November 25, 2015

Mr. Robert Stein
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Docket No. 461 - CSC 461 Greenwich Substation and Line Project

Dear Mr. Stein:

This letter provides the response to requests for the information listed below.

Response to HD-01 Late Filed Exhibits dated 10/06/2015
LF-003

Response to OCC-03 Interrogatories dated 11/04/2015
OCC-030, 031

Very truly yours,

John Morissette
Project Manager
Siting
As Agent for CL&P
dba EversourceEnergy

cc: Service List

Witness: **Witness Panel**
Request from: **Connecticut Siting Council**

Question:
Investigate an overhead line option along the interstate and rail road minimizing the ROW width.

Response:
The Company provides below a summary of alternatives considered and preliminary conclusions associated with its investigation into using an overhead line option along the interstate and railroad minimizing the ROW width for all or part of the route. This review is a work in progress. If the Council prefers one or more of these route variations for all or part of the Project, the Company must perform further detailed engineering analysis to refine the requirements and the estimated cost for use of this route variation.

While investigating potential overhead route variations, the Company found four uniquely challenged line segments which could be analyzed separately and be examined later for possible mixing and matching. These segments are described later in this response and depicted on the attached drawing.

To address narrow overhead corridors and reduce the project costs, the Company used 556 ACSS conductor, rather than the original plan to use the larger and heavier 1590 ACSS conductor. This smaller conductor design enables cost savings associated with the use of light-duty, directly embedded, steel structures rather than using heavier structures which require foundations. The new structure design would not allow for larger conductors to be installed in the future without rebuilding the line, which would require replacement of structures and/or additional new structures and possible foundations. This design would typically require a 50-foot ROW to maintain proper clearances for conductor blow out. However, in the areas adjacent to the railroad and/or the highway, where it can reasonably be anticipated that no buildings will be located in those corridors, the required ROW could be reduced to 40 feet. This narrower ROW is possible because the line conductors can blow out into the available aerial space above the railroad and the highway, without compromising the required clearance distances for the transmission lines. The structures would be built 15 feet from the railroad catenary structures and 25 feet from the edge of ROW.

The overhead line options that were evaluated included a route north of the railroad and another just south of the railroad but north of the CTDOT highway corridor "taking line." The Company met with CTDOT and presented overhead routes for its review. In addition to the initial feedback at the meeting, CTDOT Office of Rails provided comments in an email communication dated November 16, 2015, which is attached to this response. CTDOT advised the Company that it cannot support placement of any structures between

the railroad and Interstate 95 that would be within the CTDOT highway taking line, because that would conflict with CTDOT's Highway Manual and would jeopardize CTDOT federal funding, unless there were no other viable alternatives to use of such locations.

The overhead line segments would consist of two overhead transmission lines supported primarily on double circuit line support structures. The support structures would range in height from approximately 80 feet to 150 feet.

More detail on each of the four segments is provided below.

SEGMENT 1: COS COB SUBSTATION TO INDIAN FIELD DRIVE

Due to the lack of available space in and around Cos Cob Substation for a 115-kV overhead line exit out of the substation, the Company examined two possible underground "getaways" from the substation, which are referred to as Segment 1A and Segment 1B.

Segment 1A would exit Cos Cob Substation under the driveway turning west on the Cos Cob Park driveway and extending under Sound Shore Drive to two riser poles to be located in the Metro North parking lot south of the railroad. This variation would cost $12.7M and require 3 easements and no property acquisitions.

Segment 1B would extend along the western edge of the substation within the fence line until it reaches the northern boundary of the fence line and then continue under Sound Shore Drive to two riser poles to be located in the Metro North parking lot south of the railroad. This variation would require further investigation to determine if there is enough space to construct between the existing electrical facilities, a containment structure and other third party generation facilities. This variation would cost $11.2M and require 2 easements and no property acquisitions.

Segment 1A and Segment 1B would merge at the riser pole in the Metro North parking lot where the segment would transition to overhead by rising up the two overhead risers to the overhead line position. The overhead lines would then extend west over Interstate 95 and the railroad to an area, between the railroad and Station Drive. The lines would remain in this area adjacent to the north side of the railroad, and would extend west to Indian Field Road.

This segment would require a license from the railroad and minimal easements on properties. Installation of the lines along this route would also face work challenges associated with construction in close proximity to an active railroad, including very restricted work hours, flaggers, and other safety precautions, obtaining approval for track outages to perform work and potential cancellations of scheduled work times (CTDOT Office of Rails reported difficulties with obtaining railroad outages for its work), and costs impacts due to the need to maintain adequate railroad parking. These challenges have the potential to significantly increase the project cost and schedule.

SEGMENT 2: INDIAN FIELD DRIVE TO INDIAN HARBOR

Segment 2 has three variations.

Segment 2A would extend overhead along the north side of the railroad. The overhead lines would continue north of the railroad and south of residential properties on Circle Drive and Circle Drive Extension. This segment variation would cost $5.4M and require a license from the railroad and approximately 17 easements over the back portion of residential properties. No property acquisitions are needed. This variation would also require removal of the majority or all of the vegetation screening between many residential properties and the railroad to do the construction work and provide sufficient clearance for safe operation of the transmission lines after construction. In addition, it would be subject to the challenges of working next to the railroad listed above.

Segment 2B would extend overhead along the south side of the rail road but north of the CTDOT highway taking line. The variation would cost $9.2M and require a license from the railroad. No easements and no property acquisitions would be needed. This variation would be subject to the challenges of working between to the railroad listed above and Interstate Highway 95. Additional worker safety measures would be required due to close proximity to highway and to the Town of Greenwich's sewer, which would increase the duration and cost of construction.

Segment 2C would transition from overhead to underground with riser poles and head north through a private property to Circle Drive. This route would continue underground west on Circle Drive to Circle Drive Extension where the underground would head south through another private property to the railroad. A license from the railroad, one easement over residential property and one acquisition of a residential property would be required. This variation would cost $16.7M and be subject to some, but not all, of the challenges of working next to the railroad listed above.

SEGMENT 3: INDIAN HARBOR TO STEAMBOAT RD

Segment 3 has two variations.

Segment 3A would involve extending one overhead circuit along the north side of the railroad and another along the south side of the railroad but north of the CTDOT highway taking line. This variation would reduce costly acquisitions of properties on Bruce Park Avenue if both circuits were located north of the railroad in this segment. This variation would cost $18.7M and require a license from the railroad and require many easements over the back portion residential property lots (32 easements, no property acquisitions and removal of garages/out buildings). This variation would also require removal of the majority or all of the vegetation screening between many residential properties and the railroad to do the construction work and provide sufficient clearance for safe operation of the transmission lines after construction. This variation would be subject to the challenges of working next to the railroad listed above and would require additional worker safety and underground facility protection measures due to close proximity to highway and to the Town Greenwich sewer.

Segment 3B would extend two overhead circuits along the south side of the railroad but north of the CTDOT highway taking line. A license from the railroad would be required, but no easements and no property acquisitions would be needed. This variation would cost $13.9M and be subject to the challenges of working between the railroad listed above and Interstate Highway 95; plus would also require additional worker safety and facility

protection measures due to close proximity to the highway and to the Town of Greenwich sewer.

If the selected route were to combine Segment 2A with Segment 3B, the transmission lines would need to cross over the railroad from the north to the south side, which would require additional construction work and use of large angle, heavy dead-end structures with concrete foundations, which are significantly more costly, for railroad crossing.

SEGMENT 4: STEAMBOAT RD TO THE GREENWICH SUBSTATION VIA RAILROAD AVE

Segment 4 has two variations, the second of which is an underground variation.

