

NHOS
 New Hampshire Optical Systems
 New Hampshire Optical Systems, Inc.
 99 Pine Hill Rd.
 Nashua, NH 03063
 (603-821-6467)

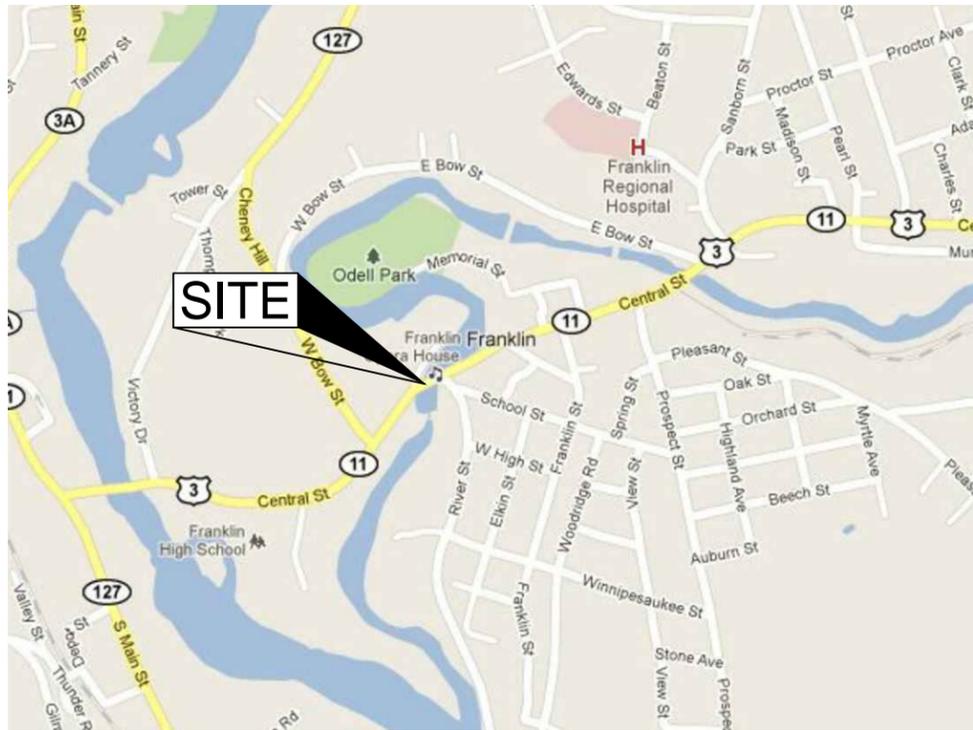
Project #TID-11 - Primary 15
 Drawing #AC-FRA-RIV-1

Date 01/25/12
 Revision # 1

Proposed
 Stream Crossing
 Franklin, NH

Location:
 Central St, Franklin NH
 Nearest cross street-Peabody Pl.

Sheet 1 of 2



LOCUS MAP
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations

Waveguide
River and Rail Crossings

09/01/11 Waveguide

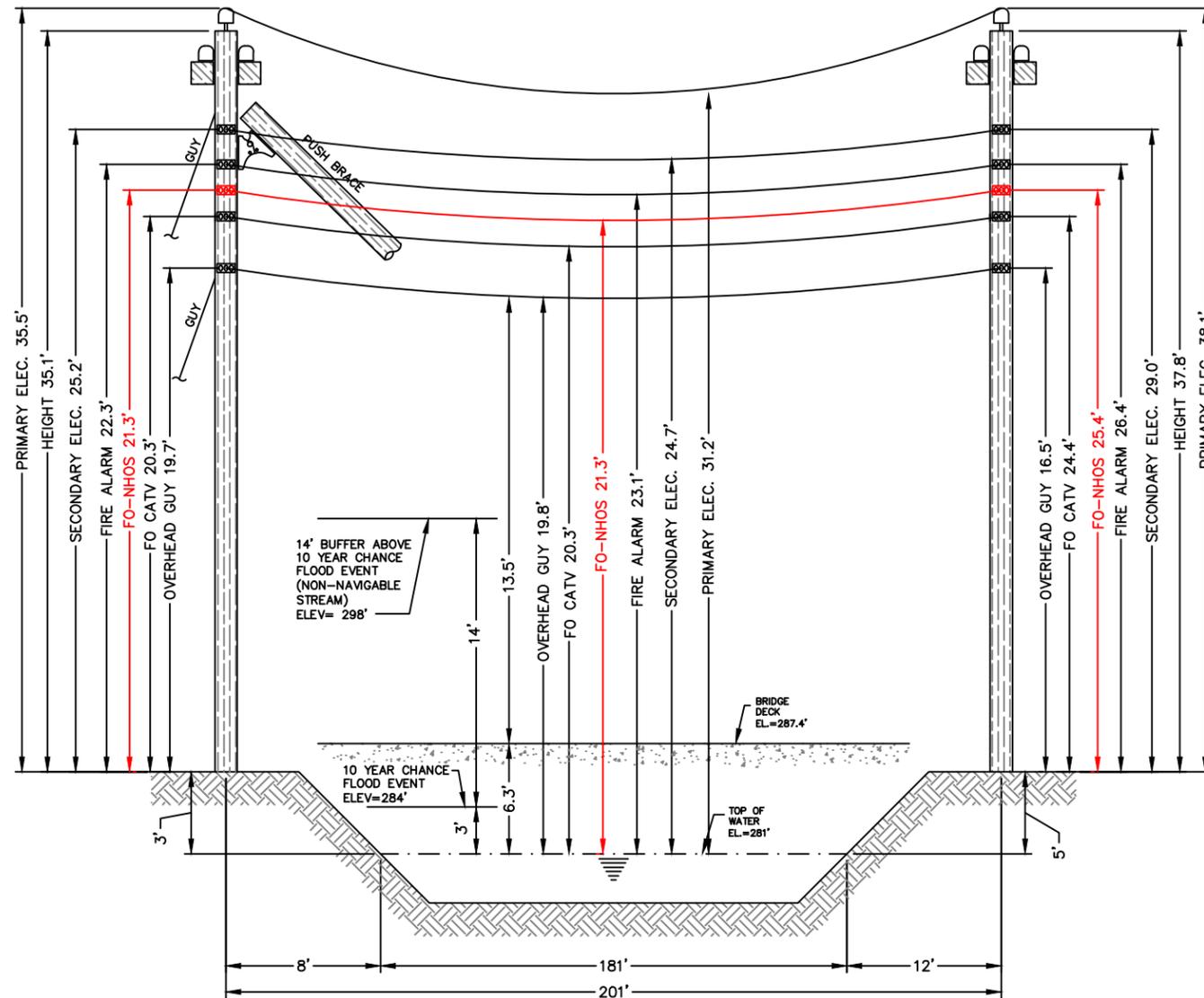
Selected Cables	X-SECT AREA (sq.in)	EFF MODULUS (psi)	NOMINAL DIAM (in)	EFF.EXP. COEFF. (1/F)	CABLE WEIGHT (lb/ft)	E'A LOAD BEARING CAPACITY (lbs)	MAX. RATED LOAD (lbs)
1/4"6.6mEHS	0.0352	2.60E+07	0.250	5.60E-06	0.1210	914940	6650
ORF-O-288-LN Bundle	0.5782	2.70E+05	0.858	1.13E-05	0.1960	155982	651

