DOCKET NO. 435 - The Connecticut Light & Power Company Application for a Certificate of Environmental Compatibility and Public Need for the Stamford Reliability Cable SRCP, which consists of construction, maintenance, and operation of a new 115-kV underground transmission circuit extending approximately 1.5 miles between Glenbrook and South End Substations, Stamford, Connecticut and related substation improvements.	}	Connecticut
	}	Siting
	}	Council
		August 2, 2013

DRAFT

Findings of Fact

Introduction

1. Pursuant to Connecticut General Statutes (CGS) §16-50g et seq., on January 18, 2013, Northeast Utilities Service Company (NUSCO), as agent for The Connecticut Light and Power Company (CL&P), applied to the Connecticut Siting Council (Council) for a Certificate of Environmental Compatibility and Public Need (Certificate) for the construction, operation and maintenance of an underground transmission circuit, extending approximately 1.5 miles between CL&P's Glenbrook and South End Substations and related substation improvements in Stamford, Connecticut and referred to as the Stamford Reliability Cable SRCP (SRCP). (CL&P 1, pp. ES-1, A-2)

2. NUSCO and CL&P are wholly-owned subsidiaries of Northeast Utilities (NU). (CL&P 1, p. A-2)

3. The purpose of CL&P's proposed SRCP is to strengthen the 115-kilovolt (kV) transmission system serving the Stamford-Greenwich Sub-area and eliminate reliability criteria violations by relieving power flows and ensuring compliance with mandatory national and regional reliability standards. (CL&P 1, p. ES-1)

4. The parties in this proceeding are the applicant and the Office of Consumer Counsel. (Transcript, March 28, 2013, 3:00 p.m. [Tr. 1], pp. 4-5)

5. Pursuant to CGS §16-50*l*(b), CL&P had public notice of its application to the Council published twice in The Advocate and in The Connecticut Post, newspapers having general circulation in Stamford. CL&P's notice was published on January 7 and 14, 2013. (CL&P 1, p. A-13)

6. Pursuant to CGS §16-50*l*(b), CL&P sent notice of the proposed SRCP to each of its customers located within the vicinity of the three alternate routes for one or more months not earlier than 60 days prior to the filing of its application with the Council. This notice was included with the customers' monthly bill. This notice was sent to all CL&P customers in the City of Stamford (City). (CL&P 1, p. A-13)

7. Pursuant to CGS §16-50*l*(b), CL&P sent notice of the proposed SRCP to the abutting property owners of each of the two substations that would be affected by the SRCP. (CL&P 1, p. A-13)

8. Of the 23 certified mail notices sent to the substations' abutting property owners, CL&P received 16 return receipts. CL&P sent an additional notice via first class mail to the seven abutters from whom return receipts were not received. (CL&P 3, Q-CSC-001)

9. In accordance with the Council's Application Guide, CL&P provided notice to a number of community groups including: the Stamford Chamber of Commerce, the Stamford Land Conservation Trust, the Stamford Historical Society, the Historic Neighborhood Protection Program, and the Mill River Collaborative. (CL&P 1, pp. A-12-13; CL&P 2)

10. Pursuant to CGS §16-50*l*(b), CL&P sent notice of the proposed SRCP to federal, state, regional and local officials listed therein. (CL&P 1, pp. A-11-12)

11. On March 18, 2013, CL&P installed seven four-foot by six-foot signs at various locations within the SRCP area to notify the public of its pending application to the Council and the hearing to be held on it. (CL&P 6, p. 38; Attachment 3)

12. The Council and its staff conducted an inspection of the alternate routes for the proposed underground transmission line on March 28, 2013, beginning at 1:00 p.m. The applicant provided a bus to drive the different routes. (Tr. 1, p. 56)

13. Pursuant to CGS § 16-50m, the Council, after giving due notice thereof, held a public hearing on March 28, 2013, beginning at 3:00 p.m. and continuing at 7:00 p.m. in the NEON Stamford gymnasium at 34 Woodland Avenue in Stamford, Connecticut. (Tr. 1, p. 3 ff.)

14. At a meeting held on April 18, 2013, the Council voted to re-open the evidentiary record for this proceeding. (Council memorandum re Docket 435, dated April 19, 2013)

15. The Council's re-opened evidentiary hearing was held on June 20, 2013, beginning at 1:00 p.m. at the Council's offices at Ten Franklin Square, New Britain. (Transcript, June 20, 2013, 1:00 p.m. [Tr. 3], pp. 2 ff.)

Municipal and Community Outreach

16. CL&P held numerous meetings, beginning in January 2010, with City officials and community organizations regarding electric service in Stamford and its desire to improve service reliability and to upgrade the transmission infrastructure between the Glenbrook and South End substations. (CL&P 1, pp. J-1-2)

17. Pursuant to CGS §16-50*l*(e), CL&P delivered a Municipal Consultation Filing (MCF) to the mayor of Stamford on September 7, 2012 to begin the 60-day municipal consultation process. (CL&P 1, p. J-1)

18. As part of its community outreach efforts, CL&P distributed brochures to City residents living in the vicinity of the proposed SRCP. The brochures explained the scope and nature of the SRCP, why it is needed, what local residents could expect to see in their neighborhoods and when the construction was scheduled. (CL&P 1, p. J-3)

19. In a letter dated December 13, 2012, Stamford Mayor Michael Pavia expressed the City's support for the Stamford Reliability Cable SRCP (SRCP – the proposed SRCP) "as a means to provide our community and our region with more reliable electric power and to facilitate our continued economic growth." (CL&P 1, Appendix E.5 – Mayor's Letter)

20. On March 28, 2013, the Council received a letter from Stamford Mayor Michael Pavia commenting on CL&P's Preferred Route with Canal Street Option. In this letter, Mayor Pavia stated, "the City favors the Preferred Route with Canal Street Option." (Letter from Stamford Michael Pavia, dated March 25, 2013)

State Agency Comment

21. At a meeting held on February 1, 2013, the Connecticut Energy Advisory Board (CEAB), pursuant to CGS § 16a-7c, determined that a Request for Proposal to seek non-transmission alternative solutions to CL&P's proposed SRCP was unnecessary. This determination was based on information provided by CL&P that satisfactorily demonstrated the SRCP fell within CEAB's RFP exemption criteria. The information upon which CEAB made its determination included: the small scope of the SRCP; the short lead time for the SRCP; the urgent need for the SRCP; and the fact that the SRCP is energy efficient and environmentally benign. (CL&P 3, Q-CSC-002; Letter from Elin Swanson Katz, Consumer Counsel, dated March 1, 2013)

22. Pursuant to CGS § 16-50j(h), on February 22, 2013 and April 1, 2013, the Council solicited comments on CL&P's application from the following state agencies: Department of Agriculture, Department of Energy and Environmental Protection (DEEP), Public Utilities Regulatory Authority, Department of Public Health, Council on Environmental Quality, Office of Policy and Management, Department of Economic and Community Development, the Department of Transportation (ConnDOT), and the Department of Emergency Services and Public Protection. (CSC Hearing Package dated February 22, 2013; CSC Letter to State Department Heads dated April 1, 2013)

23. The Connecticut Department of Transportation (ConnDOT) responded to the Council's solicitation with comments emphasizing the requirements for CL&P to obtain permits to work within Department highway and rail right-of-ways. (ConnDOT Letter from Sohrab Afrazi, dated March 15, 2013)

24. In a letter dated April 8, 2013, ConnDOT stated that it favored the Preferred Route with Canal Street Option, the alternate route that CL&P developed in response to ConnDOT's request to pursue an option that would not traverse Atlantic Street. (ConnDOT letter dated April 8, 2013)

25. The Council did not receive comments from any of the other state agencies solicited. (Record)

Mandatory Reliability Standards

26. The Federal Energy Policy Act of 2005 required the Federal Energy Regulatory Commission (FERC) to designate an entity to provide for a system of mandatory, enforceable reliability standards. This requirement was part of a transition from a voluntary to a mandatory system of reliability standards for the bulk-power system. (CL&P 1, p. B-8)

27. In July 2006, FERC designated the North American Electric Reliability Council (NERC) to be the nation's Electric Reliability Organization (ERO). The ERO is charged with improving the reliability of the bulk-power system by proactively preventing situations that can lead to blackouts. NERC establishes a general set of rules and criteria applicable to all geographic areas. Electric utilities must adhere to the reliability standards and criteria established by NERC. (CL&P 1, p. B-8)

28. The Northeast Power Coordinating Council (NPCC) is a regional reliability council that, under NERC's supervision, establishes criteria for the design and operation of the bulk power system in New York, New England, and eastern Canada. (CL&P 1, p. B-8)

29. New England's Independent System Operator (ISO-NE) is responsible for planning and operating the various transmission systems owned by electric utilities in New England as a single transmission system. It has adopted planning criteria consistent with the standards and criteria established by NERC and NPCC, which are designed to ensure that New England's electric system will provide adequate and reliable electric power. (CL&P 1, pp. B-8-9)

30. CL&P must comply with the standards and criteria adopted by NERC, NPCC, and ISO-NE. These standards and criteria establish a set of performance tests or contingencies under which CL&P's 69-kV, 115-kV, 138-kV, and 345-kV transmission elements must perform without experiencing overloads or voltage problems. (CL&P 1, p. B-9; Tr. 1, p. 16)

