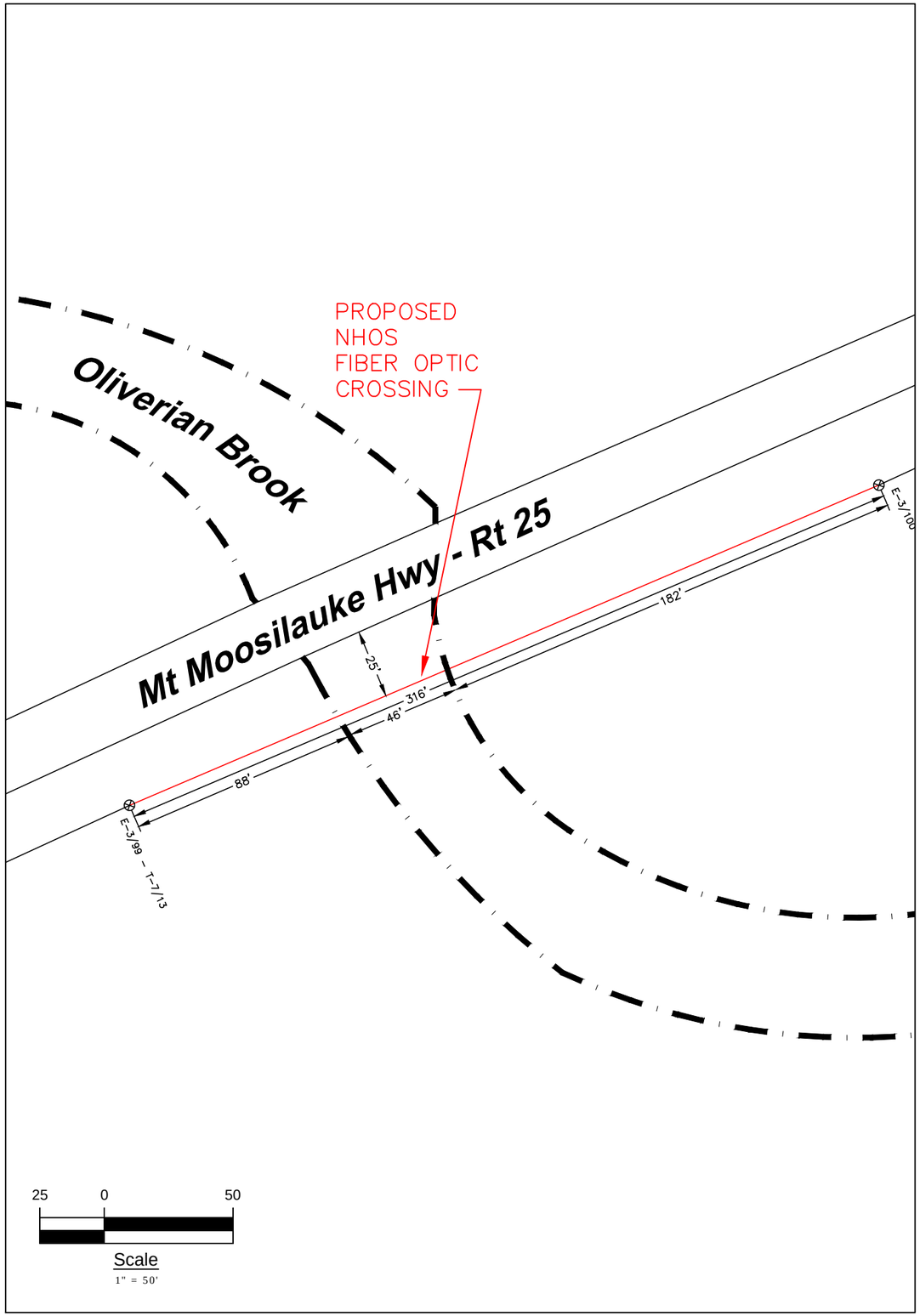


NHOS
New Hampshire Optical Systems
New Hampshire Optical Systems, Inc.
99 Pine Hill Rd.
Nashua, NH 03063
(603-821-6467)

Proposed Oliverian Brook Crossing Haverhill, NH

N
W
E
S

Project # TID-101-PRI-5
Drawing # AC-HAV-RIV-3

Date: 11/7/2011
Revision #

Proposed Oliverian Brook Crossing Haverhill, NH

Location:
Mt Moosilauke Hwy - Rt 25, Haverhill, NH
Nearest cross street: Brushwood Rd

K:\Projects\USNH\dwgs\Haverhill\river_xing\TID-101\TID-101.dwg

LOCUS MAP
(Not to Scale)

CommScope®

Spanmaster ® Release 3.1 Sag / Tension Computations

Waveguide 09/01/11 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	0.5782	2.70E+05	0.858	1.13E-05	0.1960	155982	651
Bundle			1.108		0.3170		

