Exhibit B:
Alternate Modified Project

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Exhibit B, Section A

Detailed Description of Alternate Modified Project

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A. Detailed Description of Alternate Modified Project

As urged by the Council in its Docket 461 Opinion, Eversource consulted extensively with representatives of the Town of Greenwich in an attempt to reach an agreement with respect to the characteristics and configuration of the Proposed Modified Project that would be proposed to the Council by this Petition. In the course of these consultations, Eversource learned that the Town would not support any form of the Hybrid Alternative identified in Docket 461, notwithstanding its prior position that the Hybrid Alternative should be approved if a reliability need were demonstrated. (Docket 461, FOF No. 379; Opinion, p.6). However, the Town advised Eversource that it would support an all-underground configuration different from that originally proposed in Docket 461. Accordingly, Eversource designed and evaluated a new all-underground project configuration specified by the Town. Eversource expected that if the cost and other characteristics of this configuration proved to compare favorably to those of the refined Hybrid Alternative that Eversource was designing and evaluating pursuant to the Council's suggestion in its Docket 461 Opinion, Eversource would propose the all-underground configuration for the Proposed Modified Project. Ultimately, Eversource determined that:

- The all-underground configuration specified by the Town was feasible, but
- a refinement of the Hybrid Alternative configuration identified by the Siting Council was preferable.

Therefore, in this Petition, Eversource has proposed a refinement of the Hybrid Alternative as its Proposed Modified Project, as discussed in *Exhibit A* of this document. However, consistent with its discussions with the Town of Greenwich, Eversource is also presenting the all-underground configuration specified by the Town as an Alternate Modified Project in this *Exhibit B.* Appendices to this Exhibit provide detailed information regarding the Alternate Modified Project, including the following:

- *Appendix 9: Substation Drawings*
- *Appendix 10: Visual Simulation of New Substation*
- *Appendix 11: 100-Scale Maps*
- *Appendix 12: Underground T-Line Trench Section*
- *Appendix 13: EMF Calculations*

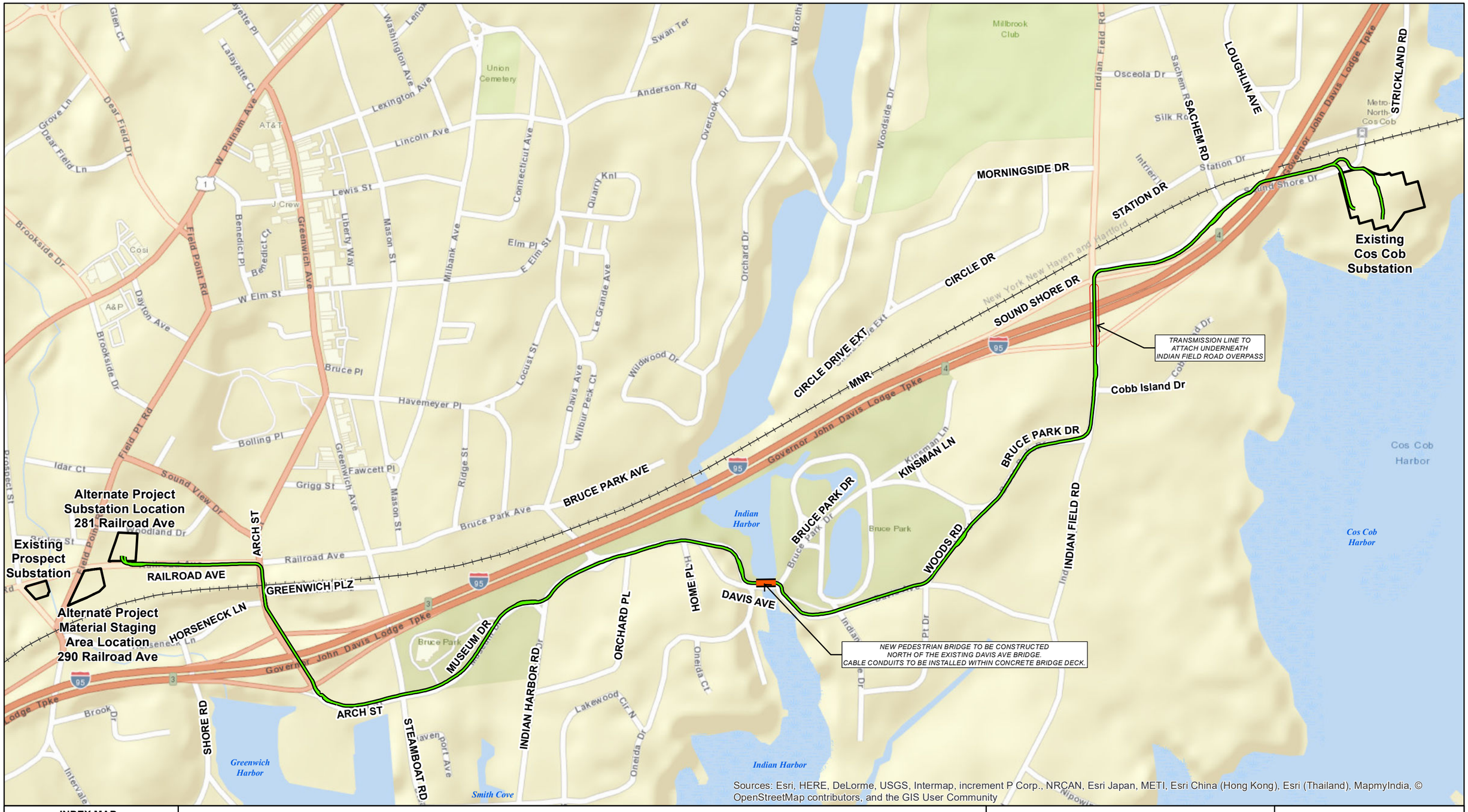
The Alternate Modified Project would involve:

- Two underground 115-kV transmission circuits using XLPE cables installed in a common duct bank;
- These circuits would extend between Eversource's existing Cos Cob Substation and a new "all-indoor" Greenwich Substation to be located at 281 Railroad Avenue; and
- The circuits would be aligned within or along public roads, including roads through Bruce Park.

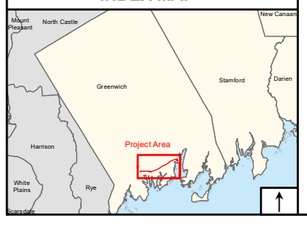
The modifications of Eversource's existing Cos Cob and Prospect substations would be the same as proposed by the Proposed Modified Project.

Compared to the Proposed Modified Project, the Alternate Modified Project would align the majority of the new 115-kV line south of I-95. *Figure A-1* depicts the Alternate Modified Project location. This section provides technical information with respect to the following elements of the Alternate Modified Project:

- Greenwich Substation and existing substation modifications (equipment, location);
- Underground cable system design, including conductor size and specifications;
- Transmission line route length and terminal points;
- Line capacity;
- Access roads and construction work areas, as needed for underground cable system installation and substation construction; and
- Estimated capital (construction) and life-cycle costs.



INDEX MAP



Legend

- Alternate Modified Route
- Proposed New Pedestrian Bridge
- Railroad
- Alternate Project Substation Location (281 Railroad Ave)
- Alternate Project Material Staging Area Location (290 Railroad Ave)
- Existing Cos Cob Substation Location
- Existing Prospect Substation Location

Base Map: ESRI Street Map

1 inch = 650 feet

650 325 0 650 Feet

Exhibit B Figure A-1
Alternate Modified Project Facilities Location

Greenwich Substation and Line Project
Greenwich, Connecticut

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A.1 Summary Comparison of the Proposed and Alternate Modified Projects

The following table describes high level differences between the Proposed Modified and Alternate Modified Projects.

Table A-1, Comparison of Proposed Modified Project and Alternate Modified Project

Proposed Modified Project	Alternate Modified Project
Scope	Scope
▪ Transmission ▪ Overhead: 1.5 miles ▪ Underground: 0.6 miles ▪ Greenwich Substation ▪ AIS Substation at 290 Railroad Avenue ▪ Cos Cob Substation ▪ Same modifications	▪ Transmission ▪ Underground: 2.3 miles ▪ Greenwich Substation ▪ All-Indoor, air insulated at 281 Railroad Ave. **Cos Cob Substation** ▪ Same modifications
Environmental Impact	**Environmental Impact**
▪ 1 wetland crossing required: temporary work pad approximately 1,080 feet^2 ▪ 1 NDDB Area crossing: ~80 feet ▪ 1 watercourse aerial crossing (Indian Harbor): ~75feet ▪ 2 100-year flood zone crossings: ~115 feet (Overhead) and ~155 feet (Underground) ▪ Avoids Bruce Park ▪ Vegetative clearing required (~5.5 ac in MNRROW and 3.4 ac off MNRROW)	▪ 0 wetland crossings required ▪ 1 NDDB Area crossing: ~80 feet ▪ 1 watercourse bridged crossing (Indian Harbor at Bruce Park): ~110 feet ▪ 3 100-year flood zone crossings: ~3,780 feet ▪ Goes through Bruce Park ▪ Proposed pedestrian bridge over Indian Harbor at Bruce Park carrying the transmission line would span from bank to bank (~165 feet.), however, possible disturbance to the harbor at each bridge foundation location ▪ Installed beneath roadways in Bruce Park, avoiding off-road excavation ▪ No significant vegetative clearing required
Cost	**Cost**
▪ ~$78M	▪ ~$100M

A.2 New Greenwich Substation and Existing Substation Modifications

As with the Proposed Modified Project, a new Greenwich Substation would be constructed for the Alternate Modified Project. Similarly, the existing Cos Cob and Prospect substations would be modified.

A.2.1 Proposed Greenwich Substation

Per the request of the Town of Greenwich, for the Alternate Modified Project, the new Greenwich Substation would be designed to be entirely surrounded by an enclosure. This all-indoor substation would be constructed on a 0.75-acre site at 281 Railroad Avenue (refer to *Figure A-2* for locational map).

Figure A-2, 281 Railroad Avenue Alternate Greenwich Substation Location Map

The site, which is industrially zoned, is owned by Eversource and used for storing materials, such as utility poles and was presented as an alternate site in the Docket 461 Application. Residential parcels about the site. The characteristics of the site are described in detail in the Docket 461 Application (refer to *Section H.2.2.2*) and in paragraphs 253 – 255 and 257 of the Docket 461 Findings of Fact.

Preliminary plan and section drawings of the Alternate Greenwich Substation are provided in *Appendix 9* and a visual simulation of the substation is provided in *Appendix 10*. *Table A-2* summarizes the components of the Greenwich Substation, as identified for the Alternate Modified Project, that differ from the Greenwich Substation as identified for the Proposed Modified Project.

Table A-2, Summary of Greenwich Substation Components:
Comparison of Alternate Modified Project, Proposed Modified Project, and Original Project

PROPOSED VERSUS ALTERNATE MODIFIED PROJECT: GREENWICH SUBSTATION COMPONENTS		
Substation Components	**Proposed Modified Project (290 Railroad Avenue)**	**Alternate Modified Project (281 Railroad Avenue)**
Two 60-megavolt ampere (MVA) transformers	✓	✓
Future Mobile Transformer	✓	
One 115-kV circuit breaker	✓	✓
13.2-kV Switchgear	✓	✓
The 13.2-kV switchgear enclosure (switchgear remains)	✓	
Two Circuit Switchers		✓
Two new 115-kV solid dielectric underground transmission line exits	✓	✓
Two 115-kV underground termination structures, four circuit switchers, two disconnect switches	✓	
Architecturally enhanced building enclosure surrounding the entire substation except for roof opening above the transformers and circuit switchers		✓
AIS design	✓	✓
15-foot-tall perforated brick veneer wall with an architectural treatment surrounding the substation site	✓	
One lightning mast approximately 65 feet in height	✓	
Two neutral reactors	✓	✓
Battery Room & toilet	✓	✓
Separate control house for transmission relaying, battery, and toilet	✓	

A.2.2 Modifications at Cos Cob Substations

The modifications at Cos Cob Substation that would be required for the Alternate Modified Project would be the same as described for the Proposed Modified Project.

