







LOCUS MAP  
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations

Waveguide  
River and Rail Crossings

	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)
Selected Cables							
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		

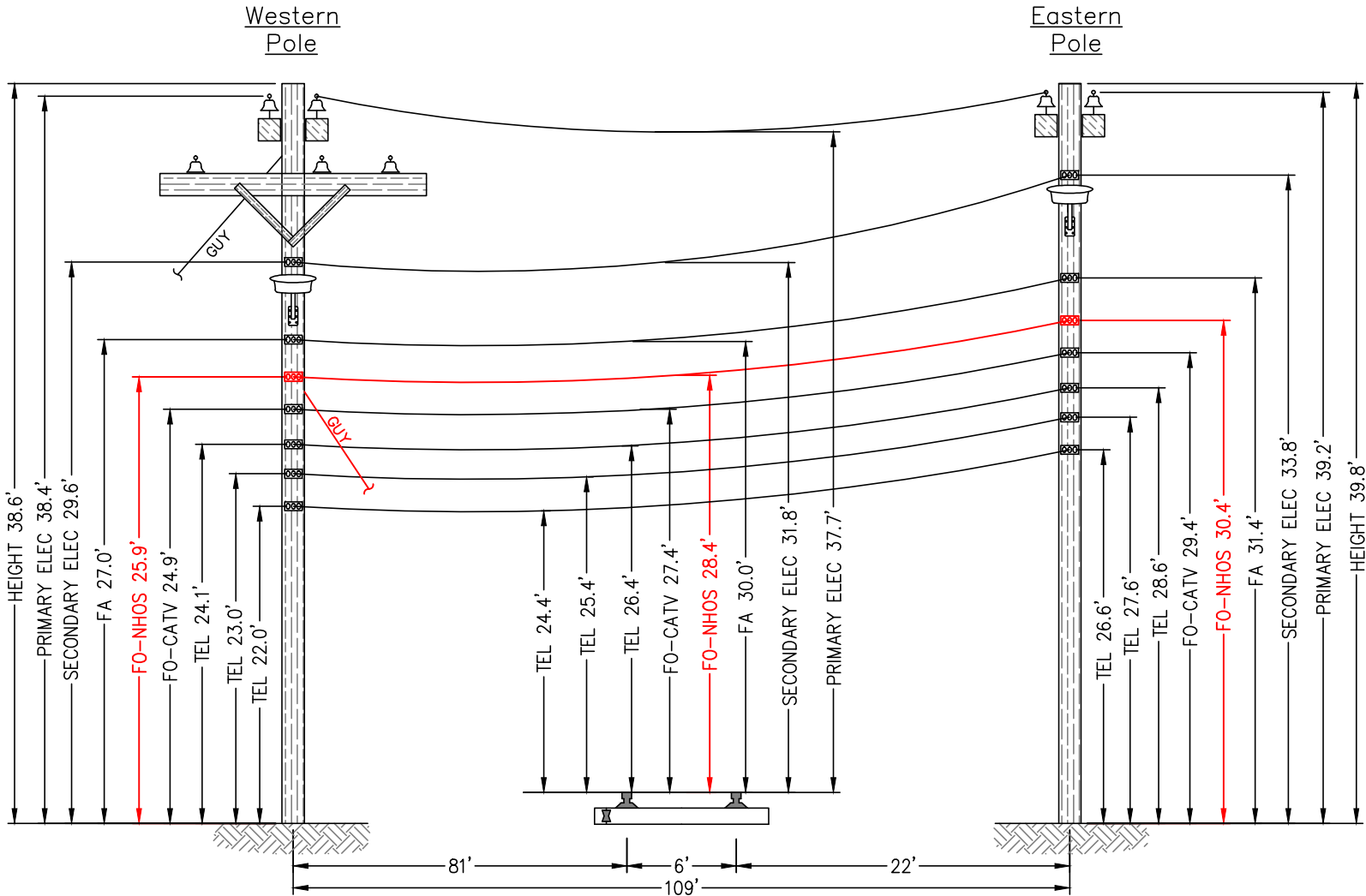
NESC RESULTS

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 Ctg From Input Conditions	Sag @ Point 54.5 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	1.97	1346	0.06	1.98	0.93	1.74	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	1.40	336	0.02	1.40	0.00	1.40	0.0

Span Length = 109.00 ft  
Span Sag = 1.09 ft (13.1 in)  
Span Tension = 432 lb  
Max Load = 6,650 lb  
Usable load (60%) = 3,990 lb  
Catenary Length = 109.029 ft  
Stress Free Length @  
Installed Temperature = 108.978 ft

Unloaded Strand  
Sag = 65 ft (7.8 in) 0.60 %  
Tension = 275 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	.57	818	-0.02	N/A
-30.0	.61	775	-0.02	N/A
-20.0	.64	733	-0.02	N/A
-10.0	.68	692	-0.02	N/A
.0	.72	653	-0.02	N/A
10.0	.76	615	-0.01	N/A
20.0	.81	579	-0.01	N/A
30.0	.86	545	-0.01	N/A
40.0	.92	514	-0.01	N/A
50.0	.97	484	-0.01	N/A
60.0	1.03	457	0.00	N/A
70.0	1.09	432	0.00	N/A
80.0	1.15	409	0.00	N/A
90.0	1.21	388	0.01	N/A
100.0	1.28	369	0.01	N/A
110.0	1.34	351	0.01	N/A
120.0	1.40	336	0.02	N/A
130.0	1.47	321	0.02	N/A
140.0	1.53	308	0.03	N/A



E-24/12 - T-40/9  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

E-24/11 - T-40/8  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



E-24/12 - T-40/9

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the railroad. 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-24/11 - T-40/8



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

Proposed  
Railroad Crossing  
Lancaster, 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 10/12/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

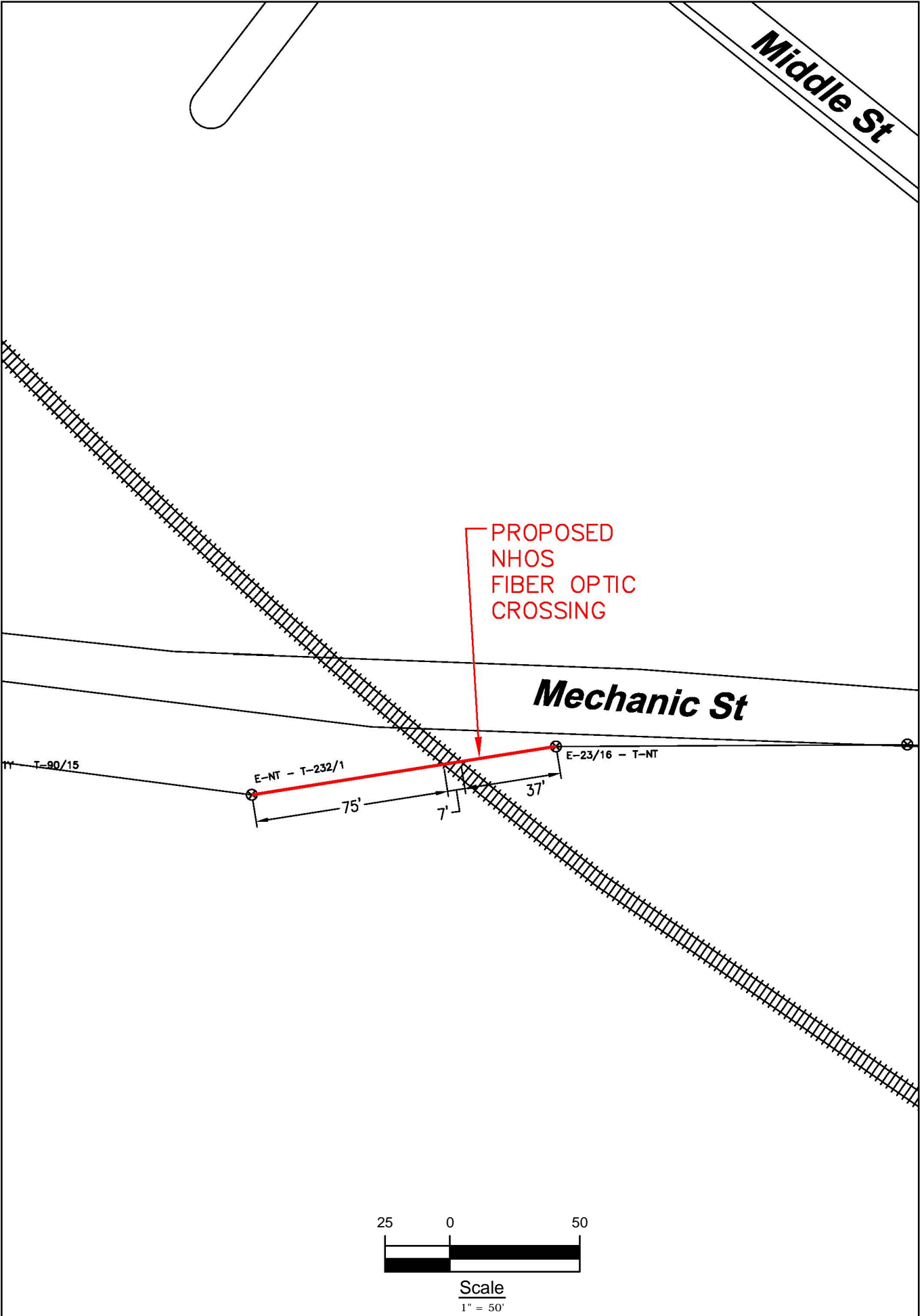
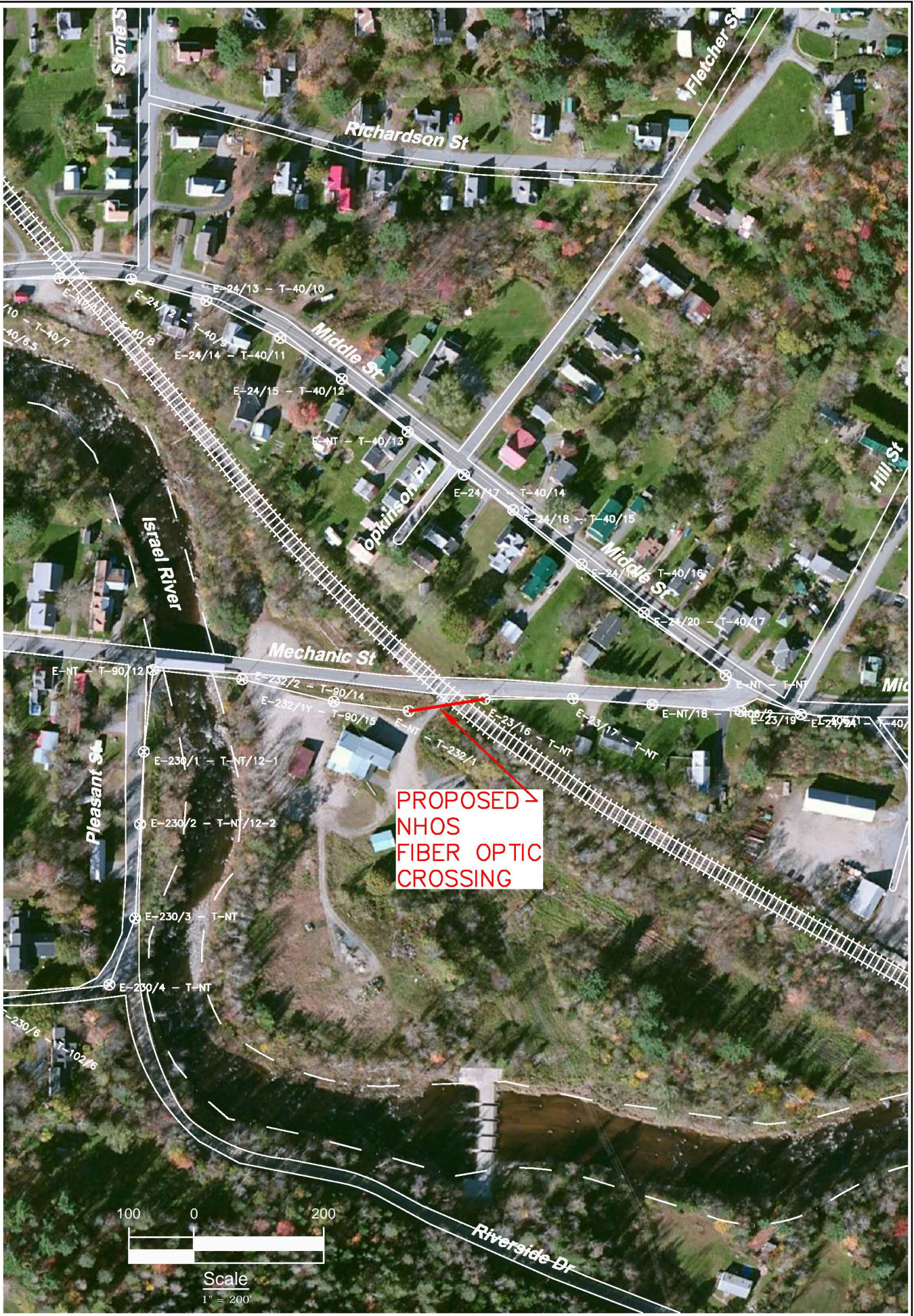
Project # TID-136 - Primary 7  
Drawing # AC-LANC-RR-3