Project Need

31. The transmission needs addressed by the SRCP were identified by an ISO-NE led working group formed to study the Southwestern Connecticut (SWCT) area and included in the annual ISO-NE Regional System Plan, beginning in 2011. The working group included representatives from ISO-NE, NU, and United Illuminating (UI). (CL&P 1, p. B-6; CL&P 6, p. 16)

32. The SRCP is designed to strengthen the 115-kV transmission system that serves the Stamford-Greenwich Sub-area (See Figure 1) and to eliminate reliability criteria violations by relieving power flows thus ensuring compliance with mandatory national and regional reliability standards. (CL&P 1, p. ES-1)

33. The SRCP would provide the Stamford-Greenwich Sub-area with a strong electric supply source arising from the new transmission lines installed in Southwest Connecticut—including the Bethel-Norwalk transmission line, Long Island Cables, the Middletown-to-Norwalk transmission line, and Glenbrook Cables— since 2006 by adding a new and alternate path to relieve power flows. Having an additional transmission path would strengthen the capability of the existing transmission system and minimize customer outages that result from the loss of other sources of electricity. (CL&P 1, p. ES-1; p. A-1)

34. The proposed SRCP would implement an important component of long-range plans for the expansion of Connecticut's electric power grid in the Stamford-Greenwich area, which include a new substation in Greenwich and additional transmission connections to this substation. (CL&P 1, p. A-1)

35. Without the SRCP, the transmission system could experience voltage collapse in the Stamford-Greenwich Sub-area; thermal overloads on transmission lines could exceed emergency ratings; and system voltages at substations could fall below acceptable limits conditions. With the SRCP in service, these conditions would be prevented for at least twenty years. (CL&P 1, p. B-4; CL&P 3, Q-CSC-003)

36. The New England Power Pool (NEPOOL) Reliability Committee voted to recommend approval of CL&P's proposed SRCP to New England's Independent System Operator (ISO-NE) on June 20, 2012. (CL&P 1, p. B-7)

37. In the City of Stamford, there are a number of economic development and urban redevelopment SRCPs being planned or under construction that have the potential to significantly affect load levels in the Stamford-Greenwich Sub-area. These development SRCPs include: Harbor Point development that would include 6 million square feet of office, retail, and residential uses; Metro Center II that would include 250,000 square feet of office space near the Stamford Transportation Center; the redevelopment of the 32-acre former Clairol site; an expansion of Stamford Hospital; Park Square West Phase I and II that would comprise four separate buildings with a total of 419 apartments and the Mill River Corridor/Park/Skating Rink that would include additional housing units. (CL&P 1, p. B-11-12)

38. Results of contingency event analyses indicated that the transmission load capability between the Glenbrook Substation and the South End Substation is insufficient to reliably serve the customer demands in the Stamford-Greenwich Sub-area under contingency events. The analyses also indicated that the transmission loading capability from the South End Substation to the Waterside Substation and the Cos Cob Substation is insufficient to reliably serve customer demands during contingency events. (CL&P 1, p. B-13)

39. Load levels in the Stamford-Greenwich Sub-area of approximately 360 MW would cause a reliability criteria violation if certain contingency events occurred. The 360 MW load level is the equivalent of peak load levels that have already occurred. In 2015, the Stamford-Greenwich Sub-area load is forecast to be approximately 128% greater than necessary to result in transmission planning analyses violations. (CL&P 3, Q-CSC-008)

40. The SRCP would provide a new cable circuit between the Glenbrook Substation and the South End Substation that would increase the power flow loading capability between these two substations and relieve possible overloads on existing transmission lines between the two substations. (CL&P 1, p. B-13)

41. Contingency events were modeled with the SRCP in place. The results of this modeling indicated that the transmission system serving the Stamford-Greenwich Sub-area would experience improved transmission reliability for the contingencies tested in conformance with the reliability standards and criteria established by NERC, NPCC, and ISO-NE. (CL&P 1, p. B-13)

42. The SRCP would have approximate summer thermal ratings of Normal = 250 MVA (megavolt ampere), Long-Term Emergency (LTE) = 450 MVA and Short-Term Emergency (STE) = 475 MVA. These ratings would comply with the SRCP's thermal rating requirements. (CL&P 1, p. B-13; CL&P intog2, Q-CSC-001)

Non-Transmission Alternatives

43. CL&P considered and rejected a "no action" alternate to the SRCP because doing nothing to eliminate violations of national and regional reliability standards and criteria would be inconsistent with its obligation to provide reliable electric service. (CL&P 6, p. 16)

44. CL&P considered central generation, energy efficiency and contracted load curtailment as non-transmission alternatives for the proposed SRCP. However, there are no alternatives currently available at levels necessary to resolve the existing reliability criteria violations that would be resolved with the completion of the proposed SRCP. (CL&P 1, p. ES-1)

45. After analyzing its non-transmission alternatives to the SRCP, CL&P concluded that there are no practical non-transmission alternatives that would resolve the reliability criteria violations the SRCP was designed to address. (CL&P 6, p. 16)

Route Analysis

46. To help it identify the best routes for its needed transmission system improvements, CL&P initially defined a geographic study area that would encompass the shortest potential routes with the least environmental and social impacts, as well as costs. The study area defined by CL&P is shown in Figure 4. (CL&P 1, p. C-1)

47. CL&P adopted several criteria to use in identifying and evaluating potential routes for the SRCP. These criteria included:

- **Constructability**: this criterion included complexity of construction and specialized equipment required.
- **Existing Utilities Impact**: CL&P sought to minimize possible conflicts with existing utilities in planning its route. External heat sources that could negatively impact the ampacity rating of the cable were considered.
- **Operations and Management**: Consideration was given to operating performance of the underground transmission cable from an ampacity perspective and the accessibility and number of splice vaults.
- **Permits, Right-of-Way, and Easements**: CL&P sought to minimize the need to obtain additional and time-consuming permits and the need to acquire additional easements or property.
- **Proximity to Schools or Licensed Day-care Centers**: CL&P sought to avoid having its route located close to school zones or licensed day-dare centers.
- **Surface Disruption Impacts**: CL&P sought to minimize surface disruptions due to construction activity.
- **Scheduling Impacts**: CL&P took into consideration work schedules possible in residential areas and in the vicinity of busier thoroughfares.
- **Length of Route**: CL&P sought to keep its route as short and as straight as possible to minimize cost and complexity.
- **Coordination with Other Local SRCPs**: CL&P took into consideration the locations and timing of local utility SRCPs.

- **Environmental Resources**: In selecting a route for the SRCP, CL&P sought to minimize environmental impacts such as disturbance of contaminated soils, traffic congestion, wetlands and watercourse crossings, bridge crossings, and disturbance of vegetation.
- **Costs**: Greater weight was given to the route with the lowest cost.
- **Proximity to Public Services**: In its route selection, CL&P sought to avoid public services such as police stations, fire stations, and hospitals since such facilities need to be accessible around the clock.
- **Public Transportation Facilities**: CL&P sought to avoid significant impacts to bus routes to reduce public inconvenience.

(CL&P 1, pp. C-3-5)

48. In identifying potential routes, CL&P applied a set of route selection objectives based upon its experience in siting and constructing utility facilities. These objectives included:

- Comply with all statutory requirements, regulations and state and federal siting agency policies;
- Achieve a reliable, operable, constructible and cost-effective solution;
- Maximize the reasonable, practical and feasible use of existing linear corridors;
- Minimize the need to acquire property by eminent domain;
- Minimize adverse effects to environmental resources;
- Minimize adverse effects to significant cultural resources;
- Minimize adverse effects on designated scenic resources;
- Minimize conflicts with local, state and federal land use plans and resource policies; and
- Maintain public health and safety.

(CL&P 1, p. C-5)

49. CL&P focused its analysis of route options on the use of existing Rights-of-Way (ROWs), including public roads, existing transmission lines, railroads, and limited access highways (I-95). (CL&P 1, p. C-6)

50. In choosing its route, CL&P sought to avoid impacting either Phase I or Phase II of the City of Stamford's roadway improvement SRCP known as the Stamford Urban Transitway (SUT). (CL&P 1, p. C-6)

SRCP Description

51. At the conclusion of its route selection process, CL&P identified three potential routes and designated them as: Preferred Route, Preferred Route with Variation, and Alternate Route. These three routes are shown in Figure 2. (CL&P 1, p. C-7)

52. On March 15, 2013, CL&P submitted a supplemental filing to the Council to present an alternative potential route option, which it referred to as the "Preferred Route with Canal Street Option." (CL&P 4 cover letter, dated March 15, 2013)

53. On May 23, 2013, CL&P submitted a second supplemental filing that presented a refinement of its Canal Street Option route referred to as the "Preferred Route with Canal Street Option (Updated)." CL&P's route refinement was based on more detailed engineering analyses. This route would avoid Manhattan Street by installing a portion of the SRCP underneath the South End Substation. (CL&P 10 , Supplemental Filing II, Cover Letter)

54. The following table presents an analysis of each of CL&P's five possible routes in comparison to several key factors.