A.2.3 Prospect and Byram Substations

The Prospect Substation modifications required for the Alternate Modified Project, all of which would be located within the existing substation facility, would be the same as described for the Proposed Modified Project. Byram Substation would remain in service with no modifications.

A.3 Transmission Supply Lines

For the Alternate Modified Project, a new, approximately 2.3-mile double-circuit underground 115-kV transmission line would be installed to link Cos Cob Substation to a proposed Greenwich Substation at 281 Railroad Avenue. This underground line would consist entirely of XLPE solid dielectric cable, as described for the Proposed Modified Project. Preliminary splice vault locations are depicted along the underground cable route on the 100-Scale maps in *Appendix 11*. As the maps show, the Alternate Modified Route would be located along public roads, mostly south of and generally parallel to I-95.

A.3.1 Line Design and Configuration

The proposed 2.3-mile underground 115-kV transmission line would consist of two XLPE cable circuits, each of which would consist of three phases, so that the cable system would comprise of six cables in total. Each phase of each circuit would consist of one 3500-kcmil copper-conductor cable insulated to 115-kV with approximately 0.75 inches of XLPE insulation. Each cable would be approximately 4.6 inches in diameter.

Three electric cables would be installed in PVC ducts encased in concrete. Except for short distances at their terminal points, the two circuits would be encased in a common concrete duct bank. Smaller conduits would also be installed in the duct bank for the communications, temperature monitoring, and ground continuity cables. *Appendix 12* and *Figure*[1] *A-3* illustrate a typical underground duct bank cross-section.

[1] All drawing details within this document are preliminary and are not intended to be used for construction at this time.

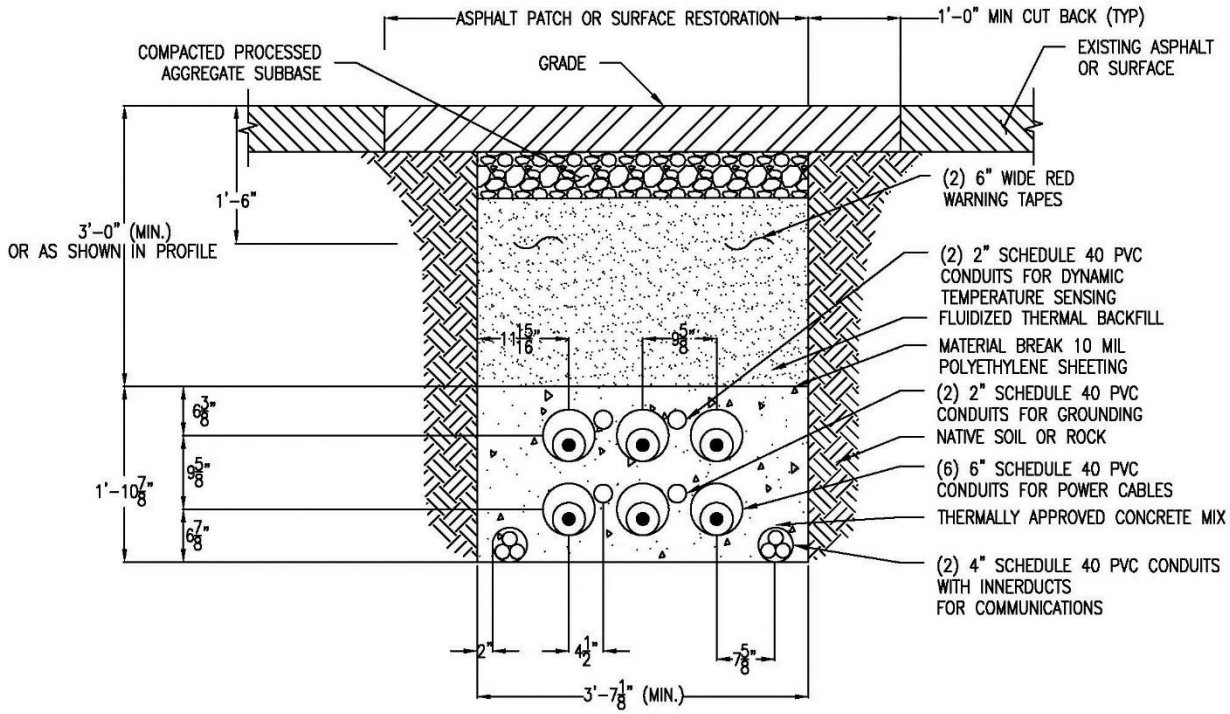

Figure A-3, Underground Duct Bank Cross Section

A.3.1.1 Splice Vaults

Along the 2.3-mile underground length of the Alternate Modified Route, eight splice vault locations would be required with two vaults required at each splice location (one for each circuit), for a total of sixteen vaults. The original Project Application details the specifications for splice vaults. Compared to the Original Project, vaults for XLPE cables would be very similar to vaults used for HPFF cables, with the HPFF vaults being slightly wider. The main difference is that, since HPFF cables are enclosed in steel pipes, two HPFF circuits may be installed in one vault, while the XLPE circuits require an individual splice vault for each circuit. The approximate dimensions for these splice vaults would be 7 feet deep by 7 feet wide by 22 feet long (see *Figure A-4* for an example three-dimensional rendering of a splice vault). Splice vaults would be located either within road ROWs (to the extent that space is available given the locations of other existing underground utilities) or on private property adjacent to road ROWs (refer to *Appendix 11* for anticipated splice vault locations).

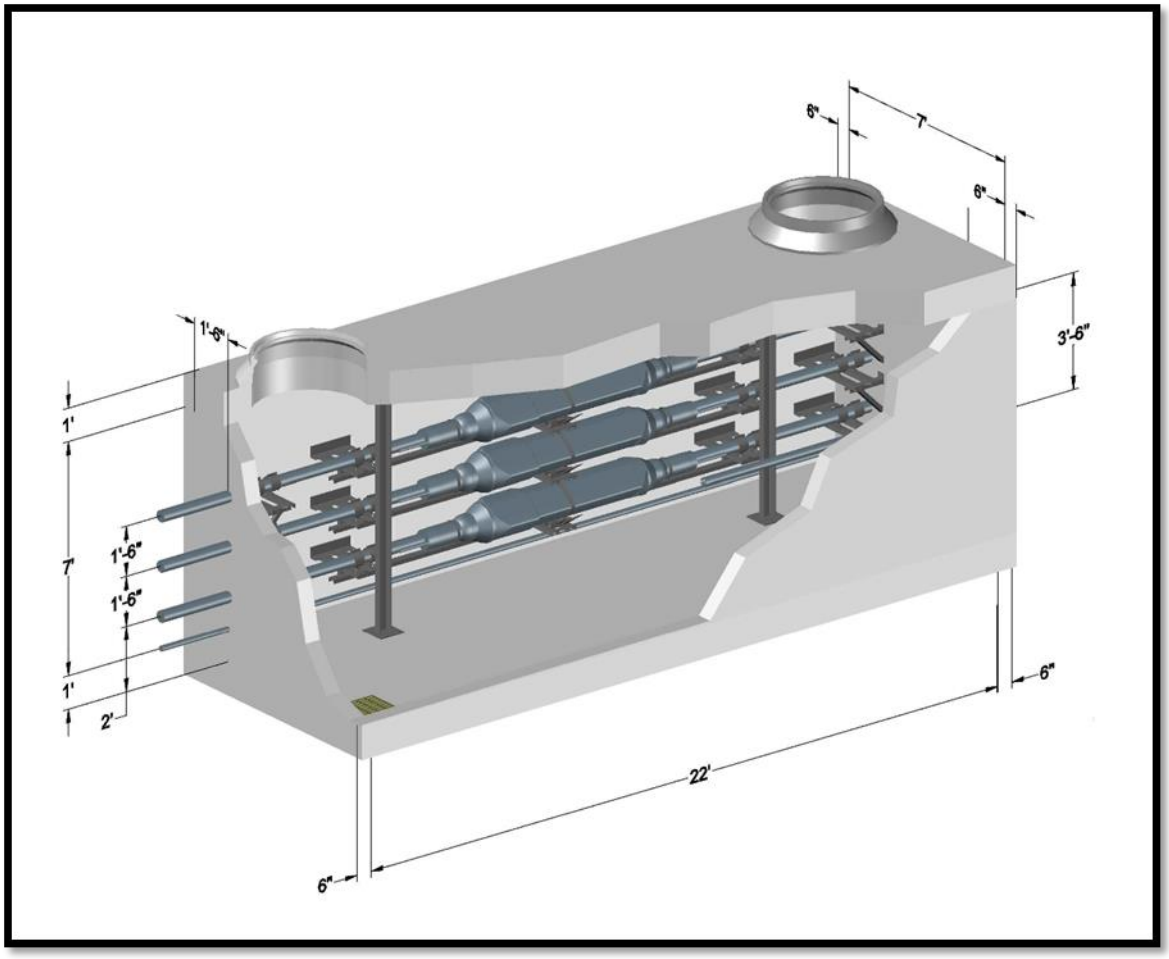

Figure A-4, Splice Vault Rendering

Line Design Voltage and Capacity

The 115-kV transmission line would be designed to operate at a nominal voltage of 115,000 volts and would provide approximately 192 megavolt amperes (MVA) of summer normal line capacity.

A.4 Alternate Modified Route

The Alternate Modified Route would extend for approximately 2.3 miles, as illustrated on *Figure A-1*, and shown in detail on the *Appendix 11* maps. The Alternate Modified Route is summarized below:

- The cables for each of the circuits would exit, underground, from Cos Cob Substation. Each set of cables would follow a separate route within and exiting from the substation and crossing the two-lane Sound Shore Drive (refer to Map Sheet 1).
- The circuit routes would converge in the railroad commuter lot north of Sound Shore Drive. From there, the circuits would be installed in a common duct bank and follow the same route to the west/southwest, crossing beneath I-95, before traversing ConnDOT Highway property,

parallel to Sound Shore Drive. The lines would then follow Sound Shore Drive to the intersection with Indian Field Road.

- The cable system would then cross I-95 by attaching it to the underside of the overpass bridge following Indian Field Road south (refer to Map Sheet 2 in *Appendix 11*)[2].
- After crossing I-95, the cable system would continue south along the two-lane Indian Field Road until turning west on Bruce Park Drive.
- From Bruce Park Drive, the cable system would intersect with and continue south along Wood Road, traversing Bruce Park beneath the paved surface of the roadway, before turning west along Davis Avenue, crossing Indian Harbor, and then intersecting with Indian Harbor Drive (refer to Map Sheet 6).
- The cable system would be aligned along Indian Harbor Drive to Museum Drive and then to Arch Street (State Route 742), crossing beneath I-95 along Arch Street near I-95 Exit 3.
- At the intersection of Arch Street and Railroad Avenue, the cable system would turn west to follow Railroad Avenue to terminate at the new Greenwich Substation at 281 Railroad Avenue.

In order to cross Indian Harbor, which is perpendicular to Davis Avenue, the Town of Greenwich proposed that Eversource construct a pedestrian bridge just north of the existing Davis Avenue Bridge. This bridge would be designed to carry the proposed transmission line and its associated conduits over the harbor. The Town reasoned that the proposed pedestrian bridge would minimize disruption to Indian Harbor or potential conflicts with the existing Davis Avenue Bridge, which is scheduled for replacement at some time in the future. Although Eversource prefers to utilize a cofferdam to facilitate the crossing of Indian Harbor in this area, the Company would coordinate the design of the pedestrian bridge with the Town of Greenwich should the Council approve the Alternate Modified Route, including the pedestrian bridge. If Eversource were to utilize a cofferdam, it would cost approximately $1.8M less than building a pedestrian bridge.

