

**APPENDIX A**  
**Z177 Line**  
**ANDROSCOGGIN RIVER**  
**BERLIN, NH**

1. Line Z177 crosses the Androscoggin River at two spans on one, 37.75' steel lattice tower (West – Smith Hydro), one three pole 60' wood deadend structure (Middle – Structure 1) and one, three pole 70' running angle structure (East – Structure 2) with spans of 188.73' between Smith Hydro and Structure 1 and 368.71' between Structure 1 and Structure 2. A detail of these structures have been provided with the petition as FIGURE 1, FIGURE 2 and FIGURE 3 respectively. As shown on FIGURE 1, the phase wires are spaced 11' horizontally. The static wire is carried directly on top of the lattice structure approximately 10'-0" above and 5'-6" laterally from the closest phase wire. As shown on FIGURE 2, the phase wires are spaced 14' horizontally. The static wire is carried on the structures above the phase wires by a crossarm approximately 7'-6" above and 7' laterally from the closest phase wire. The static wire is located approximately 7'-6" above and 0' laterally from the conductor idler jumper, which is the closest clearance at the structure. As shown on FIGURE 3, the phase wires are spaced 14' horizontally. The static wire is carried on a static support bracket near the top of the pole approximately 9'-0" above and 5'-6" laterally from the closest phase wire. OPGW cable will replace the static wire in the static wire positions on the crossing between Structure 1 and Structure 2. Two ADSS fiber optic cables will cross the spillway portion of the River from Structure 1 to a 35ft (29 ft above ground, 6 ft below ground) western red cedar pole, then attach directly to the Smith Hydro Facility at the location of an existing communication cable at elevation 953.61 ft. The ADSS cable shall be attached to the single round wood stub pole (Comm. 1) one foot below the top of the pole. Minimum distances to ground for truck traffic for 115kV is 20.1' per the NESC and has been met as 26.79' of clearance is provided. Minimum distance to ground for truck traffic for shield wires and fiber optic cables is 15.5' per the NESC and has been met as 19.85' of clearance is provided.

2. Flood water elevations for the Androscoggin River were based on information contained in flood insurance rate map number 3300290017B, panel 17 of 20 effective June 15, 1982 provided by FEMA. The 100-year flood elevation for this portion of the River is approximately 927.61' for the West portion of the crossing and 934.61' for the East portion of the crossing. No information was available for the 10-year flood elevation for this portion of the River. However, it should be noted that the 100-year elevation, which these lines were designed to safely exceed, would be well above the 10-year flood elevation. The area of the crossings, as required by the NESC (Table 232-1.7, Note 19), is approximately 48.5 acres. This is based on the total area of the River for a 1-mile stretch in either direction of the crossings (400' x 5,280')/43,560 sf/ac = 48.5 ac). As stated in paragraph 9 of the petition, the minimum required 115 kV conductor clearances for water surface area over 20-200 acres is 30.1'. The required minimum clearance for dielectric fiber optic cable (including ADSS) is 25.5'.

