



# Welch & Donohoe, LLP

ATTORNEYS AT LAW

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September 12, 2016

Robert J. Shea, Presiding Officer  
Energy Facilities Siting Board  
One South Station  
Boston, MA 02108

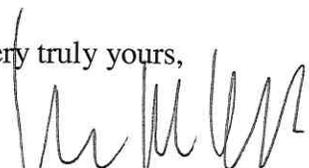
RE: NSTAR Electric Company d/b/a Eversource Energy and New England Power Company  
d/b/a National Grid, EFSB 15-04/D.P.U. 15-140/15-141

Dear Mr. Shea:

Enclosed on behalf of the Town of Winchester please find: (1) the Town of Winchester's Responses to the First Set of Information Requests of NSTAR Electric Company d/b/a Eversource Energy and New England Power Company d/b/a National Grid; and (2) the Town of Winchester's Responses to the First Set of Information Requests of the Energy Facilities Siting Board.

I have also enclosed a Certificate of Service. Thank you for your attention to this matter.

Very truly yours,

  
Wade M. Welch

Enclosures

Wade M. Welch\*  
wwelch@welchdonohoe.com  
Melissa C. Donohoe  
mdonohoe@welchdonohoe.com

\*also admitted in the District of Columbia

COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES

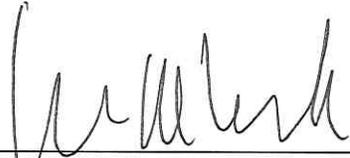
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NSTAR Electric Company )  
d/b/a Eversource Energy and ) EFSB 15-04/D.P.U. 15-140/15-141  
New England Power Company )  
d/b/a National Grid )

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**CERTIFICATE OF SERVICE**

I certify that I have this day served the foregoing upon the Energy Facilities Siting Board and the Service List in the above-docketed proceeding in accordance with the requirements of 980 C.M.R. 1.03 (Siting Board's Rules of Practice and Procedure).



---

Wade M. Welch, Esq.  
Welch & Donohoe, LLP  
655 Summer St., Suite 203  
Boston, MA 02210  
617-428-0222

Dated: September 12, 2016

**COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES**

\_\_\_\_\_)  
NSTAR Electric Company )  
d/b/a Eversource Energy and )  
New England Power Company )  
d/b/a National Grid )  
\_\_\_\_\_)

EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF DONALD L. HAES**

Donald L. Haes, does hereby depose and say as follows:

I, Donald L. Haes, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
Donald L. Haes

**COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES**

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NSTAR Electric Company )  
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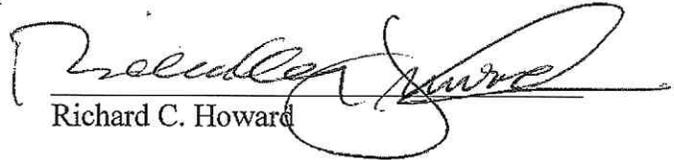
EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF RICHARD C. HOWARD**

Richard C. Howard does hereby depose and say as follows:

I, Richard C. Howard, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
Richard C. Howard

**COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES**

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NSTAR Electric Company )  
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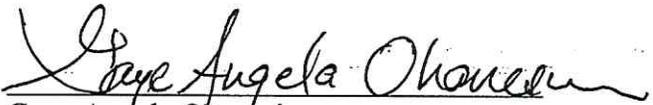
EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF GAYE ANGELA OHANESIAN**

Gaye Angela Ohanesian does hereby depose and say as follows:

I, Gaye Angela Ohanesian, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
Gaye Angela Ohanesian

COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES

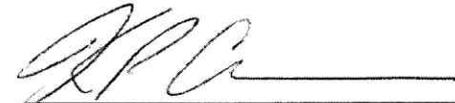
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NSTAR Electric Company )	
d/b/a Eversource Energy and )	EFSB 15-04/D.P.U. 15-140/15-141
New England Power Company )	
d/b/a National Grid )	
_____)	

**AFFIDAVIT OF KENNETH CRAM**

Kenneth Cram does hereby depose and say as follows:

I, Kenneth Cram, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
Kenneth Cram

**COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES**

\_\_\_\_\_  
NSTAR Electric Company )  
d/b/a Eversource Energy and )  
New England Power Company )  
d/b/a National Grid )  
\_\_\_\_\_ )

EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF PETER TIRINZONI**

Peter Tirinzoni does hereby depose and say as follows:

I, Peter Tirinzoni, on behalf of the Towns of Winchester and Stoneham, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 8<sup>th</sup> day of September, 2016.

  
Peter Tirinzoni

**COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES**

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NSTAR Electric Company )  
d/b/a Eversource Energy and )  
New England Power Company )  
d/b/a National Grid )  
\_\_\_\_\_ )

EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF BETH E. RUDOLPH**

Beth E. Rudolph, does hereby depose and say as follows:

I, Beth E. Rudolph, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
Beth E. Rudolph

COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES

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NSTAR Electric Company )  
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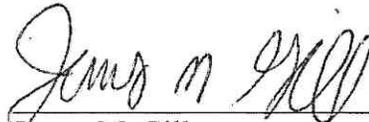
EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF JAMES M. GILL**

James M. Gill, does hereby depose and say as follows:

I, James M. Gill, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
James M. Gill

**COMMONWEALTH OF MASSACHUSETTS  
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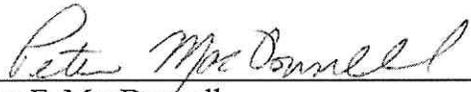
EFBS 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF PETER F. MACDONNELL**

Peter F. MacDonnell does hereby depose and say as follows:

I, Peter F. MacDonnell, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
Peter F. MacDonnell

**COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES**

\_\_\_\_\_)  
NSTAR Electric Company )  
d/b/a Eversource Energy and )  
New England Power Company )  
d/b/a National Grid )  
\_\_\_\_\_)

EFSB 15-04/D.P.U. 15-140/15-141

**AFFIDAVIT OF JOHN F. NASH**

John F. Nash does hereby depose and say as follows:

I, John F. Nash, on behalf of the Town of Winchester, certify that the discovery responses submitted herewith, which bear my name, were prepared by me or under my supervision and are true and accurate to the best of my knowledge and belief.

Signed under the pains and penalties of perjury this 12<sup>th</sup> day of September, 2016.

  
\_\_\_\_\_  
John F. Nash

COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES

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NSTAR Electric Company )  
d/b/a Eversource Energy and ) EFSB 15-04/D.P.U. 15-140/15-141  
New England Power Company )  
d/b/a National Grid )

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TOWN OF WINCHESTER RESPONSES TO  
FIRST SET OF INFORMATION REQUESTS OF  
THE ENERGY FACILITIES SITING BOARD

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Richard Howard

Information Request: EFSB-TOW01

Please refer to the prefiled testimony of Richard Howard at 4. Mr. Howard states that “Winchester and Woburn have given the petitioners a Preferred Route Variation of their own which will also avoid all of the major traffic impacts that occur on the Preferred Route – Winchester segment.”

- a. Is there any difference between what Winchester calls the Preferred Route Variation and the Green Street Variation?
- b. Please describe what role has the City of Woburn (“Woburn”) had in the selection of the Green Street Variation, as discussed by Mr. Howard. Has Woburn discussed with Town of Winchester (“Winchester”) and/or NSTAR Electric Company d/b/a Eversource Energy and New England Power Company d/b/a National Grid (“Companies”) what route (the proposed Preferred Route utilizing Cross Street or the Green Street Variation) it prefers?
- c. Please provide any notes or correspondence between Winchester and Woburn concerning the route variations through their respective towns.

Response:

- a. Yes. As described in TOW-RS-2 and attachment TOW-RS-2(1), the Preferred Route Variation does not connect to Green Street. The City of Woburn Engineer proposed the route describe in TOW-RS.2.
- b. In January of 2016, Winchester Town Manager Richard Howard, Mayor of Woburn, Scott Galvin, City Engineer or Woburn John E. Corey and Town Engineer of Winchester, Beth Rudolph met to discuss route variations for the Eversource 345kV line. At this meeting, the group discussed the possibility of routing the line through the industrial areas on Holton Street and Draper Street as referred to in an email from Ms. Rudolph to Mr. Corey on February 8, 2016 at 1:58pm. At 2:43pm on the same day, Mr. Corey stated in an email “I passed it off to Eversource last week”. See email attached documentation hereto. Subsequently the Town was advised by Mr. Corey that Eversource was not inclined to

explore Mr. Corey's variation as it already had a Preferred Route and the Green Street Variation. Thereafter, on May 23, 2016, Gaye Ohanesian, at the direction of the Town, emailed Mr. Corey as a follow-up to a meeting she had with him the previous week with Beth Rudolph and Jay Gill, suggesting a further variation to the Green Street Route. As of yet, the Town of Winchester and the City of Woburn have not met to discuss this variation. It is worth noting that in the Company's response to CUR-1-1A which is cited in the Company's response to the previously described information request TOW-RS-2, the Company again misperceived the Preferred Route Variation and indicated that it connected to Green Street.

c. See documents attached. (TO BE LISTED)

EFSB-TOW-1 (c)(1) E-mails B. Rudolph to J. Corey, February 8, 2016

E-mail J. Corey to B. Rudolph, February 8, 2016

Map J. Corey, February 8, 2016

(c)(2) E-mail G. Ohanesian to J. Corey

(c)(3) Companies Response to TOW-RS-2 with attachment RS-2(1)

(c)(4) Companies Response to CUR-1-1(a)

**Rudolph, Beth**

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**From:** Corey, John E. <jaycorey@cityofwoburn.com>  
**Sent:** Monday, February 08, 2016 2:43 PM  
**To:** Rudolph, Beth  
**Subject:** RE: 345kV line Follow-up  
**Attachments:** Holton St alternative.pdf

Beth,

We were looking at the enclosed route. I passed it off to Eversource last week. If it works, it will alleviate a lot through residential areas in Winchester. It's still a problem with the bikeway though.

Jay

**John E. Corey, Jr. P.E.**  
City Engineer  
City of Woburn  
Engineering Department  
10 Common Street  
Woburn, MA 01801  
(781) 897-5882  
(781) 897-5889 fax  
(781) 389-7860 cell  
jcorey@cityofwoburn.com

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**From:** Rudolph, Beth [mailto:brudolph@winchester.us]  
**Sent:** Monday, February 08, 2016 1:58 PM  
**To:** Corey, John E. <jaycorey@cityofwoburn.com>  
**Subject:** 345kV line Follow-up

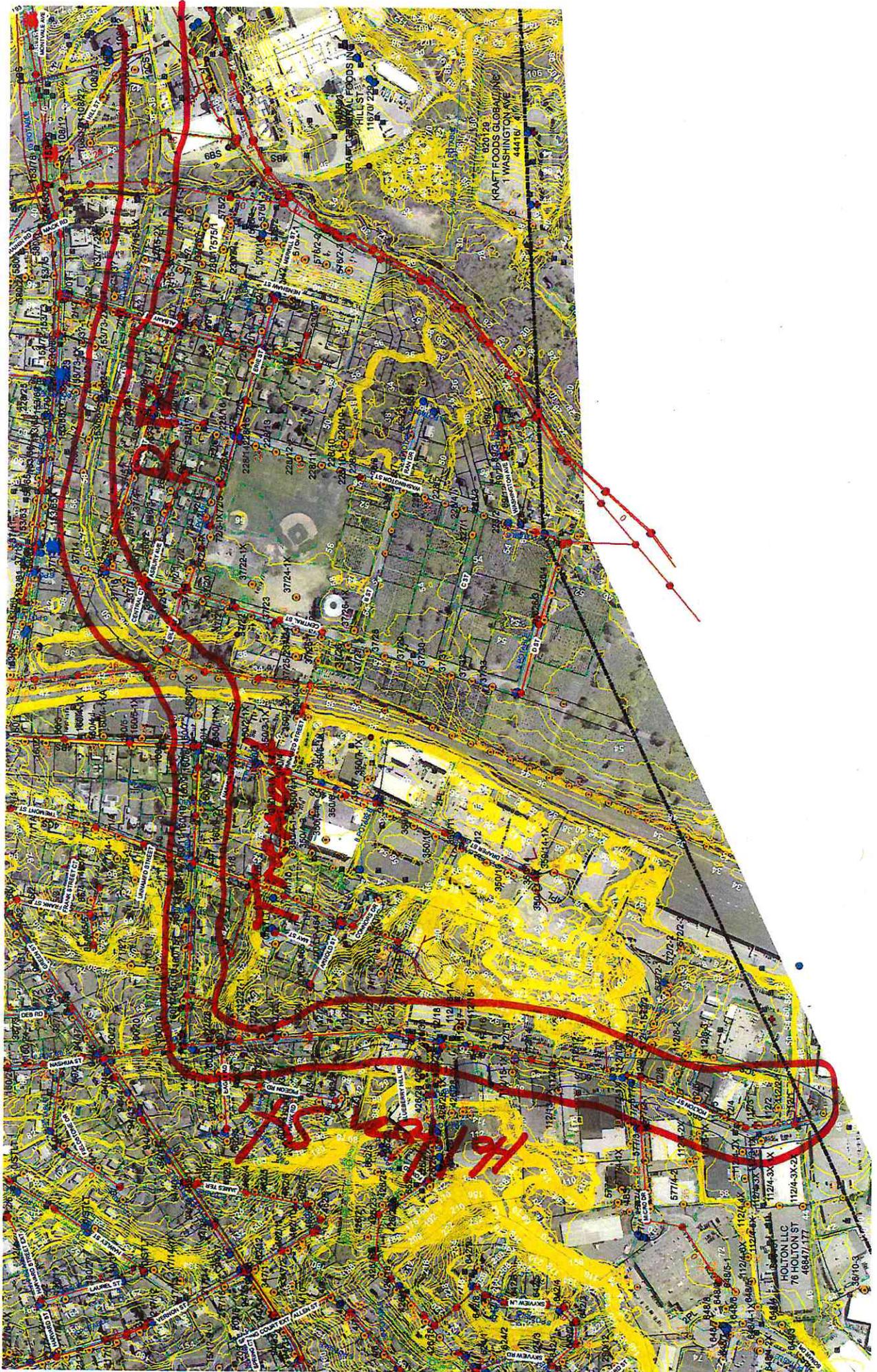
Hi Jay-

Richard Howard asked me to follow-up with you regarding our meeting a few weeks back with Mayor Galvin to talk about the proposed route of Eversource's 345kV line. At the time, we discussed the possibility of routing the line through the industrial areas on Holton Street and Draper Street. Just wondering if you had been able review this?

Thanks so much.  
Beth

Beth Rudolph, P.E.  
Town Engineer  
Engineering Department  
71 Mount Vernon Street  
Winchester, MA 01890  
rel: 781-721-7120  
Fax: 781-721-7166  
Email: [brudolph@winchester.us](mailto:brudolph@winchester.us)

*EF5B - TOW-1(c)1*



**Howard, Richard**

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**From:** GOhanesian <gohanesian@gopowerinc.com>  
**Sent:** Thursday, September 08, 2016 12:23 PM  
**To:** wwelch@welchdonohoe.com  
**Cc:** Howard, Richard  
**Subject:** FW: Bullet Points and Maps of proposed segment alternative through Holton St industrial area and using RR ROW  
**Attachments:** Proposed Alternate Segment though Industrial Area Holton St to Stoneham 051816.pdf

This was sent to Jay Corey as requested on May 23. See email and attachment with bullet points.

These maps show the route from Crane's Court which is different and not the Preferred Route Variation which Jay Corey mapped out, although there are common segments.

Gaye Angela Ohanesian  
Director  
gopower inc | consulting services for utilities  
tel 781.844.2494

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**From:** GOhanesian [mailto:gohanesian@gopowerinc.com]  
**Sent:** Monday, May 23, 2016 12:30 PM  
**To:** John E. Corey Jr.(jcorey@cityofwoburn.com) <jcorey@cityofwoburn.com>  
**Cc:** 'Rudolph, Beth' <brudolph@winchester.us>; 'Gill, James' <jgill@winchester.us>  
**Subject:** Bullet Points and Maps of proposed segment alternative through Holton St industrial area and using RR ROW

Jay,  
Per our meeting last week, please find attached bullet points and maps showing route.  
If you have any questions or comments, please do not hesitate to call me, Beth or Jay.

Thank you,  
Gaye

Gaye Angela Ohanesian  
Director  
gopower inc | consulting services for utilities  
tel 781.844.2494

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EFSB. TOW-1-(C) 2

May 18 2016

PROPOSED ALTERNATIVE SEGMENT FROM LAKE ST TO HOLTON ST TO RR ROW TO STONEHAM

345kV Woburn – Wakefield Underground Transmission Line

An alternative route segment was explored that takes into account the concerns of the residents, businesses and the Town of Winchester and City of Woburn.

