Appendix A
I-135N – Connecticut River, Walpole, NH

1. As currently constructed, this line crosses over the Connecticut River in a cross country location approximately 1,500 feet south of the Bridge Street Crossing of the Connecticut River. The location of the existing crossing of the Connecticut River and the proposed construction is shown on attached location map, marked as Exhibit 1-1.

2. In order to accommodate the reconductoring, the existing 4/0 copper, brass reinforced, conductors in the current crossing of the I135N Line, a 115 kV circuit, will be replaced with new 795 kcmil ACSR conductors, and the existing 7/16 inch high strength galvanized steel shieldwire will be replaced with a new shieldwire containing fiber optics (OPGW), equivalent to 3/8 inch extra high strength galvanized steel. The existing steel lattice towers will be reused.

3. The design and proposed construction of the crossing is shown on the attached New England Power Company Plan and Profile Drawing entitled "Plan Showing Location of I135N Transmission Line Over and Across Connecticut River, Walpole , New Hampshire", marked as Exhibit 1-1.

4. The required technical information provided in this petition is based on the 2007 National Electrical Safety Code (NESC) C2-2007.

5. The proposed crossing occurs between two existing lattice towers, located approximately 2,073 feet apart. The tower on the north side of the Connecticut River is the 60-foot high terminal bridge structure located inside the Bellows Falls Substation. The tower on the south side of the river, Tower 1A, is a 48-foot high deadend tower, Type N-48. The three phase wires will be 795 kcmil ACSR, 26/7, and the shieldwire will be OPGW, equivalent to 3/8 inch extra high strength galvanized steel.

   The three new phase conductors and the new shieldwire will be located at the same elevation on the towers, and will have similar sags and clearances over the river as the existing 4/0 copper, brass reinforced, conductors. A copy of Tower 1A is attached, marked as Exhibit 2-1.

   Both the phase wire and the shieldwire will be sagged using the NESC Heavy Loading condition (0°F, 4 pounds wind, ½" radial ice). The phase wires will be sagged using a maximum tension of 8,800 pounds. The shieldwire will be sagged using a maximum tension of 4,900 pounds.

6. The 10 year flood elevation for the Connecticut River was based on the FEMA 10 year flood profile elevation from the Flood Insurance Study for Cheshire

County. The 10-year flood elevation for this location is approximately 252.3 feet based on the National Geodetic Vertical Datum of 1929 (NGVD 29).

7. The nature of the water surface underneath the conductors crossing the Connecticut River is not suitable for sailboating. See Site Review of the Connecticut River Crossing, the Cold River Crossing, and the Ashuelot River Crossing; Identification of Clearance Issues, Dated September, 2008, Prepared by Vanderweil Engineers.

   The applicable vertical clearance is found in NESC Table 232-1, Row 6.

8. Using the above design criteria, and the maximum sags of the phase wire and the shieldwire, the minimum clearance for the crossing have been determined and designed as follows:

Condition	Maximum Sag under this condition	Minimum clearance to Land	Minimum clearance to the 10-year flood
	Feet	Feet	Feet
A. NESC Heavy, Phase Wires	156.1	26.3	30.5
B. Minus 20° F, Phase Wires	151.5	26.1	33.1
C. 105° F, Phase Wires	155.9	24.6	29.7
D. 284° F, Phase Wires	161.5	24.5	25.6
E. NESC Heavy, Shieldwire	144.6	37.5	48.8
F Minus 20° F, Shieldwire	134.4	37.5	53.5
G. 105° F, Shieldwire	139.6	37.3	49.9

H. Minimum Clearance, Phase Wires

Maximum Operating Condition at 284 ° F (Item D above) results in minimum clearance
Minimum Clearance to land under those conditions is 24.5 feet, next to Tower 1A
- Required minimum clearance to land based on NESC Table 232-1.2 is 20.1 feet

Minimum Clearance to the 10-year flood water level under those conditions is 25.6 feet
- Required minimum clearance to water surface based on NESC Table 232-1.6 is 18.6 feet