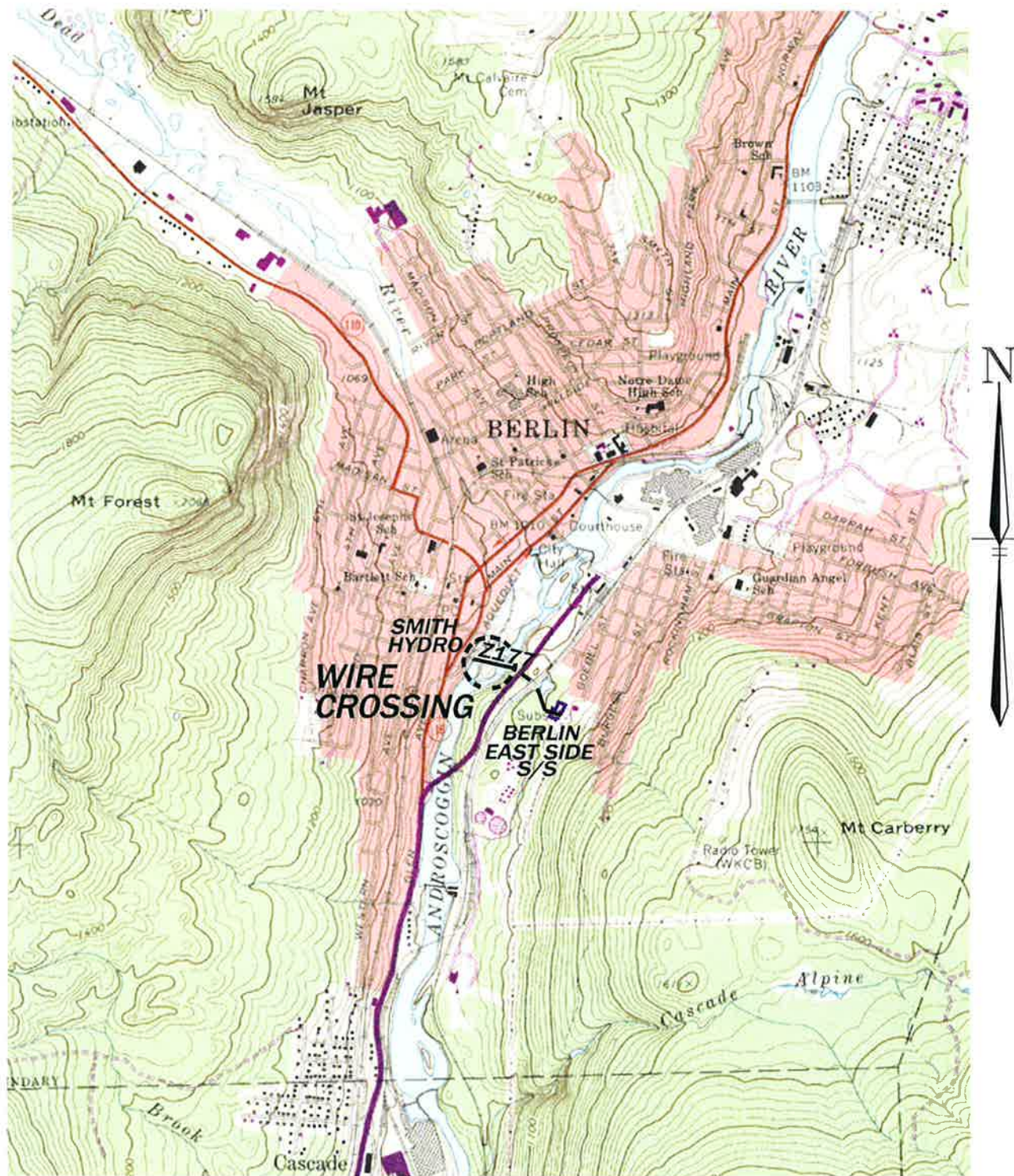
3. The sags and clearances to the water surface during a 100-year flood event for this crossing are as follows;

- PSNH investigated a multitude of weather and loading conditions for its design. The conditions investigated include ANSI C2-2012 Heavy Load Conditions, minus 20 degrees F ambient temperature for the phase conductors and OPGW cable, 120 degrees F ambient temperature for the static wires and ADSS cable, and 285 degrees F for the phase conductors. PSNH used these design conditions and combinations thereof to determine the minimum clearance of all conductors and the ADSS to the water and land surfaces, and between the phase conductors and OPGW and ADSS cables. PSNH has determined that the weather cases and combinations listed below result in the minimum clearances and control over all other weather conditions and combinations. PSNH has checked all clearances with three dimensional line modeling software to ensure all NESC required clearances have been met.
- OPGW Cable – Due to the fact that the OPGW cable is located above the phase wires in the static wire position, its clearance to the water surface will always exceed the minimum required NESC distance.
- 30 degrees, ½” Ice, ADSS Cable- The maximum conductor sag for this weather case will be 2.5’, however the lowest clearance to the water surface occurs right at the Smith Hydro building attachment point with a clearance of 26.0’, which exceeds the minimum clearance requirement of 25.5’ by 0.5’.
- NESC Heavy Loading, Phase Wires - The maximum conductor sag for this weather case will be 9.5’, however the lowest clearance to the water surface occurs right at the Smith Hydro Lattice structure with a clearance of 55.21’.
- 30 degrees F, Phase Wires - The maximum conductor sag for this weather case will be 9.5’, however the lowest clearance to the water surface occurs right at the Smith Hydro Lattice structure with a clearance of 55.21’.
- 285 degrees F, Max operating temperature (Phase wires) based on PSNH transmission standards - The maximum conductor sag for this weather case will be 12.4’. The lowest clearance to the water surface occurs right at the Smith Hydro Lattice structure with a clearance of 55.21’. This condition produces the greatest sag in the phase wires and therefore the minimum clearance to the water surface. This design will exceed the minimum clearance requirement of 30.1’ by