NESC RESULTS

Loading Condition	Temp. (F)	Ice Load lb/ft	Ice Thick in	Wind Constant lb/ft	Horz Wind Load lb/sq ft	Result Load + Const lb/ft	Sag ft	Tension lb	% Len Chg From Input Conditions	Sag @ 100.5 ft	Horz Sag Comp ft	Vert Sag Comp ft	Vector Angle Deg
Rule 251 - Heavy 232A1	0.0	1.000	.50	.3	4.0	1.793	4.38	2065	0.10	4.38	2.06	3.86	28.1
	120.0	0.000	.00	.0	0.0	0.317	2.44	655	0.01	2.44	0.00	2.44	0.0

Span Length = 201.00 ft
Span Sag = 2.01 ft (24.1 in)
Span Tension = 796 lb
Max Load = 6,650 lb
Usable load (60%) = 3,990 lb
Catenary Length = 201.054 ft
Stress Free Length @ Installed Temperature = 200.879 ft
Unloaded Strand Sag = 1.00 ft (12.0 in) 0.50 %
Tension = 612 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	1.31	1,218	-0.02	N/A
-30.0	1.36	1,174	-0.01	N/A
-20.0	1.41	1,132	-0.01	N/A
-10.0	1.47	1,090	-0.01	N/A
.0	1.52	1,049	-0.01	N/A
10.0	1.58	1,010	-0.01	N/A
20.0	1.65	971	-0.01	N/A
30.0	1.71	933	-0.01	N/A
40.0	1.78	897	-0.01	N/A
50.0	1.86	862	0.00	N/A
60.0	1.93	828	0.00	N/A
70.0	2.01	795	0.00	N/A
80.0	2.09	765	0.00	N/A
90.0	2.18	735	0.00	N/A
100.0	2.26	707	0.01	N/A
110.0	2.35	681	0.01	N/A
120.0	2.44	655	0.01	N/A
130.0	2.53	632	0.02	N/A
140.0	2.63	610	0.02	N/A



E-1/23 - T-2/1-1
(Existing joint owned utility pole (Fairpoint/PSNH) in existing Right-of-Way)

E-1/22 - T-140/NT
(Existing joint owned utility pole (Fairpoint/PSNH) in existing Right-of-Way)



E-1/23 - T-2/1-1

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the river. The strand will be installed at the proposed height (see above). The supporting strand will be secured to each pole using double dead end attachments to prevent any sag in the wire and maintain proper clearances. NHOS will lash a one inch diameter fiber optic cable (PVC jacket) to the strand using a dual lash method to provide security of the fiber over the right of way. The fiber will be tagged with twenty four hour contact information at each pole clamp. NHOS will employ the proper safety personnel during the crossing installation. The proposed install will meet all proper clearances from other Utilities. (see above). Additional pole guys will be added per NESC Rule 264 and as directed by pole owners.



E-1/22 - T-140/NT

Notes:

- Heights of structures shown hereon are based on field measurements taken with a Nikon NPL 362 total station on August 11, 2011 using .
- The elevations shown hereon are based on NHDOT Geodetic Disk #OC0798 found in the south wall of Soldiers Memorial Hall located northeast of the intersection of Central St. and Church St. This disk has a published elevation of 309.56' (NAVD88).
- Based on the FEMA Flood profile for the Winnepesaukee River (page 105P) The elevation for the 10% Chance flood event is 284' (NAVD88).
- The horizontal distance between the bridge and the existing overhead wires ranges from 6' to 10'.
- The vertical distance between the 10% chance flood event and the lowest overhead wire is approximately 17'.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.



