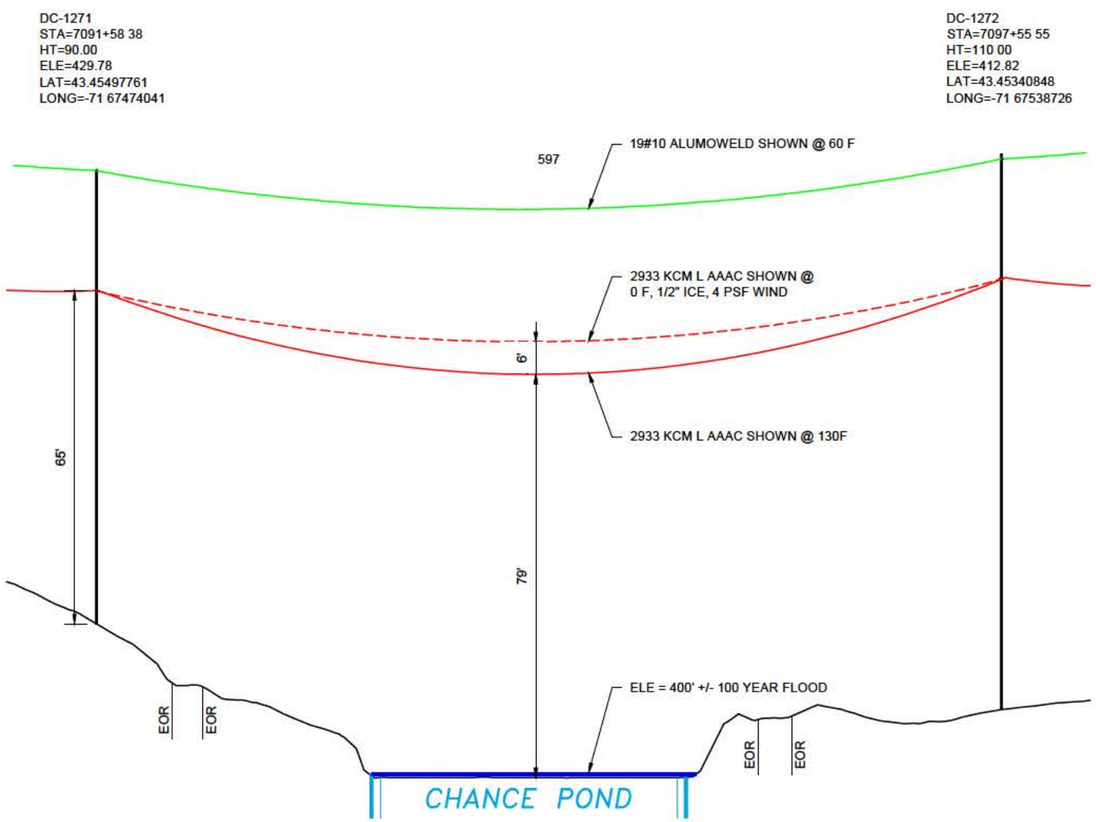
THE NORTHERN PASS

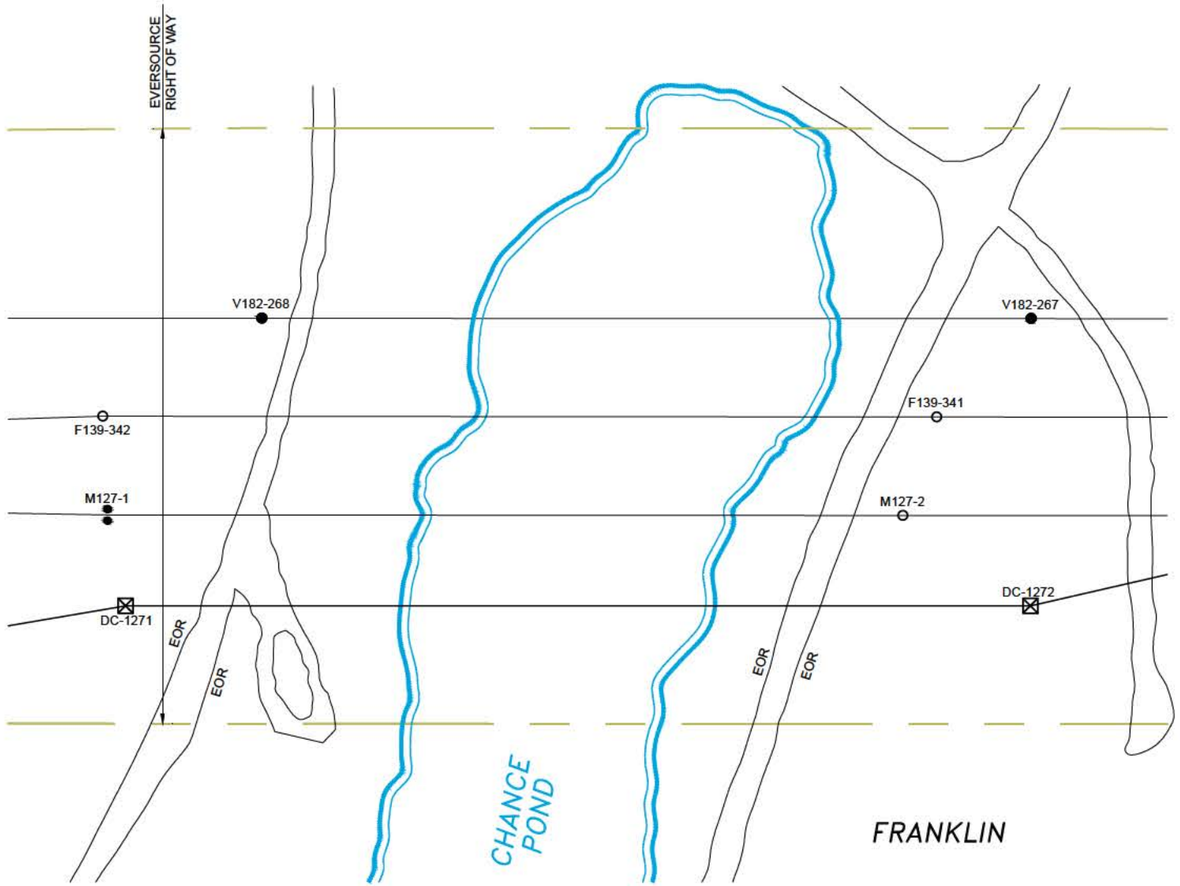
Line List 7315
Chance Pond
Water Crossing Permit
Location Map

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL7315_Chance_Pond_Lettersize.mxd rfraser 8/26/2015





RIGHT OF WAY

EOR EDGE OF ROAD

EXISING MONOPOLE

PROPOSED MONOPOLE

PROPOSED TRANS STRUCTURE

EXIST NG H-FRAME

PROPOSED H-FRAME

100.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–		–	–
A	4/30/15	ISSUED FOR REVIEW		KRR	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: C2 LL7315 3720/3731 CHANCE POND CROSSING

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	372099907.DWG

APPENDIX 13
3132 AC LINE
STRUCTURES 3132-4 TO 3132-5
MERRIMACK RIVER
FRANKLIN/NORTHFIELD, NH

1. This crossing is shown on attached drawing 313299905

2. The location of the 3132 line is shown on attached map titled Line List 7077.

3. The 3132 line will cross the Merrimack River on steel structures. The energized conductor is in a horizontal configuration using a 2-bundle of 1590 kcmil ACSR. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. 3132-4 & 3132-5 will be structures with suspension insulators. The energized conductors are separated approximately 26 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 13 feet. The ground/OPGW and energized conductor are separated vertically by approximately 25 feet.

4. Energized conductors will have a maximum tension of 11,400 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 48 feet between the energized conductor and ground has been achieved, which is greater than required 20.8 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Merrimack River were based on information in FEMA Flood Insurance Rate Map (FIRM) FM33013C0169E Panel 169 of 705. This document has an effective date of April 19, 2010. The 100 year flood elevation for this portion of the river is approximately 267 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 45 acres (370 feet x 5280 feet / 43560 square feet/acre).

7. The 3132 line is a 345 kV alternating current (AC) line.

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as

specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 6.24 feet or [(209.1 kV-22 kV)x 0.4]/12 is needed, which brings the total required minimum clearance to 34.7 feet.

b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

    i. 7.72 feet is required between 345 kV AC energized conductor and ground wire
    ii. 12.83 feet is required between 345 kV AC energized conductors

d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

    i. 9.17 feet is required between 345 kV AC energized conductors and ground wire
    ii. 13.00 feet is required between 345 kV AC energized conductors
    iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
    i. 8.01 feet is required between 345 kV AC energized conductors and ground wire
    ii. 13.12 feet is required between 345 kV AC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
    i. 7.34 feet are required between 345 kV AC energized conductors and ground wire
    ii. 14.31 feet are required between 345 kV AC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

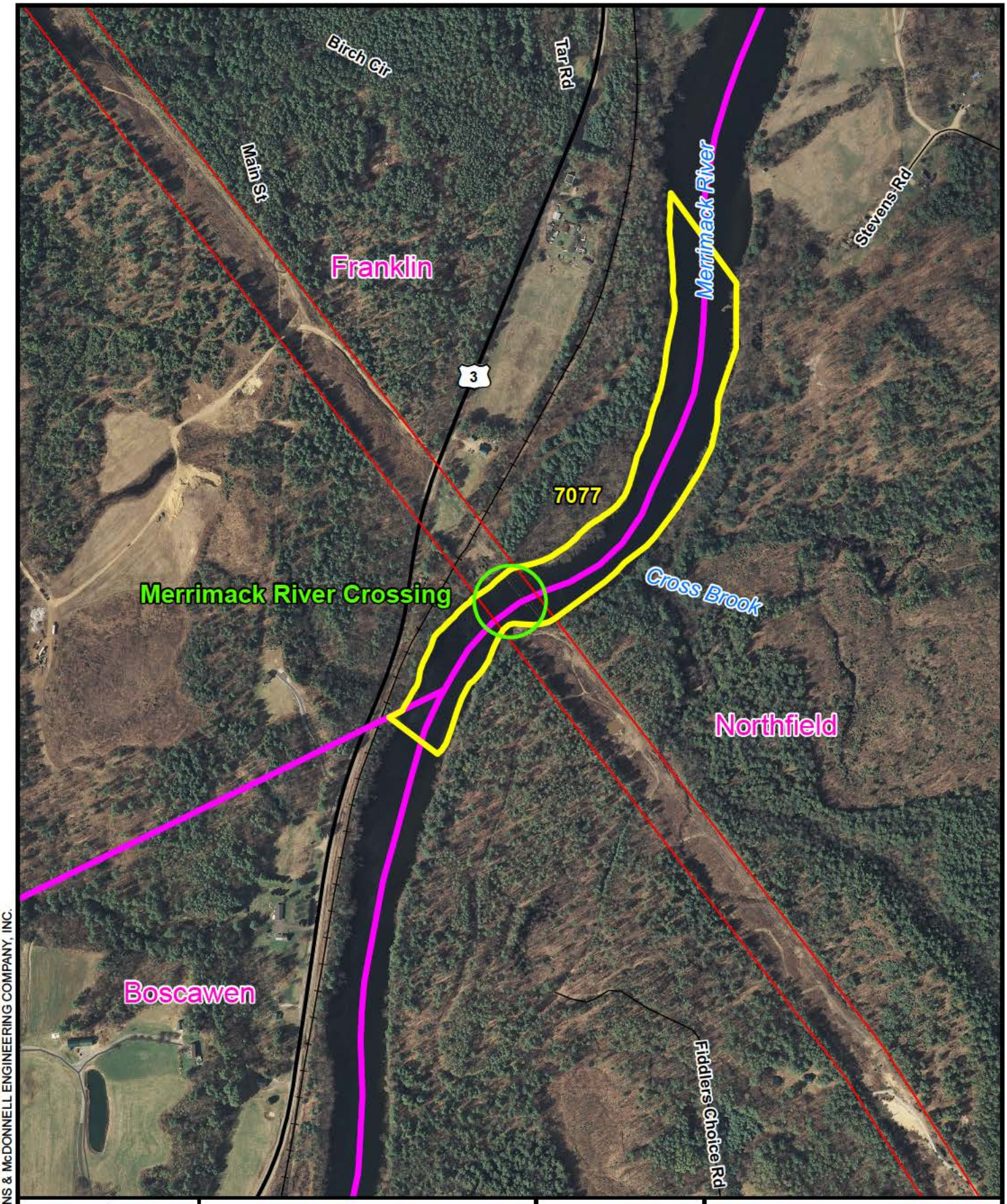
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 285 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 47 feet, this exceeds the minimum required clearance of 34.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 24.9 feet vertically and 13.1 feet horizontally from the ground wires to the closest energized conductor. As described above these clearances exceed both requirements.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

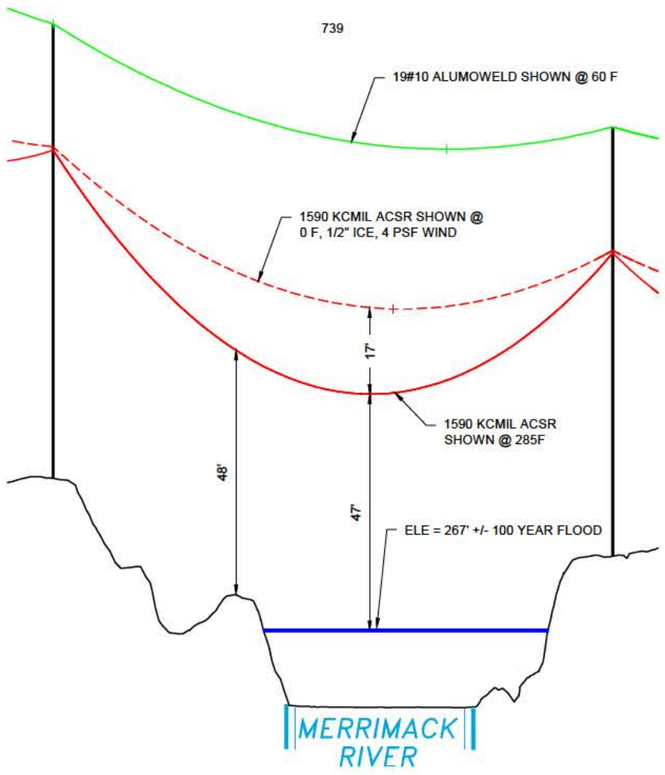
THE NORTHERN PASS

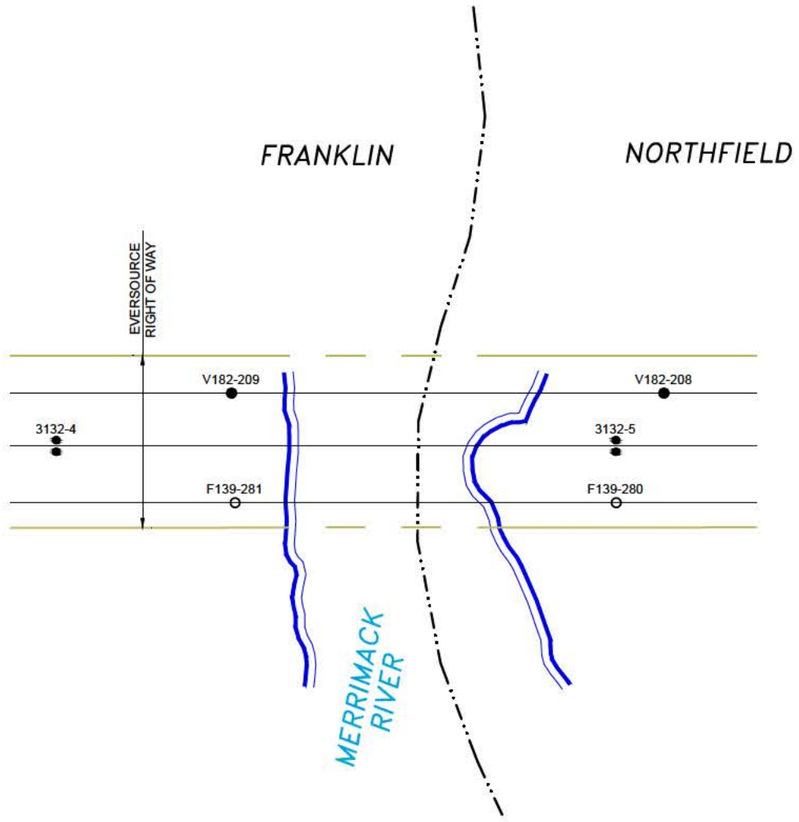
Line List 7077
Merrimack River
Water Crossing Permit
Location Map

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL7077_Merrimack_River_Lettersize.mxd rfraser 8/26/2015





RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
EXIST NG MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 7077 3132 MERRIMACK RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	313299905.DWG

APPENDIX 14
3132 AC LINE
STRUCTURES 3132-112 TO 3132-117
TURTLE POND
CONCORD, NH

1. This crossing is shown on attached drawing 313299901

2. The location of the 3132 line is shown on attached map titled Line List 8076.

3. The 3132 line will cross Turtle Pond on steel structures. The energized conductor is in a horizontal configuration using a 2-bundle of 1590 kcmil ACSR. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. 3132-113, 3132-115 & 3132-116 will be structures with suspension insulators. The energized conductors are separated approximately 26 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 13 feet. The ground/OPGW and energized conductor are separated vertically by approximately 25 feet.
    b. 3132-112, 3132-114 & 3132-117 will be structures with strain insulators. The energized conductors are separated approximately 30 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 60 feet. The ground/OPGW and energized conductor are separated vertically by approximately 25 feet.