See attached plans proposed route layout between Lake Ave and Holton Street:

Lake Ave across Main St/RT 38 to Cranes Court

Through private property across to Medford St

Along Medford St through private property to East St

Across East St to Sonar Drive through the parking lot and drive to Micro Drive to Holton St.

Along Holton St to Nashua St across the active RR ROW using Jack&Bore or HDD to continue along inactive RR ROW to be used as the Tri-Community Greenway continuing to Stoneham's portion of the Tri-Community Greenway.

This route provides the following advantage or reductions in impact of the various criteria:

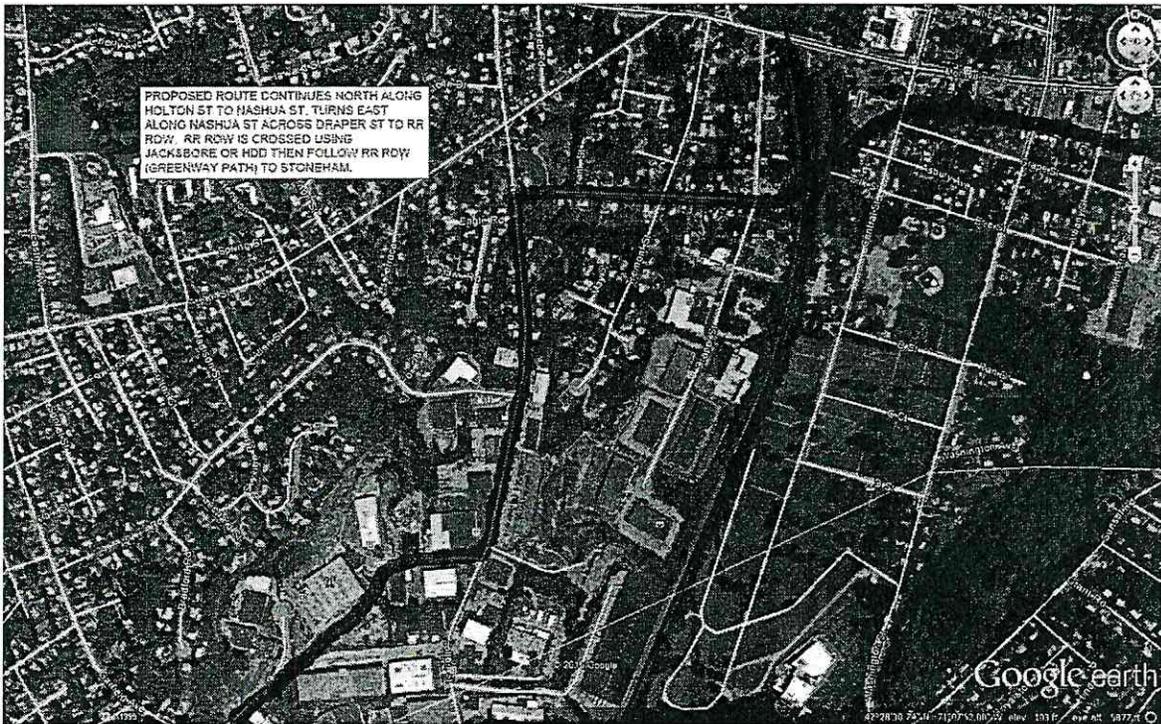
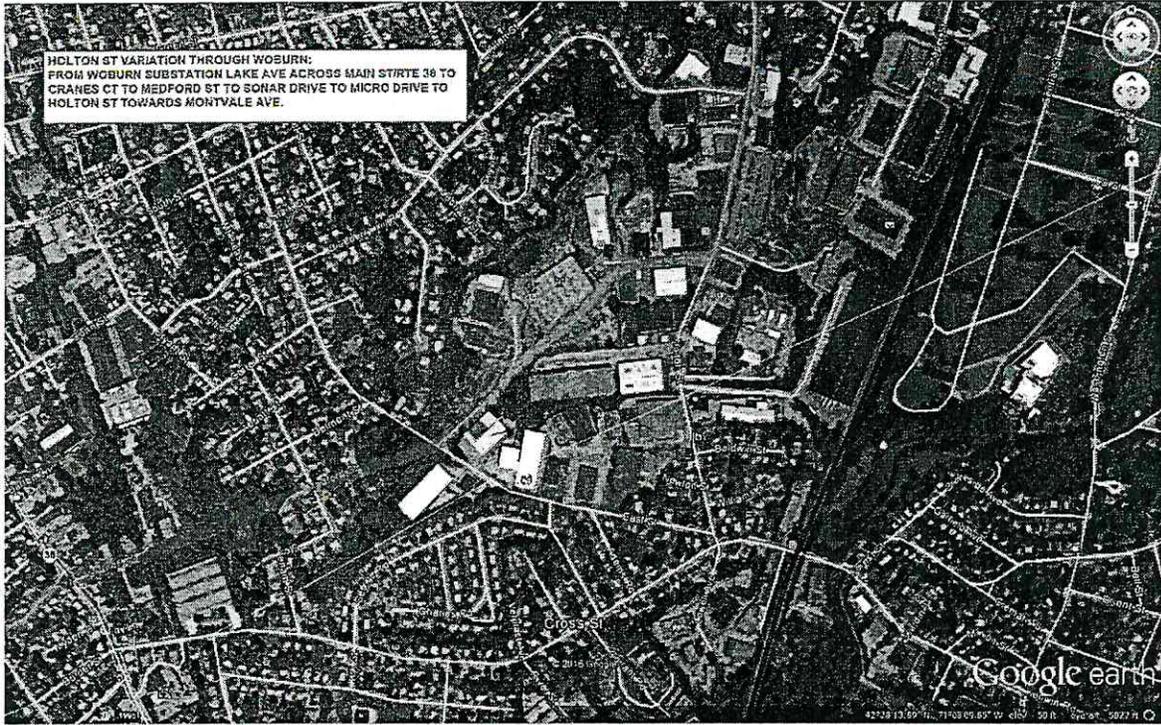
- Avoids Cross Street which includes one of the two Winchester Aberjona River crossings and a RR crossing.
- Avoids Green Street
  - Cross St and Green St are similar in width, traffic, residents, businesses, utility congestion and trees. By using this alternative route both are only crossed instead of being used as the longitudinal alignment proposed in the petition for the Preferred Route and the Noticed Alternative Route, respectively.
  - The proposed route segment significantly reduces the count of residential units along the route, mitigating many issues by the sheer avoidance of many households and businesses.
  - This alternate route is through a predominantly commercial and industrial area where there are roadways and drives which can be used as satisfactory detours during construction.
  - Although the construction will affect the businesses in the industrial park area, in weighing the impact, the temporary construction and the permanent transmission line installation will far less impact the abutters along this route segment than the many more individual residences and business along Cross St or Green St.
  - It would be prudent to check with the businesses (if they are within 50 feet of the centerline of the transmission line route, especially in the industrial park) whether they use equipment that would be sensitive to EMF.
- Avoids Washington Street
  - Washington Street is a very busy street in both Woburn and Winchester. Although Washington Street is wider than Cross St and Green St, the amount of traffic is

significant. By avoiding Washington Street together with Cross St, two Aberjona River crossings are avoided as well as two Double Jack and Bores, one at the intersection of Cross and Washington and the other along Washington Street. Furthermore, the route avoids Shields Health Care also located on Washington St near the Aberjona River and the Double Jack and Bore.

- In Woburn, the avoidance of Washington St avoids construction of a 90 degree turn at the major traffic intersection at Washington St and Montvale Ave.
- Although the crossing of the active RR line cannot be avoided by any route, crossing near Nashua Street eliminates the two Winchester Aberjona River crossings. An HDD crossing could cross both the RR and Sweetwater Brook which runs parallel to the RR. The added advantage is that it is in an area where there is no traffic and few utilities.
- This is an alternative to the RR crossing for the Noticed Alternative Route. Eversource discussed that they had not yet determined a method to cross above the RR using the Montvale Avenue bridge even though it a part of the Noticed Alternative Route.
- Avoids Montvale Avenue in Woburn
  - This alternative route segment eliminates the footprint of the transmission alignment along Montvale Ave reducing impacts on traffic that effect the entire area including on and off I93. Using this route segment will mitigate the traffic congestion that will occur at Montvale Ave and I93. This would alleviate the consequence of commercial and financial impact to the retail businesses along Montvale in this area.
- Overall, this route segment reduces the impact of traffic congestion by moving the route from busy roadways abutted by many residential units to a path that is avoids roadways, uses an industrial area, and uses and ties into the RR ROW for the Tri-Community Greenway.
- In Woburn, easements will need to be obtained along the route. All privately owned parcels along the route, such as near Cranes Court and between Medford St and East Street, and within the industrial park area will need to be addressed as well as any public parcels owned by City of Woburn.
- Grants of location will also be required for the route constructed within roadways.
- It is makes sense and it is preferred to use this alternative and along the Tri-Community Greenway RR ROW for the following reasons:
  - The ROW exists and there is no traffic to contend with.
  - There is hardly any utility congestion especially when compared to the other roadway routes.
  - The gentle bends of the RR ROW are conducive to the bending requirements of the transmission line. Many transmission lines co-exist along RR ROWs for this reason. Furthermore, if maintenance or repair is required, the Greenway path provides easy access and it is much less impactful to setup repair equipment than a busy roadway.
  - If the RR ROW width is greater than the roadways, it is possible that the transmission line could be positioned further from the abutters that if it was located in a roadway.
  - Financially, a win-win-win situation would be created on Federal, State and Local levels. The Tri-Community Greenway is being funded by the TIP program. Because there are always more projects than funds, this is a way to reduce the cost of the Greenway and return some of the funding to TIP for other Metropolitan Boston projects. By using the RR ROW path for its transmission line, some of the construction tasks are common to

both projects including clearing, excavating and restoring. Eversource's efforts would offset the costs of the Greenway. These cost savings could be redirected to other TIP projects.

- This would be a smart way to provide value and results to residents, businesses, who are also customers: installing an electric transmission line for the Greater Boston area while reducing local traffic and utility congestion impacts during construction and future maintenance, while preparing the Greenway base, and simultaneously reducing the TIP bill of a public works project for multiple communities which can be redirected to accomplish another project.



NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester Set 1  
Response to TOW-RS-2  
May 6, 2016  
Person Responsible: David Klinch

Information Request TOW-RS-2

The Town of Winchester and the City of Woburn have held several meetings on a proposed alternative route through Woburn which reduces the impacts of the Environmental Justice Areas described in TOW 3. The proposed Route is attached as Exhibit B and runs up Holton Street and then through largely commercial areas of Woburn.

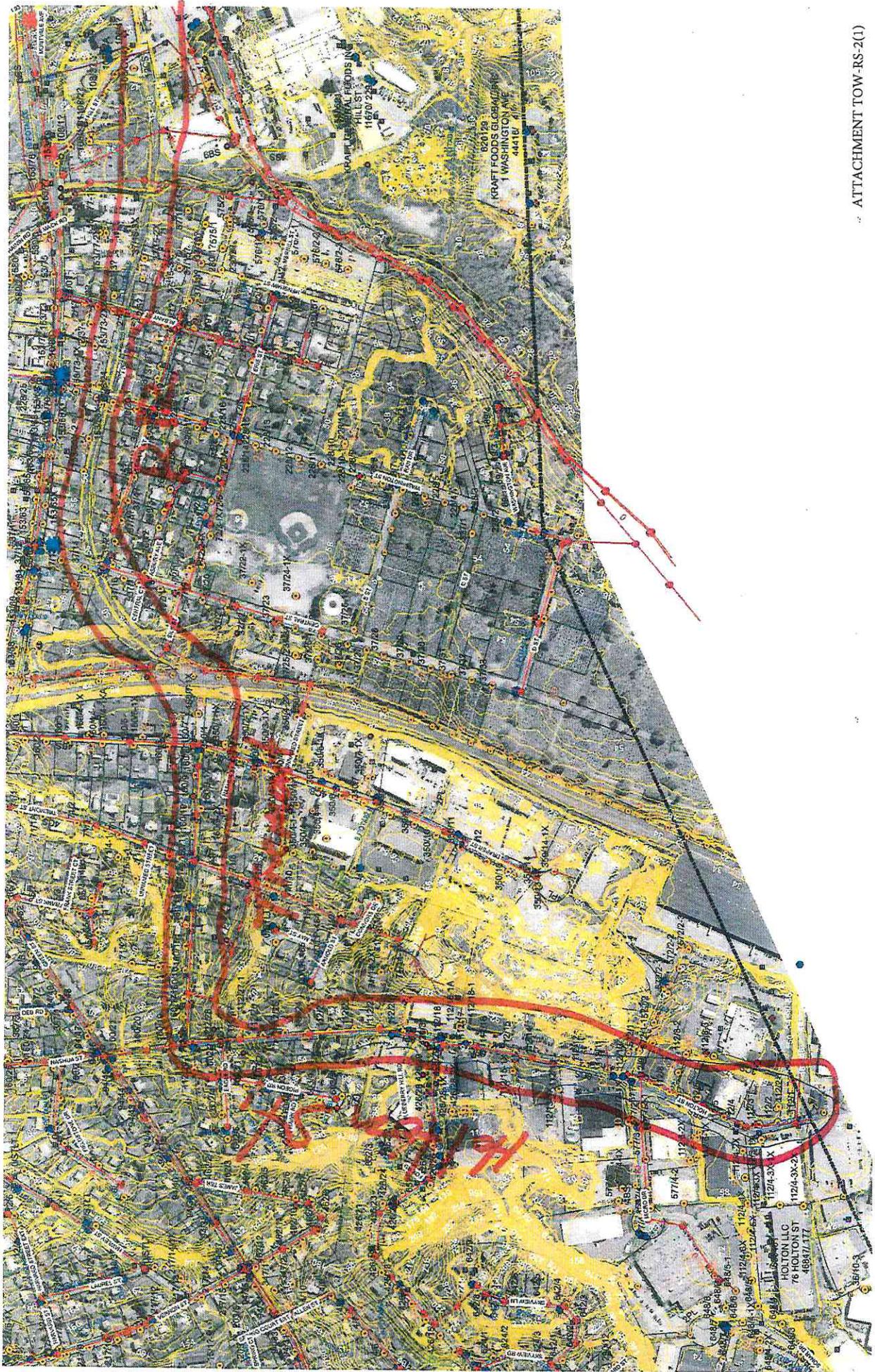
See Attachment TOW-RS-2(1)

Assuming that both Winchester and Woburn support this alternative will the Companies provide an environmental constructability analysis of this alternative?

Response

Please see the Companies' response to Information Request CUR-1-1(a), as well as Attachment CUR-1-1(a)(1), for an analysis of why the use of Holton Street is inferior to the Companies' already proposed Green Street Variation of the Preferred Route.

*EFSB-TOW-1(a)3*



Information Request CUR-1-1(a)

Alternate Routes

- a. Discuss why the Companies (or "Petitioners") did not identify, evaluate, and score a route using the preferred route beginning from Cross Street but heading north on Holton Street to connect to Green Street.

Response

The Companies considered but did not advance analysis of a route variation that included the use of Holton Street for several reasons. As detailed in Exhibit JP-1, the Companies considered a wide variety of routes to ensure that no clearly superior route was overlooked. Early in the routing analysis, a variation using Holton Street to connect Cross Street and Green Street was considered, but ultimately dismissed once the Green Street Variation of the Preferred Route was identified and analyzed. Please see Attachment CUR-1-1(a)(1) for a figure illustrating the Holton Street variation. Use of the 0.65-mile inactive railroad right-of-way ("RR ROW") in Woburn east of Main Street (Route 38) to connect to Green Street from Cross Street was considered to be superior to the use of Holton Street to connect to Green Street because the use of the inactive RR ROW would not have as much impact to traffic and adjacent residences as would Holton Street. Use of the inactive RR ROW also would simplify construction by avoiding utility relocation, preventing public street disturbance, and allowing the Companies to complete construction on this section of the route without seasonal restrictions associated with roadway use. Holton Street, particularly the northern part, exhibits dense residential development and is, in places, under 20 feet wide. Further, use of Holton Street necessitates a difficult crossing of the active railroad (Lowell Line) at Montvale Avenue. Because (a) the Holton Street option is similar in length and cost to the Green Street Variation of the Preferred Route; (b) the Green Street variation would have fewer traffic impacts, would simplify construction by avoiding utility relocation, preventing public street disturbance, and would allow the Companies to complete construction on this section of the route without seasonal restrictions; and (c) there was no obvious benefit to using Holton Street over the Green Street variation, the use of Holton Street was not advanced for further analysis by the Companies.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Requests of the EFSB to the  
Town of Winchester Set 1  
Response to EFSB-TOW-2  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request EFSB-TOW-2

Please indicate whether Exhibit 20 (Figure 1) of Peter Tirinzoni's pre-filed testimony illustrates a one-cable or two-cable high-pressure fluid-filled pipe-type cable ("HPFF-PTC") design.

Response

Figure 1 illustrates a single cable pipe and a parallel 5" fluid pipe to allow fluid circulation.

