APPENDIX A AMENDMENT
T198 LINE – STRUCTURE 29-30
SOUTH BRANCH OF ASHUELOT RIVER AND STATE ACQUIRED RAILROAD PROPERTY
TROY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 29 & 30, SOUTH BRANCH ASHUELOT RIVER, TROY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the Ashuelot River on a 60' type DA structure (West) and a 50' type DA structure (East) with a span of 985.25 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic on Route 12 of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 59.8 and 72.3 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 31.5 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 880.8 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 1.9 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 880.8 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface and railroad track path. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 112.3 feet under temporary emergency conditions. It also exceeded the minimum clearance requirement for a railroad track of 28.5 feet with a clearance of 85.9 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 109.1 feet. The clearance to the railroad track of the conductor, under the maximum operating condition, after thermal uprate will be 80.2 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 98.7 feet. It also exceeded the minimum clearance requirement for a railroad track path of 23.5 feet with a clearance of 73.3 feet.

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

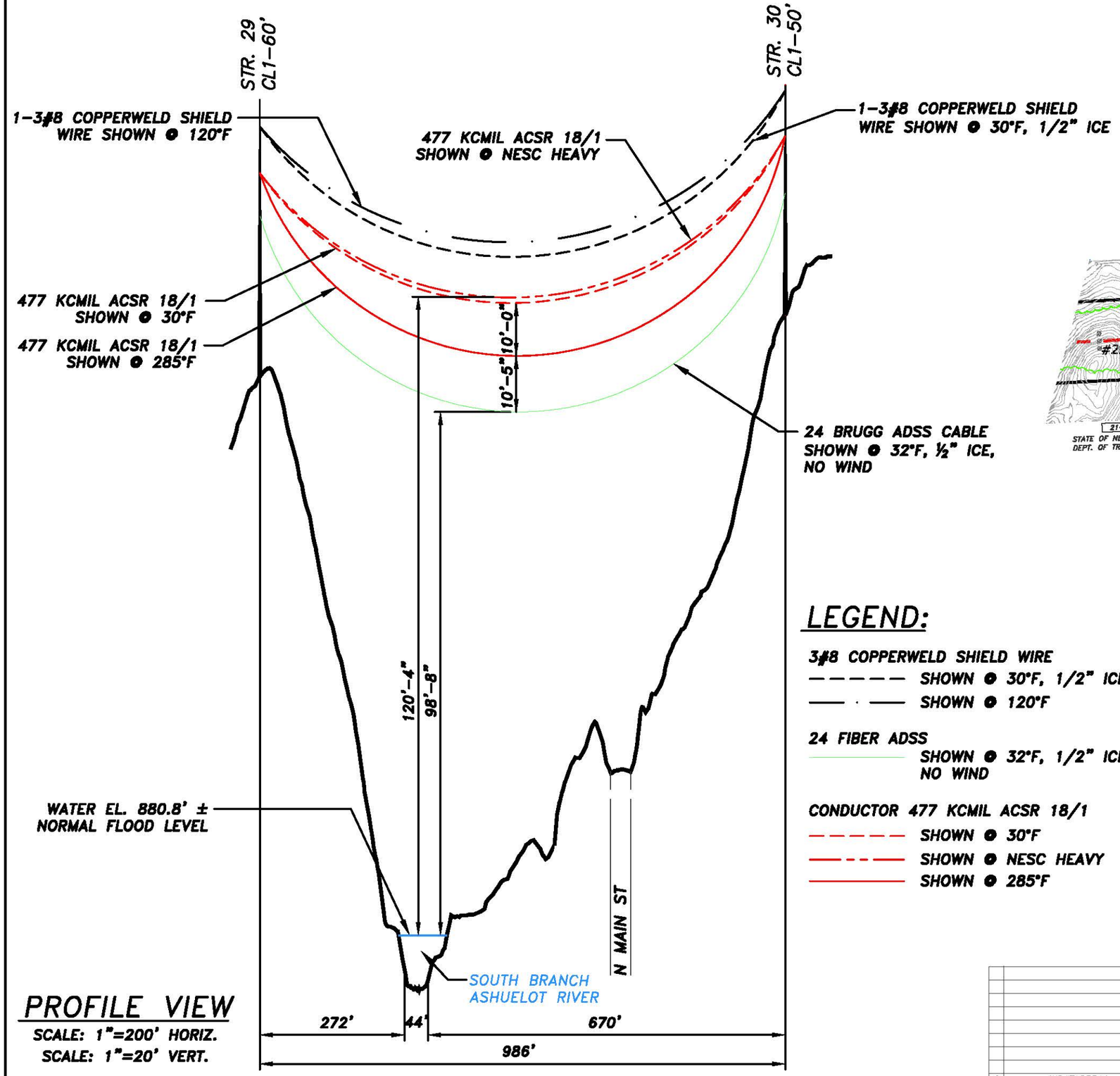
- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires

would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½” ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

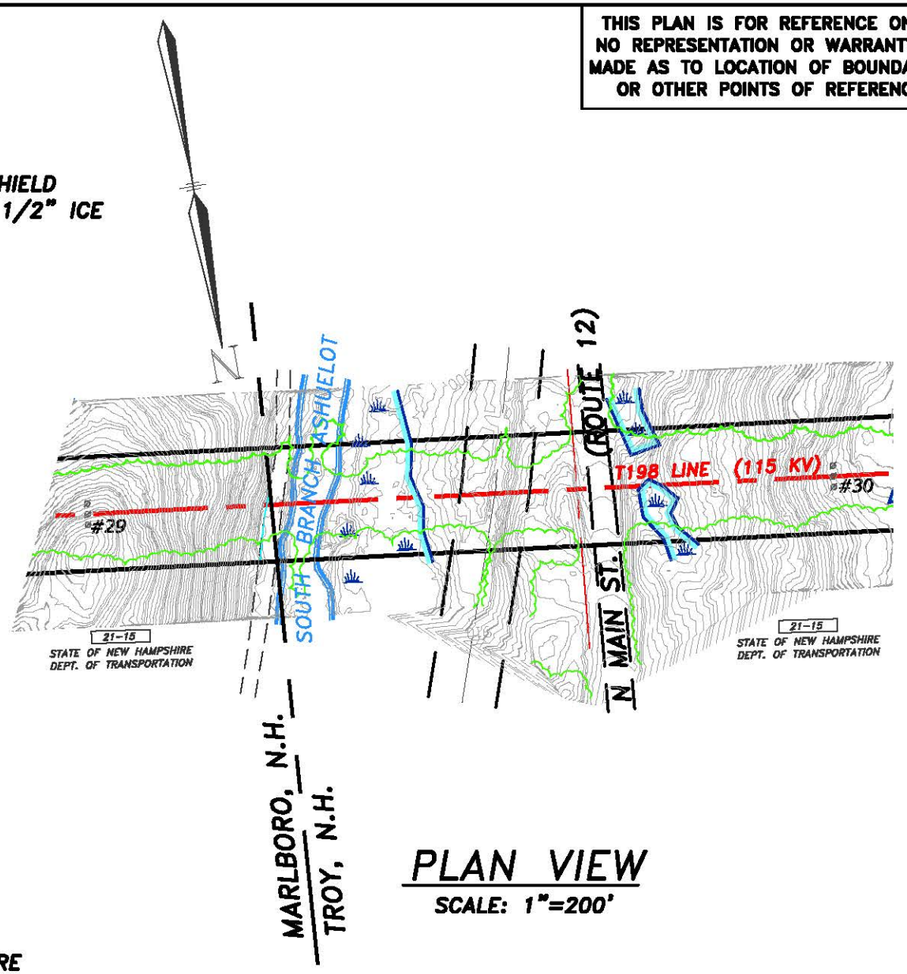
- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4”/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.



PLAN VIEW

SCALE: 1"=200'

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 29 & 30
SOUTH BRANCH ASHUELOT RIVER CROSSING
TROY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT A2 & A3 AMENDMENT

APPENDIX B AMENDMENT
T198 LINE – STRUCTURE 71-72
SOUTH BRANCH OF ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 71 & 72, SOUTH BRANCH ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the South Branch Ashuelot River on a 60' type D structure (West) and a 55' type A structure (East) with a span of 429.42 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 32.2 and 36.0 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 78.0 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 562.2 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 1.9 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 562.2 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 42.4 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 43.4 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 42.2 feet