4. Energized conductors will have a maximum tension of 11,400 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 40 feet between the energized conductor and ground has been achieved, which is greater than required 20.8 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for Turtle Pond were based on information in FEMA Flood Insurance Rate Map (FIRM) 33013C0345E. This document has an effective date of April 19, 2010. Based on the information provided in the FIRM, the section of the Turtle Pond where the 3132 line crosses is in an area unlabeled. Due to the uncertainties

and availability of flood data for this portion of the Turtle Pond, Northern Pass Transmission, LLC has used the approximate top of the pond bank as the peak elevation for this pond. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation since it is neither labeled with base flood elevation or Zone A classification. At the time of survey the elevation at this section of the Turtle Pond was 316 feet and elevation of the top of the Pond bank was 317 feet. These elevations are based on the North American Vertical Datum of 1988. The area of the crossing, as required by the Section 232 of the NESC is approximately 150 acres.

7. The 3132 line is a 345 kV alternating current (AC) line.

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 6.24 feet or [(209.1 kV-22 kV)x 0.4]/12 is needed, which brings the total required minimum clearance to 34.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 7.72 feet is required between 345 kV AC energized conductor and ground wire
        ii. 12.83 feet is required between 345 kV AC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.17 feet is required between 345 kV AC energized conductors and ground wire
        ii. 13.00 feet is required between 345 kV AC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.01 feet is required between 345 kV AC energized conductors and ground wire
        ii. 13.12 feet is required between 345 kV AC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 7.34 feet are required between 345 kV AC energized conductors and ground wire
        ii. 14.31 feet are required between 345 kV AC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

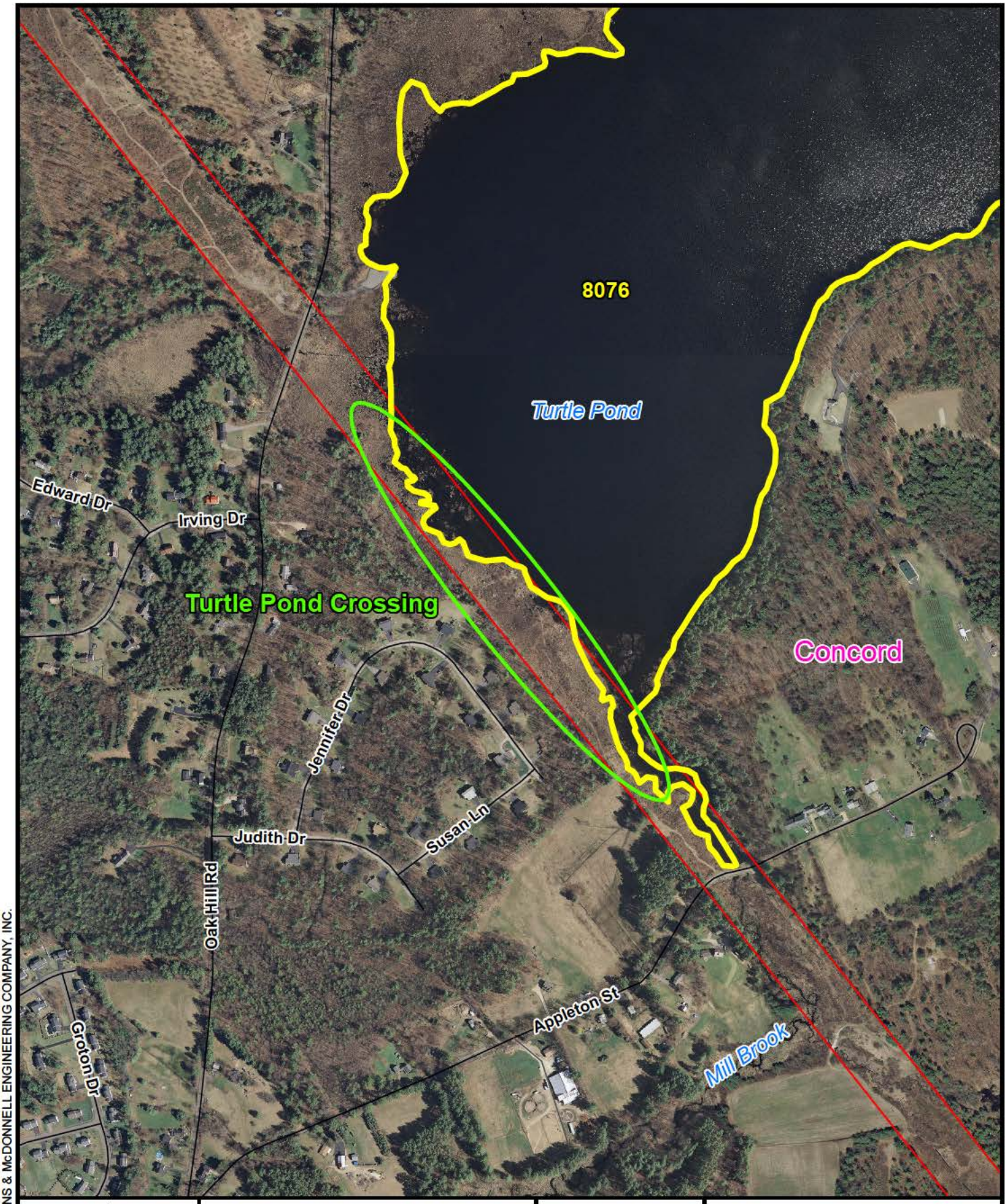
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

    i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

    j. 285 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 43 feet, this exceeds the minimum required clearance of 34.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 24.7 feet vertically and 2.1 feet horizontally from the ground wires to the closest energized conductor. As described above these clearances exceed both requirements.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

THE NORTHERN PASS

Line List 8076
Turtle Pond
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL8076_Turtle_Pond_Lettersize.mxd rfraser 8/26/2015

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015

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ELE=334.98
LAT=43.25497025
LONG=-71 52348867

3132-113
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LAT=43.25332951
LONG=-71.52172

3132-114
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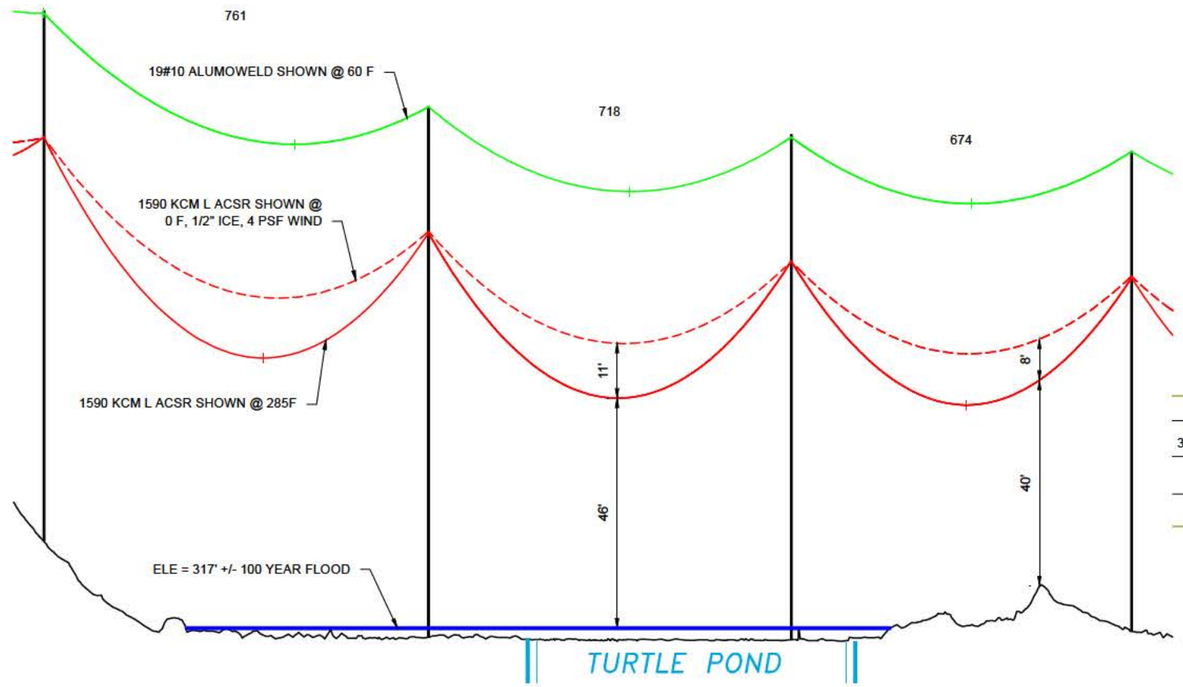
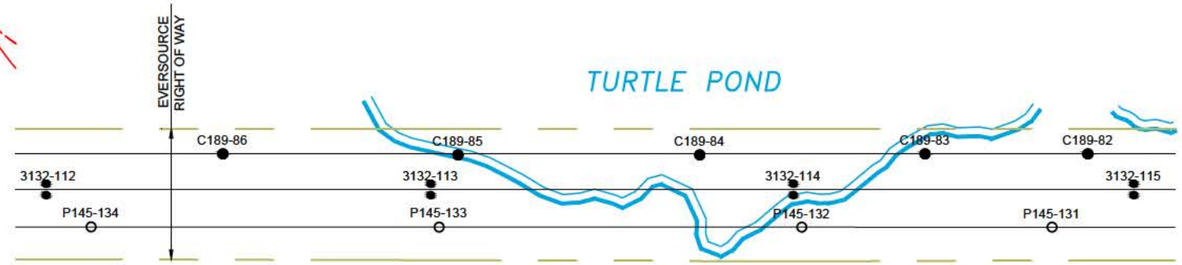




CONCORD

NOTE:
318 LINE NOT SHOWN
FOR CLARITY

RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
EXIST NG MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

300.0 ft. Horiz. Scale
30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

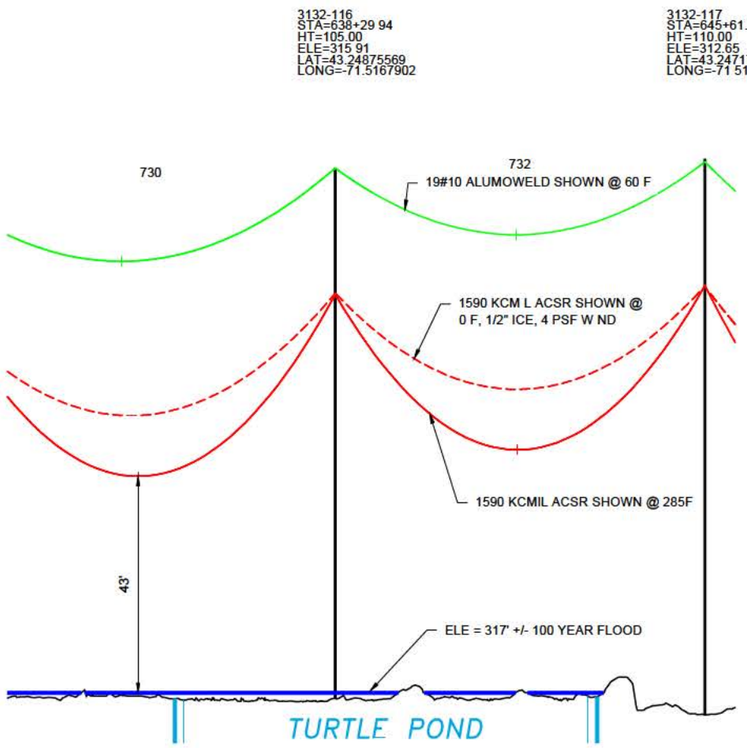
THE NORTHERN PASS

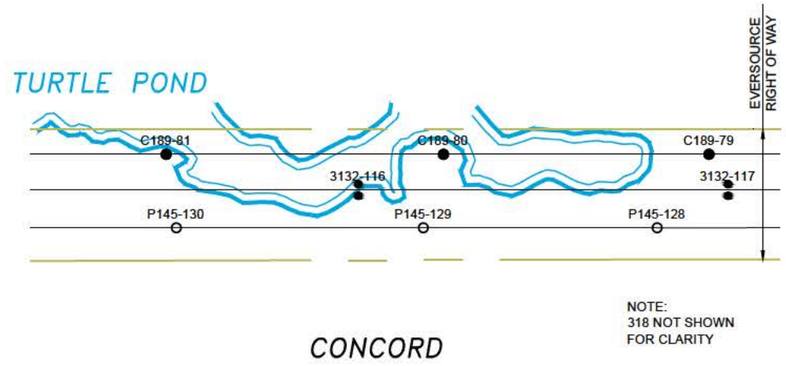
NORTHERN PASS LLC

TITLE: S1 LL 8076 3132
TURTLE POND sh 1 OF 2

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	313299901.DWG

05/06/2015 1:43pm – mspepich – N:\NUSCO\58479 – NPT\Overhead\Cadd\01-Record Worksheets\02 Permits\Water Cross Permits\313299901.dwg





NOTE:
318 NOT SHOWN
FOR CLARITY

RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
EXIST NG MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

300.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 8076 3132
TURTLE POND sh 2 OF 2

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	313299901.DWG

APPENDIX 15
3132 AC LINE
STRUCTURES 3132-159 TO 3132-160
SOUCOOK RIVER
CONCORD/PEMBROKE, NH

1. This crossing is shown on attached drawing 313299903

2. The location of the 3132 line is shown on attached map titled Line List 8951.

3. The 3132 line will cross the Soucook River on steel structures. The energized conductor is in a horizontal configuration using a 2-bundle of 1590 kcmil ACSR. The structures will have 2 ground wires in a horizontal configuration. One will be 19#10 Alumoweld; the other will be an OPGW with sag coefficients similar to 19#10 Alumoweld.

    a. 3132-159 & 3132-160 will be structures with strain insulators. The energized conductors are separated approximately 26 feet horizontally and 0 feet vertically in a horizontal configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW wires are separated horizontally approximately 52 feet. The ground/OPGW and energized conductor are separated vertically by approximately 25 feet.

4. Energized conductors will have a maximum tension of 11,400 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 48 feet between the energized conductor and ground has been achieved, which is greater than required 20.8 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Soucook River were based on information in FEMA Flood Insurance Rate Map (FIRM) 33013C0553E Panel 553 of 705. This document has an effective date of April 19, 2010. The 100 year flood elevation for this portion of the river is approximately 304 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 17 acres (140 feet x 5280 feet / 43560 square feet/acre).