A.5 Construction and Operations/Maintenance Procedures

A.5.1 Conditions Requiring Special Construction Procedures

Along the Alternate Modified Route, Eversource's constructability reviews identified two areas where land uses or physical constraints pose potential challenges and warrant the consideration of special

[2] Alternately, if ConnDOT approval cannot be obtained for attaching the cables to the overpass, the cable system would cross beneath I-95 from a point east of Indian Field Road by using a trenchless method. The proposed trenchless installation is a method called pipe jacking, which consists of an operation that simultaneously jacks or pushes a casing pipe into an excavated cavity. Staging areas for a trenchless installation would be located between the entrance exit ramps of I-95. Specifically, the north staging area would be located between the exit 4 southbound on- and off-exit ramps and the south staging area would be located between the exit 4 northbound on- and off-exit ramps.

construction procedures or alternative construction techniques for the underground cable system. These areas include the crossing of I-95 east of the Indian Field Road I-95 overpass and the Indian Harbor crossing within the proposed pedestrian bridge[3].

The following sections describe the analyses conducted to date of construction procedures for these crossings. If the Alternate Modified Route is selected, site-specific procedures would be provided in the Project D&M Plans, after the completion of a final Project design.

A.5.1.1 Indian Field Road I-95 Overpass

As illustrated on *Figure A-1* and shown in detail in the *Appendix 11* maps, the Alternate Modified Route would cross I-95 by way of Indian Field Road near I-95 Exit 4 (refer to Map Sheets 2 and 3). In this area, Indian Field Road is elevated above I-95. At the Town's suggestion, Eversource evaluated attaching the cables to the I-95 overpass on Indian Field Road and, although technically feasible, the Company determined it was not the most practical or cost-effective option. In meetings with ConnDOT, Eversource was told that using the overpass would not be the agency's preferred choice for crossing the highway. To avoid a bridged crossing (attaching circuits to the existing Indian Field Road overpass bridge structure) Eversource determined that using trenchless technology to install the cable system beneath I-95 would be a viable alternative.

Trenchless Installation beneath Interstate 95 Variation

If approval from ConnDOT to attach the cable to the Indian Field Road overpass cannot be obtained, a trenchless installation method, such as pipe jacking[4], would be used to install the cable system beneath I-95. The general procedure for a trenchless cable installation would include the following:

- Establish staging areas (each approximately 0.5 acre) on each side of I-95, between the Exit 4 on- and off-ramps.
- Within these staging areas, excavate vertical shafts on both sides of the highway. Such excavations would be approximately 15 feet wide, 40 to 50 feet long, and up to 15 feet deep.
- Position a boring machine at the bottom of the bore pit on one side of the highway. The boring machine would be used to bore a 42-inch diameter hole beneath the highway, across to the opposite pit.
- A 42-inch diameter casing pipe would then be installed between the bore pits and the cable ducts pulled into the casing pipe.

[3] Along the Alternate Modified Project Route, the cable system would cross beneath I-95, following local roads, in two other locations. The Indian Field Road crossing is the only overpass of I-95 along the Alternate Modified Route.
[4] Pipe jacking was a trenchless installation procedure explored based on the Town's opposition to utilizing Horizontal Directional Drilling methods along the Alternate Modified Route.

- The remaining voids in the casing would be filled with a thermal grout mixture (such as flow fill or thermal) concrete.

Final excavation size of the horizontal bore pits would be determined by a number of different factors dependent on the length, bore diameter, soil conditions, and groundwater conditions. Excavation stabilization methods or equipment (such as sloping or a trench box) would be employed to keep workers safe in the bore pit. *Figure A-5* depicts the trenchless installation beneath I-95.

The additional cost of pipe jacking underneath I-95, in lieu of the overpass cable attachments, is approximately $2.8 million.

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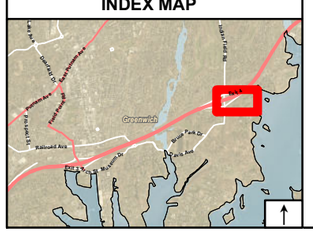
INDEX MAP



Legend

- Alternate Modified Route
- Alternate Modified Route Variation
- Proposed Splice Vault
- Pipe Jacking Excavation Pit
- Approximate Parcel Boundary
- Coastal Boundary (CTDEEP GIS)

FEMA Flood Zones

- 100-Year Flood Zone
- Waterbody
- Stormwater Outfall

Base Map: 2016 Orthophotography (CTECO Map Service)

1 inch = 100 feet

100 50 0 100 Feet

Exhibit B Figure A-5
Trenchless Crossing Beneath I-95 Variation

Greenwich Substation and Line Project
Greenwich, Connecticut

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A.5.1.2 Davis Avenue Bridge

Davis Avenue, a two-lane town road, spans Indian Harbor within the designated Coastal Boundary, near Bruce Park (refer to *Appendix 11,* Map Sheet 5). As introduced above, in the Alternate Modified Route, the new 115-kV lines would be aligned above Indian Harbor via a new pedestrian bridge that would be constructed as part of this Project, adjacent to (and north of) the existing Davis Avenue Bridge. Construction activities to install the bridge would not take place below the ordinary high water mark.

The general procedure for installing the pedestrian bridge would utilize these general methods:

- Establish erosion and sedimentation controls around the proposed abutment foundation.
- Install sheet piling around the limits of excavation for the proposed abutment foundations.
- Excavate for abutment foundations.
- Form and place concrete for abutment and abutment foundations.
- Remove sheet piling.
- Install steel truss.
- Form and place concrete for superstructure with conduits formed within the bridge.
- Complete architectural treatments.

A.6 Estimated Project Costs

The estimated capital cost for the Alternate Modified Project is approximately $100 million, subdivided by component as follows:

- Cable system: approximately $57.1 million (approximately $52.5 million and $4.6 million for the transmission and distribution portions of the line, respectively).
- Alternate Greenwich Substation (at 281 Railroad Avenue, AIS all-indoor design): approximately $29 million (approximately $12.3 million and $16.7 million for the transmission and distribution portions of the substation, respectively).
- Proposed Modifications at Cos Cob Substation: approximately $12.7 million.
- Proposed modifications at the existing Prospect Substation: approximately $0.9 million.

A.7 Facility Service Life and Life-Cycle Costs

In accordance with the Council's *Life-Cycle Cost Studies for Overhead and Underground Transmission Lines* (2012), Eversource performed a present-value analysis of capital and operating costs over a 40-year economic life of the Project. The following items were considered:

- Project Capital Costs (Transmission Line Only is $52.5 million).

- Annual carrying charges of the capital cost (14.1%).
- Annual operation and maintenance costs ($11,435 per mile for 2.3 miles of UG construction).
- Cost of energy losses (load factor of 0.62, load growth of 2.0%, cost of electricity of $48/mil, Peak current of 218 Amps/phase).
- Present Value Discount Factor is assumed to be 8%.
- Cost of Capacity (assumed to be zero for this Project).

Applying these factors, the life-cycle cost for the proposed transmission lines is approximately $89.1 million. The resulting life-cycle cost per mile is $38.7 million.

Exhibit B, Section B

Existing Environmental Conditions

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B. Existing Environmental Conditions

This section describes the existing environmental conditions associated with the Alternate Modified Route and provides a context for the discussion in *Exhibit B, Section C*, which considers the extent to which the Alternate Modified Project could potentially affect resources and how such effects may be mitigated.

B.1 Alternate Modified Route

At the Town's request, Eversource evaluated an all-underground transmission line route. Under this scenario, the Alternate Substation would be constructed at 281 Railroad Avenue. The ±2.3-mile long double-circuit transmission line would consist of trenched-in XLPE cables extending west from the Cos Cob Substation to 281 Railroad Avenue via Sound Shore Drive, Indian Field Road, Bruce Park Drive, Wood Road, Davis Avenue, Indian Harbor Drive, Museum Drive, Arch Street and Railroad Avenue. All underground installation work associated with the new transmission line would be conducted within the roadways with two exceptions. First, the transmission lines would be attached under the Indian Field Road overpass structure to cross I-95. Secondly, Eversource will construct a new ±165-foot pedestrian bridge with a duck bank within its superstructure, approximately 25 feet north of the Davis Avenue Bridge to span a portion of Indian Harbor in Bruce Park.

One variation along the Alternate Modified Route is also under consideration. In the event that ConnDOT does not approve affixing the transmission lines to the Indian Field Road overpass, an underground trench would extend south from the west end of Sound Shore Drive to connect the route from Sound Shore Drive back onto Indian Field Road south of the bridge. This variation would require a jack and bore horizontal drilling to cross beneath I-95 between the highway access ramps.

The property at 290 Railroad Avenue would be used for construction equipment and material storage associated with the Alternate Modified Project.

B.2 Alternate Modified Project Substations

The Project requires the construction of a new bulk substation at the west end of the Alternate Modified Project Area, within a General Business zone[5]. Modifications to the existing Cos Cob and Prospect

[5] See Greenwich Municipal Code, Chapter 6 Land Use, Article 1 Building Zone Regulations, Sec. 6-105 Use Regulations And Special Requirements For The GB [General Business] Zone.

substations are also required as part of the Alternate Modified Project and are identical to those proposed for the Proposed Modified Project.

B.2.1 Alternate Modified Substation Location

Under this alternative, the proposed location of the new 115-kV Greenwich Substation would be at 281 Railroad Avenue. This ±0.80-acre parcel is primarily undeveloped, with the exception of an asphalt parking lot, and has been used by Eversource for surface storage of materials, including wood poles. No structures are located on the property. This property is located outside of the 100-year and 500-year flood zones, and no wetlands or watercourses are located on the parcel. It provides no significant habitat for wildlife. Residential properties about the site. Environmental resources associated with the property at 281 Railroad Avenue are depicted on *Figure B-1*.

B.2.2 Cos Cob Substation

As described previously, the Cos Cob Substation property on Sound Shore Drive consists primarily of previously disturbed and developed land, where both Eversource and the MNR maintain extensive substation and other electrical infrastructure.

B.3 Environmental Resources Along the Alternate Modified Route

Environmental features proximate to the Alternate Modified Route can be found in *Figure B-2*.