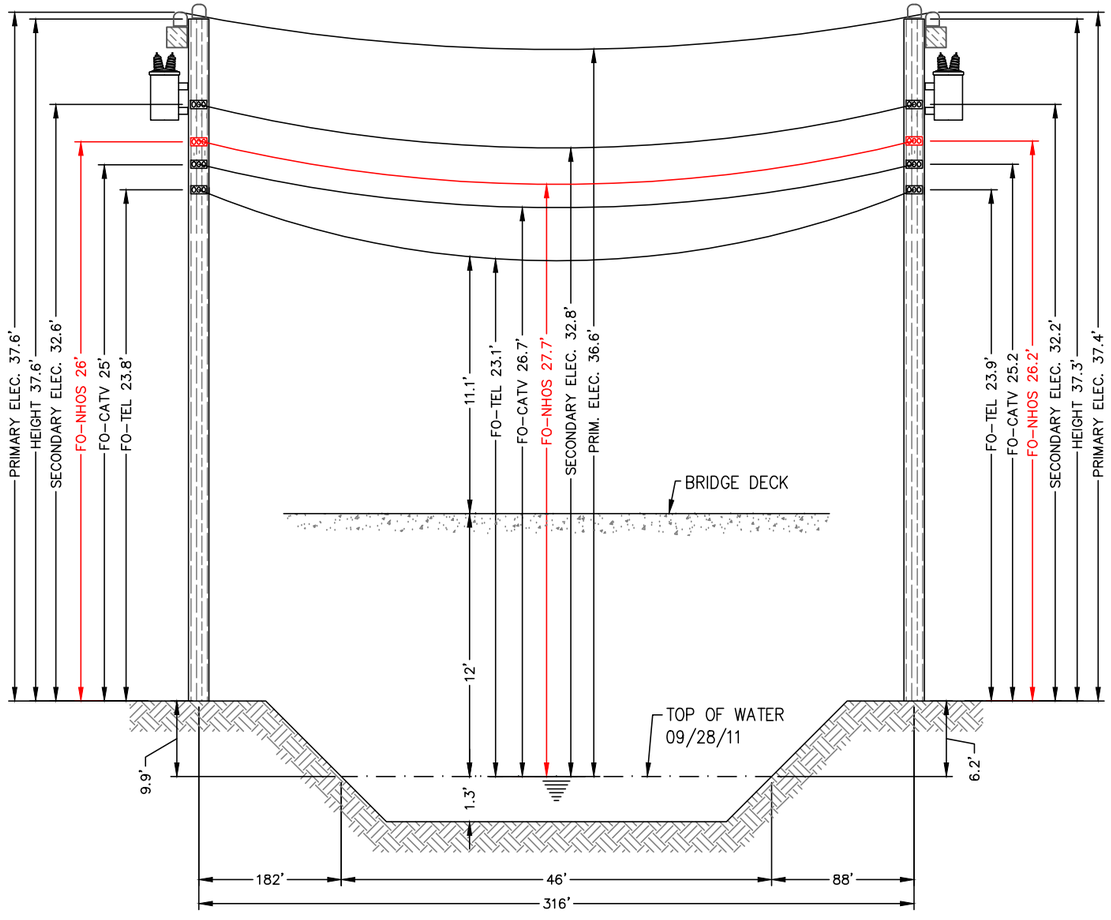
NESC RESULTS

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 @ Point 168 ft	Horz Sag Comp ft	Vert Sag Comp ft	Vector Angle Deg
Rule 251 - Heavy	0.0	1.000	.50	.3	4.0	1.793	7.82	2854	0.14	7.84	3.68	6.90	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	3.66	1078	0.01	3.67	0.00	3.66	0.0

Span Length = 316.00 ft
Span Sag = 3.16 ft (37.9 in)
Span Tension = 1,252 lb
Max Load = 6,650 lb
Usable load (60%) = 3,990 lb
Catenary Length = 316.084 ft
Stress Free Length @
Installed Temperature = 315.652 ft

Unloaded Strand
Sag = 1.43 ft (17.1 in) 0.45 %
Tension = 1,058 lb

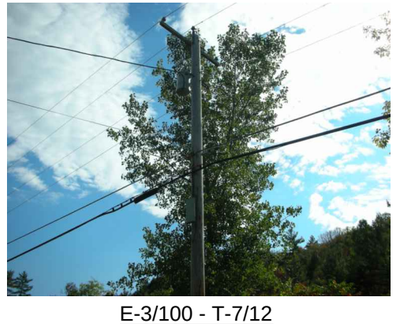
Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	2.32	1,698	-0.01	N/A
-30.0	2.38	1,655	-0.01	N/A
-20.0	2.45	1,611	-0.01	N/A
-10.0	2.52	1,568	-0.01	N/A
.0	2.59	1,526	-0.01	N/A
10.0	2.66	1,484	-0.01	N/A
20.0	2.73	1,443	-0.01	N/A
30.0	2.81	1,403	-0.01	N/A
40.0	2.89	1,363	0.00	N/A
50.0	2.98	1,324	0.00	N/A
60.0	3.07	1,287	0.00	N/A
70.0	3.16	1,249	0.00	N/A
80.0	3.25	1,213	0.00	N/A
90.0	3.35	1,178	0.00	N/A
100.0	3.45	1,144	0.01	N/A
110.0	3.56	1,110	0.01	N/A
120.0	3.66	1,078	0.01	N/A
130.0	3.77	1,047	0.01	N/A
140.0	3.89	1,017	0.01	N/A



E-3/100 – T-7/12
(Existing joint owned utility pole (PSNH/Fairpoint) in existing Right-of-Way)

Not to Scale

E-3/99 – T-7/13
(Existing joint owned utility pole (PSNH/Fairpoint) in existing Right-of-Way)



E-3/100 - T-7/12

Construction Notes:

NHOS proposes to install a ¼ inch metal supporting strand between the existing utility poles shown above that will traverse the brook. 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-3/99 - T-7/13

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

Proposed Oliverian Brook Crossing Haverhill, NH

Notes:

The heights of structures shown hereon are based on field measurements taken with a Nikon 362 total station during a site survey on 09/28/11.

The horizontal distance between the nearest bridge edge and the existing overhead wires is approximately 25'.

The smallest vertical distance from the top of existing bridge deck to the lowest existing overhead wires is 23.1'.

The vertical distance between the top of water and bridge deck is approximately 12'.

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 Insurance Rate Map for Grafton County (County Map Number 33009C0370E Panel 370 of 1185) dated 02/20/08 there is no FEMA Flood Profile available for the Oliverian Brook and a conservative 10 year flood elevation could not be calculated. Normally this is done by adding the delta between the river bed and the 10 year flood elevation to the surveyed water level and then the 14' buffer (for non-navigable streams) was added to that.

Vertical distances are representative of attachment heights after utility make ready moves are completed.

