



## Fairfield to New Haven Asset Condition Assessment

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The United Illuminating Company  
June 30, 2018

# APPENDIX E

## +200/-50% CONCEPTUAL COST AND

## SCHEDULE ESTIMATE SUMMARIES AND

## APPROACH ASSUMPTIONS



**APPENDIX E.1**  
**+200/-50% CONCEPTUAL ESTIMATES AND**  
**ASSUMPTIONS FOR MILVON TO WEST**  
**RIVER**

Level 1 Schedule Summary Comparison (Years)				
Line Segment	Alternative 1 - Double Circuit Monopole	Alternative 2 - (2) Single Circuit Monopoles	Alternative 3 - (1) Single Circuit Monopole and Existing Catenary Structure	Alternative 4 - Existing Catenary Structure
Milvon to Woodmont (4.1 miles)	3.17	3.92	5.00	4.58
Woodmont to Allings Crossing (2.9 miles)	2.92	3.42	4.58	3.92
Allings Crossing to Elmwest (1.3 miles)	2.58	3.08	3.75	3.33
Elmwest to West River (1.2 miles)	2.58	3.08	3.67	3.33
<b>Total</b>	<b>11.25</b>	<b>13.50</b>	<b>17.00</b>	<b>15.16</b>

Cost Estimate Summary Comparison - Total Project Cost*				
Line Segment	Alternative 1 - Double Circuit Monopole	Alternative 2 - (2) Single Circuit Monopoles	Alternative 3 - (1) Single Circuit Monopole and Existing Catenary Structure	Alternative 4 - Existing Catenary Structure
Milvon to Woodmont (4.1 miles)	\$67,684,409	\$88,210,263	\$119,695,432	\$112,661,545
Woodmont to Allings Crossing (2.9 miles)	\$52,260,103	\$68,507,580	\$97,589,533	\$91,208,214
Allings Crossing to Elmwest (1.3 miles)	\$27,959,790	\$35,562,491	\$47,174,965	\$42,752,087
Elmwest to West River (1.2 miles)	\$29,437,813	\$37,120,210	\$50,602,225	\$44,639,839
<b>Total Project Cost</b>	<b>\$177,342,115</b>	<b>\$229,400,544</b>	<b>\$315,062,155</b>	<b>\$291,261,685</b>

\* UI Costs of "Remote End Modifications" and "AFUDC" are not included.

Cost Estimate Summary Comparison - Milvon to Woodmont Line Segment*				
Cost Category	Alternative 1 - Double Circuit Monopole	Alternative 2 - (2) Single Circuit Monopoles	Alternative 3 - (1) Single Circuit Monopole and Existing Catenary Structure	Alternative 4 - Existing Catenary Structure
Material	\$6,748,810	\$10,111,648	\$7,424,361	\$6,805,750
Labor	\$17,037,256	\$23,184,400	\$45,230,547	\$44,089,004
Engineering/Indirects	\$33,560,201	\$39,188,148	\$40,048,251	\$35,879,472
Escalation	\$2,170,054	\$3,898,324	\$7,876,646	\$7,475,756
Contingency	\$8,168,088	\$11,827,743	\$19,115,625	\$18,411,563
<b>Total Project Cost</b>	<b>\$67,684,409</b>	<b>\$88,210,263</b>	<b>\$119,695,432</b>	<b>\$112,661,545</b>

\* UI Costs of "Remote End Modifications" and "AFUDC" are not included.

Cost Estimate Summary Comparison - Woodmont to Allings Crossing Line Segment*				
Cost Category	Alternative 1 - Double Circuit Monopole	Alternative 2 - (2) Single Circuit Monopoles	Alternative 3 - (1) Single Circuit Monopole and Existing Catenary Structure	Alternative 4 - Existing Catenary Structure
Material	\$5,103,860	\$7,799,521	\$5,810,716	\$5,335,325
Labor	\$13,898,787	\$18,880,664	\$35,483,053	\$34,566,076
Engineering/Indirects	\$23,504,781	\$27,077,987	\$28,359,275	\$25,876,953
Escalation	\$3,470,686	\$5,511,603	\$12,811,222	\$10,861,541
Contingency	\$6,281,989	\$9,237,805	\$15,125,267	\$14,568,319
<b>Total Project Cost</b>	<b>\$52,260,103</b>	<b>\$68,507,580</b>	<b>\$97,589,533</b>	<b>\$91,208,214</b>

\* UI Costs of "Remote End Modifications" and "AFUDC" are not included.