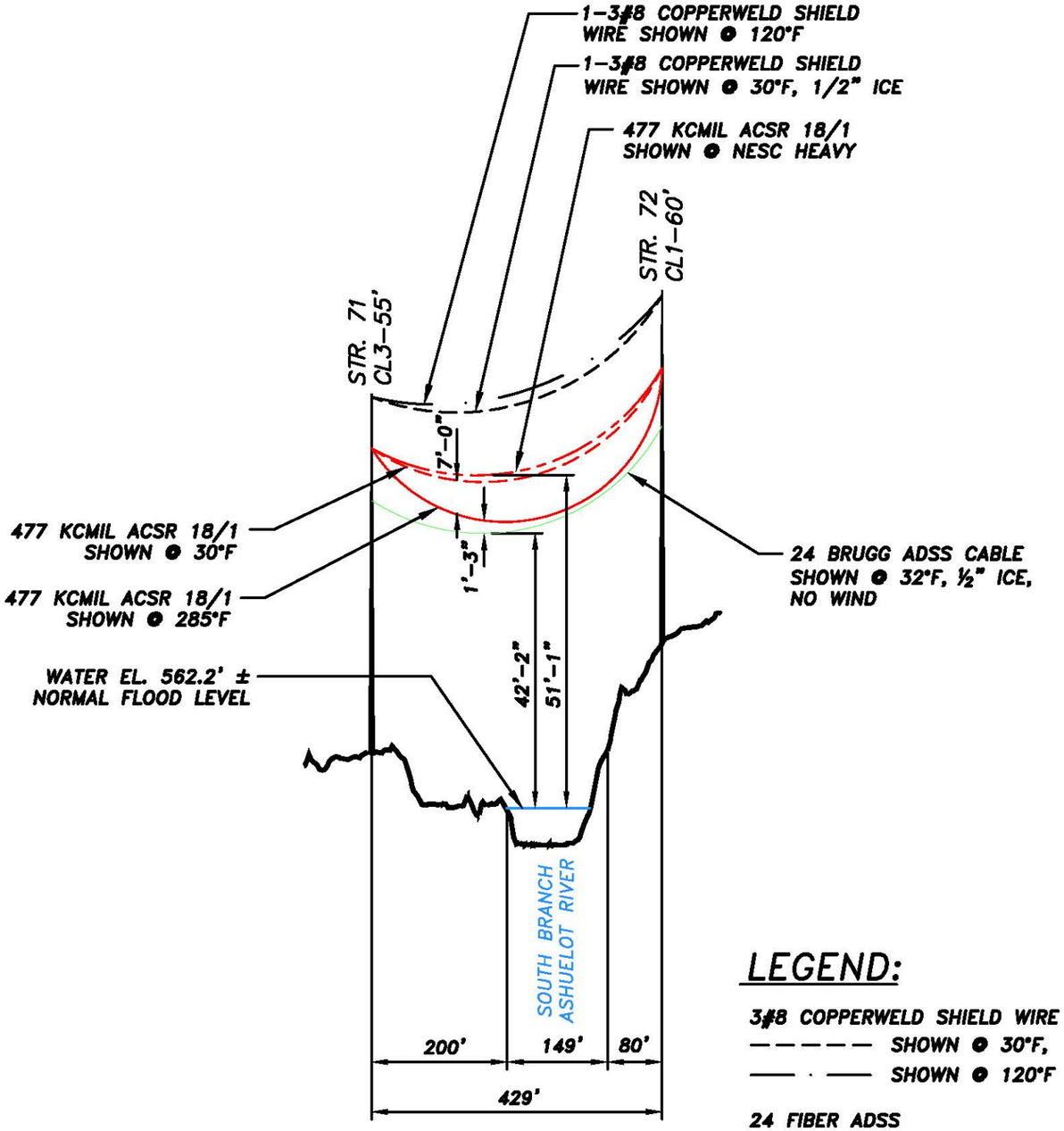
- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

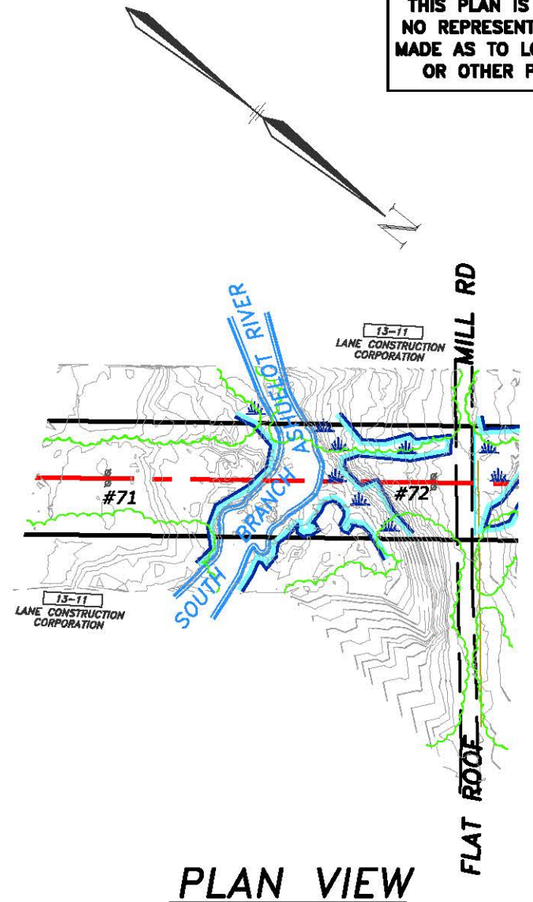
- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.



PLAN VIEW

SCALE: 1"=200'

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 71 & 72
SOUTH BRANCH ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT B2 AMENDMENT

APPENDIX C AMENDMENT
T198 LINE – STRUCTURE 97-98
SOUTH BRANCH OF ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 97 & 98, SOUTH BRANCH ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the South Branch Ashuelot River on an 85' type RA structure (West) and a 60' type A structure (East) with a span of 568.29 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic on Route 32 of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 22.5 and 22.7 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 99.0 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 464.8 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 1.9 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 464.8 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 30.0 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 24.4 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 24.1 feet

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

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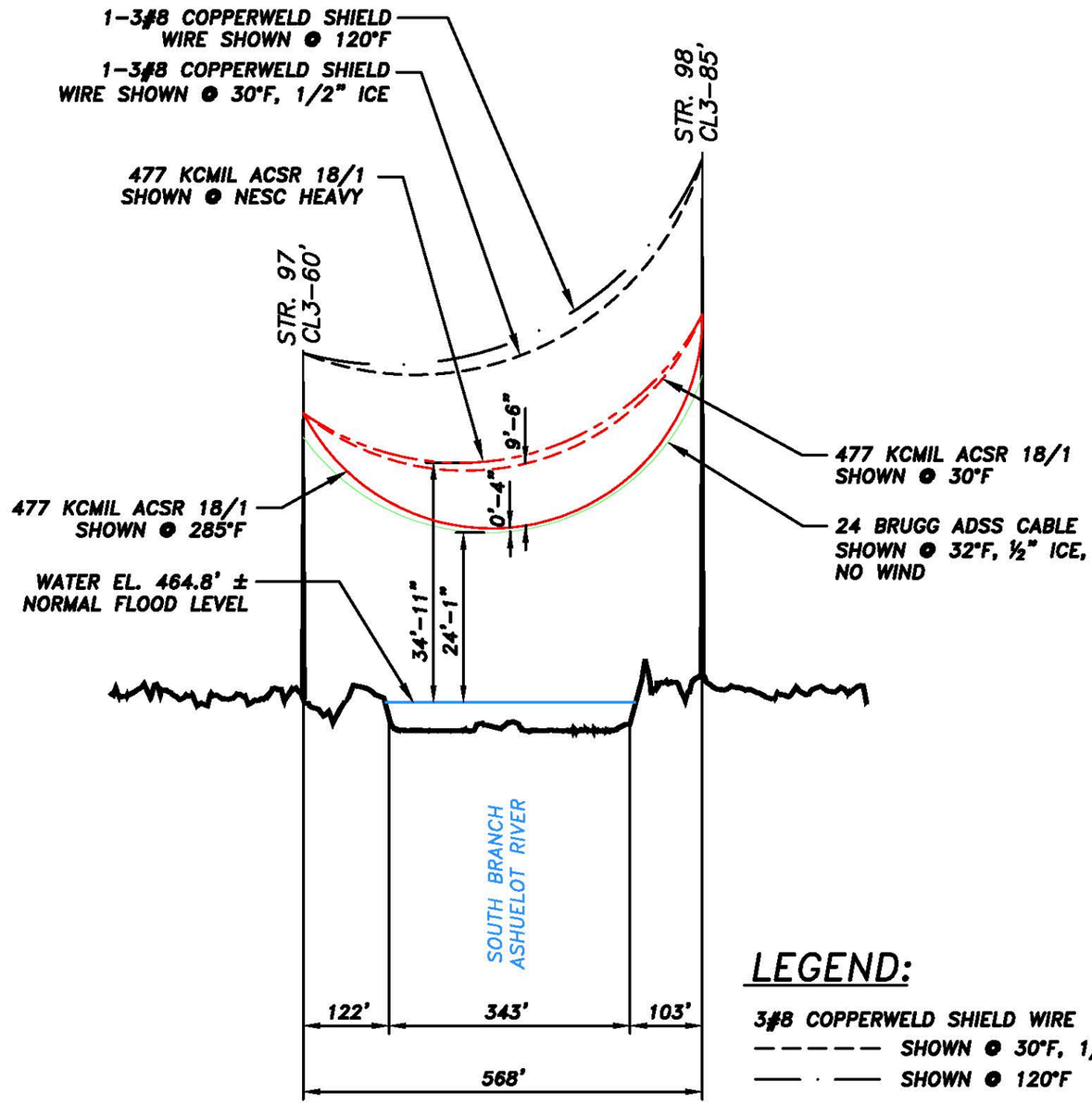


PROFILE VIEW

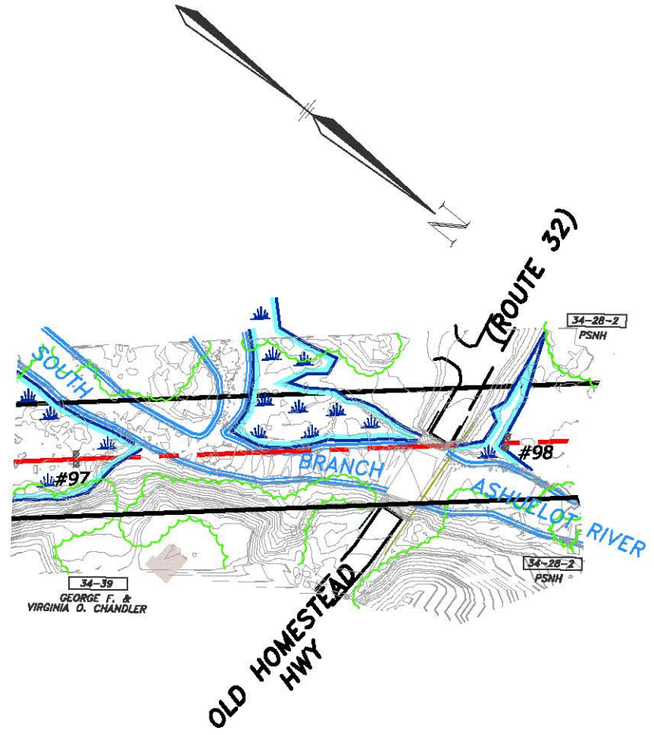
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 97 & 98
SOUTH BRANCH ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT C2 AMENDMENT

APPENDIX D AMENDMENT
T198 LINE – STRUCTURE 99-100
SOUTH BRANCH OF ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 99 & 100, SOUTH BRANCH ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the South Branch Ashuelot River on an 65' type DA structure (West) and a 50' type A structure (East) with a span of 398.99 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for pedestrian traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 15.1 and 21.4 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 58 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 464.6 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 1.9 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 464.6 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 29.6 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 29.1 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 22.1 feet