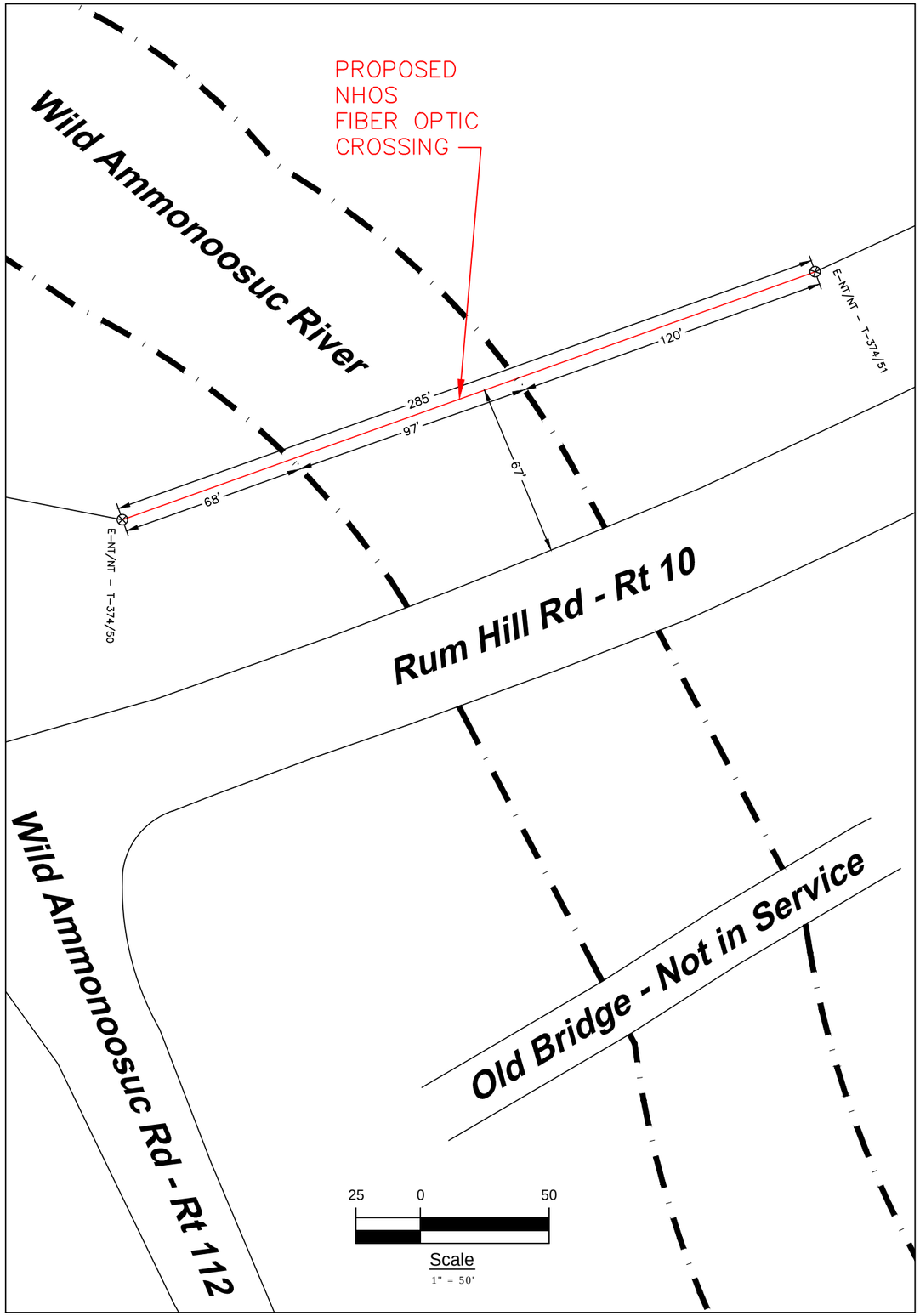
Project # TID-101-PRI-5
Drawing # AC-HAV-RIV-3

Date: 11/7/2011
Revision #

Proposed Oliverian Brook Crossing Haverhill, NH

Location:
Mt Moosilauke Hwy - Rt 25, Haverhill, NH
Nearest cross street: Brushwood Rd

K:\Projects\USNH\dwgs\Haverhill\river_xing\TID-101\TID-101.dwg



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

Proposed Crossing Wild Ammonoosuc River, Bath, NH

N
W
E
S

Project # TID-109-PRI-5
Drawing # AC-BAT-RIV-1

Date: 11/8/2011
Revision #

Proposed Crossing Wild Ammonoosuc River Bath, NH

Location:
Rum Hill Rd - Rt 10, Bath, NH
Nearest cross street: Wild Ammonoosuc Rd

K: \Projects\USNH\dwgs\Bath\river_xing\TID-109\TID-109.dwg

LOCUS MAP
(Not to Scale)

CommScope®

Spanmaster ® Release 3.1 Sag / Tension Computations

Waveguide 09/01/11 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	0.5782	2.70E+05	0.858	1.13E-05	0.1960	155982	651
Bundle			1.108		0.3170		