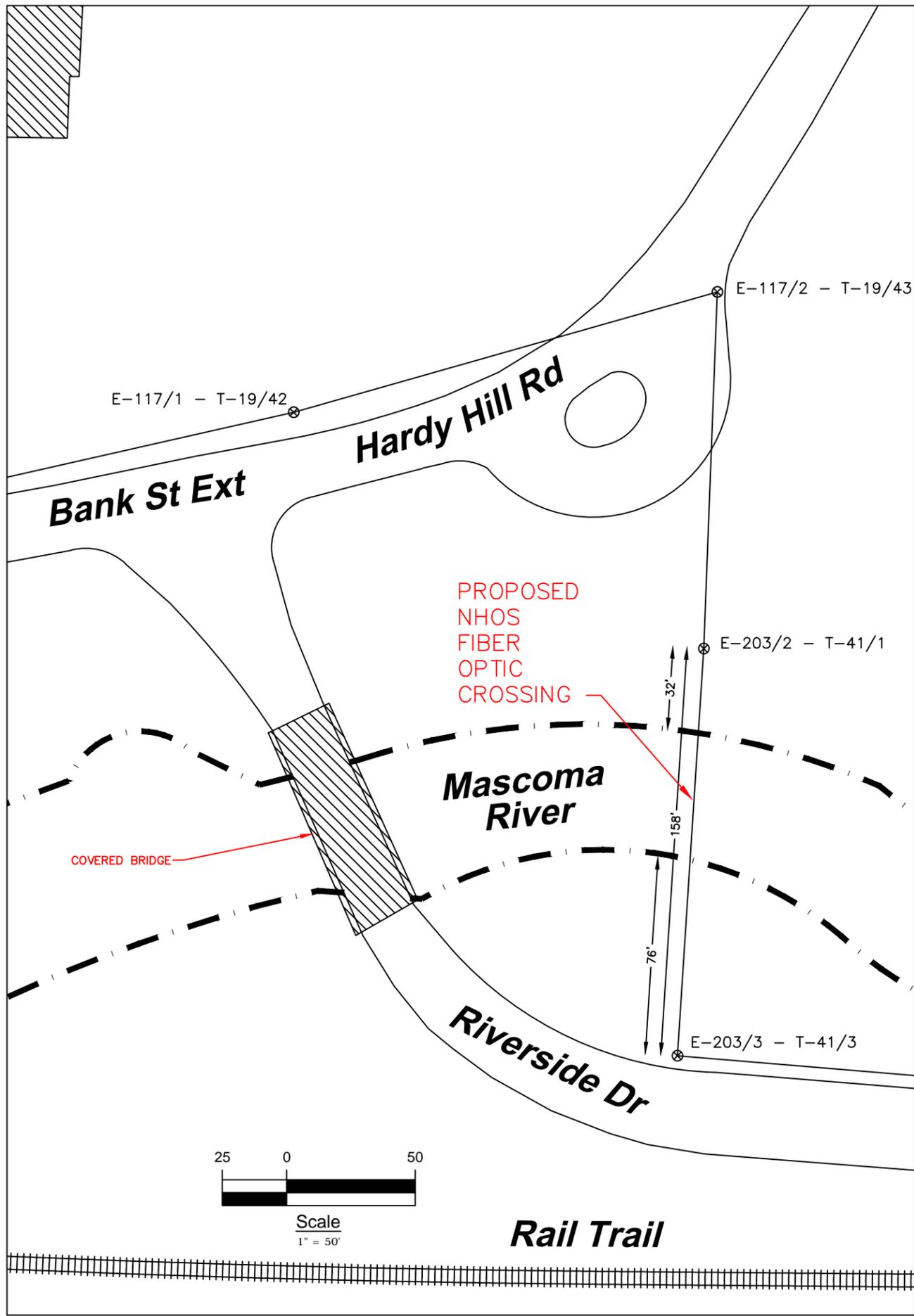
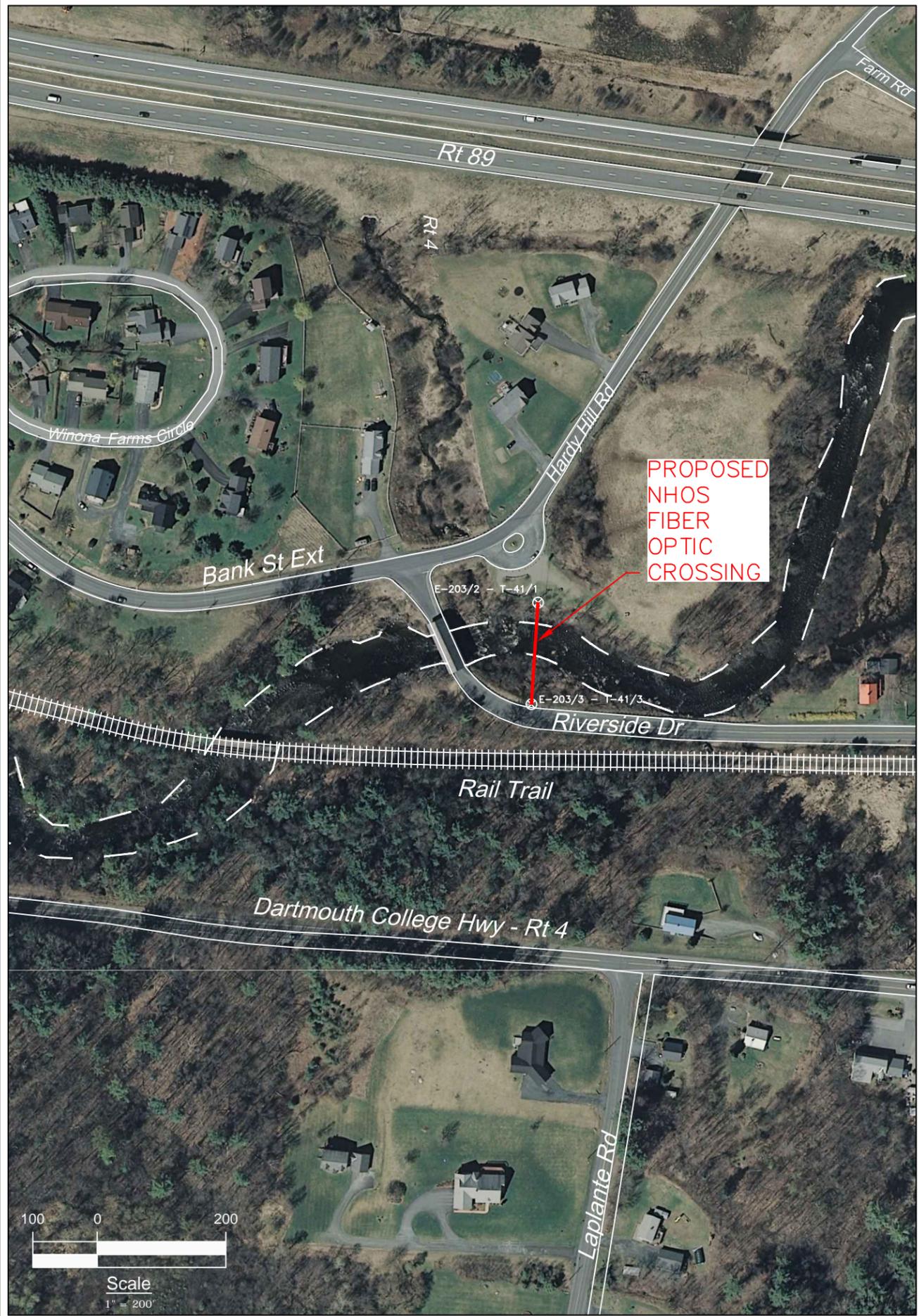
New Hampshire Optical Systems, Inc.
99 Pine Hill Rd.
Nashua, NH 03063
(603-821-6467)