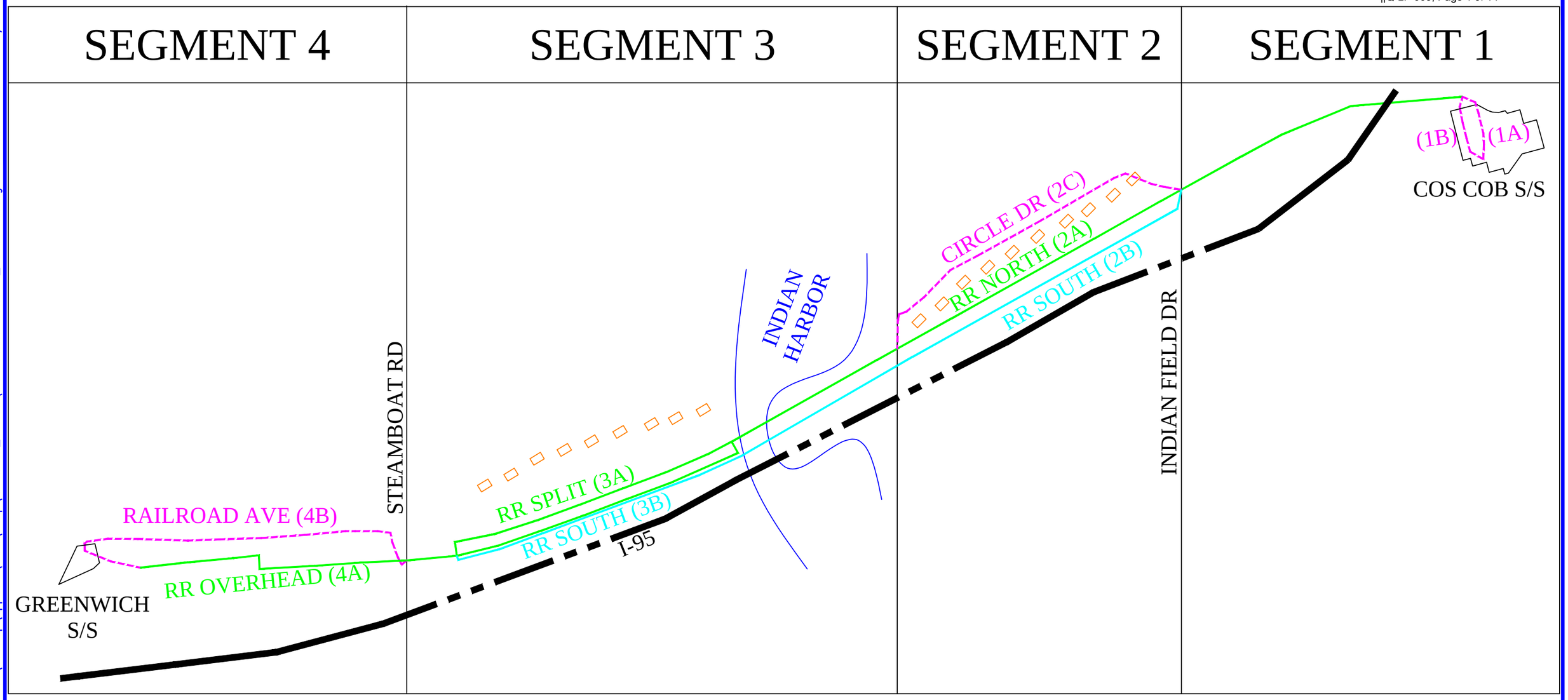
Segment 4A would require extending overhead lines along the south side of the railroad though Plaza Drive. This is a very tight space that would require significant detailed engineering to be completed in coordination with CTDOT Office of Rails and Metro North to identify structure locations on Plaza Drive and the location to cross back to the north of the railroad at the required 90-degree crossing. A license from the railroad, several easements over commercial properties and acquisition of at least one commercial building would be needed. The easements would include an easement for overhead riser structures located behind the proposed Greenwich Substation. In total, six easements and 1 property acquisition would be required for this segment. This variation would cost $39.8M and be subject to some of the challenges of working next to the railroad listed above.

Segment 4B would transition from overhead to underground lines at riser poles installed [near] Steamboat Road. This variation would then head north underground along Steamboat Road and turn west on Railroad Avenue to the Proposed Greenwich Substation. No easements in commercial or residential properties (2 easements/0 acquisitions). A license from the railroad would be needed in the area of the riser poles. This variation would cost $13.4M and be subject to some of the challenges of working next to the railroad listed above.

Detailed segment drawings, cross sections and segment cost estimates are attached to provide additional information by segment and the associated variations.

ESTIMATED COST OF TRANSMISSION LINE ROUTES

Based on the engineering and cost estimation analysis completed to date, the estimated total cost of the two all overhead transmission lines along the four segments would be approximately $76 to $77 million, which is approximately the same cost as the estimated cost of the underground transmission lines along the Preferred Route. However, in an effort to reduce overall cost of the transmission lines, the Company evaluated a hybrid overhead/underground route that would include the Segment 4B underground variation described above. This variation comprises an underground getaway route from the proposed Greenwich Substation to the riser structures located at Steamboat Road. Because of its relatively short distance (approximately 2,400 feet), this underground variation would not require any splice vaults. The estimated cost for this hybrid overhead/underground transmission line route would be approximately $50 million, which is approximately $22 million less than the estimated cost of the transmission lines along the Preferred Route.



OH ALONG RR (SPLIT)
OH ALONG RR/I-95
UG BENEATH STREETS
SUBSTATION PROPERTIES
WATER
INTERSTATE HIGHWAY
HOUSES/BUILDINGS

EVERSOURCE ENERGY

TITLE
FACILITY
GREENWICH TRANSMISSION LINE OPTIONS
SEGMENT MAP
GREENWICH, CT

BY CPS	CHKD	APP CPS	APP
DATE 11/19/2015	DATE	DATE 11/19/2015	DATE
H-SCALE N.T.S.	SIZE B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E. DWG	
R.E. PROJ. NUMBER		DWG NO. GREEN OH OPTIONS	

N

LEGEND

- PROPOSED CENTERLINE – UNDERGROUND ROUTE
- PROPOSED CENTERLINE – OVERHEAD RR ROUTE
- PARCEL BOUNDARY
- PROPOSED EASEMENT BOUNDARY

SCALE

0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 1A ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015

N

LEGEND

- PROPOSED CENTERLINE – UNDERGROUND ROUTE
- PROPOSED CENTERLINE – OVERHEAD RR ROUTE
- PARCEL BOUNDARY
- PROPOSED EASEMENT BOUNDARY

SCALE

0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 1B ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015

LEGEND

PROPOSED CENTERLINE – OVERHEAD RR ROUTE

PARCEL BOUNDARY

PROPOSED EASEMENT BOUNDARY

SCALE

0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 2A ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015

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LEGEND

PROPOSED CENTERLINE – OVERHEAD RR ROUTE

PARCEL BOUNDARY

PROPOSED EASEMENT BOUNDARY

SCALE

0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 2B ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015