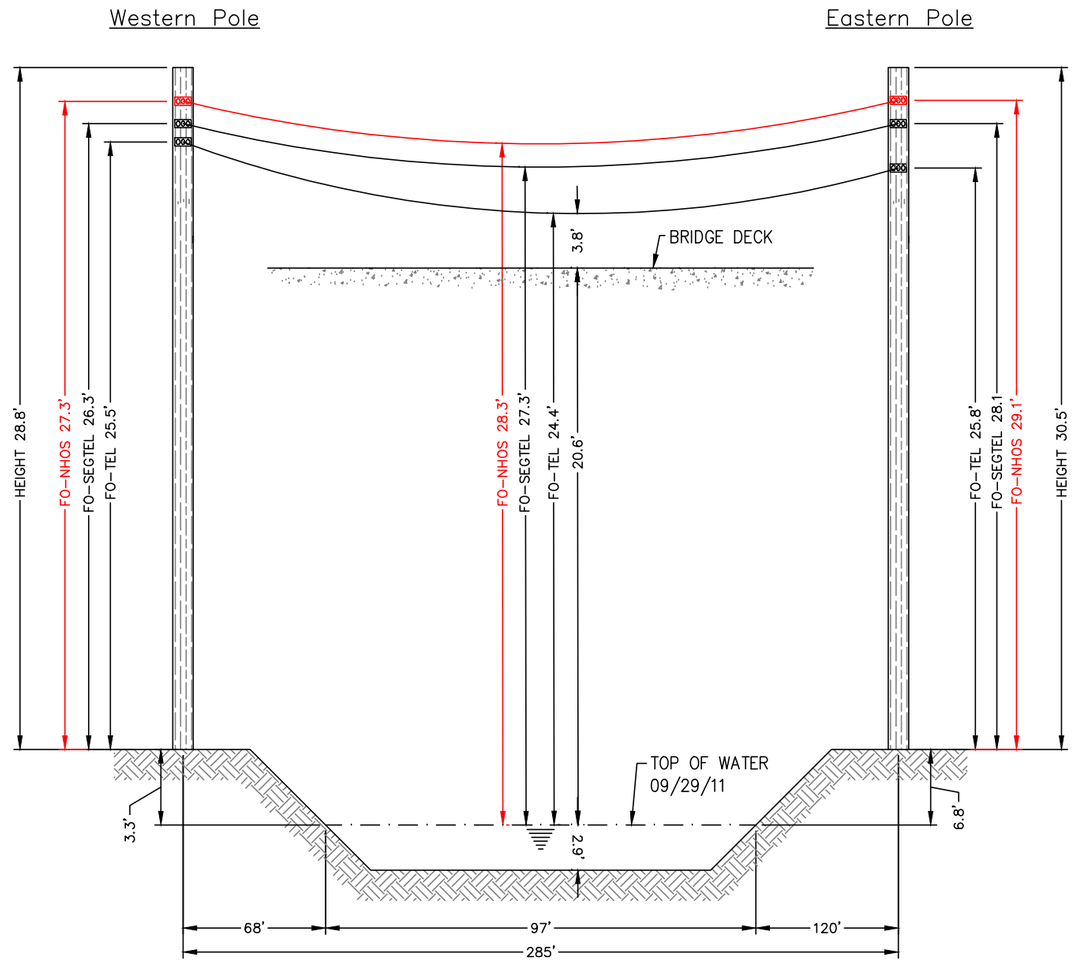
NESC RESULTS

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 @ Point 142.5 ft	Horz Sag Comp ft	Vert Sag Comp ft	Vector Angle Deg
Rule 251 - Heavy	0.0	1.000	.50	.3	4.0	1.793	6.85	2649	0.13	6.87	3.23	6.04	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	3.34	963	0.01	3.34	0.00	3.34	0.0

Span Length = 285.00 ft
Span Sag = 2.85 ft (34.2 in)
Span Tension = 1,129 lb
Max Load = 6,650 lb
Usable load (60%) = 3,990 lb
Catenary Length = 285.076 ft
Stress Free Length @
Installed Temperature = 284.725 ft

Unloaded Strand
Sag = 1.31 ft (15.7 in) 0.46 %
Tension = 937 lb

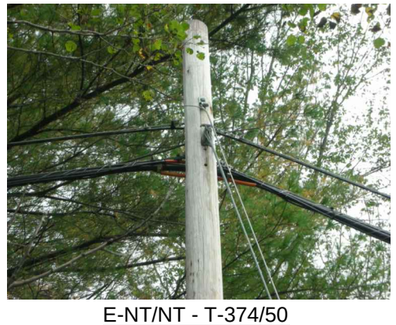
Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	2.04	1,570	-0.01	N/A
-30.0	2.10	1,527	-0.01	N/A
-20.0	2.16	1,483	-0.01	N/A
-10.0	2.23	1,441	-0.01	N/A
.0	2.29	1,399	-0.01	N/A
10.0	2.36	1,358	-0.01	N/A
20.0	2.44	1,317	-0.01	N/A
30.0	2.51	1,277	-0.01	N/A
40.0	2.59	1,238	0.00	N/A
50.0	2.68	1,200	0.00	N/A
60.0	2.76	1,163	0.00	N/A
70.0	2.85	1,127	0.00	N/A
80.0	2.94	1,092	0.00	N/A
90.0	3.04	1,058	0.00	N/A
100.0	3.13	1,025	0.01	N/A
110.0	3.24	993	0.01	N/A
120.0	3.34	963	0.01	N/A
130.0	3.45	933	0.01	N/A
140.0	3.55	905	0.01	N/A



E-NT/NT – T-374/50
(Existing owned utility pole (Fairpoint) in existing Right-of-Way)

Not to Scale

E-NT/NT – T-374/51
(Existing owned utility pole (Fairpoint) in existing Right-of-Way)



E-NT/NT - T-374/50

Construction Notes:

NHOS proposes to install a ¼ inch metal supporting strand between the existing utility poles shown above that will traverse the brook. 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-NT/NT - T-374/51

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

Proposed Crossing Wild Ammonoosuc River, Bath, NH

Notes:

The heights of structures shown hereon are based on field measurements taken with a Nikon 362 total station during a site survey on 09/29/11.

The horizontal distance between the nearest bridge edge and the existing overhead wires is approximately 67'.

The smallest vertical distance from the top of existing bridge deck to the lowest existing overhead wires is 3.8'.

The vertical distance between the top of water and bridge deck is approximately 20.6'.

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 Insurance Rate Map for Grafton County (County Map Number 33009C0240E Panel 240 of 1185) dated 02/20/08 there is no FEMA Flood Profile available for the Wild Ammonoosuc River and a conservative 10 year flood elevation could not be calculated. Normally this is done by adding the delta between the river bed and the 10 year flood elevation to the surveyed water level and then the 14' buffer (for non-navigable streams) was added to that.

Vertical distances are representative of attachment heights after utility make ready moves are completed.