Key Factors	Preferred Route	Preferred Route with Variation	Alternate Route	Preferred Route w/ Canal St Option	Pref. Route w/ Canal St Option (Updated)
Route Length	8,000 feet	8,080 feet	8,800 feet	7,565 feet	7,410 feet
Impact to ConnDOT property — Route 1 — Atlantic Street	275 feet 175 feet 100 feet	1,150 feet 1,050 feet 100 feet	395 feet 45 feet 350 feet	175 feet 175 feet 0 feet	175 feet 175 feet 0 feet
ConnDOT Encroachment Agreement Needed	No	Yes	No	No	No
Railroad Crossing Agreement Needed	Yes	No	Yes	Yes	Yes
Impact to SUT	0 feet	700 feet	0 feet	130 feet	130 feet
Underground Utilities Congestion	Least	Greatest	Moderate	Least	Least
Property Easement Needed	2	0	3	4	4
Schools/Day-cares within 600 feet	0	0	2 (day-cares)	0	0

(CL&P 1, p. C-9; CL&P 4, March 15 Supplemental Filing; CL&P 10, Supplemental Filing II, Table SC-1-Updated)

55. CL&P focused on developing an underground rather than an overhead transmission solution due to the urban infrastructure in the area, the elevated Metro North Railroad (MNRR) corridor, and the elevated I-95 corridor. (CL&P 1, p. D-1)

56. The SRCP area is highly urbanized. The predominant land uses in the area are commercial/ industrial, retail, and residential. (CL&P 1, pp. F-8, F-9)

57. The physical security of the SRCP's proposed facilities would comply with the Council's *White Paper on the Security of Siting Energy Facilities*, as amended, that was adopted in the Council's Docket 346 proceeding. (CL&P 1, p. H-2)

Preferred Route

58. CL&P's Preferred Route is the shortest of the originally proposed three routes and would be located primarily along city streets. It would consist of seven segments, which would be:

- **Segment 1 -** would originate at the Glenbrook Substation and would extend southerly along Lincoln Avenue a distance of 735 feet to a location past Sheridan Street, where it would turn westerly onto private property.

- **Segment 2 -** would continue westerly across the MNRR corridor, via a 140-foot jack and bore crossing, to connect with Scott Place and then extend westerly 480 feet to the intersection with Culloden Road.
- **Segment 3 –** would continue southerly a distance of 1,230 feet down Culloden Road, which becomes Crystal Street, to the intersection of East Main Street (Route 1).
- **Segment 4 –** would cross East Main Street and continue 175 feet southwesterly to connect with North State Street.
- **Segment 5 -** would continue for a distance of 975 feet southwesterly along North State Street and then take a left onto South Street, crossing under the elevated I-95.
- **Segment 6 –** would continue for a distance of 4,055 feet southwesterly on South State Street to Atlantic Street, where it would turn southeasterly, crossing through the MNRR underpass on Manhattan Street.
- **Segment 7 –** would extend 350 feet easterly along Manhattan Street to terminate at the South End Substation.

(CL&P 1, pp. D-1-2)

Preferred Route with Variation

59. CL&P's Preferred Route with Variation is marginally longer than the Preferred Route (by 80 feet). It would not require a jack and bore crossing of the MNRR corridor or the two additional property easements that the Preferred Route would require. It would, however, require an encroachment agreement with ConnDOT for the longer segment on East Main Street/Route 1. Unlike the other two routes, this route would affect the City's SUT II SRCP. (CL&P 1, p. D-3)

60. The Preferred Route with Variation would consist of five underground segments, which would be:

- **Segment 1 -** would originate at the Glenbrook Substation and extend southerly along Lincoln Avenue a distance of 1,650 feet to the intersection with East Main Street.
- **Segment 2 -** would turn westerly on East Main Street/Route 1 (part of the SUT II SRCP) and extend for a distance of 1,050 feet through the MNRR underpass to North State Street.
- **Segment 3 –** would continue for a distance of 975 feet southwesterly along North State Street and then along South State Street to cross under the elevated I-95 roadway.
- **Segment 4 –** would continue a distance of 4,055 feet southwesterly on South State Street to Atlantic Street where it would turn southeasterly onto Atlantic Street to cross through the MNRR corridor underpass to Manhattan Street.
- **Segment 5 -** would extend easterly for a distance of 350 feet to terminate at the South End Substation.

(CL&P 1, pp. D-3-4)

Alternate Route

61. CL&P's alternate route would be 8,800 feet in length, would require a jack and bore crossing of the MNRR corridor, and would require easements on two private properties, one from the City. It would consist of seven underground segments, which are described below.

- **Segment 1 -** would originate at the Glenbrook Substation and extend southerly along Lincoln Avenue a distance of 735 feet and then turn westerly onto private property.
- **Segment 2 -** would continue westerly across the MNRR corridor, via a 140-foot jack and bore crossing, to connect to Scott Place and then extend westerly to the Clovelly Road intersection. This segment would be 830 feet in length.
- **Segment 3 –** would continue westerly down Clovelly Road a distance of 670 feet to the intersection with Lafayette Street.
- **Segment 4 –** would travel southerly down Lafayette, cross over East Main Street/Route 1 and connect to North State Street. The distance of this segment would be 1,880 feet.
- **Segment 5 -** would extend southwesterly along North State Street to the Clarks Hill Avenue intersection. From here, it would enter the rear access road of the Financial Centre. This segment would pass along the private access road to Elm Street and then emerge back onto North State Street. It would then extend southwesterly along North State Street to Atlantic Street. This segment would be 4,030 feet in length.
- **Segment 6 –** would extend southeasterly for 350 feet along Atlantic Street, pass through the I-95 underpass and the MNRR corridor underpass to Manhattan Street.
- **Segment 7 –** would extend easterly 350 feet along Manhattan Street to terminate at the South End Substation.

(CL&P 1, pp. D-4-5)

Preferred Route with Canal Street Option

62. CL&P's Preferred Route with Canal Street Option resulted from discussions with ConnDOT, which has plans to lower the Atlantic Street roadway, leaving the street surface very close to bedrock, as part of its MNRR Bridge Replacement SRCP and for an access ramp to I-95 from South State Street at Atlantic Street. Because of these plans, ConnDOT asked CL&P to consider alternate routes that would avoid the Atlantic Street underpass. After reviewing alternate route options, CL&P identified a potential route option that is feasible and avoids Atlantic Street. (CL&P 4 cover letter, dated March 15, 2013)

63. CL&P presented its Preferred Route with Canal Street Option to city officials and to ConnDOT officials. City and ConnDOT officials both expressed a preference for this route. (CL&P 4, p. 2)

64. The length of the Preferred Route with Canal Street Option would be 7,565 feet. Its first five segments would be the same as those of CL&P's Preferred Route. As with the Preferred Route, the sixth segment would travel southwesterly on South State Street, except that it would only travel a distance of 2,750 feet to Canal Street whereas the Preferred Route would travel a distance 4,055 feet to Atlantic Street. The last three segments would be as follows:

- **Segment 7** – would turn south onto Canal Street and continue south a distance of 250 feet before turning west and entering MNRR property.
- **Segment 8** – would extend westerly through the corner of MNRR property, across two private properties and then continuing into the dead end of Pacific Street. The total distance of this segment would be 440 feet.

- **Segment 9** – would extend southerly along Pacific Street to Manhattan Street where it would turn northwesterly along Manhattan Street and then turn slightly to the north to terminate at the South End Substation. The distance of this segment would be 530 feet.

  (CL&P 4, pp. 5-6)

65. The Preferred Route with Canal Street Option would have several advantages over CL&P's other proposed routes. These advantages would include:

- Length – This route would be shorter than any of the three alternate routes identified in CL&P's original application. As such, it would typically result in a shorter construction period due to less excavation and trenching.
- Fewer Construction Complexities – CL&P would have to excavate deeper trenches through bedrock along Atlantic Street than along Canal Street, which does not have bedrock present and would require shallower excavation.
- Coordination with ConnDOT – the complex nature of ConnDOT's planned activities in the vicinity of Atlantic Street would require more coordination and design changes to CL&P's SRCP.
- Traffic – avoiding Atlantic Street, a busy city street, would result in less traffic disruption as would reducing the SRCP's distance along South State Street.
- Cost – a shorter route would result in lower construction and material costs.
- Environmental – the shorter distance of this route would mean less soil disturbance and a shorter construction period.

  (CL&P 4, pp. 6-7)

66. The Preferred Route with Canal Street Option would have the following disadvantages:

- Disruption of Recently Paved Areas – The section of Canal Street and the parking lot that this route would cross were recently paved during Stamford's SUT Phase I SRCP. However, the City prefers this route, as does ConnDOT, and is willing to allow the disruption.
- Coordination with Property Owners – This route would affect two additional private property owners, and additional rights from MNRR would have to be acquired.

  (CL&P 4, p. 7)

<u>Preferred Route with Canal Street Option (Updated)</u>

67. CL&P's Preferred Route with Canal Street Option (Updated) is a refinement of CL&P's Preferred Route with Canal Street Option based on more detailed engineering analyses. It would avoid Manhattan Street completely and substantially decrease the length of Pacific Street that would be traversed by installing the underground circuit on CL&P-owned land directly beneath the South End Substation, along its northwest property line. It would be the shortest of all the routes proposed by CL&P. (CL&P 10, p. 1)

68. The Preferred Route with Canal Street Option (Updated) would consist of nine underground segments, of which only Segment 9 would differ from the Preferred Route with Canal Street Option. Segment 9 of this alternate route would run straight across Pacific Street to the entrance point at CL&P's South End Substation property and extend 375 feet along this property. (CL&P 10, p. 2)

69. The advantages of the Preferred Route with Canal Street Option (Updated) are

- Length – At 7,410 feet, this would be the shortest of all the routes CL&P presented and would typically result in a shorter construction period due to less excavation and trenching.
- Fewer Construction Complexities – CL&P would avoid all underground utilities in Manhattan Street and avoid the underground utilities in Pacific Street, except for those located within a very short segment of Pacific Street extending to the entrance to the South End Substation property.
- Cost – a shorter route would result in lower construction and material costs.
- Environmental – the shorter distance of this route would mean less soil disturbance and a shorter construction period.