Project #TID-11 - Primary 15
Drawing #AC-FRA-RIV-1

Date 01/25/12
Revision # 1

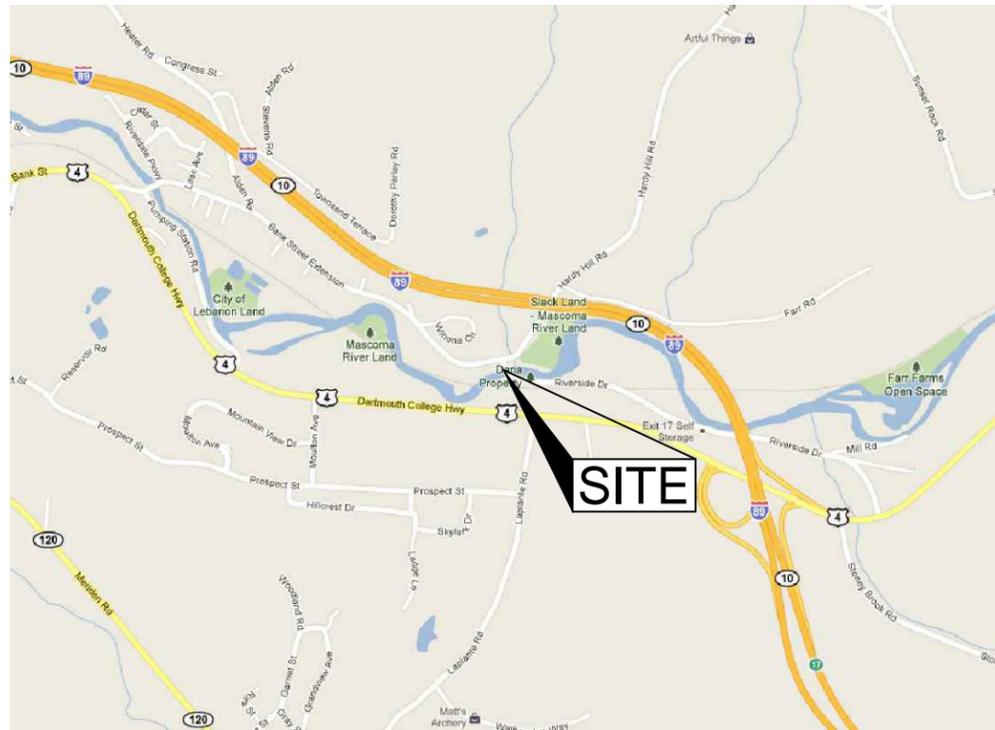
Proposed
Stream Crossing
Franklin, NH

Location:
Central St, Franklin NH
Nearest cross street-Peabody Pl.



NHOS
New Hampshire Optical Systems, Inc.
99 Pine Hill Rd.
Nashua, NH 03063
(603-821-6467)

Project # TID-41 Drawing # AC-LEB-RIV-1
Date: 01/25/12 Revision # 1
Proposed Mascoma River Crossing Lebanon, NH
<u>Location:</u> Riverside Drive, Lebanon, NH Nearest cross street-Bank Street Extension
Sheet 1 of 2



LOCUS MAP
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations
09/01/11 Waveguide