Information Requests of the EFSB to the  
Town of Winchester Set 1  
Response to EFSB-TOW-3  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request EFSB-TOW-3

Please provide Mr. Tirinzoni's estimates of the MVA capacity (normal, LTE, and STE) of his proposed 345 kV HPFF-PTC system *without* fluid circulation, in two variations: (1) installation of one cable, and (2) installation of two cables.

Response

The design proposed to meet the MVA capacity of 1040 MVA Summer LTE required as specified in EFSB-PA-4 by the Companies is *with* fluid circulation. The required 1040 MVA Summer LTE could not be achieved *without* circulation.

Summer MVA Capacity of 2-10" Cable Pipes with 3500 kcmil Copper Conductor Without Circulation		
Normal	LTE	STE
673	1392	4262

Information Requests of the EFSB to the  
Town of Winchester Set 1  
Response to EFSB-TOW-4  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request EFSB-TOW-4

Refer to Mr. Tirinzoni's testimony at 6-7. Please provide Mr. Tirinzoni's estimates of the MVA capacity (normal, LTE, and STE) of his proposed 345 kV HPFF-PTC system *with* fluid circulation, in two variations: (1) installation of one cable, and (2) installation of two cables.

Response

(1) The MVA capacity for 345kV HPFF-PTC system *with* fluid circulation for installation of **one** PT Cable system is:

Summer MVA Capacity of 1-10" Cable Pipe with 3500 kcmil Copper Conductor With Circulation		
Normal	LTE	STE
840	1041	2665

(2) **Not Applicable** for installation of **two** PT Cable system – since the above one PTC system *with* fluid circulation achieved the specified rating.

Summer MVA Capacity of 2-10" Cable Pipes with 3500 kcmil Copper Conductor With Circulation		
Normal	LTE	STE
1199	1721	4376

Information Requests of the EFSB to the  
 Town of Winchester Set 1  
 Response to EFSB-TOW-5  
 September 12, 2016  
 Person Responsible: Peter Tirinzoni

Information Request EFSB-TOW-5

Refer to Mr. Tirinzoni's testimony at 8 and Exh. TOW-C-3. Please provide a cost estimate for: (1) the installation of a one-cable HPFF-PTC system, and (2) the installation of a two-cable HPFF-PTC system. Please break down the cost estimate as follows:

Response

A two cable HPFF-PTC system was not part of the scope as a one cable HPFF-PTC system achieves the rating. However, Mr. Tirinzoni calculated an estimate for a two-cable HPFF-PTC system installation at a conceptual level utilizing the unit cost numbers from the one HPFF-PTC system.

Costs (HPFF-PTC with fluid circulation to smooth out "hot spots" that can limit circuit ratings. Note accuracy of these conceptual phase estimates is in the order of +/- 30%)	(1) Installation of one HPFF-PTC System with a 3500 kcmil copper conductor	(2) Installation of two-cable HPFF-PTC system, both with a 3500 kcmil copper conductor	(3) Installation of one HVED-XLPE Cable System with a 3500 kcmil copper conductor
	One 10" cable pipe and one 5" fluid circulation pipe	Two 10" cable pipes	One set of three cables, each in their own 8" HDPE conduit
	\$Million	\$Million	\$Million
a) Material Cost of Conduit System	4.3	5.6	4.7
b) Conduit Installation	24.5	35.9	18
c) Manhole Materials and Installation	1.1	1.1	2.8
d) Material Cost of Cable and Dielectric Fluid	15.3	29.9	16.0
e) Cable Installation (including splicing, vacuuming, fluid filling)	3.9	9.3	6.3
f) Final Pavement Restoration	7.9	15.7	10.8
g) Other Required Work	39.4	58.5	41.7
<b>h) Total Cost</b>	<b>96.4</b>	<b>156</b>	<b>100.3</b>

COMMONWEALTH OF MASSACHUSETTS  
ENERGY FACILITIES SITING BOARD  
DEPARTMENT OF PUBLIC UTILITIES

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NSTAR Electric Company	)	
d/b/a Eversource Energy and	)	EFSB 15-04/D.P.U. 15-140/15-141
New England Power Company	)	
d/b/a National Grid	)	

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TOWN OF WINCHESTER RESPONSES TO  
FIRST SET OF INFORMATION REQUESTS OF  
NSTAR ELECTRIC COMPANY D/B/A EVERSOURCE ENERGY AND NEW ENGLAND  
POWER COMPANY D/B/A NATIONAL GRID

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Kenneth P. Cram

Information Request: COM-TOW-1

Please provide a copy of all traffic data beyond the data appended to Mr. Cram's Pre-Filed Testimony that Mr. Cram has collected or reviewed for the streets in Winchester that follow any of the routes identified in the Companies' Petition.

Response:

Other than the material attached to testimony, he used information submitted by Eversource and MassDOT website.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Kenneth P. Cram

Information Request: COM-TOW-2

Please provide a copy of any traffic management plan ("TMP") or any draft materials relating to a TMP that Mr. Cram has provided to Winchester for the Companies' Project.

Response:

None.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Kenneth P. Cram

Information Request: COM-TOW-3

Please provide a copy of any TMP that Mr. Cram has produced relating to the construction of utility infrastructure (e.g., gas, electric, water, sewage, telecommunications, etc.) within municipal roadways in Winchester.

Response:

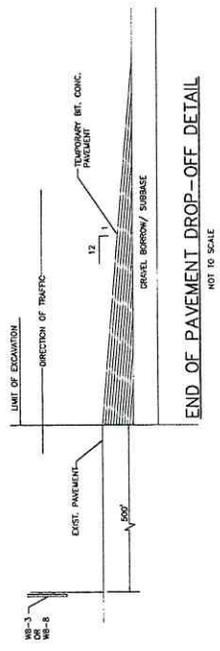
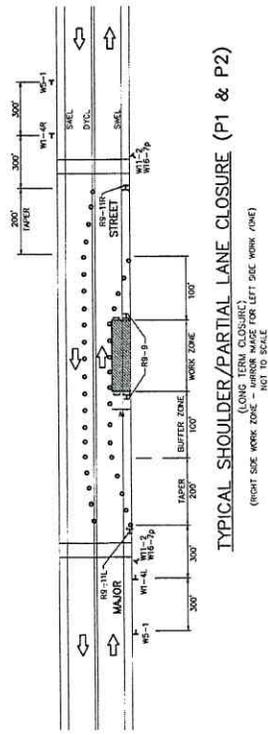
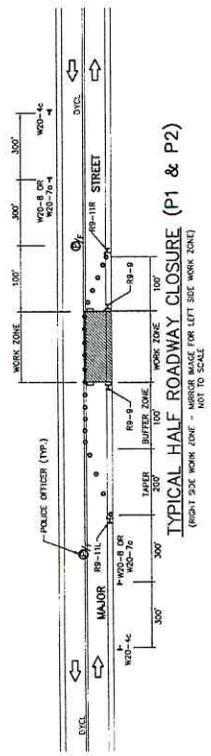
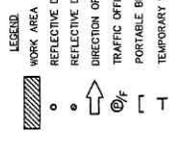
Mr. Cram has not produced a TMP for Winchester. In the past, Bayside Engineering has proceeded a TMP for sidewalk improvements on the Washington Street bridge. Bayside did not collect any traffic volume data. The data Bayside observed was from what was gathered.

See attachment COM-TOW-3(1).

**WINCHESTER**  
WASHINGTON STREET

STATE	FED. AID PROJ. NO.	FED. AID DIST. NO.	FED. AID PROJ. NO.
MASS.			
PROJECT FILE NO. 608572		TRAFFIC MANAGEMENT PLAN	
(P1 & P2)			

- TRAFFIC MANAGEMENT NOTES (P1 & P2)**
1. ALL TRAFFIC SIGNS, REFLECTORIZED DRUMS, ORBANS, AND OTHER TRAFFIC MAINTENANCE DEVICES AS REQUIRED.
  2. ALL CONSTRUCTION SIGNING AND OTHER TRAFFIC MAINTENANCE DEVICES SHALL CONFORM WITH THE 2009 MUTCD AS AMENDED.
  3. ALL TRAFFIC SIGNS, REFLECTORIZED DRUMS, ORBANS AND OTHER TRAFFIC MAINTENANCE DEVICES THAT ARE NOT REQUIRED ON THE COMPLETION OF THE WORK, EACH DAY, THIS PARTICULARLY REFLECTORIZED DRUMS, SHALL BE REMOVED OR COMPLETELY COVERED OR REMOVED AT THE END OF EACH DAY.
  4. ALL DISTANCES MAY BE ADJUSTED TO FIT FIELD CONDITIONS, AS DIRECTED BY THE ENGINEER.
  5. ACCESS TO ABUTTERS SHALL REMAIN OPEN AT ALL TIMES.
  6. NO SIGNS SHALL BE ATTACHED TO DRUMS OR CONES. ALL SIGNING SHALL BE SUPPORTED BY INDEPENDENT SUPPORTS AND MEET NCHRP 350 STANDARDS.
  7. NO SIGNS SHALL BE VISIBLE TO TRAFFIC THAT MAY CONFLICT WITH ACTUAL CONDITIONS.
  8. PAVEMENT MARKINGS NO LONGER APPLICABLE WHICH MIGHT BE OBSCURED BY THE CONSTRUCTION SHALL BE REMOVED. PAVEMENT MARKINGS SHALL BE USED AS NECESSARY AND SHALL BE IN PLACE BEFORE WORK IS COMPLETED EACH NIGHT.
  9. THE MAXIMUM SPACING BETWEEN CHANNELIZING DEVICES SHOULD BE APPROXIMATELY EQUAL TO THE SPEED LIMIT (IN MPH).
  10. PEDESTRIANS SHALL BE PROVIDED WITH A SAFE CONVENIENT TRAVEL PATH THROUGH THE CONSTRUCTION ZONE AT ALL TIMES. ALL TRAFFIC SIGNS, REFLECTORIZED DRUMS, ORBANS AND APPROPRIATE TRAFFIC MAINTENANCE DEVICES, INCLUDING SIGNAGE AND/OR A POLICE OFFICER (DURING WORK HOURS), IF AREAS OF SIDEWALKS ARE NEARLY CLOSED, SHALL BE REQUESTED FOR ALL REASONABLE PROVISIONS TO KEEP A SAFE PATHWAY OPEN FOR ALL PEDESTRIANS.
  11. LOCATION OF R5-9A SIGNS TO BE APPROVED BY THE ENGINEER WHO WILL DETERMINE THE NECESSITY FOR PROVIDING TEMPORARY CROSSWALKS.
  12. ALL SIGNS THAT ARE NOT APPROVED BY THE ENGINEER OR THE SIGNS THAT ARE TO BE REMOVED OR REPAIRED AND REPLACED WITH W8-3 OR W8-8 SIGNS (WHERE APPROPRIATE).
  13. DURING EACH PHASE, EDGES OF WORK MUST BE DELINEATED WITH REFLECTORIZED DRUMS.
  14. ONE LANE OPERATION SHALL NOT BE IN OPERATION DURING THE PHASES OF CONSTRUCTION. THE PHASES OF CONSTRUCTION OF 7:00 AM TO 3:00 AM AND 3:30 PM TO 6:00 PM.
  15. MIN. LANE WIDTH SHALL BE 11'-0", WHENEVER FEASIBLE. GREATER WIDTHS SHALL BE IMPLEMENTED.



*ATTACHMENT  
COM-TOW-3(C)*

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: James Gill

Information Request: COM-TOW-4

Please identify all projects in the past 10 years in Winchester, whether sponsored by private, municipal, or state entities, which have required the closing of all or portions of any of the public ways that comprise the Preferred Route. For each project identified, please describe the duration and physical extent to which the public ways were closed or obstructed during construction, including whether or not two-way travel was maintained. Please provide detailed figures showing these work areas.

Response:

See answer of Town Engineer, Beth Rudolph, to COM-TOW-25

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: James Gill

Information Request: COM-TOW-5

COM-TOW-5

For each project identified in the response to Information Request COMTOW-4, please:

- (a) Identify whether a TMP was prepared with the project proponent and, if so, provide a copy. If a TMP was not prepared, describe how the Town and its various agencies managed traffic and other construction impacts during construction activities;
- (b) Identify whether a Host Community Agreement was prepared with the project proponent and, if so, provide a copy;
- (c) Describe any negative impacts to the ability to maintain safe and efficient access and circulation during construction activities;
- (d) Quantify any loss of roadway capacity along critical corridors within the Town during construction activities and any compensation received by the Town for the use of its roadways for such projects;
- (e) Identify any negative impacts to access routes for Winchester Hospital or other sensitive receptors during construction activities;
- (f) Describe the number of police details and any negative impacts to the availability of police details during construction activities;
- (g) Describe any negative impacts to the ability of emergency vehicles to respond to emergencies and to access medical facilities during construction activities; and
- (h) Identify all instances where the Town requested 3 feet of clearance between the existing facilities and the proposed project.

If the Town has not identified the above metrics for prior projects, please provide any data and information that would enable the Siting Board and the Companies to assess the impacts of prior construction projects on the transportation infrastructure in the Town and how the Town handled those.

Response:

- (a) Police Department works with the Department of Public Works and contractor to implement traffic control measures as needed. No formal TMP required.
- (b) No Host Community Agreement have been prepared. As part of the Selectmen Grant of Location process, written Terms and Conditions for construction and traffic management are customary included as conditions for approval.
- (c) All roadway projects come with negative impacts to public safety and convenience which exacerbates the existing morning and evening traffic conditions along the Company's Preferred Route and adjacent streets.
- (d) Up until this project, we have not quantified construction activities along the Preferred Route. There have been no projects for which we have received compensation outside of Grant of Location process.
- (e) Winchester Hospital was required to re-route traffic from its satellite parking facility to its main campus on Highland Avenue. I expect the impact of the transmission project to be must more substantial on hospital traffic activity due to the acquisition of the hospital by Lahey Hospital and expanded campus at 620 Washington Street.
- (f) The need for Police details is determined by how extensive the construction affects the physical roadway, possible detours and the duration of construction. A major factor in determining the need for Police details is whether or not a lane can be kept open or detour set up with the goal to facilitate the safe and expeditious movement of traffic. According to the Chief of Police on September 7, 2016, there were not enough officers to fill all of the detail positions requested throughout the town for street construction activity.
- (g) I was informed by the Police and Fire Chiefs that during occasion when the streets are closed and alternate routes need to be found, response times were severely impacted. According to NFPA 1710, any increase in response time carries a substantial increased risk of property and human loss. (NFPA 17-10, Figure A.5.2.2.2.1 of Fire Chief John Nash).
- (h) For this Project, Town of Winchester has requested a minimum clearance of 3 feet to accommodate the Companies. However as an example, Town of Winchester requested that "Water Service pipe shall be laid at least ten feet from any server pipe..." in the Town's requirements for Water Services. See Attachment COM-TOW-5(2). See also e-mail from Beth Rudolph to Beverly Schultz dated July 20, 2016 discussing 2 foot versus 4 foot minimum clearance to Town utilities.

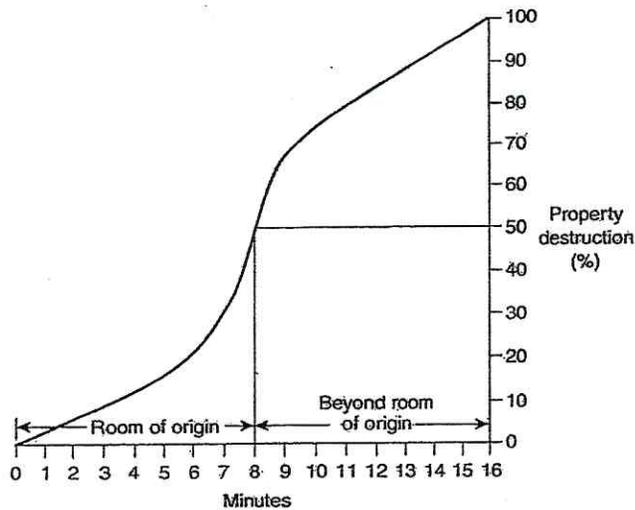


FIGURE A.5.2.2.2.1 Fire Propagation Curve.

The ability of adequate fire suppression forces to greatly influence the outcome of a structure fire is undeniable and predictable. Data generated by NFPA and used by the committee in developing this standard provide empirical data that rapid and aggressive interior attack can substantially reduce the human and property losses associated with structure fires [see Table A.5.2.2.2.1(a) and Table A.5.2.2.2.1(b)].

The NFPA Fire Analysis and Research Division provided the data in Table A.5.2.2.2.1(b) as an update of Table A.5.2.2.2.1(a).

**A.5.2.2.2.3** The assignment of specific response districts to command officers should be based on the number of companies, workload, and response distances. Department administrative procedures should indicate clearly the jurisdiction of command officers.