(CL&P 10, p. 3)

70. CL&P presented this route refinement to the City of Stamford, which prefers because it substantially reduces the construction on two local streets. (CL&P 10, p. 1)

Overhead Solution

71. An overhead alternative to the underground SRCP would be to add a second, 115-kV circuit—that would be designated as the 1151 Line—to an existing CL&P transmission line that runs between the Glenbrook and South End substations and is designated as the 1977 Line. (CL&P 13, pp. 1- 2)

72. In order to add a second circuit to the 1977 Line, all 23 of the existing transmission line structures between the two substations would have to be replaced as they do not have the structural capacity to accommodate a second circuit. (CL&P 13, pp. 2-4)

73. Because many of the structures carrying the existing 1977 Line are located within the MNRR right-of-way, much of the work to replace the existing structures and add a second circuit would have to comply with conditions stipulated by MNRR and would have to satisfy engineering and safety criteria established by the Federal Railroad Administration. (CL&P 13, pp. 2-6)

74. Constraints that CL&P would encounter in reconstructing the 1977 Line to add a second circuit would include:

- A limited construction window of 2.75 hours per day, between 2:00 a.m. and 4:45 a.m. to allow MNRR to take a track out of service for CL&P's construction SRCP.
- Because CL&P's construction would be limited to night-time hours, the work areas would have to be brightly illuminated, even in the proximity of residential areas.
- The space available for construction activities would be tightly constrained, which would reduce the amount of work that could be accomplished during each day's construction window.

- Because of the limited space available for construction, the existing line structures would have to be replaced in essentially the same locations. This type of replacement construction would proceed more slowly than if the replacement structures could be installed adjacent to the existing structures.
- MNRR could have CL&P suspend work if it is operating a train on or testing any other track.
- CL&P's construction procedures would have to be approved by MNRR, which could be a time-consuming process.
- CL&P would have to pay for MNRR safety personnel, which would be an added cost.

(CL&P 13, pp. 4-6)

75. CL&P consulted with ConnDOT about the possibility of replacing its 1977 line structures with new structures that would carry both the 1977 and 1151 lines. (CL&P 13, p. 9)

76. ConnDOT's Office of Rails does not support the installation of CL&P's dual line structures to carry the 1977 and the 1151 transmission lines within the railroad corridor because this installation would impede ConnDOT's ability to achieve long range plans for increasing ridership and reliability of its rail system in this highly congested area. (CL&P 13, p. 9)

77. An outage of the 1977 during construction of new structures accompanied by a single contingency event involving the 1440 and 1450 lines located on double circuit towers could cause a blackout for approximately 47,500 customers serviced by the Cos Cob, Waterside, Tomac and South End Substations. (CL&P 13, p. 11)

78. During the planning for this SRCP, CL&P investigated the possibility utilizing the existing, double-circuit 1410 transmission line as an overhead solution for increasing its transmission capability in the Stamford-Greenwich Sub-area. Utilizing this line would have required widening the CL&P's existing right-of-way, which, in turn, would have required purchasing additional easements over approximately 29 properties. CL&P estimates the cost of this overhead solution would have been approximately $107 million. (Tr. 1, pp. 82-83)

79. CL&P estimates the cost of reconstructing the 1977 Line as a double circuit line at $69,881,506. This cost is broken down as follows:

Item	Cost
Material	$ 2,506,705
Labor	$ 40,490,000
Engineering/Permitting	$ 14,690,178
Escalation	$ 2,003,798
AFUDC*	$ 2,884,344
Contingency	$ 7,306,481
Total Cost	**$ 69,881,506**

*Allowance for Funds Used During Construction
(CL&P 11, p. 1)

Underground Transmission System Design

80. The proposed SRCP would be designed, constructed, and maintained in compliance with the standards of the National Electrical Safety Code and other applicable electrical safety codes and designed in accordance with sound engineering practices using established design codes and guides published by, among others, the Institute of Electrical and Electronic Engineers, the American Society of Civil Engineers, the American Corporate Institute, and the American National Standards Institute. (CL&P 1, pp. E-1, G-13)

81. CL&P considered two standard design technologies for underground transmission lines: high pressure fluid filled (HPFF) pipe type cable and XLPE (Cross-linked polyethylene) cable. (CL&P 1, p. D-6)

82. CL&P determined that a single circuit XLPE cable design with a 3500 kcmil copper conductor would satisfy the SRCP's thermal rating requirements. (CL&P 1, p. D-6)

83. XLPE has become the standard for 115-kV installations in both the U.S. and worldwide and is considered as reliable as HPFF. (Council Administrative Notice No. 28 – Docket 217 Findings of Fact, FOF No. 140)

84. The maximum HPFF conductor size is 2750 kcmil copper. A single 2750 kcmil copper cable system would not meet the SRCP's thermal rating requirements. In order to meet these requirements, CL&P would need to install a double circuit HPFF cable system. (CL&P 1, p. D-6)

85. A double circuit HPFF cable system would not be feasible due to the limited space within the fenced-in area at the South End Substation for the termination of two new transmission lines. In order to accommodate a double circuit HPFF cable system, the South End Substation would need to be expanded. (CL&P 1, p. D-6)

86. HPFF cable systems pose environmental concerns associated with the potential for spills or leaks of the dielectric fluid (typically alkylbenzene) used as an electrical insulator and to transfer heat away from the cable to the pipe in which it is contained. (Council Administrative Notice No. 28 – Docket 217 Findings of Fact, FOF No. 132)

87. A typical XLPE underground 115-kV transmission system would be comprised of cables, splice vaults, duct bank, cable splices, terminations, grounding, communications, termination structures and foundations. (CL&P 1, p. D-6)

88. In a XLPE underground system, electric cables would be installed in a duct bank encased in concrete. Smaller conduits would also be included for the relaying, communications, temperature monitoring, and ground continuity cables. Cables would be installed one per duct. Splice vaults would be spaced at intervals of approximately 2,000 feet. (CL&P 1, p. D-6)

89. The expected service life of XLPE transmission cable is approximately 40 years. (CL&P 3, Q-CSC-010)

90. The XLPE cables CL&P would use in the SRCP are designed to withstand water penetration and have a lead sheath that functions as a moisture barrier. These cables, and splices, are capable of continuous long-term operation under a 30-foot head of water with no water ingress. These cables are tested against water infiltration in accordance with International Electrotechnical Commission standard IEC 60840. (CL&P 1, p. D-6)

91. If a flooding event were to cause sand and/or salt water to enter the underground splice vaults, thermal problems would be unlikely because water, seabed, and sand have lower thermal resistivity than air. If the splice vaults were to fill with sand and/or water, vacuum trucks would be used to remove the sand and dewater the vaults. The vaults would then be washed to remove any salt. The clamps and racking system used to support the cables in the vaults would be non-magnetic and non-corrosive to minimize the risk of corrosion. (CL&P 1, pp. D-6-7)

92. CL&P's proposed single circuit underground 115-kV transmission system would consist of three cables, or phases. Each phase would consist of a 3500 kcmil copper conductor cable insulated to 115-kV with 690 mils of XLPE insulation. Each cable would be approximately 4.5 inches in diameter. (CL&P 1, p. D-7)

93. Splice vaults would be installed along the route of CL&P's proposed underground transmission SRCP whenever the maximum installable length of cable is reached. Factors limiting possible cable length include maximum allowed pulling tension, maximum allowed side wall pressure, and the maximum length of cable that could be transported on a cable reel. Reinforced splice vaults would be installed approximately every 2,000 feet along the route. (CL&P 1, p. D-8)

94. CL&P anticipates that the SRCP would require three splice vaults. (Tr. 1, p. 56)

95. The size and layout of splice vaults would be determined by the space required for cable pulling, cable splicing, and cable support. Typical outside dimensions of splice vaults would be approximately 24 feet long by 9 feet wide by 9 feet high. The top of the splice vault would be installed a minimum of three feet below grade and would have two access holes—manhole covers—which would be approximately 36 inches in diameter. (CL&P 1, p. D-8)

96. The area needed for the installation of a splice vault typically requires an excavation area approximately 13 feet wide by 13 feet deep by 30 feet long. (CL&P 1, p. E-2)

97. CL&P's underground transmission line would be installed in a concrete encased duct bank for the entire length of the SRCP, except for any trenchless installation sections. The duct bank would consist of four six-inch, two four-inch, and two two-inch Schedule 40 polyvinyl chloride (PVC) conduits. The conductor cables would occupy three of the six-inch conduits, with the remaining one reserved as a spare. Fiber optic cables for communications, relaying, temperature monitoring, and the ground continuity conductor would be installed in the smaller conduits. (CL&P 1, p. D-10)

98. At the City's request, CL&P would install a four-inch duct parallel to and within the same trench excavation as the main duct bank installation for the City's future use for traffic signaling cable installation, consistent with the practice of other utilities conducting work in City streets. (CL&P 6, p. 40)