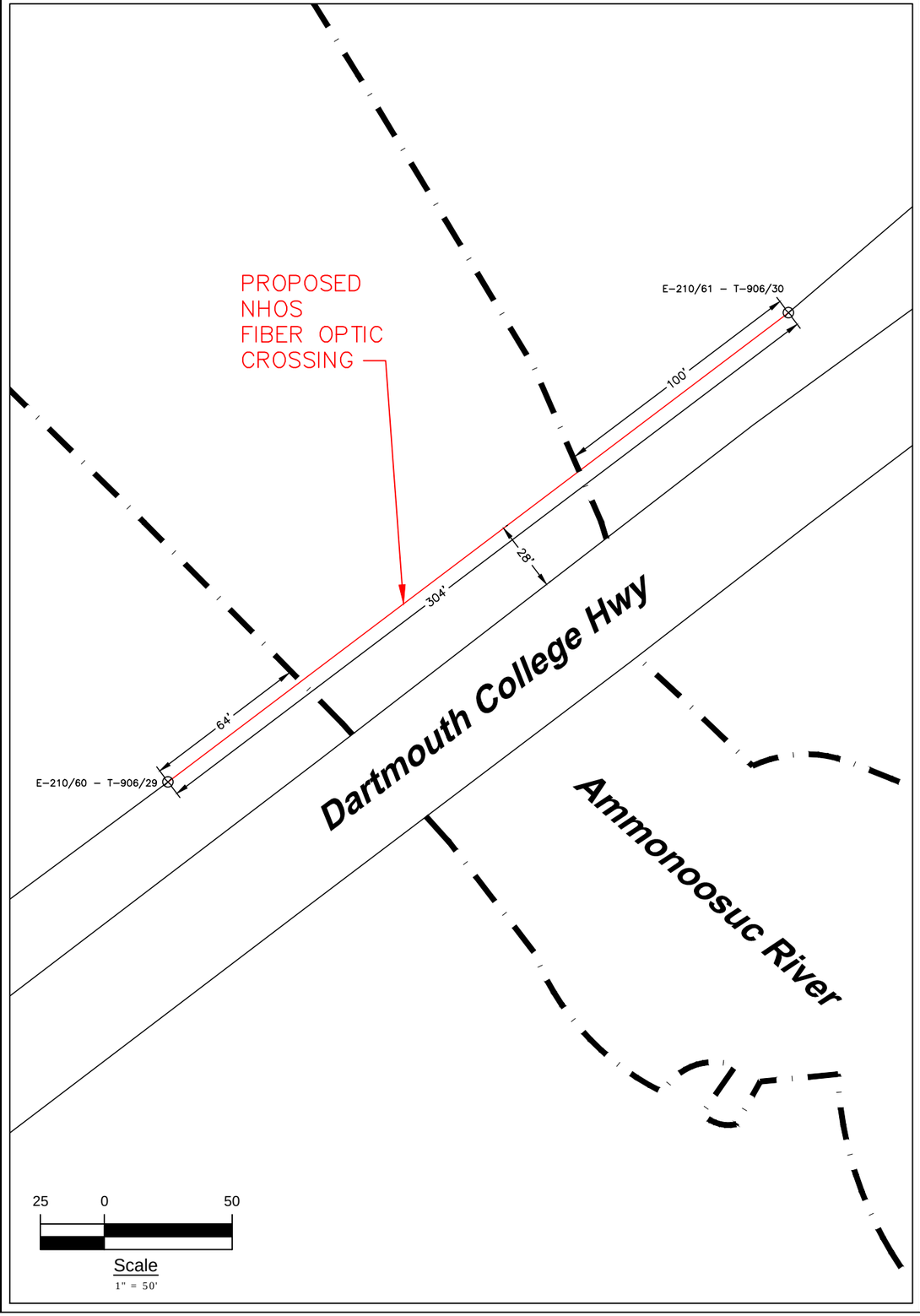
Project # TID-109-PRI-5
Drawing # AC-BAT-RIV-1

Date: 11/8/2011
Revision #

Proposed Crossing
Wild Ammonoosuc River
Bath, NH

Location:
Rum Hill Rd - Rt 10, Bath, NH
Nearest cross street: Wild Ammonoosuc Rd

K:\Projects\USNH\dwgs\Bath\river_xing\TID-109\TID-109.dwg



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

Proposed Crossing Ammonoosuc River, Lisbon, NH

N
W E
S

Project # TID-113-PRI-5
Drawing # AC-LIS-RIV-1

Date: 11/9/2011
Revision #

Proposed Crossing Ammonoosuc River Lisbon, NH

Location:
Dartmouth College Rd - Rt 10, Lisbon, NH
Nearest cross street: Sugar Hill Rd

K:\Projects\USNH\dwgs\Lisbon\river_xing\TID-113\TID-113.dwg

LOCUS MAP
(Not to Scale)

CommScope®

Spanmaster ® Release 3.1 Sag / Tension Computations

Waveguide 09/01/11 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	0.5782	2.70E+05	0.858	1.13E-05	0.1960	155982	651
Bundle			1.108		0.3170		

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 @ Point 152 ft	Horz Sag Comp ft	Vert Sag Comp ft	Vector Angle Deg
Rule 251 - Heavy	0.0	1.000	.50	.3	4.0	1.793	7.44	2775	0.13	7.46	3.50	6.56	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	3.54	1033	0.01	3.54	0.00	3.54	0.0