LEGEND

PROPOSED CENTERLINE – OVERHEAD RR ROUTE

PARCEL BOUNDARY

PROPOSED EASEMENT BOUNDARY

SCALE

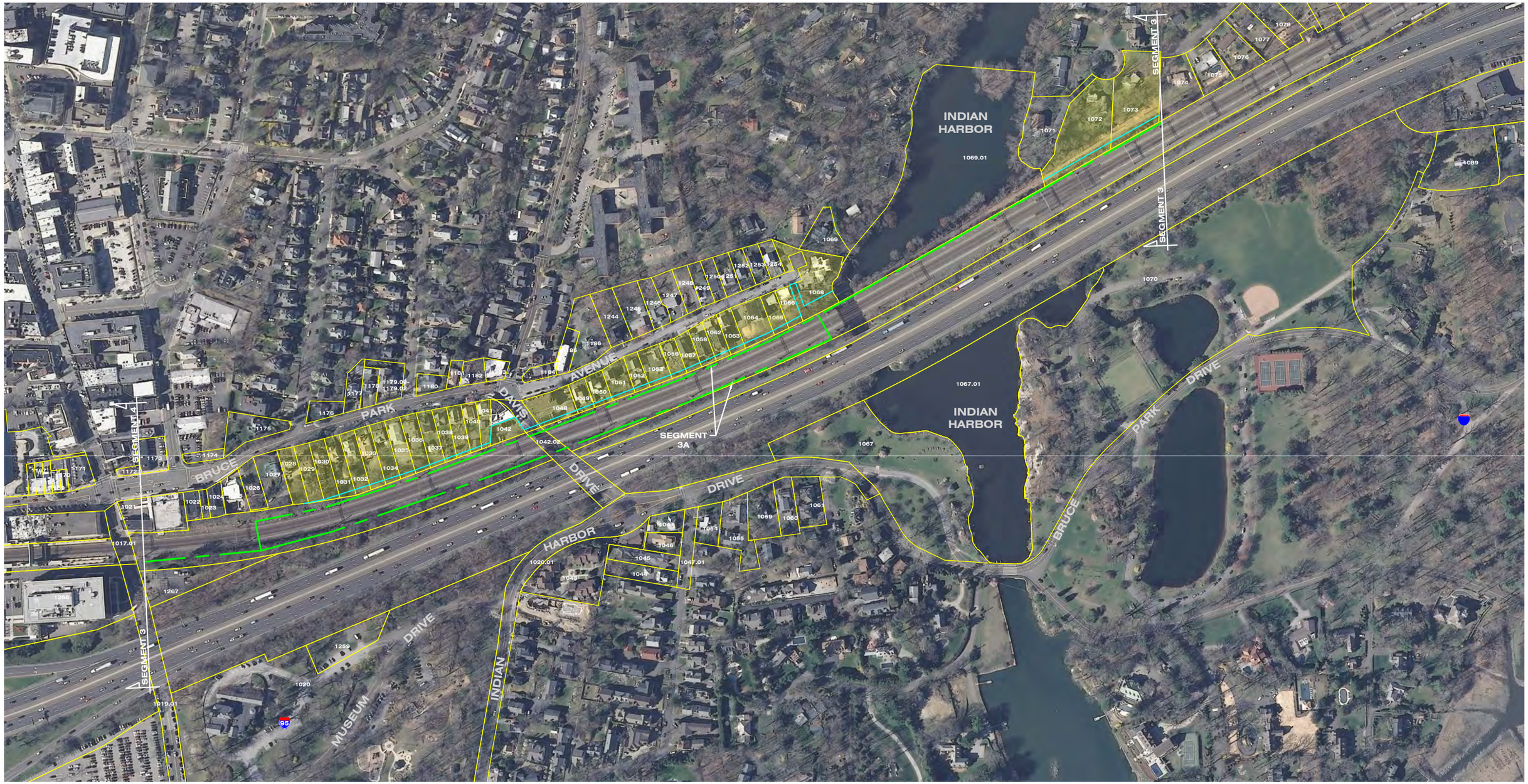
0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 2C ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015



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LEGEND

PROPOSED CENTERLINE – OVERHEAD RR ROUTE

PROPOSED EASEMENT BOUNDARY

SCALE

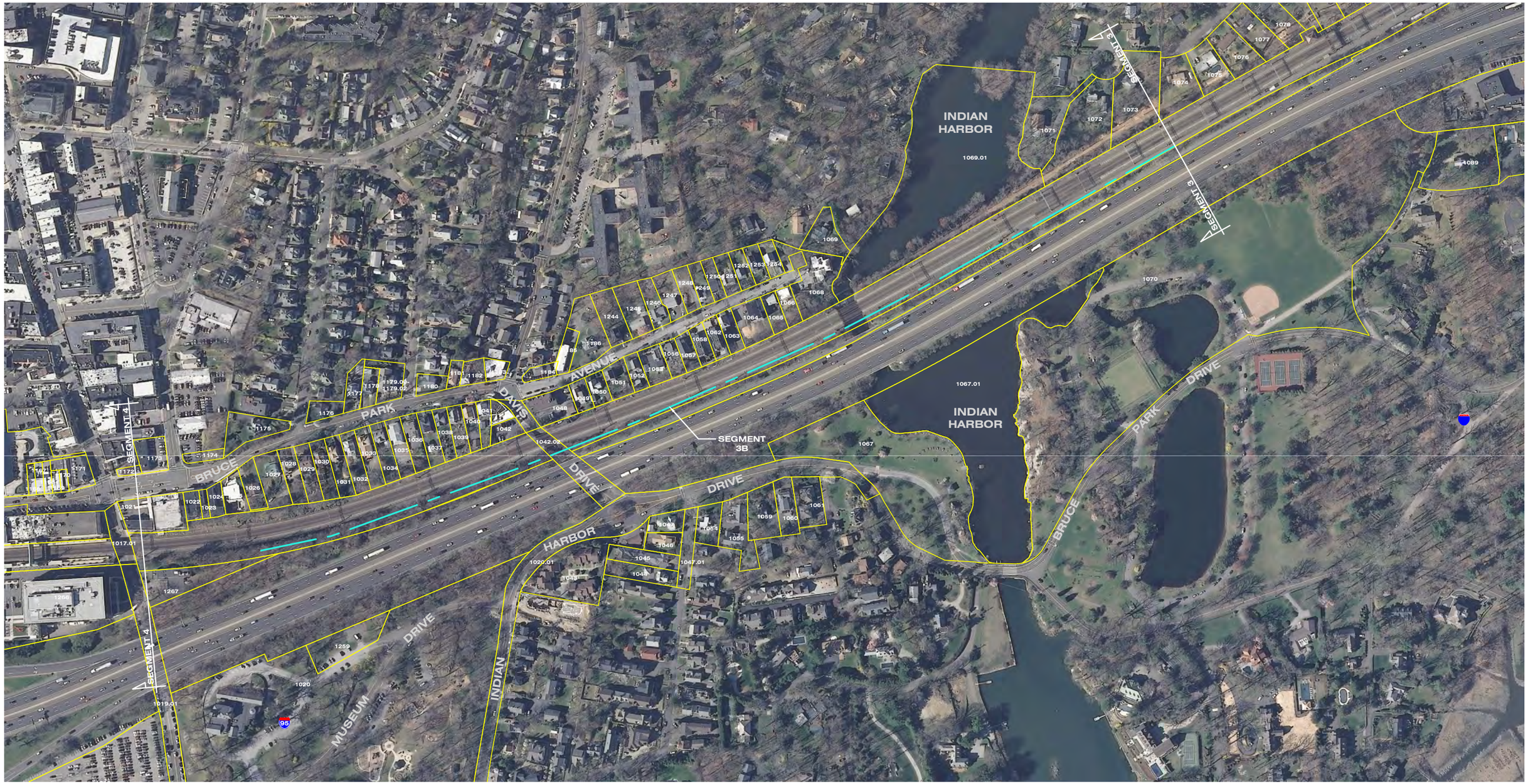
0 75 150 300 600

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 3A ROUTE"