99. CL&P would use terminations, which are rubber stress cones, to transition the underground cables to overhead lines, substation buswork, or other above ground equipment. Terminations are typically mounted on a substation termination structure or to an underground-to-overhead transition structure, often called a riser pole. (CL&P 1, p. D-14)

100. Riser poles and termination structures for the transition of the 115-kV circuit from underground cables to the overhead substation bus would be installed within both substations, Glenbrook and South End. (CL&P 1, p. D-15)

101. The estimated capital cost of the SRCP is $46.9 million. This cost estimate includes:

Transmission line costs	$43,900,000
Substation modifications costs	$ 3,000,000

(CL&P 1, p. D-19)

102. The life-cycle cost for the SRCP (Preferred Route) would be $60.97 million. This total would include annual carrying charges of the capital cost, annual operation and maintenance costs, cost of energy losses, and cost of capacity. (CL&P 1, p. D-19; CL&P 6, p. 39)

103. The cost of the proposed SRCP would be regionalized throughout the ISO-NE's region and would be amortized over a 40-year period. (Tr. 1, pp. 19-21)

Construction Procedures

104. Construction of the proposed SRCP would be expected to be completed in 12 months. (CL&P 1, p. E-4)

105. During construction, CL&P would require support areas for temporarily storing and staging construction materials and equipment in the vicinity of the transmission route. These areas would include one or more primary construction yards and several, smaller staging areas. (CL&P 1, p. E-3)

106. To the extent possible, storing and staging areas would be located on CL&P property, previously developed sites (such as paved parking lots), vacant land or properties previously used for construction support, depending on the parcel size requirements and location in relation to the SRCP route. (CL&P 6, p. 18)

107. Once storage and staging areas are no longer needed, they would be restored substantially to their previous conditions. (CL&P 1 , p. E-3)

108. Prior to the commencement of construction, CL&P would conduct studies and surveys to develop procedures aimed at minimizing adverse impacts on the environment and the public. Pre-construction planning activities would include: surveys to identify underground and overhead infrastructure that would be affected by the SRCP; studies of soil and groundwater conditions along the transmission line route; and identifying potential locations for construction support areas. (CL&P 1, pp. E-4-5)

109. The typical method used to install an underground duct bank is open cut trenching. Once a trench has been excavated to the desired depth and shoring installed, the PVC conduit is lowered into the trench and the area around the conduit is filled with high strength thermal concrete. After the concrete has set, the trench is backfilled. (CL&P 1, p. D-10)

110. Work zones around active trench areas range from approximately 600 to 800 feet. (CL&P 1, pp. E-5-6)

111. After conduits have been installed, they would be tested with a mandrelling procedure, in which a "pig" (a cylindrical object slightly smaller than the conduit) is pulled through the conduit to verify that the conduit has not been crushed, damaged, or installed improperly. (CL&P 1, p. E-6)

112. When conduits have been successfully installed and tested, cable would be pulled through them using truck-mounted winches and cable handling equipment. (CL&P 1, pp. E-6-7)

113. CL&P's Preferred Route and its Alternate Route would both require a trenchless installation to cross the MNRR corridor. (CL&P 1, p. D-11)

114. A trenchless installation would require CL&P to jack and bore under the railroad. This would consist of an auguring operation that simultaneously jacks (or pushes) a casing pipe into the cavity being excavated. Casing segments are added as the excavation progresses forward. To avoid de-rating of the circuit, CL&P would utilize a centrifugally cast, fiberglass-reinforced polymer-mortar pipe (trade name: HOBAS) instead of the standard steel casing. (CL&P 1, p. D-11)

115. When the casing installation is complete, CL&P would position the duct system inside the casing pipe using specially designed spacers. The entire casing would then be backfilled with thermally designed grout, which solidifies the installation to prevent movement and also helps to dissipate heat away from the cable system. (CL&P 1, p. D-11)

116. Cable segments would be spliced using pre-fabricated or pre-molded compressions splices. Splicing cables requires a clean working environment. For this reason, the splicing would be performed inside the splice vaults within a controlled, "clean room" atmosphere. (CL&P 1, pp. D-13; E-7)

117. CL&P does not anticipate that blasting would be required for excavation of the trenches. Should bedrock be encountered, mechanical methods would be the preferred method of removal. If blasting would be necessary, CL&P would adhere to established controlled blasting techniques. (CL&P 1, p. G-3)

118. CL&P would consult with City and ConnDOT officials to develop a Traffic Management Plan to minimize traffic congestion and access restrictions during the construction period. (CL&P 1, p. G-14)

Substation Modifications

119. The SRCP would require that modifications be made to the Glenbrook and South End Substations. (CL&P 1, p. D-17)

120. Modifications to the South End Substation would include electrical and physical work and substation protection and control work. The electrical and physical work would consist of: the installation of a riser pole for cable termination bushings; the installation of a motor operated disconnect (MOD) switch; the installation of lightning arresters on the riser pole structure; and the installation of control cables for the MOD in the existing conduits. The substation protection and control work would consist of: reconfiguring the primary and back up relays as line protection relay for the cable line; calculating and establishing new line relay setting using the cable line impedance; using the fiber optic cables installed with the underground cable line as communication path for cable line protection schemes; installing line metering; and updating the System Control and Data Acquisition (SCADA) system. (CL&P 1, pp. D-17-18)

121. Modifications to the Glenbrook Substation would include the same categories of work as at the South End Substation. At the Glenbrook Substation, electrical and physical work would consist of: the installation of a 115-kV circuit breaker; the installation of a cable termination; the installation of a MOD switch; the installation of lightning arresters on the termination structure; the installation of three potential transformers for relaying; and the installation of the control cables for the breaker, transformers, and MOD. The substation protection and control work would consist of: the installation of primary and back up relays; calculating and establishing new line relay setting using the line impedance; the installation of breaker failure relays and breaker control; using the fiber optic cables installed as communication path for line protection schemes and for direct transfer trip; using the fiber optic cables installed to monitor cable temperature; the installation of line metering; and updating SCADA. (CL&P 1, pp. D-18-19)

122. Substation modifications would be completed within the existing fence lines of the two affected substations. (CL&P 1, p. E-7)

123. All new substation equipment would be tested before the final connection to the transmission grid. (CL&P 1, p. E-9)

124. Landscaping for the South End Substation would be coordinated with City officials as part of the Council's decision in Petition No. 999. At the Glenbrook Substation, CL&P would replace any vegetation removed as part of the SRCP. (CL&P 1, E-9; CL&P 6, p. 10)

Environmental Considerations

125. The Master Plan for the City of Stamford recommends that power lines be buried, particularly in areas such as downtown, neighborhood business districts, and on major corridors. (CL&P 1, p. F-9)

126. The proposed SRCP would not impact any extant populations of federal or state endangered, threatened or special concern species. (CL&P 1, p. F-7; Appendix B.2)

127. The proposed SRCP would not be expected to impact any fisheries. (CL&P 1, p. F-7)

128. Based upon its review of research into the SRCP's potential for affecting significant archaeological resources, the State Historic Preservation Office concluded that there is a low potential for intact and significant archaeological resources to be extant within the SRCP area. (CL&P 1, Appendix B.1)

129. There are no statutory facilities—as defined under CGS § 16-50p(a)(3)(D) to include residential areas, private or public schools, licensed child day care facilities, licensed youth camps or public playgrounds—located within 600 feet of CL&P's Preferred Route. (CL&P 1, p. F-11-12)

130. For construction of the SRCP, CL&P would adhere to *Northeast Utilities Transmission Group Best Management Practices Manual for the State of Connecticut, Construction & Maintenance Environmental Requirements* – December 2011. (CL&P 1 p. G-1)

131. CL&P would deploy erosion and sedimentation controls in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control* at locations where pavement or soils would be disturbed. (CL&P 1, pp. E-5, G-2)

132. If dewatering should be necessary, it would be performed in accordance with applicable permit conditions. (CL&P 1, p. E-5)

133. No potential surface water resource areas (wetlands, vernal pools or watercourses) were identified in the vicinity of the Preferred Route. (CL&P 1, p. F-4)

134. The Preferred Route would cross over the East Branch of the Rippowam River, which is underground and contained within a culvert at the crossing location. (CL&P 1, p. F-4)

135. The Preferred Route would not cross any areas within the 100-year flood plain as designated by FEMA. (CL&P 1, p. F-5)

136. Groundwater quality in the vicinity of the SRCP is classified as "GB" (not suitable for human consumption without treatment) by the Connecticut DEEP. (CL&P 1, p. F-4)

137. The southwestern portion of the SRCP area is located within a coastal boundary as defined by the Connecticut Coastal Management Act (CCMA). However, none of the coastal resources identified by the CCMA would be adversely affected by the SRCP. (CL&P 1, pp. F-5-6)

138. The Preferred Route with Canal Street option would not affect any of the coastal resources protected by the CCMA. (Tr. 1, p. 17)

139. CL&P would employ procedures to minimize construction-related noise levels including: ensuring that construction equipment is properly muffled and maintained and adjusting work schedules to minimize noise and vibration disturbances. (CL&P 1, p. G-11)

140. Sound pressure levels along the property lines of the two substations that are part of the SRCP would meet applicable state regulations. (CL&P 1, p. G-11)