25.11' under temporary emergency conditions during a 100-yr storm event.

- Minimum phase to OPGW clearance – The weather case that would produce the minimum clearance between the phase wires and the static wire would be a combination of winter weather factors. First, the phase wires would have to be at 30 deg. F just after an ice storm and would have just dropped their ice. The static wire would also be at 30 deg. F and would still be iced with 1/2" of radial ice. The worst case span is between Structure 1 and Structure 2. Under these conditions the clearance would be 9.7' vertically and 7.0' horizontally from the shield wires to the closest phase wire. Based on Section 235.C.2.a.1 and Table 235-6 section 2.a of the NESC, the minimum clearance required is 57.4", or approximately 4.78'  $[29" + (121 \text{ kV} - 50 \text{ kV}) \times 0.4"]$ .
- Minimum phase to ADSS clearance – The weather case that would produce the minimum clearance between the phase wires and the ADSS cable occurs when the conductor is operating under its maximum operating temperature during a cold period. First, the phase wires would have to be at 285 deg. F. The ADSS cable would be at 30 deg. F. The closest clearance occurs where the ADSS crosses under the outer most phase approximately 30 ft from Z177 Structure 1. Under these conditions the clearance would be 5.42' vertically from the ADSS cable to the closest phase wire. According to NESC Rule 230F1b fiber optic cables shall meet the requirements of Rule 230E1. Based on Section 235.C.2.a.1 and Table 235-6 section 2.a of the NESC, the minimum clearance required in any direction is 57.4", or approximately 4.78'  $[29" + (121 \text{ kV} - 50 \text{ kV}) \times 0.4"]$ . This clearance would be exceeded by 0.64'.