SCALE: 1" = 300'	PAGE 1 OF 1	DATE: 11/20/2015



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LEGEND

PROPOSED CENTERLINE – OVERHEAD RR ROUTE

SCALE

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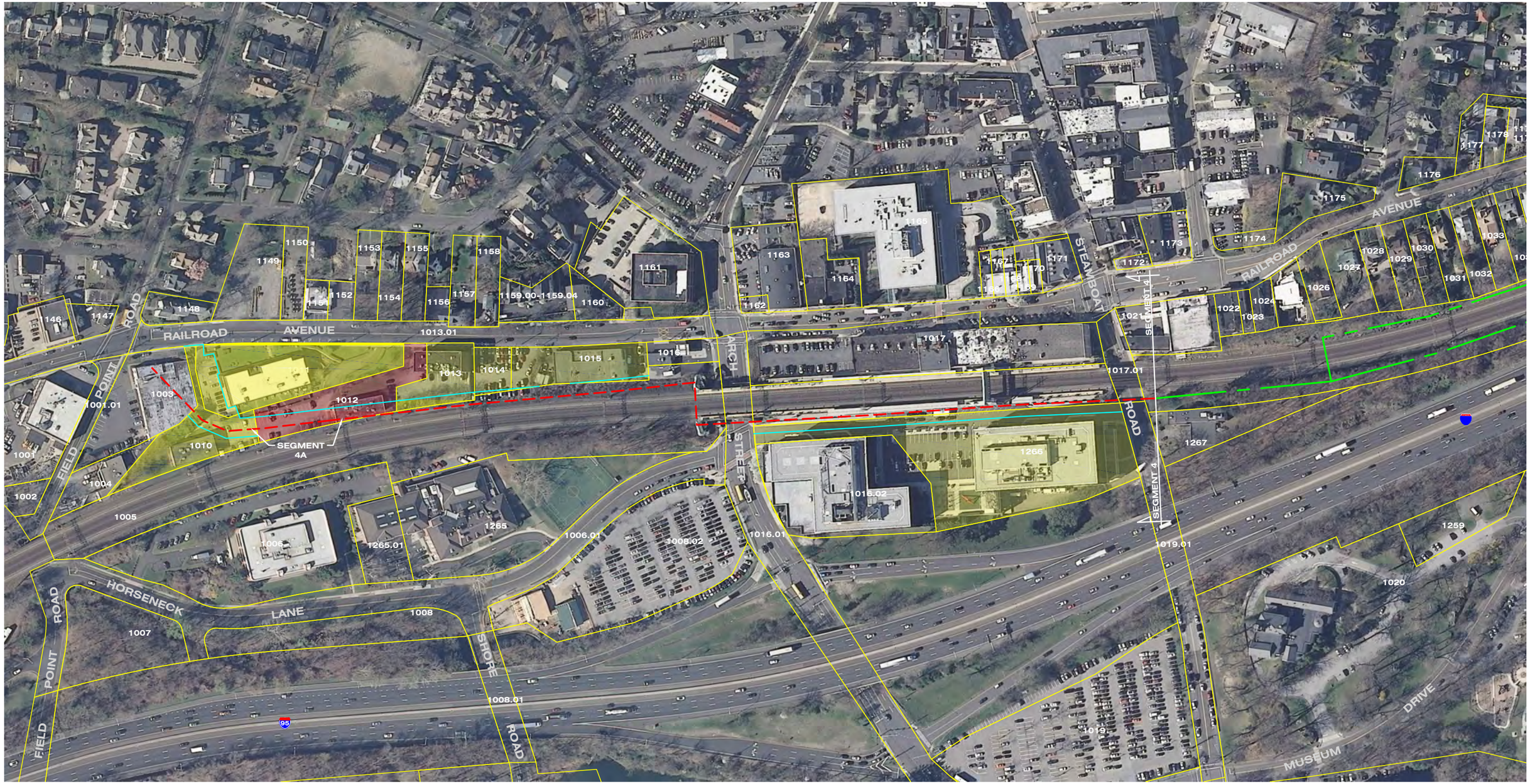
Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 3B ROUTE"

SCALE: 1" = 300'	PAGE 1 OF 1	DATE: 11/20/2015



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LEGEND

PROPOSED CENTERLINE – UNDERGROUND ROUTE

PROPOSED EASEMENT BOUNDARY

SCALE

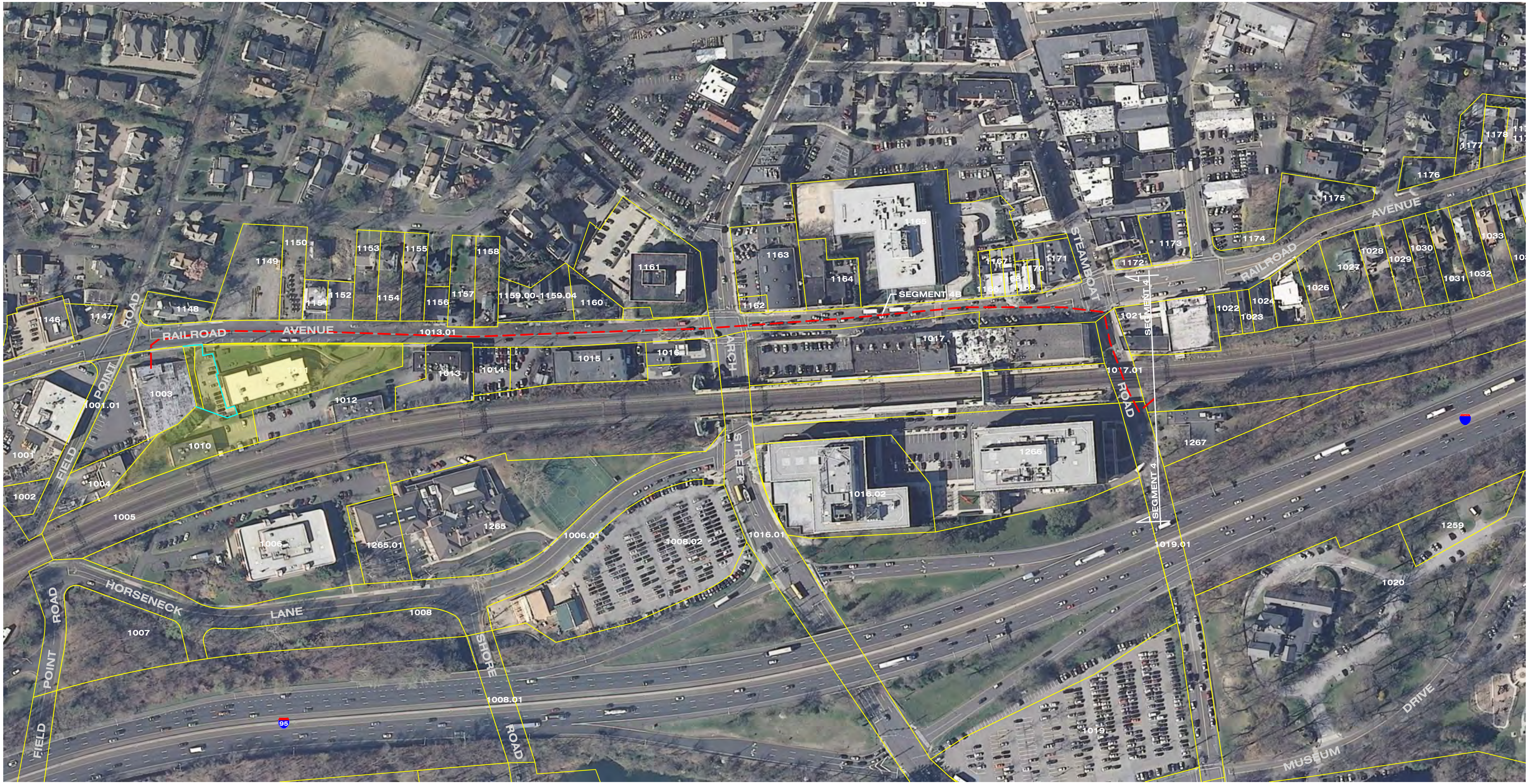
0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 4A ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015