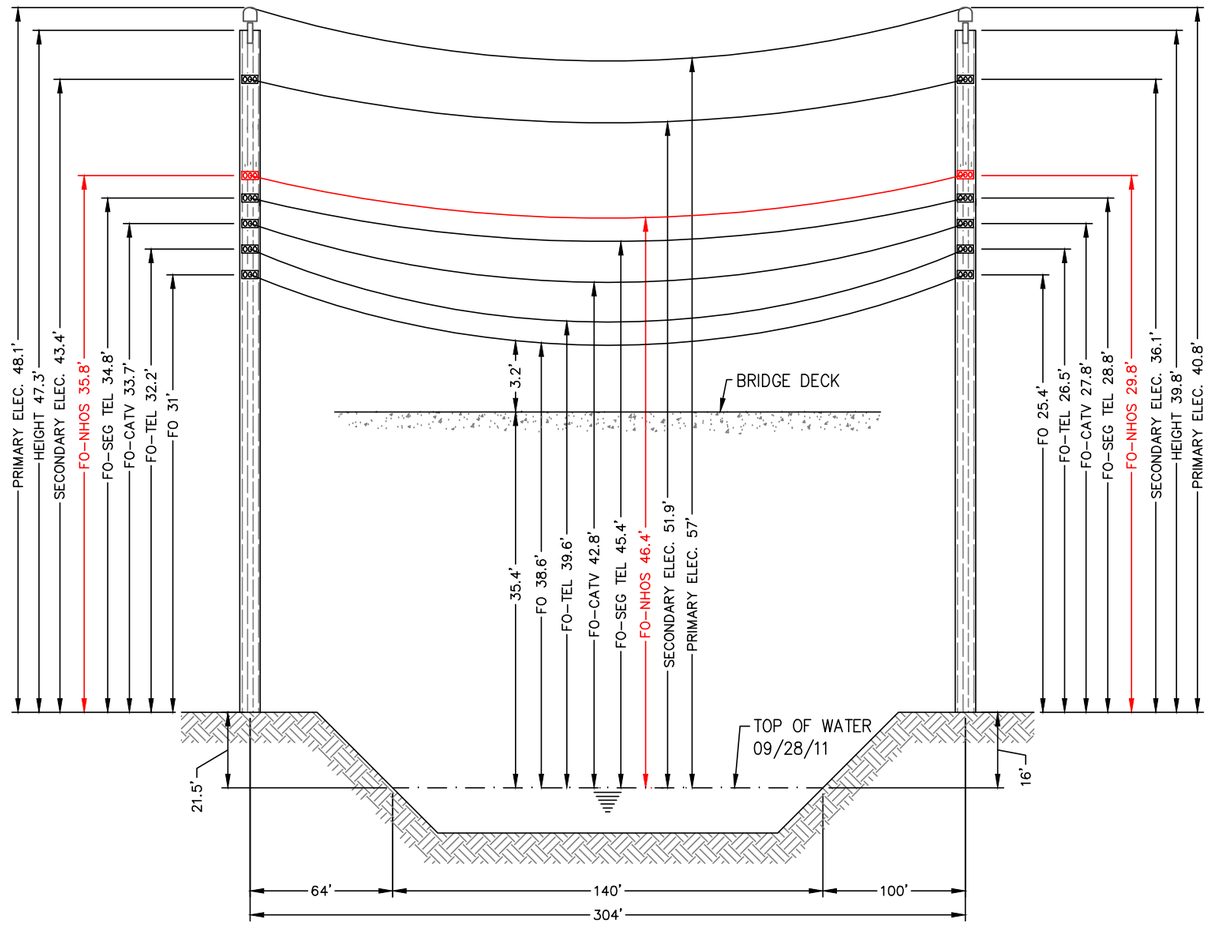
Span Length = 304.00 ft
Span Sag = 3.04 ft (36.5 in)
Span Tension = 1,205 lb
Max Load = 6,650 lb
Usable load (60%) = 3,990 lb
Catenary Length = 304.081 ft
Stress Free Length @
Installed Temperature = 303.681 ft

Unloaded Strand
Sag = 1.38 ft (16.6 in) 0.45 %
Tension = 1,011 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	2.21	1,649	-0.01	N/A
-30.0	2.27	1,605	-0.01	N/A
-20.0	2.34	1,562	-0.01	N/A
-10.0	2.40	1,519	-0.01	N/A
.0	2.47	1,477	-0.01	N/A
10.0	2.54	1,435	-0.01	N/A
20.0	2.62	1,394	-0.01	N/A
30.0	2.70	1,354	-0.01	N/A
40.0	2.78	1,315	0.00	N/A
50.0	2.86	1,277	0.00	N/A
60.0	2.95	1,239	0.00	N/A
70.0	3.04	1,202	0.00	N/A
80.0	3.13	1,166	0.00	N/A
90.0	3.23	1,131	0.00	N/A
100.0	3.33	1,098	0.01	N/A
110.0	3.43	1,065	0.01	N/A
120.0	3.54	1,033	0.01	N/A
130.0	3.65	1,003	0.01	N/A
140.0	3.76	973	0.01	N/A

Southwest Pole

Northeast Pole



E–210/60 – T–906/29
(Existing joint owned utility pole (PSNH/Fairpoint) in existing Right–of–Way)

Not to Scale

E–210/61 – T–906/30
(Existing joint owned utility pole (PSNH/Fairpoint) in existing Right–of–Way)

E-210/60 - T-906/29

Construction Notes:

NHOS proposes to install a ¼ 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-210/61 - T-906/30

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

Proposed Crossing Ammonoosuc River, Lisbon, NH

Notes:

The heights of structures shown hereon are based on field measurements taken with a Nikon 362 total station during a site survey on 09/29/11.

The horizontal distance between the nearest bridge edge and the existing overhead wires is approximately 28'.

The smallest vertical distance from the top of existing bridge deck to the lowest existing overhead wires is 3.2'.

The vertical distance between the top of water and bridge deck is approximately 35.4'.

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 Insurance Rate Map for Grafton County (County Map Number 33009C02350E Panel 235 of 1185) dated 02/20/08 there is no FEMA Flood Profile available for the Ammonoosuc River and a conservative 10 year flood elevation could not be calculated. Normally this is done by adding the delta between the river bed and the 10 year flood elevation to the surveyed water level and then the 14' buffer (for non-navigable streams) would be added to that.

Vertical distances are representative of attachment heights after utility make ready moves are completed.