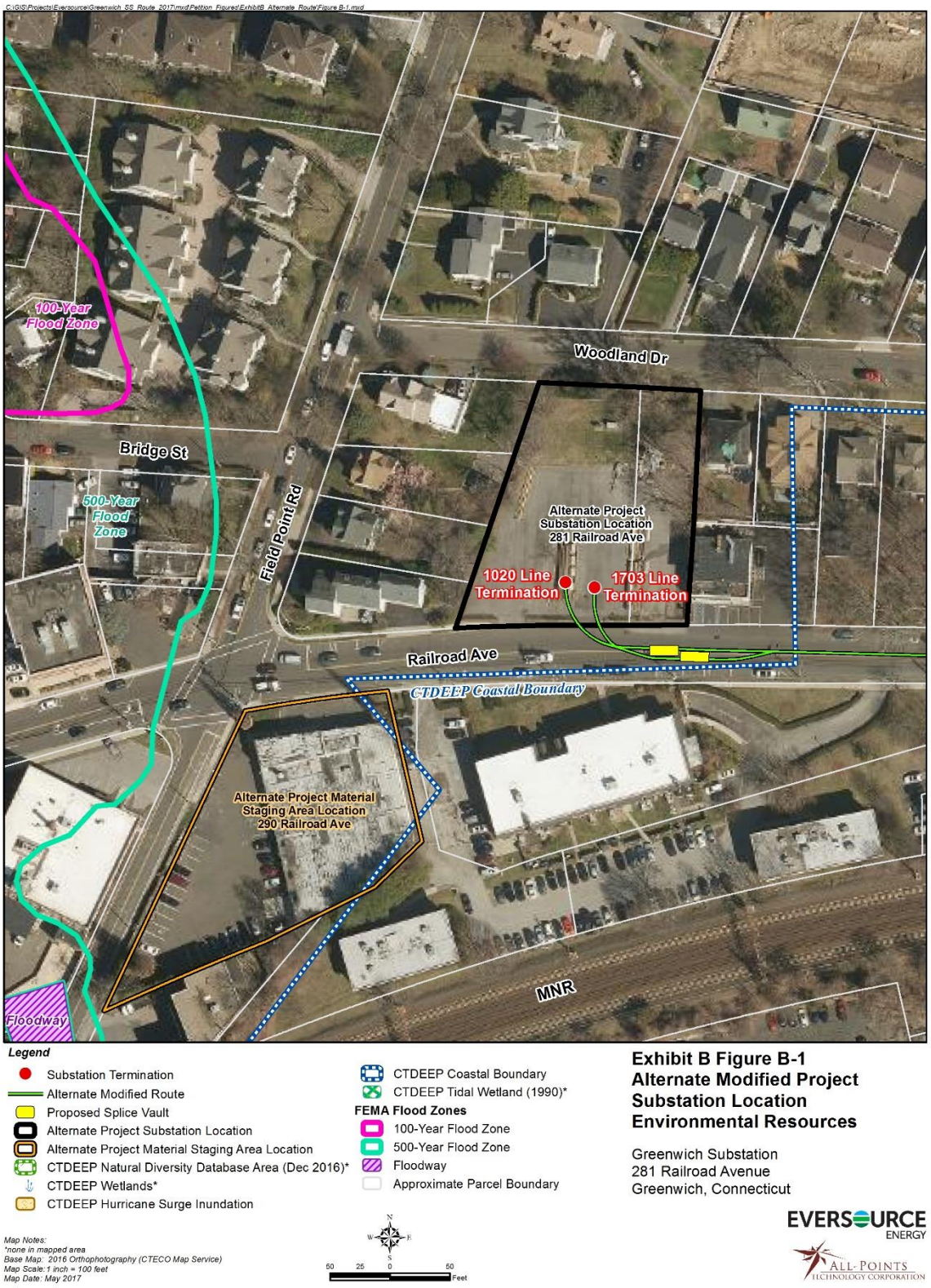

Figure B-1, Alternate Modified Substation Location Map

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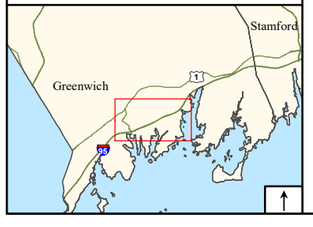
Ymca
Julian Curtiss School
Millbrook Country Club
LOUGHLIN AVE
STRICKLAND RD
SACHEM RD
Cos Cob Railroad Station
MORNINGSIDE DR
STATION DR
Existing Cos Cob Substation
CIRCLE DR
SOUND SHORE DR
TRANSMISSION LINE TO ATTACH UNDERNEATH INDIAN FIELD ROAD OVERPASS
Greenwich Avenue Historic District
Town Hall Playground
Greenwich Town Hall
Greenwich Municipal Center HD
Town Hall & Fields
U.S. Post Office
CIRCLE DRIVE EXT
MNR
COBB ISLAND DR
Cos Cob Harbor
BRUCE PARK DR
KINSMAN LN
BRUCE PARK AVE
Alternate Project Substation Location 281 Railroad Ave
Indian Harbor
Bruce Park
ARCH ST
RAILROAD AVE
GREENWICH PLZ
Watercourse 1
WOODS RD
INDIAN FIELD RD
Alternate Project Material Staging Area Location 290 Railroad Ave
HORSENECK LN
I95
MUSEUM DR
ORCHARD PL
HOME PL
DAVIS AVE
NEW PEDESTRIAN BRIDGE TO BE CONSTRUCTED NORTH OF THE EXISTING DAVIS AVE BRIDGE DUCT BANK TO BE INSTALLED WITHIN SUPERSTRUCTURE OF BRIDGE
Horseneck Brook
Indian Harbor
Smith Cove
INDIAN HARBOR RD
SHORE RD
Greenwich Harbor
Roger Sherman Baldwin Park
STEAMBOAT RD

INDEX MAP



Legend

- Alternate Modified Route
- Proposed New Pedestrian Bridge
- Alternate Project Substation Location (281 Railroad Ave)
- Alternate Project Material Staging Area Location (290 Railroad Ave)
- Existing Cos Cob Substation Location
- Approximate Parcel Boundary
- National Register of Historic Places Site
- National Register of Historic Places Historic District
- Natural Diversity Database Area (12/2016)
- Inland Wetland
- Waterbody
- CTDEEP Tidal Wetland (1990)
- CTDEEP Watercourse
- CTDEEP Coastal Boundary
- CTDEEP Hurricane Surge Inundation
- Bedrock Outcrops

FEMA Flood Zones

- 100-Year Flood Zone
- 500-Year Flood Zone
- Floodway

1 inch = 650 feet

650 325 0 650 Feet

Base Map: 2016 Orthophotography (CTECO Map Service)

Exhibit B Figure B-2
Alternate Modified Project
Environmental Resources

Greenwich Substation and Line Project
Greenwich, Connecticut

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B.3.1 Topography, Geology and Soils

Topography at the Substation sites and along the Alternate Modified Route can be characterized as generally flat with no major topographic features to note. Bedrock geology consists of two different formations. The Nodular member of Harrison Gneiss, which contains prominent quartz-sillimanite nodules, is the principal bedrock formation along the Alternate Modified Route. Bedrock in the extreme western portion of the Alternate Modified Route (roughly west of Steamboat Road) is identified as Golden Hill Schist. Golden Hill Schist is described as a gray to silvery, medium to coarse-grained, generally layered schist and granofels, composed of quartz, muscovite, biotite, plagioclase, and garnet.

The character of the surficial geology along the Alternative Modified Route is predominantly glacial till of varying thickness over irregular bedrock, as well as artificial fill. As this line route crosses Bruce Park and Indian Harbor, the surficial geology changes to a mix of sand and gravel areas, and depressions/watercourse crossings of outwash and alluvium. Information concerning the physical properties and classification of soils in the vicinity of the Alternate Modified Project is presented in *Table B-1*.

Table B-1, Principal Soil Associations within the Alternate Modified Route

Soil Map Unit Name and Symbol	General Description	Hydric Soil	Depth to Bedrock
Udorthents - Urban land complex	Areas of substantial cutting or filling interspersed with highly developed areas	No	0-25 feet
Urban land	Highly developed areas	No	0-25 feet
Charlton-Chatfield complex, 3 to 15 percent slopes, very rocky	Well drained coarse loamy soil	No	0-25 feet
Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	Well drained, coarse loamy and mixed loamy soil	No	0-25 feet
Urban land-Charlton-Chatfield complex, rocky, 3 to 15 percent slopes	Well drained coarse loamy soil in highly developed areas	No	0-25 feet
Urban land-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	Well drained coarse loamy and mixed loamy soil in highly developed areas	No	0-25 feet

Sources: USDA Soil Conservation Service, Soil Surveys of Fairfield County Soil Survey Staff; Natural Resources Conservation Service, United States Department of Agriculture; Soil Survey Geographic (SSURGO) http://soildatamart.nrcs.usda.gov.

B.3.2 Water Resources

The Alternate Modified Route is located within the Southwest Coast Major Drainage Basin. Major surface water bodies include Indian Harbor, Cos Cob Harbor, Greenwich Creek, and Greenwich Harbor.

B.3.2.1 Groundwater Resources

Groundwater beneath the Alternate Modified Route is classified by the CT DEEP as both GA and GB. Class GA designations are located primarily within the central portion of the Alternate Modified Route. The GA groundwater classification assumes ground water quality is fit for human consumption without treatment. Class GB designations are mapped at the proposed and existing substation parcels, as well as the western and eastern ends of the Alternate Modified Project Area, where dense commercial/industrial development occurs. The GB classification indicates a water supply not fit for human consumption without treatment.

No water supply wells are located along the Alternate Modified Route and, based on available mapping, this route is not located within an Aquifer Protection Area.

B.3.2.2 Flood Hazard Areas

Areas along the Alternate Modified Route lie within 100-year flood zone areas, as established by the Federal Emergency Management Agency (FEMA). These areas include locations along Railroad Avenue, Arch Street and substantial portions of Davis Avenue near Indian Harbor.

No flood zones are located on the Alternate Modified Substation site at 281 Railroad Avenue. The edge of the 500-year flood zone is located approximately 200 feet from the western property line of 281 Railroad Avenue[6].

Hurricane Surge Inundation data developed by the National Hurricane Center indicate that portions of the Alternate Modified Route are located within Category 1, 2, 3, and 4 areas[7]. These Hurricane Surge Inundation Areas encroach upon Arch Street (associated with Greenwich Harbor), Davis Avenue (Indian Harbor), and the Cos Cob Substation property. No Hurricane Surge Inundation Areas encumber the property at 281 Railroad Avenue.

[6] National Geodetic Vertical Datum of 1929; FEMA Map, Panel Number 09001C 0494G, revised July 8, 2013.
[7] CT DEEP Geographic Information System data, based on *Worst Case Hurricane Surge Inundation* Areas for Category 1 through 4 hurricanes striking the coast of Connecticut. Hurricane surge values were developed by the National Hurricane Center using the SLOSH (Sea Lake and Overland Surge from Hurricanes) Model to assist emergency management officials in hurricane preparedness and operations.

B.3.2.3 Coastal Area Resources

Nearly the entire Alternate Modified Route lies within the coastal resource boundary (Coastal Boundary) pursuant to the Connecticut Coastal Management Act (CCMA). The property at 281 Railroad Avenue lies entirely outside of the Coastal Boundary as identified by CCMA. Approximately 1,120 square feet of the Proposed Material Staging Area located at 290 Railroad Avenue is located within the Coastal Boundary, while the entire Cos Cob Substation is located within the Coastal Boundary.

B.3.2.4 Inland and Tidal Wetlands and Watercourses

One (1) watercourse was identified proximate to the Alternate Modified Route, as depicted on Sheet 5 of the 100-Scale Maps provided as *Appendix 11* and discussed further in this section.

Alternate Modified Route Watercourse 1

Watercourse 1, part of Indian Harbor, is a complex of open water features south of I-95 located interior to Bruce Park. This system generally drains southward eventually into Long Island Sound. The banks of these waterbodies are well developed with stone armoring, maintained lawn, sheer bedrock cliffs, and some limited vegetated buffers. Easterly limits of these resources include vegetated buffering and stagnant back-water wetland areas. Northern limits of this resource are heavily influenced by road debris and possess little wildlife habitat value. Numerous waterfowl likely use the water bodies and adjacent habitats in Bruce Park, including ospreys, double crested cormorants, mute swans, snowy egrets, green heron, Canadian geese and numerous song birds.

B.3.2.5 Vegetation and Wildlife

Vegetation consists primarily of maintained lawns and a combination of natural and ornamental trees and shrubs along roadsides and on private properties. In general, larger stands of trees are found along the southern boundary of I-95 transportation corridor, generally providing screening from adjacent properties. Landscaping and older growth trees can be found in and around Bruce Park.

B.3.2.6 Threatened and Endangered Species

CT DEEP's NDDB mapping depicts polygons (areas of known habitat for state-listed endangered or threatened species, or species of special concern) on the Cos Cob Substation property. The Company consulted with CT DEEP NDDB regarding the Alternate Modified Project and the agency determined that no such resources would be impacted by the proposed activities. A copy of the CT DEEP letter is provided in *Appendix 3, Environmental Agency Responses*. No mapped areas of Critical Habitat are identified along the Alternate Modified Route.