LEGEND

PROPOSED CENTERLINE – UNDERGROUND ROUTE

PROPOSED EASEMENT BOUNDARY

SCALE

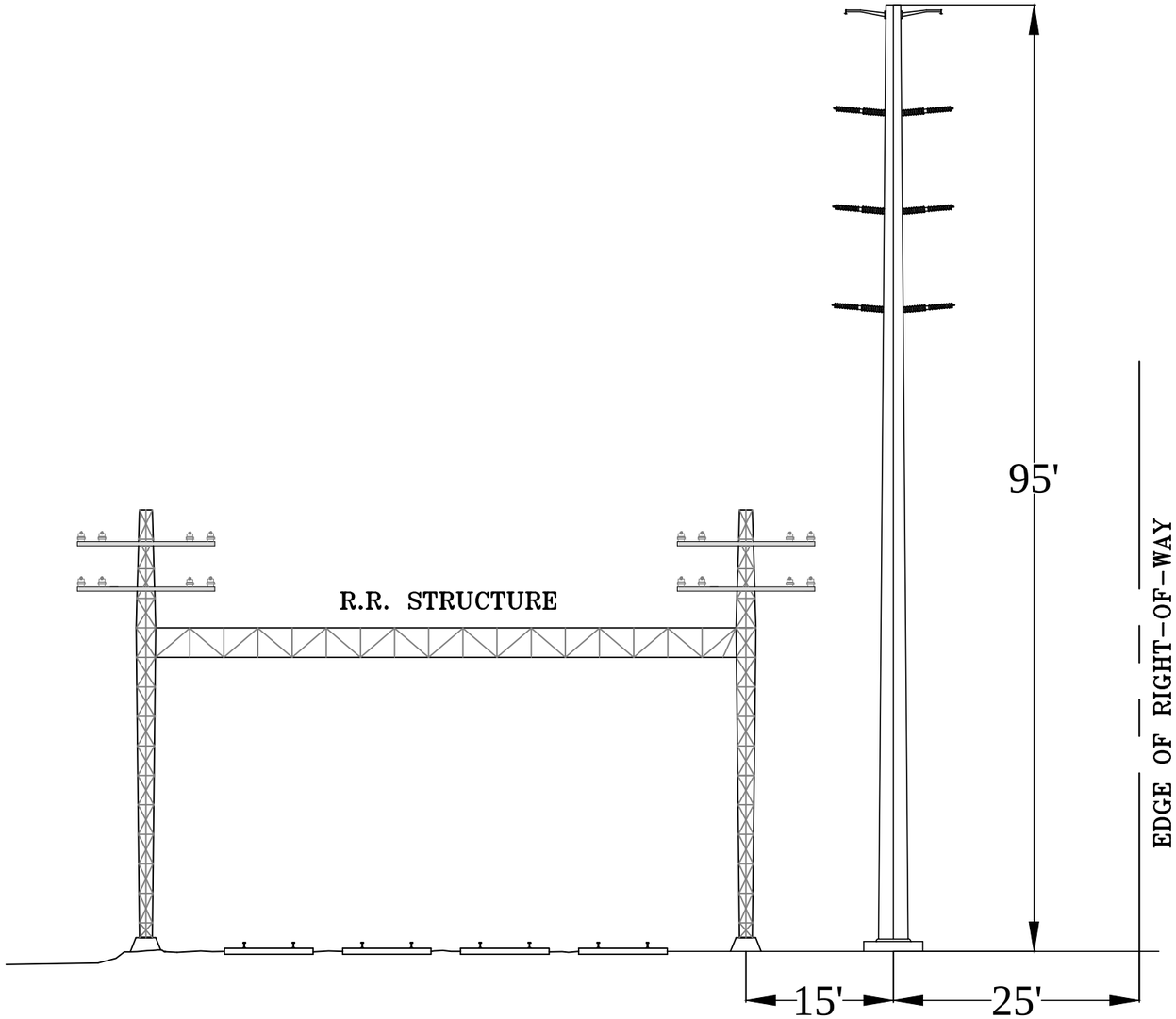
0 50 100 200 400

Cornerstone Energy Services

EVERSOURCE ENERGY

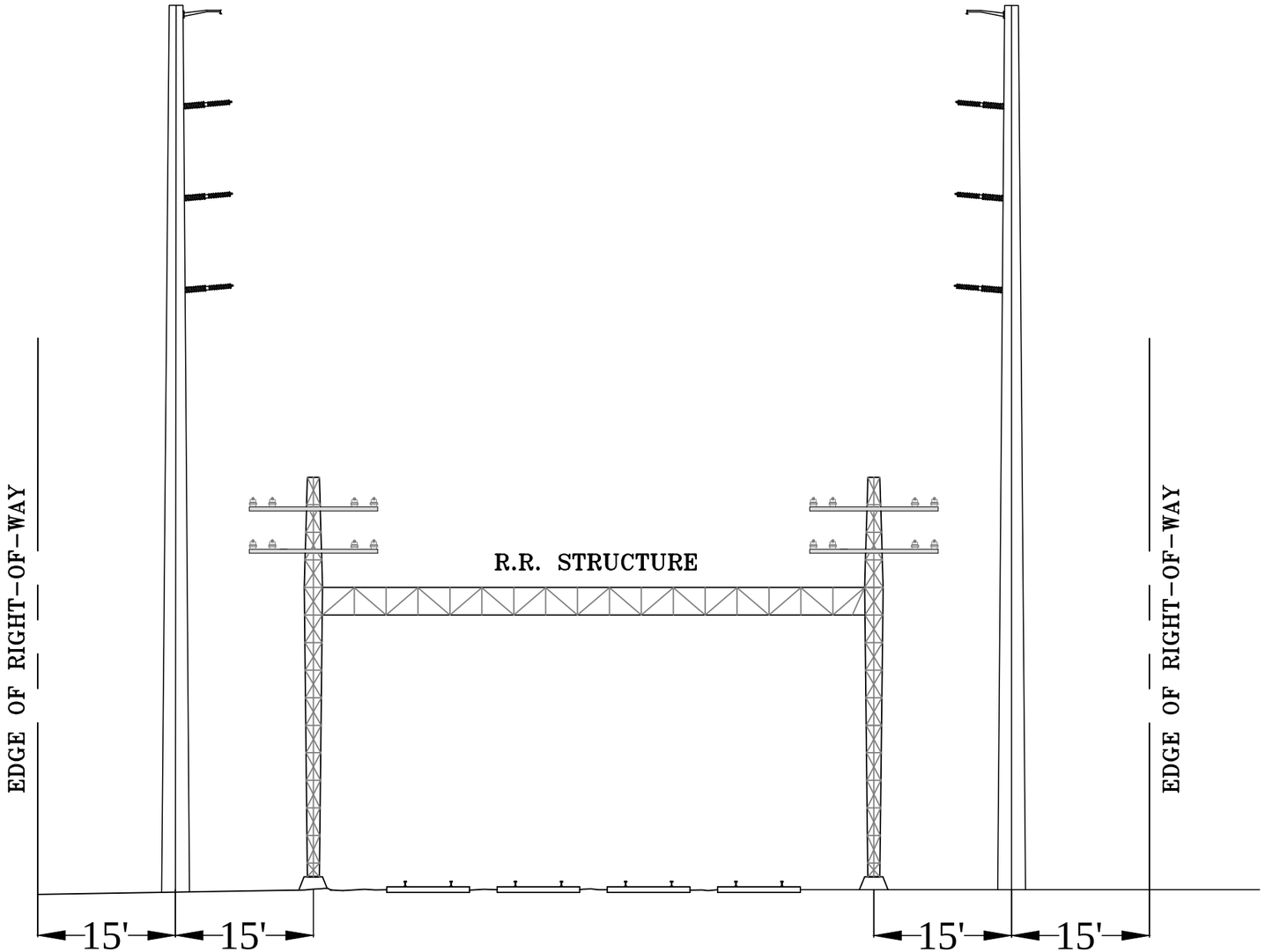
PROPOSED POWER LINE ROUTE FROM
COS COB SUBSTATION TO GREENWICH SUBSTATION
"SEGMENT 4B ROUTE"