Cost Estimate Summary Comparison - Allings Crossing to Elmwest Line Segment*				
Cost Category	Alternative 1 - Double Circuit Monopole	Alternative 2 - (2) Single Circuit Monopoles	Alternative 3 - (1) Single Circuit Monopole and Existing Catenary Structure	Alternative 4 - Existing Catenary Structure
Material	\$2,301,756	\$3,395,842	\$2,225,002	\$2,035,475
Labor	\$8,623,433	\$10,622,201	\$15,107,528	\$14,688,162
Engineering/Indirects	\$11,009,259	\$13,132,263	\$15,055,338	\$13,271,607
Escalation	\$2,900,870	\$4,093,239	\$8,470,420	\$6,683,725
Contingency	\$3,124,472	\$4,318,946	\$6,316,677	\$6,073,119
<b>Total Project Cost</b>	<b>\$27,959,790</b>	<b>\$35,562,491</b>	<b>\$47,174,965</b>	<b>\$42,752,087</b>

\* UI Costs of "Remote End Modifications" and "AFUDC" are not included.

Cost Estimate Summary Comparison - Elmwest to West River Line Segment*				
Cost Category	Alternative 1 - Double Circuit Monopole	Alternative 2 - (2) Single Circuit Monopoles	Alternative 3 - (1) Single Circuit Monopole and Existing Catenary Structure	Alternative 4 - Existing Catenary Structure
Material	\$2,538,898	\$3,716,909	\$2,313,004	\$2,115,366
Labor	\$8,687,798	\$10,656,297	\$15,394,249	\$14,965,427
Engineering/Indirects	\$10,934,117	\$12,738,102	\$14,952,303	\$12,598,129
Escalation	\$4,035,711	\$5,554,526	\$11,435,988	\$8,704,819
Contingency	\$3,241,289	\$4,454,375	\$6,506,682	\$6,256,098
<b>Total Project Cost</b>	<b>\$29,437,813</b>	<b>\$37,120,210</b>	<b>\$50,602,225</b>	<b>\$44,639,839</b>

\* UI Costs of "Remote End Modifications" and "AFUDC" are not included.

## **1.1 UPDATED +200/-50% COST ESTIMATE AND LEVEL 1 SCHEDULE ASSUMPTIONS**

### **1.1.1 General Assumptions**

1. No work inside the substation yards is included in these cost estimates unless noted otherwise.
2. A markup of 10% is applied to construction costs.
3. A contingency of 40% has been applied to the construction labor, equipment and material costs.
4. 1.75% per year escalation until construction for each line segment has been included in the total project cost. Line segments are scheduled in sequence starting in 1<sup>st</sup> quarter of 2021 as directed by UI.
5. Sales taxes of 6.35% on applicable materials are included in these cost estimates.
6. Material salvage has not been included in the total project cost.
7. Cost or schedule impacts have not been included for managing regulated material, which includes but is not limited to soil and ground water.
8. No costs have been included for the preservation of historical properties or area with potential for the presence of historical resources due to the fact that the Cultural Resource Review of the project area has not been completed.
9. Police traffic control for construction efforts/access impacting local roadways is included in the cost estimates.
10. No cost has been included for Connecticut Siting Counsel (CSC) applications or petitions.
11. The cost for the Allowance for Funds Used During Construction (AFUDC) is not included in the cost estimates at this stage.
12. Any Substation terminal upgrade costs to meet or exceed the ratings of the overhead lines are not included in the total project cost.
13. The schedule will include 12 months for permitting.
14. The schedule will include 12 months for bid, evaluation, and award of any project contract.
15. The schedule will include 12 months for any material procurement. Time for specification and drawings required for procurement are included in Detailed Design.
16. The schedule will use a mileage ratio for construction activities for the individual line segments.
17. The schedule will include 2 months for project closeout.
18. An allowance of \$10,000 per mile is included for above grade ground survey.
19. An allowance of \$6,100 per boring located once every 3 structures and at line angles and \$2,800 for underground probes at every structure location is included.
20. The acreage of Right of Way that is impacted by the new monopole structures is evaluated based off of UI clearance criteria. \$500,000 per acre is used for Right of Way costs as directed by UI.
21. A mileage ratio was used for the Flagmen, Signalmen/Groundmen, Engineering, and Construction Costs for the line segments based off of the Milvon to Woodmont section cost. The Milvon to Woodmont section cost was based on previous project information.

22. The schedule does not account for any time of year restrictions pertaining to state or federal listed species (i.e. endangered, threatened, or special concern species).
23. A lead management plan is required to meet UI/MNR requirements for any grinding, cutting, or abrasive impact to structures that may contain lead. Costs are considered in construction management.