The Company also completed consultations with the USFWS, in accordance with Section 7 of the Endangered Species Act (Section 7), through its IPaC system to determine if any federally-listed or proposed, threatened or endangered species or critical habitats exist in proximity to the Alternate Modified Route. The IPaC system identified two species (listed as "threatened") potentially occurring within the Project Area, including: red knot (*Calidris canutus*) and northern long-eared bat (NLEB, *Myotis septentrionalis*). Please see *Section C.3* of this *Exhibit B* for additional information. Results of the IPaC review are provided in *Appendix 3*.

Northern long-eared bat

The Proposed Modified Project is not within 150 feet of a known occupied maternity roost tree and is not within 0.25 mile of a known NLEB hibernaculum. There are currently no known NLEB maternity roost trees in Connecticut. The nearest NLEB habitat resource to the proposed activity is located in Greenwich ±4.3 miles to the north.

Red knot

The red knot is a shorebird typically found along the Connecticut coastline during northbound and southbound migration. These birds spend most of their time foraging along the waterline within the intertidal zone. Not known to occur at inland locations, red knots can be found on Connecticut's barrier beaches from mid-April to the end of May, and then again from July through mid-September[8]. Sometimes non-breeding individuals may linger along Connecticut barrier beaches between migratory periods, and late individuals may pass through on southbound migration well into November.

B.3.2.7 Fisheries

No CT DEEP Fisheries Management Areas exist proximate to the Alternate Modified Route. According to CT DEEP Fisheries Management data, the nearest fishery is associated with the upper portion of the Mianus River, approximately 1.20 miles northeast of the Cos Cob Substation.

B.3.3 Historic and Archaeological Resources

The Company's consultants, Heritage, reviewed and evaluated cultural resources associated with the Alternate Modified Route. This review revealed that there are four previously identified archaeological sites: a single National Register of Historic Places (NRHP) property (Cos Cob Railroad Station), two NRHP historic districts (Greenwich Avenue Historic District and Cos Cob Power Station Historic

[8] Connecticut Audubon Society Bird Finder for May 23: Red Knot - http://www.ctaudubon.org/2014/05/connecticut-audubon-society-bird-finder-for-may-23-red-knot/#sthash.oT1QBhV3.dpuf.

District[9]), and one property (former New York, New Haven & Hartford rail line) eligible for listing on the NRHP located within or in close proximity (500 feet).

Based on the results of its evaluation, Heritage concluded that the Alternate Modified Route would have a low probability of encountering intact cultural deposits or artifacts of archaeological significance. Further, Heritage determined that the Alternate Modified Project will not have adverse impacts on historic built resources or archaeological deposits.

The Heritage assessment report, entitled *Preliminary Cultural Resources Review of the Proposed Greenwich Substation and Line Project in Greenwich, Connecticut* is provided as *Appendix 2, Supplemental Cultural Resources Report*. A copy of this report has been forwarded to the CT State Historic Preservation Office (SHPO) for review and comment.

B.3.4 Noise

Land uses along the Alternate Modified Route consist of a mix of transportation, commercial, recreational and residential land uses. The existing noise environment is heavily influenced by traffic noise along local and state roads, including I-95, and the MNR corridor.

B.3.5 Air Quality

The state is currently designated as in attainment or is unclassified with respect to the National Ambient Air Quality Standards (NAAQS) for five criteria air pollutants: particulate matter no greater than 10 micrometers in diameter (PM10), sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead. In addition to these criteria pollutants, the state is currently designated as being in non-attainment with the 8-hour NAAQS standard for ozone, and the 2006 24-hour fine particulate matter (PM2.5) standard. Fairfield County is non-attainment for both the 8-hour ozone and 24-hour PM2.5 standard.

The U.S. Environmental Protection Agency (EPA) has determined that carbon dioxide (CO_2) is a greenhouse gas. Areas of non-attainment have not yet been established for CO_2 or other greenhouse gases.

[9] The Cos Cob Power Station was demolished in 2001 and as a result, lost much of its integrity of setting, materials, workmanship, design, and feeling. It is the opinion of Heritage Consultants, LLC that it is no longer eligible for inclusion in the National Register of Historic Places.

B.3.6 Scenic and Recreational Areas, Statutory Facilities and Surrounding Features

Four (4) Statutory Facilities are located in close proximity[10] to the Alternate Modified Route. These include:

- A child day care facility at the Putnam Indian Field School (101 Indian Field Road) is located 225 feet east of the Alternate Modified Route.
- Bruce Park. The Alternate Modified Route would extend through the Bruce Park road system.
- Cos Cob Park is adjacent to the Cos Cob Substation and shares a common entrance from Sound Shore Drive.
- Roger Sherman Baldwin Park, located on Arch Street (west of Steamboat Road), abuts a portion of the Alternate Modified Route.

Scenic and recreational opportunities proximate to the Alternate Modified Route are primarily associated with Bruce Park and Cos Cob Park.

[10] Distances measured from the closest boundary of the Statutory Facility to the nearest portion of the Alternate Modified Route.

Exhibit B, Section C

Potential Environmental Effect and Mitigation Measures

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C. Potential Environmental Effect and Mitigation Measures

This section identifies the potential environmental effects of the Alternate Modified Route, based on the development of an Alternate Modified Substation at 281 Railroad Avenue, installation of underground transmission supply lines and supporting infrastructure, the construction of the proposed pedestrian bridge just north of the Davis Avenue Bridge, and modifications to the existing Cos Cob Substation, using the proposed design and construction methods as described in *Section A*.

The proposed design, construction, and operation of the Alternate Modified Route would not have significant permanent adverse effects on the existing environment or on the scenic, historic or recreational values of the surrounding area. Eversource has incorporated, and will continue to incorporate, procedures into all phases of Alternate Modified Route development and implementation to promote environmental protection measures, in accordance with federal, state and local requirements. The locations of the construction-related features and environmental resources described herein are illustrated in the illustrated on the 100-Scale Maps provided as *Appendix 11*.

C.1 Alternate Modified Route and Substations

The Alternate Modified Route would use an all-underground transmission line route between the existing Cos Cob Substation on Sound Shore Drive and the Alternate Modified Substation location at 281 Railroad Avenue. The ±2.3-mile long double-circuit transmission line would consist of trenched-in cables extending west from the Cos Cob Substation to 281 Railroad Avenue via Sound Shore Drive, Indian Field Road, Bruce Park Drive, Wood Road, Davis Avenue, Indian Harbor Drive, Museum Drive, Arch Street and Railroad Avenue. Eight (8) pair of subsurface splice vaults would be installed along the route at the approximate following locations:

- Within the northeastern and northwestern portions of the existing Cos Cob Substation;
- Within the southern Sound Shore Drive ROW immediately east of the Sachem Road intersection;
- Within the central Indian Field Road ROW northwest of Cobb Island Drive;
- Within the southeastern Woods Road ROW just south of the Bruce Park Drive/Woods Road intersection;
- Within the eastern portion of the Davis Avenue (one-way north) ROW located northwest of the Davis Avenue Bridge;
- Within the northern Museum Drive ROW due east of the Museum Drive/Indian Harbor Drive intersection;
- Within the northwestern portion of the State of Connecticut Interstate 95 Commuter Lot;

- Within the central portion of the Railroad Avenue ROW just south of the Alternate Modified Substation at 281 Railroad Avenue.

All underground installation work associated with the new transmission line would be conducted within the roadways with two exceptions. First, the transmission lines would be attached under the Indian Field Road overpass structure to cross I-95. Secondly, a new ±165-foot pedestrian bridge with a duck bank contained within the infrastructure to carry the transmission supply lines is proposed just north of the Davis Avenue Bridge to span a portion of Indian Harbor in Bruce Park.

A variation under consideration if attaching the transmission lines to the Indian Field Road overpass is not feasible would divert the underground trench before the western terminus of Sound Shore Drive. This variation would extend southward to cross beneath I-95 before rejoining Indian Field south of the overpass and would require a jack and bore trenchless construction method to cross beneath between the highway access ramps and require the temporary installations of excavation pits on either side of the I-95 within the ConnDOT ROW. This area is undeveloped with no significant vegetation.

Because the work will occur primarily within public roads, the proposed construction areas are easily accessible and do not require the development of new entrance/egress points.

Construction at the Alternate Modified Substation will require some grading and excavation activities prior to installation of new facilities. The modifications of Eversource's existing Cos Cob and Prospect substations would be essentially the same as proposed by the Modified Project. Thus, potential environmental effects are unchanged from those discussed in *Exhibit A, Section C*.

C.2 Effects on Environmental Resources

This section identifies potential short- and long-term effects construction activities could have on the environment, including scenic, historic, and recreational resources, and discusses the measures that Eversource proposes to avoid, minimize, or mitigate any potential adverse effects.

C.2.1 Topography, Geology and Soils

Alternate Modified Substation

The removal of the existing paved parking area and necessary earth work required to prepare 281 Railroad Avenue for new structures and equipment (e.g., foundation excavations and trenching) would have negligible, if any, adverse effects on topography, geology and soils. No substantive changes in site topography or grades are anticipated.

Alternate Modified Route

Installation of the underground transmission supply lines and proposed pedestrian bridge along the Alternate Modified Route, (including pipes, conduit, splice vaults and jack and bore drilling) will require substantial earthwork. However, site/civil would be temporary in nature as excavations would be backfilled upon completion of the equipment installations.

Prior to the commencement of construction activities, Eversource will provide its contractors with information and drawings that incorporate *Eversource's* BMP Manual, which contains guidance and other information designed to minimize or eliminate potential adverse environmental effects that may result from construction activities. The drawings will include specific details as to the procedures and/or methods to be utilized for the selected route and provide information on erosion control, construction site dewatering, spill prevention and control, construction staffing and hours of work, and restoration. Eversource would also install E&S controls at the limits of work and around adjacent catch basins, in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*. The E&S controls would be inspected and maintained throughout the course of the Alternate Modified Route until all disturbed sites are stabilized.

Measures would be implemented, as required, to contain temporary soil storage piles and to avoid sedimentation into water resource areas and/or catch basins. As appropriate for work in urban areas, suitable temporary E&S control measures would be installed and maintained, as needed. Typical E&S controls may not be required for excavation, trenching and other construction activities within road ROWs, where the potential for off-site erosion or sedimentation is limited, but would be employed as needed at any off-road ROW work sites. Any temporary controls would be maintained until the disturbed work sites are properly restored, as determined by standard criteria for stormwater pollution prevention and erosion control. After the completion of conduit and splice vault installation, disturbed areas would be restored to the appropriate grade. Once the pedestrian bridge has been installed, all disturbed areas along the banks of Indian Harbor would be properly restored and protected from erosion. No changes to existing grades are anticipated as a result of the proposed facility installations associated with the Alternate Modified Route[11]. Excess excavated materials and materials not suitable for backfilling the trench would be disposed of in accordance with applicable regulations.

[11] If the cables are installed adjacent to, but not within, existing road ROWs, some grading may be required to create a level work area. Areas around the pedestrian bridge may also require grading to aid in construction and to set the bridge at its proposed elevation.

In the event that bedrock is encountered, excavation, drilling, or pneumatic hammer would be used to remove rock. In accordance with the Town's request, no blasting techniques would be considered.

C.3 Water Resources

Neither the construction nor the operation of the Alternate Modified Route would have any long-term adverse effects on surface or groundwater resources or water quality.

C.3.1 Inland and Tidal Wetlands and Watercourses

Alternate Modified Substation Location

No portion of the Alternate Modified Substation location would be located within wetlands or watercourses.

Eversource will design a stormwater management system in accordance with the 2004 *CT Stormwater Quality Manual* to adequately treat the quantity and quality of stormwater generated during construction and operation of the Substation.

Based on these design considerations and site features, development and operation of the Greenwich Substation at 281 Railroad Avenue would have no adverse environmental impacts on water resources.