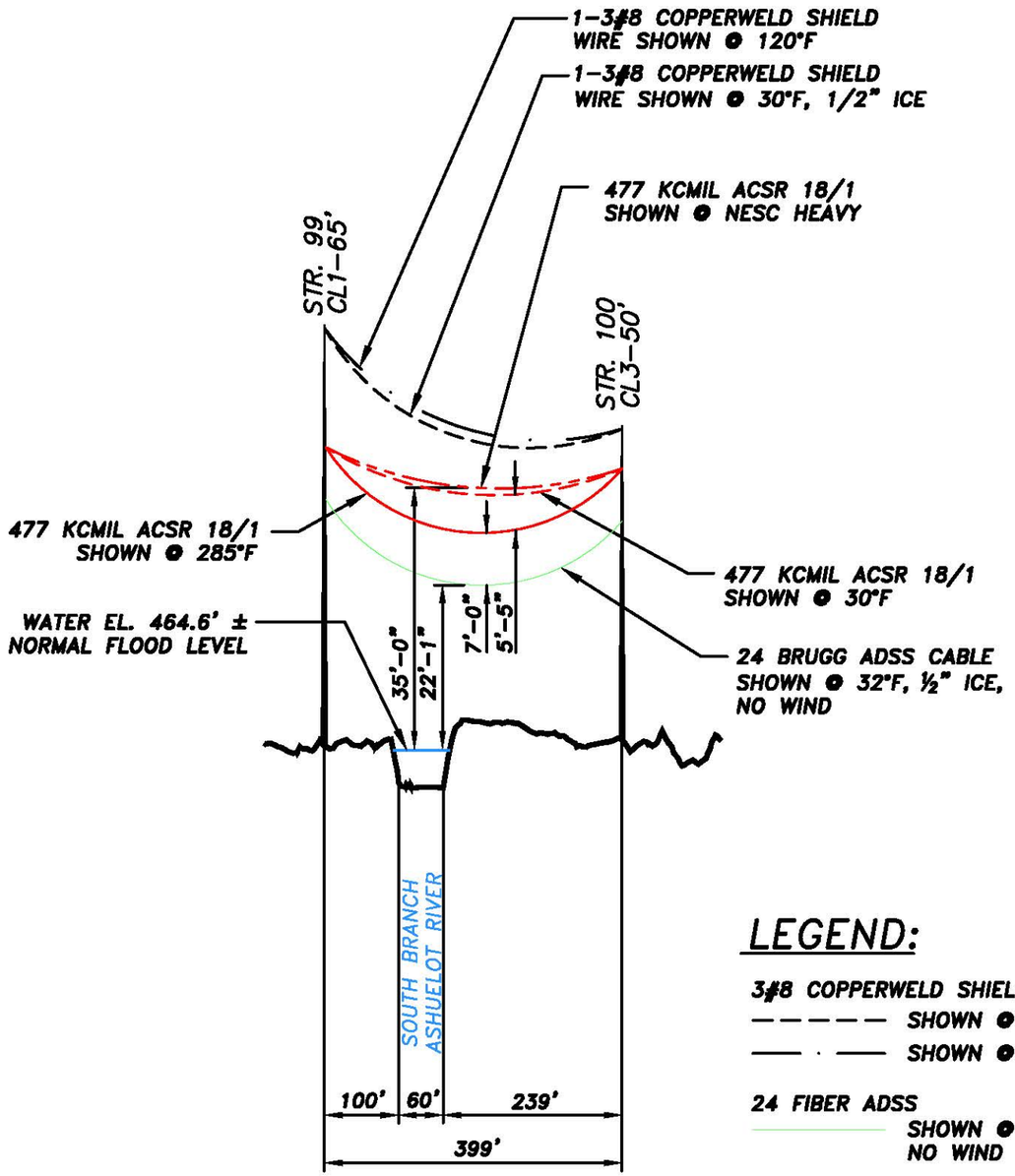
- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

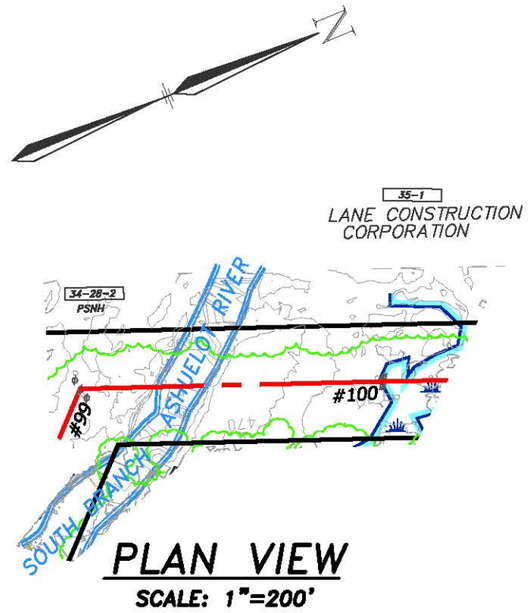
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – SHOWN @ 30°F, 1/2" ICE
- —·— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – SHOWN @ 30°F
- — – — SHOWN @ NESC HEAVY
- ——— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN RRR
ENGINEER AM
CHECKED RPL
APPROVED DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 99 & 100
SOUTH BRANCH ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT D2 AMENDMENT

APPENDIX E AMENDMENT
T198 LINE – STRUCTURE 103-104
SOUTH BRANCH OF ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 103 & 104, SOUTH BRANCH ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the South Branch Ashuelot River on a 50' type A structure (West) and a 60' type A structure (East) with a span of 357.47 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for pedestrian access of 9.5 feet for the ADSS and 16.1 feet for the 115kV open supply per the NESC have been met as 18.6 and 19.2 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 39 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 461.8 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 6.3 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 461.8 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 41.1 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 42.0 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 38.9 feet

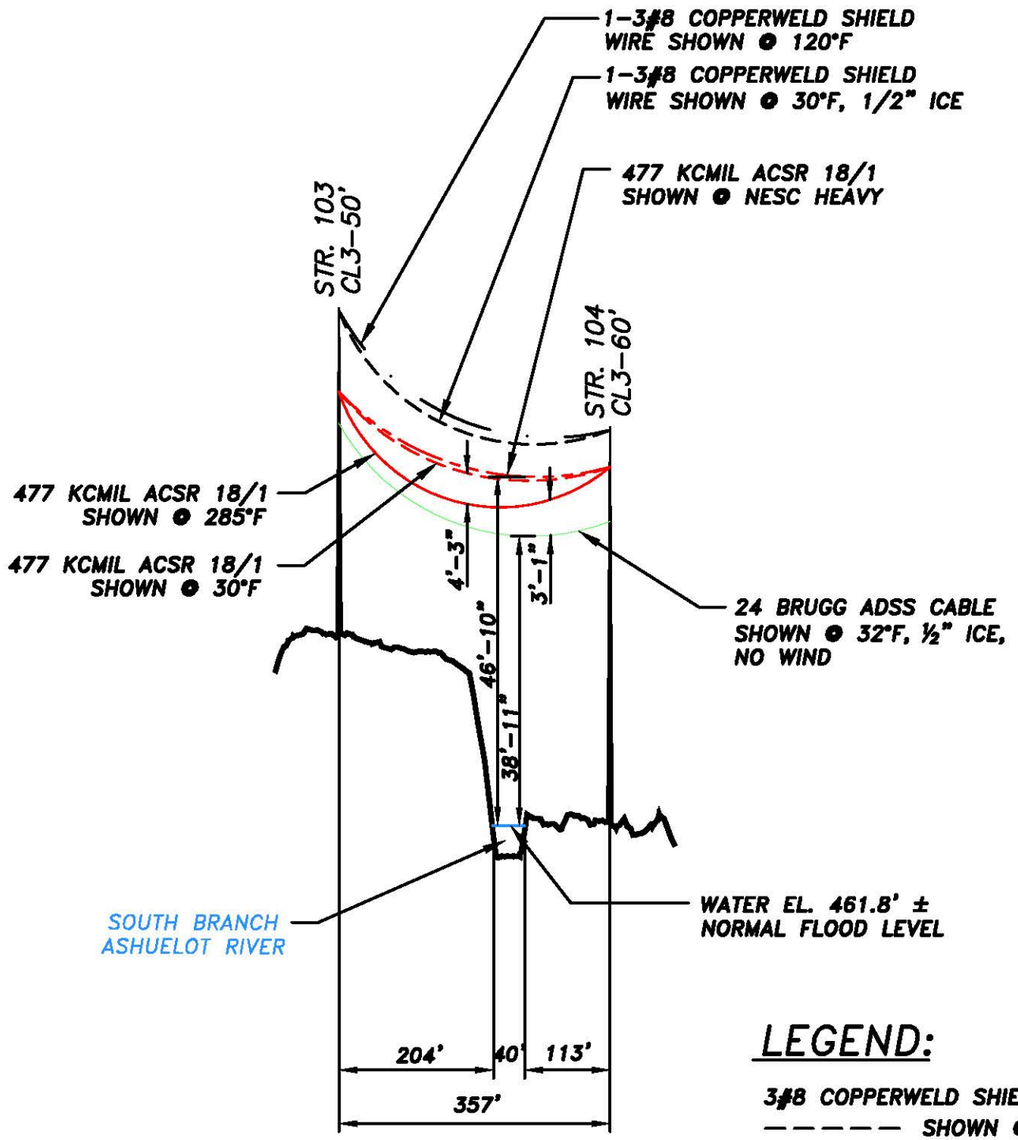
- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY.
NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- ——— SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ——— SHOWN @ 285°F

PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 103 & 104
SOUTH BRANCH ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT E2 AMENDMENT

APPENDIX F AMENDMENT
T198 LINE – STRUCTURE 105-106
ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 105 & 106, ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the Ashuelot River on a 55' type A structure (West) and a 50' type A structure (East) with a span of 407.20 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 19.4 and 20.7 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 125 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 460.7 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 6.6 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 460.7 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 24.9 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 25.8 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 24.0 feet.