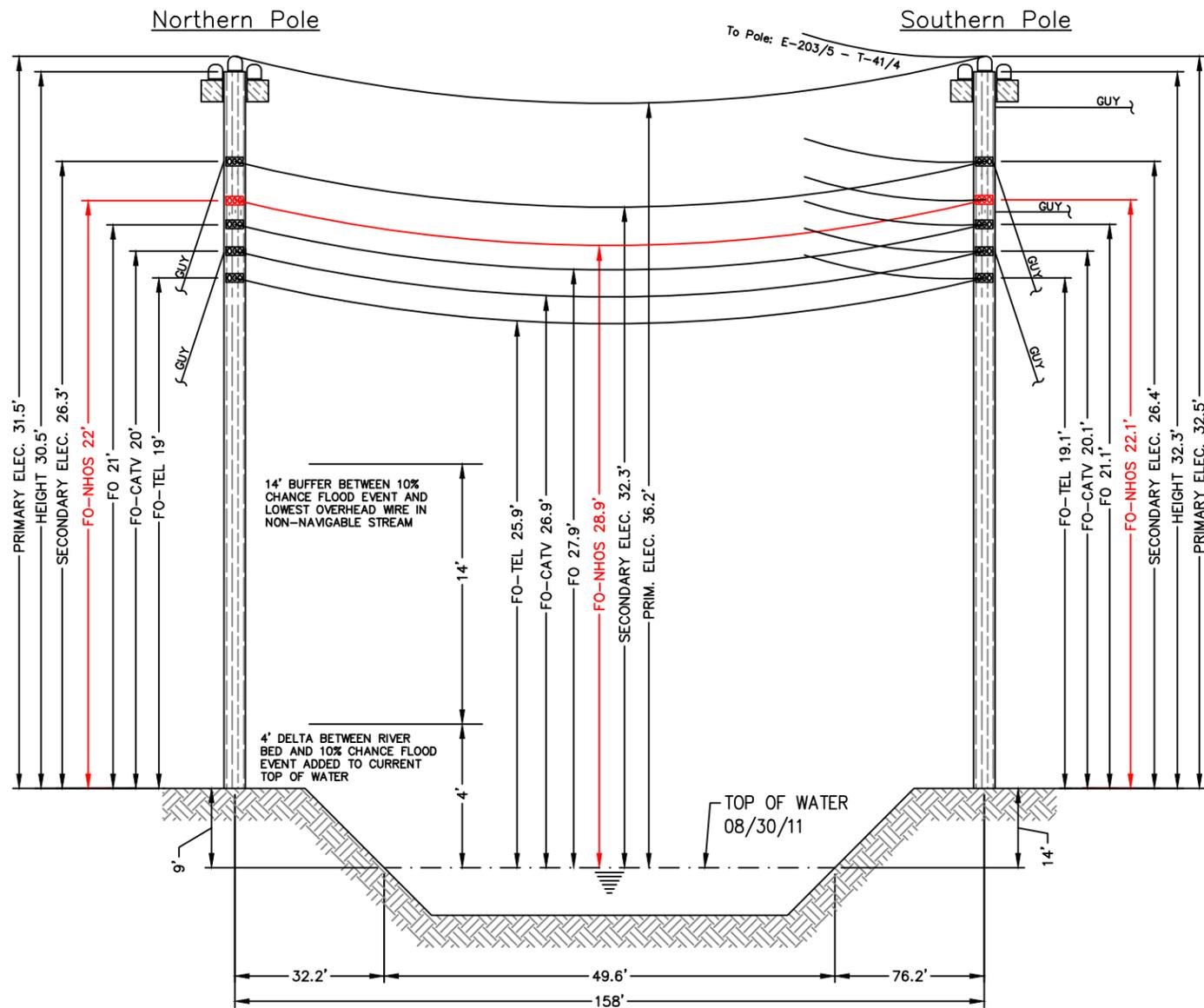
Waveguide
River and Rail Crossings

Selected Cables	X-SECT AREA (sq.in)	EFF MODULUS (psi)	NOMINAL DIAM (in)	EFF. EXP. COEFF. (1/F)	CABLE WEIGHT (lb/ft)	E*A LOAD BEARING CAPACITY (lbs)	MAX. RATED LOAD (lbs)
1/4"6.6mEHS	0.0352	2.60E+07	0.250	5.60E-06	0.1210	914940	6650
ORF-O-144-LN	0.4307	3.50E+05	0.741	1.09E-05	0.1520	150720	640
Bundle			0.991		0.2730		

NESC RESULTS

Loading Condition	Temp. (F)	Ice Load (lb/ft)	Ice Thick (in)	Wind Constant (lb/ft)	Haz. Wind Load (lb/ft)	Result. Load + Const (lb/ft)	Sag (ft)	Tension (lb)	% Len Chg From Input Conditions	Sag @ Point 79 (ft)	Horz Sag Comp (ft)	Vert Sag Comp (ft)	Vector Angle Deg
Rule 251 - Heavy	0.0	0.927	.50	.3	4.0	1.671	3.18	1639	0.08	3.18	1.54	2.78	28.9
232A1	120.0	0.000	.00	.0	0.0	0.273	1.99	427	0.02	1.99	0.00	1.99	0.0

Span Length = 158.00 ft	Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
Span Sag = 1.58 ft (19.0 in)	-40.0	.91	938	-0.02	N/A
Span Tension = 539 lb	-30.0	.95	895	-0.02	N/A
Max Load = 6,650 lb	-20.0	1.00	853	-0.02	N/A
Usable load (60%) = 3,990 lb	-10.0	1.05	812	-0.01	N/A
Catenary Length = 158.042 ft	.0	1.10	772	-0.01	N/A
Stress Free Length @ Installed Temperature = 157.949 ft	10.0	1.16	733	-0.01	N/A
	20.0	1.22	697	-0.01	N/A
Unloaded Strand	30.0	1.29	661	-0.01	N/A
Sag = .97 ft (11.7 in) 0.62 %	40.0	1.36	628	-0.01	N/A
Tension = 388 lb	50.0	1.43	596	0.00	N/A
	60.0	1.50	567	0.00	N/A
	70.0	1.58	539	0.00	N/A
	80.0	1.66	513	0.00	N/A
	90.0	1.74	489	0.01	N/A
	100.0	1.82	467	0.01	N/A
	110.0	1.91	446	0.01	N/A
	120.0	1.99	427	0.02	N/A
	130.0	2.08	410	0.02	N/A
	140.0	2.16	394	0.02	N/A



E-203/2 - T-41/1
(Existing joint owned utility pole (National Grid/Fairpoint) in existing Right-of-Way)

E-203/3 - T-41/3
(Existing joint owned utility pole (National Grid/Fairpoint) in existing Right-of-Way)

Notes:

- The heights of structures shown hereon are based on field measurements taken with a Nikon 362 total station during a site survey on 08/30/11.
- The horizontal distance between the nearest bridge edge and the existing overhead wires is over 100'.
- The waterway is classified as not suitable for sail boating and per NESC Table 232-1 a vertical clearance of 14' must be maintained between the lowest conductor and 10 year floodplain.
- Based on the FEMA Flood Profile for the Mascoma River (Page 87P) and the Flood Insurance Rate Map for Grafton County Map Panel 914 of 1185) dated 02/20/08 a conservative 10 year flood elevation was calculated by adding the delta between the river bed elevation (634') and the 10 year flood elevation (638') to the surveyed water level and then a 14' buffer (for non-navigable streams) was added to that.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.