Transmission Supply Lines

Utilization of existing road ROW minimizes conflicts with wetland resources and watercourses located near this route[12]. As introduced in *Section B.4.2.4*, there is one (1) watercourse along the Alternate Modified Route.

Underground transmission lines for the Alternate Modified Route will need to cross Watercourse 1 (Indian Harbor). The construction of the proposed pedestrian bridge will be completed along the adjoining banks and may include the temporary use of coffer dams or sheet piles (or a combination of the two) to excavate foundations for the bridge abutments. Although some work could occur within the watercourse, Eversource will employ appropriate design considerations to minimize environmental effects to this resource. Once construction is complete, all affected areas will be returned to their original status.

[12] No other watercourses or wetlands are located within 50 feet of the proposed Alternate Modified Route alignment.

In these areas, erosion and sedimentation controls will be installed as necessary before the commencement of any improvements or modifications. Eversource will implement appropriate E&S control measures to minimize or eliminate potential adverse environmental effects during the construction phase of the Alternate Modified Route.

C.3.2 Groundwater Resources

Alternate Modified Substation

The two 60-MVA transformers would contain insulating oil (not containing PCBs). The transformers would be installed on foundations and each would have secondary containment sufficient to contain 110% of the insulating fluid capacity of the transformer. Periodic inspections of the containment area would be performed by Eversource personnel to verify proper functioning of the containment systems.

Alternate Modified Route activities would include the site regrading plus the removal of the existing paved parking area and equipment prior to the construction of the Alternate Modified Substation. As introduced above, a comprehensive stormwater management system would be designed in accordance with the 2004 *Connecticut Stormwater Quality Manual* to adequately treat the quantity and quality of stormwater generated during construction and when the Substation is in operation.

Transmission Supply Lines

It is possible that groundwater may be encountered during installation of the transmission supply lines (which require excavation depths necessary to cross existing subsurface utilities), and splice vaults, as well as excavations for pipe jacking pits. A large portion of the Alternate Modified Route traverse areas with groundwater classified as potable (based on the CT DEEP's GA classification). If groundwater is encountered, appropriate sampling and dewatering would be performed in accordance with authorizations from applicable regulatory agencies. Options include discharges to catch basins, pumping and temporary storage within holding tanks (frac tanks), or using vacuum trucks for expedited disposal.

C.3.3 Flood Hazard Areas

Alternate Modified Substation Location

No wetlands or watercourses are located on this parcel and it is located outside both the 100-year and 500-year flood zones. As a result, no adverse effects on the areas are anticipated. No Hurricane Surge Inundation Areas encumber the property at 281 Railroad Avenue.

No flood zones or Hurricane Surge Inundation Areas extend onto the proposed material staging area located at 290 Railroad Avenue. The edge of the 500-year flood zone (associated with nearby Horseneck Brook) is located approximately 10 feet from the southwest corner of this property.

Transmission Supply Lines

Sections of the Alternate Modified Route will pass through mapped flood hazard areas. Underground cables and associated conduit will extend approximately 3,780 feet through the 100-year flood zone and approximately 6,655 feet through Hurricane Surge Inundation Areas. The transmission lines and associated equipment have been designed to be protected adequately from water. No portion of the Alternate Modified Route is located within the 500-year flood zone.

The transmission lines that require crossing over Indian Harbor affixed to the proposed pedestrian bridge are located within portions of the100-year flood zone and Hurricane Surge Inundation Areas. Equipment and structures associated with this waterbody will not be affected by their location as they will be designed to be protected from water.

C.3.4 Coastal Area Resources

Several locations along the Alternate Modified Route lie within the Coastal Boundary, including all of Cos Cob Substation, approximately 1,120 square feet of the Proposed Material Staging Area located at 290 Railroad Avenue and approximately 13,234 feet of the underground transmission supply lines. Based on existing land uses and the location and design of the proposed installations utilizing local roads, no adverse effects on coastal resources are anticipated as a result of the Alternate Modified Route.

Alternate Modified Substation Location

The Alternate Modified Substation location at 281 Railroad Avenue is located entirely outside of the Costal Boundary. As a result, the construction and operation of the Substation at 281 Railroad Avenue would not result in adverse impacts to coastal resources.

Transmission Supply Lines

Construction activities would take place in previously developed areas and would have no effect on access to the shoreline. Along the portion of the route that traverses within the Coastal Boundary, any effects would be short-term, limited to the construction phase, and highly localized. A majority of the transmission supply line route will be located underground within the Coastal Boundary and therefore will not alter the natural features of vistas and viewpoints. The proposed pedestrian bridge will be the only new aboveground structure constructed along the transmission line route within the Coastal

Boundary that will be visible once construction is complete and will designed to match the existing aesthetics of its environment.

The CCMA identifies eight potential adverse impacts to coastal resources defined below. The following discussion summarizes why the Alternate Modified Route would not result in, or contribute to, an adverse impact on these resources.

1. *Degrading **water quality** of coastal waters by introducing significant amounts of suspended solids, nutrients, toxics, heavy metals or pathogens, or through the significant alteration of temperature, pH, dissolved oxygen or salinity.*

   During construction, E&S controls would be established and maintained in accordance with the CT DEEP Bulletin 34 *Connecticut Guidelines for Soil and Erosion and Sediment Control*, dated 2002. Construction activities associated with the Alternate Modified Route are temporary and, with the appropriate E&S measures in place and maintained, are not expected to impact water quality. Throughout construction of the Alternate Modified Route, stormwater generated along the Alternate Modified Route and at the Substation sites would be adequately treated, both in quantity and quality, in accordance with the Connecticut *2004 Connecticut Stormwater Quality Manual*. Similarly, new construction at the Cos Cob Substation will require modifying the stormwater management system to increase its capacity, as necessary. With incorporation of these stormwater management measures, the Alternate Modified Route would not result in degradation of coastal water quality. Post-construction, stormwater runoff along the transmission line route will not change substantially from existing conditions.

2. *Degrading **existing circulation patterns of coastal waters** by impacting tidal exchange or flushing rates, freshwater input, or existing basin characteristics and channel contours.*

   The Alternate Modified Route is located entirely within currently developed, and outside of tidally influenced, areas. Therefore, it would not impact current drainage or circulation patterns of coastal waters.

3. *Degrading **natural erosion** patterns by significantly altering littoral transport of sediments in terms of deposition or source reduction.*

   The Substations do not border any watercourses or shoreline resources and therefore will not affect natural erosion patters or littoral transports of sediments.

   Appropriate protective measures would be installed and maintained during the construction of the proposed pedestrian bridge over Indian Harbor to mitigate potential temporary impacts. The pedestrian bridge would have an overall negligible effect once complete.

4. *Degrading natural or existing drainage patterns by significantly altering groundwater flow and recharge and volume of runoff.*

   Drainage patterns would not be significantly altered by the construction and operation of the Alternate Modified Route components. The Alternate Modified Route and Substation sites

currently consist of impervious and highly compacted surfaces. Construction of the Greenwich Substation would replace the area of impervious surfaces with the application of a trap rock in the substation yard, which would improve existing drainage. As a result, there would be an increase in groundwater recharge and a reduction in the volume of stormwater to be managed. The remainder of the Alternate Modified Route would not substantially change existing drainage patters, alter groundwater flow and recharge or the volume of runoff experienced today.

5. *Increasing the hazard of **coastal flooding** by significantly altering shoreline configurations or bathymetry, particularly within high velocity flood zones.*

   Alternate Modified Route activities within the Alternate Modified Route that traverse flood zones include installation of the underground transmission supply lines and the construction of the new pedestrian bridge to span Indian Harbor. The remainder of the Alternate Modified Route area lies outside of the 100-year and 500-year flood zones. Therefore, development and operation of the Alternate Modified Route would not affect the shoreline configurations or bathymetry.

6. *Degrading **visual quality** by significantly altering the natural features of vistas and viewpoints.*

   With the exception of Cos Cob Substation, the Alternate Modified Route is located at distances removed from the shoreline and within existing road ROW and developed areas. The proposed transmission line will be located entirely underground and will not degrade these resources or features. The proposed pedestrian bridge will be designed to include the transmission lines within its infrastructure such that no exterior duct work would be visible. In addition, the bridge itself will be designed to be consistent with the aesthetics of the park environment. Therefore, the Alternate Modified Route would not degrade the visual quality of the natural features and viewpoints within the coastal zone.

7. *Degrading or destroying **essential wildlife, finfish or shellfish habitat** by significantly altering the composition, migration patterns, distribution, breeding or other population characteristics of the natural species or significantly altering the natural components of the habitat.*

   The Alternate Modified Route area is currently developed with impervious or highly compacted surfaces and contains minimal vegetated or open water habitat. Therefore, the Alternate Modified Route would not degrade or destroy essential wildlife, finfish or shellfish habitat.

8. *Degrading **tidal wetlands, beaches and dunes, rocky shorefronts, and bluffs and escarpments** by significantly altering their natural characteristics or function.*

   Development and operation of the Alternate Modified Route components would not alter the natural characteristics of any coastal resources as none exist on or adjacent to the proposed construction areas.

C.4 Wildlife and Vegetation

No significant areas of vegetation exist along the Alternate Modified Route and no negative effects to vegetation or wildlife are anticipated from the construction of the Alternate Modified Route.

The areas planned for construction at the Substation sites have been previously disturbed and have little if any vegetation or wildlife habitat value.

The underground transmission line portion of the Alternate Modified Route will be using existing road ROW lined with homes or the undeveloped areas associated with Bruce Park. For the most part, the entire Alternate Modified Route is void of significant vegetation and wildlife habitat. Some existing vegetation would have to be removed or pruned along the Route, but it would not have any long-term adverse effects.

Upon completion of construction, Eversource would reestablish previously vegetated, disturbed areas with seed mixtures or plantings, where necessary. In the absence of other specific requirements, disturbed areas would be re-vegetated in compliance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* and other approvals, as appropriate.

C.4.1 Threatened and Endangered Species

Recent correspondence with CT DEEP and the USFWS has identified two federally-listed threatened species as potentially occurring within the Project Area.

Northern long-eared bat

The Alternate Modified Route is not within 150 feet of a known occupied maternity roost tree and is not within 0.25 mile of a known NLEB hibernaculum. There are currently no known NLEB maternity roost trees in Connecticut. The nearest NLEB habitat resource to the proposed activity is located in Greenwich ±4.3 miles to the north.

Red knot

The Alternate Modified Route is located within highly developed areas and terrestrial upland habitat within Bruce Park where the habitat is dominated by a mix of recreational fields, natural vegetation and lawn areas located adjacent to the confluence of Greenwich Creek and Indian Harbor, an inland waterbody that is subject to minimal tidal influence. This provides sub-optimal conditions for red knot. Coastal habitats used by red knots in migration and wintering areas are similar in character, generally coastal marine and estuarine (partially enclosed tidal area where fresh and salt water mixes) habitats with large areas of exposed intertidal sediments. Migration and wintering habitats include both high-energy ocean- or bay-front areas, as well as tidal flats in more sheltered bays and lagoons. Preferred wintering and migration microhabitats are muddy or sandy coastal areas, specifically, the mouths of bays and estuaries, unimproved tidal inlets and tidal flats free from excessive human disturbance. Therefore, since

no suitable habitat (either feeding or roosting) for red knot is supported along the Alternate Modified Route, project activities would not result in impact to or an "incidental take" of this species.

Copies of the CT DEEP letters are provided in *Appendix 3*. The USFWS has not yet responded. A copy of the letter will be provided upon receipt.

C.4.2 Fisheries

Based on publicly available CT DEEP Fisheries Management data, the nearest fishery is associated with the upper portion of the Mianus River, approximately 1.20 miles northeast of the Cos Cob Substation. Based on its distance from the nearest point of the Alternate Modified Route area, no impacts to this resource would result from construction of the Alternate Modified Route.