7. The 3132 line is a 345 kV alternating current (AC) line.

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as

specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 6.24 feet or [(209.1 kV-22 kV)x 0.4]/12 is needed, which brings the total required minimum clearance to 34.7 feet.

b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

    i. 7.72 feet is required between 345 kV AC energized conductor and ground wire
    ii. 12.83 feet is required between 345 kV AC energized conductors

d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

    i. 9.17 feet is required between 345 kV AC energized conductors and ground wire
    ii. 13.00 feet is required between 345 kV AC energized conductors
    iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
    i. 8.01 feet is required between 345 kV AC energized conductors and ground wire
    ii. 13.12 feet is required between 345 kV AC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
    i. 7.34 feet are required between 345 kV AC energized conductors and ground wire
    ii. 14.31 feet are required between 345 kV AC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

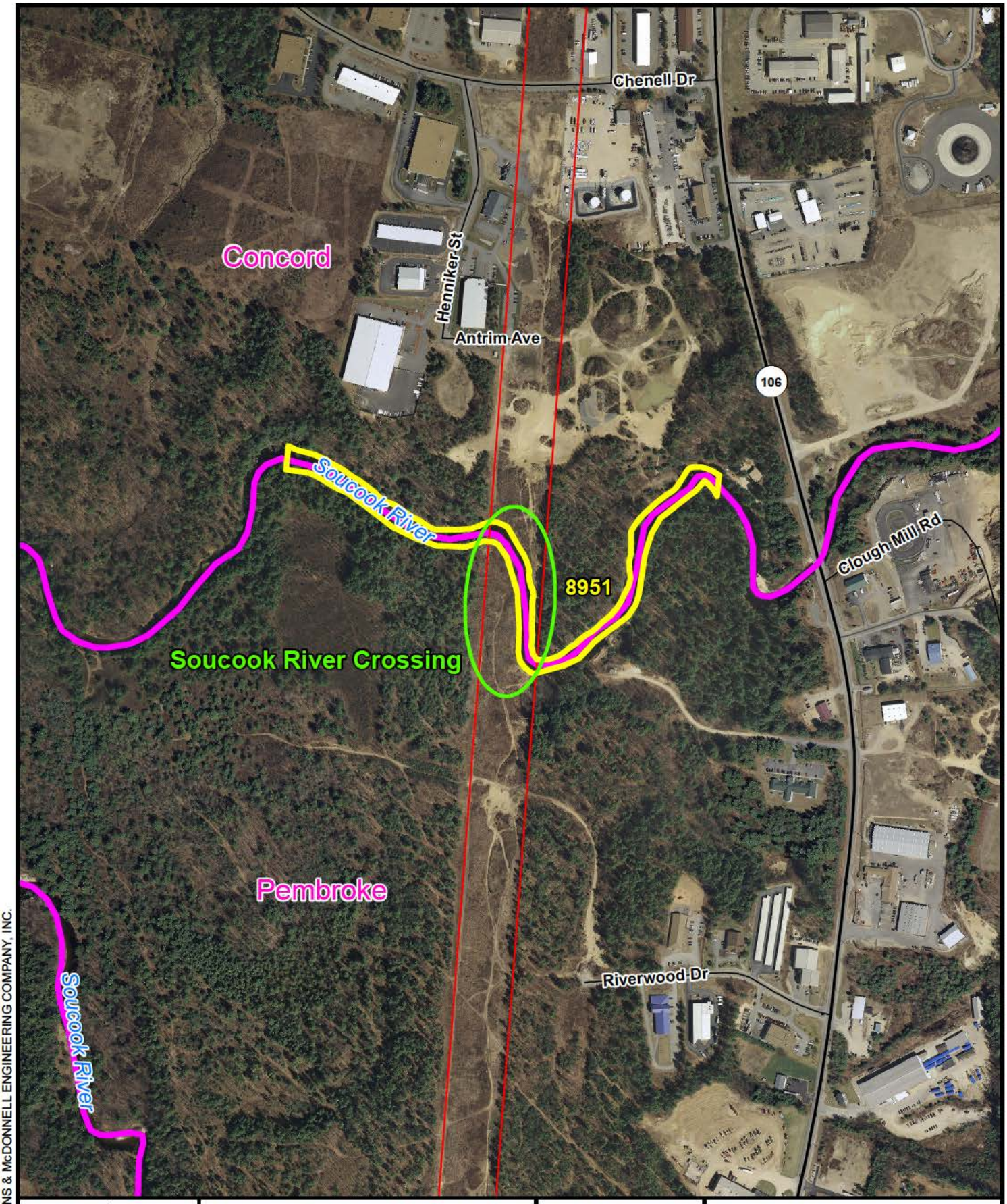
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

    h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 285 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 59 feet, this exceeds the minimum required clearance of 34.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 24.9 feet vertically and 4.4 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

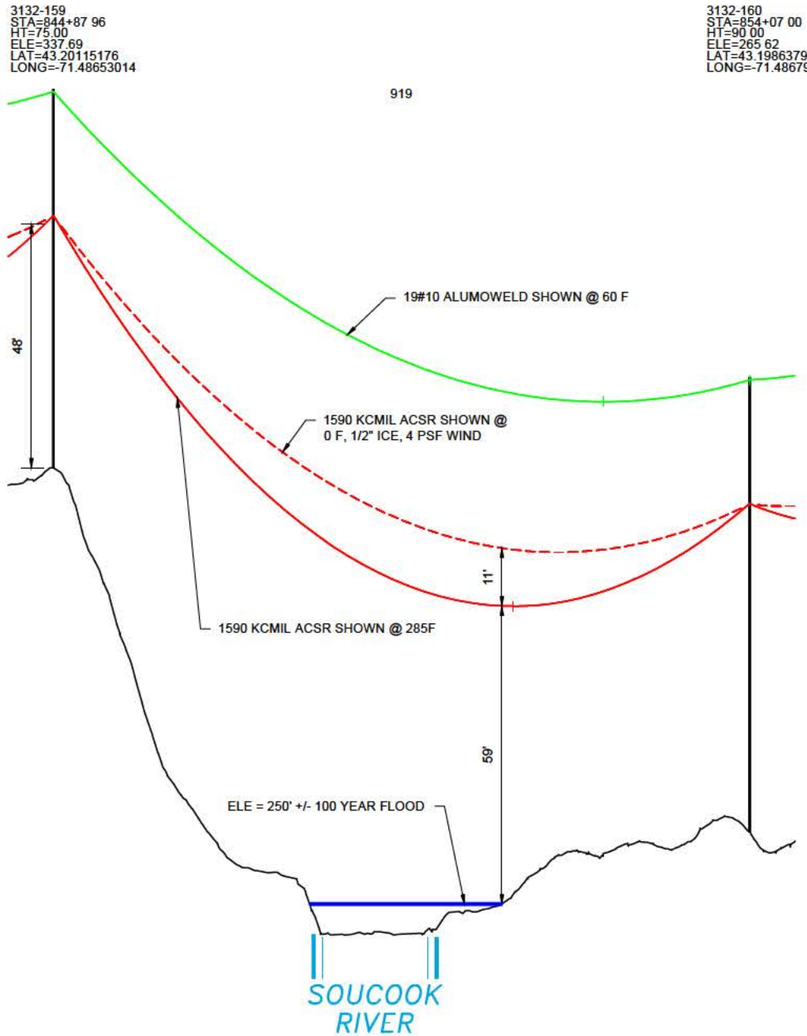
THE NORTHERN PASS

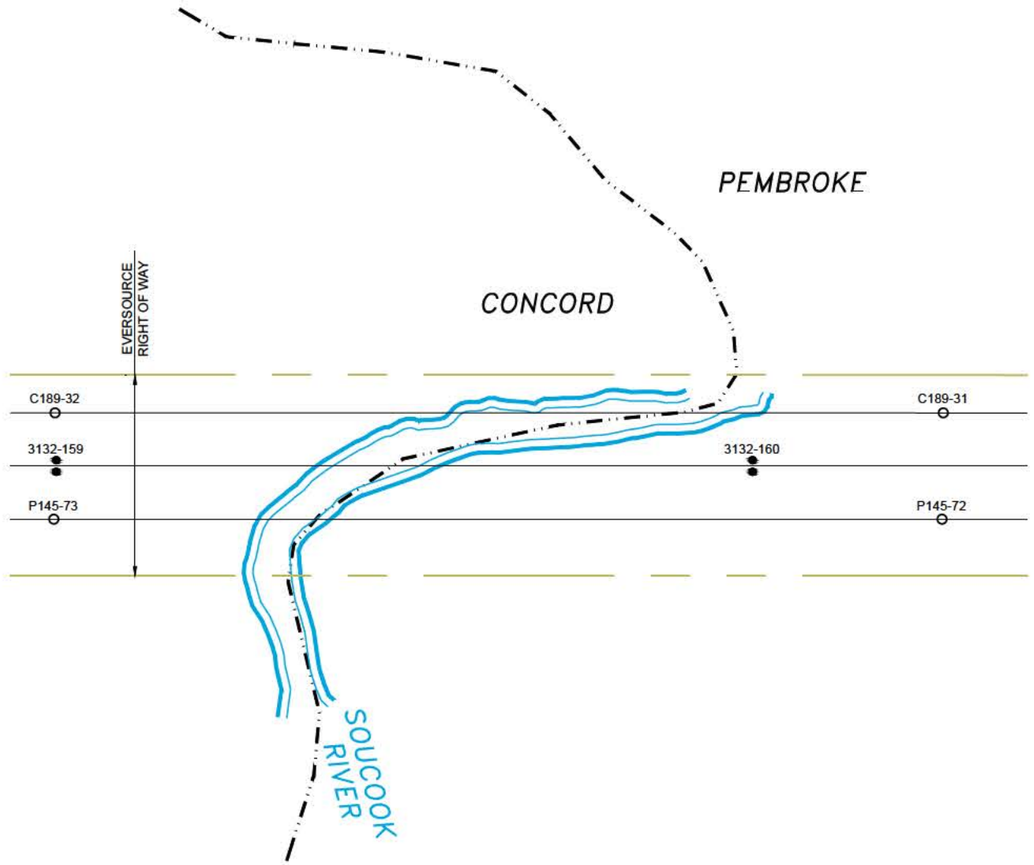
Line List 8951
Soucook River
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL8951_Soucook_River_Lettersize.mxd frraser 8/26/2015

Source: NH DOT 2011 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015





RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 8951 3132 SOUCOOK RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	313299903.DWG

APPENDIX 16
3132 AC LINE
STRUCTURES 3132-218 TO 3132-220
SUNCOOK RIVER
ALLENTOWN/PEMBROKE, NH

1. This crossing is shown on attached drawing 313299902

2. The location of the 3132 line is shown on attached map titled Line List 8950.

3. The 3132 line will cross the Suncook River on steel structures. The energized conductor is in a vertical configuration using a 2-bundle of 1590 kcmil ACSR. The structures will have ground wire. OPGW with sag coefficients similar to 19#10 Alumoweld will be used.

    a. 3132-218 thru 3132-220 will be structures with suspension insulators. The energized conductors are separated approximately 0 feet horizontally and 22 feet vertically in a vertical configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW and energized conductor are separated vertically by approximately 22 feet and 5 feet horizontally.

4. Energized conductors will have a maximum tension of 11,400 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 40 feet between the energized conductor and ground has been achieved, which is greater than required 20.8 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Suncook River were based on information in FEMA Flood Insurance Rate Map (FIRM) 33013C0567E Panel 567 of 705. This document has an effective date of April 19, 2010. The 100 year flood elevation for this portion of the river is approximately 304 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 97 acres (800 feet x 5280 feet / 43560 square feet/acre).

7. The 3132 line is a 345 kV alternating current (AC) line.

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an

additional clearance of 6.24 feet or [(209.1 kV-22 kV)x 0.4]/12 is needed, which brings the total required minimum clearance to 34.7 feet.

b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

   i. 7.72 feet is required between 345 kV AC energized conductor and ground wire
   ii. 12.83 feet is required between 345 kV AC energized conductors

d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

   i. 9.17 feet is required between 345 kV AC energized conductors and ground wire
   ii. 13.00 feet is required between 345 kV AC energized conductors
   iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
   i. 8.01 feet is required between 345 kV AC energized conductors and ground wire
   ii. 13.12 feet is required between 345 kV AC energized conductors

f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
   i. 7.34 feet are required between 345 kV AC energized conductors and ground wire
   ii. 14.31 feet are required between 345 kV AC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

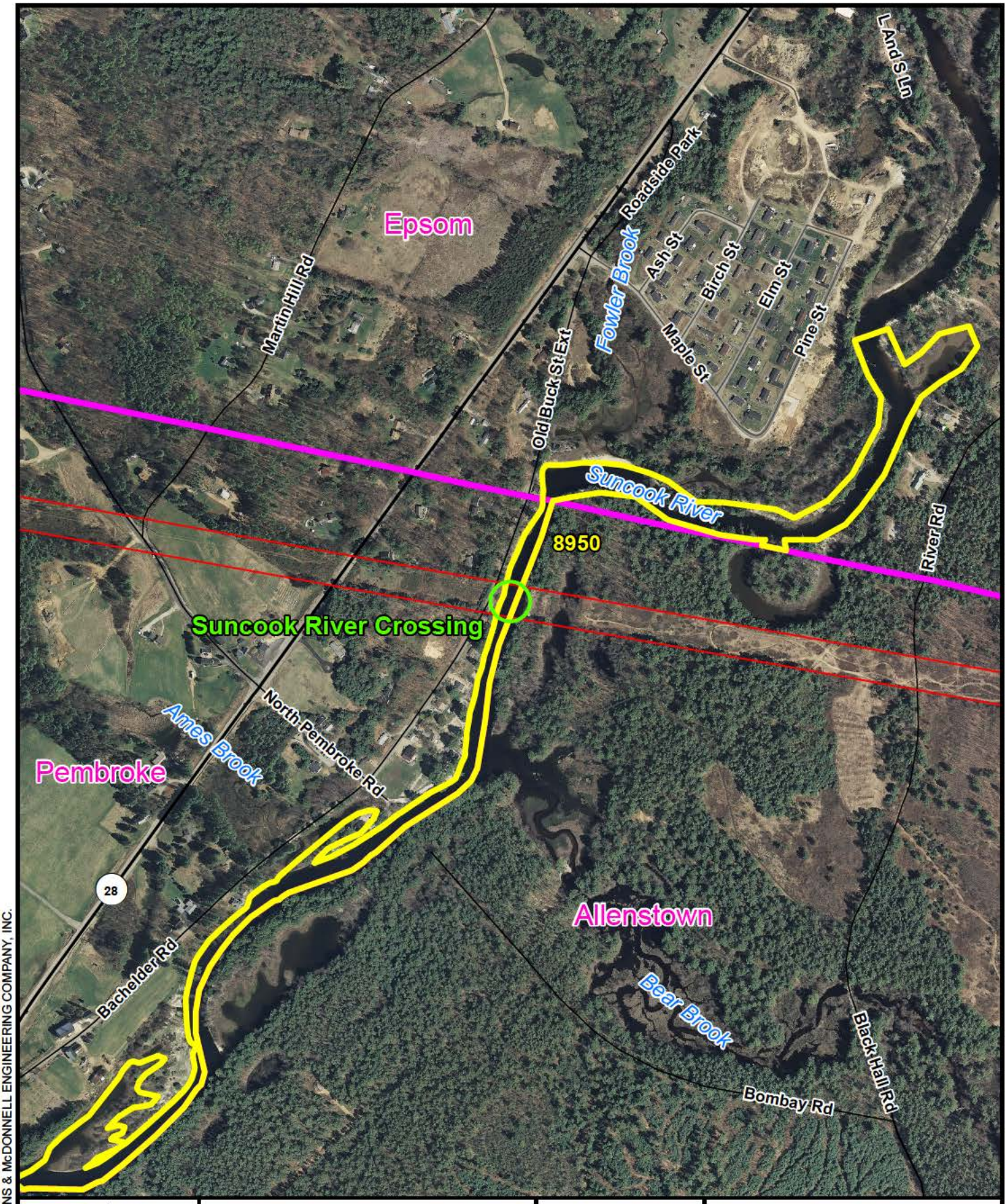
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

   h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 285 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 38 feet, this exceeds the minimum required clearance of 34.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 21.9 feet vertically and 4.9 feet horizontally from the ground wires to the closest energized conductor.