**A.5.2.2.2.5** For further information on staff aides, see 3.3.48 and A.3.3.48.

**A.5.2.4.1.2** NFPA 1500, 29 CFR 1910.134, and *Memorandum for Regional Administrators; Response to IDLH or Potential IDLH Atmo-*

Table A.5.2.2.2.1(a) Fire Extension in Residential Structures, 1994-1998

Extension	Rate per 1000 Fires		
	Civilian Deaths	Civilian Injuries	Average Dollar Loss per Fire
Confined to room of origin	2.32	35.19	3,185
Beyond the room, but confined to floor of origin	19.68	96.86	22,720
Beyond floor of origin	26.54	63.48	31,912

Note: Residential structures include dwellings, duplexes, manufactured homes (also called mobile homes), apartments, row houses, townhouses, hotels and motels, dormitories, and barracks.

Source: NFPA Annual Fire Experience Survey and National Fire Incident Reporting System (NFIRS).

Table A.5.2.2.2.1(b) Fire Extension in Residential Structures, 2002-2005

Extension	Rate per 1000 Fires		
	Civilian Deaths	Civilian Injuries	Average Dollar Loss per Fire
Confined fires (identified by incident type)	0.08	9.25	313
Confined to room of origin	4.99	47.00	8,948
Confined to room of origin, including confined fires by incident type*	2.15	25.18	3,958
Beyond the room, but confined to floor of origin	17.62	80.45	34,011
Beyond floor of origin	27.48	59.38	58,820

Note: Residential occupancies include homes, hotels and motels, dormitories, and residential board and care facilities. These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Property damage has not been adjusted for inflation.

\*NFIRS 5.0 has six categories of confined structure fires, including cooking fires confined to the cooking vessel, confined chimney or flue fire, confined incinerator fire, confined fuel burner or boiler fire or delayed ignition, confined commercial compactor fire, and trash or rubbish fire in a structure with no flame damage to the structure or its contents. Although causal information is not required for these incidents, it is provided in some cases. In this analysis, all confined fires were assumed to be confined to the room of origin.

Source: NFIRS 5.0 and NFPA survey.

spheres provide further information. The IRIC and the rapid intervention crew (RIC) members are equipped with the fire fighters' protective ensemble, including protective clothing and equipment as required by NFPA 1500.

**A.5.2.4.2.2** The hazards presented by this scenario are not unusual, as all communities respond to fire incidents in this type of structure on a regular basis.

**A.5.2.4.2.3** Other occupancies and structures in the community that present greater hazards should be addressed by additional fire fighter functions and additional responding personnel on the initial full alarm assignment. The NFPA *Fire Protection Handbook* categorizes occupancies in three broad groups:

- (1) High-hazard occupancies: schools, hospitals, nursing homes, explosives plants, refineries, high-rise buildings, and other high life hazard or large fire potential occupancies
- (2) Medium-hazard occupancies: apartments, offices, mercantile, and industrial occupancies not normally requiring extensive rescue or fire-fighting forces
- (3) Low-hazard occupancies: one-, two- or three-family dwellings and scattered small businesses and industrial occupancies. The NFPA 1710 benchmark occupancy fits into this low-hazard category.

WATER SERVICES

1. Service pipe shall be one inch minimum size Type K copper tubing, made in America. All fittings shall be brass as manufactured by Mueller, Red Red, or Ford only. Flared or compression fittings are acceptable.
2. Curb valve boxes shall be cast iron, slide adjustable, at least two and one-half inches in diameter, with a locking "Water" cap. Only American or Canadian made curb valve boxes are acceptable such as Pioneer, Tyler, or Q.W.P.
3. An angle meter stop such as Mueller catalog number H-14253 with control lever is required inside the foundation wall. A full port gate or ball valve must be placed on the house side of the service within a two foot distance of the water meter.
4. Pipe shall be installed at least four feet six inches deep but less than six feet deep with at least six inches of clean sharp sand underneath, to the sides, and above the pipe.
5. A three quarter inch water meter will be furnished by the town and water turned on by the town only after the installation is complete and acceptable and the new building is secure from vandalism to the meter. If water is required before the building is secure, a heavy duty protective encasement for the meter must be made before the water is turned on. Damage to the water meter is repaired at the expense of the owner.
6. Water Service pipe shall be laid at least ten feet from any sewer pipe unless the water pipe is located in a separate trench or is installed on an undisturbed earth shelf one and one half feet above the top of the sewer and to the side of the trench.
7. Trench backfilling must not take place until the Town inspects the water service pipe with its tamped sand envelope. Failure to abide by this regulation may necessitate uncovering by the owner.

Attachment  
COM-TOW-5(2)

**From:** [Beverly.Schultz@eversource.com](mailto:Beverly.Schultz@eversource.com) [<mailto:Beverly.Schultz@eversource.com>]

**Sent:** Wednesday, July 20, 2016 1:14 PM

**To:** Rudolph, Beth <[brudolph@winchester.us](mailto:brudolph@winchester.us)>

**Cc:** [elmerd@wseinc.com](mailto:elmerd@wseinc.com); GOhanesian <[gohanesian@gopowerinc.com](mailto:gohanesian@gopowerinc.com)>; Gill, James <[jgill@winchester.us](mailto:jgill@winchester.us)>; Gangi, Paul <[pgangi@winchester.us](mailto:pgangi@winchester.us)>; Howard, Richard <[rhoward@winchester.us](mailto:rhoward@winchester.us)>; Broderick, Sean <[sbroderick@winchester.us](mailto:sbroderick@winchester.us)>; [William.Zamparelli@eversource.com](mailto:William.Zamparelli@eversource.com); 'Wade Welch' <[wwelch@welchdonohoe.com](mailto:wwelch@welchdonohoe.com)>; [Kathleen.Freeman@eversource.com](mailto:Kathleen.Freeman@eversource.com); [ayo.osimboni@eversource.com](mailto:ayo.osimboni@eversource.com); Aaryn French <[afrench@bondbrothers.com](mailto:afrench@bondbrothers.com)>; Bernoe, Bill <[BernoeW@bv.com](mailto:BernoeW@bv.com)>; [mmagowan@smcsurvey.com](mailto:mmagowan@smcsurvey.com); Hudock, Bryan <[Bryan.Hudock@nationalgrid.com](mailto:Bryan.Hudock@nationalgrid.com)>; [Demetrios.Sakellaris@eversource.com](mailto:Demetrios.Sakellaris@eversource.com); Steve Damiano <[Steve.Damiano@powereng.com](mailto:Steve.Damiano@powereng.com)>; [Michael.Zylich@eversource.com](mailto:Michael.Zylich@eversource.com); [dklinch@epsilonassociates.com](mailto:dklinch@epsilonassociates.com); [katherine.mcneaney@eversource.com](mailto:katherine.mcneaney@eversource.com)

**Subject:** Re: Eversource Constructability Meeting Follow-up

Thanks Beth,

We appreciated the opportunity to meet with your team and to introduce Bond. They have the most experience in New England in constructing 345 XLPE.

1. Unfortunately, Eversource cannot place the new line under the existing town facilities due to operational issues, as discussed during the meeting.
2. We agreed to tracing the line in the project area prior to starting test pits during the meeting. It may be best for you to retain the contractor and for us to pay the bill. Lets discuss further.
3. In regard to the revised plans, SMC and B&V are updating the plans (clouding out areas where changes were made and further addressing your comments.) These will be delivered on Monday. I apologize that the full set had not been sent previously addressing all your concerns.
4. Eversource can not maintain 4' of separation from town facilities, our standard is 2' of seperation as discussed.
5. Thank you for the list of upcoming town projects. In addition, we are aware that NGRID Gas is planning some replacements, but we do not know any details or locations yet. I have copied Bryan Hudock here from NGRID. I hope to invite him and their gas projects manager to our next joint meeting. I would like to have monthly meetings with you, or a DPW representative; NGRID Gas; and Steve Damiano the W-M Project Manager to coordinate construction traffic management plans and establish work sequencing and scheduling to minimize traffic impacts and to assure the town that these projects are being well coordinated. Can we have regular brief conference calls to discuss coordination including the upcoming geotech borings and test pit work and construction, which at this point will likely start in June 2017? I am having similar meetings with some other towns, and it is working well.

We look forward to meeting with you again soon to advance the design and to schedule

COM-TOW-5(3)

connections) in the event that there is a conflict with the proposed 345kV line or associated vaults. The drawing should also include notes in the title block for the revision dates of the survey data and 345kV design.

(4) **Minimum offset from Municipal Utilities:** The Town of Winchester is requesting that the duct bank for the 345kV line, as well as the vaults associated with the project, be installed a minimum of 4-feet away from any Town-owned utilities (water/sewer/drain).

(5) **On-going & Upcoming Town Projects:** As requested, below is a summary of the Town's large on-going and upcoming projects. Please note that this list does not include paving projects.

a. Traffic calming improvements at four locations (Forest Street at Cross Street, Forest Street at Brookside Ave, Forest Street at Clematis St, & Cross Street at Holton Street) – Work will be complete by June 30, 2017.

b. Winchester HS renovation – On-going. Expected completion September 2017. Work is primarily contained to the WHS and Skillings Field property.

c. Skillings Field Culvert Project (Flood Mitigation) – On-going. Expected completion fall 2017. Work is primarily contained to the Skillings Field property.

d. Mount Vernon Street Bridge Culvert Project (flood mitigation) – Expected start late summer/fall 2016. 9 – 12 month duration. Mount Vernon Street will be open to one-way traffic only during construction (from the railroad tracks towards Washington Street).

e. Scalley Dam improvement project (flood mitigation) – Work is located in Woburn at the outlet to Horn Pond off of Lake Avenue. Expected start late summer/fall 2016.

f. Center Falls Dam fish ladder – Expected construction October – early December 2016. Work will impact parking lane and sidewalk on the Main Street bridge.

g. Four intersection reconstruction/traffic signal project (MassDOT project) – On-going. Work at four locations – Cambridge Street at Everett Ave, Cambridge Street at High/Church Streets, Cambridge Street at Pond Street, and the intersection of Church, Bacon, and Fletcher Streets.

h. Tri-Community Bikeway (MassDOT) – Project expected to be bid in late summer/fall 2016, with construction expected to begin in Spring 2017.

i. Winchester Center Station Reconstruction (MBTA) – Project currently in 30% design phase. Construction funding is programmed in the draft CIP for FY18.

j. Swanton Street culvert project (flood mitigation) – Likely Summer/fall 2017 start.

k. Culvert at railroad bridge near Muraco School (flood mitigation) – Likely Fall 2017 start.

Please feel free to contact me with any questions on the above material.

Regards, Beth

**Beth Rudolph, P.E.**

Town Engineer  
Engineering Department  
71 Mount Vernon Street  
Winchester, MA 01890  
Tel: 781-721-7120  
Fax: 781-721-7166  
Email: [brudolph@winchester.us](mailto:brudolph@winchester.us)

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This electronic message contains information from Eversource Energy or its affiliates that may be confidential, proprietary or otherwise protected from disclosure. The information is intended

Town of WINCHESTER  
DEPARTMENT of PUBLIC WORKS

15 Lake Street  
Winchester, MA 01890  
(781) 721-7100

10/15/15  
Application Date  
O'Connell

OPEN EXCAVATION ONLY

STREET EXCAVATING  
PERMIT

SIDEWALK EXCAVATING  
PERMIT

STAGING  
PERMIT

The application is subject to certain conditions, restrictions, and limitations during the term of this permit as set forth in the latest town rules and specifications, copies of which are available in the Department of Public Works.

Permission is hereby given to:

National Grid

Company Name

40 Sylvan Rd, Waltham, MA

781-907-3735

Address

Tel. No.

DIG Safe Number 2015-420-8751

Location of Excavation 40 Spruce St.

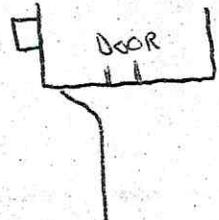
Reason for Work install new gas service

Size of Trench Opening 35' x 2'

Pedestrian and vehicular traffic must be protected at all times.

All Utility Companies must be notified seventy-two (72) hours before work commences in accordance with Chapter 82, Section 40.

ORDER of CONDITIONS Location moved met with Gary from Gas Co. on 10/26/15 min 3' from water service



The authority to do any act under this permit shall expire at six (6) p.m. on 11-15-15

Date

mark out  
PAUL

PERMIT: 2259

APPROVED BY: [Signature]

COM-TOW-5(4)

Town of WINCHESTER  
DEPARTMENT of PUBLIC WORKS

15 Lake Street  
Winchester, MA 01890  
(781) 721-7100

9/30/15  
Application Date  
OK  
PAN

OPEN EXCAVATION ONLY

STREET EXCAVATING  
PERMIT

SIDEWALK EXCAVATING  
PERMIT

STAGING  
PERMIT

The application is subject to certain conditions, restrictions, and limitations during the term of this permit as set forth in the latest town rules and specifications, copies of which are available in the Department of Public Works.

Permission is hereby given to:

National Grid

Company Name

40 Sylvan Rd, Waltham, MA

781-907-1000

Address

Tel. No.

DIG Safe Number

205400 7164

Location of Excavation

84 Woodside Rd.

Reason for Work

Install New Service

Size of Trench Opening

10'x2' roadway cut

Pedestrian and vehicular traffic must be protected at all times.

All Utility Companies must be notified seventy-two (72) hours before work commences in accordance with Chapter 82, Section 40.

ORDER of CONDITIONS

min 3' from water + sewer ser.

The authority to do any act under this permit shall expire at six (6) p.m. on

10-30-15

Date

mark  
out  
PAN

PERMIT: 2252

APPROVED  
BY:

*[Signature]*

Town of WINCHESTER  
DEPARTMENT of PUBLIC WORKS  
15 Lake Street  
Winchester, MA 01890  
(781) 721-7100

REC 5/20  
5/22/15  
on PAU

**OPEN EXCAVATION ONLY**

STREET EXCAVATING  
PERMIT



SIDEWALK EXCAVATING  
PERMIT



STAGING  
PERMIT



The application is subject to certain conditions, restrictions, and limitations during the term of this permit as set forth in the latest town rules and specifications, copies of which are available in the Department of Public Works.

Permission is hereby given to:

National Grid

Company Name

40 Sylvan Rd. Waltham ma 781-907-3733

Address Tel. No.

DIG Safe Number 2015-210-8582

Location of Excavation 10 Aristotle Dr.

Reason for Work Install new gas service

Size of Trench Opening 38' x 2'

Pedestrian and vehicular traffic must be protected at all times.

All Utility Companies must be notified seventy-two (72) hours before work commences in accordance with Chapter 82, Section 40.

ORDER of CONDITIONS min 3' from all water + sewer lines

The authority to do any act under this permit shall expire at six (6) p.m. on 6/27/15  
Date

mark out PAU

PERMIT: 2054

APPROVED BY: [Signature]

COM - PDW - 5(6)

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester  
September 12, 2016  
Person Responsible: DONALD L. HAES, Jr.

**RESPONSE TO:**

COM-TOW-6 Please state whether Dr. Haes has previously prepared an analysis or report of projected 60-Hz EMF levels from 345-kV transmission lines. If so, please provide a copy of any such analysis or report.

**RESPONSE:**

Dr. Haes has not previously prepared an analysis or report of projected 60-Hz EMF levels from 345-kV transmission lines. However, Dr. Haes did prepare analysis and a report for the Mystic-Chelsea 60-Hz 115kV transmission line earlier this year.

**RESPONSE TO:**

COM-TOW-7 Refer generally to the Pre-Filed Testimony of Dr. DONALD L. HAES, Jr.. Please clarify whether the discussion of the Gradient Report is intended to reference the initial Gradient Report filed with the Petition (Appendix 6-6 of Exh. JP-1), the updated Gradient Report filed on May 13, 2016 (Exh. Attachment EFSB-MF-9(S)(1)), or both.

**RESPONSE:**

The references to “the Gradient Report” refer to both the initial Gradient Report filed with the Petition (Appendix 6-6 of Exh. JP-1) in which, “at peak loading, the maximum magnetic field values generated by the proposed underground line in an inverted-delta configuration will be 34 mG, and this will fall to 3.6 mG at a horizontal distance of  $\pm 20$  feet away from the centerline of the conductors” AND the Gradient Report filed on May 13, 2016 (Exh. Attachment EFSB-MF-9(S)(1)), where “under extreme conditions ...” (i.e., the true maximum) “the fields would be below 50 mG ...” at 15 feet from the centerline.

In the initial Gradient Report filed with the Petition (Appendix 6-6 of Exh. JP-1), Table 3.1 lists the *Electric Currents for the Proposed Project, Estimated for Post-Project Year 2018* as 64.4 Amps (Average Annual Load) and 206 Amps as Peak Load Current. In response to TOS-MF-1, (a) and (b), Eversource admits that the maximum design load capacity is 1040 MVA or 1740 A. Therefore, the peak magnetic field would be based upon the capacity of the line at current load of 1740 A.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester  
September 12, 2016  
Person Responsible: DONALD L. HAES, Jr.

