

# DANBURY BRANCH IMPROVEMENT PROGRAM TASK 5

## ENVIRONMENTAL TECHNICAL MEMORANDUM IMPACTS ANALYSIS

STATE PROJECT 302-008



### SECTION 1: TOPOGRAPHY, GEOLOGY, AND SOILS

FEBRUARY 2012

## SECTION 1. TOPOGRAPHY, GEOLOGY AND SOILS

### METHODOLOGY

Constraints to project implementation due to the existing topography, geology and soils in the study corridor were evaluated by comparing the locations of improvement concepts associated with each of the Build Alternatives with the GIS and other base-mapping of those resources. Additionally, site visits and reviews of photographs of the existing railroad identified the topography and geology of the areas of anticipated work. The existing conditions are presented in *Section 1: Topography, Geology, and Soils* (May 2009) of the Environmental Technical Memorandum.

The corridor topography varies from urban developed to rural river valley. Features such as rivers, streets, and buildings were carefully considered as the conceptual engineering developed. Given the extensive presence of rock, the construction cost estimate has been prepared assuming that all excavation will be classified as “rock.” Also, in view of the rocky terrain, soils are not expected to be of concern except as described in other environmental technical memoranda.

Tables 1, 2, and 3 indicate the typical topography, geology, and soils for the work elements in Alternatives C, D, and E respectively. Where an improvement type is not included in an alternative, it is not shown on the table. The work elements are:

- Passenger Stations
- Traction Power System - Electrification
- Track Reconfigurations, Sidings and Connections
- Structures and Bridges
- Storage and Maintenance Yards

### CONSTRAINTS TO PROJECT

#### **Alternative A: No Build**

There are no constraints due to topography, geology or soils to the No Build Alternative as no new construction would take place as part of this alternative.

#### **Alternative B: Transportation System Management (TSM)**

There are no constraints due to topography, geology or soils to the TSM Alternative as no new construction would take place as part of this alternative.

#### **Alternative C: South Norwalk to Danbury Improvements**

Alternative C is the existing Danbury Branch between Norwalk and Danbury. It is in the watersheds of the Norwalk, Saugatuck, and Still Rivers. There are many crossings of these rivers by the railroad. Development in the rail corridor varies from Urban in Norwalk and Danbury to Rural in Redding. The area geology is predominated by rock outcrops and boulders. The

topography has impacted the conceptual designs by limiting the track realignments to allow a maximum track speed of 60 MPH with lower speeds in some areas such as at the ends of the Branch in Norwalk and Danbury and at Wilton Station. As mentioned previously, where excavations are anticipated, the presence of rock has been assumed in preparing the cost estimate.

Topographic and geologic features as well as soil types pertinent to the Alternative C improvements are shown in Table 1.

#### **Alternative D: Extension from Danbury to New Milford**

Alternative D is a section of the existing Maybrook Line in Danbury and the southern end of the Berkshire Line between Danbury and New Milford. It is in the watersheds of the Still and Housatonic Rivers. There are several crossings of these rivers or tributaries by the railroad. Development in the rail corridor varies from Urban in Danbury to Rural in Brookfield and New Milford. The area geology is predominated by rock outcrops and boulders. The topography has impacted the conceptual designs by limiting the track realignments to be within the existing railroad rights of ways. A maximum track speed of 60 MPH has been achieved with lower speeds in the developed areas of Danbury and downtown New Milford. As mentioned previously, where excavations are anticipated, the presence of rock has been assumed in preparing the cost estimate.

Topographic and geologic features as well as soil types pertinent to the improvements in Alternative D are shown in Table 2.

#### **Alternative E: Improvements from South Norwalk to Wilton (Merritt 7)**

Alternative E is the existing Danbury Branch in Norwalk and Wilton. It is in the watershed of the Norwalk River. There are several crossings of the river by the railroad. Development in the rail corridor varies from Urban to Suburban in Wilton. The area geology is predominated by rock outcrops and boulders. The topography has impacted the conceptual designs by limiting the track realignments to allow a maximum track speed of 60 MPH with lower speeds at the beginning of the Branch in Norwalk. As mentioned previously, where excavations are anticipated, the presence of rock has been assumed in preparing the cost estimate.

Topographic and geologic features as well as soil types pertinent to the Alternative E improvements are shown in Table 3.