### **1.1.2 Construction Assumptions**

1. Outages on the facilities associated with this work will be required. Generally, it is anticipated that a line outage will be required on each line as it is re-built, while the adjacent line is on “non-reclose”. It is also anticipated that several line outages will be required for the options that require modifications to the existing catenary structures.
2. Significant grading including major cuts, benching and imported fill material required to support the build out of access in areas with steep terrain are assumed to be minimal as majority of elevation change along access entrance drives is less than 5 feet.
3. It is assumed that restoration time of the line can take 12 hour or more depending upon the option selected and depending upon where the crews are in the pull.
4. It is assumed that drilling spoils will be assessed in the re-characterization stage of the project and managed according to the CT DEEP Soil Waste Guidelines. UI will provide costs for removal.
5. Access entrance drives assumed at every half mile or where access along railroad limited by road or waterway. Costs for any lease agreements from private owners for access entrance drives have not been included.
6. Access drives along railroad considered for access to structure locations from access entrance drives. 16’ width of access drives are considered and width of access drives is reduced to 12’ for wetland/sensitive areas.
7. Clearing for proposed monopole structures and access roads considered a 30’ width. Any clearing for access entrance drives is accounted for in costs as well; however, this is minimal as access paths were chosen to minimize construction effort.
8. An allowance of \$100,000 for tree restoration is considered.

### **1.1.3 Alternative 1 Assumptions- New Double Circuit Monopoles to Replace Existing Catenary Structure Supports for UI Wires**

1. Construction costs and schedule are based on work being performed Monday through Friday, 10 hours per day.
2. For the double circuit foundations, 6’ diameter x 22’ deep drilled pier foundations are assumed to be used to support new tangent and deadend steel monopoles.
3. New 1590 ACSS “Lapwing” Conductors and OPGW Shield Wires will be considered off of new monopole structures for construction.
4. One spare reel of conductor has been included in the material quantities.
5. For the double circuit pole case, it is assumed that the new poles will be installed in line with the existing lattice towers but slightly ahead or back depending on the site specific conditions.
6. New monopoles are assumed to be located 25 ft off of the existing catenary structure post centerlines.

7. New monopoles are assumed to be applied on the North side of the existing railway as the less expensive side when considering right of way, clearing, and access.

#### **1.1.4 Alternative 2 Assumptions – (2) New Single Circuit Monopoles to Replace Existing Catenary Support Structures for UI Wires**

1. Construction costs and schedule are based on work being performed Monday through Friday, 10 hours per day.
2. For the single circuit foundations, 6' diameter x 17' deep drilled pier foundations are assumed to be used to support the new tangent and deadend steel monopoles.
3. New 1590 ACSS "Lapwing" Conductors and OPGW Shield Wires will be considered off of new monopole structures for construction.
4. One spare reel of conductor has been included in the material quantities.
5. For the single circuit monopole case, it is assumed that the new monopoles will be installed to the outside of the existing towers. It is assumed that the majority of new monopoles could be installed directly adjacent to the existing towers with the arms oriented inward to support the transfer of existing conductor which could be used to pull in the new wire.
6. New monopoles are assumed to be located 25ft off of the existing catenary structure post centerlines.

#### **1.1.5 Alternative 3 Assumptions - New Single Circuit Monopole to Replace Existing Catenary Support Structures for UI Wires for (1) Circuit and Upgrade Existing Catenary Support Structure for (1) Remaining Circuit**

1. Construction costs and schedule are based on work being performed Monday through Friday, 10 hours per day for new monopoles.
2. Construction costs and schedule are based on work being performed Monday through Friday in 2 hour outage increments during low railroad traffic volume periods for existing catenary structures.
3. New 1590 ACSS "Lapwing" Conductors and OPGW Shield Wires will be considered off of new monopole structures for construction.
4. One spare reel of conductor has been included in the material quantities.
5. For the single circuit monopole case, it is assumed that the new monopoles will be installed to the outside of the existing towers. It is assumed that the majority of new monopoles could be installed directly adjacent to the existing towers with the arms oriented inward to support the transfer of existing conductor which could be used to pull in the new wire.
6. New monopoles are assumed to be located 25ft off of the existing catenary structure post centerlines.
7. New monopoles are assumed to be applied on the North side of the existing railway as the less expensive side when considering right of way, clearing, and access.
8. Existing catenary structure foundations are assumed to require modifications to meet the applied loads.
9. Temporary shoring structures and foundations are assumed to be required for existing catenary modifications.
10. Existing conductors and shield wires supported off modified catenary structures shall be maintained.



11. Chord member reinforcement and lattice member replacement is assumed for majority of modified catenary structure.

#### **1.1.6 Alternative 4 Assumptions - Upgrade Existing Catenary Support Structure for UI Wires**

1. Construction costs and schedule are based on work being performed Monday through Friday in 2 hour outage increments during low railroad traffic volume periods for existing catenary structures.
2. Existing foundations are assumed to require modifications to meet the applied loads.
3. Temporary shoring structures and foundations are assumed to be required for existing catenary modifications.
4. Existing conductors and shield wires supported off modified catenary structures shall be maintained.
5. Chord member reinforcement and lattice member replacement is assumed for majority of modified catenary structure.