The crossing clearances as proposed exceeds the NESC Requirements

I. Minimum Clearance, Shieldwire

Maximum Temperature Condition at 105° F (Item G above) results in minimum clearance
Minimum Clearance to land under those conditions is 37.3, next to Tower 1A
- Required minimum clearance to land based on NESC Table 232-1.2 is 15.5 feet

Minimum Clearance to the 10-year flood water level is 49.9 feet
- Required minimum clearance to water surface based on NESC Table 232-1.6 is 14.0 feet

The crossing clearances as proposed exceeds the NESC Requirements

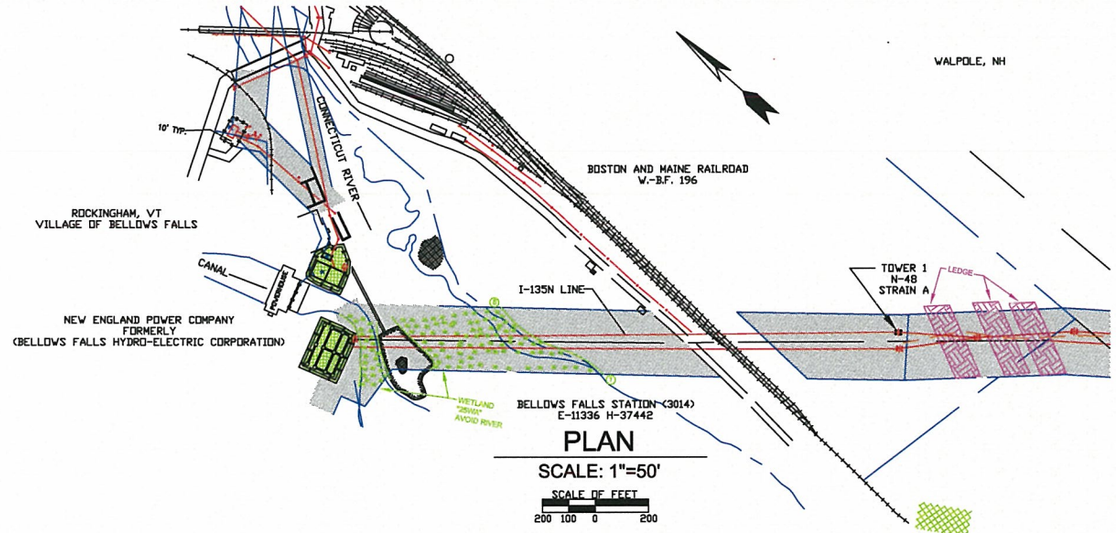
J. Minimum Shieldwire to Phase Wire Clearance

	Shieldwire Sag, feet	Conductor Sag, feet	Minimum separation between shieldwire and conductor
1	30 °F, ½" ice – 146.8	30 °F, Bare – 153.3	10.1 feet, next to Tower 1A
2	NESC Heavy – 144.6	NESC Heavy - 156.1	9.7 feet, next to Tower 1A
3	30 °F, 3/4" ice, 4 psf wind – 147.9	30 °F, Bare – 153.3	8.8 feet, next to Tower 1A

The minimum separations are based on the output of PLS-CADD, which searched for the minimum distance between the shieldwire and conductor along the entire span for conditions 1, 2, and 3.
Condition 3 results in the minimum clearance between these wires
Minimum Clearance shieldwire to phase under those conditions is 8.8 feet

- Required minimum clearance shieldwire to phase based on NESC Table 235-6, Section 2 is 4.8 feet

The shieldwire to phase wire clearances as proposed exceeds the NESC Requirements