Date: 03/22/12  
Revision #

Proposed  
Railroad Crossing  
Lancaster, NH

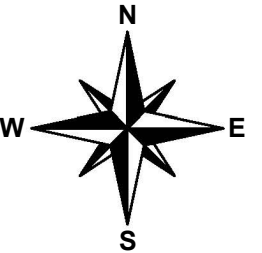
Location:  
Middle St., Lancaster, NH  
Nearest cross street- Stone St.





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

Proposed  
Railroad Crossing  
Lancaster, NH



Project # TID-137 - Primary 7  
Drawing # AC-LANC-RR-4

Date: 03/22/12  
Revision #

Proposed  
Railroad Crossing  
Lancaster, NH

Location:  
Mechanic St., Lancaster, NH  
Nearest cross street- Middle St.





LOCUS MAP  
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations

Waveguide  
River and Rail Crossings

09/01/11 Waveguide

	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)
Selected Cables							
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		

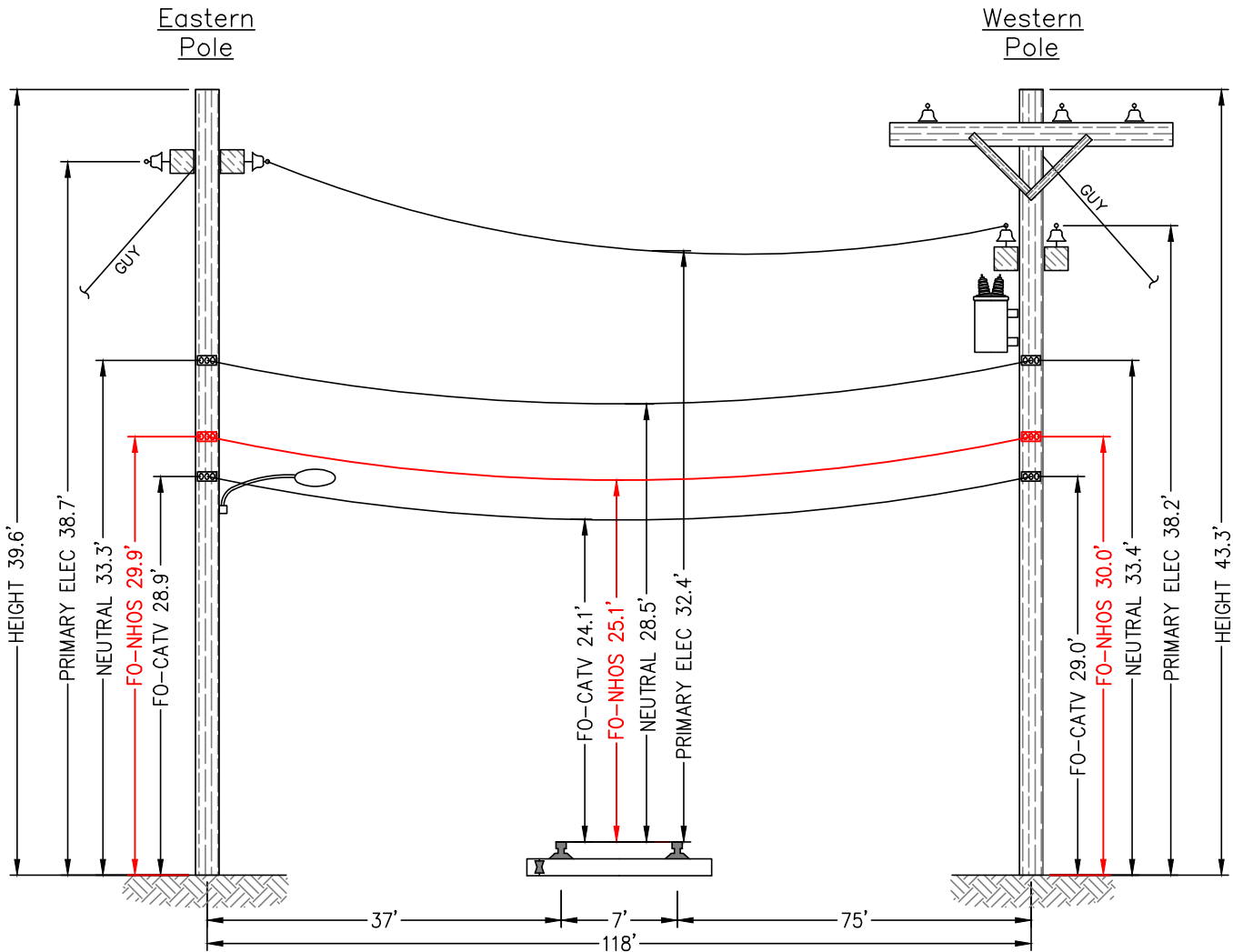
NESC RESULTS

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 59 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	2.19	1422	0.07	2.19	1.03	1.93	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	1.51	366	0.02	1.51	0.00	1.51	0.0

Span Length = 118.00 ft  
Span Sag = 1.18 ft (14.2 in)  
Span Tension = 468 lb  
Max Load = 6,650 lb  
Usable load (60%) = 3,990 lb  
Catenary Length = 118.031 ft  
Stress Free Length @  
Installed Temperature = 117.971 ft

Unloaded Strand  
Sag = .69 ft (8.2 in) 0.58 %  
Tension = 306 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	.64	858	-0.02	N/A
-30.0	.68	815	-0.02	N/A
-20.0	.71	773	-0.02	N/A
-10.0	.75	732	-0.02	N/A
.0	.80	693	-0.01	N/A
10.0	.84	655	-0.01	N/A
20.0	.89	618	-0.01	N/A
30.0	.94	584	-0.01	N/A
40.0	1.00	552	-0.01	N/A
50.0	1.06	522	-0.01	N/A
60.0	1.12	493	0.00	N/A
70.0	1.18	467	0.00	N/A
80.0	1.24	443	0.00	N/A
90.0	1.31	421	0.01	N/A
100.0	1.38	401	0.01	N/A
110.0	1.44	383	0.01	N/A
120.0	1.51	366	0.02	N/A
130.0	1.57	351	0.02	N/A
140.0	1.64	336	0.02	N/A



E-23/16 - T-NT  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

E-NT - T-232/1  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



E-23/16 - T-NT

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the Railroad. 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 - T-232/1



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

Proposed  
Railroad Crossing  
Lancaster, 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 10/12/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