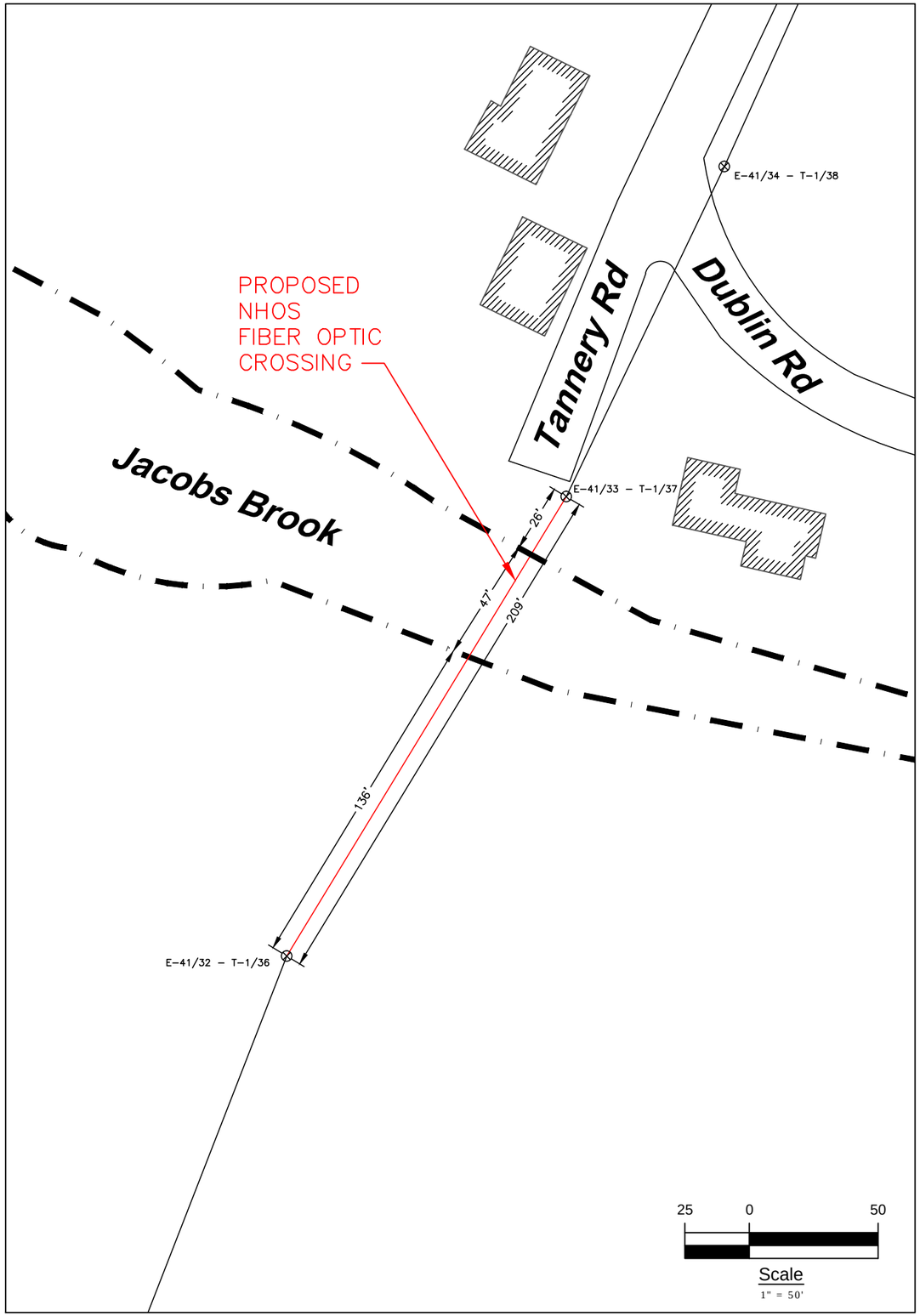
Project # TID-113-PRI-5
Drawing # AC-LIS-RIV-1

Date: 11/9/2011
Revision #

Proposed Crossing
Ammonoosuc River
Lisbon, NH

Location:
Dartmouth College Rd - Rt 10, Lisbon, NH
Nearest cross street: Sugar Hill Rd

K:\Projects\USNH\dwgs\Lisbon\river_xing\TID-113\TID-113.dwg



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

Proposed Crossing
Jacobs Brook,
Orford, NH

N
W
E
S

Project # TID-267-PRI-5
Drawing # AC-ORF-RIV-1

Date: 11/9/2011
Revision #

Proposed Crossing
Jacobs Brook,
Orford, NH

Location:
Tannery Rd, Orford, NH
Nearest cross street: Dublin Rd

K:\Projects\USNH\dwgs\Orford\TID-267\TID-267.dwg

LOCUS MAP
(Not to Scale)

CommScope®

Spanmaster ® Release 3.1 Sag / Tension Computations

Waveguide 09/01/11 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	0.5782	2.70E+05	0.858	1.13E-05	0.1960	155982	651
Bundle			1.108		0.3170		