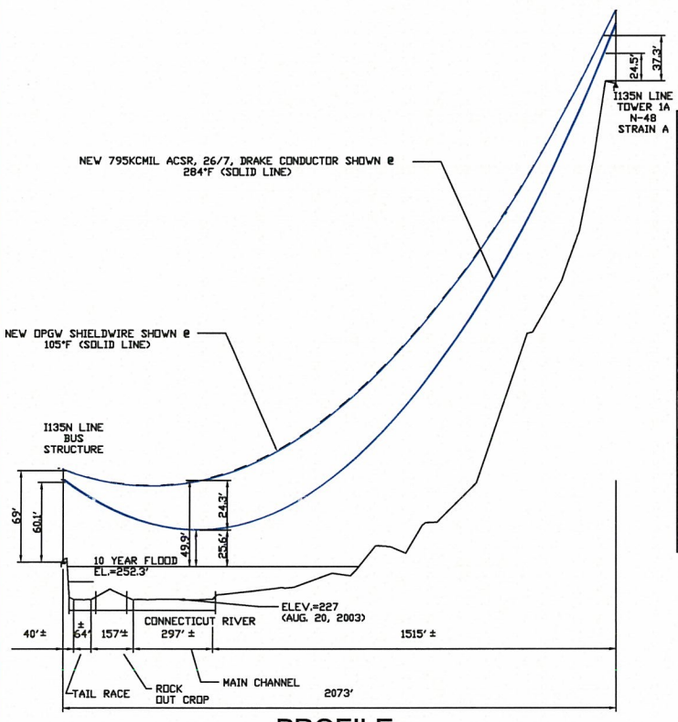


PLAN

SCALE: 1"=50'

SCALE OF FEET

200 100 0 200



PROFILE

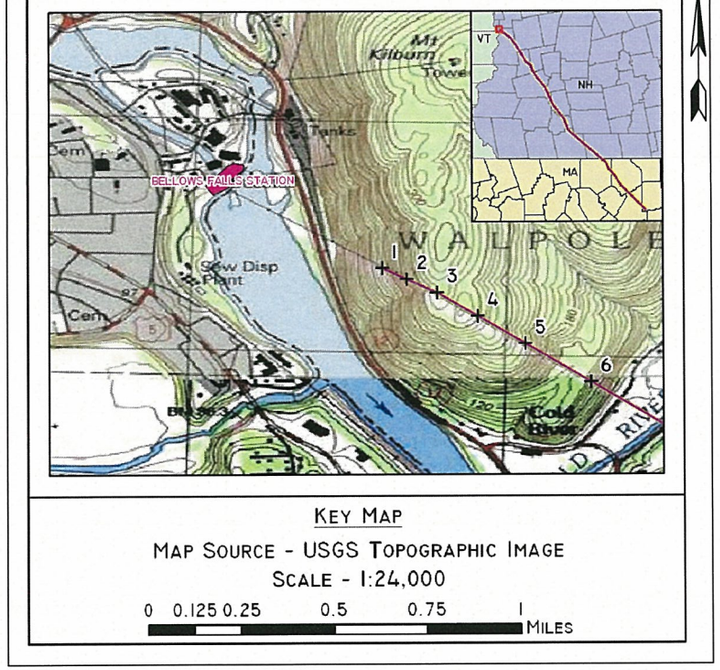
HORIZONTAL:1"=500'

VERTICAL:1"=100'

PHOTO

RAPIDS UNDER I135N & J136N MARCH 12. 2008 (August 20, 2003) = Date Flown

BELOW BELLOWS FALLS



KEY MAP

MAP SOURCE - USGS TOPOGRAPHIC IMAGE

SCALE - 1:24,000

0 0.125 0.25 0.5 0.75 1 MILES

LEGEND

Tower Location

Existing Conductor to be Replaced

EXHIBIT 1-1

New England Power Company
Plan Showing Location of
I-135N Transmission Line
Over and Across
Connecticut River
Walpole, New Hampshire