Project # TID-137 - Primary 7  
Drawing # AC-LANC-RR-4

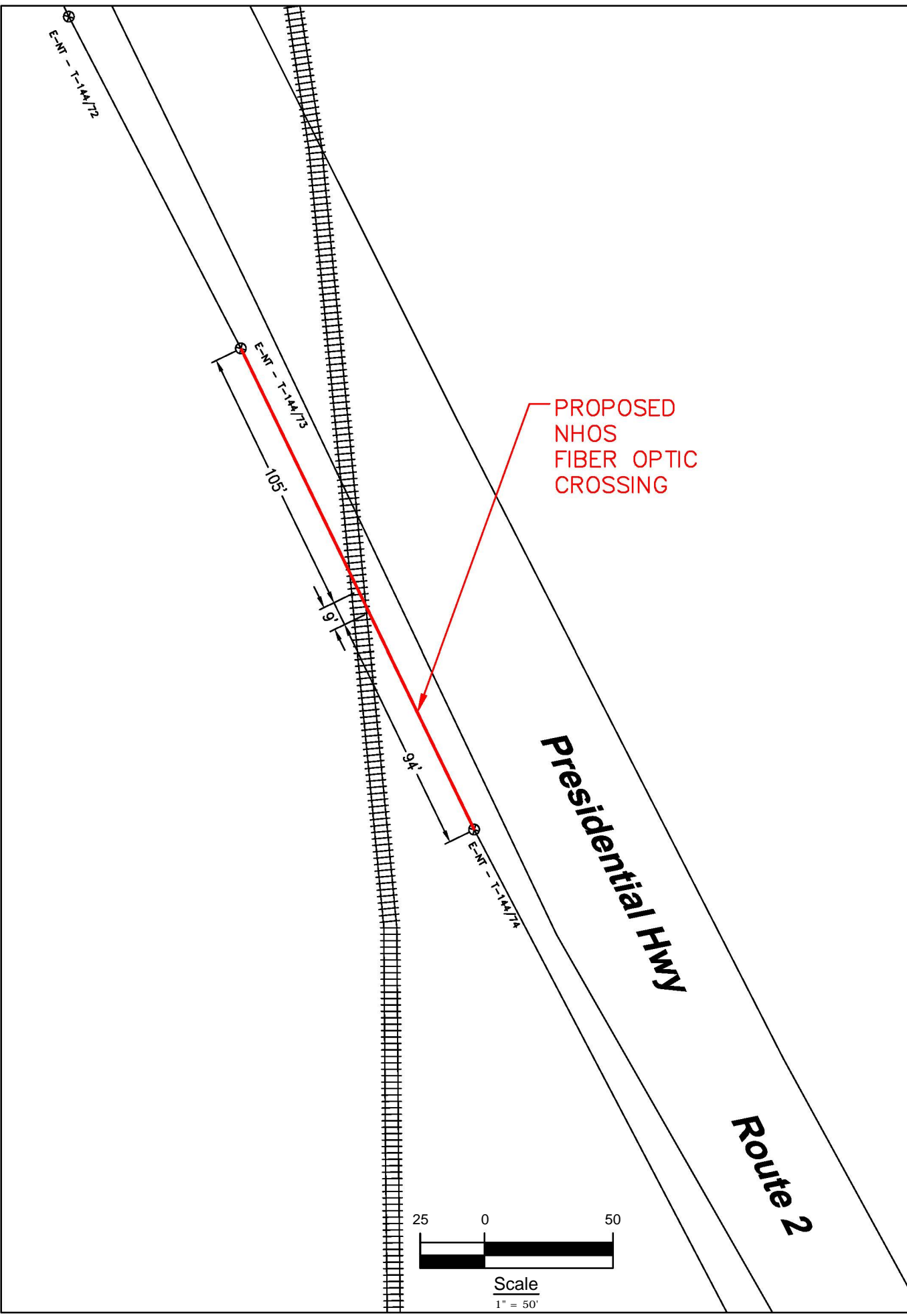
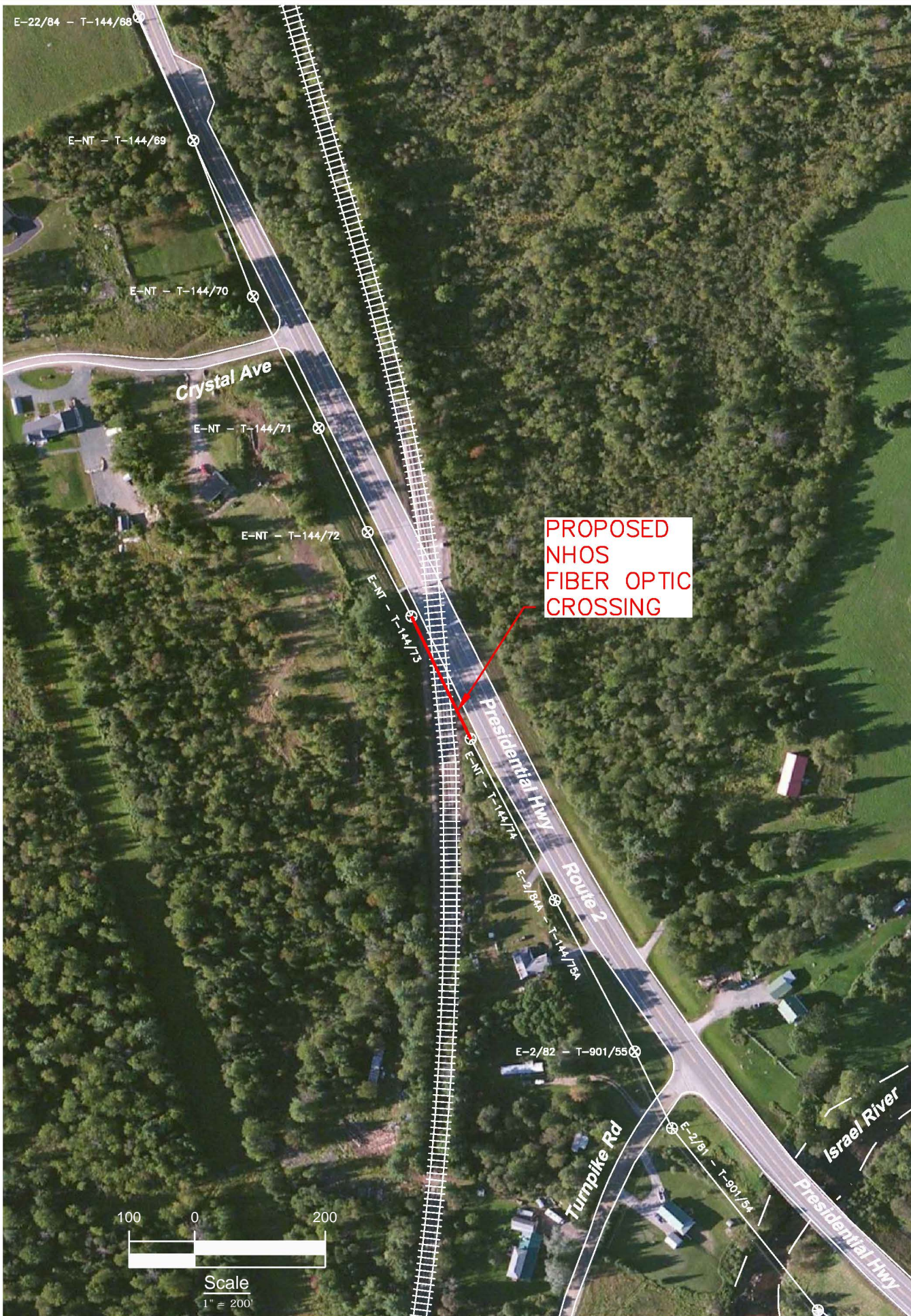
Date: 03/22/12  
Revision #

Proposed  
Railroad Crossing  
Lancaster, NH

Location:  
Mechanic St., Lancaster, NH  
Nearest cross street- Middle St.

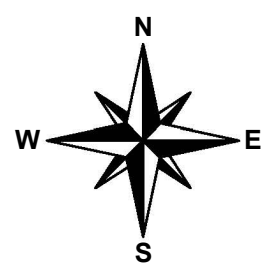
Sheet 2 of 2





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

Proposed  
Railroad Crossing  
Jefferson, NH



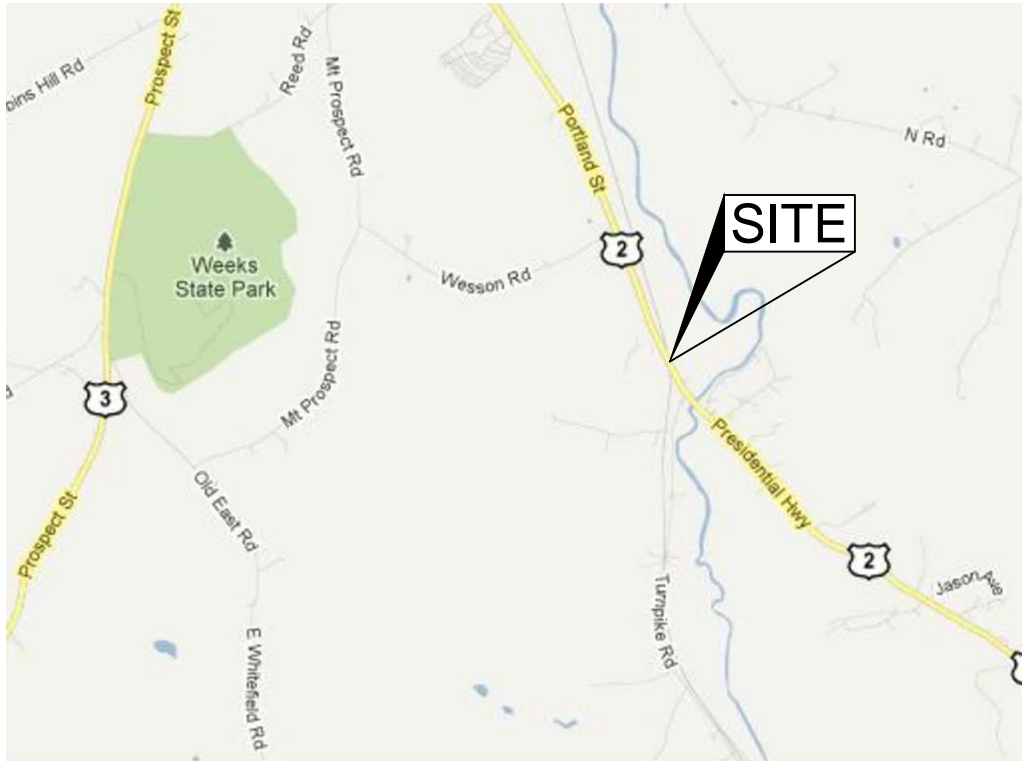
Project # TID-139 - Primary 7  
Drawing # AC-JEF-RR-1

Date: 03/23/12  
Revision #

Proposed  
River Crossing  
Jefferson, NH

Location:  
Presidential Highway, Jefferson, NH  
Nearest cross street- Turnpike Rd.





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	0.858	1.13E-05	0.1960	155982	651
			1.108		0.3170		