C.5 Local, State and Federal Land Use

The Alternate Modified Route is consistent with local, state, and federal land use plans. According to the Town of Greenwich Zoning Regulations, the Alternate Modified Substation location at 281 Railroad Avenue is located within a General Business Zone and surrounded by commercial properties. The Alternate Modified Route lies within areas zoned for Residential, Business and Waterfront Business use. The proposed Alternate Modified Route would strengthen the reliability of electric utility infrastructure to help the Town meet several of the objectives discussed in the *2009 Greenwich Plan of Conservation and Development*.

The Company has also reviewed the *Conservation and Development Policies Plan for Connecticut 2013 - 2018* (C&D Plan) for information relating to the state's growth in general, and which also provided information specifically on infrastructure. The objective of the C&D Plan is to guide and balance regional and state development plans in response to human, environmental, and economic needs in a manner that best suits Connecticut's future.

Based upon the general planning information provided in the C&D Plan, the proposed Alternate Modified Route is consistent with the overall goals and objectives of the Plan and serves a public need for a reliable source of electricity for the Town of Greenwich.

Excerpts from the Plan (pp. 8-9):

State Agency Policies:

> *Ensure the safety and integrity of existing infrastructure over its useful life through the timely budgeting for maintenance, repairs and necessary upgrades…*
>
> *Focus on infill development and redevelopment opportunities in areas with existing infrastructure, such as in city or town centers, which are at an appropriate scale and density for the particular area…*
>
> *Capitalize on opportunities to develop and deploy innovative energy technologies, and promote distributed generation and microgrids where practical to provide reliable electrical power during outages and peak demand periods…*

In addition, the future land-use and planning objectives of the SWRPA are also consistent with the Alternate Modified Route. The SWRPA Regional Plan of Conservation and Development 2006-2015 notes the inadequacy of southwestern Connecticut's electrical transmission grid, and encourages coordination between state and federal siting agencies to achieve a balance between the need for expanded services and preservation of the natural environment and community character.

There are no federal properties or federally-designated areas located on or proximate to the Alternate Modified Route area.

C.6 Historic and Archeological Resources

The Company's consultant completed a cultural resource assessment of the Alternate Modified Route area that included review of both historic and archeological resources. Based on the results of its evaluation, Heritage concluded that the Alternate Modified Route would have a low probability of encountering intact cultural deposits or artifacts of archaeological significance. Further, Heritage determined that the Alternate Modified Project will not have adverse impacts on historic built resources or archaeological deposits. Refer to *Appendix 2.* This report was provided to the State Historic Preservation Office (SHPO) on March 13, 2017. The SHPO responded in writing on April 25, 2017, and concurred with the Heritage findings by stating that *"no historic properties will be affected by this project. No further review is requested".* A copy of the SHPO's response letter is provided in *Appendix 3* of Petition *Volume 2*.

C.7 Noise

Construction noise is exempted under the Connecticut regulations for the control of noise, RCSA 22a-69-1.8(h). However, the temporary increase in construction-related noise could potentially raise localized ambient sound levels near work sites. The extent of a noise effect to humans is dependent upon a number of factors, including the change in noise level from ambient, the duration and nature of the noise, the presence of other non-Alternate Modified Route noise sources, people's attitudes concerning a specific

noise or noise quality, such as tone, the number of people exposed to the noise and the type of activity affected by the noise (e.g. sleep, recreation, conversation). The effect of construction-generated noise on some receptors would also depend on the distance of the receptor from the source location, as sound attenuates with distance and with the presence of vegetative buffers or other barriers.

Standard types of construction equipment would be used for the Alternate Modified Route. In general, the highest noise level from this type of equipment (e.g., jackhammer, drill rig, etc.) is approximately 92 dBA at the source.

Alternate Modified Substation

Noise from the new facility will be minimal. The predominant noise contribution from the Substation would be steady state noise from the new transformers. Infrequent impulse noise would be generated from switching and circuit breaker opening and closing. The projected noise levels at the Property lines will comply with applicable levels permitted by both the Town of Greenwich Noise Ordinance and CT DEEP's noise regulations. Noise levels will be at or below the most restrictive regulation, which is the Greenwich Noise Ordinance. Neighboring properties in the Business Zone will not be subjected to substation noise in excess of 62 dBA. Neighboring properties in the Residential Zone will not be subjected to substation noise in excess of 55 dBA during the day or 45 dBA at night.

The generator would operate during emergencies such as "black out" conditions. The emergency generator will also operate occasionally for maintenance and testing purposes during normal business hours.

Alternate Modified Route

Construction-related noise for the underground transmission supply lines would be short-term and highly localized in the vicinity of work sites, and would result from the operation of construction equipment including truck traffic, earth moving equipment, drill rigs, and jackhammers.

If blasting is subsequently determined to be required to facilitate line construction, Eversource will retain a certified blasting specialist (licensed by the Connecticut Commissioner of Emergency Services and Public Protection) to develop a site-specific blasting plan, in compliance with State and local regulations and Eversource guidelines.

The underground transmission supply line construction would be aligned within, or immediately adjacent to, busy road ROWs, where the existing noise environment throughout a majority of the Route is

influenced by traffic noise associated with public roads and business districts. In general, construction activities for the underground transmission supply lines are expected to occur over a 12- to 18-month period and would typically be performed during the daytime (7 AM to 7 PM), 6 days per week (Monday through Saturday)[13] when human sensitivity to noise is lower. Eversource expects to further define appropriate work hours for construction activities in coordination with the Town.

C.8 Air Quality

The construction and operation of the Alternate Modified Route would result in short-term, highly localized effects on air quality during construction, primarily from fugitive dust and equipment emissions. To minimize the amount of dust generated by construction activities, the extent of exposed/disturbed areas of the Alternate Modified Route at any one time would be minimized. To minimize dust, water may be used to wet down disturbed soils or work areas with heavy tracking, as needed.

Vehicle emissions will be limited by requiring contractors to properly maintain construction equipment and vehicles, and by minimizing the idling time of diesel construction equipment in accordance with regulatory standards.

C.9 Scenic and Recreational Areas, Statutory Facilities and Surrounding Features

No permanent adverse effects are anticipated to these facilities and features from construction and operation of the Alternate Modified Route components, primarily because of their distances from the Route.

Alternate Modified Substation

Construction and operation of the Alternate Modified Substation would not result in any adverse effects to Statutory Facilities or on recreational and/or scenic resources. No municipal land, open space, recreation areas or parks are located proximate to the proposed Substation site, which is surrounded by commercial properties.

Cos Cob Substation

Construction activities associated with the proposed modifications to Cos Cob Substation would not result in any direct effects to Statutory Facilities or to recreational and/or scenic resources, including Cos Cob Park. The property is located adjacent to the Town's recently developed recreational park and is close to Long Island Sound. Trenching for the proposed underground transmission lines would temporarily affect

[13] Two exceptions to this schedule are cable and pipe pulling (see Section K.1.3) and splicing activities (see Section K.1.4).

access to Cos Cob Park during construction but would not cause any long-term effect to park access. Existing utility infrastructure currently exists on the property in form of substation equipment and numerous transmission structures and overhead lines. The addition of the relatively modest proposed substation expansion would not create a substantial visual impact over existing conditions.

Transmission Supply Lines

No long-term or permanent adverse effects to Statutory Facilities or recreational and/or scenic resources are expected as a result of the Alternate Modified Route as the entire Alternate Modified Route, with the exception of the proposed pedestrian bridge, will be installed below grade. The proposed pedestrian bridge with affixed transmission lines required to cross Indian Harbor will be designed to match the existing aesthetics of its environment and therefore would not have an adverse effect to Statutory Facilities or recreational and/or scenic resources. Temporary effects may occur in some locations during construction as the Alternate Modified Route traverses road ROWs and passes residential properties.

Exhibit B, Section D

Electric and Magnetic Fields

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D. Electric and Magnetic Fields

This section provides information about EMF and presents Project-specific projections for future EMF levels associated with the Alternate Modified Route that includes all underground transmission supply lines. The base case underground 115-kV line system that was modeled for these projections includes two solid dielectric cable circuits. In addition, Pre-Construction Field Measurements have also been provided for context. It should be noted that there will be no discussion regarding electric fields. The reason is that there are no external electric fields produced from underground transmission cables.

D.1 Magnetic Field Measurements

Magnetic field measurements were taken at a number of locations along the Alternate Modified Route and reported in Docket 461 and in *Exhibit A, Section D* of this Petition.

D.2 Magnetic Field Calculations

This section describes the calculated magnetic fields from the proposed transmission lines. These calculations represent only the transmission contribution of the magnetic fields in the vicinity of the Alternate Modified Route. It should be noted that existing distribution facilities are the major contributor to the magnetic fields in the area. The peak and edge of ROW values for the proposed are summarized in *Table D-1* below. Calculations presented in this section are based on Average Annual Loads (AAL). Calculations for the Peak Day Average Loads (PDAL) and the Annual Peak Load (APL) can be found as an Attachment to this report.

Table D-1, Magnetic Field Calculation Summary

Calculated Magnetic Field Levels (mG;AAL)		
Section	Edge of Road	Max in Road
Underground Duct Bank	0.6	6.7
Underground near Splice Vault	8.1	28.7