RESPONSE TO:

Additional Person Responsible: Richard Howard

COM-TOW-8 Refer to page 4 of Dr. Haes' testimony. Dr. Haes states that he was retained by Winchester and Stoneham "in response to their concerns that the proposed ... lines ... could affect the health and safety of Winchester and Stoneham's residents and visitors." Please identify any electric and magnetic field ("EMF") epidemiology studies reviewed or performed by Dr. Haes that have identified adverse health effects during "peak loading times" that he expects will occur from the Project as currently designed by the Companies.

**RESPONSE:**

Dr. Haes was retained by the towns of Winchester and Stoneham based upon information received during a public "town meeting". In that town meeting, not attended by Dr. Haes, many town residents expressed their "concerns that the proposed ... lines ... could affect the health and safety of Winchester and Stoneham's residents".

**RESPONSE TO:**

COM-TOW-9 Please provide a copy of any study, analysis or report reviewed or performed by Dr. Haes that identifies the location and type of unshielded electric equipment located along the Preferred or Noticed Alternative Routes that Dr. Haes expects to be negatively affected by EMF interference at levels as low as 2 milligauss (“mG”). With respect to such equipment, please identify:

- (a) A full and complete description of each piece of equipment;
- (b) The address of where that equipment exists;
- (c) The distance from such equipment to the nearest edge of the Town’s roadways;
- (d) The background levels of mG at all such locations;
- (e) The increment in mG that Dr. Haes has calculated that would be associated with the Project;
- (f) Manufacturer specifications for such equipment that describe the mG levels above which such equipment may be negatively affected; and
- (g) How, if at all, these pieces of equipment are currently protected from interference associated with magnetic fields generated by common office and household appliances.

**RESPONSE:**

It was beyond the scope of Dr. Haes’ assignment to perform a review sensitive receptors located along the Preferred or Noticed Alternative Routes in Winchester or Stoneham, MA. However, his personal experience in investigations involving electro-magnetic interference (EMI) has shown that the following facilities are most sensitive to effects from time-varying electric and magnetic fields:

- High-tech semiconductor (e.g., electron microscopes [TEM/SEM], electron-beam lithography, ion-writing systems, focused ion-beam systems).
- High-tech biology (e.g., nuclear magnetic resonance [NMR], magnetic resonance imaging [MRI], electron microscopes).
- Medical Imaging (e.g., computed tomography [CT] scanners, MRI systems), ECG (electrocardiogram).
- University/research (instrumentation for chemistry, physics, electrical)
- Office: Computer monitors employing a cathode-ray tube (CRT) The effects of 60 Hz electric field interference appeared as an injection of spurious data when a spark train occurred on a power supply circuit and the potential of the computer operator's body was raised above 15 volts with respect to the keyboard. The effect of 60 Hz magnetic field interference was noticed as oscillating distortions of the images on the monitor. Published in: Power Delivery, IEEE Transactions on (Volume:2, Issue: 2); Page(s):558 - 563 ISSN :0885-8977; DOI:10.1109/TPWRD. Date of Publication: April 1987.

**RESPONSE TO:**

COM-TOW-10 In terms of estimating the “existing electromagnetic field strengths,” i.e., power-frequency MF exposure of Stoneham and Winchester residents in their present-day environment, please explain why Dr. Haes considered “middle of the street” measurements relevant to daily, general public MF exposure in Stoneham and Winchester. Please identify EMF health research articles that designate “within the roadway” magnetic fields, as Dr. Haes quantified in Winchester and Stoneham, as being relevant to evaluating potential biological effects of power-frequency MF.

**RESPONSE:**

The measurements were made by Dr. Haes at 10 predetermined locations along the proposed route, perpendicular to the route, at a distance of 1 meter above the ground for comparison with the calculated magnetic field results provided in Gradient’s reports. In Dr. Haes’ testimony, he points out that in his review of the Gradient reports, Gradient assumes the installation of the transmission line is in the middle of the road for its calculations. It is also assumed that the distance to the edge of roadway from the transmission line is 20 feet. In also reviewing the Woburn to Wakefield plans, in some locations the line is proposed to be installed within sidewalks to the middle of the road. This installation location varies from about 20 feet from the middle of the road to about 3 feet, to the edge of road. The magnetic field at edge of roadway will vary depending on the location of the transmission line within the roadway.

**RESPONSE TO:**

COM-TOW-11 Refer to page 3 of 22 in Dr. Haes' Winchester Appendix to his Pre-Filed Testimony and page 4 of 11 in Dr. Haes' Stoneham Appendix. Please state what Dr. Haes believes to be the guidance value established by ICNIRP for allowable general-public exposures to power-frequency magnetic fields.

**RESPONSE:**

The **most recent** guidance values established by ICNIRP for allowable general-public exposures to power-frequency magnetic fields can be found in the *International Commission for Non-Ionizing Radiation Protection (ICNIRP); 2010; "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (1 Hz to 100 kHz)." Health Physics 99(6):836.818*. The value is 2000 mG. However, on page 818, there is a caveat concerning the applicability of the "guidance values" with protection of ALL members of the public. Specifically,

*Compliance with the present guidelines may not necessarily preclude interference with, or effects on, medical devices such as metallic prostheses, cardiac pacemakers and implanted defibrillators and cochlear implants. Interference with pacemakers may occur at levels below the recommended reference levels.*

According to Medtronic (Medtronic USA, Inc. *Cardiac Rhythm Disease Management Patient Services – MVS14 8200*; Coral Sea St. NE, Mounds View, MN 55112 ([www.medtronic.com](http://www.medtronic.com))), their "pacemakers/defibrillators are designed to operate normally in modulated magnetic fields: 1 gauss (or <0.1 millitesla or <80 amps per meter) for frequencies up to 10 kilohertz (kHz)". Since 1 gauss (1,000 mG) is ABOVE the value listed, Dr. Haes does not consider it applicable to ALL residents of Stoneham and Winchester. However, the guidance values listed in the superseded version of ICNIRP (*The ICNIRP Guidelines For Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (Up to 300 GHz); Published in: Health Physics 74 (4):494-522; 1998*; "This publication replaces the low-frequency part of the 1998 guidelines (ICNIRP 1998)"), admittedly with the same caveat, at 833 mG, IS BELOW the (Medtronic USA, Inc. value of 1000 mG. Dr. Haes considers 833 mG the "guidance value" with protection of ALL members of the public

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester  
September 12, 2016  
Person Responsible: DONALD L. HAES, Jr.

**RESPONSE TO:**

COM-TOW-12 Refer to page 4 of 22 in Dr. Haes' Winchester Appendix to his Pre-Filed Testimony and page 5 of 11 in Dr. Haes' Stoneham Appendix, describing Dr. Haes' "Measurement Protocol." Dr. Haes states that magnetic field measurements were obtained at each location "by continuously scanning an area approximately 1 meter by 1 meter at a height of 1 meter above ground level." Please identify the IEEE protocol for power-frequency MF where this "scanning an area" procedure is specified.

**RESPONSE:**

Dr. Haes performed measurements based on personal experience in addition to using established protocols. There was no single protocol that was specifically followed.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester  
September 12, 2016  
Person Responsible: DONALD L. HAES, Jr.

**RESPONSE TO:**

COM-TOW-13 Please refer to the Figures contained in Dr. Haes' Winchester Appendix and Stoneham Appendix (e.g., pages 5-14 of the Winchester Appendix and pages 6-8 of the Stoneham Appendix). Dr. Haes' graphs have "suppressed" zero vertical (y-) axes. Is this a standard manner to display such data? Please explain why the data were presented that way in the graphs.

**RESPONSE:**

Dr. Haes is not aware of any standards for presenting data. The data is simply an X-Y plot demonstrating variability of strength of magnetic field over distance.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester  
September 12, 2016  
Person Responsible: DONALD L. HAES, Jr.

**RESPONSE TO:**

COM-TOW-14 Please refer to Exhibit B, page 4 of 22 and Exhibit C, page 5 of 11, of Dr. Haes' testimony, please explain whether Dr. Haes conducted his measurements based upon IEEE Standard 644, entitled "Standard Procedures for Measuring Power Frequency Electric and Magnetic Fields from AC Power Lines." To the extent Dr. Haes used or relied upon that standard, please provide a copy of IEEE Standard 644. If that standard was not used or relied upon by Dr. Haes, please explain why it was not.

**RESPONSE:**

Dr. Haes performed measurements based on personal experiences in addition to using established protocols such as The NIOSH (National Institute for Occupational Safety and Health) *Manual for Measuring Occupational Electric and Magnetic Field Exposure*, as referenced.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141  
Information Request Town of Winchester  
September 12, 2016  
Person Responsible: DONALD L. HAES, Jr.

**RESPONSE TO:**

COM-TOW-15 Please provide a copy of the publication referenced by Dr. Haes in his curriculum vitae,  
“ELF Magnetic Field Measurements: Units of Bedlam,” Health Physics, 63(5), 591, 1992.

**RESPONSE:**

Dr. Haes does not have any copies of the letter to the editor, or an electronic version, due to the age of the article.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-16

Provide copies of any studies, reports or analyses that Ms. Ohanesian (or other individuals on behalf of the Town) has performed of overloads and other reliability issues that are associated with the use of a (a) HPFF-PTC cable system; and (b) HVED-XLPE system for the Project. Provide the results of such studies, indicate where the overloads would occur, the size of the overloads and under what conditions overloads would occur. Please provide all calculations, workpapers, assumptions, inputs and data from such studies and analyses.

Response

No analyses were performed by Ms. Ohanesian of overloads and other reliability issues that are associated with the use of a (a) HPFF-PTC cable system; and (b) HVED-XLPE system for the Project.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a  
Eversource Energy and New England Power  
Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-17 Refer to the Segment Route Comparison attached to the testimony of Gaye Ohanesian. Please identify the starting and ending locations for: (a) the “Preferred Route Segment”; and (b) the “Noticed Green Street Variation.”

Response

The starting and ending locations of (a) the “Preferred Route Segment”; and (b) the “Noticed Green Street Variation” are the same. One location is the intersection of Cross St and the railroad right-of-way near Main St, Woburn and the other is the intersection of Montvale Ave and Washington St, Woburn.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a  
Eversource Energy and New England Power  
Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-18

Refer to page 2 of Ms. Ohanesian's "Segment Route Comparison" document appended to her Pre-Filed Testimony. Please define the "Woburn Segment" of the Green Street Variation and provide calculations showing the derivation of "raw data" for that segment.

Response

The Woburn Segment is the same as the Green Street Variation. See COM-TOW-18 Attachments (1) through (9).

Preferred Route with Green Street Variation

Road Segment	Length (ft)	ADTs <sup>1</sup>	Avg Width	Percent of Route	Avg Lanes	Number of Intersections	Sidewalks, Breakdown Lanes, Roadside Parking	One Way	Public Transportation	Commuter Route	Ranking
Woburn RR ROW	3379.20	0	40.00	0.08	N/A	0.00	N/A	N	N	N	1
Green Street	6019.20	est 10000	26.40	0.15	2.00	1.00	Y/Y/N	N	Y	Y	2
Montvale Ave Woburn/Stoneham	6864.00	16000 to 37000	36.50	0.17	2.30	1.00	Y/Y/N	N	Y	Y	3
Main St Stoneham	1742.40	22000 to 25000	48.70	0.04	2.00	1.00	Y/Y/Y	N	Y	Y	3
Elm St Stoneham	4804.80	~18000	30.60	0.12	2.00	1.00	Y/N/N	N	Y	Y	3
Albion St Wakefield	1108.80	18000	32.30	0.03	2.00	0.00	Y/N/N	N	Y	Y	3
Broadway Wakefield	3484.80	11500	30.10	0.09	2.00	1.00	Y/N/N	N	Y	Y	2
RR ROW (Wakefield)	5438.40	0	40.00	0.14	N/A	1.00	N/A	N	N	N	1
Salem St Wakefield	6019.20	5000 to 16500	31.30	0.15	2.00	2.00	Y/N/N	N	Y	Y	2
Montrose Wakefield (from N)	1848.00	4300	28.60	0.05	2.00	1.00	Y/N/N	N	Y	Y	2
			34.45			9.00					

2 (avg)

<sup>1</sup> ADTs predominantly from Google Earth Pro- used as backup/confirmation, not as primary indicator of potential for traffic congestion

Length of Ranked Segments for PR w/ Green St	1	2	3
Length	8817.60	17371.20	14520.00
Percent of Route	0.22	0.43	0.36
Percent * Rank	0.22	0.85	1.07
			2.14 RAW SCORE

Attachment  
 COM-TOW-18 (1)

Preferred Route with New Salem Street Variation

Road Segment	Length (ft)	ADTs <sup>1</sup>	Avg Width	Percent of Route	Avg Lanes	Number of Intersections	Sidewalks, Breakdown Lanes, Roadside Parking	One Way	Public Transportation	Commuter Route	Ranking
Cross Street Winchester	5755.20	10000	? (32.00)*	0.14	2.00	1.00	Y/N/N	N	N	Y	2
Washington St Winch/Woburn	5438.40	16000 to 1	30.80	0.13	2.00	1.00	Y/Y/N	N	Y	Y	3
Montvale Ave Woburn/Stonham	6336.00	16000 to 3	36.50	0.15	2.30	1.00	Y/Y/N	N	Y	Y	3
Main St Stoneham	1742.40	22000 to 2	48.70	0.04	2.00	1.00	Y/Y/Y	N	Y	Y	3
Broadway Wakefield	3484.80	11500	30.10	0.22	2.00	1.00	Y/N/N	N	Y	Y	2
RR ROW (Wakefield)	2807.00	0	40.00	0.18	N/A	1.00	N/A	N	N	N	1
New Salem St	3769.00	6040	28.10	0.24	2.00	1.00	N/N/Y	N	N	N	2
Salem St Wakefield	3744.00	5000 to 16	31.30	0.24	2.00	2.00	Y/N/N	N	Y	Y	2
Montrose Wakefield (from N)	1848.00	4300	28.60	0.12	2.00	1.00	Y/N/N	N	Y	Y	2
Elm St Stoneham	4804.80	~18000	30.60	0.11	2.00	1.00	Y/N/N	N	Y	Y	3

} 2.5 (avg)

<sup>1</sup> ADT's predominantly from Google Earth Pro - used as backup/confirmation, not as primary indicator of potential for traffic congestion

Length of Ranked Segments for PR	1	2	3
Length	2807.00	18601.00	18321.60
Percent of Route	0.07	0.47	0.46
Percent * Rank	0.07	0.94	1.38

2.39 raw score

\* See Google Earth Measurements - Screen Shots see Attachments COM-Tow-18(6) through(9) showing measurements less than 30 feet.  
 Also note Washington St, Woburn is >30 feet  
 Washington St, Winchester is ≤30 feet

Attachment  
 COM-Tow-18(2)

Green St Segment = B - A = TOTAL

TOW-RS-15(1) - Woburn Raw Data

SCORING CRITERIA	A					B	
	Northern Route	Northern Route with Highway Variation	Central Route	Central Route with Green Street Variation	Central Route with New Salem Street Variation	Southern Route	
Residential structures	173	150	23	130	23	5	
Residential units	352	283	29	174	29	8	
Commercial and Industrial Structures	52	55	19	44	19	1	
Sensitive Receptors	3	4	2	2	2	N/A	
Street Width (# ~1,000 ft segments under 30 feet wide)	12	11	0	7	0	N/A	
Public Transit	3	3	2	3	2	N/A	
Historic Resources	5	2	0	2	0	N/A	
Traffic Volume	See TOS-RS-34(1)	See TOS-RS-34(1)	See TOS-RS-34(1)	See EFSB-T-22(1)	See EFSB-T-22(1)	See TOS-RS-34(1)	
Public Shade Trees	43	37	4	7	4	N/A	
ACEC	0	0	0	0	0	N/A	
ORW	5665	5665	0	5665	0	N/A	
TOTAL ACEC/ORW	5665	5665	0	5665	0	N/A	
Potential Subsurface Contamination	6	7	1	5	1	N/A	
Length (miles)	3.881	3.950	1.430	3.144	1.430	0.583	
Existing Utility Density (# ~1,000 ft segments with high utility density)	10	11	2	8	2	0	
Route Bends	9	8	4	6	3	3	
High Impact Crossings	1	1	0	1	0	N/A	
Trenchless Crossings	4	2	1	2	1	0	
Wetlands linear feet buffer zone	3061	1472	401	1217	401	N/A	

Length RR Row 3400 FT  
 Green St. 5820  
 Mountvale 2220  
11440 FT

Green St → 5 - 1000 ft segments within 5840 ft  
 Therefore 5

Attachment COM-Tow-18 (3)

Winchester (Cross Washington) = A + Washington (Woburn) = Total  
 (hand count)

TOW-RS-15(1) - Winchester Raw Data

SCORING CRITERIA	Northern Route	Northern Route with Highway Variation	Central Route	Central Route with Green Street Variation	Central Route with New Salem Street Variation	Southern Route
Residential structures	5	5	19	5	122	179
Residential units	3	3	143	5	143	200
Commercial and Industrial Structures	0	0	2	0	9	7
Sensitive Receptors	N/A	N/A	3	N/A	5	2
Street Width (# ~1,000 ft segments under 30 feet wide)	N/A	N/A	0	N/A	3	3
Public Transit	N/A	N/A	0	N/A	0	0
Historic Resources	N/A	N/A	0	N/A	11	31
Traffic Volume	See TOS-RS-34(1)	See TOS-RS-34(1)	0	See EFSB-T-22(1)	See EFSB-T-22(1)	See TOS-RS-34(1)
Public Shade Trees	N/A	N/A	1	N/A	49	69
ACEC	N/A	N/A	0	N/A	0	0
ORW	N/A	N/A	0	N/A	0	0
TOTAL ACEC/ORW	N/A	N/A	0	N/A	0	0
Potential Subsurface Contamination	N/A	N/A	0	N/A	0	0
Length (miles)	0.002	0.002	2340	0.002	1.602	2.118
Existing Utility Density (# ~1,000 ft segments with high utility density)	0	0	0	0	7	9
Route Bends	0	0	0	0	2	3
High Impact Crossings	N/A	N/A	0	N/A	0	0
Trenchless Crossings	0	0	0	0	2	2
Wetlands linear feet buffer zone	N/A	N/A	2026	N/A	2026	1449

Note: "N/A" indicates that a route is not routed through a town. Limited scoring (residences) is included due to locations close to the town boundary counted for route predominantly in other towns.