New Hampshire Optical Systems, Inc.
99 Pine Hill Rd.
Nashua, NH 03063
(603-821-6467)

Project # TID-41
Drawing # AC-LEB-RIV-1

Date: 01/25/12
Revision # 1

Proposed Mascoma River Crossing
Lebanon, NH

Location:
Riverside Drive, Lebanon, NH
Nearest cross street-Bank Street Extension



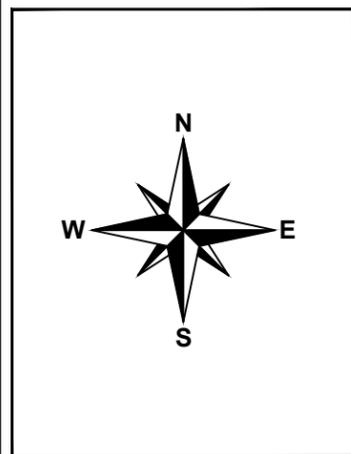
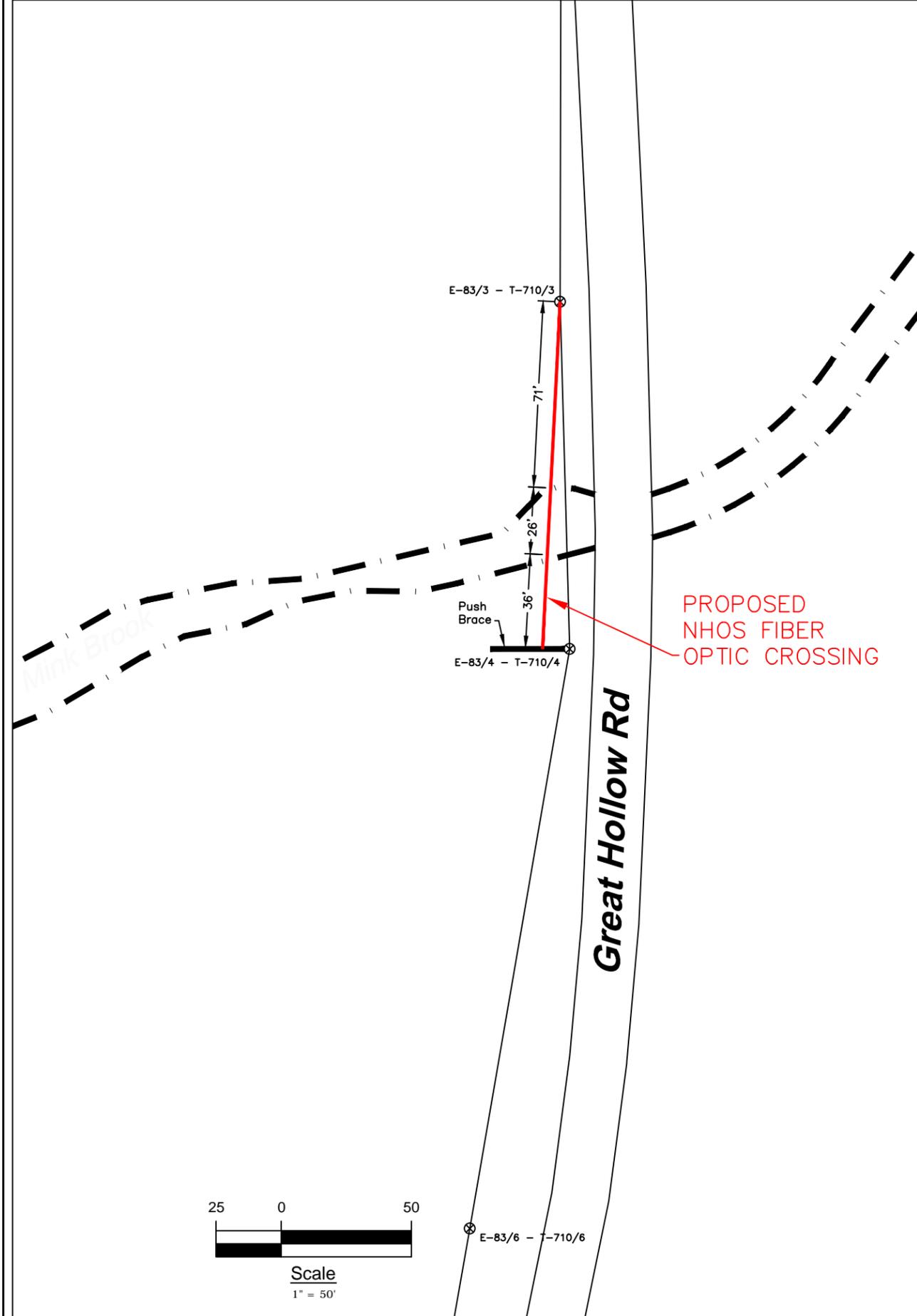
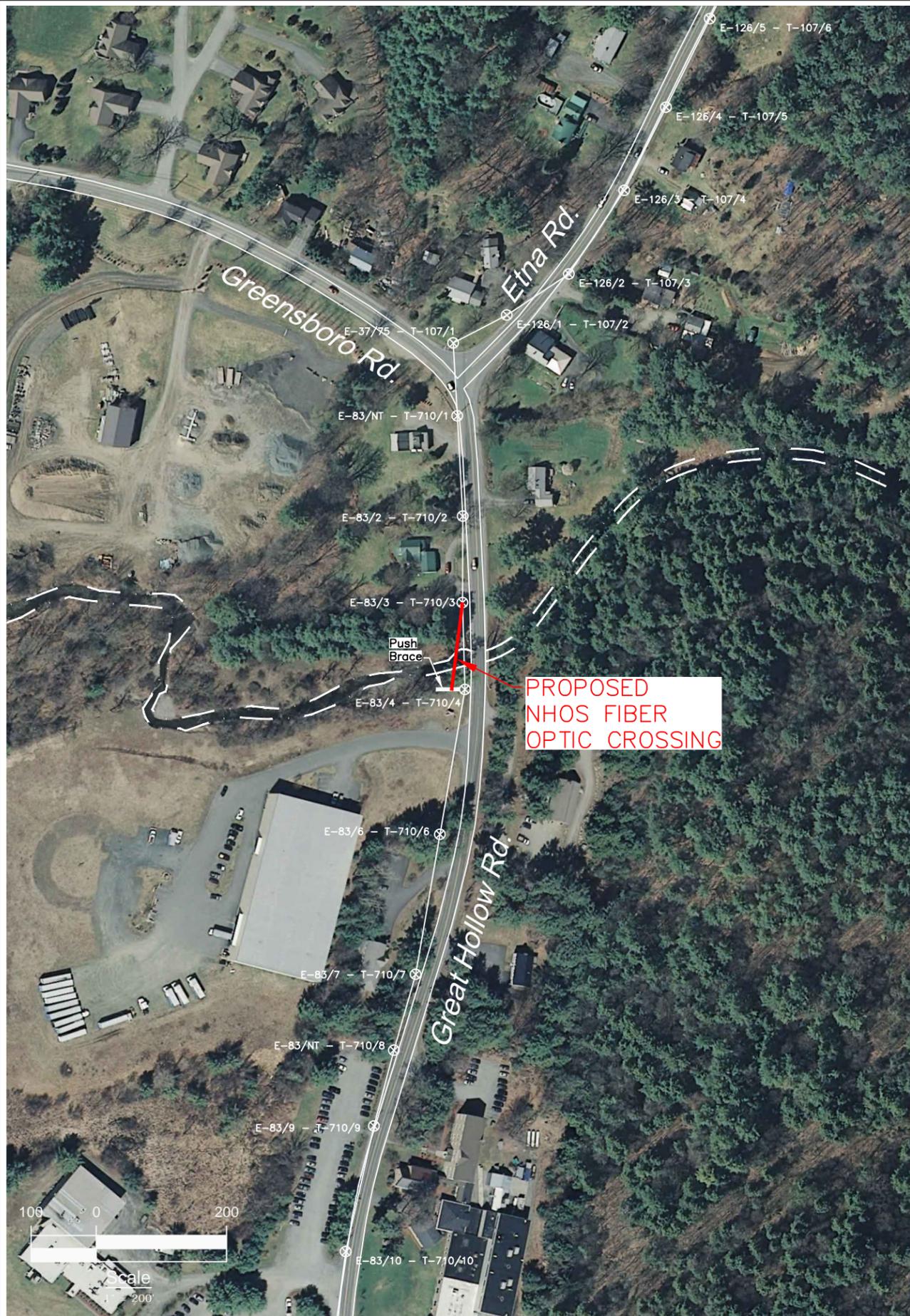
E-203/2 - T-41/1