NORTH

0 300 600

Feet

LEGEND

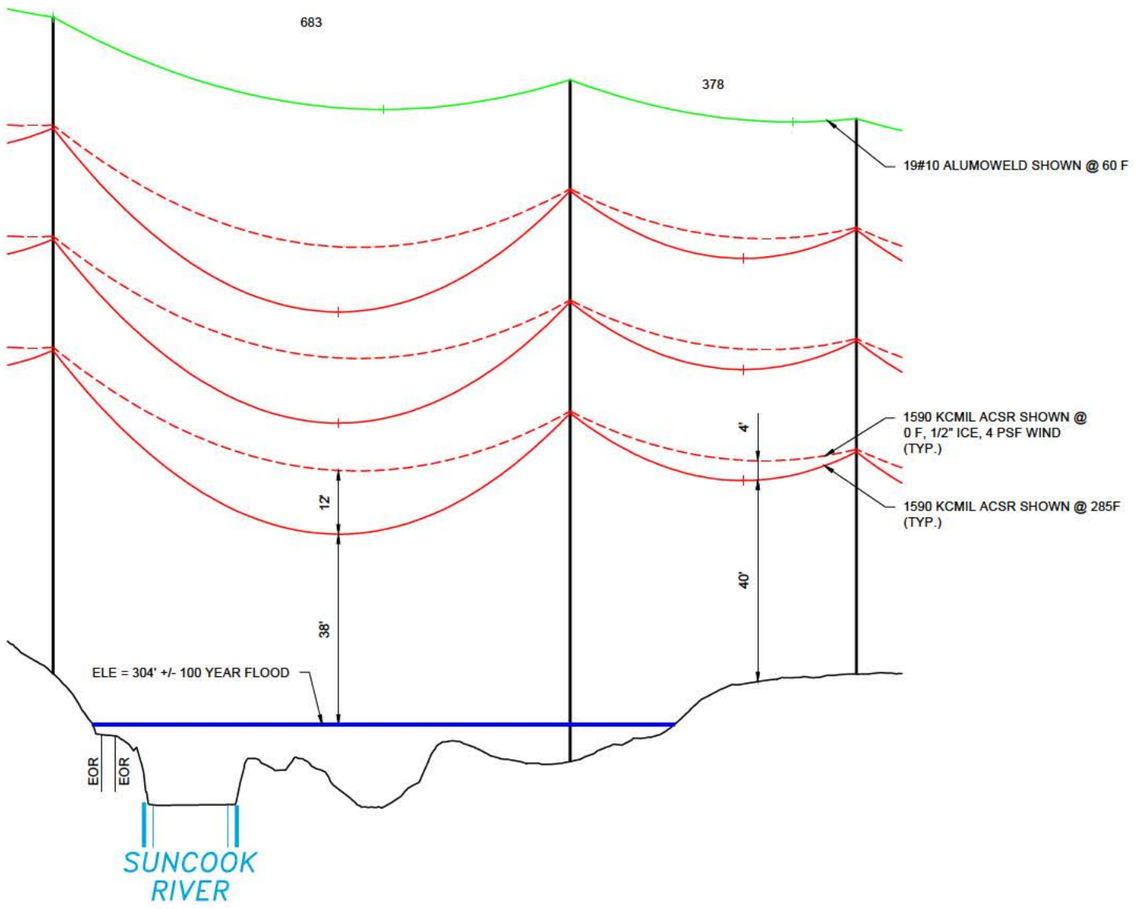
- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

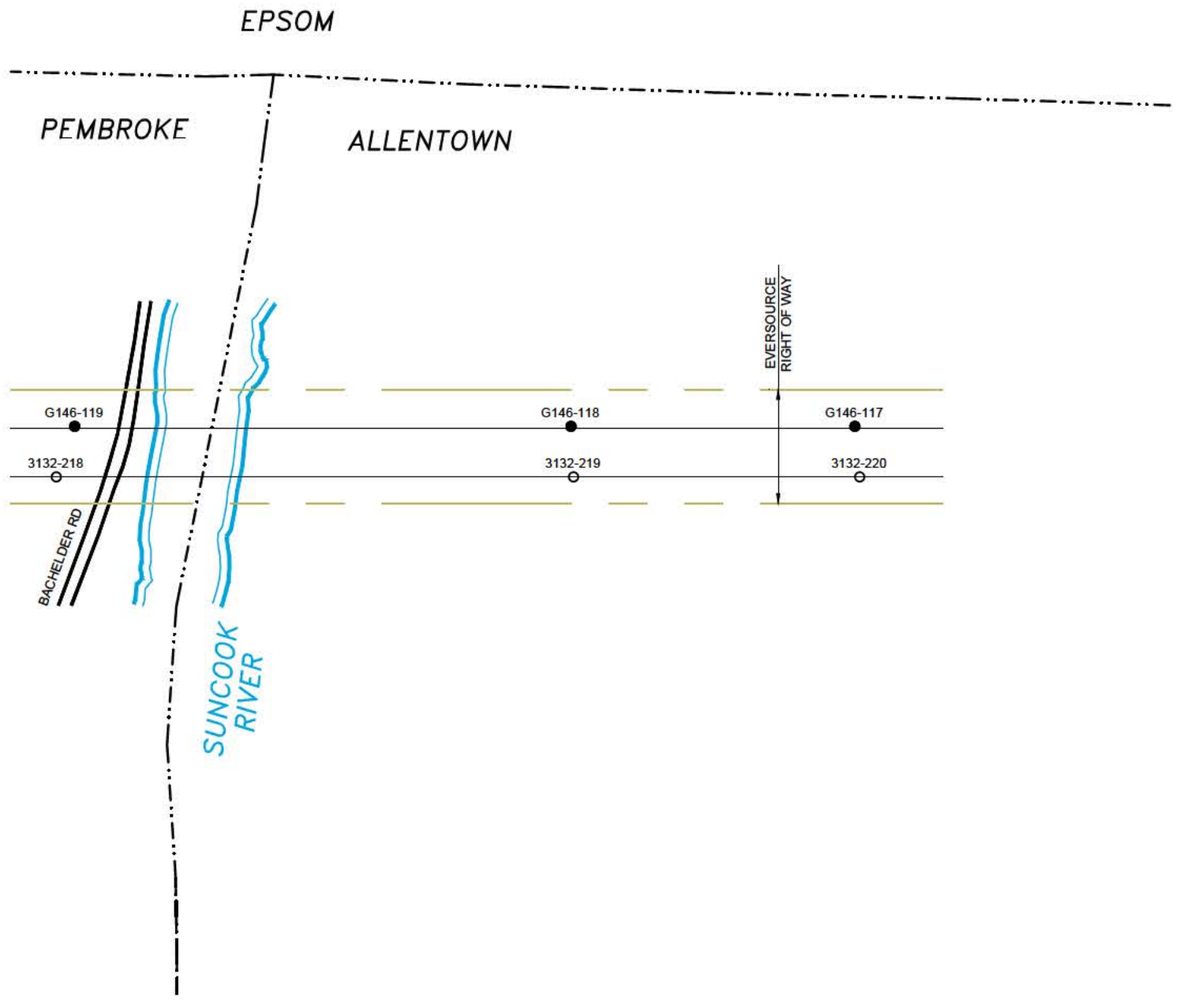
THE NORTHERN PASS

Line List 8950
Suncook River
Water Crossing Permit
Location Map

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015





RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
EXIST NG MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

N

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–		–	–
A	4/30/15	ISSUED FOR REVIEW		MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 8950 3132 SUNCOOK RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	313299902.DWG

09/25/2015 7:57am – mspepich – N:\NUSCO\58479 – NPT\Overhead\Cadd\01–Record Worksheets\02 Permits\Water Cross Permits\313299902.dwg

APPENDIX 17
3132 AC LINE
STRUCTURES 3132-295 TO 3132-296
LAMPREY RIVER
DEERFIELD, NH

1. This crossing is shown on attached drawing 313299904

2. The location of the 3132 line is shown on attached map titled Line List 9703.01.

3. The 3132 line will cross the Lamprey River on steel structures. The energized conductor is in a vertical configuration using a 2-bundle of 1590 kcmil ACSR. The structures will have ground wire. OPGW with sag coefficients similar to 19#10 Alumoweld will be used.

    a. 3132-295 will be a structure with suspension insulators. The energized conductors are separated approximately 0 feet horizontally and 22 feet vertically in a vertical configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW and energized conductor are separated vertically by approximately 22 feet and 5 feet horizontally.
    b. 3132-296 will be a structure with strain insulators. The energized conductors are separated approximately 0 feet horizontally and 22 feet vertically in a vertical configuration. The ground/OPGW wire is carried on the structure by a support bracket approximately 6 inches below the top of the structure. The ground/OPGW and energized conductor are separated vertically by approximately 22 feet and 0 feet horizontally.

4. Energized conductors will have a maximum tension of 11,400 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice). Ground wires will have a maximum tension of 5,500 pounds at NESC 250B Heavy weather case (0 degrees F, 4 pounds per square foot wind loading, ½-inch radial ice).

5. All NESC clearances described in subsequent paragraphs have been met by exceeding the horizontal and/or vertical clearances required. Minimum distances to ground per the NESC have been met. A clearance of 50 feet between the energized conductor and ground has been achieved, which is greater than required 20.8 feet.

6. Flood water elevations were based on information contained flood insurance rate maps provided by FEMA. Table 232-1 of the NESC states that the minimum clearance over a water body is based on a 10 year flood elevation. In the absence of 10 year flood elevation data, the project has used 100 year flood elevations. All elevations provided are based on NAVD88 and location information is based on NAD83. Flood water elevations for the Lamprey River were based on information in FEMA Flood Insurance Rate Map (FIRM) # 33015C0090E Panel 90 of 681. This document has an effective date of May 17, 2005. Based on the information provided in the FIRM, the section of the Lamprey River where the 3132 line crosses is in an area labeled "Zone A". From the map legend, Zone A areas are determined to be inside of the 1% (100 year flood) annual chance floodplain with no base flood elevations determined. Due to the uncertainties and availability of flood data for this portion of the Lamprey River, Northern Pass

Transmission, LLC has used the approximate top of the river bank as the peak elevation for this river. Based on the information given in the FIRM, Northern Pass Transmission, LLC feels this assumption is more than adequate for a 100 year flood elevation. At the time of survey the elevation at this section of the Lamprey River was 369 feet and elevation of the top of the river bank was 382 feet. The area of the crossing, as required by the Section 232 of the NESC is approximately 38 acres (310 feet x 5280 feet / 43560 square feet/acre).

7. The 3132 line is a 345 kV alternating current (AC) line.

    a. Based on Table 232-1 of the NESC, for open supply conductors 750 V to 22kV to ground, the minimum clearance to the water surface during a normal flood (10 year flood as specified by the NESC, however the project has used the 100 year flood in absence of 10 year data) is 28.5 feet for waters 20-200 acres. NESC Rule 232.C.1.a states that an additional clearance of 6.24 feet or [(209.1 kV-22 kV)x 0.4]/12 is needed, which brings the total required minimum clearance to 34.7 feet.

    b. For overhead ground wires, the minimum required clearance to the water surface at the normal flood level is 25.5 feet. As the static wires are located above the energized conductors at all crossings, this NESC minimum clearance requirement will always be met.

    c. Table 235-1 of the NESC does not specify horizontal values for supply conductors of the same circuit for voltages greater than 50 kV. In the absence of this, the project will use values for different circuits. Based upon Table 235-1:

        i. 7.72 feet is required between 345 kV AC energized conductor and ground wire
        ii. 12.83 feet is required between 345 kV AC energized conductors

    d. Based on Table 235-3 of the NESC for horizontal clearance along the span for wires or conductors carried on the same support

        i. 9.17 feet is required between 345 kV AC energized conductors and ground wire
        ii. 13.00 feet is required between 345 kV AC energized conductors
        iii. These horizontal clearances assume conductor or wire sag of 35 feet which exceeds any sag at the location of these crossings.

    e. Based on Table 235-5 of the NESC the vertical clearance required at the supports for wires or conductors carried on the same supporting structure is:
        i. 8.01 feet is required between 345 kV AC energized conductors and ground wire
        ii. 13.12 feet is required between 345 kV AC energized conductors

    f. Based on Rule 235.C.2.b of the NESC, the vertical clearance required in the span for wires or conductors carried on the same supporting structure:
        i. 7.34 feet are required between 345 kV AC energized conductors and ground wire
        ii. 14.31 feet are required between 345 kV AC energized conductors

g. Per Figure 235-1 of the NESC conductors or wires cannot encroach the envelope formed by the horizontal and vertical clearances prescribed above.

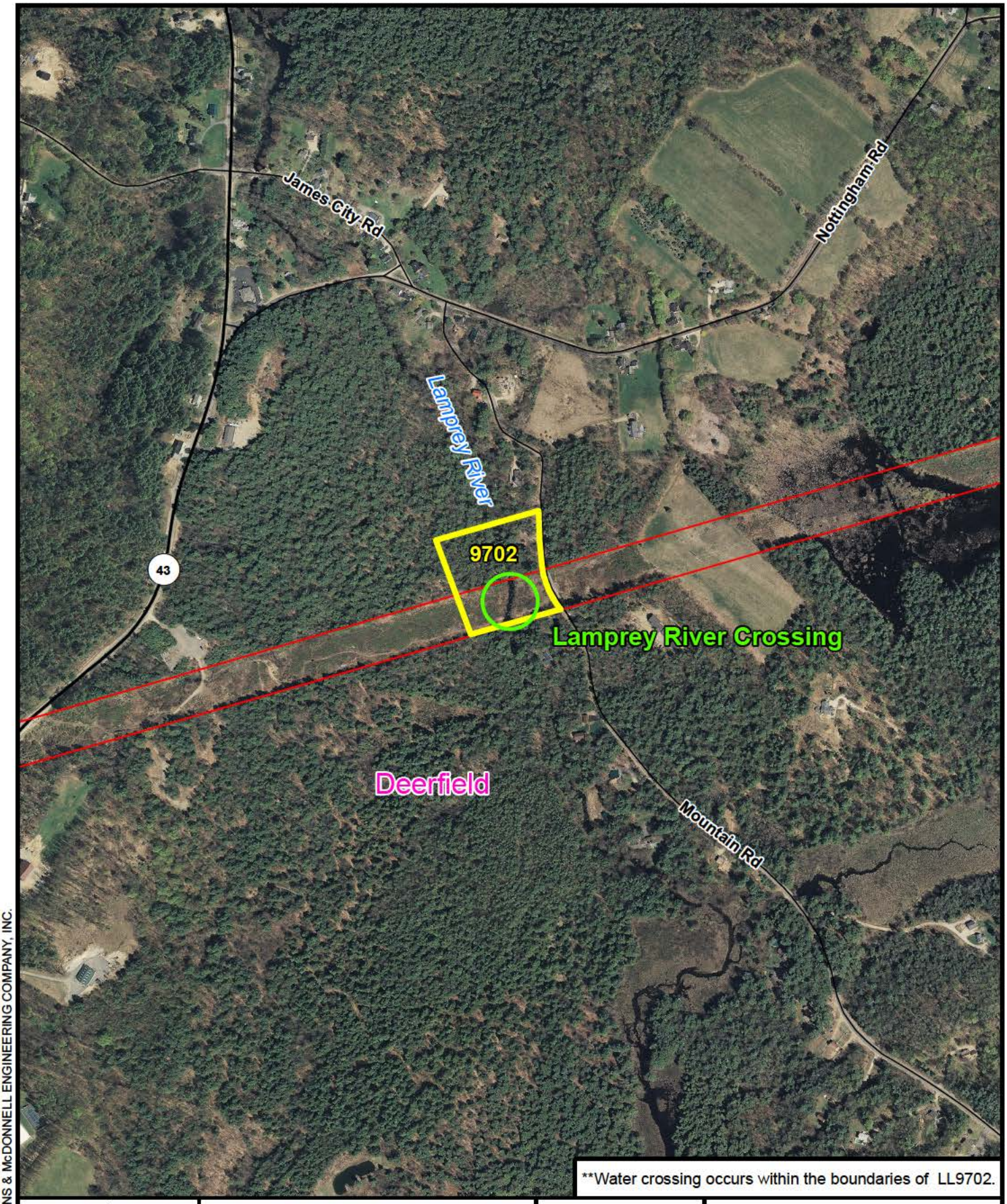
8. The sags and clearances to the water surface during a 100 year flood event for this crossing are as follows:

h. Northern Pass Transmission, LLC (NPT) has investigated a multitude of weather and loading conditions for its design. NPT used these design conditions and combinations thereof to determine the minimum clearance of all conductors to the water and land surfaces, between the phase conductors and OPGW cable. NPT has determined that the weather cases and combinations listed below results in the minimum clearance and control over all other weather conditions and combinations.

i. Ground wires – Due to the fact that the ground wire is located above the energized conductor, its clearance to the water surface will always exceed the minimum required NESC distance.

j. 285 degrees F – Maximum operating temperature (energized conductor) based on NPT transmission standards, the maximum sag for this weather case results in a clearance to the water surface of 38 feet, this exceeds the minimum required clearance of 34.7 feet

Minimum clearance energized conductor to ground wires clearance – The weather case that would produce the minimum clearance between energized conductors and ground wires would be a combination of winter weather factors. First, the energized conductors would be at 30 degrees F immediately following an ice storm and would have recently dropped their ice. The ground wires would be at 32 degrees F and would still be iced with ½" of radial ice. Under these conditions the clearance would be 21.7 feet vertically and 1.6 feet horizontally from the ground wires to the closest energized conductor.