141. Any impacts the proposed SRCP would have on air quality would be short-term, highly localized effects resulting from construction activities and would be limited to fugitive dust and vehicular emissions. In order to minimize dust, CL&P would limit the extent of exposed/disturbed areas, would install stone construction pads at ingress/egress points, would sweep areas to remove excess accumulations of dirt, and would use water to wet down disturbed soils. (CL&P 1, pp. G-11-12)

Electric and Magnetic Fields

142. Electric fields (EF) and magnetic fields (MF) are two forms of energy that surround an electrical device. Transmission lines are a source of both EF and MF. (CL&P 1, Appendix D, p. 1 of 11)

143. Electric fields result from voltages applied to electrical conductors and equipment. They are expressed in measurement units of volts per meter (V/m) or kilovolts per meter (kV/m). Appliances within homes and the workplace are the major sources of electric fields indoors, and power lines are the major sources of electric fields outdoors. (CL&P 1, p. I-2)

144. Magnetic fields are produced by the flow of electric currents. The level of a magnetic field is commonly expressed as magnetic flux density in units called gauss (G), or in milliGauss (mG). The magnetic field level at any point depends on characteristics of the source, which can include the arrangement of conductors, the amount of current flow through the source, and its distance from the point of measurement. (CL&P 1, p. I-2)

145. In December 2007, the Council adopted a complete revision of its EMF Best Management Practices (BMP). This revision was adopted after a two-year proceeding and was based on policies previously implemented by the State of California. The Council's EMF BMP provides precautionary guidelines for the reduction of magnetic field levels associated with new electric transmission lines at the edges of electric transmission right-of-ways and beyond. (CL&P 1, p. I-5)

146. CL&P's Field Management Design Plan (FMDP) for the SRCP transmission line improvements is based on calculations of EMF levels included in the Council's EMF BMP and was formulated to best fit the Council's EMG BMP guidelines. (CL&P 1, p. I-7)

147. The major sources of Electric and Magnetic Fields (EMF) associated with CL&P's proposed SRCP are the proposed underground line and existing overhead transmission lines on an existing, nearby right-of-way. (CL&P 1, p. I-7)

148. There are no state or federal exposure standards for 60-Hz MF based on demonstrated health effects established in the United States. Nor are there any such standards established world-wide. However, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has established a level of 833 mG, based on extrapolation from scientific experimentation, and the International Committee on Electromagnetic Safety (ICES) has calculated a guideline of 9,040 mG for exposure to workers and the general public. (CL&P 1, Appendix D, p. 3 of 11)

149. Transformers and other equipment within the South End and Glenbrook Substations are other potential EMF sources. These sources, however, would be expected to cause little or no exposure to the general public because the strength of fields from typical substation equipment decreases rapidly with distance and reaches very low levels at relatively short distances beyond substation perimeter fences. (CL&P 1, p. I-7)

150. The exception to the normally low levels of EMF associated with substations is where transmission and distribution lines enter the substation. (CL&P 1, p. I-8)

151. CL&P took measurements of existing EMF levels at selected locations along its Preferred Route. For the purpose of taking these measurements, CL&P divided its Preferred Route into two paths. Path 1 was along Lincoln Avenue on the east side of the MNRR. Path 2 was along the streets the Preferred Route would take after crossing under the MNRR. The electric field was measured in units of kV/m, and the magnetic field was measured in units of mG. (CL&P 1, p. I-8)

152. The highest measurement of existing Magnetic Fields along Path 1 was 7.03 mG. The average measurement was 5.95 mG, and the median measurement was 5.97 mG. (CL&P 1, p. I-12)

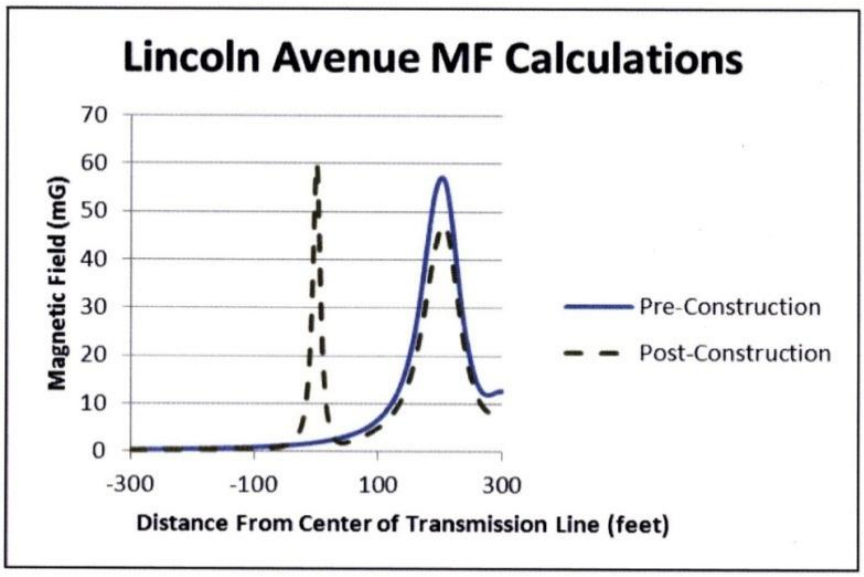
153. The highest measurement of existing Magnetic Fields along Path 2 was 15.9 mG. The average measurement on this path was 5.2 mG, and the median measurement was 4.97 mG. (CL&P 1, p. I-13)

154. CL&P calculated pre- and post-construction EMF levels using methods described in the Electric Power Research Institute's *AC Transmission Line Reference Book – 200-kV and Above, Third Edition* and *Underground Transmission Systems Reference Book*. (CL&P 1, p. I-14)

155. In its EMF calculations, CL&P accounted for the interactions between its proposed underground transmission line and existing overhead transmission lines. (CL&P 1, p. I-14)

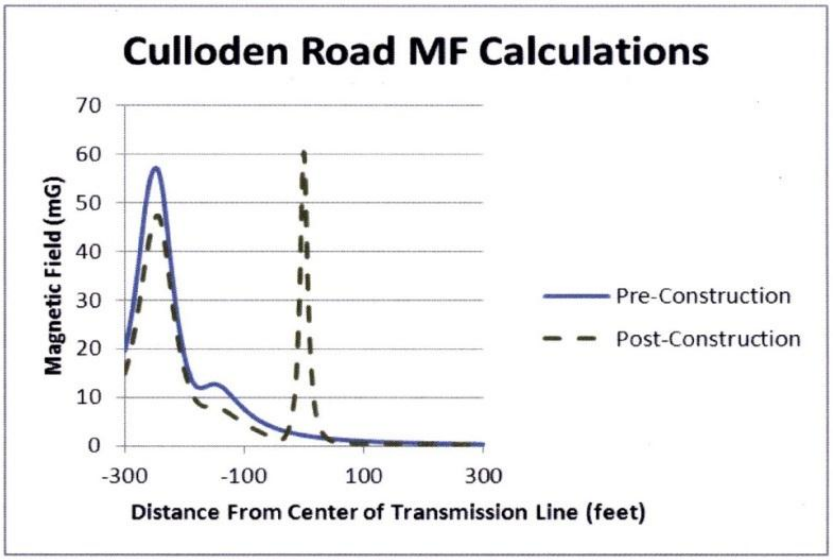
156. CL&P calculated magnetic fields for existing lines under pre-SRCP conditions for 2014 and for the proposed and existing lines under post-SRCP conditions in 2019 for three system load conditions: Annual Peak Load (APL), Peak-Day Average Load (PDAL), and Annual Average Load (AAL). Conservative assumptions were made for each load condition in order for the results to be higher than the actual magnetic fields that might be expected under the calculated load conditions. (CL&P 1, p. I-14)

157. The calculated magnetic fields along Lincoln Avenue are shown in the table below.



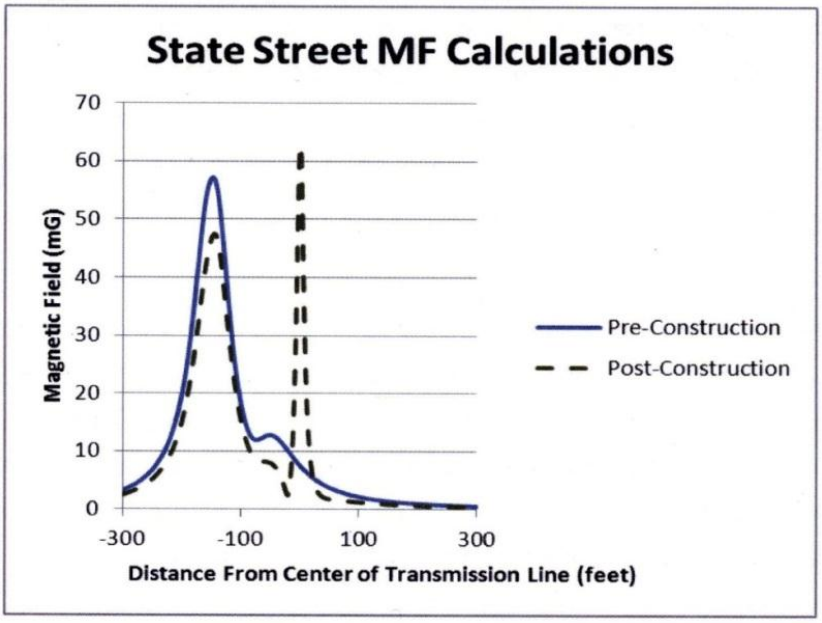
(CL&P 1, p. I-17)