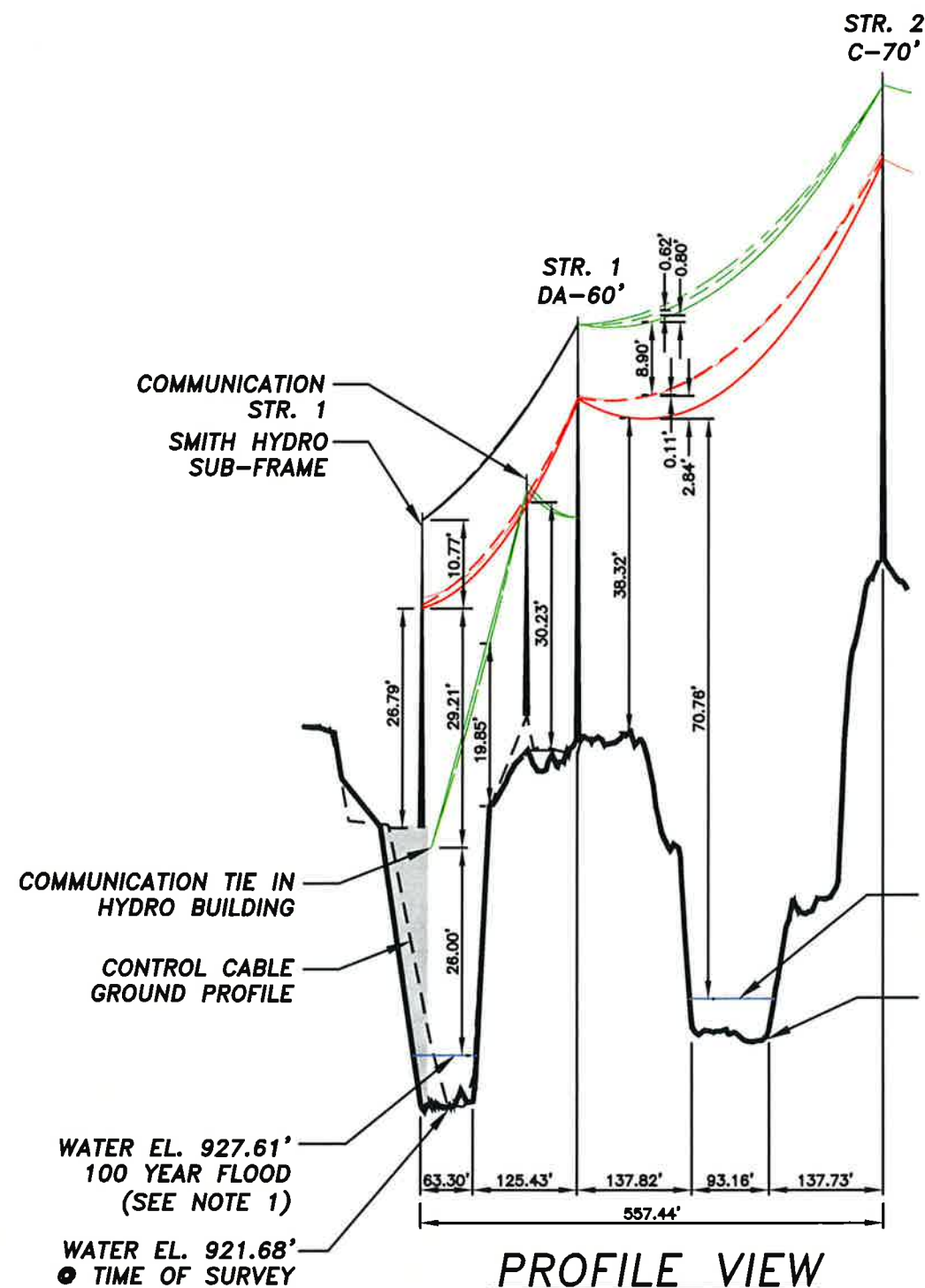




**EXHIBIT 1**

							DRAWN		Public Service of New Hampshire					
							<i>WNT</i>							
							DESIGNED		Transmission Business					
							CHECKED							
							<i>JRS</i>							
							APPROVED		LOCATION PLAN Z177 LINE (115 KV) <b>ANDROSCOGGIN RIVER WATER CROSSING</b> <b>BERLIN, NEW HAMPSHIRE</b>					
							<i>JRS</i>							
							SCALE		DATE		SHEET		DRAWING NO.	
							<i>1"=2000'</i>		<i>4/9/2012</i>		<i>2</i> of <i>2</i>		<i>D-7649-613A</i>	