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the river. The strand will be installed at the proposed height (see above). The supporting strand will be secured to each pole using double dead end attachments to prevent any sag in the wire and maintain proper clearances. NHOS will lash a one inch diameter fiber optic cable (PVC jacket) to the strand using a dual lash method to provide security of the fiber over the right of way. The fiber will be tagged with twenty four hour contact information at each pole clamp. NHOS will employ the proper safety personnel during the crossing installation. The proposed install will meet all proper clearances from other Utilities. (see above). Additional pole guys will be added per NESC Rule 264 and as directed by pole owners.



E-91/NT - T-110D/10



NHOS
 New Hampshire Optical Systems
 New Hampshire Optical Systems, Inc.
 99 Pine Hill Rd.
 Nashua, NH 03063
 (603-821-6467)

Project # TID-50 - Lateral 29
 Drawing # AC-HAN-RIV-2

Date: 02/08/12
 Revision # 1

Proposed Crossing
 Mink Brook
 Hanover, NH

Location:
 Great Hollow Rd, Hanover, NH
 Nearest cross street- Greensboro Rd.

Sheet 1 of 2



LOCUS MAP
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations
09/01/11 Waveguide

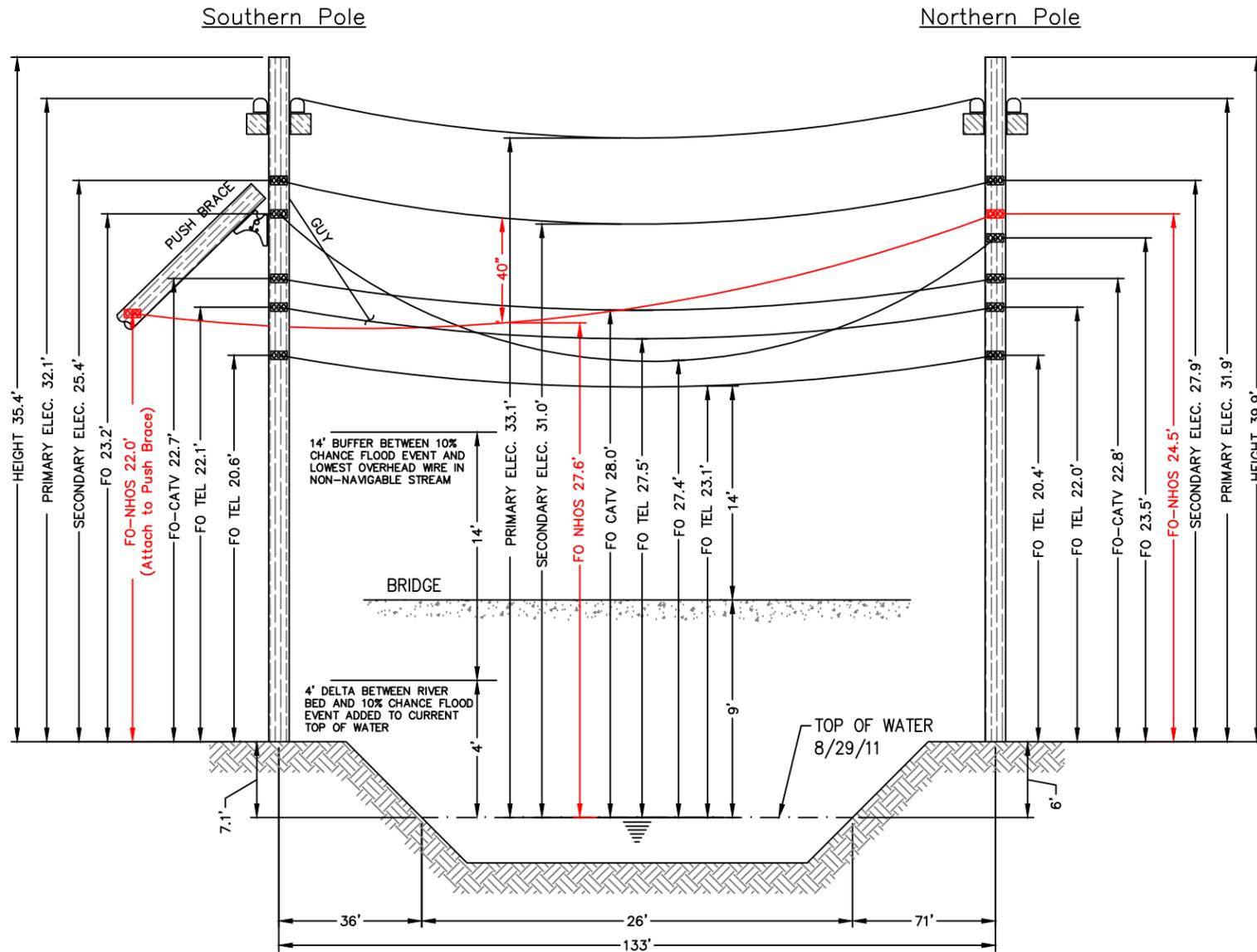
Waveguide
River and Rail Crossings

Selected Cables	X-SECT AREA (sq.in)	EFF MODULUS (psi)	NOMINAL DIAM (in)	EFF.EXP. COEFF. (1/F)	CABLE WEIGHT (lb/ft)	E'A LOAD BEARING CAPACITY (lbs)	MAX. RATED LOAD (lbs)
1/4"6.6mEHS	0.0352	2.60E+07	0.250	5.60E-06	0.1210	914940	6650
ORF-O-288-LN Bundle	0.5782	2.70E+05	1.108	1.13E-05	0.1960	155982	651

NESC RESULTS

Loading Condition	Temp. (F)	Ice Load (lb/ft)	Ice Thick (in)	Wind Constant (lb/ft)	Horz Wind Load (lb/ft)	Result Load + Const (lb/ft)	Sag (ft)	Tension (lb)	% Len Chg From Input Conditions	Sag @ 66.5 (ft)	Horz Sag Comp (ft)	Vert Sag Comp (ft)	Vector Angle Deg
Rule 251 - Heavy 232A1	0.0	1.000	.50	.3	4.0	1.793	2.56	1545	0.07	2.56	1.21	2.26	28.1
	120.0	0.000	.00	.0	0.0	0.317	1.68	417	0.02	1.68	0.00	1.68	0.0

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
Span Length = 133.00 ft				
Span Sag = 1.33 ft (16.0 in)				
Span Tension = 527 lb				
Max Load = 6,650 lb	-40.0	.76	924	-0.02
Usable load (60%) = 3,990 lb	-30.0	.79	881	-0.02
Catenary Length = 133.035 ft	-20.0	.83	839	-0.02
Stress Free Length @ Installed Temperature = 132.959 ft	-10.0	.88	798	-0.02
	.0	.92	758	-0.01
	10.0	.97	720	-0.01
	20.0	1.02	683	-0.01
	30.0	1.08	648	-0.01
	40.0	1.14	615	-0.01
	50.0	1.20	584	0.00
	60.0	1.26	554	0.00
	70.0	1.33	527	0.00
	80.0	1.40	501	0.00
	90.0	1.47	477	0.01
	100.0	1.54	456	0.01
	110.0	1.61	435	0.01
	120.0	1.68	417	0.02
	130.0	1.75	400	0.02
	140.0	1.83	384	0.02



E-83/4 - T-710/4
(Existing joint owned utility pole (National Grid/Fairpoint) in existing Right-of-Way)

E-83/3 - T-710/3
(Existing joint owned utility pole (National Grid/Fairpoint) in existing Right-of-Way)