158. The calculated magnetic fields along Culloden Road are shown in the table below.



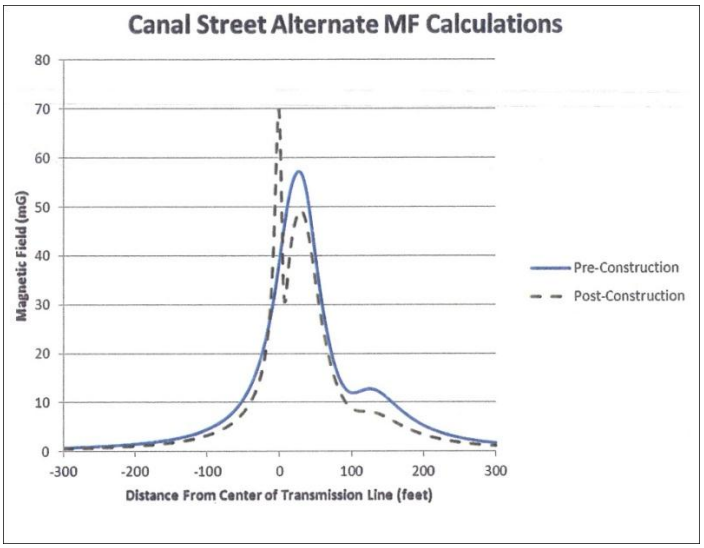
(CL&P 1, p. I-18)

159. The calculated magnetic fields along State Street are shown in the table below.



(CL&P 1, p. I-19)

160. The calculated magnetic fields along Canal Street are shown in the table below.



(CL&P 4, p. 9)

161. CL&P incorporated two "no-cost" magnetic field measures into the base design of its proposed SRCP. These two measures are: 1) minimizing the spacing between the cables to be installed underground and 2) arranging the phases of the underground line to achieve better cancellation with the field from the existing overhead transmission lines. (CL&P 1, Appendix D: Field Management Design Plan, p. 4)

162. There are no "low cost" magnetic field management measures available that provided significant reduction at or outside the edges of the roadway. (CL&P 6, p. 34)

163. CL&P did consider magnetic field methods including high-pressure fluid filled cable systems, "shielding" plates, increased cable depths and cancellation loops but dismissed these methods due to high costs, technical difficulty or limited effectiveness. (CL&P 6, p. 34)

Cost Allocation

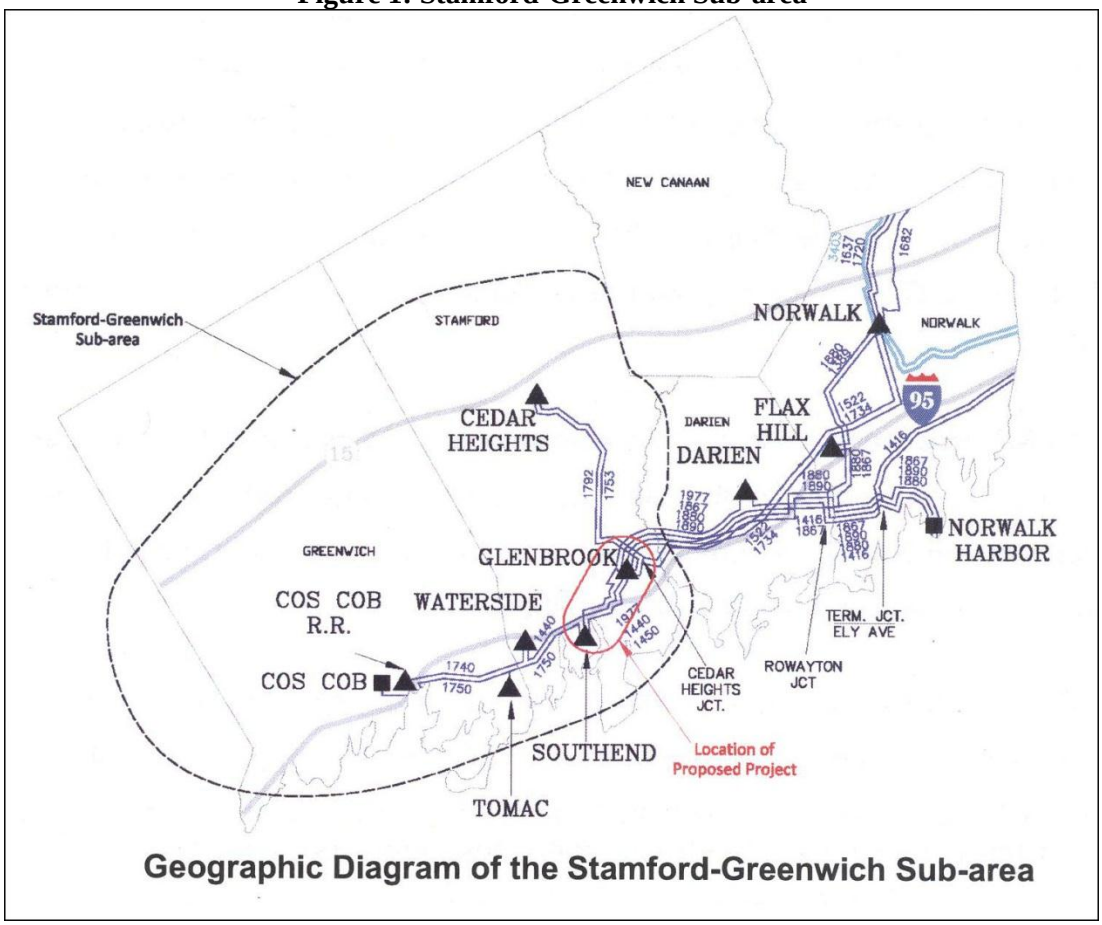
164. CL&P would expect the costs of the SRCP, with the underground route, to be regionalized unless there are costs to satisfy local requirements. Costs incurred to satisfy local requirements would likely be localized to Connecticut customers only. (CL&P 6, p. 9)

165. Since Connecticut uses approximately 27 percent of the New England load, if ISO-NE decides to regionalize all portions of the SRCP, Connecticut consumers would pay approximately 27 percent of the project's entire costs. (Council Administrative Notice No. 31 – Docket 370 Findings of Fact, FOF No. 168)

166. The SRCP would have an incremental retail rate impact of five cents per month, or 60 cents per year for a typical 700 kilowatt-hour CL&P residential customer bill. (Tr. 1, p. 20)

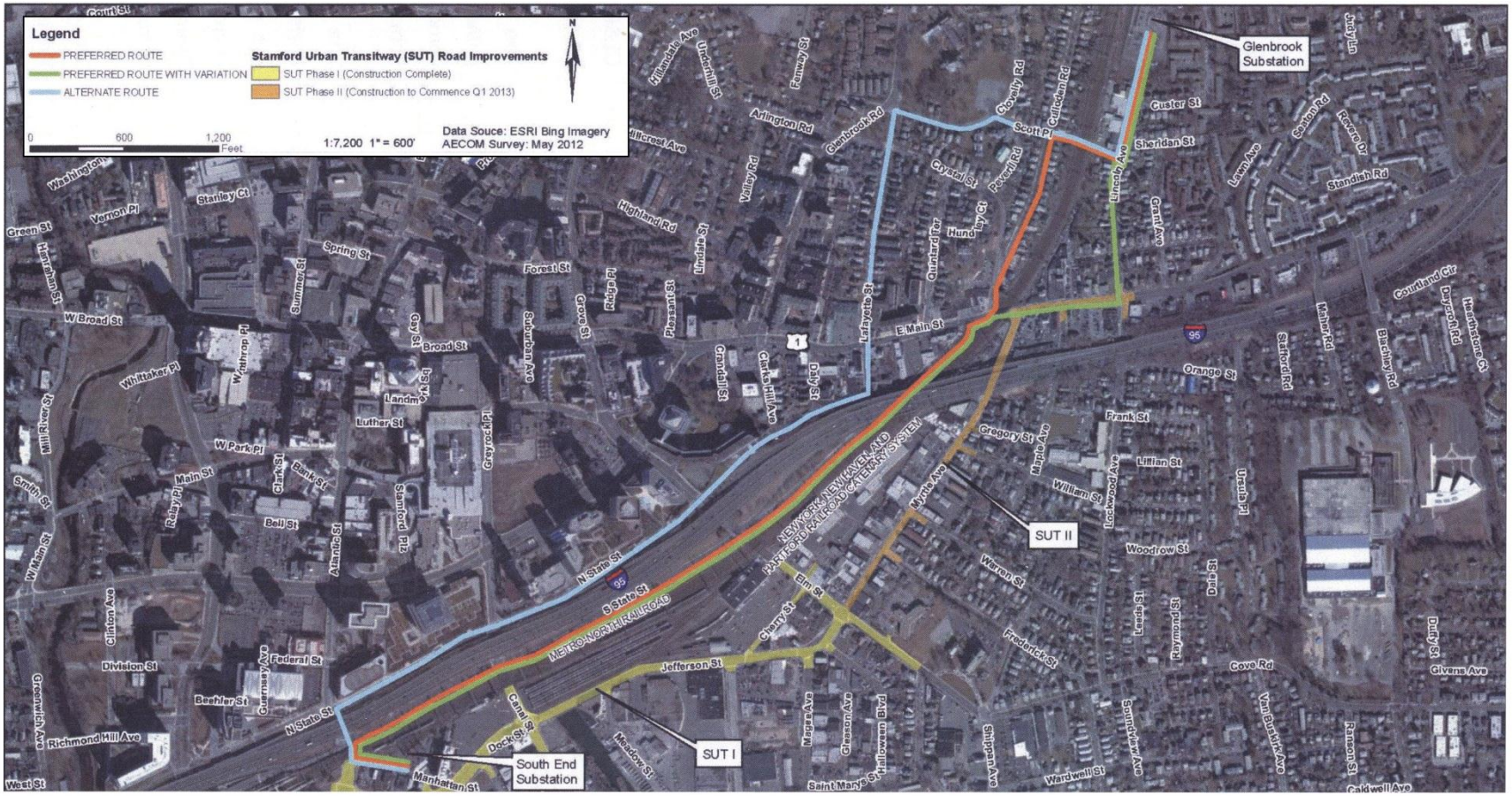
167. The costs of the SRCP would be amortized over a period of approximately 40 years. (Tr. 1, p. 20)