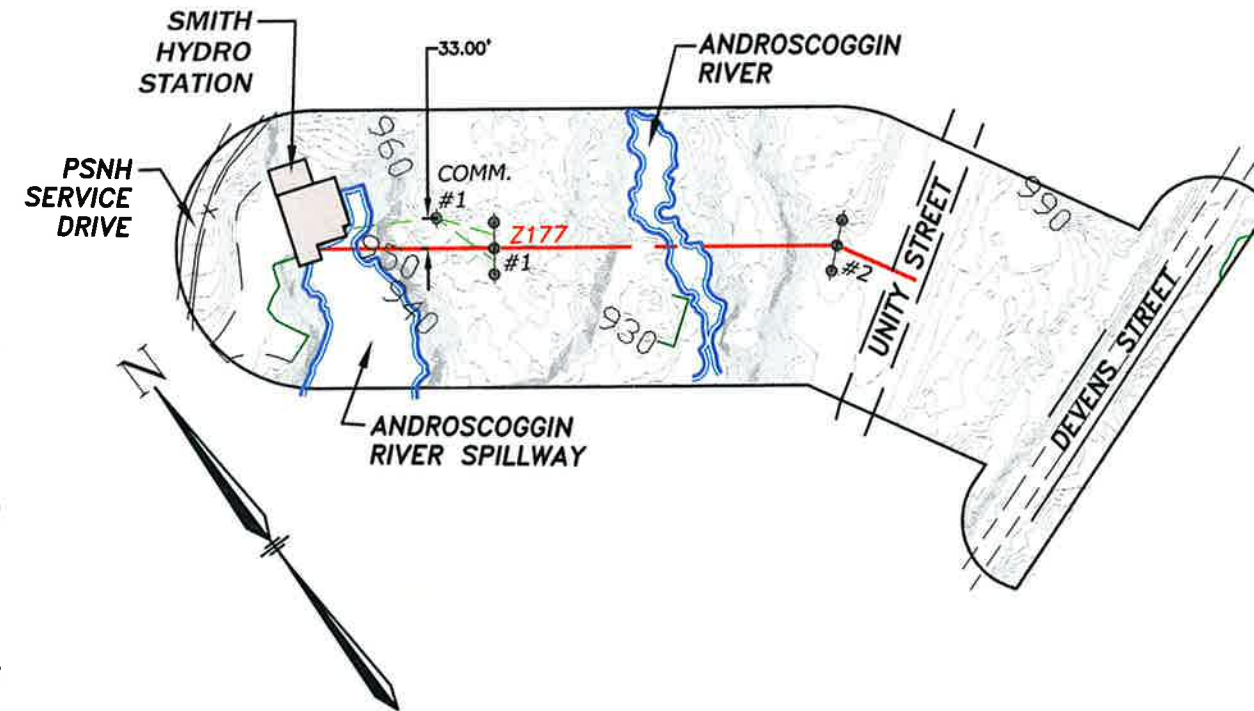


### PROFILE VIEW

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

### LEGEND:

- 3#8 COPPERWELD SHIELD WIRE  
 ----- SHOWN @ 30°F, 1/2" ICE  
 ----- SHOWN @ 120°F  
 ----- SHOWN @ NESC HEAVY
- 2-24 FIBER OPGW  
 ----- SHOWN @ 30°F, 1/2" ICE  
 ----- SHOWN @ 120°F  
 ----- SHOWN @ NESC HEAVY
- 2-24 FIBER ADSS  
 ----- SHOWN @ 30°F, 1/2" ICE  
 ----- SHOWN @ 120°F  
 ----- SHOWN @ NESC HEAVY
- 3-226.8 KCMIL ACSR 6/7 "OWL"  
 ----- SHOWN @ 30°F  
 ----- SHOWN @ NESC HEAVY  
 ----- SHOWN @ 285°F



### PLAN VIEW

SCALE: 1"=200'

### NOTE:

1. THE 100 YEAR FLOOD ELEVATION WAS BASED ON THE FEMA FIRM MAP PANEL #330029 0017 B, DATED JUNE 15, 1982. THE FIRM MAP 100 YEAR FLOOD ELEVATION OF 928.00 FEET (NGVD 29) IS USED AT THE PROPOSED CROSSING. THIS ELEVATION WAS CONVERTED TO NAVD 88. THE CONVERSION FOR NGVD 29 TO NAVD 88 FOR BERLIN, N.H. IS APPROXIMATELY -0.39041 FT. PER NATIONAL GEODETIC SURVEY.
2. ALL ELEVATIONS SHOWN ON DRAWING BASED ON NAVD 88.

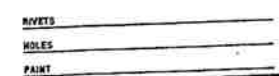
### LEGEND:

- ===== RIVER  
 ----- T-LINE CENTERLINE  
 [ ] PSNH FEE PROPERTY

### EXHIBIT 2

						Public Service of New Hampshire		Transmission Business
						Z177 LINE (115kV) CROSSING BETWEEN SMITH HYDRO-STATION & STR. 1 & 2 ANDROSCOGGIN RIVER CROSSING BERLIN, NEW HAMPSHIRE		
1	CROSSING ADJ WO# T126881 - EPN R8066	5/12	KMW	NOL	RPL	CHECKED	NDL	
0	CROSSING ADJ WO# T126881 - EPN R8066	3/12	PAP	TT	CAG	APPROVED	RPL	
NO.	REVISION	DATE	DRWN	CHCK	APPR	SCALE	DATE	DRIVING NO.
						AS SHOWN	5/2012	D-7649-613