Scale: As Shown Date: September 2008

115KV LINE
LINE CROSSING OF CONNECTICUT RIVER
IN WALPOLE, NH
PLAN & PROFILE
SCALE : 1:50

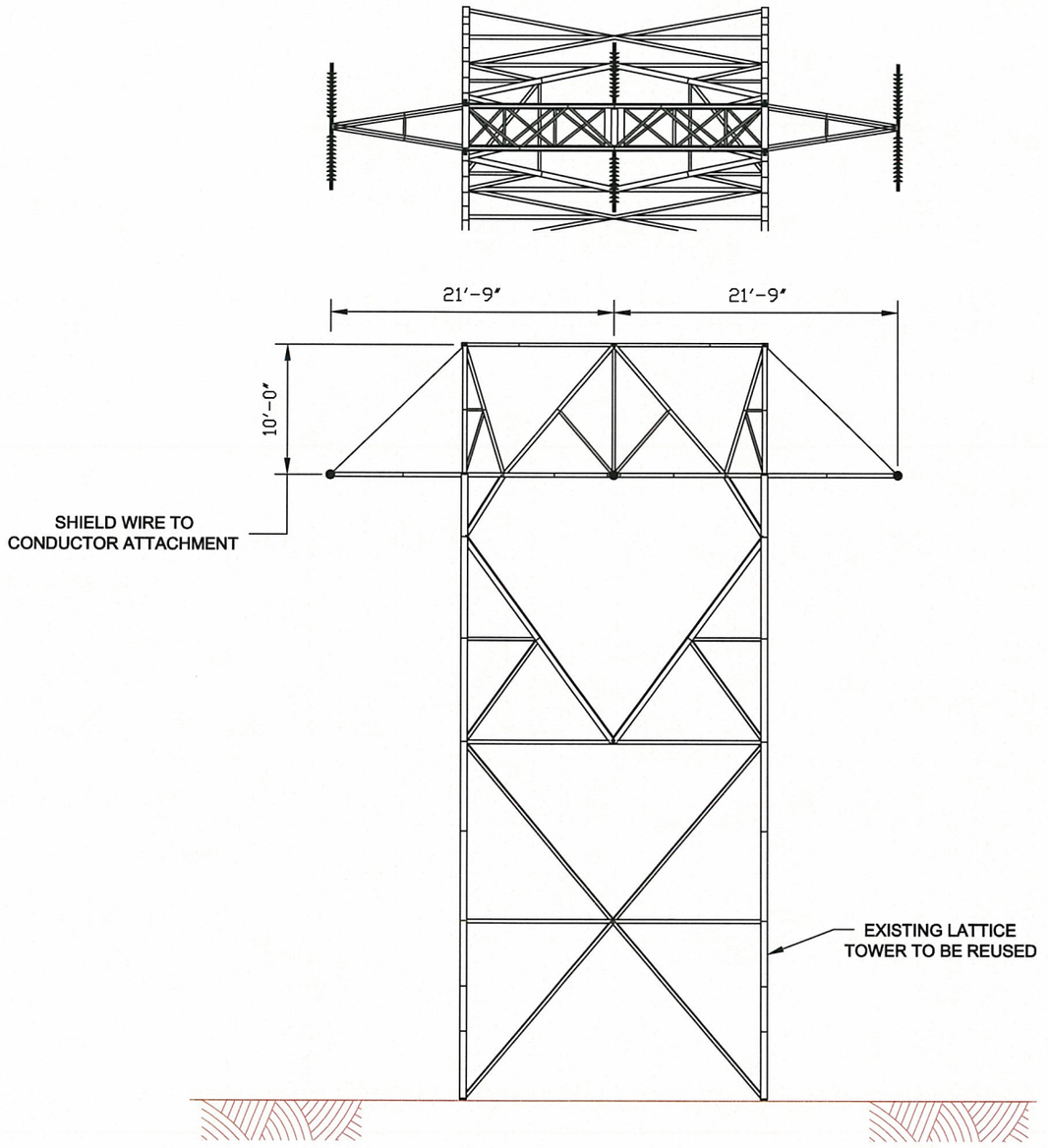
REV	DATE	REVISION DESCRIPTION	DRAWN	CHKD	APPVD
1	10/28/08	EDIT 10 YEAR FLOOD DESCRIPTION			

ORIGINAL	NAME	DATE
DRAWN BY		7/31/08
CHKD BY		
RGHTD BY		
APPVD BY		

nationalgrid

INCHES ON ORIGINAL

INCHES ON ORIGINAL



ELEVATION
SCALE:1"=10'

EXHIBIT 2-1

New England Power Company
Deadend Tower, Type N-48
I135N Transmission Line
Over and Across the
Connecticut River
Walpole, New Hampshire

Scale: As Shown Date: October 2008

115KV LINE
LINE CROSSING OF CONNECTICUT RIVER
IN WALPOLE, NH
DEADEND TOWER
SCALE : As Shown

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