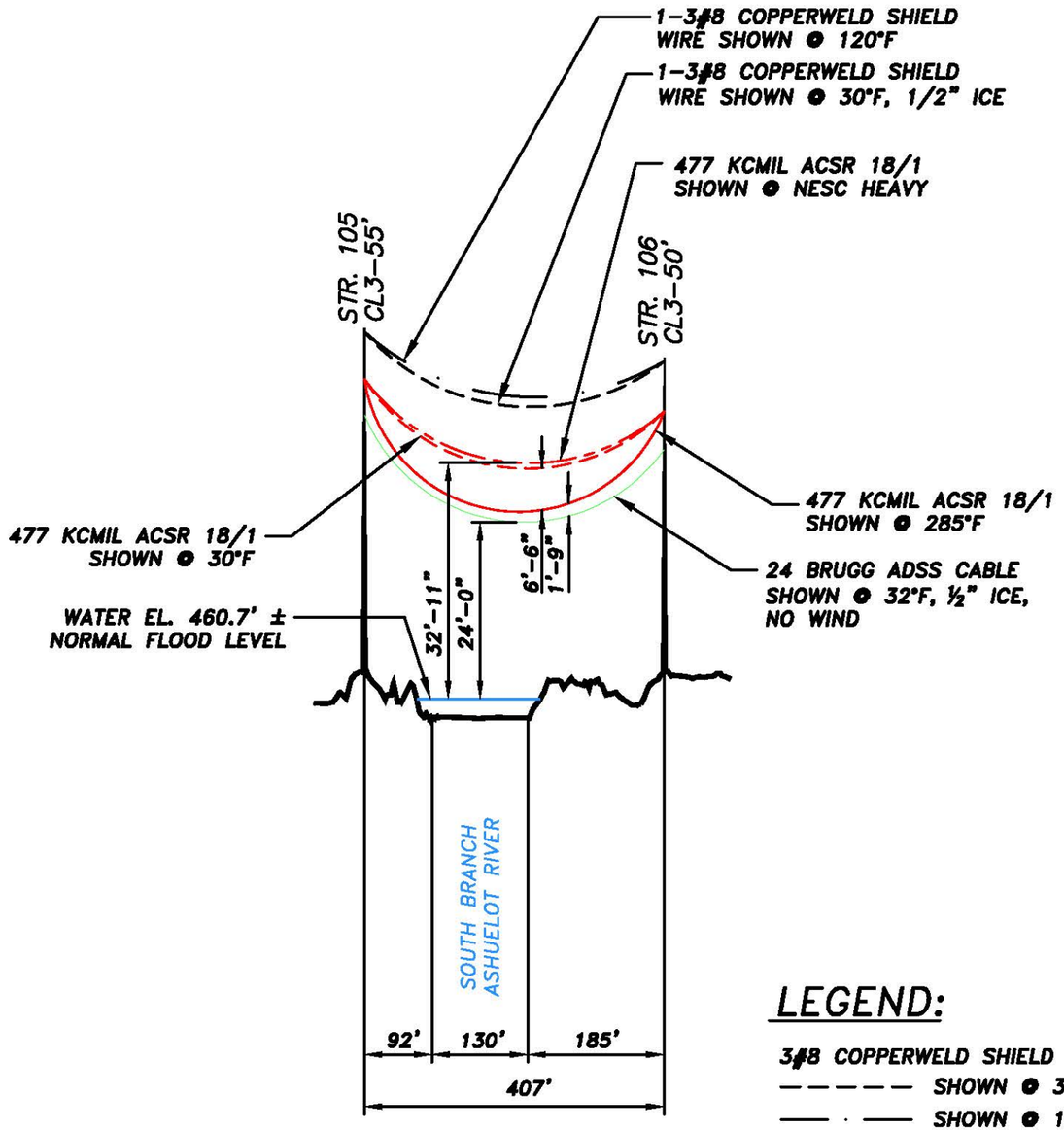
- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

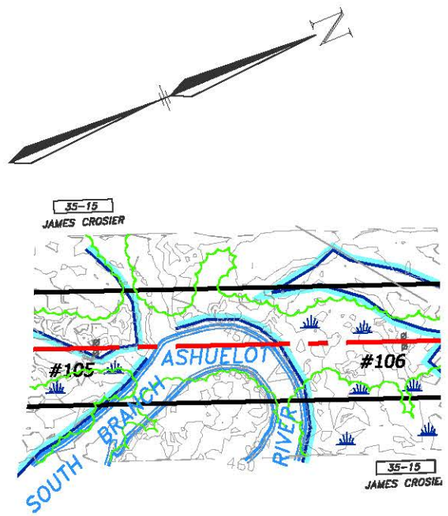
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 105 & 106
SOUTH BRANCH ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT F2 AMENDMENT

APPENDIX G AMENDMENT
T198 LINE – STRUCTURE 110-111
ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 110 & 111, ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the Ashuelot River on a 55' type A structure (West) and a 60' type C structure (East) with a span of 427.71 feet. Detailed drawings of these structures have been provided with this amendment. Minimum distances to ground for pedestrian access of 9.5 feet for the ADSS and 16.1 feet for the 115kV open supply per the NESC have been met as 18.6 and 19.6 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 40 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 456.4 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 7.9 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 456.4 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 24.4 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 25.6 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 23.9 feet.

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

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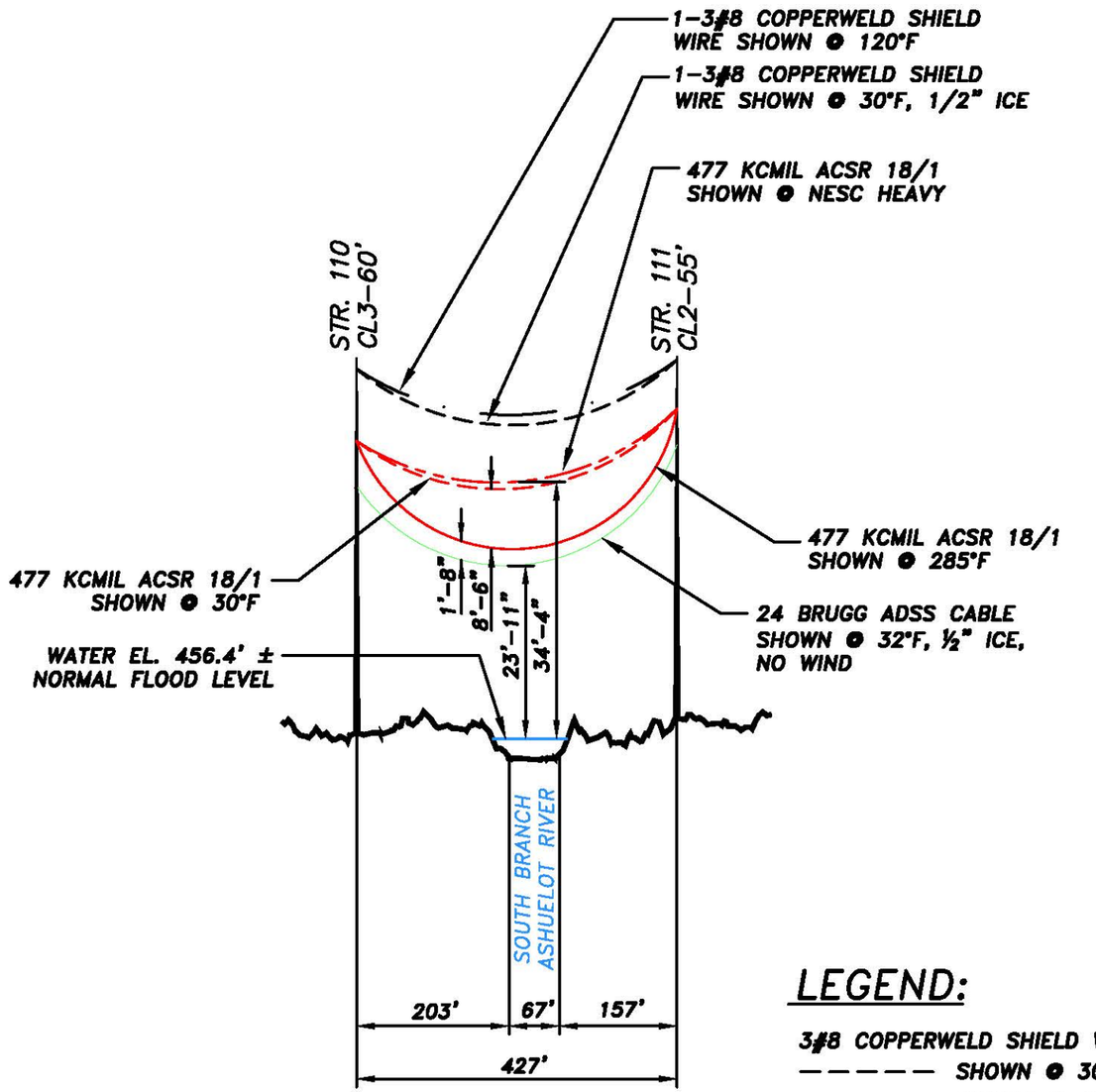
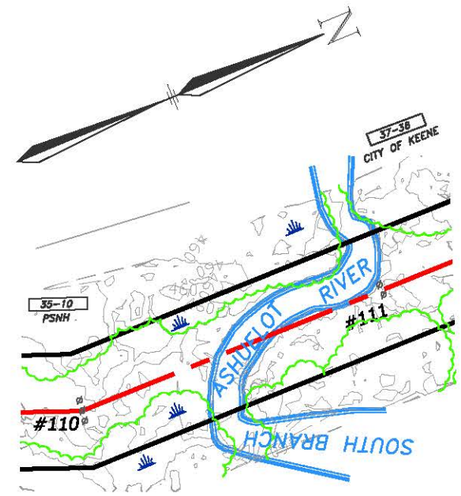


PROFILE VIEW

SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.



PLAN VIEW

SCALE: 1"=200'

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 110 & 111
SOUTH BRANCH ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT G2 AMENDMENT

APPENDIX H AMENDMENT
T198 LINE – STRUCTURE 121-122
ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 121 & 122, ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the Ashuelot River on a 55' type A structure (West) and a 60' type C structure (East) with a span of 417.19 feet. Detailed drawings of these structures have been provided with this amendment. Minimum distances to ground for truck traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 22.1 and 23.8 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The line crosses two water bodies with different high water mark elevations. The most limiting water body is presented below. The river width was 52 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 456.0 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 10.4 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 456.0 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 26.4 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 29.0 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 26.8 feet.