DEAD END STRUCTURE TYPE DA  
APPLICATION: ANGLES ABOVE 50°  
GENERAL ARRANGEMENT

(110) 141

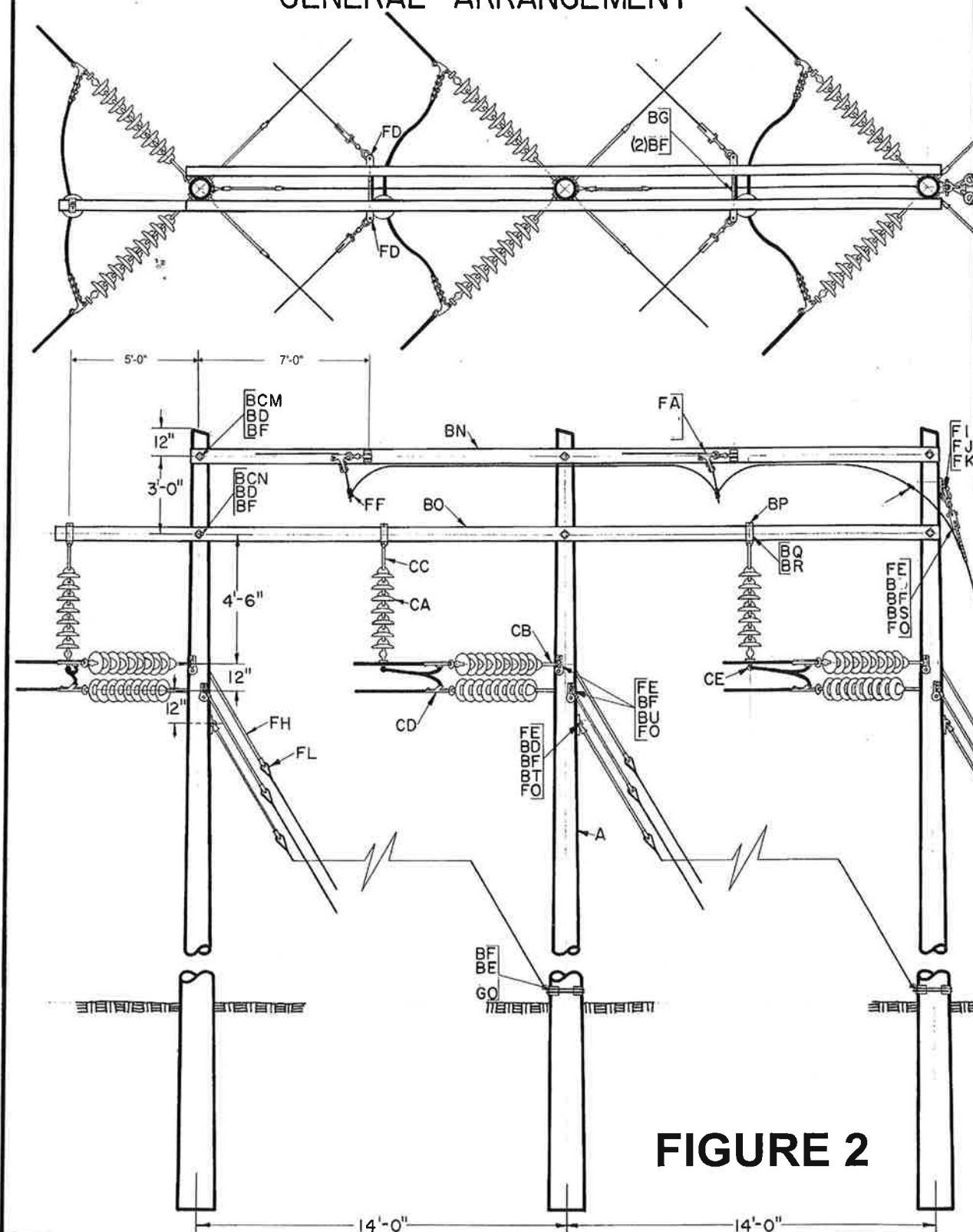


FIGURE 2

PSNH PUBLIC SERVICE  
Company of New Hampshire

115 KV  
TRANSMISSION STANDARDS

ISSUE	DATE
ORIGINAL 03-31-80	