SCALE: 1" = 200'	PAGE 1 OF 1	DATE: 11/20/2015



EVERSOURCE ENERGY

TITLE: GREENWICH S/S AND LINE PROJECT RAILROAD NORTH OPTION R.O.W. CROSS SECTION GREENWICH, CT			
BY CPS	CHKD	APP	APP CPS
DATE 10/19/15	DATE	DATE	DATE
H-SCALE N.T.S.	SIZE B	FIELD BOOK & PAGES	
V-SCALE N.T.S.	V.S.	R.E. DWG	
R.E. PROJ. NUMBER 403813RA		DWG NO. GREEN-RR-XS	



EVERSOURCE ENERGY

TITLE: GREENWICH S/S AND LINE PROJECT RAILROAD TWO-POLE OPTION R.O.W. CROSS SECTION GREENWICH, CT			
BY: CPS	CHKD	APP	APP: CPS
DATE: 11/3/2015	DATE	DATE	DATE
H-SCALE: N.T.S.	SIZE: B	FIELD BOOK & PAGES	
V-SCALE: N.T.S.	V.S.	R.E. DWG	
R.E. PROJ. NUMBER: 403813RA		DWG NO.: GREEN-RR-2P-XS	

From: "Young, Jay D" <D.Jay.Young@ct.gov>
To: Jacqueline A. Gardell/NUS@NU,
Cc: Daniel J. Garstka/NUS@NU, "Mysliwiec, Andrzej" <Andrzej.Mysliwiec@ct.gov>, "Thomas, Julie L" <Julie.Thomas@ct.gov>
Date: 11/16/2015 02:23 PM
Subject: Greenwich substation to CosCob substation Transmission Line

Jackie,

Please let this email serve as a follow up to our meeting today. Topics for follow up are as noted below:

1) Be advised that work along the rail right of way during the winter months that require railroad feeders be taken out of service, on either side of the railroad, becomes extremely unlikely and often unpredictable with frequent outage cancellations on short notice. All this is due to the need to keep the rail cars energized in order to keep the toilet plumbing from freezing for cars we store on the line and in our rail yards. Another railroad need is to keep our track switch heaters on such that the switches do not become ice locked and inoperable which affects train movements. This has recently affected one of my ongoing catenary projects, in the winter 2014-15 season, my contractor requested 40 working days and by the end of the season, was only granted 4 days that they could actually perform work.

2) Your project occurs within the track block we refer to as Section A (Catenary Structures 236 to 356A). Currently, the Department has a project 301-092 involving the replacement of railroad bridges over Sound Beach Avenue and Tomac Avenues ongoing. You indicated that you were targeting a Start of Construction for late 2016, planned track outages have already been scheduled with a long term outage on Track 4 starting February 2016 to July 2016, then Track 2 from July 2016 to August 2016, followed by a long term outage on Track 1 starting August 2016 to April 2017, and wrapping up with the last long term outage on Track 3 from April 2017 to June 2017. During these outages, if your work doesn't coincide with the planned outage from this project, it may not be possible to grant your outage requests.

3) Lastly, for any proposed aerial crossing of Eversource conductors over the railroad, the Department is going to require that those cross over the railroad perpendicular to our tracks. We noted a crossing occurring over the highway, which passes over the railroad, effectively shielding the railroad from dropped Eversource lines, and in such a case, we would find a non-perpendicular crossing acceptable.

As always, we appreciate the coordination and should you have any questions regarding this matter, do not hesitate to contact me.

Jay Young
Project Engineer
Division of Rail Design and Construction
Bureau of Public Transportation
2800 Berlin Turnpike, P.O. Box 317546
Newington, Connecticut 06131-7546
Office: (860) 594-2881
Fax: (860) 594-2377
Cell: (860) 622-8583

Segment Matrix

Route Segment	Segment Cost (millions)	Type of Construction		**RR North** All Overhead Option 1[1] (millions)	**RR South** All Overhead Option 2[1] (millions)	**RR South/UG** Hybrid Overhead/ Underground[1] (millions)
Segment 1						
Segment 1A	$12.7	UG Getaway/OH		$12.7	$12.7	$12.7
Segment 1B[2]	$11.2	UG Getaway/OH				
Segment 2						
Segment 2A	$5.4	OH		$5.4		
Segment 2B	$9.2	OH			$9.2	$9.2
Segment 2C	$16.7	UG				
Segment 3						
Segment 3A	$18.7	OH		$18.7		
Segment 3B	$13.9	OH			$13.9	$13.9
Segment 4						
Segment 4A[3]	$39.8	OH		$39.8	$39.8	
Segment 4B	$13.4	UG Getaway (No Vaults)				$13.4
Total				$76.6	$75.6	$49.2

[1] This option uses an underground getaway to exit Cos Cob Substation.

[2] This route segment variation would require further investigation to determine if there is enough space to construct between the existing electrical facilities, a containment structure and other third party generation facilities.

[3] The cost of overhead installation is more expensive than underground in this segment due to the higher cost of easements and an acquisition.

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Reference Response to CSC-12. Substantiate the one percent average annual load that the Company used for forecasting growth for the Project area.

a. List the areas covered by town and substation that are referenced in the CSC-12 response as "other substations in Greenwich" and the surrounding area ("Forecast Area").
b. Explain why the Company combined the Forecast Area's growth forecast with the Project area's forecast and used it to develop the Project area forecast.
c. Compare and contrast the service profile of the Project area with the Forecast Area including but not limited to number of residential customers and commercial/industrial customers served in the Forecast Area.
d. Provide the five-year total annual actual usage and the peak load in the Forecast Area vs. the Project area.

Response:

a. The areas covered by town and substation that are referenced in the CSC-12 response as "other substations in Greenwich" are found in the application on pages E-12 and E-13. The municipalities covered in the surrounding area ("Forecast Area") are Stamford, Darien, Norwalk, Weston, Wilton and Greenwich.

b. The company combined the Forecast Area with the Greenwich Project area to validate the Cos Cob load growth calculation by taking a broader view of load growth in the area and to mitigate any variability of the Cos Cob results. For example using this method, the Project Area results were mitigated for the Cos Cob load growth between 2010 to 2011 based in actual peak MVA load of 1.7% (119.7 MVA in 2010 vs 121.8 MVA in 2011) and the load growth percentage of 1.8% between 2012 and 2013 (128.2 MVA in 2012 vs 130.5 MVA in 2013). For the Forecast Area, Eversource also looked at the load growth of substations in Stamford, Darien, Norwalk, Weston and Wilton and averaged the load growth. This average was about 1.0%. Eversource felt the 1% load growth applied to Cos Cob Substation load was a conservative approach. Note this was also more conservative than the ISO New England CAGR of 1.2%.

Forecast Area Load Growth Results

Substation	KV	Town	Load 2013	Load growth Factor [1]
Cedar Hts 4R	13.2	Stamford	71.9	1.015
Compo 23K	13.8	Norwalk	46.9	1.010
Cos Cob 11R + Cos Cob 35K-6X	13.2	Greenwich	29.5	1.010
Cos Cob 11R	27.6	Greenwich	130.5	1.017
Darien 13S	13.2	Stamford	65.1	1.012
Flax Hill 24A	27.6	Norwalk	21.4	1.010
Flax Hill 24A	13.8	Norwalk	56.0	1.010
Glenbrook 1K	13.2	Stamford	95.9	1.012
Norwalk 9S	13.8	Norwalk	61.7	1.012
Norwalk 9S	27.6	Norwalk	105.0	1.000
Norwalk 9S	4.8	Norwalk	5.2	1.000
Peaceable 12N	13.8	Norwalk	31.6	1.010
Sherwood 18P	13.8	Norwalk	4.2	1.000
South End 1G	13.2	Stamford	100.7	1.034
Tomac 12H	27.6	Greenwich	43.0	1.010
Waterside 22M	13.2	Stamford	75.6	1.012
Weston 21M	27.6	Norwalk	48.7	1.010
Wilton 35A	13.8	Norwalk	45.2	1.013
		Total	Total	18.196
		Average		1.0109

Note [1]: The individual load growth factor was calculated using the logarithmic formula: (MVA last year/ MVA first year)^1/(last year – first year).

c. See the compare and contrast the service profile of the Project area with the Forecast Area table in the attachment.

d. Provide the five-year total annual actual usage and the peak load in the Forecast Area vs. the Project area.