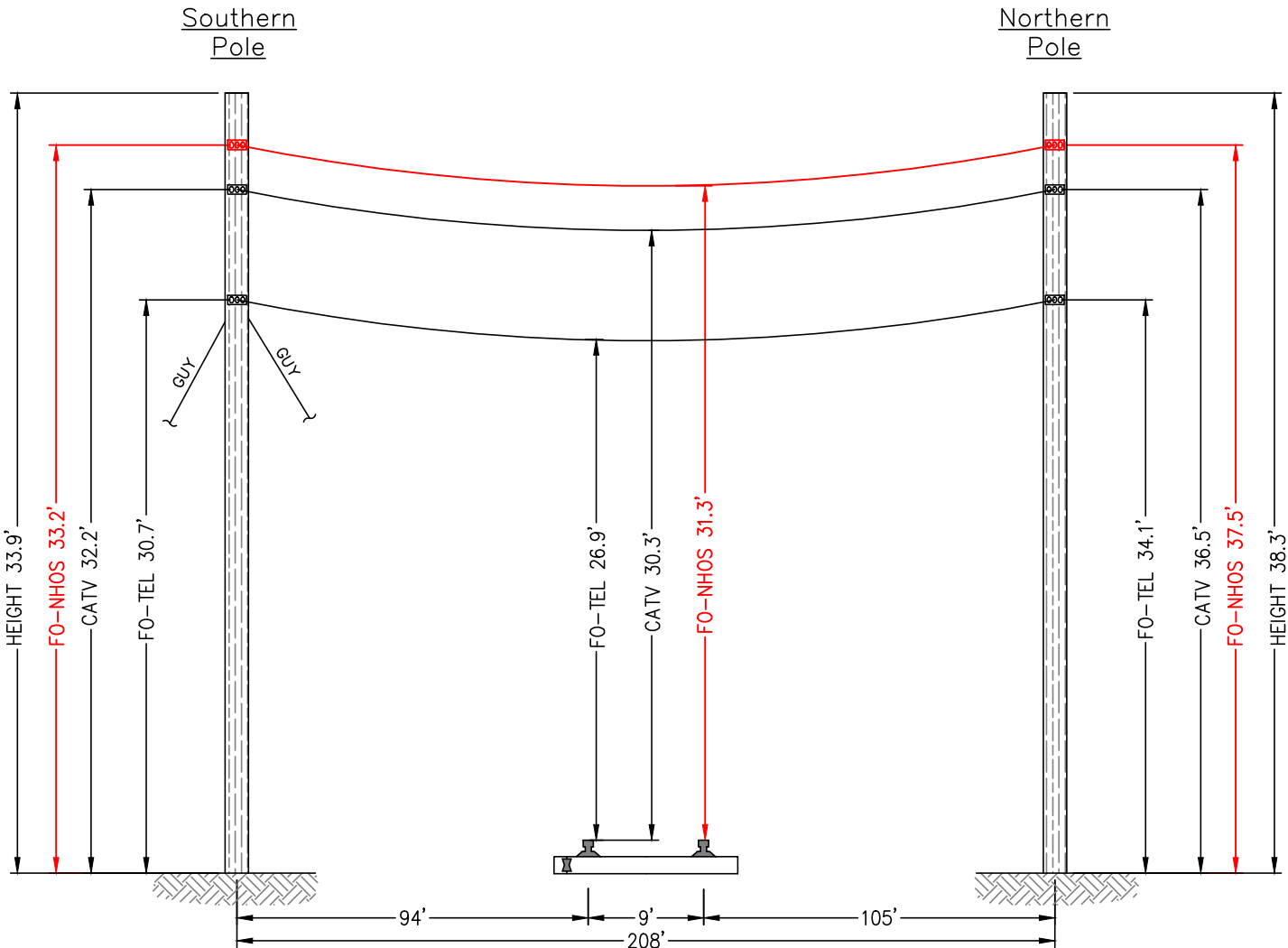
NESC RESULTS

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 ft	Horz Sag Comp ft	Vert Sag Comp ft	Vector Angle Deg
Rule 251 - Heavy 232A1	0.0 120.0	1.000 0.000	.50 .00	.3 .0	4.0 0.0	1.793 0.317	4.57 2.52	2115 681	0.10 0.01	4.58 2.52	2.15 0.00	4.03 2.52	28.1 0.0

Span Length = 208.00 ft  
Span Sag = 2.08 ft (25.0 in)  
Span Tension = 824 lb  
Max Load = 6,650 lb  
Usable load (60%) = 3,990 lb  
Catenary Length = 208.055 ft  
Stress Free Length @  
Installed Temperature = 207.868 ft

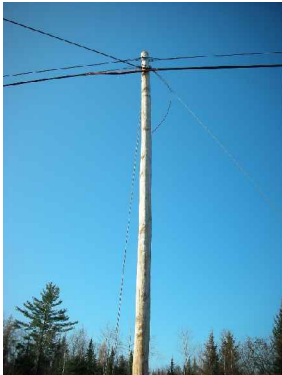
Unloaded Strand  
Sag = 1.02 ft (12.3 in) 0.49 %  
Tension = 639 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	1.37	1,247	-0.02	N/A
-30.0	1.42	1,204	-0.01	N/A
-20.0	1.47	1,162	-0.01	N/A
-10.0	1.53	1,120	-0.01	N/A
.0	1.59	1,079	-0.01	N/A
10.0	1.65	1,039	-0.01	N/A
20.0	1.71	1,000	-0.01	N/A
30.0	1.78	962	-0.01	N/A
40.0	1.85	925	-0.01	N/A
50.0	1.92	890	0.00	N/A
60.0	2.00	856	0.00	N/A
70.0	2.08	823	0.00	N/A
80.0	2.16	792	0.00	N/A
90.0	2.25	762	0.00	N/A
100.0	2.34	733	0.01	N/A
110.0	2.43	706	0.01	N/A
120.0	2.52	681	0.01	N/A
130.0	2.61	656	0.02	N/A
140.0	2.70	634	0.02	N/A



E-NT - T-144/74  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

E-NT - T-144/73  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



E-NT - T-144/74

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the railroad. 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 - T-144/73



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

Proposed  
Railroad Crossing  
Jefferson, 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 11/02/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

Project # TID-139 - Primary 7  
Drawing # AC-JEF-RR-1

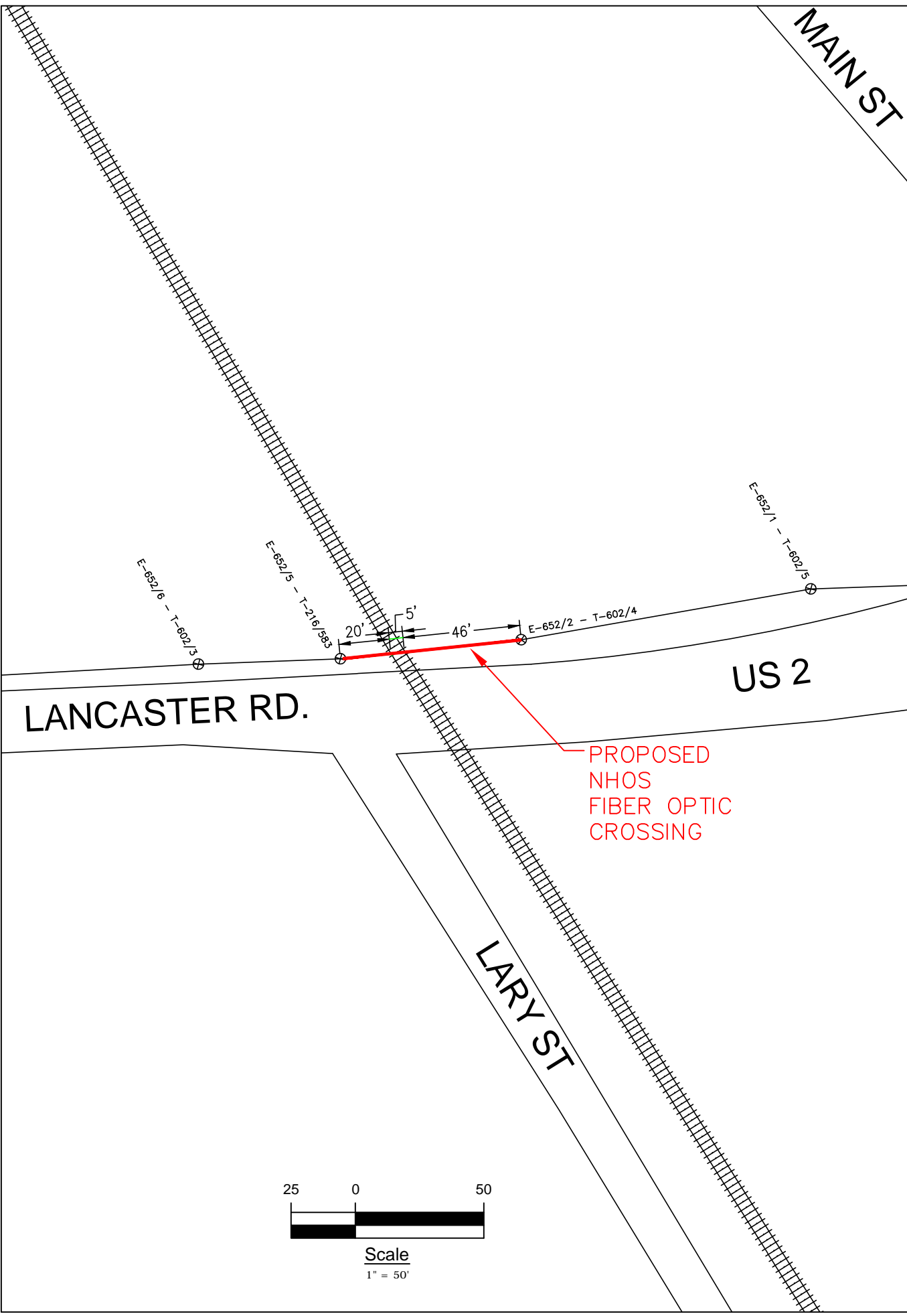
Date: 03/23/12  
Revision #


Proposed  
River Crossing  
Jefferson, NH

Location:  
Presidential Highway, Jefferson, NH  
Nearest cross street- Turnpike Rd.

Sheet 2 of 2



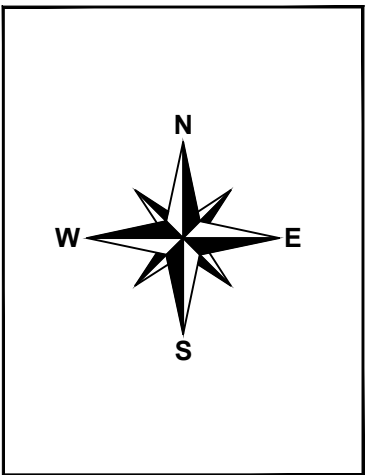




**NHOS**  
New Hampshire Optical Systems

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

Proposed  
River Crossing  
Gorham, NH



Project # TID-142 - Primary 7  
Drawing # AC-GOR-RR-2

Date: 11/18/11  
Revision #

Proposed  
Railroad Crossing  
Gorham, NH

Location:  
Lancaster Rd., Gorham, NH  
Nearest cross street- Lary St.





LOCUS MAP  
(Not to Scale)



Waveguide  
River and Rail Crossings

	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)
Selected Cables							
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 35.5 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	1.12	1005	0.04	1.12	0.53	0.99	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	0.94	212	0.02	0.94	0.00	0.94	0.0

Span Length = 71.00 ft  
Span Sag = .71 ft (8.5 in)  
Span Tension = 281 lb  
Max Load = 6,650 lb  
Usable load (60%) = 3,990 lb  
Catenary Length = 71.019 ft  
Stress Free Length @  
Installed Temperature = 70.997 ft

Unloaded Strand  
Sag = .49 ft (5.9 in) 0.69 %  
Tension = 155 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	.31	646	-0.02	N/A
-30.0	.33	602	-0.02	N/A
-20.0	.36	560	-0.02	N/A
-10.0	.38	519	-0.02	N/A
.0	.42	480	-0.02	N/A
10.0	.45	443	-0.02	N/A
20.0	.49	409	-0.01	N/A
30.0	.53	377	-0.01	N/A
40.0	.57	349	-0.01	N/A
50.0	.62	324	-0.01	N/A
60.0	.66	301	0.00	N/A
70.0	.71	281	0.00	N/A
80.0	.76	264	0.00	N/A
90.0	.80	248	0.01	N/A
100.0	.85	235	0.01	N/A
110.0	.90	223	0.02	N/A
120.0	.94	212	0.02	N/A
130.0	.99	202	0.02	N/A
140.0	1.03	194	0.03	N/A