D.2.1 Magnetic Field from Underground Transmission Line Over Duct Bank

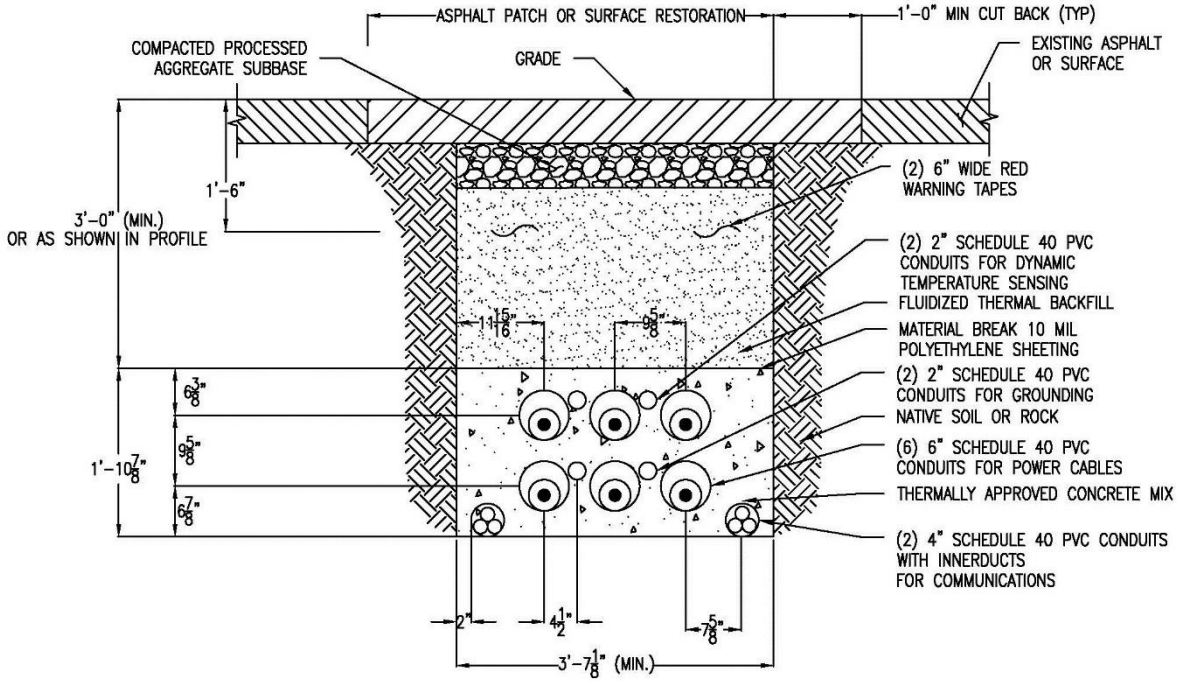

Figure D-1, Depiction of Typical Transmission Line Duct Bank

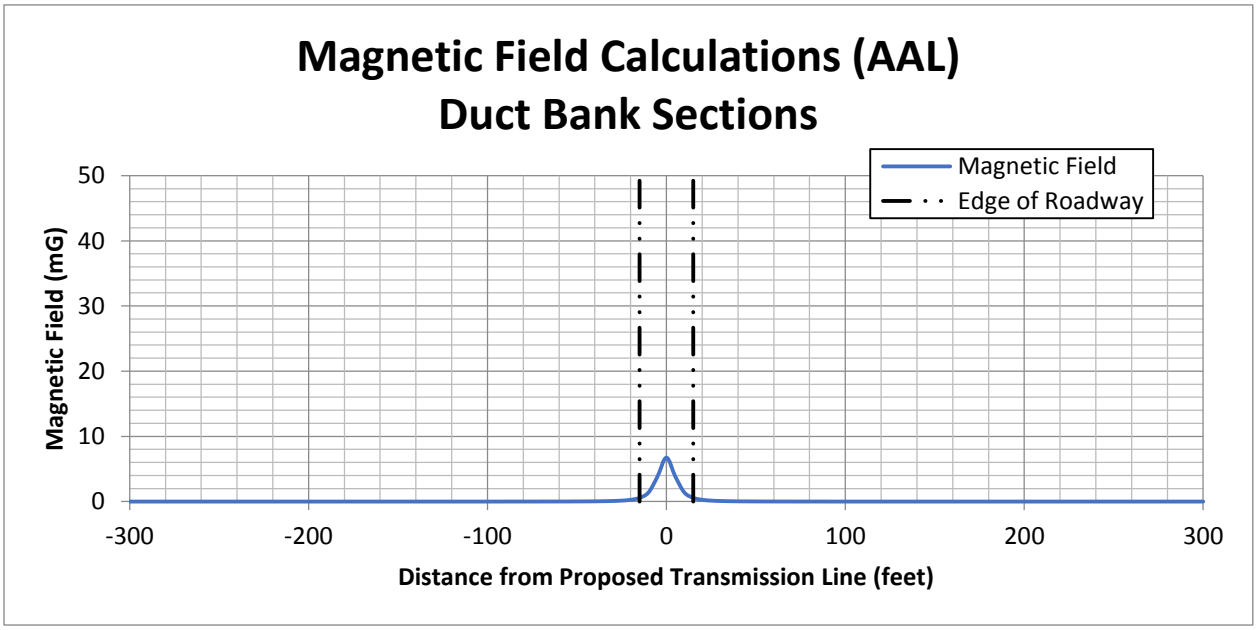

Figure D-2, Calculated Magnetic Fields in the Vicinity of the Transmission Line Duct Bank

D.2.2 Magnetic Field from Underground Transmission Line near Splice Vaults

In the vicinity of splice vaults, the cables separate for entry into the vault. These calculations are shown here for Average Annual Load Conditions. The calculations assume that the cable circuits are separated 10 feet horizontally and the phase spacing is 2 feet.

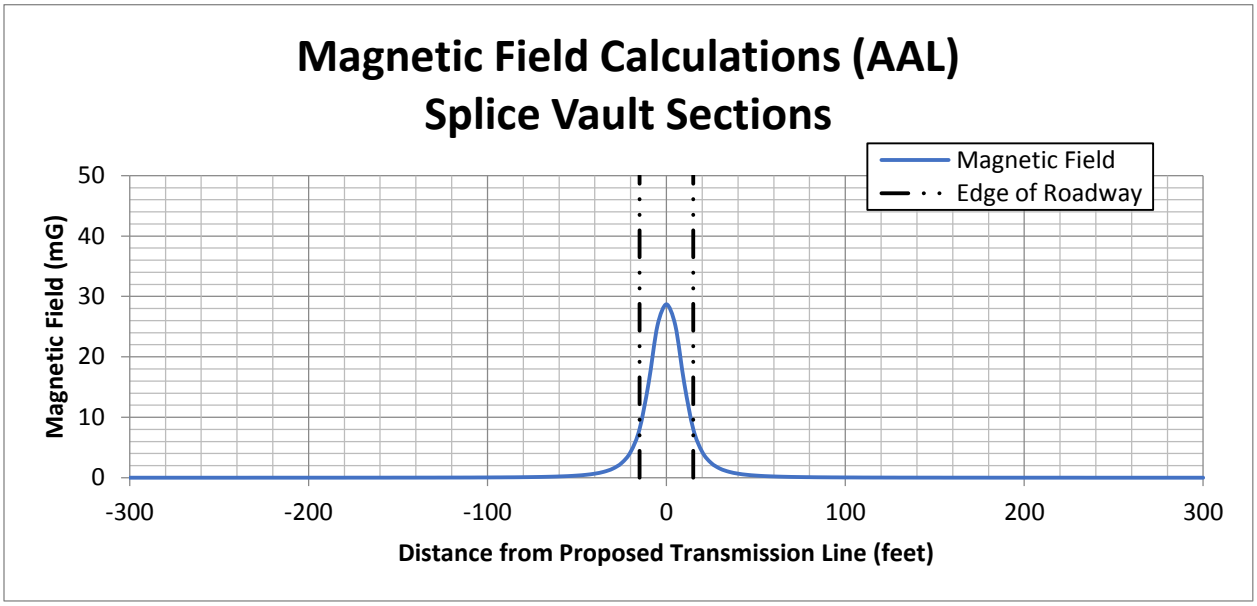

Figure D-3, Calculated Magnetic Fields in the Vicinity of Transmission Line Splice Vault

D.2.3 Magnetic field from Underground Transmission Lines at the Pedestrian Bridge

A portion of this Alternate Modified Project would cross Indian Harbor by means of a pedestrian bridge, in order to avoid a trenchless crossing in accordance with the Town's requirements. Because this crossing design would require special construction, separate MF calculations were prepared. The general arrangement of the cables is depicted in *Figure D-4*.

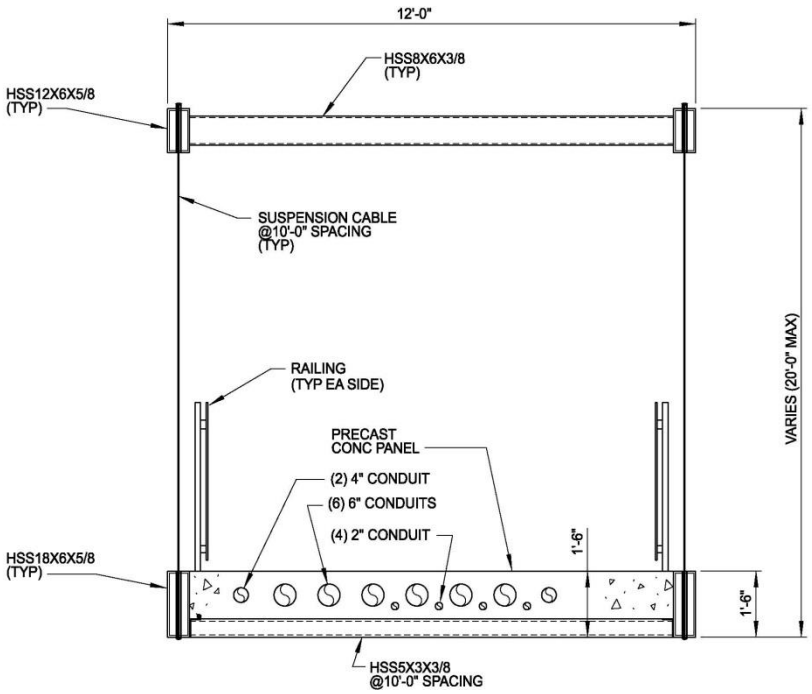

Figure D-4, Depiction of Conduits constructed in Pedestrian Bridge

The proximity of the cables to the travel surface of the bridge would result in higher fields directly above the bridge surface relative to the remainder of the project. A summary of the calculated fields is included in *Table D-2*. The calculations are also depicted in *Figure D-5*.

Table D-2, Summary of Calculated Magnetic Fields for the Pedestrian Bridge

Calculated Magnetic Field Levels (mG; AAL)		
Section	Edge of Bridge	Max on Bridge
Pedestrian Bridge	20.7	87.6

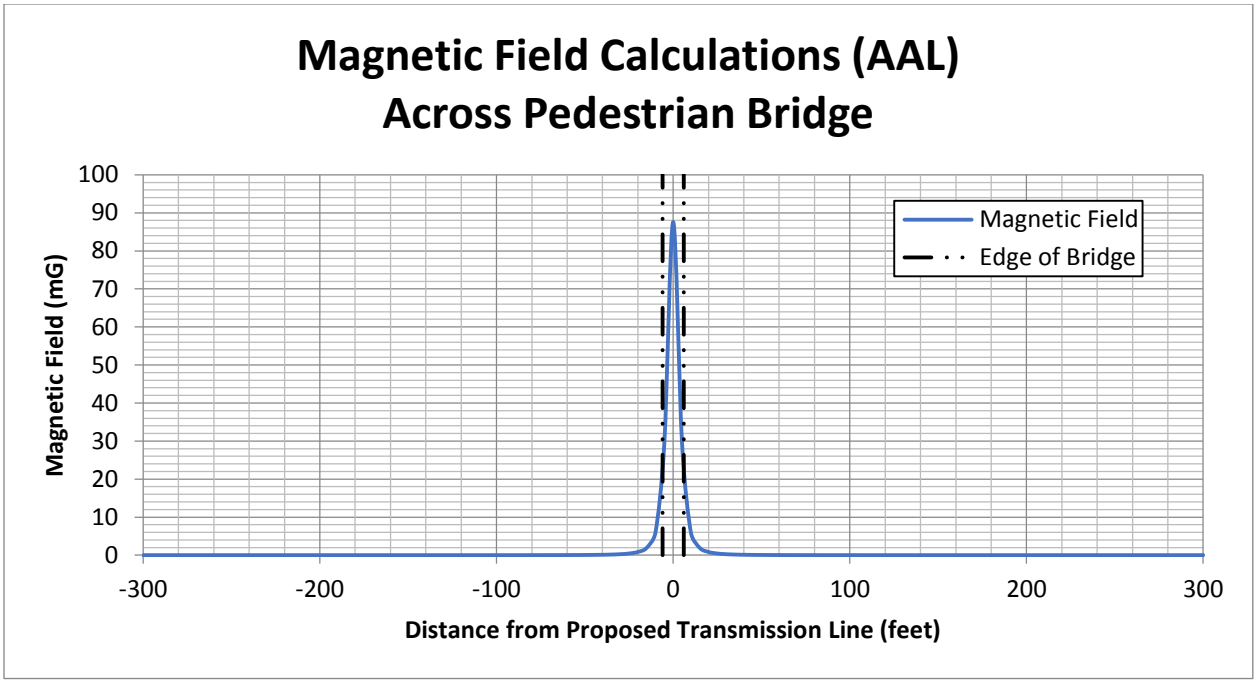

Figure D-5, Calculated Magnetic Fields in the vicinity of the Pedestrian Bridge

Reduction of these magnetic field levels immediately above the bridge could be achieved by one of three potential techniques, including:

- Addition of ground continuity conductors.
- Installation of a conducting plate such as aluminum or copper.
- Installation of a steel plate.

In the event that the Council were to approve a project design that incorporated the pedestrian bridge, it would require a Field Management Design Plan specific to the pedestrian bridge. In contrast to the pedestrian bridge, a trenchless crossing of Indian Harbor would result in low above ground magnetic fields typical to the rest of the Alternate Modified Project.

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