The peak load in the Project Area is found below:

Cos Cob 11R 27.6kV System LOAD [MVA]

Transformers	KV	2011	2012	2013	2014	2015
11R-1X	27.6	24.3	30.4	26.8	22.4	24.2
11R2X+3X		97.5	97.8	103.7	85.3	90.6
Total MVA		121.8	128.2	130.5	107.7	114.8

The annual usages for both the Project Area (Cos Cob 27.6 kV) and for the Forecast Area are included in the table below:

							YR-TO-DATE
Substation	**kV**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015(NOV15)**
Cedar Heights	13.2	252,538,354	260,944,592	254,762,596	257,755,708	253,326,890	226,950,887
Compo	13.8	164,342,208	167,467,549	164,377,521	152,834,074	137,954,214	91,121,296
Cos Cob 13.2kV	13.2	78,876,428	97,949,602	60,304,797	92,810,721	96,711,098	89,070,743
Cos Cob 27.6kV	27.6	202,277,230	478,812,970	464,887,551	475,093,662	470,489,183	389,983,021
Darien	13.2	220,102,426	225,712,211	221,916,108	228,480,872	228,330,012	204,386,962
Flax Hill	27.6	0	7,789,511	177,817,056	189,487,160	120,516,185	637,689
Flax Hill	13.8	187,743,289	202,163,592	156,631,445	23,995,516	204,911,412	165,500,893
Glenbrook	13.2	442,448,193	452,708,021	340,942,253	315,285,263	327,750,141	281,021,291
Norwalk	13.8	211,989,009	248,893,934	171,125,847	214,140,754	250,119,159	211,037,643
Norwalk	27.6	424,143,475	391,927,586	373,042,507	365,591,958	296,691,258	271,837,503
Norwalk	4.8	22,780,354	21,849,941	21,018,911	21,018,911	20,113,730	16,357,478
Peaceable	13.8	117,227,086	116,230,728	113,594,216	118,980,388	96,008,094	47,338,346
Sherwood	13.8	0	0	264,830	13,663,592	69,500,054	125,277,380
South End	13.2	416,524,653	406,507,510	400,473,716	412,733,007	525,197,607	485,258,771
Tomac	27.6	155,018,137	125,598,885	129,840,849	139,940,888	129,800,102	115,473,462
Waterside	13.2	251,323,803	371,253,751	425,073,552	443,615,310	434,111,092	393,763,126
Weston	27.6	162,636,532	163,201,827	157,677,129	161,737,855	141,921,015	83,713,830
Wilton	13.8	315,304,621	319,181,060	308,149,151	343,256,474	395,852,198	347,050,734

The peak load in the Forecast Area is found below:

MVA load of the Forecast Area

Transformers	KV	2011	2012	2013	2014	2015
Cedar Hts 4R	13.2	74.7	71.9	74.7	55.1	67.6
Compo 23K	13.8	48.5	45.3	46.9	32.3	27.0
Cos Cob 5X+6X	13.2	28.2	26.7	29.5	25.0	29.0
Darien 13S	13.2	65.4	57.0	65.1	58.1	58.0
Flax Hill 24A	27.6	22.0	21.3	21.4	4.2	0.0
Flax Hill 24A	13.8	40.2	50.5	56.0	48.8	52.8
Glenbrook 1K	13.2	107.0	95.9	95.9	80.5	78.6
Norwalk 9S	13.8	58.8	58.5	61.7	51.3	56.8
Norwalk 9S	27.6	110.0	103.0	105.0	74.4	75.9
Norwalk 9S	4.8	5.2	5.2	5.2	5.2	5.2
Peaceable 12N	13.8	28.2	31.6	31.6	15.7	29.9
Sherwood 18P	13.8	10.3	10.3	10.3	20.4	37.4
South End 1G	13.2	98.6	90.0	100.7	101.5	102.3
Tomac 12H	27.6	49.0	49.5	43.0	35.0	36.9
Waterside 22M	13.2	71.1	64.1	75.6	62.7	68.7
Weston 21M	27.6	50.0	50.0	48.7	36.7	32.9
Wilton 35A	13.8	45.6	43.0	47.0	43.0	51.5

Excerpt 1) ISO-New England 2013 Peak load and energy forecast as published in the CELT Report See Attachment for the Excerpt 1 Table: 1.5 - Actual and Estimated Energy and Peak Loads.

Excerpt 2) See Attachment for the Excerpt 2 Table: 2013 CELT & RSP Forecast Detail: ISO-NE Control Area, New England States, RSP Sub-areas, and SMD Load Zones.

Excerpt 3) See Attachment for the Excerpt 3 Table: ISO –New England 2015 Peak load and energy forecast as published in the ISO CELT Report – Includes the effect of PV.

c. Compare and contrast the service profile of the Project area with the Forecast Area Table

		AWC		
		Greenwich	Stamford	Norwalk
Customer Type	Revenue Class	Number of Residents served	Number of Residents served	Number of Residents served
Total Customers		28273	58507	50462
RESIDENTIAL-NON HEATING	10	23949	44578	39619
COMMERCIAL-NON HEATING	30	2576	4542	4578
RESIDENTIAL SPACE HEATING	11	1632	9067	6010
COMMERCIAL-HEATING	31	99	183	173
INDUSTRIAL/MANUFACTURING	50	17	137	82
Number of Bulk Substations		2	5	7
Total bulk transformers nameplate MVA		245.5	747.8	921.2
Average nameplate capacity per customer KVA		8.68	12.78	18.26

Greenwich residents are fed by 2 Bulk Substations Cos Cob and Tomac
Stamford residents are fed by 5 Bulk Substations Cedar Heigths, Darien, Glenbrook, Waterside and South End
Norwalk residents are fed by 7 Bulk Substations Compo, Flax Hill, Norwalk, Peaceable, Sherwood, Weston and Wilton

Excerpt 1 Table

Excerpt 1 Table

1.5 - Actual and Estimated Energy and Peak Loads[1]

								2012 ACTUAL							
	JAN		FEB		MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
MONTHLY PEAK LOAD - MW	19926		18333		18371	16412	19869	25678	25880	24751	21439	16681	18792	19119	
MONTHLY NET ENERGY - GWH	11266		10100		10104	9297	10045	10698	12837	12740	10164	9751	10072	10998	
								2013 FORECAST							
	JAN		FEB		MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
MONTHLY PEAK LOAD - MW	20775	A	19457	A	19980	17750	19740	24915	27840	27840	22925	18375	19745	22445	
MONTHLY NET ENERGY - GWH	11499	A	10216	A	11286	10067	10562	11579	13335	13053	10918	10527	10551	12021	
								2014 FORECAST							
	JAN		FEB		MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
MONTHLY PEAK LOAD - MW	22445		21580		20145	17885	19930	25245	28290	28290	23200	18515	19910	22630	
MONTHLY NET ENERGY - GWH	12478		10982		11440	10205	10706	11737	13517	13231	11067	10671	10695	12185	
														CAGR (5)	
	2012		2013		2014	2015	2016	2017	2018	2019	2020	2021	2022	2013 to 2022	
SUMMER PEAK - MW	25880	A	27840		28290	28825	29350	29790	30155	30525	30860	31205	31520	1.4	
WINTER PEAK - MW (2)	20775	A	22445		22630	22810	22970	23110	23235	23350	23470	23585	23700	0.6	
NET ANNUAL ENERGY - GWH (3)	128047	A	137045	(4)	138910	140895	142795	144470	145940	147265	148535	149775	151005	1.1	

FOOTNOTES:

A = ACTUAL

(1) Recognizing that the seasonal peaks usually occur within a few months of the year, the forecasted monthly peaks of July and August have been replaced by the summer peak, and December and January have been replaced by the winter peak.