Washington St Woburn  
 12 + 7 residential structures  
 2 businesses  
 3 sensitive receptors (cemetery, field, MA Construction School)  
 1 public shade tree

Length Cross/Washington 8460 FT  
 Washington (Woburn) 2340  
 10800 FT

Cross/Washington → 8-1000ft segments within 8460ft Therefore 8

Attachment COM - TOW-18 (4)

TABLE 1

COMPARISON	Residential Land Use	Commercial or Industrial Land Use	Sensitive Receptors	Public Transit Facilities	Historic Resources	Potential for Traffic Congestion	High Impact Crossings	Public Shade Trees	Wetlands	ACCES or ORWS	Potential for Subsurface Contamination	Street Width <30ft	Utility Density	Angles > 30 deg	Trenchless Crossings	TOTAL SCORE
Weight	3	3	2	1	1	3	3	1	1	2	1	1	2	1	1	13.88
Winchester Ratio Score	1.00	0.44	1.00	0.00	1.00	2.50	0.00	1.00	1.00	0.00	1.00	0.94	1.00	1.00	1.00	13.88
Weighted Score	3.00	1.32	2.00	0.00	1.00	7.50	0.00	1.00	1.00	0.00	1.00	0.94	2.00	2.00	1.00	24.76
Green St V Ratio Score	0.76	1.00	0.00	0.00	0.18	1.50	1.00	0.06	0.60	1.00	0.00	1.00	0.63	0.86	0.50	9.08
Weighted Score	2.28	3.00	0.00	0.00	0.18	4.50	3.00	0.06	0.60	2.00	0.00	1.00	1.25	1.71	0.50	20.08
RAW DATA TOW-RS-15(1)																
Winchester	141	11	8	0	11	RR ROW Rank 2 and Wash. Rank 3	0	50	2026	0	0	10800	7	4	2	
<i>Sec Attachment COM-TOW-18(4)</i>																
Green St Variation	107	25	0	1	2	Green St Rank 1 Green St Rank 2 Montvale	1	3	1217	5665	4	11440	6	2	1	
<i>Sec Attachment COM-TOW-18(3)</i>																
ADJUSTMENTS see Notes																
Winchester	141	11	13	0	11	RR ROW Rank 1 Green St Rank 2	0	50	2026	0	1	10800	7	4	2	
Green St Variation	107	25	3	0	2	Montvale	1	3	1217	5665	0	11440	6	2	0	
Notes																
*G See Attachment's COM-TOW-18(3), (4) Green St segment is 5-1000 ft - Crosswalk St is 8-1000 ft segments < 30 ft																
A Residential structures were used for comparison rather than residential units because data for the Woburn portion of Washington St was not available or could not be counted using Google Earth																
B. There are no Public Transit Facilities within these segments, both Google and checked with the Town. The one facility referred to appears to be on Main St, Woburn near the corner of Green St.																
B. This route segment intersects Green St to the east of Main Street, not at Main St. #B1 - No Public Transit facilities on abandoned RR ROW																
B. Furthermore it appears some of the counts may be higher for Green Street because the counts were done on Main St which parallels the RR ROW.																
C. Rankings from TOW-RS-15(1) for traffic congestion were averaged for the portions of the segments. *C1 See Attachment's COM-TOW-18(1), (2), (3), (4)																
C. Even though the widths shown on EFSB-T-22(1) are incorrect for Cross St and Washington St Winchester.																
C. The congestion ranking is still better for Green St Route with the RR ROW being number 1 and Green St roadway being number 2																
C. Using desktop measurement of Google Earth, similar to methods noted in the Petition, Cross St per 1000 feet is less than 30 feet wide. Washington St Winchester is also less than 30 feet wide.																
D. MA DEP site was accessed. There are 4 closed sites in Woburn and 1 open site in Winchester. The 4 closed sites were counted as 0. The 1 open site is counted as 1. *D1																
E. A review of the sensitive receptors in the sources of data gathered found 3 in Woburn and 13 in Winchester along these two segments. *E1																
F. Utility Density was estimated at 0 because the area is very sparsely populated given the cemeteries, field and only 19 residential structures.																

\*E1 Winchester Sensitive Receptors - See Figure 1 TOWN OF WINCHESTER 345KV ROUTE  
Woburn - Blessed of the Lord, Sharnock Elementary School, Green St Playground - See Figure 5-9 for Church, school town JP1  
\* D1 See JP1 Figure 5-9 for 4 closed sites. See Figure 1 TOW 345KV ROUTE for Winchester MA DEP Open Site  
\* H There are no trenchless crossings on Green St segment see JP1 Figure 5-10 COM-TOW-18(5)

chester, MA  
yville, NY

Search

Get Directions History

Polygon | Circle | 3D path | 3D  
Distance between two points on the ground

Map Length: 29.84 Feet  
Ground Length: 29.84  
Heading: 17.07 degrees

Measurement: Save Clear

Winchester, MA

Winchester, MA 01890

My Places

Earth Gallery

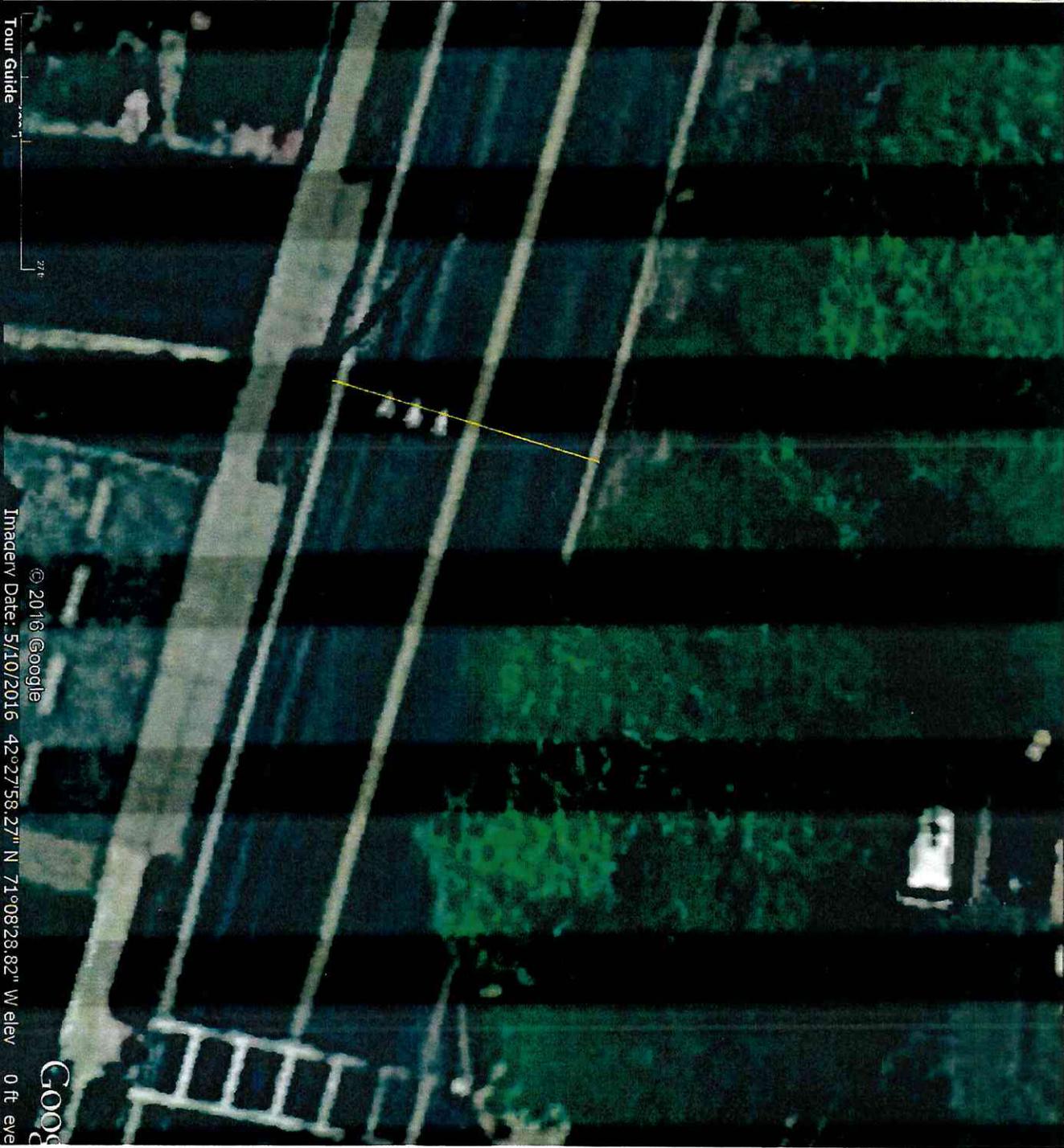
Database

and Labels

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COM-TOW-18 (6)  
Screenshot 1 near George Rd



Tour Guide

© 2016 Google

Imagery Date: 5/10/2016 42°27'58.27" N 71°08'28.82" W elev 0 ft eye

Ask me anything

MA Search

Get Directions History

Polygon | Circle | 3D path | 3D  
Distance between two points on the ground

Length: 29,68 Feet  
Length: 29,68  
Heading: 148,11 degrees

ion Save Clear

Network Link  
Winchester, MA

Winchester, MA 01890

Earth Gallery

1 Labels

js

iveness

Ask me anything

Tour Guide

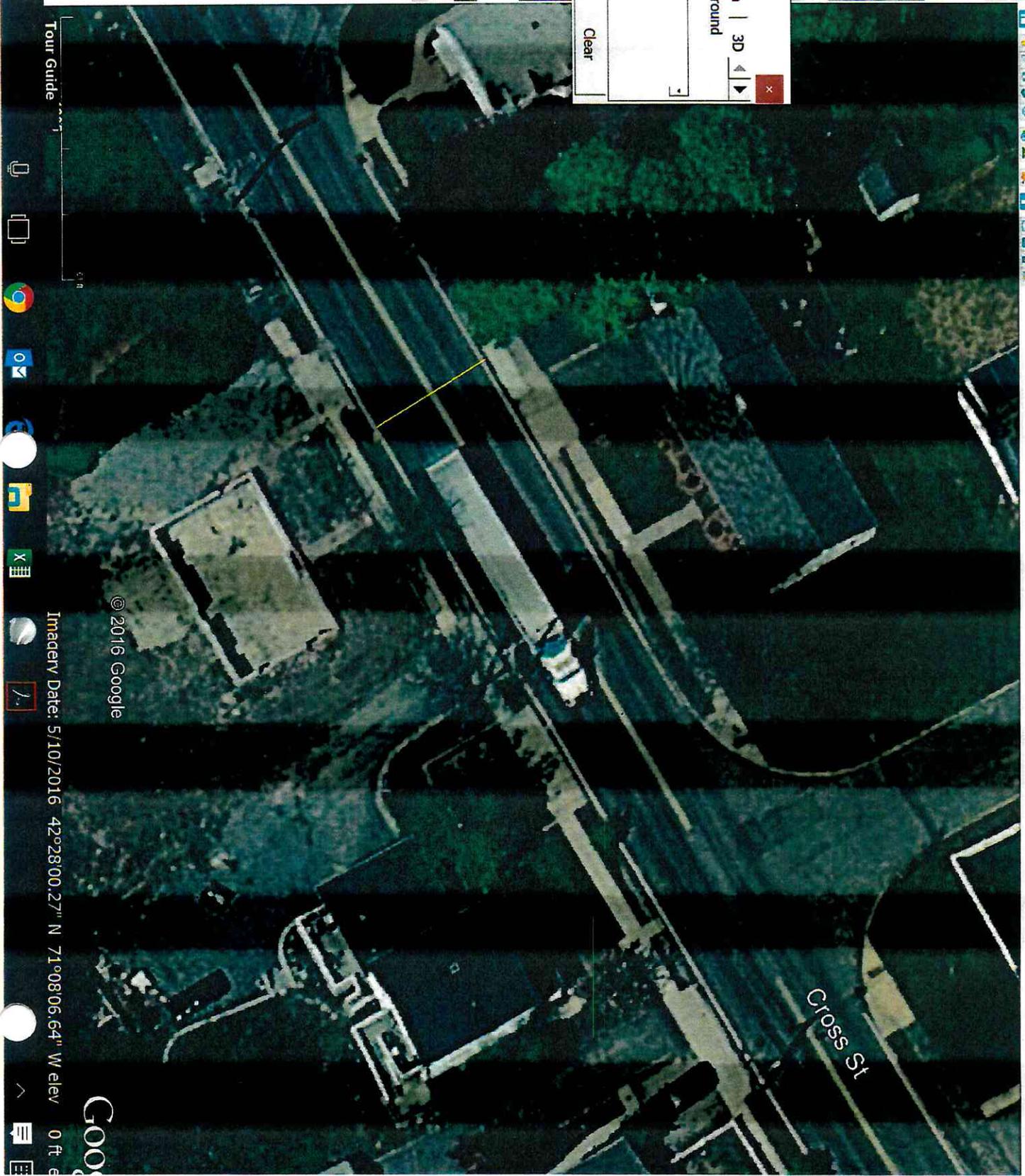
© 2016 Google

Imagery Date: 5/10/2016 42°28'00.27" N 71°08'06.64" W elev 0 ft

GOO

COM-TOW-18(7)  
Screen shot 2 near Adams Rd

Cross St



1 Pro  
Tools Add Help

Winchester, MA  
Winchester, MA

Search  
Get Directions History

Polygon | Circle | 3D path | 3D  
Distance between two points on the ground

Map Length: 23.09 Feet  
Ground Length: 23.09  
Heading: 202.94 degrees

Measurement: Save Clear

Winchester, MA

Winchester, MA 01890

My Places

Earth Gallery

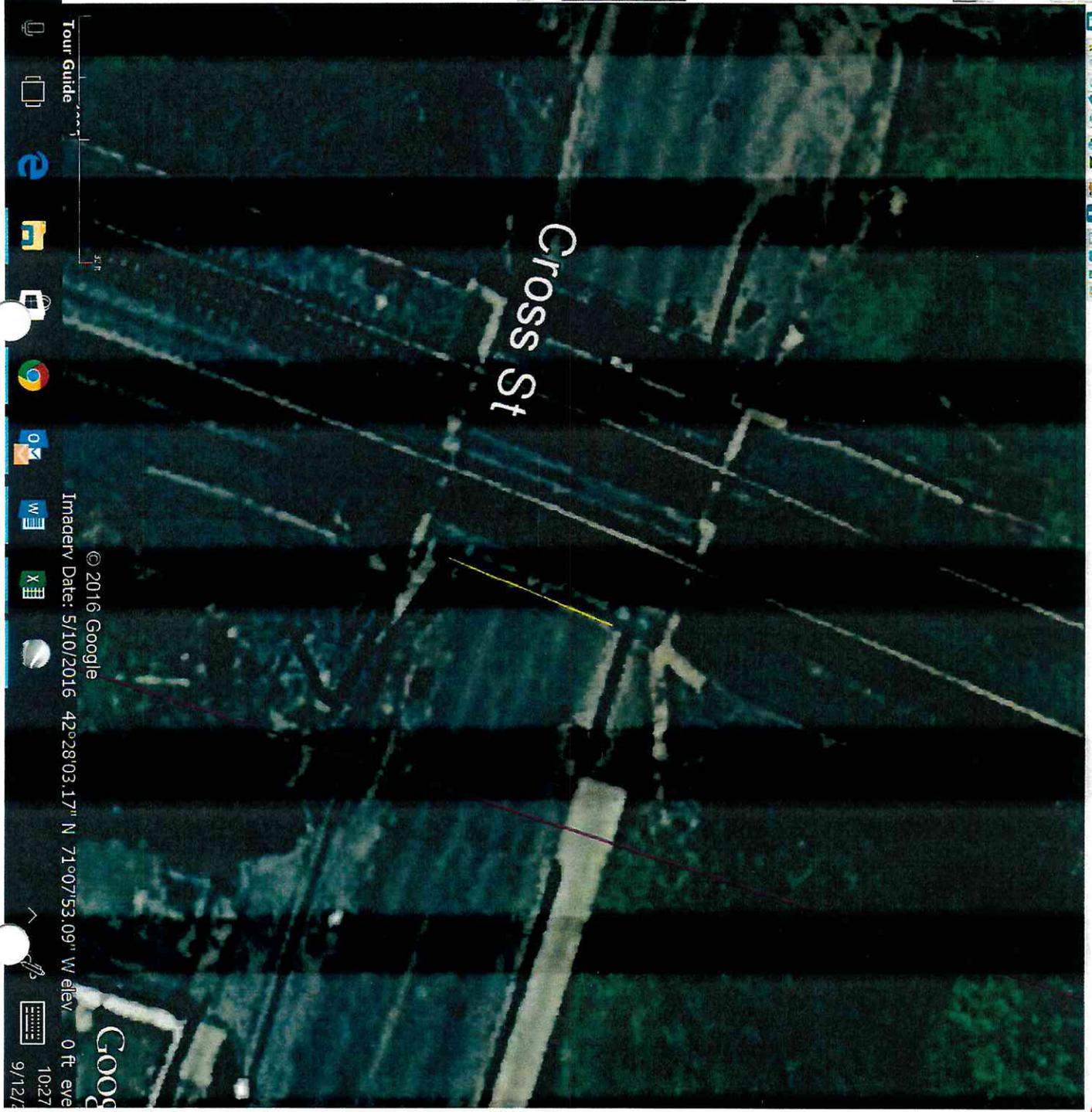
Database

and Labels

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Ask me anything



COM-Tow-18(8)  
Screenshot 3 near RL Bridge

Tour Guide  
© 2016 Google  
Imagery Date: 5/10/2016 42°28'03.17" N 71°07'53.09" W elev 0 ft  
10:27  
9/12/16