**Water crossing occurs within the boundaries of LL9702.

NORTH

0 300 600

Feet

LEGEND

- Water Crossing Area
- Parcel Boundary
- Project ROW
- Town Boundary

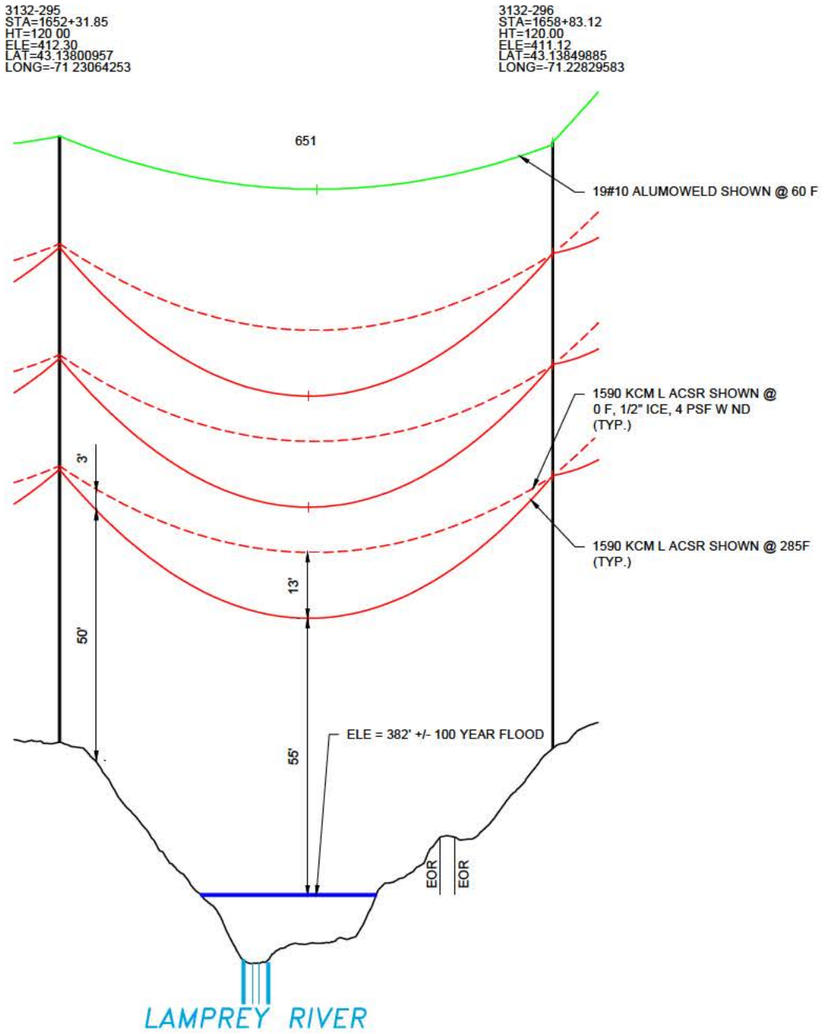
THE NORTHERN PASS

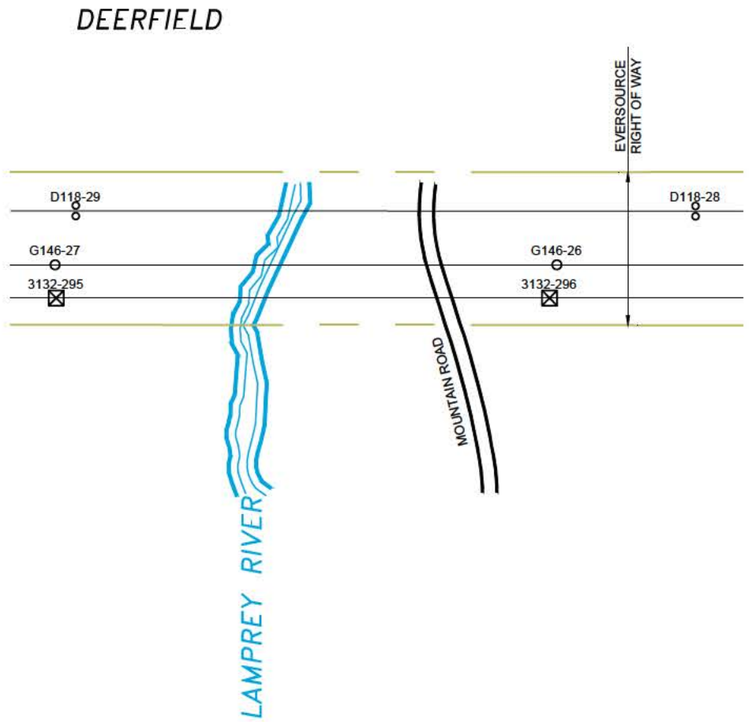
Line List 9702**
Lamprey River
Water Crossing Permit
Location Map

Path: \\ESPSRV\data\Data2\Projects\NUS\53899_DC_Tline\GIS\DataFiles\ArcDocs\Water_Crossing_Maps\Water_Crossing_Permit_LL9702_Lamprey_River_Lettersize.mxd rfraser 8/26/2015

Source: NH DOT 2010 Aerial Photography; NH GRANIT; Burns & McDonnell.

August 26, 2015





RIGHT OF WAY
EOR EDGE OF ROAD
PROPOSED MONOPOLE
PROPOSED TRANS STRUCTURE
EXIST NG H-FRAME
PROPOSED H-FRAME

200.0 ft. Horiz. Scale

30.0 ft. Vert. Scale

N

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	4/30/15	ISSUED FOR REVIEW	MSP	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

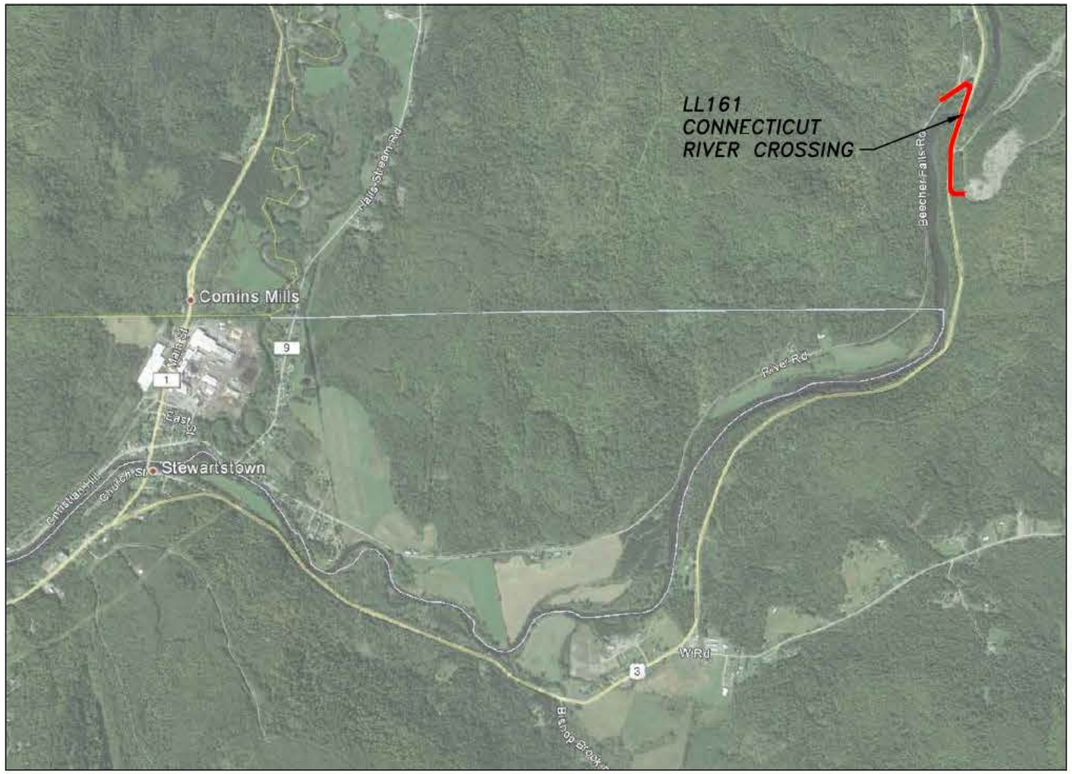
TITLE: S1 LL 9702 3132 LAMPREY RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
MSP	A	4/30/15	B	313299904.DWG

APPENDICES

PART B

UNDERGROUND CROSSINGS

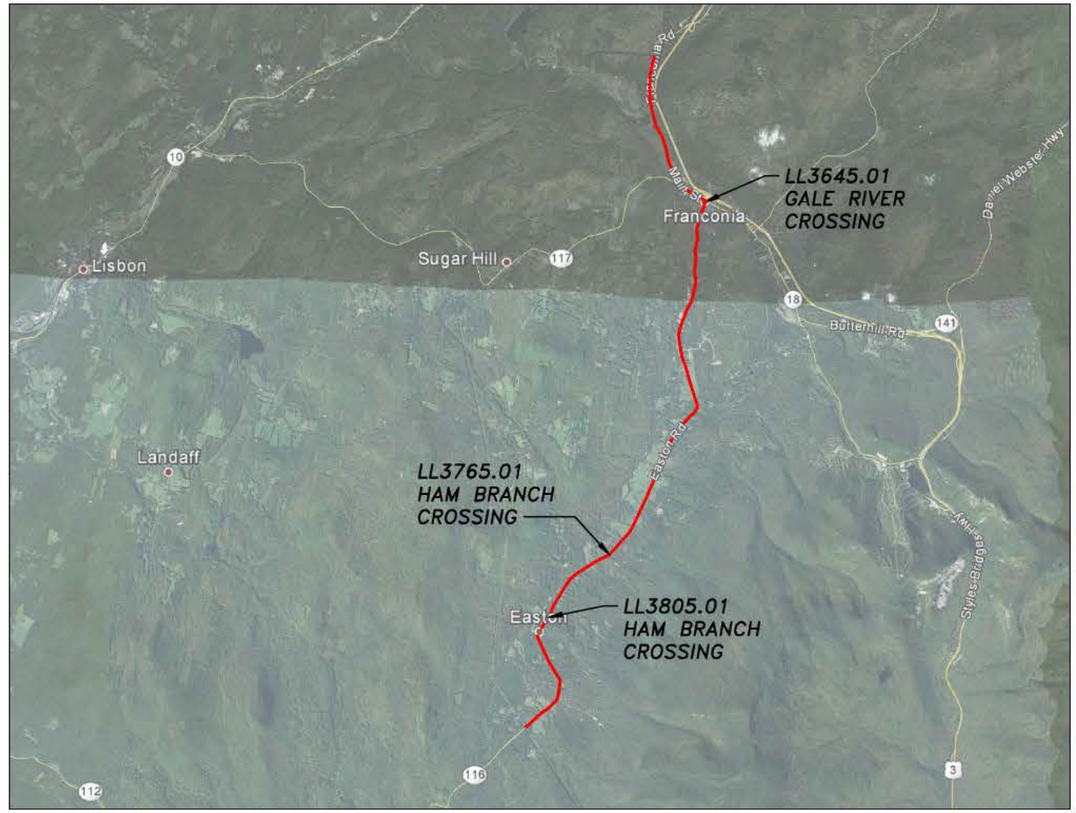


Route 3 (ROT3) UNDERGROUND ALIGNMENT

VICINITY MAP

NOT TO SCALE

IMAGE TAKEN FROM GOOGLE EARTH 2014



SUGAR HILL EASTERN BYPASS (SHEB) Alignment

VICINITY MAP

NOT TO SCALE

IMAGE TAKEN FROM GOOGLE EARTH 2014

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: VICINITY MAPS – 1 ROT3 & SHEB

BY	REV. NO.	DATE	SIZE	DWG. NO.
NDS	A	5/29/15	B	VMAP.DWG

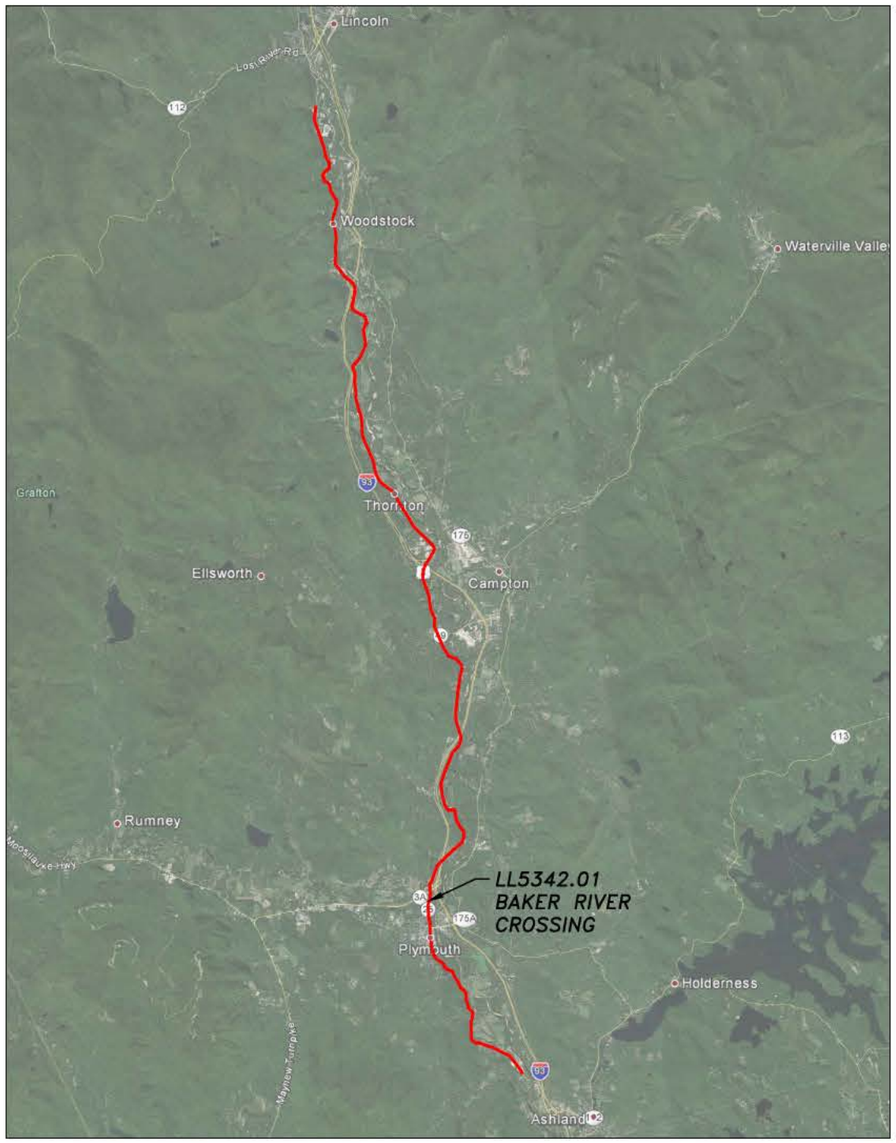
05/29/2015 3:30pm – ckuntz – N:\NUSCO\58479 – NPT\Underground\Cadd\03_REF\UNDWAT_CROSS\VMAP.dwg

WHITE MOUNTAIN NATIONAL FOREST (WMNF) Alignment

VICINITY MAP

NOT TO SCALE

IMAGE TAKEN FROM GOOGLE EARTH 2014



Woodstock to Ashland – Route 3 (WAR3) Alignment

VICINITY MAP

NOT TO SCALE

IMAGE TAKEN FROM GOOGLE EARTH 2014

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY					
–	–	–	–	–	
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB	

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: VICINITY MAPS – 2
WMNF & WAR3