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

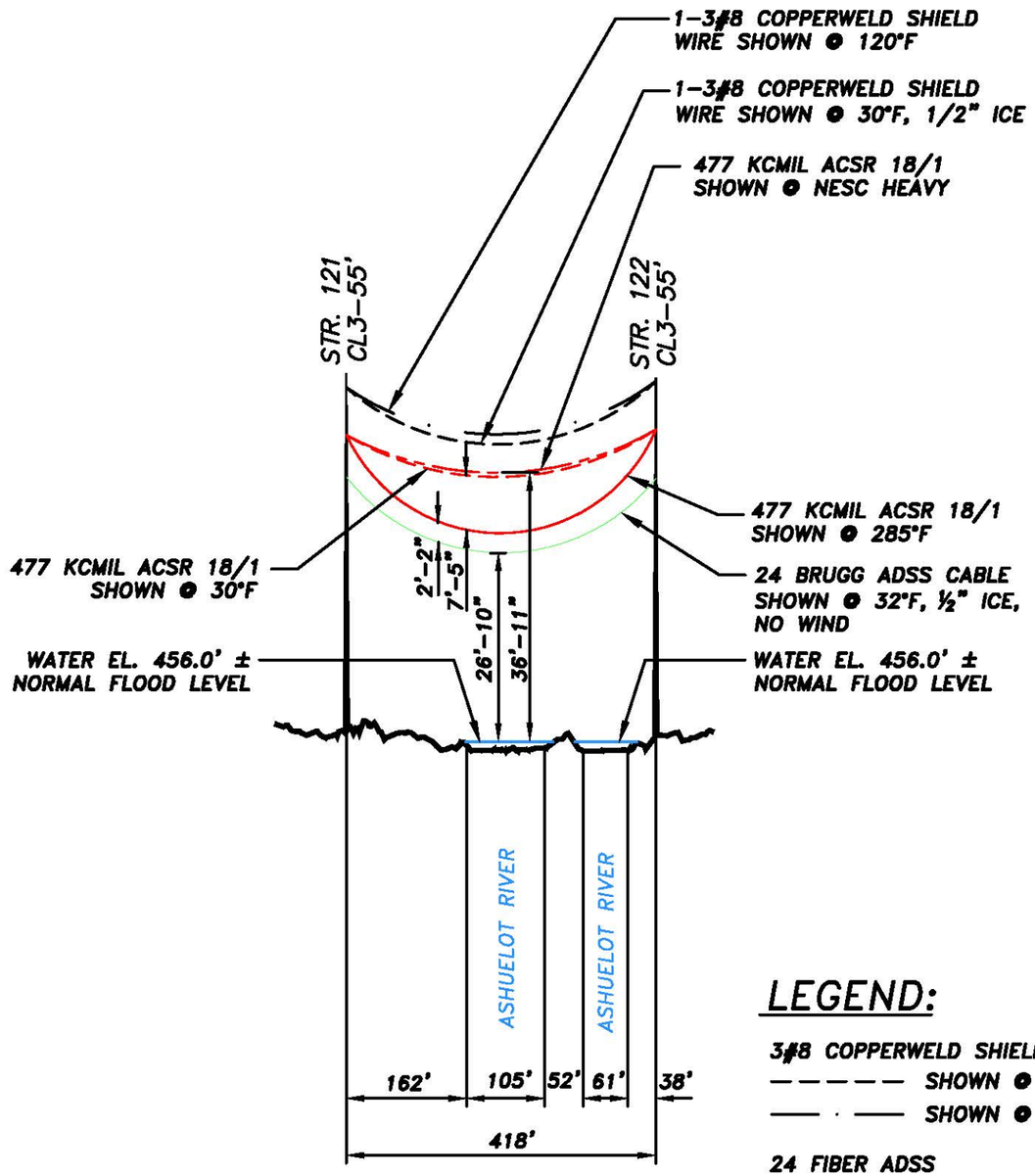
- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum

NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

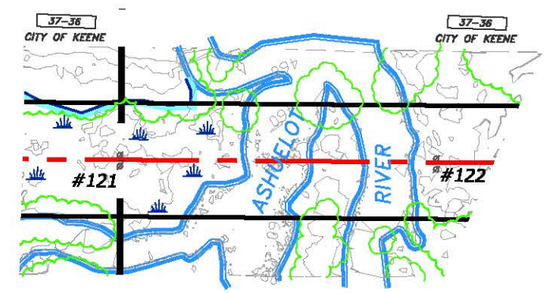
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
– – – – – SHOWN @ 30°F, 1/2" ICE
——·—— SHOWN @ 120°F

24 FIBER ADSS
SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
– – – – – SHOWN @ 30°F
——– – —— SHOWN @ NESC HEAVY
——————— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 121 & 122
ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT H2 AMENDMENT

APPENDIX I AMENDMENT
T198 LINE – STRUCTURE 122-123, 123-124
ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 122 & 123, 123 &124, ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

For the Span between STR 122-123

2. Currently, Line T198 crosses the Ashuelot River on a 55' type A structure (West) and a 55' type A structure (East) with a span of 415.73 feet. Detailed drawings of these structures have been provided with this amendment. Minimum distances to ground for truck traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 19.1 and 21.5 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 82 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 460.2 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 1.6 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the

normal flood is 460.2 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 27.4 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 37.0 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 32.6 feet.

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8

feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½” ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4”/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

<u>For the Span between STR 123-124</u>

7. Currently, Line T198 crosses the Ashuelot River on a 50’ type A structure (West) and a 55’ type A structure (East) with a span of 438.15 feet. Detailed drawings of these structures have been provided with this amendment. Minimum distances to ground for pedestrian access of 9.5 feet for the ADSS and 16.1 feet for the 115kV open supply per the NESC have been met as 17.0 and 19.0 feet of clearance is provided respectively for the ADSS and conductor wires.

8. No structure work is required in this span.

9. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

10. The river width was 120 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at

all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 459.6 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 1.6 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

11. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 459.6 feet. The current sags and clearances to the water surface are as follows:

    - Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

    - Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 23.2 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 22.9 feet.

    - ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 20.2 feet.

    - Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same

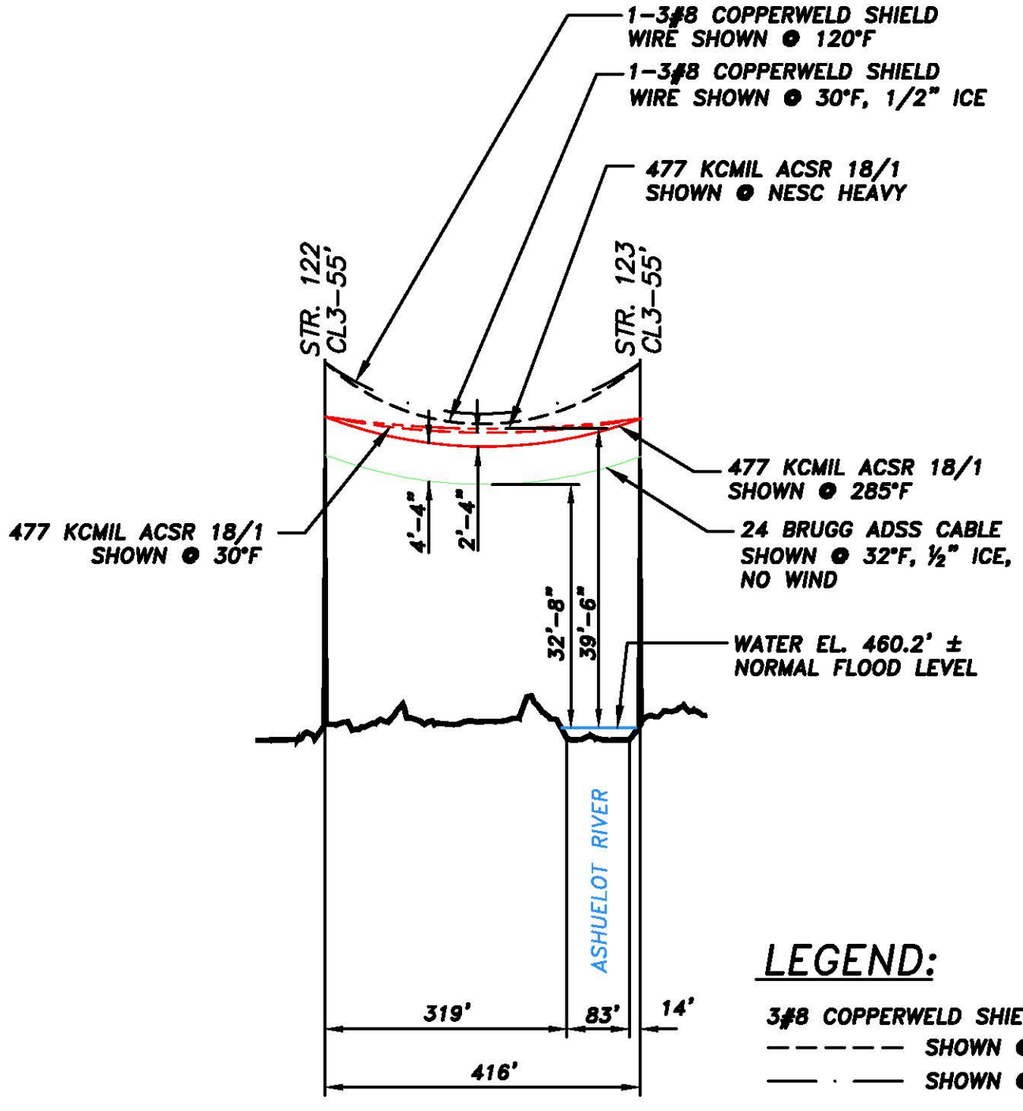
utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29"+(115kV*1.05-50kV)*0.4")). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