Pro  
Tools Add Help

Winchester, MA  
Winchester, NY

Search  
Get Directions History

Polygon | Circle | 3D path | 3D  
Distance between two points on the ground

Map Length: 29,93 Feet  
Circle Length: 29,93  
Heading: 205,41 degrees

Winchester, MA  
Winchester, MA

Winchester, MA 01890

Earth Gallery

and Labels

ings

wareness

Tour Guide

© 2016 Google  
Imagery Date: 5/10/2016 42°27'56.21" N 71°07'38.56" W elev 0 ft eye

Low-Tow-18(9)  
Screenshot 4 near Wash's

Ask me anything

Windows taskbar with icons for Internet Explorer, File Explorer, Google Chrome, Outlook, Word, Excel, and system tray showing time 10:36 and date 9/12/2016.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a  
Eversource Energy and New England Power  
Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-19

Refer to page 3 of Ms. Ohanesian's "Segment Route Comparison" document appended to her Pre-Filed Testimony. Describe the method used for identifying sensitive receptors and including them in the scoring count. In addition, please provide the offset distance used from the route under consideration.

Response

See COM-TOW-18 Attachments (1) through (9). The scoring counts are shown as well as specific receptors. Receptors were of parcels abutting the route.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a  
Eversource Energy and New England Power  
Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-20

Refer to Table 1 of Ms. Ohanesian's "Segment Route Comparison" document appended to her Pre-Filed Testimony. Provide a legible copy of Table 1.

Response

On August 31, 2016 as part of Exhibit 18, the Town of Winchester resubmitted a legible document entitled, "Segment Route Comparison" that contains the table. Further, COM-TOW-18(5) is the same with comments responding to the previous two information requests.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a  
Eversource Energy and New England Power  
Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-21

Has Ms. Ohanesian, or any Town representative, consulted with the MBTA and/or the City of Woburn regarding their willingness to provide an easement allowing for the construction of a truss bridge over the Lowell Line in Woburn? If so, what response have you received? Please provide a copy of all correspondence, meeting notes and telephone logs from such discussions.

Ms. Ohanesian has not consulted and she is not aware of any Town representative who consulted with the MBTA and/or the City of Woburn regarding their willingness to provide an easement allowing for the construction of a truss bridge over the Lowell Line in Woburn.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a Eversource Energy  
and New England Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-22

Has Ms. Ohanesian, or any Town representative, consulted with the City of Woburn as to whether the City concurs with your assessment that the Green Street Variation, including construction of a truss bridge over the Lowell Line on Montvale Avenue, is superior to the Preferred Route? If so, what response did you receive? Please provide a copy of all correspondence, meeting notes and telephone logs from such discussions.

Ms. Ohanesian has not consulted and she is not aware of any Town representative who has consulted with the City of Woburn as to whether the City concurs with her assessment that the Green Street Variation, including construction of a truss bridge over the Lowell Line on Montvale Avenue, is superior to the Preferred Route. NSTAR Electric Company d/b/a Eversource Energy

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company d/b/a  
Eversource Energy and New England Power  
Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Gaye Ohanesian

COM-TOW-23

Is Ms. Ohanesian proposing, in sum, a Project route that includes both the Green Street Variation in Woburn and the Main/Northern Variation in Stoneham and Wakefield?

Ms. Ohanesian does not propose for the Towns. Town of Winchester is proposing the Green Street Variation in Woburn as the approved route.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Beth Rudolph

Information Request: COM-TOW-24

Refer generally to the Pre-Filed Testimony of Beth Rudolph and pages 5 and 6 in particular. Please clarify whether the discussion of construction-related impacts from the Project concern the Companies' plans dated October 27, 2015 (as referenced on page 6), the Companies plans dated July 22, 2016 (as referenced on page 5), or both. Of the concerns identified by Ms. Rudolph in her Pre-Filed Testimony, please identify which, if any, of the concerns have been addressed by the Companies' July 22, 2016 plan set.

Response:

The construction-related impacts discussed in the pre-filed testimony provided by Ms. Rudolph relate to both sets of plans – those dated October 27, 2015 and those dated July 22, 2016. The review conducted by Weston & Sampson, and reported in Ms. Rudolph's testimony, was based on the October 27, 2015 plans. Their report is dated July 1, 2016, so the July 22<sup>nd</sup> plans were not available at the time of their review.

The original plans submitted by Eversource to the Town dated October 27, 2015 consisted of 19 sheets (Sheet 4 – 22) showing the proposed route in the Town of Winchester. The July 22<sup>nd</sup> set of plans provided only 12 of the 19 sheets for the Winchester route. It is our assumption that there are no changes on the other seven sheets from the October 27, 2015 version. However, there has been no confirmation of that from Eversource.

The revised July 22<sup>nd</sup> plans address very few of the comments provided by Weston & Sampson and Ms. Rudolph in her testimony. For example, some of the missing existing conditions information was added to the plans, but not all. The plans do not show the water and sewer laterals, nor do they show how the Town's water, sewer, and drain utilities will be protected or relocated to accommodate the new 345kV transmission line and associated chambers. The plans do not provide any information with respect to road closures or other traffic management items, particularly as they relate to work at the jack and bore locations. Additionally, Eversource has not traced the Town's water mains to provide a more accurate location, as has been requested several times since discussions began with the company in 2014.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Request Set 1  
Response to NSTAR Electric Company  
d/b/a Eversource Energy and New England  
Power Company d/b/a National Grid  
September 12, 2016  
Person Responsible: Beth Rudolph

Information Request: COM-TOW-25

Please refer to page 4 of Ms. Rudolph's Pre-Filed Testimony and her description of the various facilities located on Washington Street and Cross Street in Winchester. Please describe how impacts to these facilities were mitigated by the Town when other work projects (e.g. street repaving, drainage, culvert replacement, or utility project, etc.) have been undertaken on Washington Street and Cross Street near the facilities listed.

Response:

Page 4 of Ms. Rudolph's testimony references the following facilities located on Washington Street in Winchester – the Winchester Hospital Ambulatory Care/Cancer Care Facility, the Muraco Elementary School, and Leonard Field. Ms. Rudolph noted that Cross Street provides access to various commercial and industrial businesses in Winchester and Woburn, as well as a private multi-sport field complex whose driveway entrance is located between the railroad crossing and the Aberjona River crossing where Eversource's proposed entrance pit will be located for the jack and bore operations. These streets also serve as major regional transportation routes, providing east-west and north-south corridors through the Town, including access to Route 93 and ambulance routes to Winchester Hospital.

Over the years, the Town and utility providers, such as National Grid, have completed various projects within the Cross and Washington Street corridors. Most recently, in 2013, the Town of Winchester, in conjunction with MassDOT, completed improvements to the sidewalks on the Washington Street bridge. To date, none of the utility projects completed by the Town or outside companies have required complete closure of Washington Street. Contractors have been able to maintain at least one lane of travel at all times. The Winchester Police Department, not the Engineering Department, is responsible for managing traffic flow and safety during these types of projects. Additionally, the projects have all been limited in scope and size to small manageable areas, and not comparable to the size and scale of the proposed Eversource transmission

project, which will impact the entire length of Cross Street and a significant portion of Washington Street.

In summer 2005, the Town of Winchester closed Cross Street for approximately 8-weeks to install a new culvert at the Aberjona River crossing as part of the Town's flood mitigation program. This work was completed while school was closed for the summer. The Town compensated one business (now closed) at the corner of Cross Street and Forest Street for disruption during the closure, and provided off-site parking for residents in the same building. No other businesses were impacted (the private sport facility referenced above only opened in Spring 2016, and the site was vacant in 2005). The Winchester Police Department implemented a long-term detour around Cross Street during the closure, and the Fire Department coordinated the rerouting of ambulances to Winchester Hospital down Swanton Street. In October 2015, the Town also closed Cross Street at the railroad crossing for a weekend (October 17 & 18) at the request of the MBTA to allow for the replacement of a structural beam across the road that had previously been damaged by a truck strike.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-26  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-26

Please refer to page 3 of Mr. Tirinzoni's Pre-Filed Testimony and the XLPE cable projects listed therein. Please explain: (a) whether HPFF technology was considered for any of the listed projects; and (b) why XLPE technology was ultimately selected. Please identify any transmission projects in which Mr. Tirinzoni was the lead engineer since January 1, 2010, in which he recommended the use of an HPFF system instead of an XLPE system. Please provide a copy of all reports and studies developed by Mr. Tirinzoni for such projects that explain the basis for his recommendation.

Response

- (a) HPFF cable technology was initially considered for the Middletown-to-Norwalk Project. It was not considered for the Glenbrook Cables Project and it was not the appropriate cable technology for the submarine cable project.
- (b) Due to the capacitance such a long (approximately 24 mile) PTC circuit would have added to the electrical system, the Middletown-to-Norwalk Project was eventually switched to XLPE cable technology.

Mr. Tirinzoni recommended the use of HPFF cable technology for a yet to be constructed cable circuit in Greenwich, CT. This work was performed when Mr. Tirinzoni was employed at Eversource Energy and he has no reports or studies with him at his current employer. All other cable systems Mr. Tirinzoni was involved with were single lengths of cable, where solid dielectric cable technology is more economically feasible.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-27  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-27

Please identify any underground transmission project in which Mr. Tirinzoni's firm, PDC, has been involved on behalf of an electric utility since January 1, 2010, in which it compared (or recommended) an HPFF system versus an XLPE system. Please provide: (a) the identity and location of the subject transmission line; (b) the name of the electric utility owning the transmission line; (c) the voltage and length of the transmission line; and (d) a copy of the report, analysis of study developed by PDC that compares (or recommends) such a cable selection.

Response

The studies PDC has performed for our client utilities are confidential. We cannot provide the report or details of the study.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-28  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-28

Please indicate whether Mr. Tirinzoni is aware of any instances of magnetic field interference experienced by abutters of the XLPE cable systems listed on page 3 of his testimony.

Response

Mr. Tirinzoni is not aware of any instances of magnetic field interference experienced by abutters of the XLPE cable projects in which he has been involved.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-29  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-29

Please refer to Mr. Tirinzoni's HPFF-PTC cable design as stated on page 5 of his testimony and the design parameters stated on page 6. Please provide a copy of any and all reports, models, calculations, spreadsheets (with formulas and cell references intact), analyses, and workpapers developed by Mr. Tirinzoni that support the development of his proposed cable design and that document the cable rating of 1040 MVA as stated in Mr. Tirinzoni's testimony. Please identify and explain all assumptions, inputs and data sources used by Mr. Tirinzoni for his rating calculations.

Response

Please see Attachment COM-TOW-29(1) and (2).

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-29(1)  
September 12, 2016  
Person Responsible: Peter Tirinzoni

**Attachment COM-TOW-29(1) – PCToolbox Input Data**

Power Cable Toolbox 2. 5. 54

**GENERAL CASE DATA**

User Name : PLTirinzoni  
Case Title : Single 10" Pipe with 3500 kcmil Cu HPFF Conductor  
Date/Time Created : Pipe with FTB 01-20-2016  
Date/Time Modified : 09-07-2016 12:21:54  
Substation 1 : Wakefield  
Substation 2 : Woburn

**CABLE SYSTEM PARAMETERS**

Power Frequency = 60 Hz  
System Voltage = 345 kV  
Loss Factor = 62.00 %  
System Type = Pipe-Type (HPFF)

**CABLE PARAMETERS**

Conductor Size =	3500.0	KCMIL	
Conductor Construction =	Segmental, 4 Segments		
Conductor Diameter =	2.159	in.	
Conductor Material =	Copper		
Conductor Shield/Screen Thickness =	0.023	in.	
Conductor Shield/Screen Material =	Non-Metallic		
Insulation Thickness =	0.650	in.	
Insulation Material =	PPP		
Insulation Shield Thickness =	0.005	in.	
Insulation Shield Material =	Non-Metallic		
Skid Wire Type =	0.1 in x 0.2 in, 2x3 in. lay		Stainless Steel
Pipe Filling Material =	Dielectric Fluid		
Pipe Coating Thickness =	0.010	in.	
Pipe Coating Material =	Pritec		
Pipe Outer Diameter =	10.750	in.	
Pipe Wall Thickness =	0.250	in.	

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-29(1)  
September 12, 2016  
Person Responsible: Peter Tirinzoni

INSTALLATION PARAMETERS

Installation Type =	Buried	
Controlled BF/Duct Bank Width =	30.00	in.
Controlled BF/Duct Bank Height =	48.00	in.      Center Depth: 36.00
Controlled BF/Duct Bank TR =	0.65	C°-m/Watt
Native Soil Thermal Resistivity =	0.90	C°-m/Watt
Ambient Soil Temperature =	25.00	°C
Installation Configuration =	Flat (Horizontal)	
Number of 3-Phase Circuits =	1	
Center-Line Burial Depth =	48.00	in.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-29(2)  
September 12, 2016  
Person Responsible: Peter Tirinzoni

**Attachment COM-TOW-29(2) – PCToolbox Output Data**

**Emergency Ampacity Calculations**

Title: Single 10" Pipe with 3500 kcmil Cu HPFF Conductor  
Date / Time: 09-07-2016 12:30:47

**Pre-Load Percent of Normal (%) = 100.00**  
Pre-Load Conductor Temperature (°C) = 85.0  
Pre-Load Current (A) = 1405.8

<b>Time (Hrs)</b>	<b>Temperature</b>	<b>Ampacity</b>
12.000	105.00	1742
0.250 (15 min)	105.00	3791

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-30  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-30

What does Mr. Tirinzoni assume the operating temperature of the single-cable HPFF-PTC conductor to be at normal and transient conditions? Please provide the basis for that assumption with all supporting documentation.

Response

Per AEIC CS2, "Specification for Impregnated Paper and Laminated Paper Polypropylene Insulated High Pressure Pipe Type Cable", the allowable temperature is 85°C for continuous operation and 105°C for transients (e.g. 12-hour Long Term Emergency), as long as the installation conditions (native soil and trench backfill thermal resistivity and the presence of any additional heat source) are known.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-31  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-31

With respect to the thermal resistivity values stated on page 6 of Mr. Tirinzoni's testimony, what backfill material is assumed? Please provide the basis for that assumption with all supporting documentation.

Response

Mr. Tirinzoni's PTC system design assumed the trench was backfilled with FTBTM, possessing a thermal resistivity of  $65\text{C}^{\circ}\text{-cm/W}$ . This is consistent with the Companies' response to TOW-CM-1, dated May 6, 2016.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-32  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-32

What burial depth did Mr. Tirinzoni assume for his HPFF-PTC cable design? Please provide a copy of any and all studies or analyses reviewed or performed by Mr. Tirinzoni that identify the maximum depth the Companies' cable is expected to be buried. At what burial depth would the cable design Mr. Tirinzoni has proposed not be able to achieve the design rating of 1040 MVA. What changes to the proposed design would be necessary in order to enable the cable to achieve a design rating of at least 1040 MVA at that depth? Please provide all workpapers, calculations, inputs, studies and reports that form the basis of Mr. Tirinzoni's assumptions.