# RUNNING ANGLE STRUCTURE TYPE C APPLICATION: ANGLES 20° TO 50° GENERAL ARRANGEMENT

110 131

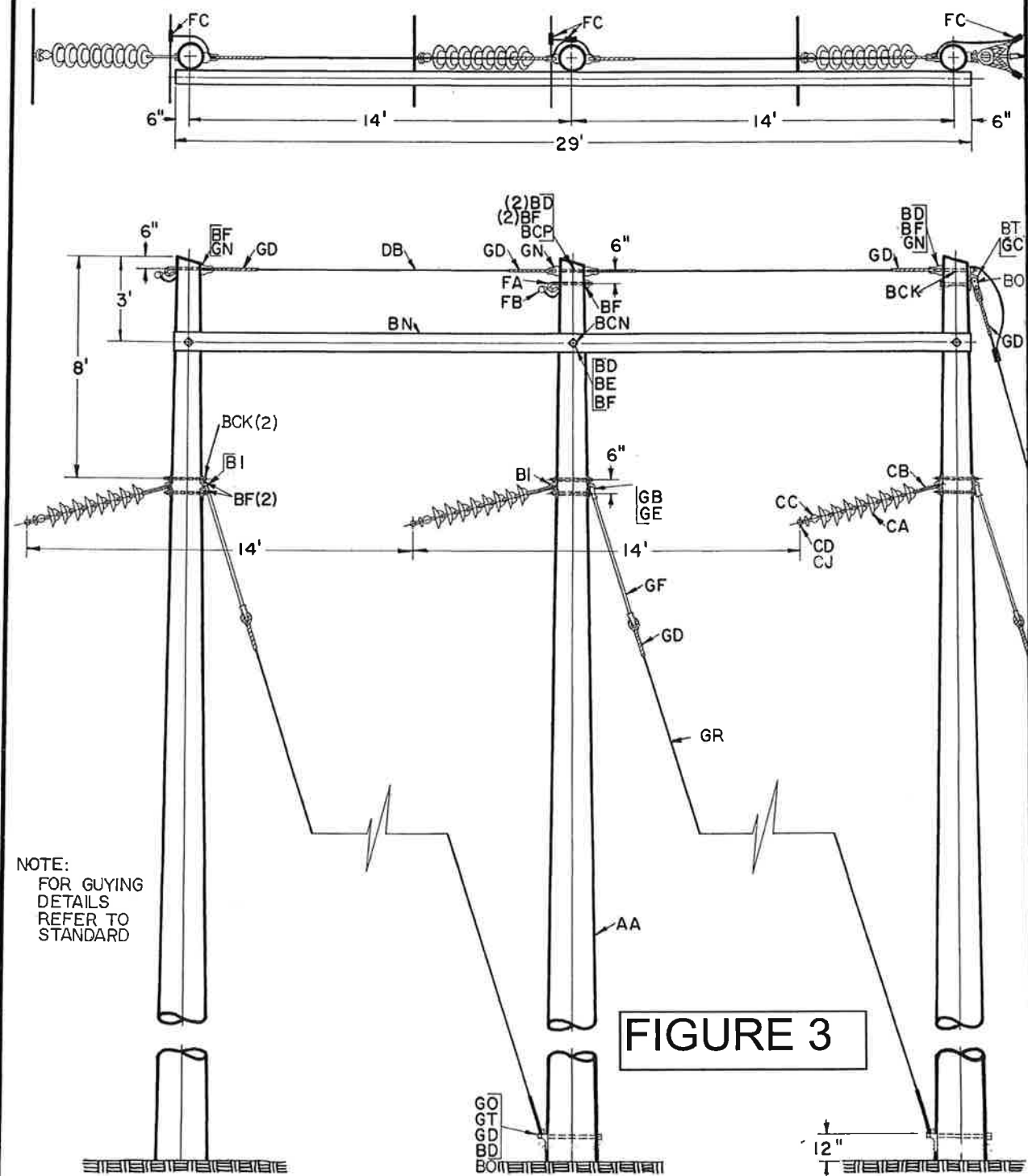


FIGURE 3

PSNH PUBLIC SERVICE  
Company of New Hampshire

115 KV  
TRANSMISSION STANDARDS

ISSUE	DATE
ORIGINAL	