E-83/4 - T-710/4

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the river. The strand will be installed at the proposed height (see above). The supporting strand will be secured to each pole using double dead end attachments to prevent any sag in the wire and maintain proper clearances. NHOS will lash a one inch diameter fiber optic cable (PVC jacket) to the strand using a dual lash method to provide security of the fiber over the right of way. The fiber will be tagged with twenty four hour contact information at each pole clamp. NHOS will employ the proper safety personnel during the crossing installation. The proposed install will meet all proper clearances with other Utilities. (see above). Additional pole guys will be added per NESC Rule 264 and as directed by pole owners.



E-83/3 - T-710/3

Notes:

- The heights of structures shown hereon are based on field measurements taken with a Nikon 362 total station during a site survey on 08/29/11.
- The horizontal distance between the nearest bridge edge and the existing overhead wires ranges from 14' to 15'.
- The smallest vertical distance from the top of existing bridge deck to the lowest existing overhead wires is 14'.
- The vertical distance between the top of water and bridge deck is approximately 9'.
- The waterway is classified as not suitable for sail boating and per NESC Table 232-1 a vertical clearance of 14' must be maintained between the lowest conductor and 10 year floodplain.
- Based on the FEMA Flood Profile for Mink Brook (Page 104P) a conservative 10 year flood elevation was calculated by adding the delta between the river bed elevation (636') and the 10 year flood elevation (640') to the surveyed water level and then a 14' buffer (for non-navigable streams) was added to that.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.
- NHOS will attach their fiber optic line to the push brace attached to pole E-83/4 - T-710/4. Although not shown on this plan, NHOS shall maintain a minimum of 40" clearance between power and their fiber optic line.
- Although the push brace is graphically depicted to the side of pole E-83/4 - T-710/4 in our diagram, this is not actually the way it is constructed. From the perspective of the road, the push brace attaches near the top back of pole E-83/4 - T-710/4 and is angled away from the road to where it is anchored into the ground. (See photo) Due to the fact that NHOS is attaching to this push brace, and not pole E-83/4 - T-710/4, it will not be "stacked" above/under the existing secondary electric and other communications lines.



New Hampshire Optical Systems, Inc.
99 Pine Hill Rd.
Nashua, NH 03063
(603-821-6467)

Project # TID-50 - Lateral 29
Drawing # AC-HAN-RIV-2

Date: 02/08/12
Revision # 1

Proposed Crossing
Mink Brook
Hanover, NH

Location:
Great Hollow Rd, Hanover, NH
Nearest cross street- Greensboro Rd.