(2) Winter beginning in December of the year shown.

(3) May not equal sum due to rounding.

(4) Forecasted value only; does not include the January 2013 actual monthly net energy shown above.

(5) Compound Annual Growth Rate (%).

Excerpt 2 Table

2013 CELT & RSP Forecast Detail: ISO-NE Control Area, New England States, RSP Sub-areas, and SMD Load Zones

	Summer 50/50 CELT Peak	Summer 90/10 CELT Peak	Summer Passive Demand Resource	Summer 50/50 Peak Net PDR	Summer 90/10 Peak Net PDR
SWCT					
%ISO-NE	8.7	8.7	10.9	8.6	8.7
2013	2415	2635	126	2289	2509
2014	2450	2670	124	2326	2546
2015	2490	2715	122	2368	2593
2016	2530	2760	101	2429	2659
2017	2565	2790	111	2454	2679
2018	2590	2820	120	2470	2700
2019	2615	2845	129	2486	2716
2020	2635	2870	137	2498	2733
2021	2660	2895	144	2516	2751
2022	2680	2920	151	2529	2769
%ISO-NE	8.5	8.6	5.7	8.8	8.8
CAGR	1.2	1.1		1.1	1.1
NOR					
%ISO-NE	4.5	4.5	5.6	4.4	4.5
2013	1240	1355	65	1175	1290
2014	1260	1370	64	1196	1306
2015	1280	1395	63	1217	1332
2016	1300	1415	52	1248	1363
2017	1315	1435	57	1258	1378
2018	1330	1445	62	1268	1383
2019	1340	1460	66	1274	1394
2020	1355	1470	70	1285	1400
2021	1365	1485	74	1291	1411
2022	1375	1495	78	1297	1417
%ISO-NE	4.4	4.4	2.9	4.5	4.5
CAGR	1.2	1.1		1.1	1

Note : SWCT- Southwestern CT

NOR- Norwalk, Stamford-Greenwich

Excerpt 3 Table

1.5 - Actual and Forecasted Energy and Peak Loads (Forecast is Reference with reduction for BTM PV) (1)

2014 ACTUAL

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MONTHLY PEAK LOAD - MW	21334	19654	19696	16011	16222	21263	24443	22694	23715	17053	18348	19812
MONTHLY NET ENERGY - GWH	12022	10468	11037	9452	9463	10400	12244	11229	10236	9710	9950	10926

2015 FORECAST

	JAN		FEB		MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MONTHLY PEAK LOAD - MW	20556	A	20070	A	19635	17735	19905	25230	28251	28251	23160	18670	20350	22740
MONTHLY NET ENERGY - GWH	11713	A	11015	A	11524	10092	10440	11664	13357	13014	10854	10549	10794	12194

2016 FORECAST

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MONTHLY PEAK LOAD - MW	22740	21505	19770	17870	20008	25463	28673	28673	23338	18770	20500	22920
MONTHLY NET ENERGY - GWH	12771	11166	11643	10186	10539	11777	13489	13143	10960	10661	10912	12336

	2014		2015		2016	2017	2018	2019	2020	2021	2022	2023	2024	CAGR (5) 2015 to 2024
SUMMER PEAK - MW	24443	A	28251		28673	29066	29483	29861	30182	30487	30804	31131	31455	1.2
WINTER PEAK - MW (2)	20556	A	22740		22920	23105	23280	23430	23570	23715	23865	24020	24175	0.7
NET ANNUAL ENERGY - GWH (3)	127317	A	138153	(4)	139583	141102	142614	143925	145182	146466	147837	149253	150666	1.0

FOOTNOTES:

A = ACTUAL

(1) Recognizing that the seasonal peaks usually occur within a few months of the year, the forecasted monthly peaks of July and August have been replaced by the summer peak, and December and January have been replaced by the winter peak.

(2) Winter beginning in December of the year shown.

(3) May not equal sum due to rounding.

(4) Forecasted value only; does not include the January 2015 actual monthly net energy shown above.

(5) Compound Annual Growth Rate (%).

Witness: **Witness Panel**
Request from: **Office of Consumer Counsel**

Question:
Provide two types of forecasts - annual usage forecast, and peak usage forecast- for the area of Greenwich served by the proposed Project. Provide a table for each forecast type showing by year: actual usage for 2010 through 2014; for 2015, year-to-date actuals for the first three quarters plus the forecasted fourth quarter; and forecasts for 2016 through 2022. Explain the following in detail and show all calculations: a. base starting point for the forecast; b. how the forecast takes into account actual usage, and historical trending; c. how the forecast incorporates conservation, load management, energy efficiency, and growth prospects for the proposed Project's service area; d. the basis for, and application of, weather-normalization; and e. actual and forecasted heating and cooling degree days by month by year.

Response:
Eversource does not forecast annual usage of power (MWh) by service area. The capacity of electrical equipment including lines and transformers are measured in volt-ampere unit of measurement (MVA). The actual annual usage of power from 2010 to 2015 year to date - MWh and the actual peak demand and project peak demand 2010 through 2022 are included in the attachment.

Eversource's responses to a. to e. are as follows:

a) The year 2013 was chosen for as the basis for the projections because it represents the highest peak demand of the last past five years.

b) The 2013 demand is the actual demand in MVA seen at Cos Cob Substation on the 27.6-kV system during the summer of 2013, usage (actual MWh) or, historical trending are not included in the forecast.

c) The forecast is based on actual demand data that is already affected by the conservation load management programs and energy efficiency programs offered to the existing Greenwich customers. A new large customer load would be considered for distribution line and substation capacity upgrades, however none are included in the company’s forecast.

d) Eversource used the peak year of 2013 as a base year demand for forecasting. This base takes in consideration the hot temperatures and high heat indices that occurred during the 2013 summer. Eversource compared the load growth used for Cos Cob substation of 1% with the larger southwest Forecast Area (also 1.0%), and the ISO-New England Forecast Data in Southwest Connecticut and NOR (Norwalk, Stamford and Greenwich) of 1.2% Compound Annual Growth Rate (CAGR). The ISO-New England Forecast Data does include the application of weather-normalization.

e) Eversource uses actual peak demand values as the basis for its demand forecasts. If similar conditions affecting peak demand occur in the future, Eversource anticipates that the load on its equipment will be consistent with its forecasted peak demand level for the particular year. The ISO-New England Forecast Data does include the application of actual and forecasted heating and cooling degree days by month by year.

Annual Usage MWh:

Substation	kV	2010 MWh	2011 MWh	2012 MWh	2013 MWh	2014 MWh	YR-TO-DATE 2015 (NOV15)) MWh
Cos Cob 11R 27.6kV	27.6	202,277,230	478,812,970	464,887,551	475,093,662	470,489,183	389,983,021

Peak Demand Actual and Forecast:

Cos Cob 27.6-kV System LOAD [MVA]						
	Actual Peak Demand					
Transformers	**2010 MVA**	**2011 MVA**	**2012 MVA**	**2013 MVA**	**2014 MVA**	**2015 MVA**
11R-1X	19.1	24.3	30.4	26.8	22.4	24.2
11R2X+3X	100.6	97.5	97.8	103.7	85.3	90.6
Total MVA	119.7	121.8	128.2	130.5	107.7	114.8

Cos Cob 27.6-kV System LOAD [MVA]							
Transformers	Projected Peak Demand						
	2016 MVA	**2017 MVA**	**2018 MVA**	**2019 MVA**	**2020 MVA**	**2021 MVA**	**2022 MVA**
11R-1X	27.6	27.9	28.2	28.4	28.7	29.0	29.3
11R2X+3X	106.8	107.9	108.9	110.0	111.1	112.2	113.4
Total MVA	134.4	135.7	137.1	138.5	139.9	141.3	142.7