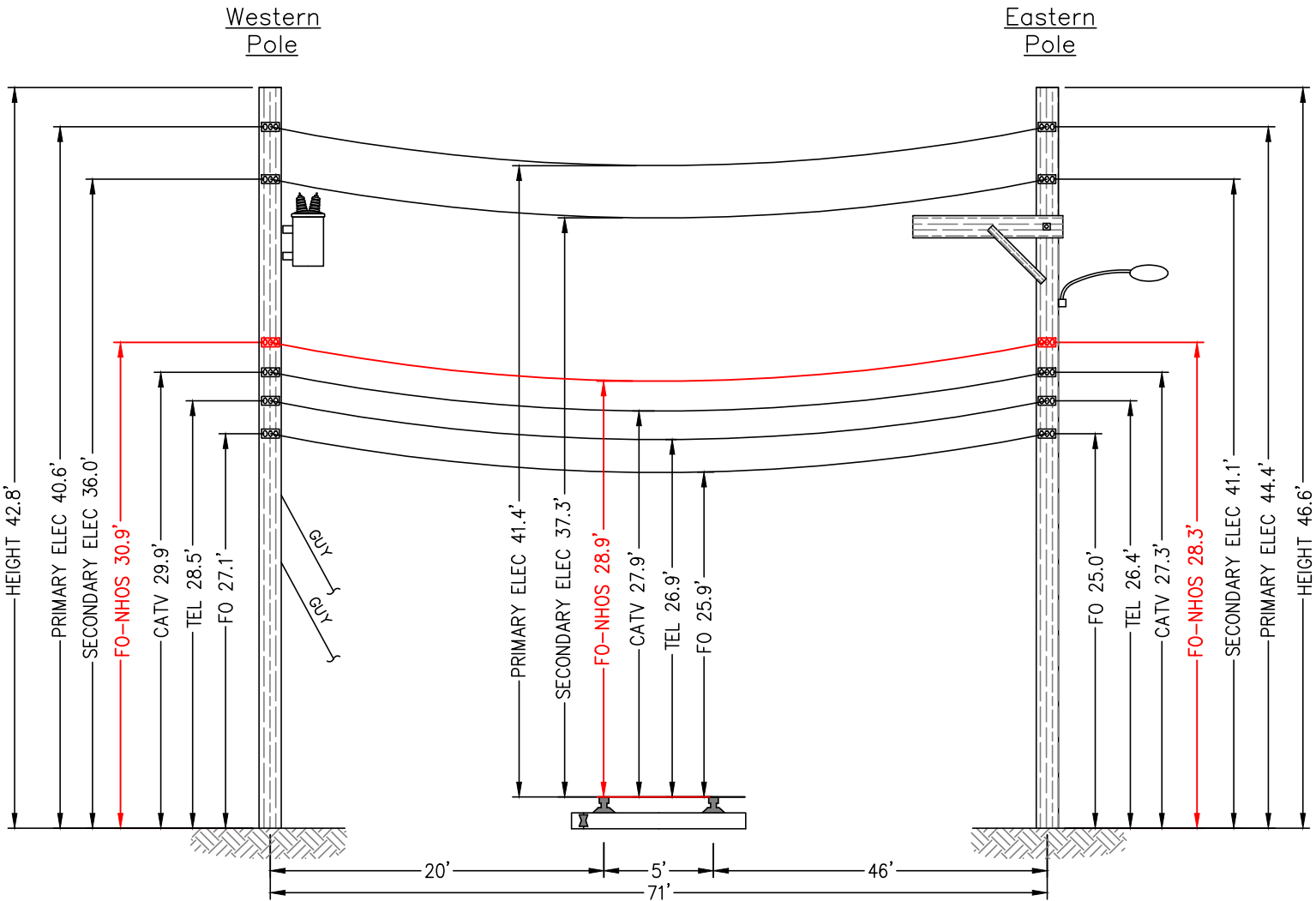
E-652/5 - T-216/583

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the railroad. 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-652/2 - T-602/4



E-652/5 - T-216/583  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

Not to Scale

E-652/2 - T-602/4  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



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

Proposed  
River Crossing  
Gorham, 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 11/02/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

Project # TID-142 - Primary 7  
Drawing # AC-GOR-RR-2

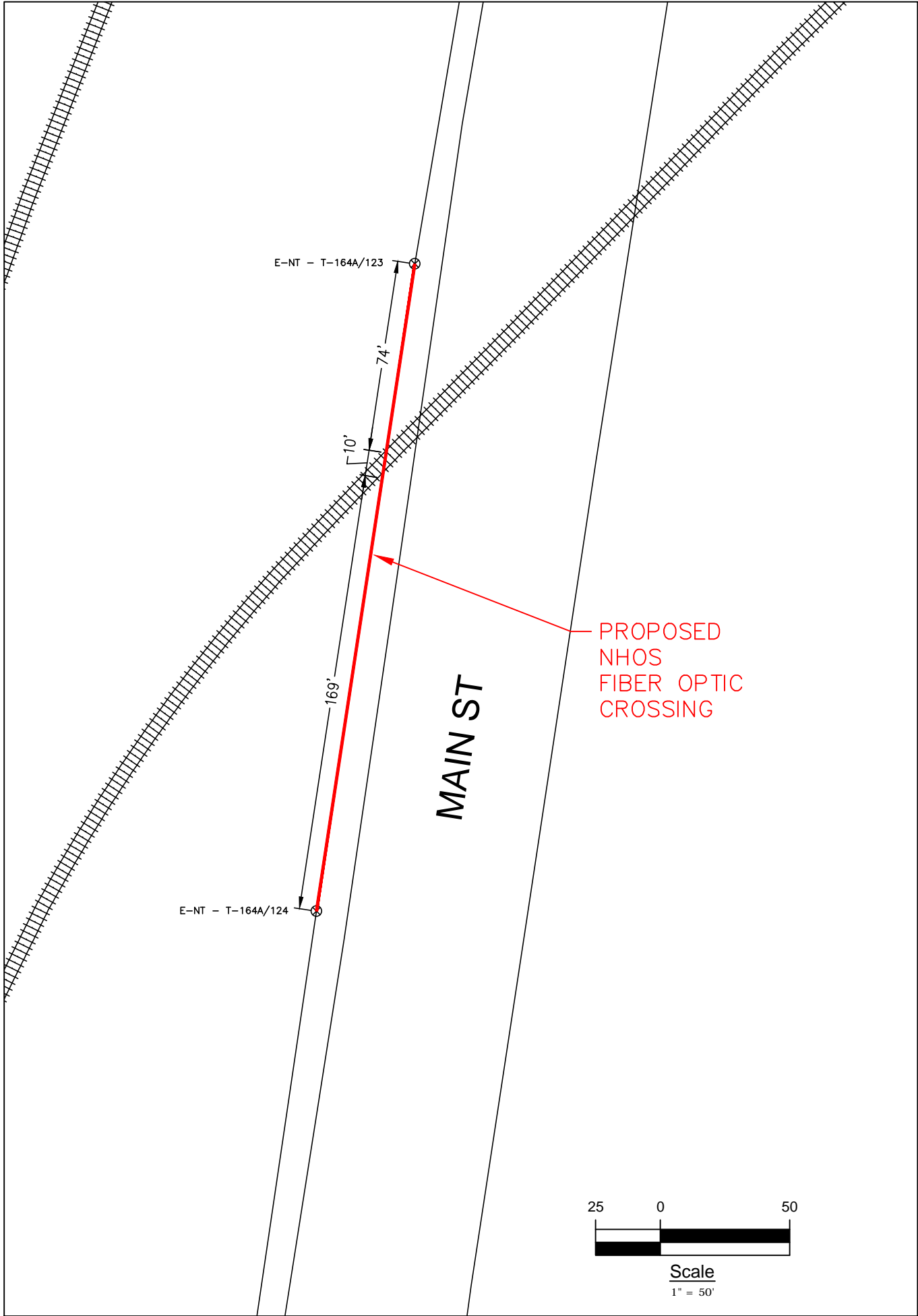
Date: 11/18/11  
Revision #

Proposed  
Railroad Crossing  
Gorham, NH

Location:  
Lancaster Rd., Gorham, NH  
Nearest cross street- Lary St.

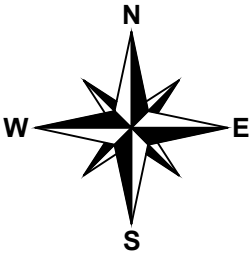
Sheet 2 of 2





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

## Proposed Railroad Crossing Gorham, NH



Project # TID-143 - Primary 7  
Drawing # AC-GOR-RR3

Date: 03/23/12  
Revision #

## Proposed Railroad Crossing Gorham, NH

Location:  
Main St., Gorham, NH  
Nearest cross street- Cascade Flats Rd.





LOCUS MAP  
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations

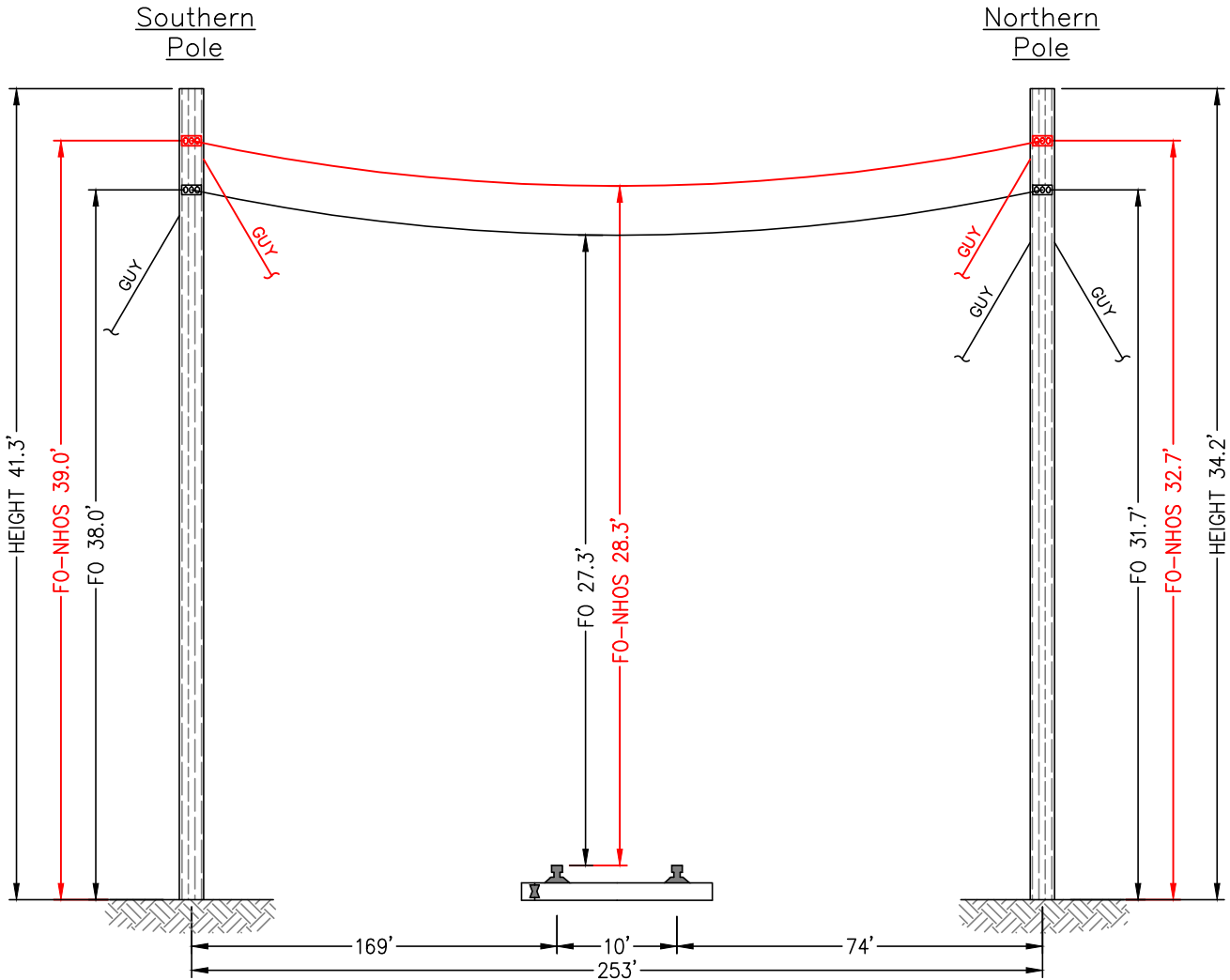
Waveguide  
River and Rail Crossings

	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)
Selected Cables							
1/4"6.mEHS	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/ft	Result Load + Const lb/ft	Sag ft	Tension lb	% Len Chg From Input Conditions	Sag @ Point 126.5 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	5.88	2432	0.12	5.90	2.77	5.19	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	3.00	844	0.01	3.00	0.00	3.00	0.0

	Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
Span Length = 253.00 ft					
Span Sag = 2.53 ft (30.4 in)					
Span Tension = 1,003 lb					
Max Load = 6,650 lb	-40.0	1.76	1,437	-0.01	N/A
Usable load (60%) = 3,990 lb	-30.0	1.82	1,393	-0.01	N/A
Catenary Length = 253.067 ft	-20.0	1.87	1,350	-0.01	N/A
Stress Free Length @	-10.0	1.93	1,308	-0.01	N/A
Installed Temperature = 252.790 ft	.0	2.00	1,267	-0.01	N/A
	10.0	2.06	1,226	-0.01	N/A
	20.0	2.13	1,186	-0.01	N/A
	30.0	2.21	1,147	-0.01	N/A
	40.0	2.28	1,109	0.00	N/A
	50.0	2.36	1,072	0.00	N/A
	60.0	2.44	1,036	0.00	N/A
	70.0	2.53	1,001	0.00	N/A
	80.0	2.62	967	0.00	N/A
	90.0	2.71	935	0.00	N/A
	100.0	2.80	903	0.01	N/A
	110.0	2.90	873	0.01	N/A
	120.0	3.00	844	0.01	N/A
	130.0	3.10	817	0.01	N/A
	140.0	3.21	791	0.02	N/A



E-NT - T-164A/124  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

E-NT - T-164A/123  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



E-NT - T-164A/124

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the railroad. 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 - T-164A/123



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

Proposed  
Railroad Crossing  
Gorham, 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 11/02/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

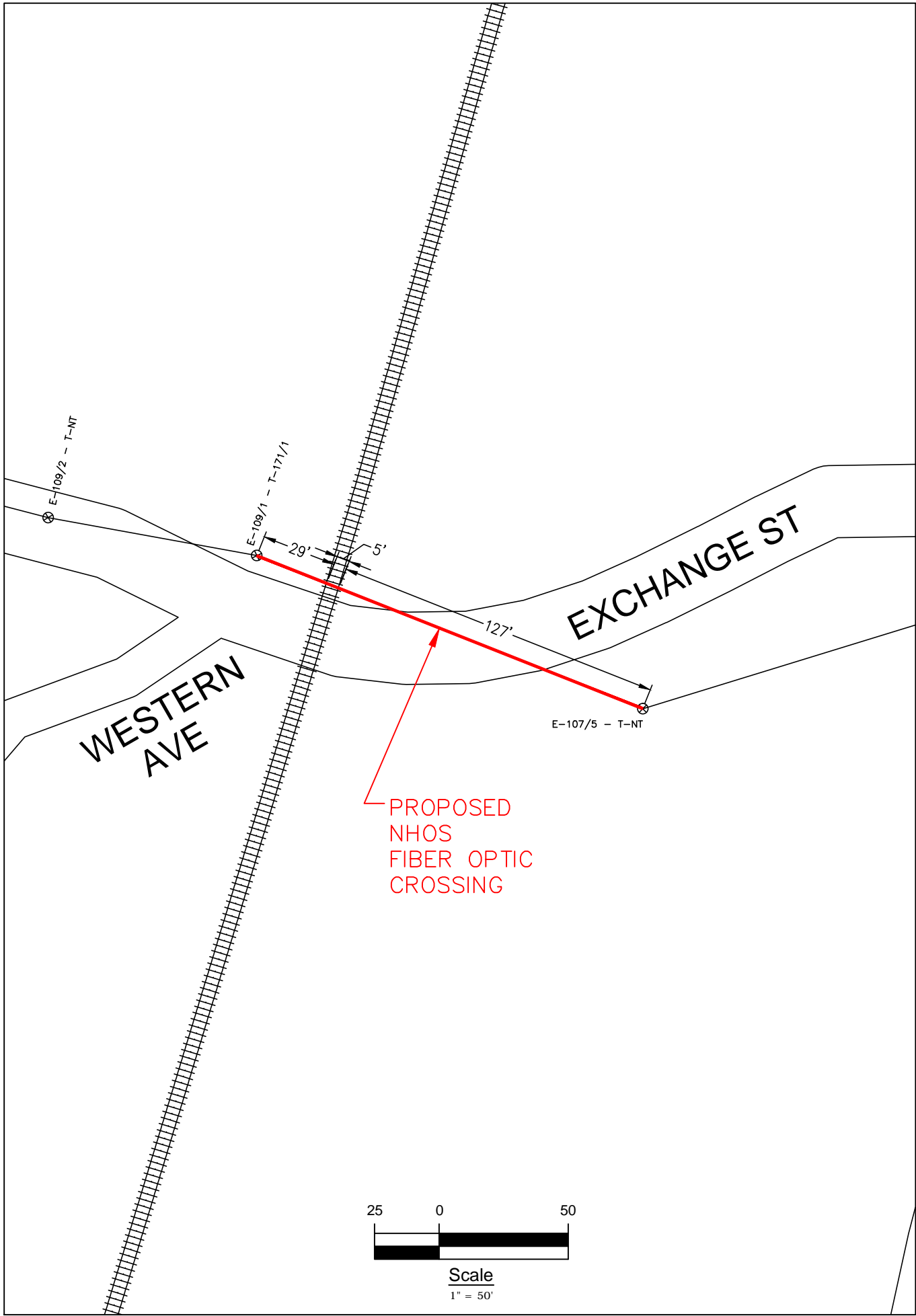
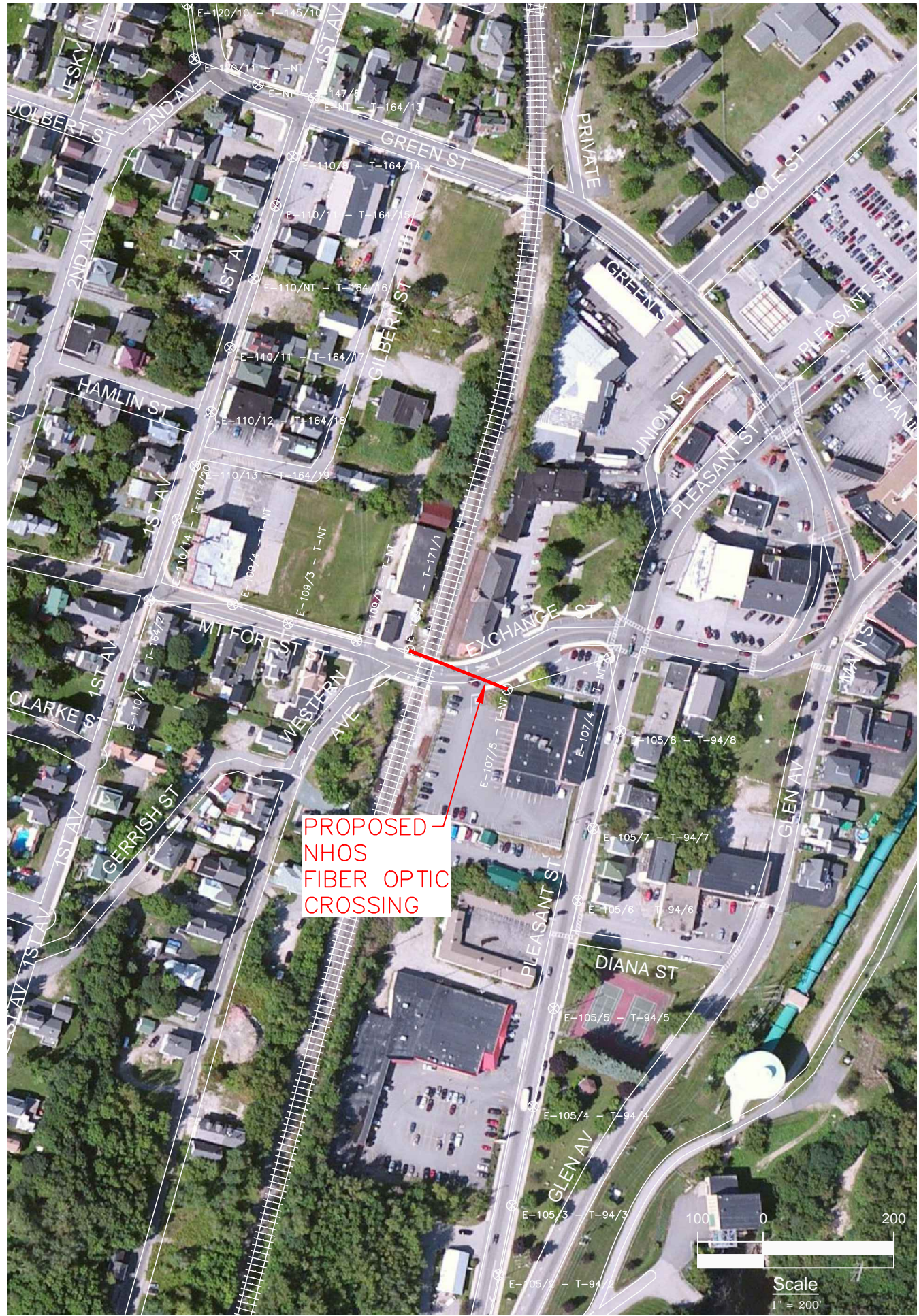
Project # TID-146 - Primary 7  
Drawing # AC-GOR-RR-3

Date: 03/23/12  
Revision #

Proposed  
Railroad Crossing  
Gorham, NH

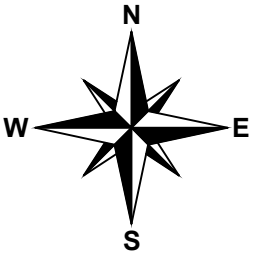
Location:  
Main St., Gorham, NH  
Nearest cross street- Cascade Flats Rd.