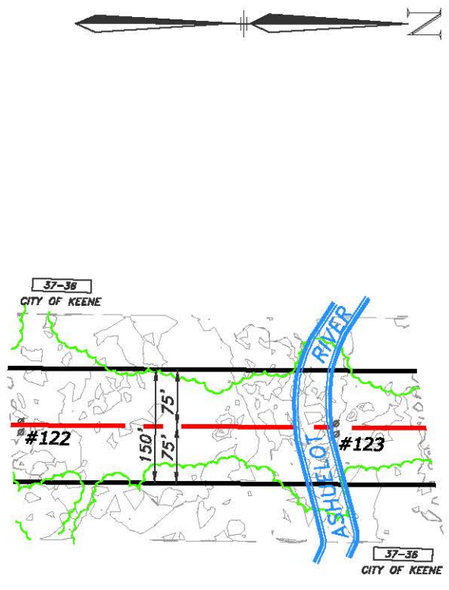
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
– – – – – SHOWN @ 30°F, 1/2" ICE
——·—— SHOWN @ 120°F

24 FIBER ADSS
SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
– – – – – SHOWN @ 30°F
——– – ——– SHOWN @ NESC HEAVY
——— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

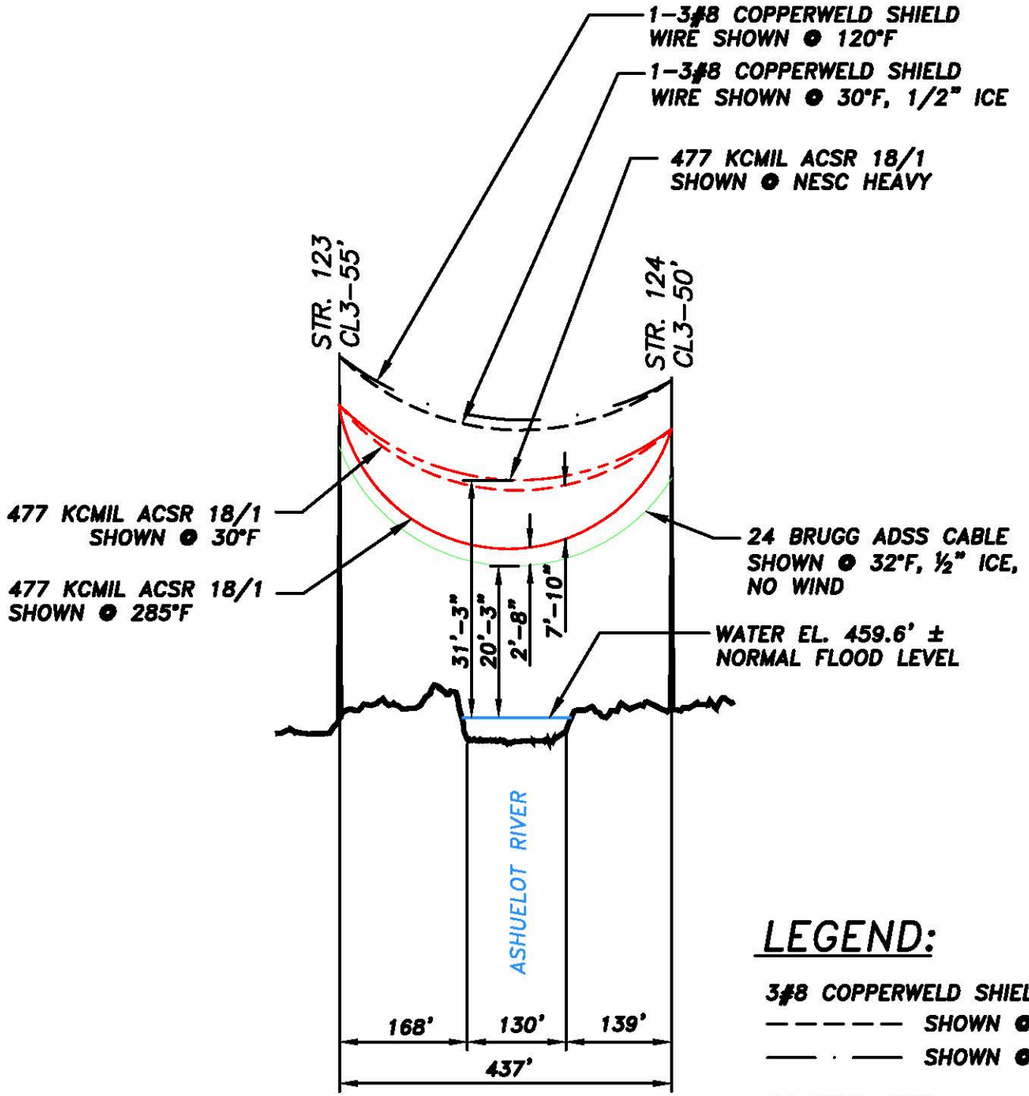
TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 122 & 123
ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT 12 AMENDMENT

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

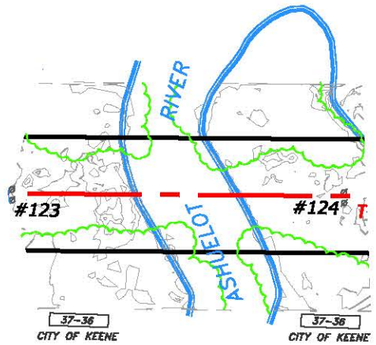
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
– – – – – – SHOWN @ 30°F, 1/2" ICE
——— · ——— SHOWN @ 120°F

24 FIBER ADSS
——— SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
– – – – – – SHOWN @ 30°F
——— – – ——— SHOWN @ NESC HEAVY
——————— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 123 & 124
ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT 12 AMENDMENT

APPENDIX J AMENDMENT
T198 LINE – STRUCTURE 130-131
ASHUELOT RIVER
SWANZEY, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 130 & 131, ASHUELOT RIVER, SWANZEY, NEW HAMPSHIRE".

2. Currently, Line T198 crosses the South Branch Ashuelot River on an 50' type C structure (West) and a 50' type A structure (East) with a span of 354.54 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic of 9.5 feet for the ADSS and 16.1 feet for the 115kV open supply per the NESC have been met as 17.1 and 19.1 feet of clearance is provided respectively for the ADSS and conductor wires.

3. No structure work is required in this span.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 100.0 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 460.1 feet. The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 9.3 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 460.1 feet. The current sags and clearances to the water surface are as follows:

- Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

- Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 22.1 feet with a clearance of 23.8 feet under temporary emergency conditions. The clearance to the water surface of the conductor, under the maximum operating condition, after thermal uprate will be 23.5 feet.

- ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance to water surface exceeded the minimum requirement of 17.5 feet with a clearance of 21.4 feet

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29”+(115kV*1.05-50kV)*0.4”)). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix. Efficiency

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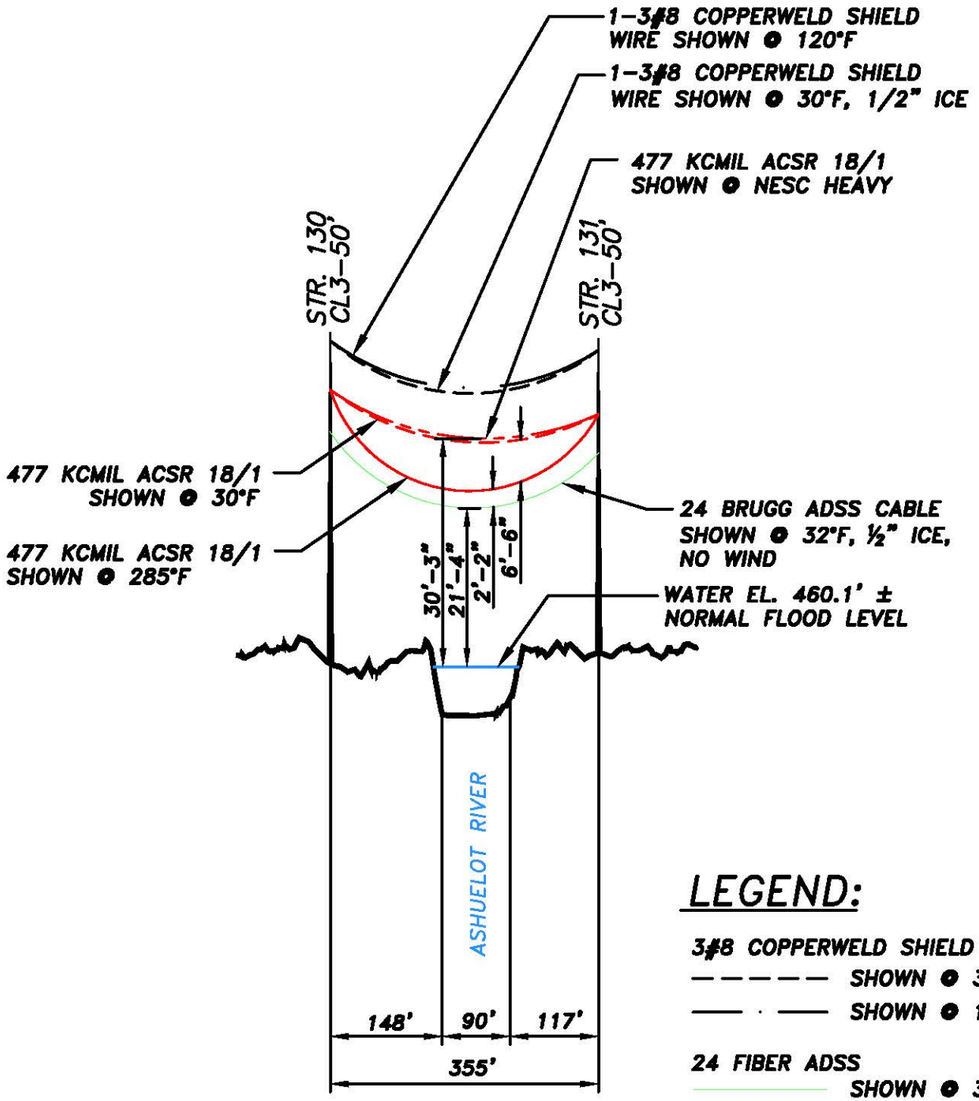


PROFILE VIEW

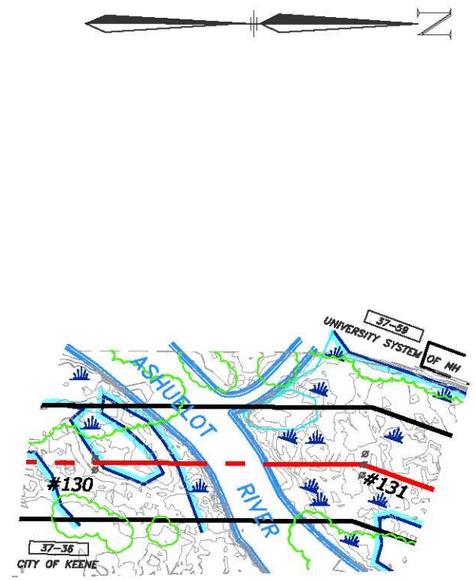
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ——— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 130 & 131
ASHUELOT RIVER CROSSING
SWANZEY, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT J2 AMENDMENT

APPENDIX K AMENDMENT
T198 LINE – STRUCTURE 150-151, 151-152
ASHUELOT RIVER
KEENE, NH

1. The design and proposed construction of this crossing is shown on the attached PSNH Transmission Drawing entitled "LINE T198 (115 KV) CROSSING BETWEEN STR. 151 & 152, ASHUELOT RIVER, KEENE, NEW HAMPSHIRE".