Figure 1: Stamford-Greenwich Sub-area



(CL&P 1, p. B-1)

Figure 2: Aerial Photograph Showing the Three Routes Originally Proposed

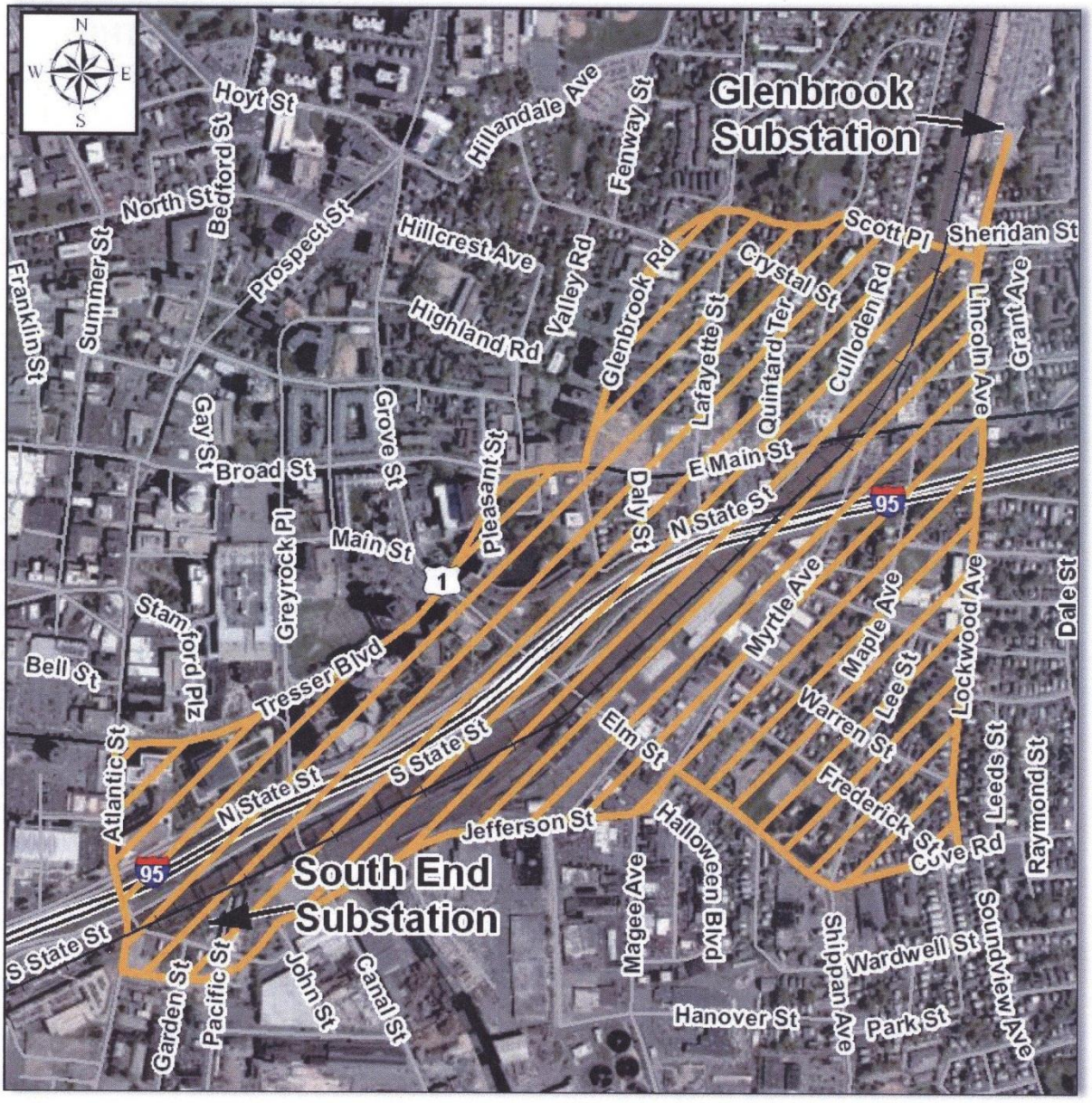


(CL&P 1, p. C-8)

Figure 3: Canal Street Option (Updated) Route

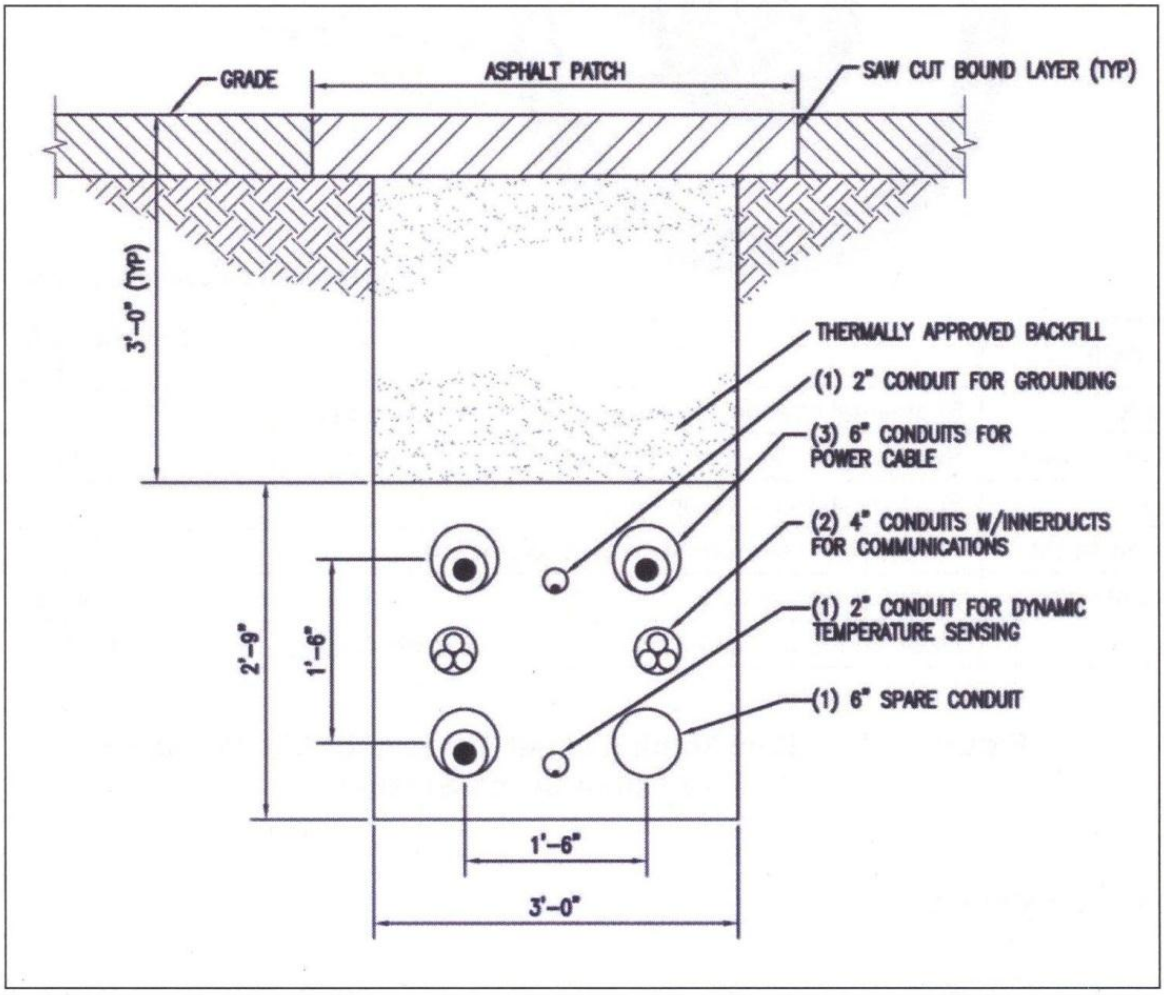
(CL&P 10, CL&P's Supplemental Filing II, dated May 23, 2013)

Figure 4: Stamford Reliability Cable SRCP Study Area



(CL&P 1, p. C-2)

Figure 5: Typical Underground Duct Bank Cross Section



Typical Underground Duct Bank Cross Section

(CL&P 1, p. D-7)