BY	REV. NO.	DATE	SIZE	DWG. NO.
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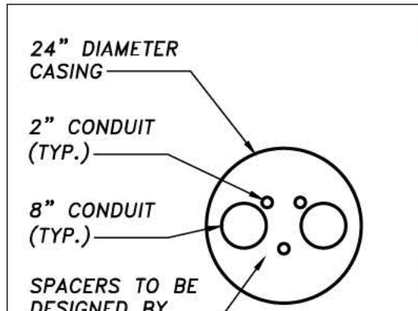
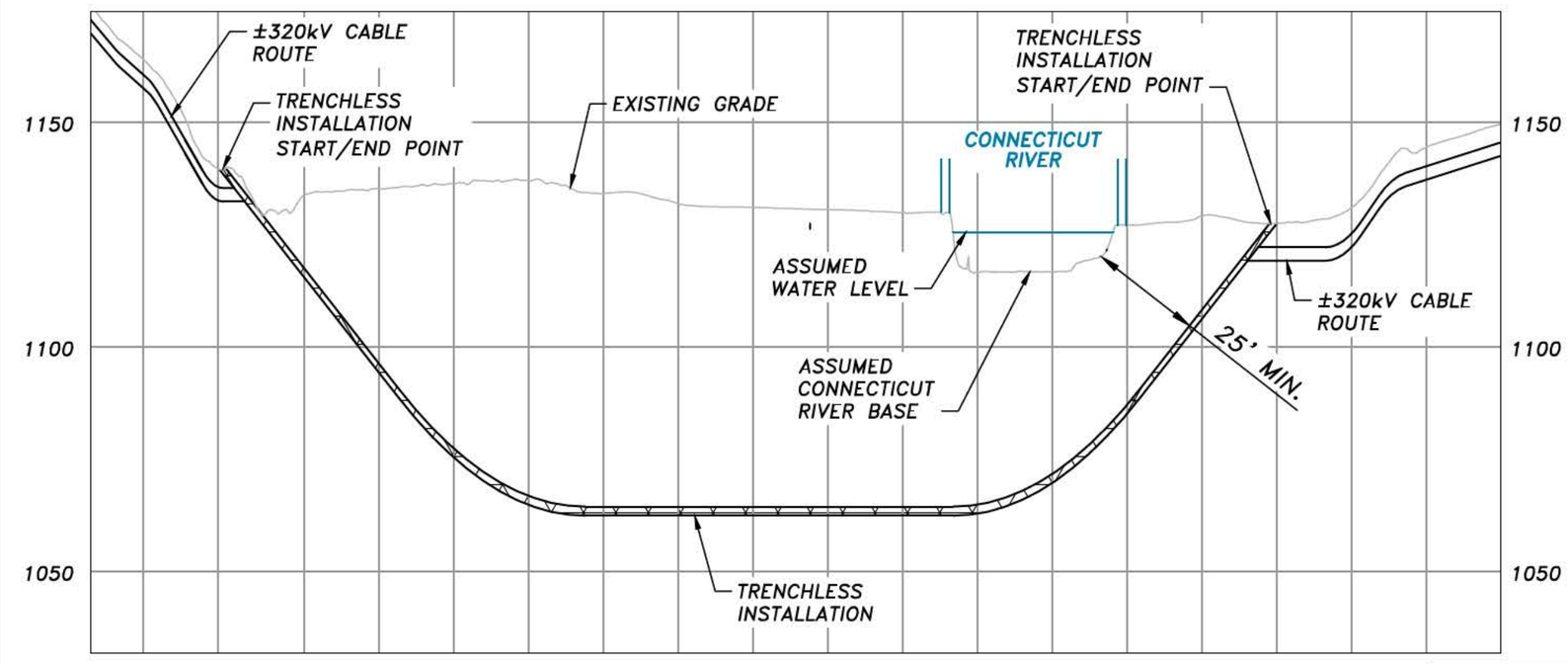


TYPICAL ±320kV CABLE ROUTE TRENCHLESS CROSS-SECTION
NOT TO SCALE



LEGEND:

- EXISTING EDGE OF ROAD
- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY

–	–	–	–	–
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 161 ROT3 STA. 20+50 CONNECTICUT RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
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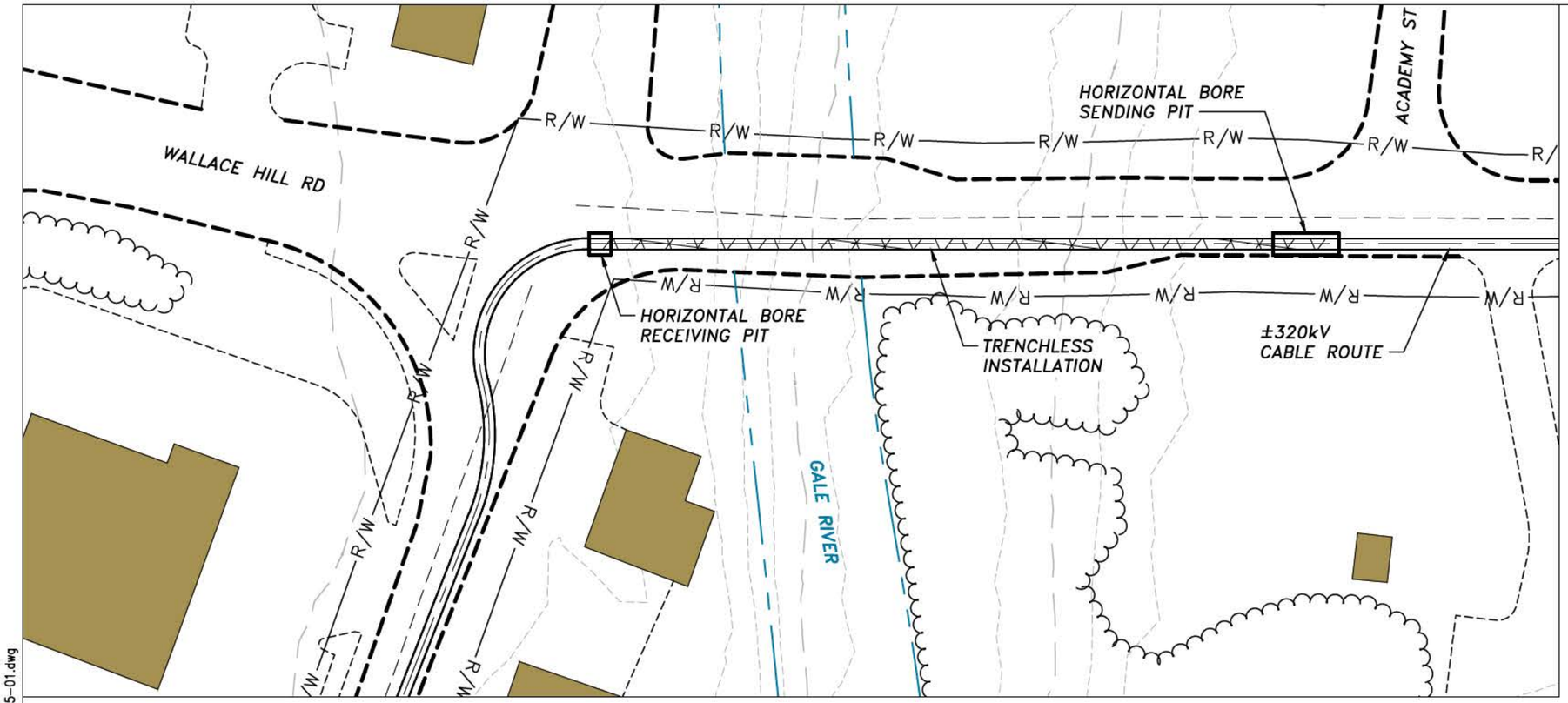
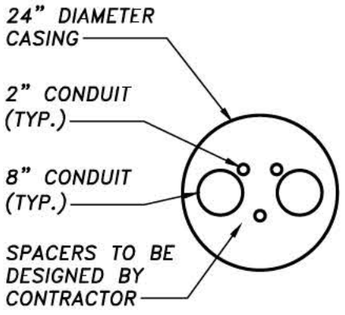
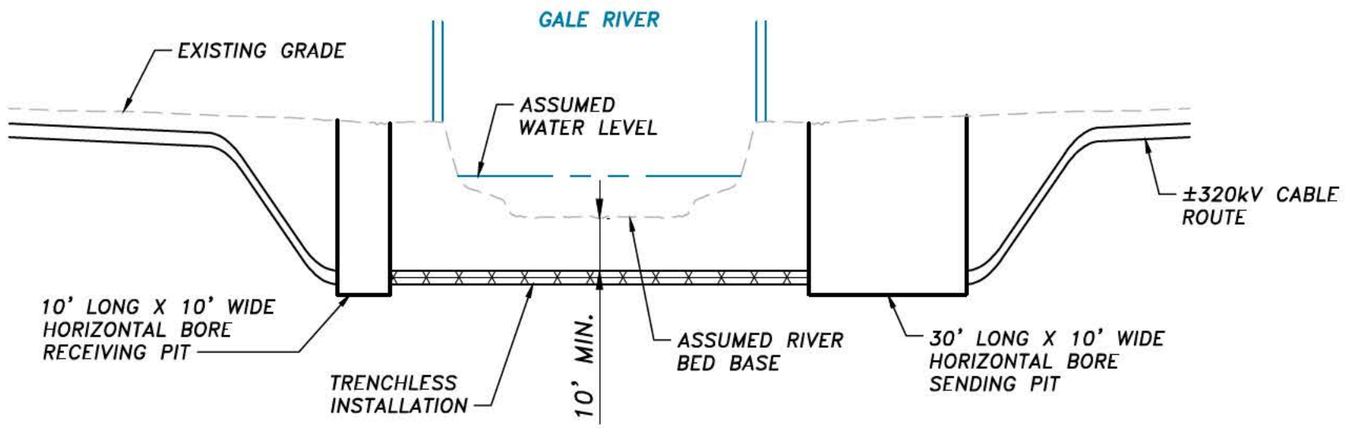




TYPICAL ±320kV CABLE ROUTE TRENCHLESS CROSS-SECTION
NOT TO SCALE



LEGEND:

- EXISTING EDGE OF ROAD
- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
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A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 3645.01 SHEB STA. 126+25 GALE RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
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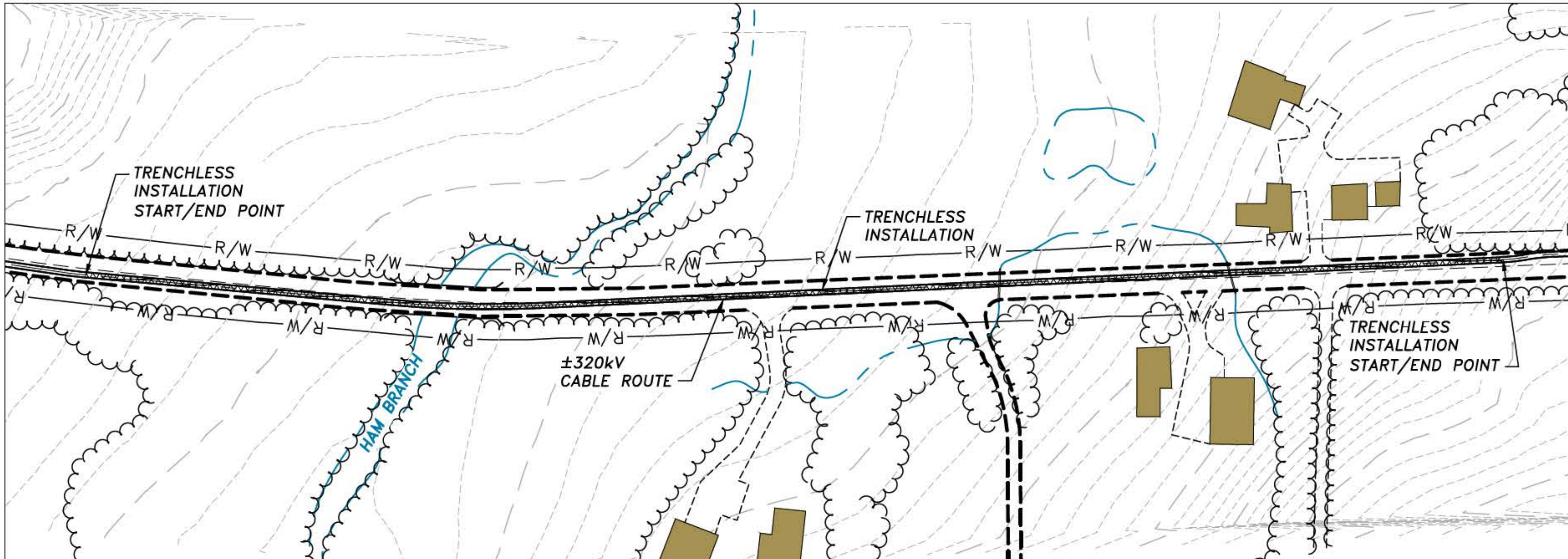
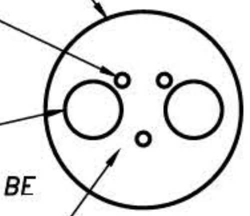
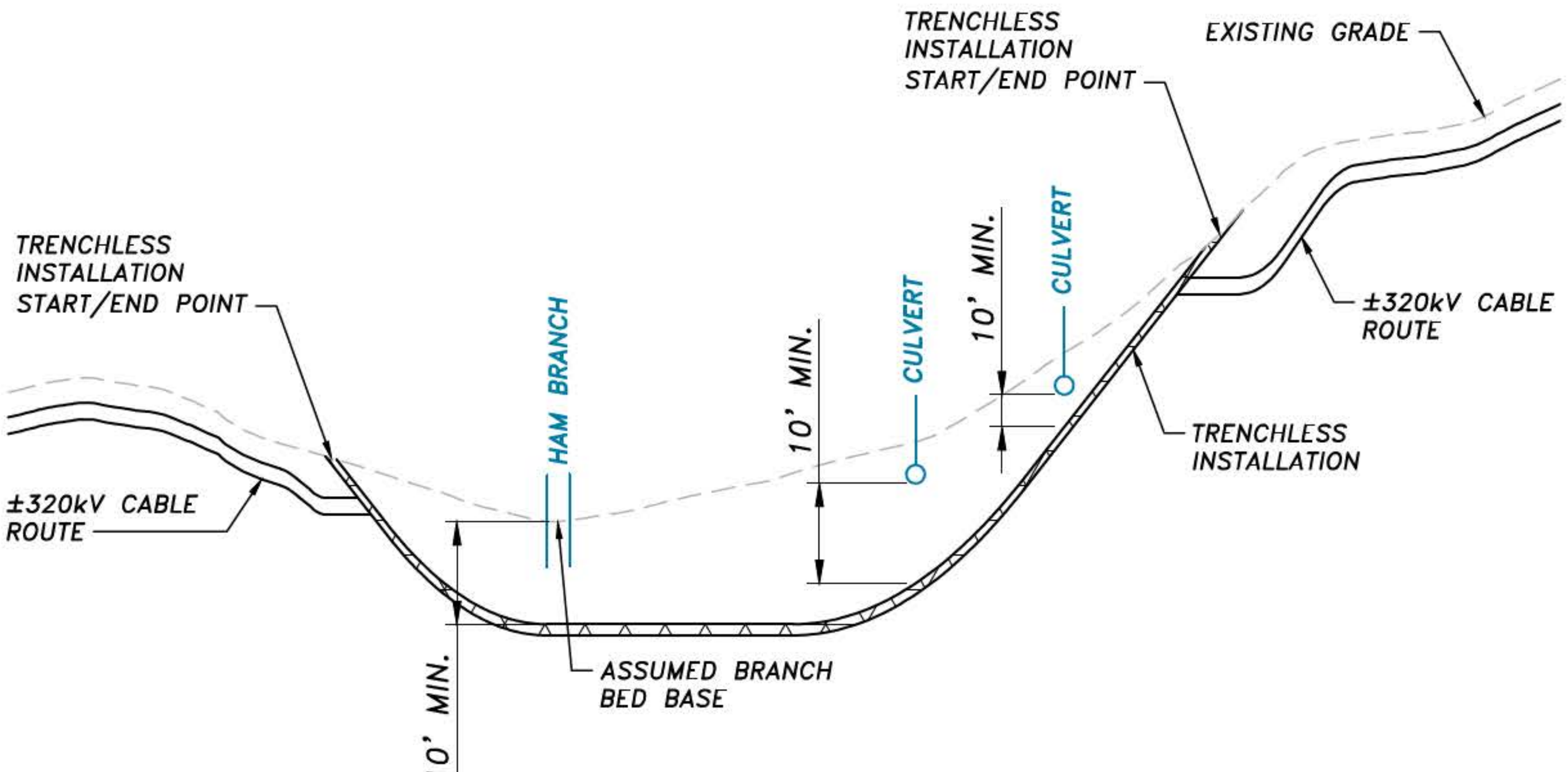




TYPICAL ±320kV CABLE ROUTE TRENCHLESS CROSS-SECTION
NOT TO SCALE



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- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
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A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE S1 LL 3765.01 SHEB STA. 404+00
HAM BRANCH