**Table 1: Alternative C - Potentially Impacted Topography, Geology, and Soils**

| Improvement Type                               | Location           | Study Milepost (MP) |       | Topography   | Geology/Soils   |
|--|--------------------|---------------------|-------|--------------|---|
| <b>Existing Stations (Upgrades)</b>            |                    |                     |       |              |   |
| Merritt 7                                      | Norwalk            | 3.6                 | 3.6   | Developed    | Urban Land  |
| Cannondale                                     | Wilton             | 8.85                | 8.85  | River Valley | Haven & Enfield Soils   |
| Branchville                                    | Ridgefield         | 12.65               | 12.65 | River        | Hinkley-Urban Land Complex  |
| Redding  | Redding            | 17.1                | 17.1  | River Valley | Canton & Charlton Soils   |
| Bethel   | Bethel             | 21                  | 21    | River        | Timakwa & Natchaug soils<br>Farmington-Nellis complex, very rocky |
| <b>Undergrade Bridges</b>                      |                    |                     |       |              |   |
| Washington & South Main St.                    | Norwalk            | 0.0                 | 0.0   | Urban        | Udorthents-Urban Land complex                                     |
| Marshall St.                                   | Norwalk            | 0.1                 | 0.1   | Urban        | Udorthents-Urban Land complex                                     |
| Ann St.  | Norwalk            | 0.2                 | 0.2   | Urban        | Udorthents-Urban Land complex                                     |
| Norwalk River                                  | Norwalk            | 3.2                 | 3.2   | River        | Urban Land<br>Rock Outcrops                                       |
| Small stream                                   | Norwalk            | 5.12                | 5.12  | River/Stream | Haven & Enfield Soils   |
| Small stream                                   | Norwalk            | 6.43                | 6.43  | River/Stream | Urban Land  |
| Norwalk River                                  | Wilton             | 6.64                | 6.64  | River        | Pootatuck fine sandy loam   |
| Norwalk River                                  | Wilton             | 8.7                 | 8.7   | River        | Rippowan fine sandy loam  |
| Norwalk River                                  | Wilton             | 9.42                | 9.42  | River        | Hinckley gravelly sandy loam                                      |
| Old Mill Rd.                                   | Wilton             | 11.01               | 11.01 | Street       | Hinckley gravelly sandy loam                                      |
| Norwalk River                                  | Wilton             | 11.55               | 11.55 | River        | Charlton-Chatfield complex, very rocky                            |
| Factory Pond                                   | Wilton             | 12.17               | 12.17 | River/Stream | Hinckley-Urban Land complex                                       |
| Old Redding Rd.                                | Redding            | 14.16               | 14.16 | Street       | Canton & Charlton soils, extremely stony                          |
| Simpaug Tpke.                                  | Redding            | 14.8                | 14.8  | Street       | Charlton-Chatfield complex, very rocky                            |
| Umpawaug Pond Brook                            | Redding            | 16.4                | 16.4  | Brook        | Raypot Silt Loam  |
| Saugatuck River                                | Redding            | 17.1                | 17.1  | River        | Saco Silt Loam  |
| Grassy Plains Rd. (Rt. 53)                     | Bethel             | 19.64               | 19.64 | Street       | Rippowan fine sandy loam  |
| Sympaug Brook                                  | Bethel             | 21.4                | 21.4  | Brook        | Saco Silt Loam  |
| <b>Overhead Bridges</b>                        |                    |                     |       |              |   |
| Route 7  | Wilton             | 7.87                | 7.87  | Street       | Ninigret & Tisbury soils  |
| <b>Traction Power System - Electrification</b> |                    |                     |       |              |   |
| Catenary and support structures                | Norwalk to Danbury | 1.1                 | 23.9  | Railroad     | RR embankment   |
| RTU (CP401)                                    | Norwalk            | 0.63                | 0.63  | Developed    | Udorthents-Urban Land complex                                     |
| Substation (SUB-41D)                           | Norwalk            | 1.62                | 1.62  | River        | Urban Land  |
| Substation (SUB-170D)                          | Wilton             | 7.25                | 7.25  | Developed    | Urban Land  |
| Substation (SUB-305D)                          | Ridgefield         | 13                  | 13    | Developed    | Udorthents-Urban Land complex                                     |
| Substation (SUB-RED)                           | Redding            | 17.2                | 17.2  | Street & RR  | Ridgebury, Leicester & Whitman soils, extremely stony             |
| RTU (CP421)                                    | Bethel             | 20.22               | 20.22 | Developed    | Udorthents-Urban Land complex                                     |
| Substation (SUB-560D)                          | Danbury            | 23.3                | 23.3  | Railroad     | Udorthents-Urban Land complex                                     |