For Span 150-151

2. Currently, Line T198 crosses the Ashuelot River on a 70' type D3 structure (West) and a 60' type A3 structure (East) with a span of 355.38 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 24.9 and 32.9 feet of clearance is provided respectively for the ADSS and conductor wires.

3. After replacement, Line T198 will cross the Ashuelot River on an 80' type RAX structure (West) and a 60' Type A3 structure (East) with a span of 346 feet. A detailed drawing of the new structure has been provided with this amendment.

4. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

5. The river width was 104 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 469.1 feet (top of lowest bank). The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 2.4 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

6. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 469.1 feet. The current sags and clearances to the water surface are as follows:

    - Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

    - Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance exceeded the minimum requirement of 22.1 feet with a clearance of 33.6 feet. The clearance to the water surface of the conductor, under the maximum operating condition, after structure replacement will be 35.1 feet.

    - ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance exceeded the minimum requirement of 17.5 feet with a clearance of 30.0 feet. The new ADSS cable clearance at maximum sag, after structure replacement, will be 32.5 feet.

    - Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

    - Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½

inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29"+(115kV*1.05-50kV)*0.4")). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

<u>For Span 151-152</u>

7. Currently, Line T198 crosses the Ashuelot River on a 70' type D3 structure (West) and a 60' type A3 structure (East) with a span of 355.38 feet. Detailed drawings of these structures have been provided with his amendment. Minimum distances to ground for truck traffic of 15.5 feet for the ADSS and 20.1 feet for the 115kV open supply per the NESC have been met as 23.5 and 25.5 feet of clearance is provided respectively for the ADSS and conductor wires.

8. After replacement, Line T198 will cross the Ashuelot River on an 80' type RAX structure (West) and a 60' Type A3 structure (East) with a span of 346 feet. A detailed drawing of the new structure has been provided with this amendment.

9. A total of three phase wires, two static wires and an ADSS cable currently span this crossing. The phase conductor design tension is 4,000 lbs at NESC Heavy. The static wire design tension is 2,300 lbs at NESC Heavy. The ADSS cable design tension is 350 lbs at 60 deg F.

10. The river width was 112 feet at the time of the survey done for the original petition. The elevation of the normal flood level was determined for PSNH at all crossings in a special study conducted by ENSR Environmental Consultants (ENSR) of Westford, Massachusetts in 2008. The normal flood level for this crossing is approximately 465.8 feet (top of lowest bank). The surface area of the crossing, as required by the NESC (Table 232-1, Note 19) is approximately 2.4 acres. This is based on the total area of the river for a 1-mile stretch that includes the crossing, based on FEMA digital maps and FEMA identified river boundaries limited by bridge impediment. ESRI ArcView (GIS software) was used to calculate the surface area polygon. As stated in paragraph 8 of this petition, the minimum required clearances for the 115kV conductors and ADSS over water surface areas less than 20 acres are 22.1 feet and 17.5 feet, respectively.

11. As stated in the NESC (Table 232-1, Note 18), the surface area shall be enclosed by its high water mark and clearances hall be based on the normal flood level. In this case, the final river elevation at this location during the normal flood is 465.8 feet. The current sags and clearances to the water surface are as follows:

    - Shield wires – Due to the fact that the static wires are located above the phase wires, its clearances to the water surface will always exceed the minimum required NESC distance.

    - Conductors (phase wires) – The maximum sag for the conductor will occur under the maximum operating condition (285 deg F). This condition produces the greatest sag and therefore the minimum clearance to water surface. At the time of the original petition, the clearance exceeded the minimum requirement of 22.1 feet with a clearance of 33.6 feet. The clearance to the water surface of the conductor, under the maximum operating condition, after structure replacement will be 38.5 feet.

    - ADSS cable – The maximum sag for the ADSS cable will occur under the weather case of 32 deg F; ½ inch radial ice; no wind and therefore produces the minimum clearance to the water surface. At the time of the original petition, the clearance exceeded the minimum requirement of 17.5 feet with a clearance of 30.0 feet. The new ADSS cable clearance at maximum sag, after structure replacement, will be 30.7 feet.

- Minimum phase to ADSS clearance – The conditions that would produce the minimum clearance between the phase wires and ADSS cable would be at the maximum operating temperature of 285 deg F for the phase wires and 120 deg F for the ADSS. Based on NESC Section 235 and Table 235-5-1b for communication conductors and cables located in the supply space the vertical clearance between communication cable and 115kV of the same utility at the structure is 40 inches (3.3 feet) and its Note 10 which states there is no clearance specified between fiber optic supply cables meeting Rule 230F-1b and supply cables and conductors. Since no vertical clearance is specified, this case meets the minimum clearance diagonally of 40 inches (3.3 feet) at the structure and at mid span because of horizontal separation.

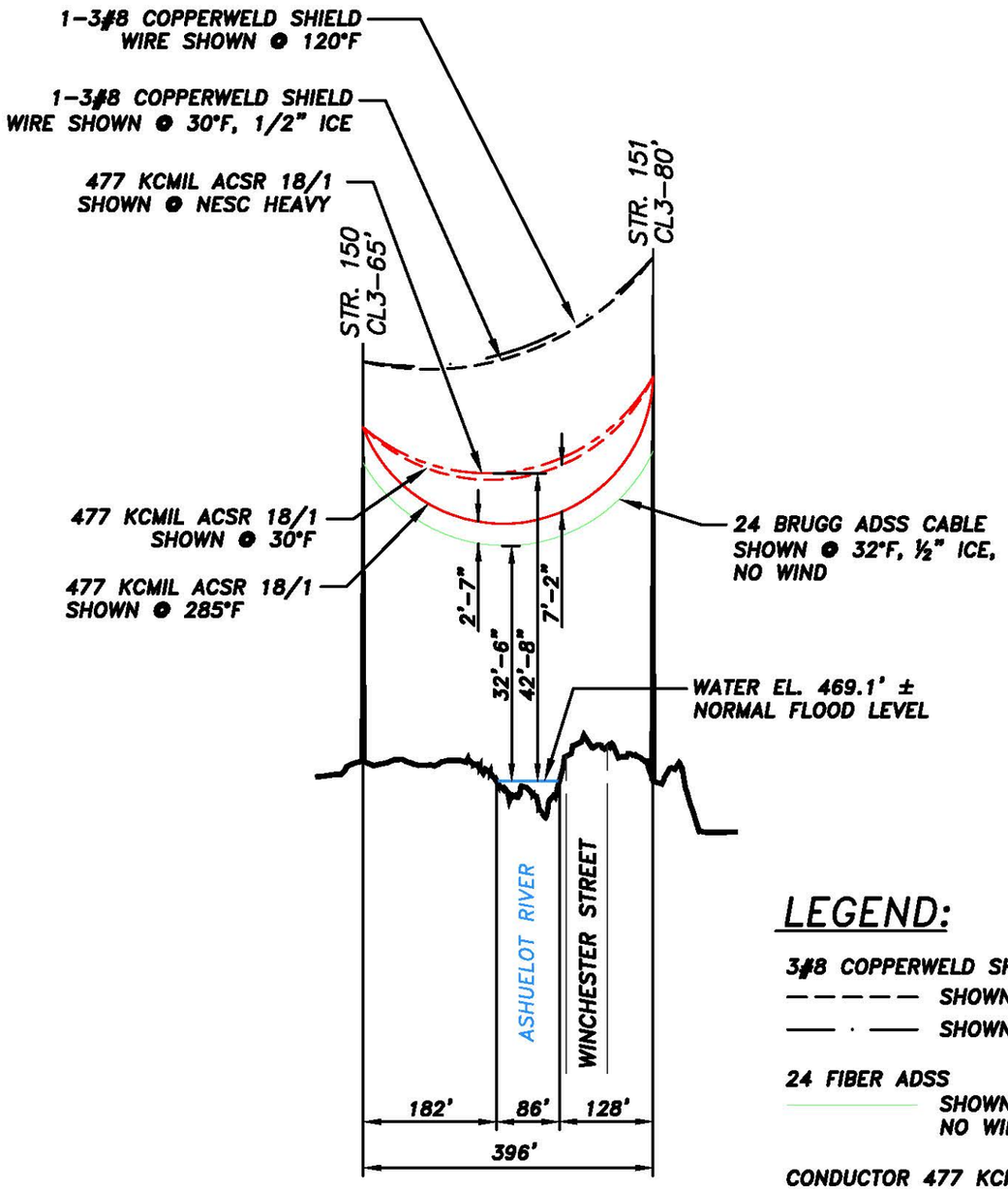
- Minimum phase to overhead ground wire (static wire) clearance – Based on NESC 235E-1, the weather case that would produce the minimum clearance between the phase wires and the static wires would be a combination of winter weather factors. The phase conductor condition is 30 deg F and the static wire condition is ½ inch radial ice at 30 deg F based on Table 230-1 for Zone 1. Under these conditions the vertical clearance based on NESC Table 235-6-2a for span wires when parallel to a line is calculated to be 4.8 feet (29"+(115kV*1.05-50kV)*0.4")). In this case the minimum NESC clearance of 4.8 feet between the static wire and the phase conductor is met through horizontal separation alone.