Response

The ampacity calculations were performed at a cable pipe burial depth of 4 feet, which is deeper than the burial depth of the upper conduit in the provided XLPE cross-section. These cross-sections represent the "typical" burial depths for the cable trench; however, at the trenchless crossings and to avoid existing underground utilities, a deeper trench will be needed. One of the advantages of a PTC system is that the pipes can be threaded through the existing utilities much easier than the HVED-XLPE concrete duct bank, and as a result, the cable pipes are at or close to the "typical" burial depth for a much greater percentage of the route. Additionally, circulating the dielectric fluid smooths out the hotspots where the cable pipe is deeper, allowing the desired ampacity to be achieved. There is no fluid to circulate in the HVED-XLPE cable technology to mitigate hot spots. Hot spots generally can be expected at trenchless crossings where jack and bore techniques are being proposed. For example this is pointed out by Eversource engineering consultant, Black and Veatch in their notes, Note 6, of the Woburn-Wakefield 345kV Drawings, Sheet 00A also referred to as pdf page 2 of 95 from Information Request EFSB Set 1 Attachment EFSB-CM-2(1). Attachment COM-TOW-32(1).

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-32(1)  
September 12, 2016  
Person Responsible: Peter Tirinzoni

## Attachment COM-TOW-32(1)

### Design Notes

The following information pertains to the design of this drawing package, dated September 8, 2015. Any subsequent revisions will be clearly identified.

### Survey

1. Black & Veatch has removed (or hidden from print) some survey manholes in the profile; which were provided by SMC. Unless crossing the duct bank centerline, or very close to the duct bank centerline Black & Veatch does not typically show in the profile.
2. Black & Veatch has provided survey comments in PDF format for reference. We believe these survey items need review by SMC.
3. We have also provided the updated AutoCAD file for SMC use. This places ownership in SMC hands. We "gathered" SMC information provided 08-17-2015, which contained additional survey information of Cross Street and MBTA crossing and Elm and Central Street. We placed this information into the 07-20-2015 drawing. We will provide this AutoCAD drawing back to SMC for updates as needed.
4. We need SMC to update the alignment in accordance with option 2 of drawing 023 (SMC plan 13). We recommend a station equation be placed here.

### Drawing Notes

5. We assume Eversource is writing the specifications to incorporate all necessary items for the duct bank. This would regard a large amount of information from type of connections of HDPE and PVC, conduit proofing with separate contractors, to concrete testing. Black & Veatch typically does not place a large amount of notes on the drawings; we capture information within the technical specifications and scope of work write up to the separate contractors. Without the understanding of Eversource technical specifications and contractual setup its difficulty for Black & Veatch to assume what is needed. However, we are pleased to incorporate information onto the drawings per Eversource direction if required.

### Jack & Bore

6. Black & Veatch has incorporated the 8" HDPE SDR 13.5 conduit as designed by Eversource into the Jack & Bore drawings. However, we caution using this conduit. In our experience we have witnessed failures during construction using such conduits. The reason for failures (we believe) are contributed to contractor's lack of experience or poor construction techniques, and not necessarily directed to the conduit integrity itself. However, as a conservative measure we typically

performed calculations to determine the conduit type and thickness with parameters based on our experience; obviously this also needs to consider requirements of Ampacity as J&B's are typically the hot spots. We also specify in our technical specifications certain installation techniques, for example flooding the conduits with water, to assist in installation. We have not performed any calculations, or providing any specifications for this project, we are simply noting concern; in which Eversource may already be aware of.

### Utility Relocations

7. Utilities requiring relocations are identified on drawing 00b. An example is Manhole number 03 with a water line; this is assumed to be relocated. Black & Veatch believes Eversource will coordinate with all utility owners for relocation coordination efforts and general construction activities. Any design changes, if required, can be discussed with Black & Veatch for revisions. It was noted early on in the project by eversource project manager Beverly Schultz that easement shall be avoided at all cost for manhole installations. Thus utility relocations are required as there is insufficient room within the city street right-of-way to facilitate manhole installation without interference with other utilities.
8. Other utility relocations should also be reviewed to maximize cost. For example 150' of duct bank and manhole 26 could be significantly reduced in trench depth (approximately 4'-0") if a water line was relocated. The cost of relocating the water line versus digging and installing the duct bank and manhole deeper should be evaluated by Eversource.

### Duct Bank Routing

9. Utility clearances follow Black & Veatch Project design memorandum, which codifies multiple standards and requirements as identified within the document.
10. Routing of the duct bank in profile.
  - Flat configuration (Section 2) was used when feasible clearances were allowed in the profile, and where room (clearances) were allowed in the plan view.
  - In the event the duct bank route in the profile could potentially cause too tight of a clearance to a utility going over it, we took the conservative approach and went under the utility. In the event during construction there is favor to go over the utility it's a bonus for the project, rather than requiring going deeper in the event the utility was not in the correct or exact location.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-33  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-33

What temperature was used by Mr. Tirinzoni for the point of immediate earth interface at the surface of the line pipe and the immediate fill material? Please provide the basis for that assumption with all supporting documentation.

Response

The temperature of the cable pipe was allowed to approach 61.1°C. For the majority of the route, the cable pipe is encased in a weak concrete mixture sometimes called FTB<sup>TM</sup>. (Fluidized Thermal Backfill). The presence of the FTB<sup>TM</sup> transfers the interface with native soil to the outside edges of the backfill envelope, which will be at a much lower temperature.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-34  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-34

Please describe what Mr. Tirinzoni proposes for the cable design, its associated depth and the alignment of the oil return line given the various trenchless crossing locations along the Project route. Please provide all materials, workpapers, calculations, drawings and plans that form basis of Mr. Tirinzoni's proposal.

Response

The fluid pipe would run parallel to the cable pipe in the trench. At the trenchless crossings, the fluid pipe could be installed in the same or a parallel bore or take a slightly different route altogether. At 5 inches in diameter, it may be possible to install the fluid pipe through areas where the 10-inch cable pipe cannot be installed. The decision as to where to place the fluid pipe depends on many variables, including plans for future expansion. These details are evaluated as part of the detailed design process.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-35  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-35

Please identify whether Mr. Tirinzoni has included heat exchangers as part of the cable design he proposes in his testimony. If so, please describe the proposed locations where any such heat exchangers are proposed to be located, the size of any such heat exchangers that have been assumed, the availability of real estate as such location(s) and the estimated cost of said heat exchangers. If the answer is that Mr. Tirinzoni believes that no heat exchangers are required, please explain in detail why he believes that to be so, along with any analysis, report, study or calculations performed by Mr. Tirinzoni of the ability of the cable to operate reliably at peak loads.

Response

Since the 1040 MVA Summer LTE design capacity specified is achieved with the proposed single PTC system, heat exchangers have not been considered or included in the calculations performed.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-36  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-36

Please explain whether Mr. Tirinzoni's cable design assumes the existence of chillers at each of the cable ends. Has Mr. Tirinzoni analyzed whether there is available space at each substation for such additional equipment? Please provide any and all materials related to such analysis. Please provide an analysis of the noise impacts, including manufacturer information, relative to such additional equipment. Please provide a description of the maintenance requirements associated with such additional equipment and the expected annual cost of said maintenance.

Response

Since the 1040 MVA Summer LTE design capacity specified is achieved with the proposed single PTC system, chillers have not been considered or included in the calculations performed.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-37  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-37

What did Mr. Tirinzoni assume for the inlet and outlet temperatures of the circulating fluid? What type of pressure differential was considered from the point of origin to the terminal connection point? Please provide the basis of Mr. Tirinzoni's assumptions with all supporting documentation.

Response

The dielectric fluid inlet and outlet temperatures and pressure drop would be determined during the detailed design of the cable system.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-38  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-38

Refer to the HPFF Trench Cross-Section attached to Mr. Tirinzoni's Pre-Filed Testimony. What offset in distance was assumed between the line pipe and the oil return line? How does this distance affect the maximum cable rating that can be produced by Mr. Tirinzoni's proposed design? Please provide the basis of Mr. Tirinzoni's assumptions with all supporting calculations, results and associated documentation.

Response

The fluid circulation pipe is typically located within 12-18 inches of the cable pipe. The distance is governed by the ability to allow repairs to be made to either pipe after installation. Distances greater than this have no impact on the maximum cable ratings that can be achieved under fluid circulation.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-39  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-39

Please indicate whether Mr. Tirinzoni has ever calculated or measured MF from underground cable systems. Please provide all reports, studies and analyses from such calculations and measurements, along with a full and complete identification of the underground transmission line and the projected and measured MF levels.

Response

Magnetic fields were not calculated or considered for this HPFF cable option. Mr. Tirinzoni was only asked to develop a conceptual design for a HPFF cable system that is capable of meeting the specified LTE of 1040 MVA as specified in the response to EFSB-PA-4.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-40  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-40

Refer to pages 8 and 12 of Mr. Tirinzoni's testimony where Mr. Tirinzoni refers to Eversource's "Mystic" substation. Please clarify whether Mr. Tirinzoni intended to refer to Eversource's Woburn Substation instead of the Mystic substation.

Response

Mr. Tirinzoni referenced the incorrect substation. He was referring to the pump house at Eversource's Woburn substation.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-41  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-41

Please refer to page 12 of Mr. Tirinzoni's testimony where he states that there is "no requirement for a redundant pump house at the opposite end of a PTC circuit." Please provide the basis for this statement. Does Mr. Tirinzoni believe that the existing 3,000 gallon pump plant at Woburn Substation would be adequate to provide primary pressure support for Mr. Tirinzoni's proposed HPFF-PTC cable design without any loss of capacity? Please explain what would happen to the capacity of the HPFF cable if the primary pressurization pump house at Woburn Substation was unavailable because of a contingency affecting its operation during a period of high temperatures (i.e., 90°C) and peak system loads. Please provide all studies, reports and analyses regarding the consequences to the cable's maximum rating during such a contingency.

Response

While it is prudent engineering design, there is no industry "requirement" to provide a redundant pump house at the opposite end of the circuit. It is acceptable to have redundant pumps at one end of the circuit, as long as an alternate power supply is made available. Each pump should be powered off of a different distribution feeder to maximize redundancy. Additionally, a fluid circulating pump will need to be installed to provide a flowrate of approximately 10-20 gpm (pending detailed design).

The Companies' response to TOS-PA-5, indicates that in addition to the 3,000 gallon fluid storage tank, there is a 10,000 gallon fluid storage tank at the Woburn Substation. If the 10,000 gallon tank is not available for use by the proposed circuit, the 3000 gallon fluid storage tank should be increased or supplemented by a second tank.

This response also indicates that an added 10,000 gallon fluid storage tank and pressurization plant would cost approximately \$630,000. Since a new pressurization plant is not needed, it is estimated that a new 10,000 gallon tank and fluid circulation pumps would cost approximately \$150,000.

Well-designed pump houses themselves typically do not fail. An individual pump on a skid or an electrical feeder however may put one or several pumps out of service. Typically pump skids with designated back-up pumps (as is the case at Woburn) typically have different feeders power the two sets of pumps for redundancy.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-42  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-42

What type of cathodic protection system has been assumed in Mr. Tirinzoni's proposed HPFF-PTC cable design? Have any considerations been included to address any potential locations where there may be railroad DC interference? Please provide all supporting materials and documentation for such assumption, along with Mr. Tirinzoni's calculations, reports, workpapers, inputs and data sources.

Response

None. Cathodic protection systems are typically not designed at the conceptual stage; however, an allowance for the system was included in the estimate. Since the Woburn Substation is the termination of a number of PTC systems (both 115kV and 345kV), it might be possible to expand the existing cathodic protection system for expansion of the proposed line.

There are many installations in Chicago, New York, New Jersey and even Connecticut and Massachusetts where cathodic protection systems were successfully designed and implemented by electric utilities for their PTC systems, and many of the circuits in those are subject to railroad dc interference.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-43  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-43

Did Mr. Tirinzoni perform load flow testing, voltage support impacts, potential for system overloads, short circuit analyses, and reactive compensation requirements (e.g., series reactors or larger shunt reactors) for the cable design he proposes? If so, provide the results of any and all such studies or analysis, along with workpapers, assumptions, sources, spreadsheets and related data.

Response

No. Mr. Tirinzoni only developed a conceptual design for a HPFF cable system that is capable of meeting the specified LTE of 1040 MVA.

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-44  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-44

Please provide the pre-load percentage used in Mr. Tirinzoni's calculations and the actual ratings he calculated, including normal, LTE and STE. Please provide any and all assumptions, workpapers, and calculations, along with the sources for all inputs.

Response

The ampacity calculations were performed assuming a 24-hr loss factor of 0.62 (daily load factor of 75%). The LTE and STE ratings were performed assuming a unity loss factor and a preload equal to 100% of the normal rating.

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-45  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-45

Refer to page 13 of Mr. Tirinzoni's Pre-Filed Testimony and his statement that "the costs for the two different cable technologies are essentially the same...." Please provide a copy of all itemized cost estimates (including an identification of all relevant system components) prepared or reviewed by Mr. Tirinzoni with respect to both: (a) the proposed single-cable HPFF-PTC design; and (b) the Companies' proposed XLPE system. Please provide a copy of all reports, models, calculations, spreadsheets (with formulas and cell references intact), analyses, and workpapers developed by Mr. Tirinzoni to support the development of the cost estimate for his proposed cable design and his comparative cost estimate for the Companies' proposed XLPE design. Please identify and explain all assumptions used by Mr. Tirinzoni for these cost estimates.

Response

Conceptual Estimate for 8.5 mile HPFF-PTC Cable Circuit  
Utilizing 3500 kcmil Copper Conductor with Fluid Circulation

Electrical (cable, splices and dielectric fluid):	\$ 26,200,000
Civil (includes excavation, pipe, manholes, etc.):	\$ 68,600,000
Substation (terminations, structures and pump house/tank modifications):	\$ 1,600,000
Total	\$ 96,400,000

The above estimates assume fluid circulation to smooth out the "hot spots" than can limit the circuit ratings. Note the accuracy of estimates at the conceptual stage is on the order of +/- 30%

NSTAR Electric Company d/b/a Eversource Energy  
New England Power Company d/b/a National Grid  
EFSB 15-04/D.P.U. 15-140/15-141

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-46  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-46

Did Mr. Tirinzoni develop estimates of the magnetic fields associated with the single-cable HPFF-PTC design he proposes? If so, what are those estimates? Please provide all reports, studies, analyses, assumptions and calculations, including cable flow levels, which were used to develop any magnetic field estimates.

Response

Magnetic fields were not considered. The conceptual design of a single PTC option was solely to meet the specified LTE rating of 1040 MVA. However, in 2008, the Electric Power Research Institute (EPRI) published Report 1015925 "EMF Management User's Guide for Underground Transmission Systems". This report states that "Pipe-type cables inherently produce much lower magnetic fields than the single-conductor cables..."

Information Requests of the Companies to the Town of Winchester Set 1  
Response to COM-TOW-47  
September 12, 2016  
Person Responsible: Peter Tirinzoni

Information Request COM-TOW-47

Please identify what the charging VAR requirements are of a 345-kV 3,500-kcmil PTC system (~8.5 miles long) versus those of a 345-kV 3,500-kcmil XLPE cable system? Would more reactor compensation be required at one or both of the terminal substations for the PTC design (i.e., Woburn Substation and Wakefield Junction Substation)? Please provide a copy of all such studies and analyses, including workpapers, formulas, assumptions, and related calculations.

Response

Charging current (and associated reactive compensation) was not a consideration in the conceptual HPFF option, as it was not identified as an issue by the Companies. The Companies had considered a double PTC circuit as an option, but ruled it out as being too expensive. The HPFF alternative of a single 3500 kcmil PTC circuit with a parallel 5" fluid pipe has estimated charging VARs of 4.43 MVAR/1000 feet, while the double PTC option considered by the Companies is estimated to have charging VARs of 7.76 MVARs/1000 feet. Therefore, the single 3500 kcmil HPFF cable circuit is estimated to have approximately 43% less charging current than the double 2500 kcmil HPFF cable circuit considered by the Companies.

Information Request COM-TOW-48

Has a 345-kV PTC system ever been installed in the United States with a cable size as large as 3,500 kcmil? Is this a common PTC cable size? Did such a system have a 5-inch oil return line as part of its design? Please identify where such a cable design has been implemented, along with any report or study Mr. Tirinzoni has reviewed or performed regarding the performance of that cable system.

Response

The Okonite Company has sold over 1,180,000 feet of 3500 kcmil PTC since 2010, with over 1,135,000 feet being sold to Public Service Electric and Gas for installation in New Jersey.