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

Proposed  
Railroad Crossing  
Berlin, NH



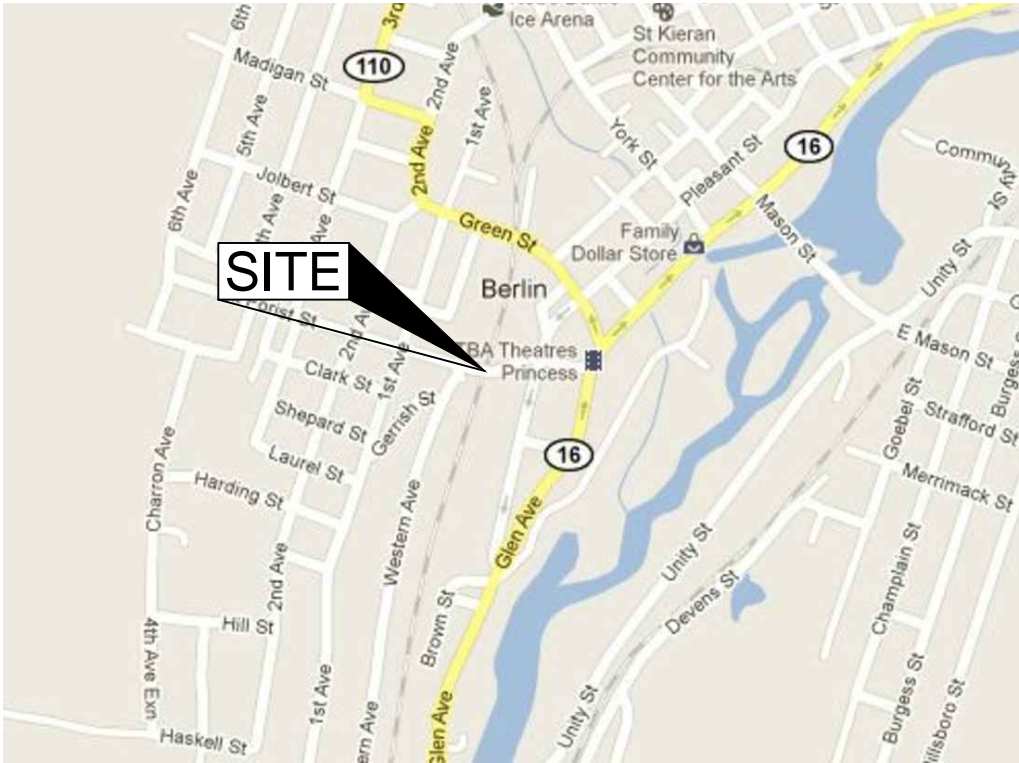
Project # TID-147 - Primary 7  
Drawing # AC-BER-RR-1

Date: 03/23/12  
Revision #

Proposed  
Railroad Crossing  
Berlin, NH

Location:  
Exchange St., Berlin, NH  
Nearest cross street- Western Ave.





LOCUS MAP  
(Not to Scale)



Spanmaster® Release 3.1 Sag / Tension Computations

Waveguide  
River and Rail Crossings

09/01/11 Waveguide

	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)
Selected Cables							
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		

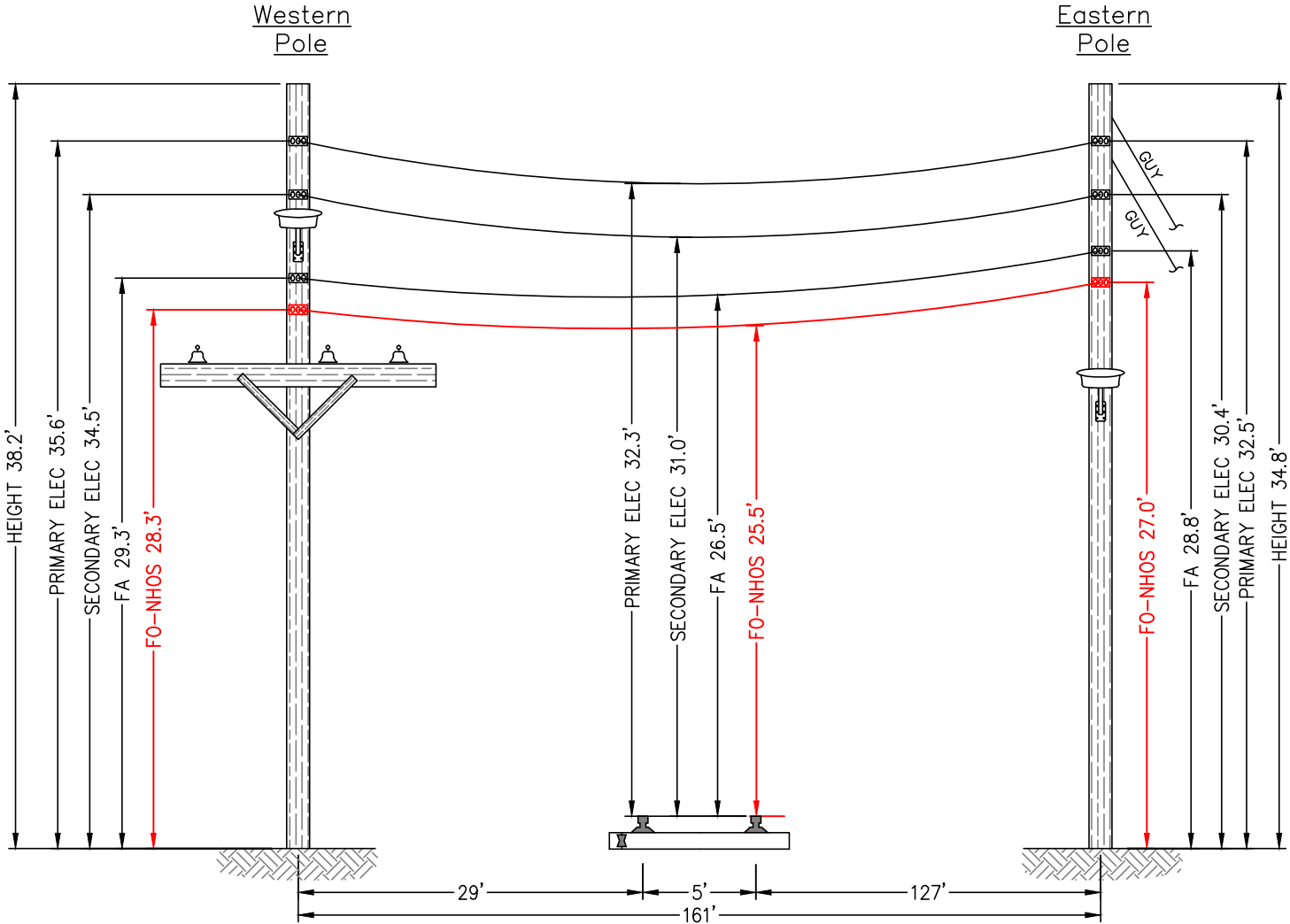
NESC RESULTS

Loading Condition	Temp. (F)	Ice Load lb/ft	Ice Thick in	Wind Constant lb/ft	Horz Wind Load lb/ft	Result Load + Const lb/ft	Sag ft	Tension lb	% Len Chg From Input Conditions	Sag @ Point 80.5 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	3.28	1766	0.08	3.29	1.55	2.90	28.1
232A1	120.0	0.000	.00	.0	0.0	0.317	2.00	514	0.01	2.00	0.00	2.00	0.0

Span Length = 161.00 ft  
Span Sag = 1.61 ft (19.3 in)  
Span Tension = 638 lb  
Max Load = 6,650 lb  
Usable load (60%) = 3,990 lb  
Catenary Length = 161.043 ft  
Stress Free Length @  
Installed Temperature = 160.931 ft

Unloaded Strand  
Sag = .85 ft (10.2 in) 0.53 %  
Tension = 462 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	.98	1,046	-0.02	N/A
-30.0	1.02	1,003	-0.02	N/A
-20.0	1.07	961	-0.01	N/A
-10.0	1.11	920	-0.01	N/A
.0	1.17	879	-0.01	N/A
10.0	1.22	840	-0.01	N/A
20.0	1.28	803	-0.01	N/A
30.0	1.34	767	-0.01	N/A
40.0	1.40	732	-0.01	N/A
50.0	1.47	699	0.00	N/A
60.0	1.54	667	0.00	N/A
70.0	1.61	637	0.00	N/A
80.0	1.68	609	0.00	N/A
90.0	1.76	583	0.01	N/A
100.0	1.84	558	0.01	N/A
110.0	1.92	535	0.01	N/A
120.0	2.00	514	0.01	N/A
130.0	2.08	494	0.02	N/A
140.0	2.16	475	0.02	N/A



E-109/1 - T-171/1  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

E-107/5 - T-NT  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



E-109/1 - T-171/1

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the railroad. 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-107/5 - T-NT



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

Proposed  
Railroad Crossing  
Berlin, 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 11/03/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

Project # TID-147 - Primary 7  
Drawing # AC-BER-RR-1

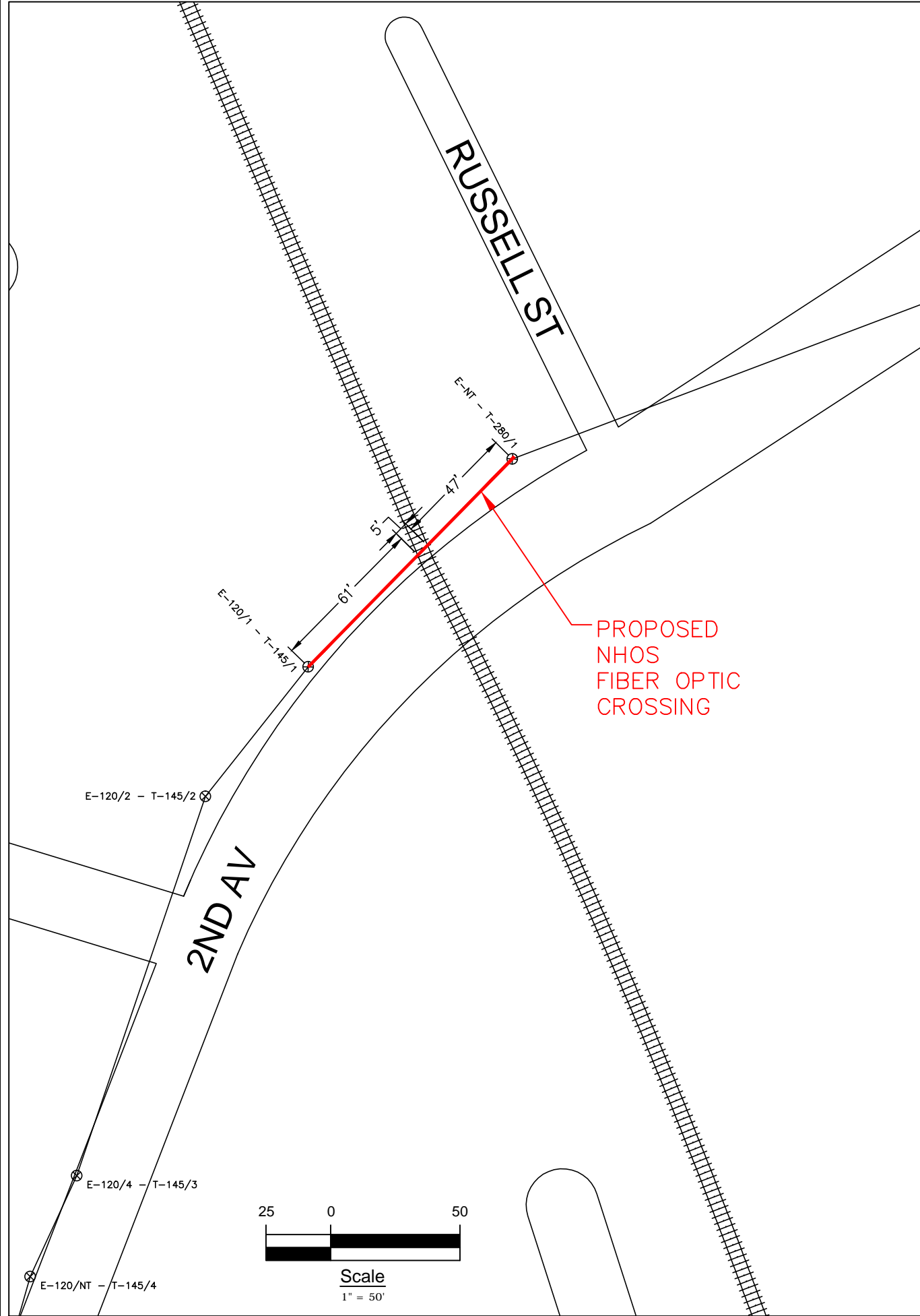
Date: 03/23/12  
Revision #

Proposed  
Railroad Crossing  
Berlin, NH

Location:  
Exchange St., Berlin, NH  
Nearest cross street- Western Ave.