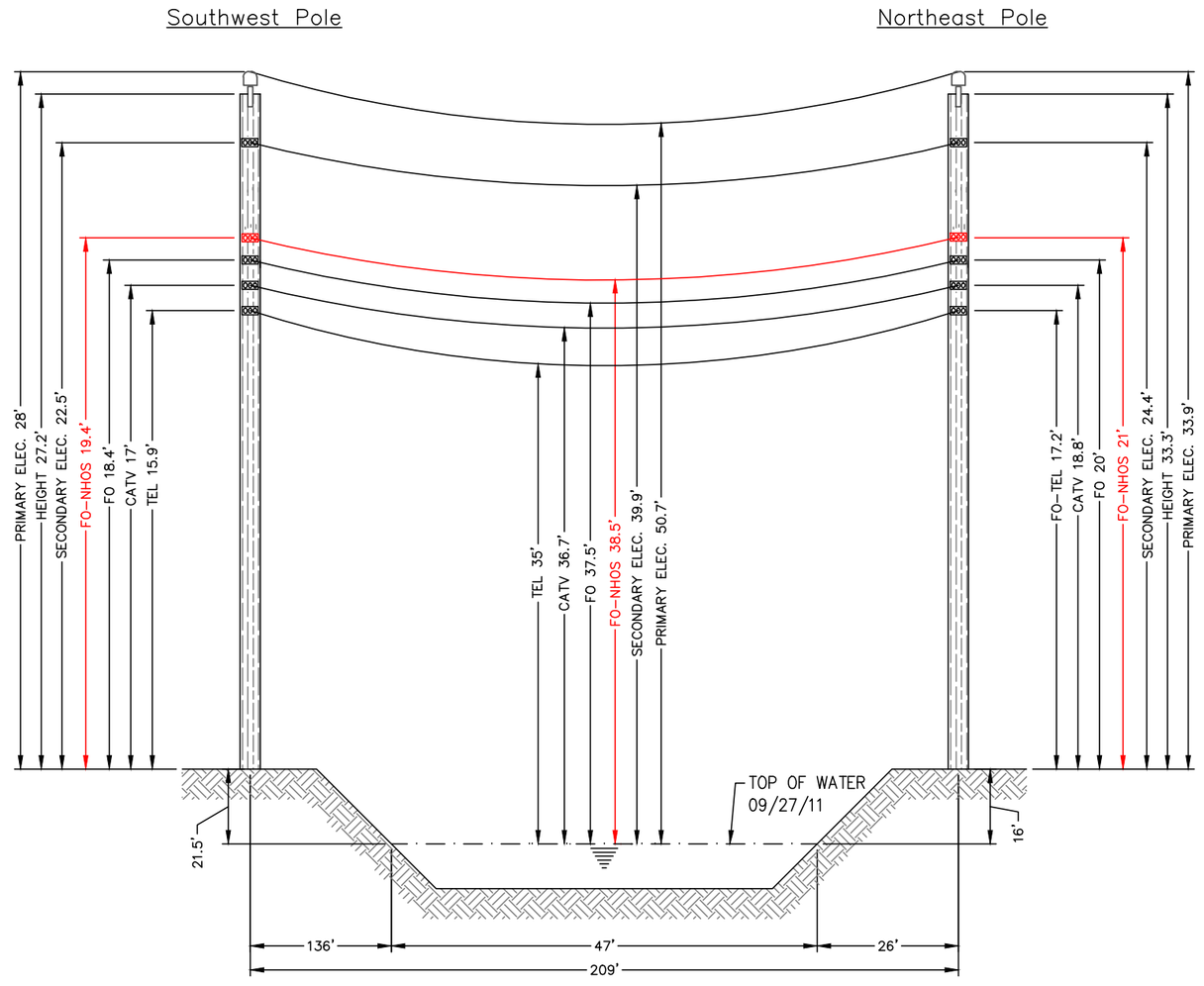
NESC RESULTS

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 @ Point 104.5 ft	Horz Sag Comp ft	Vert Sag Comp ft	Vector Angle Deg
Rule 251 - Heavy	0.0	1.000	.50	.3	4.0	1.793	4.60	2123	0.10	4.61	2.17	4.06	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	2.53	684	0.01	2.53	0.00	2.53	0.0

Span Length = 209.00 ft
Span Sag = 2.09 ft (25.1 in)
Span Tension = 828 lb
Max Load = 6,650 lb
Usable load (60%) = 3,990 lb
Catenary Length = 209.056 ft
Stress Free Length @
Installed Temperature = 208.867 ft

Unloaded Strand
Sag = 1.03 ft (12.3 in) 0.49 %
Tension = 643 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	1.38	1,252	-0.02	N/A
-30.0	1.43	1,208	-0.01	N/A
-20.0	1.48	1,166	-0.01	N/A
-10.0	1.54	1,124	-0.01	N/A
.0	1.59	1,083	-0.01	N/A
10.0	1.66	1,043	-0.01	N/A
20.0	1.72	1,004	-0.01	N/A
30.0	1.79	966	-0.01	N/A
40.0	1.86	930	-0.01	N/A
50.0	1.93	894	0.00	N/A
60.0	2.01	860	0.00	N/A
70.0	2.09	827	0.00	N/A
80.0	2.17	796	0.00	N/A
90.0	2.26	766	0.00	N/A
100.0	2.35	737	0.01	N/A
110.0	2.44	710	0.01	N/A
120.0	2.53	684	0.01	N/A
130.0	2.62	660	0.02	N/A
140.0	2.72	637	0.02	N/A



E-41/32 - T-1/36
(Existing joint owned utility pole (PSNH/Fairpoint) in existing Right-of-Way)

Not to Scale

E-41/33 - T-1/37
(Existing joint owned utility pole (PSNH/Fairpoint) in existing Right-of-Way)

E-41/32 - T-1/36

Construction Notes:

NHOS proposes to install a ¼ inch metal supporting strand between the existing utility poles shown above that will traverse the brook. 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-41/33 - T-1/37

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

Proposed Crossing Jacobs Brook, Orford, NH

Notes:

The heights of structures shown hereon are based on field measurements taken with a Nikon 362 total station during a site survey on 09/27/11.

The vertical distance between the top of water and lowest existing overhead wire is approximately 35'.

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 Insurance Rate Map for Grafton County (County Map Number 33009C0565E) dated 02/20/08 there is no FEMA Flood Profile available for the Jacob Brook and a conservative 10 year flood elevation could not be calculated. Normally this is done by adding the delta between the river bed and the 10 year flood elevation to the surveyed water level and then the 14' buffer (for non-navigable streams) would be added to that.

Vertical distances are representative of attachment heights after utility make ready moves are completed.

Project # TID-267-PRI-5
Drawing # AC-ORF-RIV-1

Date: 11/9/2011
Revision #

Proposed Crossing
Jacobs Brook,
Orford, NH

Location:
Tannery Rd, Orford, NH
Nearest cross street: Dublin Rd

K:\Projects\USNH\dwgs\Orford\TID-267\TID-267.dwg