- Minimum clearance between ADSS and wires carried on different structures (i.e. ADSS to distribution power lines) – The NESC condition of ½" ice; no wind; 32 deg F provides the minimum NESC clearance between the ADSS cable and wires carried by other structures. Based on Section 233 and Table 233-1, the NESC minimum clearance between ADSS which meets Rule 230E-1 and open supply conductors, 750kV to 22kV is 2 feet. This clearance requirement is met in the case described by this Appendix.

- Minimum clearance between phase and wires carried on different supporting structures (i.e. phase to distribution power lines) – The maximum operating condition of 285 deg F produces the greatest sag in the phase wires and the minimum clearance between the phase wire and wires carried by other structures. Based on Section 233 and Table 233-1.4, the NESC minimum clearance between an open supply conductor of 115kV and open supply conductors 750V to 22kV is 2 feet plus the clearance calculated by Rule 233.C.2, where voltages exceed 22kV. NESC Rule 233.C.2a states that an additional clearance of 1.6 feet or [(((115kV*1.05√3)-22kV)*0.4"/12)] is needed for 115kV, which brings the total

required clearance to 3.6 feet. This clearance requirement is met in the case described by this Appendix.

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE



PROFILE VIEW

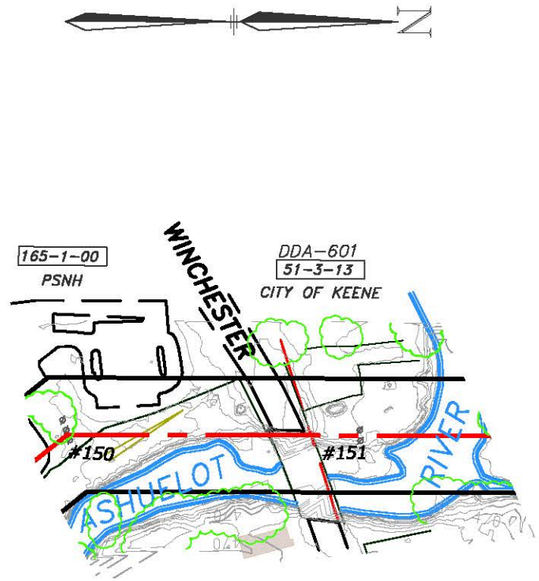
SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – – SHOWN @ 30°F
- —— - - —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F



PLAN VIEW

SCALE: 1"=200'

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'

NO.	REVISION	DATE	DRWN	CHCK	APPR
0	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB

Public Service of New Hampshire

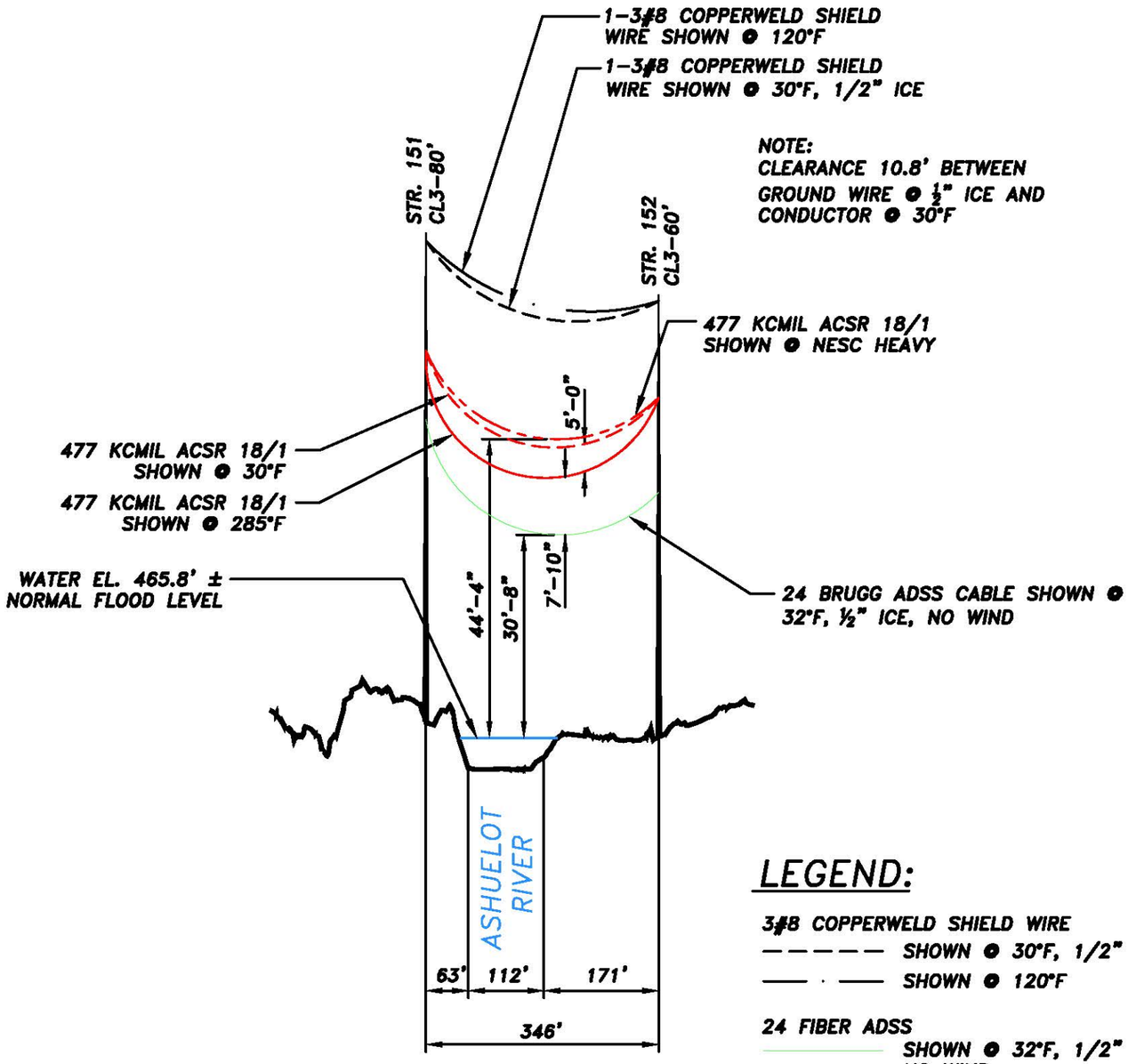
TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 150 & 151
ASHUELOT RIVER CROSSING
KEENE, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 8/13
DRAWING NO.: EXHIBIT K2 AMENDMENT

THIS PLAN IS FOR REFERENCE ONLY. NO REPRESENTATION OR WARRANTY IS MADE AS TO LOCATION OF BOUNDARIES OR OTHER POINTS OF REFERENCE

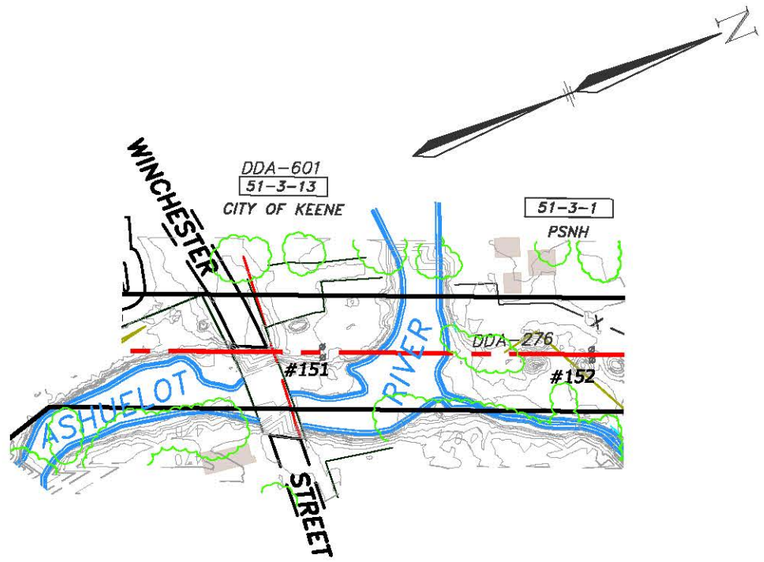


PROFILE VIEW

SCALE: 1"=200' HORIZ.
SCALE: 1"=20' VERT.

200 100 0 200 400 600

GRAPHIC SCALE
1" = 200'



PLAN VIEW

SCALE: 1"=200'

LEGEND:

3#8 COPPERWELD SHIELD WIRE
- – – – – – SHOWN @ 30°F, 1/2" ICE
- —— · —— SHOWN @ 120°F

24 FIBER ADSS
- SHOWN @ 32°F, 1/2" ICE, NO WIND

CONDUCTOR 477 KCMIL ACSR 18/1
- – – – – – SHOWN @ 30°F
- —— – – —— SHOWN @ NESC HEAVY
- ———— SHOWN @ 285°F

NOTES:

ELEVATION OF THE NORMAL FLOOD LEVEL WAS BASED ON A SPECIAL STUDY CONDUCTED FOR PSNH BY ENSR ENVIRONMENTAL CONSULTANTS IN 2008.

THIS DRAWING REPLACES THE PREVIOUS DRAWING DATED 7/2008 AND CONTAINS UPDATED CABLE SAGS & CLEARANCES.

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1	WO#T1258A1 – EPN R8249	8/13	RRR	RPL	DMB
0	WO#T1258A1 – EPN R8249	7/13	RRR	RPL	DMB

Public Service of New Hampshire

TRANSMISSION BUSINESS

DRAWN: RRR
ENGINEER: AM
CHECKED: RPL
APPROVED: DMB

LINE T198 (115kV) CROSSING BETWEEN STR. 151 & 152
ASHUELOT RIVER CROSSING
KEENE, NEW HAMPSHIRE

SCALE: AS SHOWN
DATE: 6/13
DRAWING NO.: EXHIBIT K2 AMENDMENT