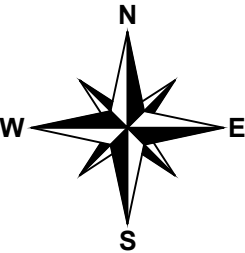
Sheet 2 of 2





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

Proposed  
Railroad Crossing  
Berlin, NH



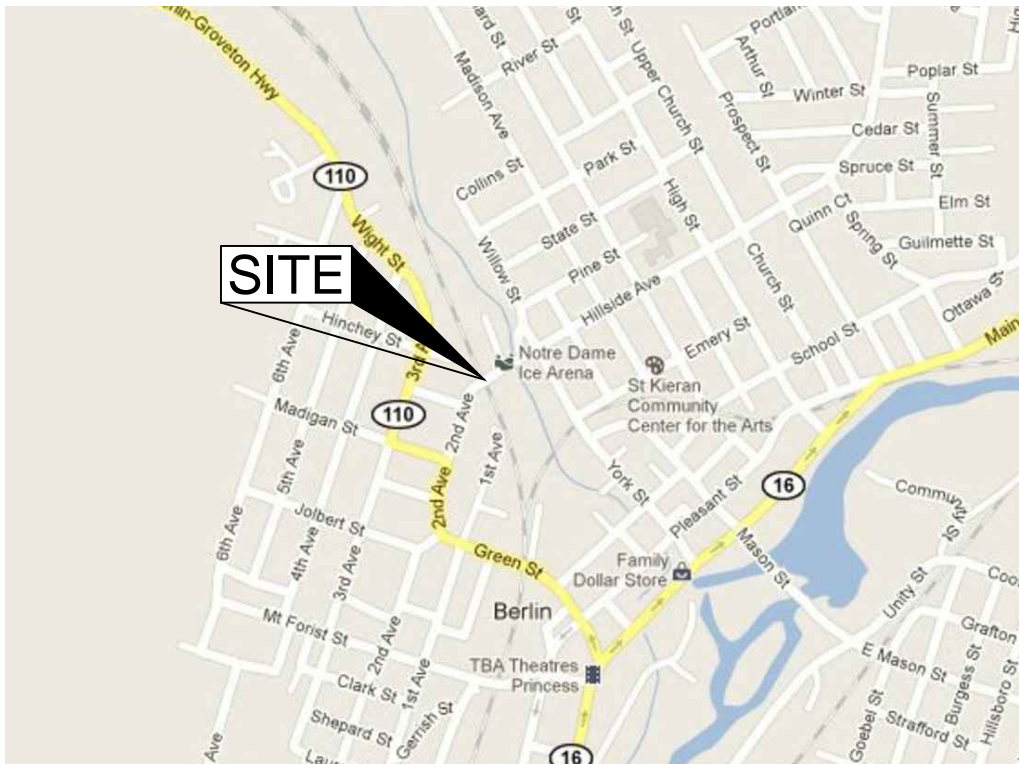
Project # TID-148 - Primary 7  
Drawing # AC-BER-RR-2

Date: 03/23/12  
Revision #

Proposed  
Railroad Crossing  
Berlin, NH

Location:  
2nd Ave., Berlin, NH  
Nearest cross street- Mannering St.





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-Q-288-LN Bundle	0.5782	2.70E+05	0.858	1.13E-05	0.1960	155982	651

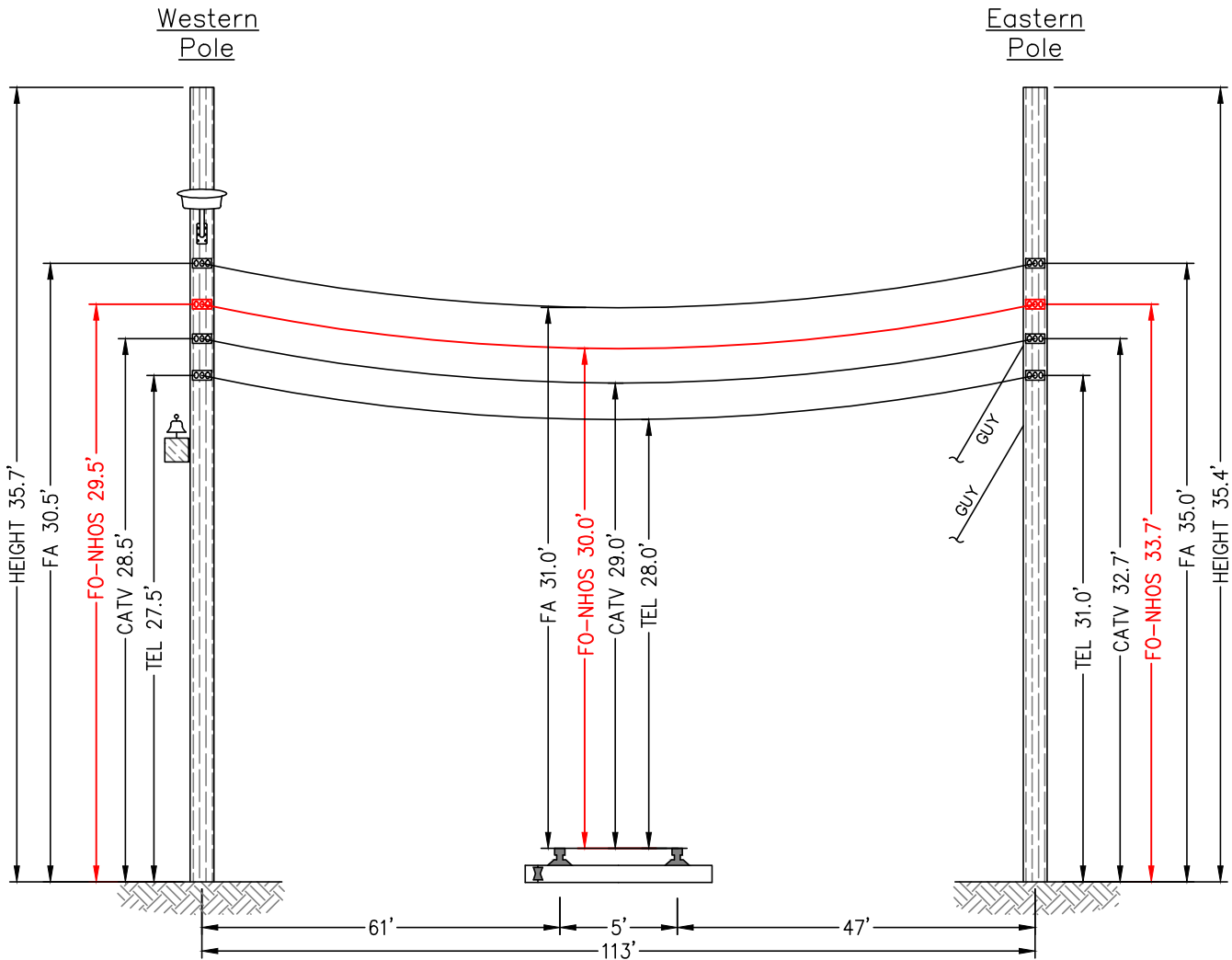
NESC RESULTS

Loading Condition	Temp. (F)	Ice Load lb/ft	Ice Thick in	Wind Constant lb/ft	Horz Wind Load lb/ft	Result Load + Const lb/ft	Sag ft	Tension lb	% Len Chg From Input Conditions	Sag @ Point 56.5 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	2.07	1380	0.06	2.07	0.97	1.83	28.1
	120.0	0.000	.00	.0	0.0	0.317	1.45	349	0.02	1.45	0.00	1.45	0.0

Span Length = 113.00 ft  
Span Sag = 1.13 ft (13.6 in)  
Span Tension = 448 lb  
Max Load = 6,650 lb  
Usable load (60%) = 3,990 lb  
Catenary Length = 113.030 ft  
Stress Free Length @  
Installed Temperature = 112.975 ft

Unloaded Strand  
Sag = .67 ft (8.0 in) 0.59 %  
Tension = 289 lb

Temp (F)	Midspan Sag (ft)	Tension (lb)	% Length Change	Clearance
-40.0	.60	836	-0.02	N/A
-30.0	.64	793	-0.02	N/A
-20.0	.67	751	-0.02	N/A
-10.0	.71	710	-0.02	N/A
.0	.75	670	-0.01	N/A
10.0	.80	633	-0.01	N/A
20.0	.85	597	-0.01	N/A
30.0	.90	563	-0.01	N/A
40.0	.95	531	-0.01	N/A
50.0	1.01	501	-0.01	N/A
60.0	1.07	473	0.00	N/A
70.0	1.13	448	0.00	N/A
80.0	1.19	424	0.00	N/A
90.0	1.26	403	0.01	N/A
100.0	1.32	383	0.01	N/A
110.0	1.39	365	0.01	N/A
120.0	1.45	349	0.02	N/A
130.0	1.51	334	0.02	N/A
140.0	1.58	321	0.03	N/A



E-120/1 - T-145/1  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)

E-NT - T-280/1  
(Existing joint owned utility  
pole (PSNH/Fairpoint) in  
existing Right-of-Way)



E-120/1 - T-145/1

Construction Notes:

NHOS proposes to install a 1/4 inch metal supporting strand between the existing utility poles shown above that will traverse the railroad. 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 - T-280/1



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

Proposed  
Railroad Crossing  
Berlin, 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 11/03/11.
- Vertical distances are representative of attachment heights after utility make ready moves are completed.

Project # TID-148 - Primary 7  
Drawing # AC-BER-RR-2

Date: 03/23/12  
Revision #

Proposed  
Railroad Crossing  
Berlin, NH

Location:  
2nd Ave., Berlin, NH  
Nearest cross street- Mannering St.