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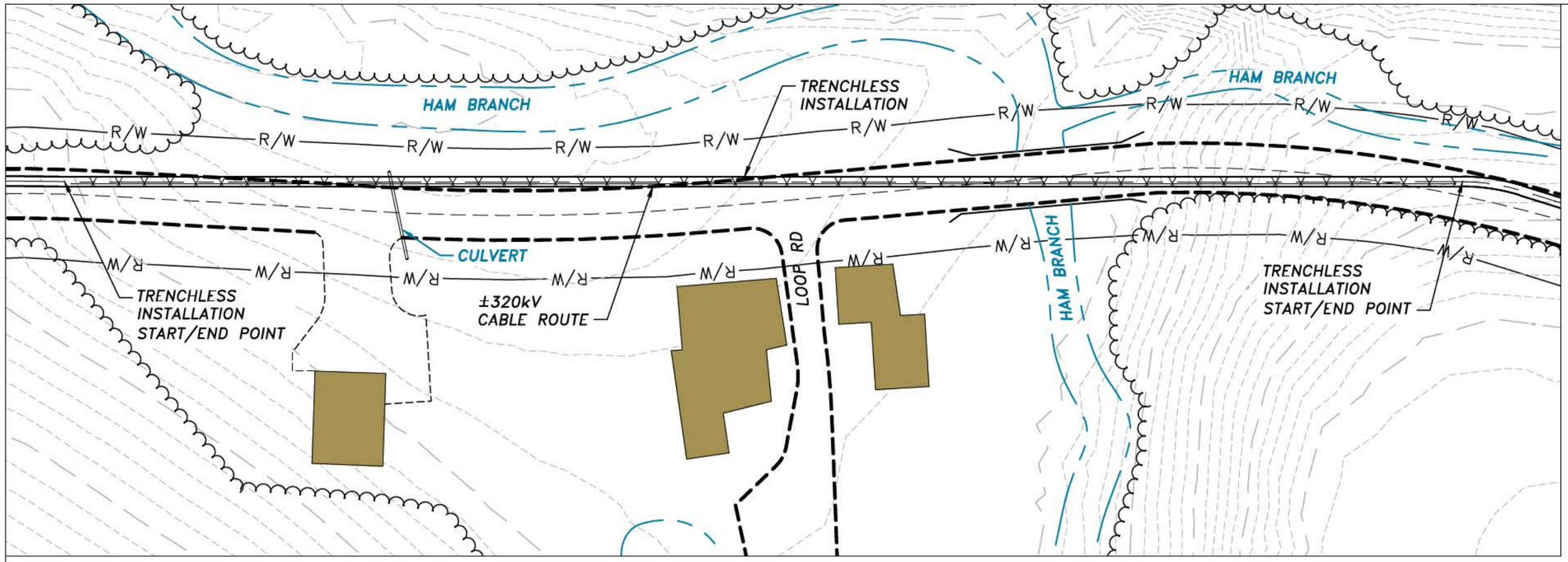

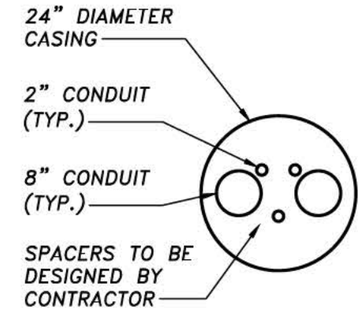

TYPICAL ±320kV CABLE ROUTE
TRENCHLESS CROSS-SECTION
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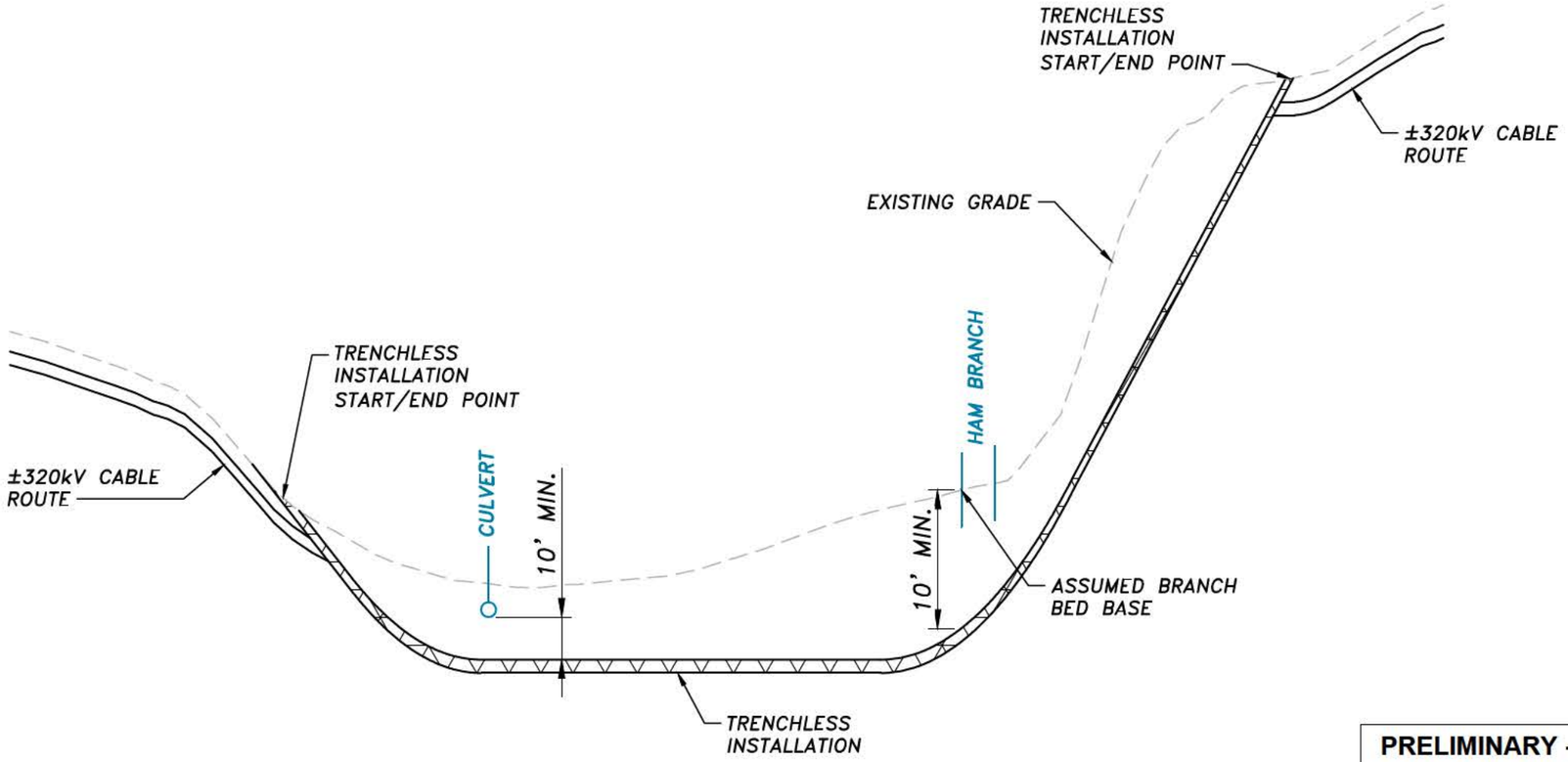

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- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
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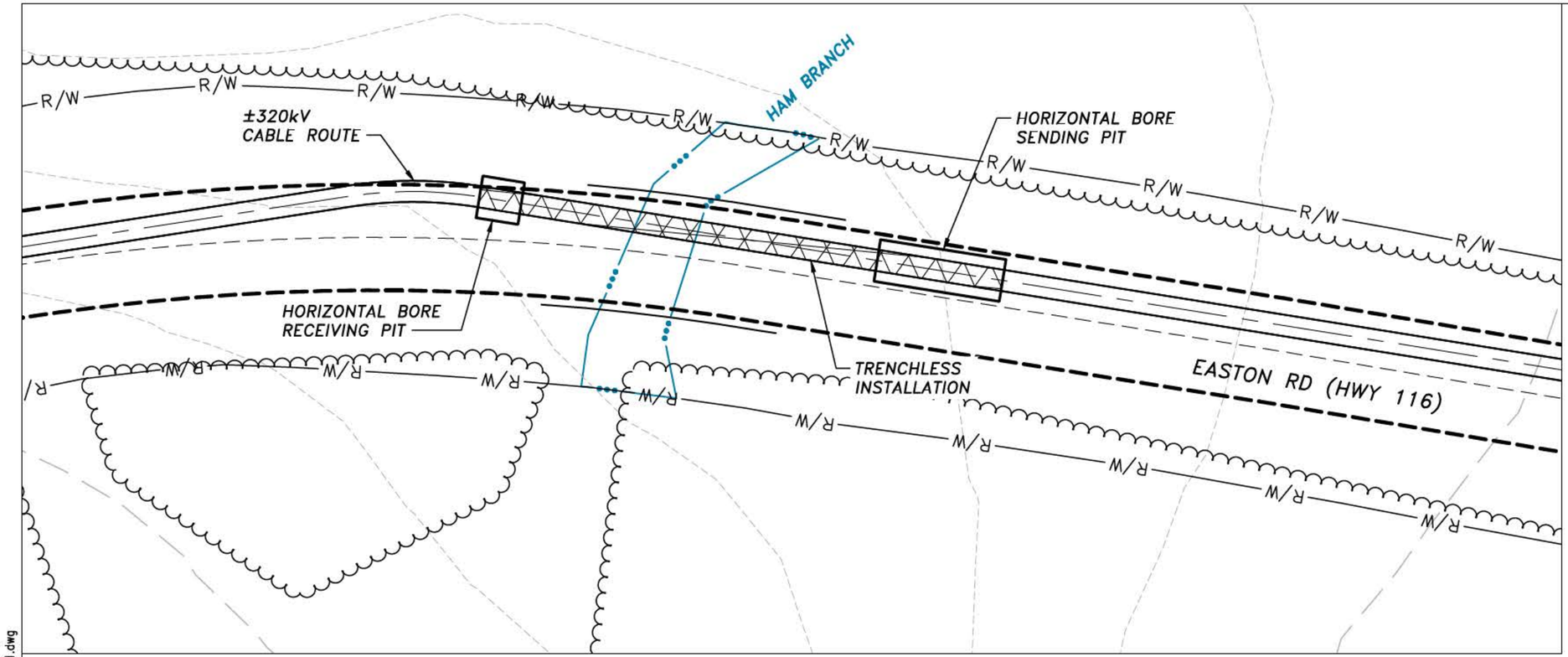
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

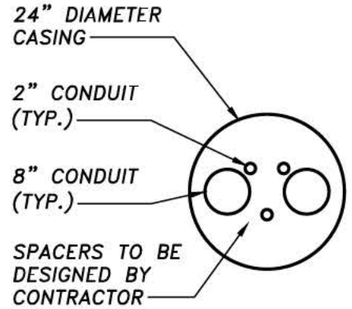
THE NORTHERN PASS

NORTHERN PASS LLC

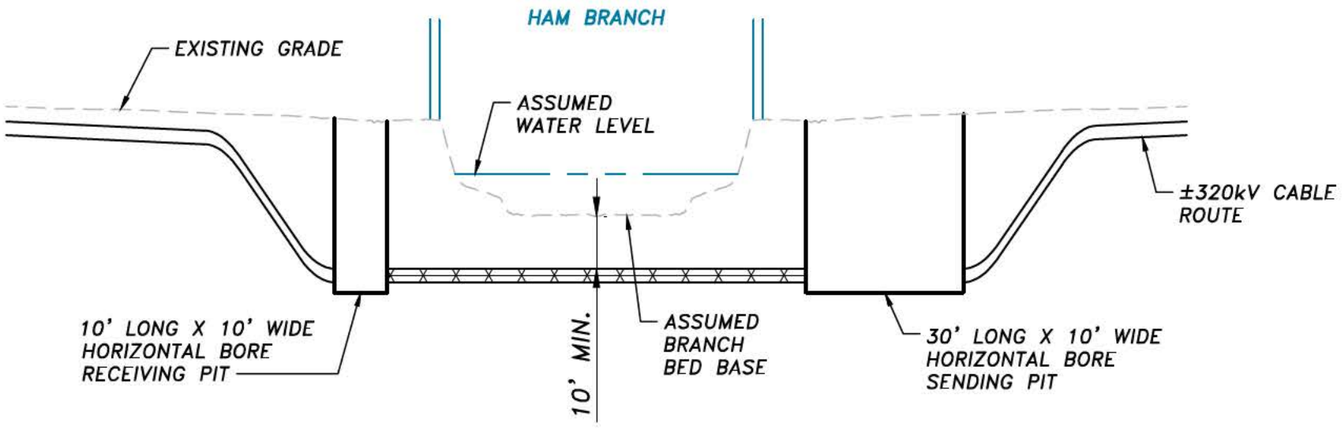
TITLE: S1 LL 3805.01 SHEB STA. 460+00 HAM BRANCH

BY	REV. NO.	DATE	SIZE	DWG. NO.
NDS	A	5/29/15	B	3805-01.DWG





TYPICAL ±320kV CABLE ROUTE
TRENCHLESS CROSS-SECTION
NOT TO SCALE



LEGEND:

- EXISTING EDGE OF ROAD
- 950 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W — EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 3841.01 WMNF STA. 55+00 GALE RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
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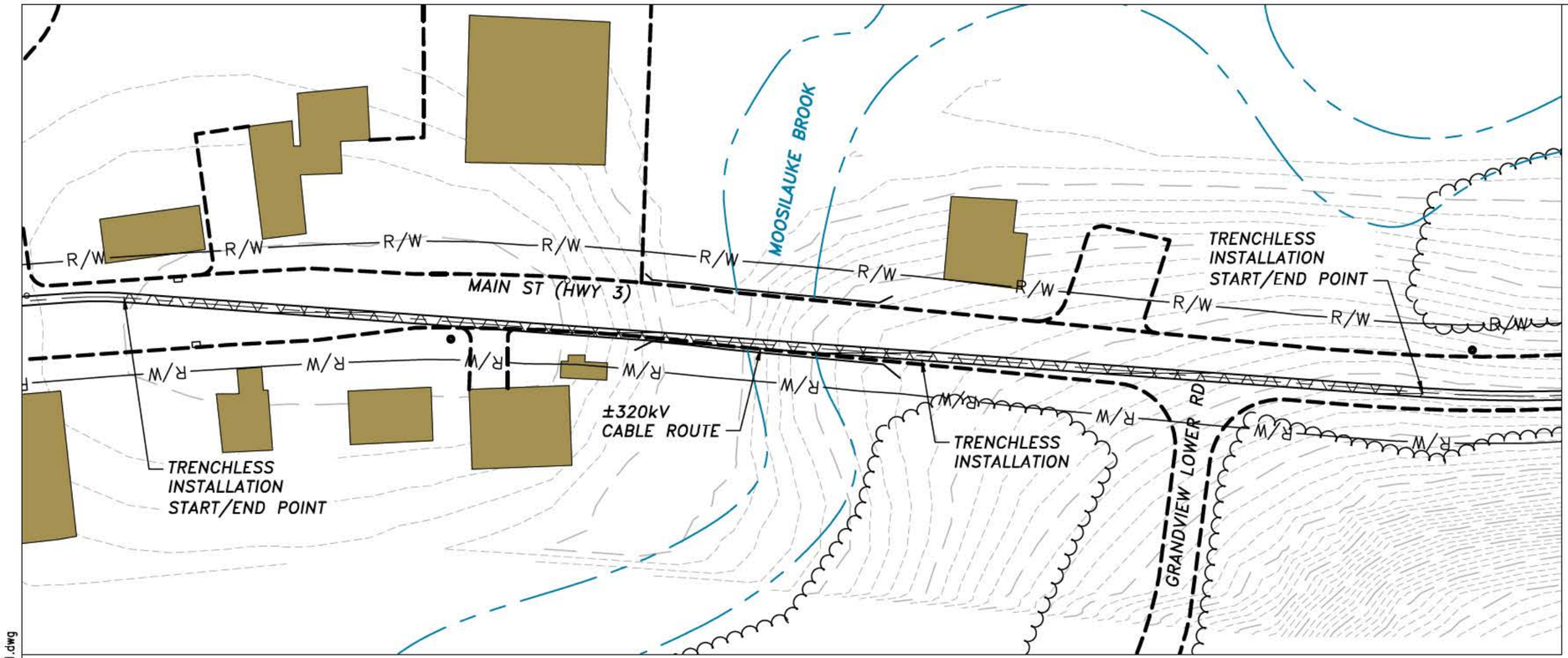
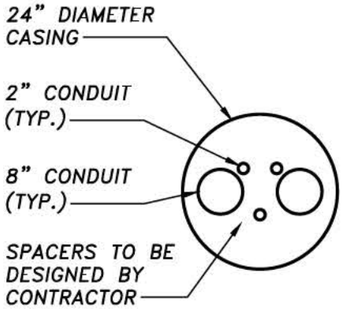
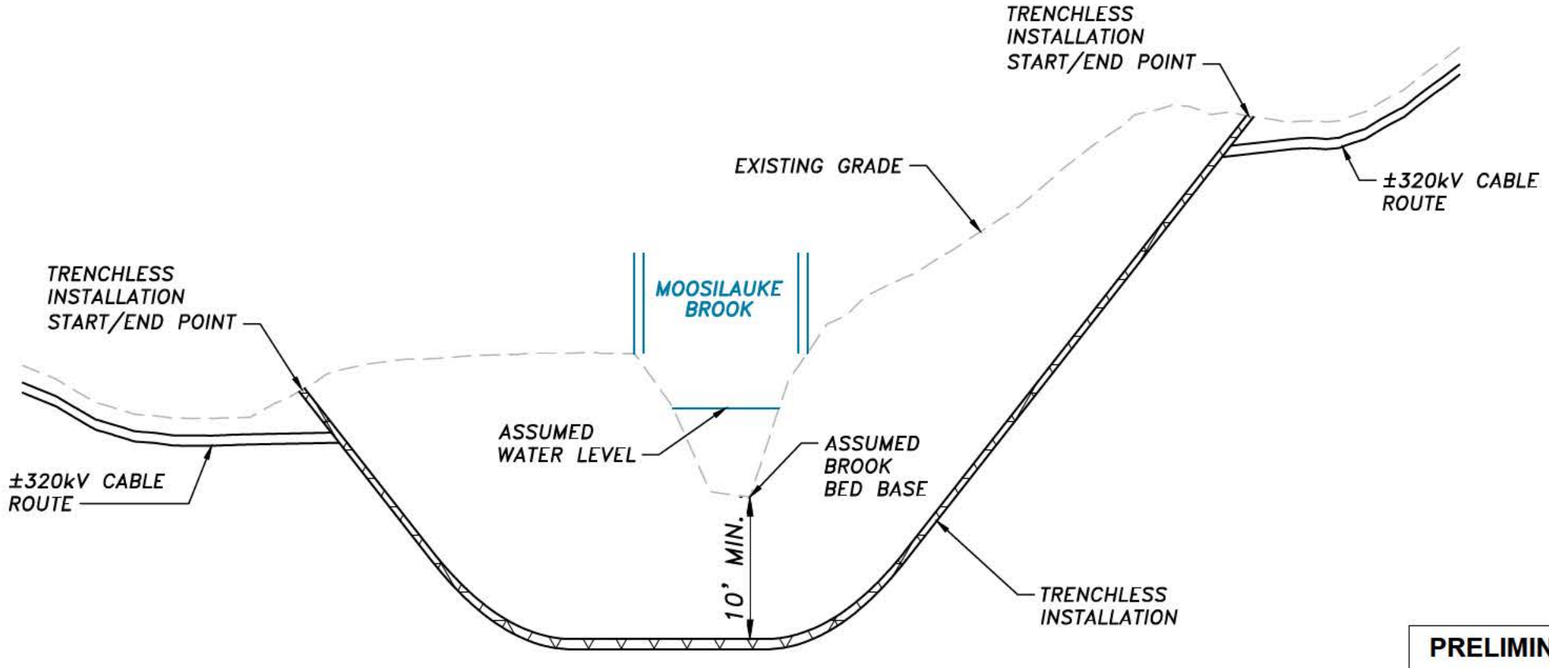




TYPICAL ±320kV CABLE ROUTE
TRENCHLESS CROSS-SECTION
NOT TO SCALE



LEGEND:

- EXISTING EDGE OF ROAD
- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

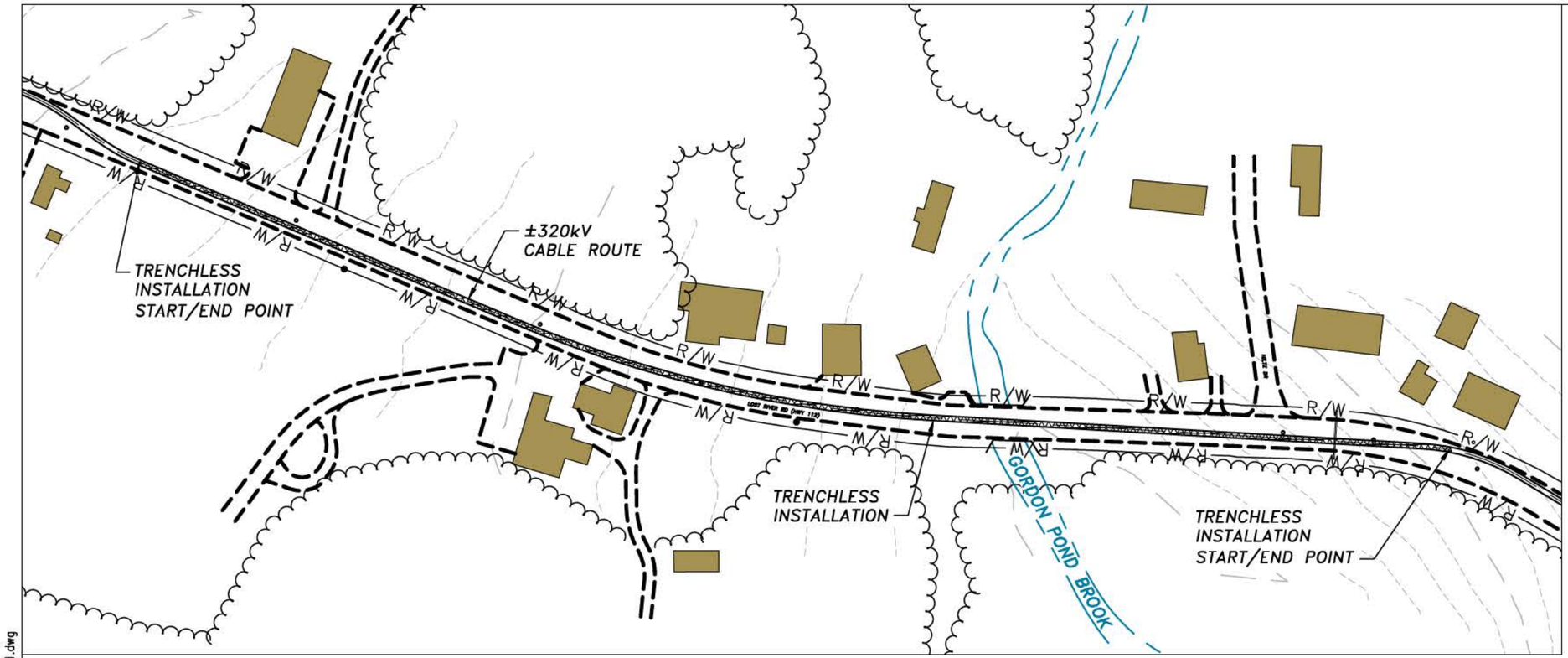
REVISION HISTORY				
–	–	–	–	–
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

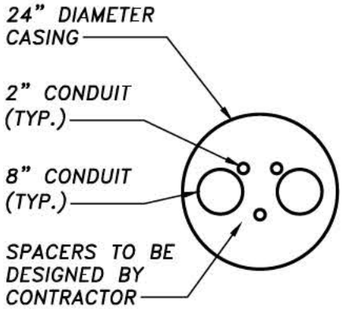
THE NORTHERN PASS

NORTHERN PASS LLC

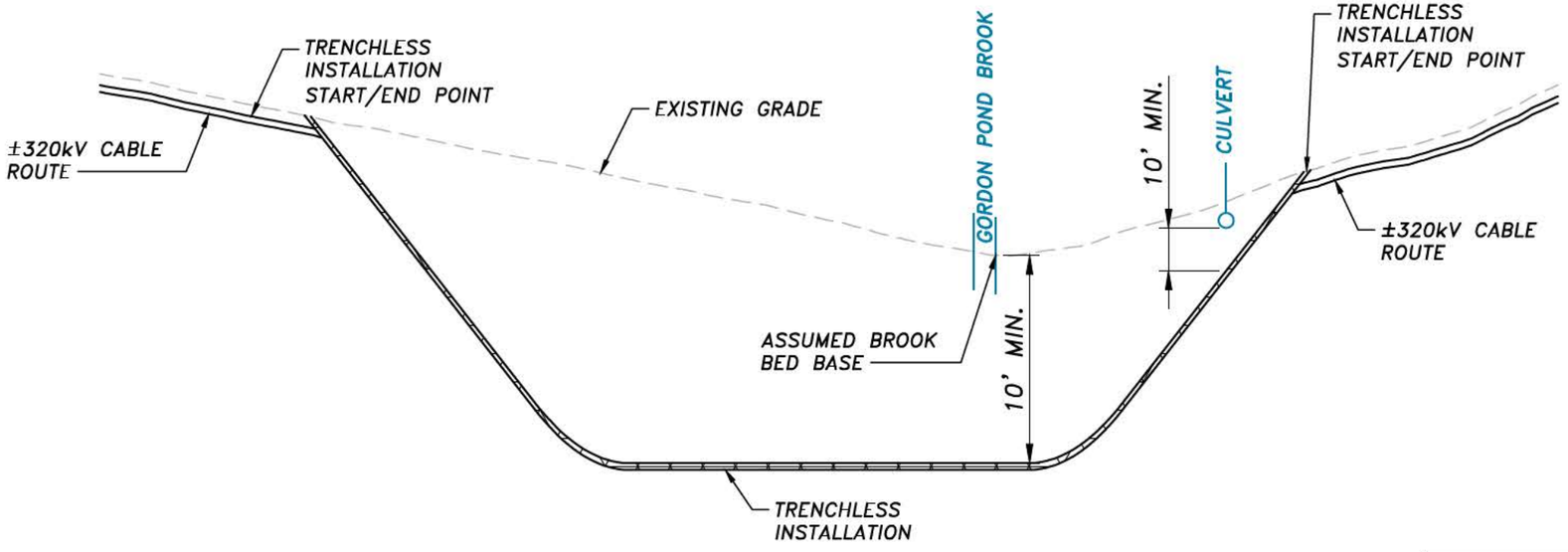
TITLE: S1 LL 4123.01 WMNF STA. 794+00 MOOSILAUKE BROOK

BY	REV. NO.	DATE	SIZE	DWG. NO.
NDS	A	5/29/15	B	4123-01.DWG





TYPICAL ±320kV CABLE ROUTE
TRENCHLESS CROSS-SECTION
NOT TO SCALE



LEGEND:

- EXISTING EDGE OF ROAD
- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 4483.01 WMNF STA. 756+00
GORDON POND BROOK

BY	REV. NO.	DATE	SIZE	DWG. NO.
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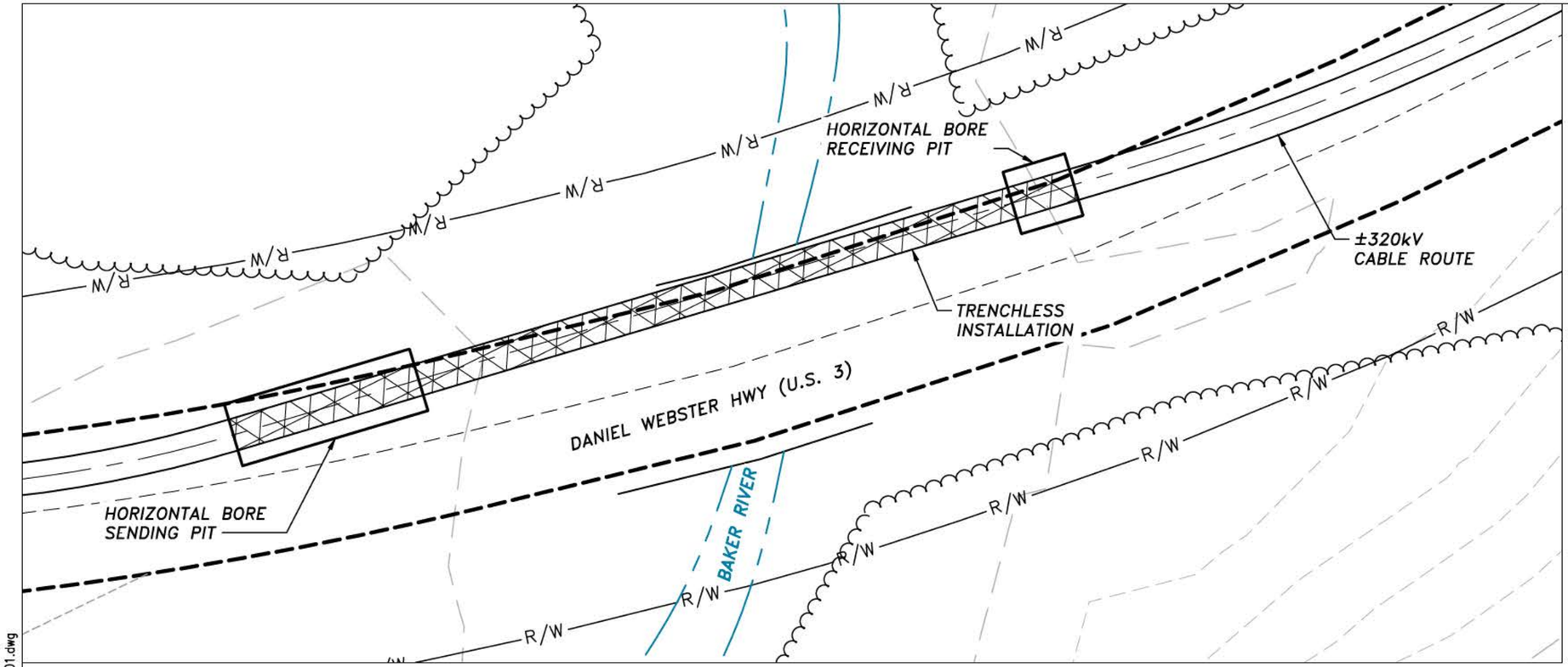
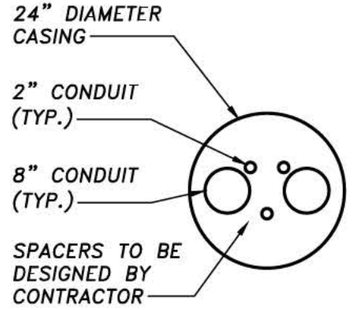
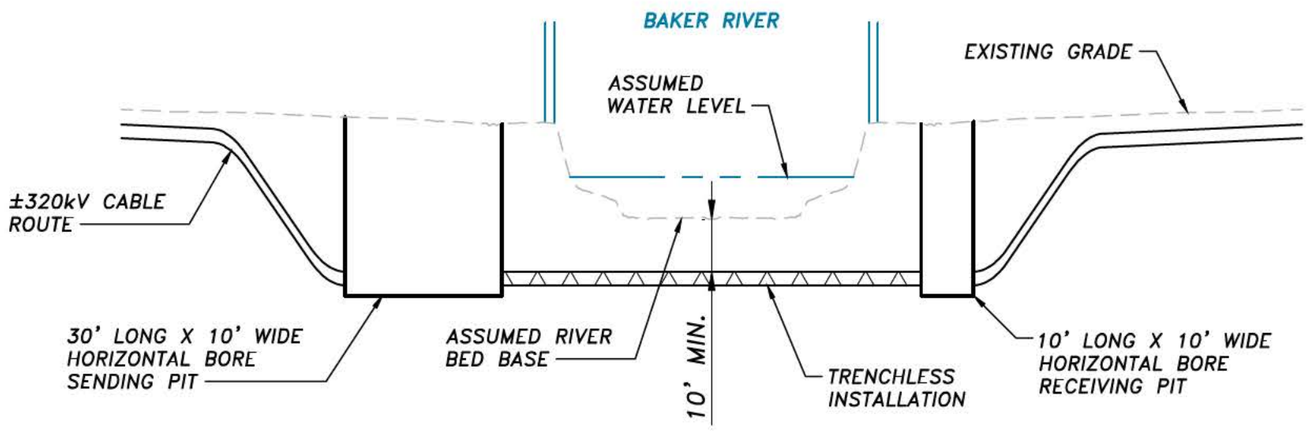




TYPICAL ±320kV CABLE ROUTE
TRENCHLESS CROSS-SECTION
NOT TO SCALE



LEGEND:

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- 950 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- R/W EXISTING ROAD RIGHT OF WAY
- EXISTING TOWN BOUNDARY LINE
- EXISTING RIVER
- EXISTING STREAM
- EXISTING TREE LINE
- TRENCHLESS INSTALLATION
- UNDERGROUND CABLE ROUTE

PRELIMINARY - NOT FOR CONSTRUCTION

REVISION HISTORY				
–	–	–	–	–
A	5/29/15	ISSUED FOR REVIEW	NDS	DAB

THE NORTHERN PASS

NORTHERN PASS LLC

TITLE: S1 LL 3645.01 WAR3 STA. 1072 BAKER RIVER

BY	REV. NO.	DATE	SIZE	DWG. NO.
NDS	A	5/29/15	B	5342-01.DWG