**Table 1: Alternative C - Potentially Impacted Topography, Geology, and Soils**

| Improvement Type                          | Location          | Study Milepost (MP) |       | Topography            | Geology/Soils                          |
|---|-------------------|---------------------|-------|-----------------------|--|
| <b>Track Reconfigurations</b>             |                   |                     |       |                       |  |
| CP 241                                    | Norwalk           | 0                   | 0.3   | Urban                 | Urban Land                             |
| Curves 0E, 1A & 1B                        | Norwalk           | 1                   | 1.7   | Developed             | Urban Land                             |
| Curves 2B, 3A, 3B & 3C                    | Norwalk           | 2.7                 | 4     | River                 | Urban Land                             |
| Curve 3D                                  | Norwalk           | 3.82                | 3.96  | River                 | Urban Land                             |
| Curve 4C                                  | Wilton            | 4.8                 | 4.97  | Street & RR           | Haven & Enfield Soils                  |
| Curve 5                                   | Wilton            | 5.75                | 5.83  | Railroad              | Haven & Enfield Soils                  |
| Curve 6A                                  | Wilton            | 6.07                | 6.24  | Railroad              | Haven & Enfield Soils                  |
| Curve 6B                                  | Wilton            | 6.53                | 6.68  | River                 | Urban Land                             |
| Curves 7E & 8                             | Wilton            | 7.71                | 8.47  | Developed & Street    | Ninigret & Tisbury soils               |
| Curve 9C                                  | Wilton            | 9.53                | 9.84  | River                 | Charlton-Chatfield complex, very rocky |
| Curves 10B & 11A                          | Wilton            | 11                  | 11.47 | River & Street        | Hinckley gravelly sandy loam           |
| Curve 12A                                 | Wilton            | 12.21               | 12.33 | Developed             | Charlton-Chatfield complex, very rocky |
| Curve 12B                                 | Wilton/Ridgefield | 12.42               | 12.57 | Developed             | Charlton-Chatfield complex, very rocky |
| Curve 13B                                 | Redding           | 13.25               | 13.4  | Slope                 | Charlton-Chatfield complex, very rocky |
| Curve 13C                                 | Redding           | 13.46               | 13.59 | Street                | Charlton-Chatfield complex, very rocky |
| Curve 13D                                 | Redding           | 13.63               | 13.7  | Slope                 | Charlton-Chatfield complex, very rocky |
| Curve 14A                                 | Redding           | 13.97               | 14.1  | Slope                 | Charlton-Chatfield complex, very rocky |
| Curves 14B, 14C, 14D & 15A                | Redding           | 14.24               | 15.14 | Slope, Street, Houses | Charlton-Chatfield complex, very rocky |
| Curves 15B & 15C                          | Redding           | 15.26               | 15.77 | Street, Houses, Pond  | Catden & Freetown soils                |
| Curves 16A & 16B                          | Redding           | 16.58               | 16.89 | Street & Slope        | Charlton-Chatfield complex, very rocky |
| Curve 17A                                 | Redding           | 17.25               | 17.45 | Slope                 | Canton & Charlton soils, very stony    |
| Curve 17B                                 | Redding           | 17.57               | 17.72 | slope                 | Haven & Enfield soils                  |
| Curve 17C                                 | Redding           | 17.83               | 18.01 | Railroad              | Charlton-Chatfield complex, very rocky |
| Curve 19A                                 | Bethel            | 19.07               | 19.18 | Developed             | Udorthents-Pits complex, gravelly      |
| <b>Rail Storage and Maintenance Yards</b> |                   |                     |       |                       |  |
| Danbury Yard                              | Danbury           | 23                  | 24    | Railroad              | Udorthents-Urban Land complex          |

**Table 2: Alternative D - Potentially Impacted Topography, Geology, and Soils**

| Improvement Type                               | Location               | Study Milepost (MP) |          | Topography        | Geology/Soils                     |
|--|------------------------|---------------------|----------|-------------------|-----------------------------------|
| <b>Proposed Stations</b>                       |                        |                     |          |                   |                                   |
| Brookfield Station                             | Brookfield             | 31.5                | 31.5     | River & Developed | Woodbridge fine sandy loam        |
| Brookfield Passing Siding at Station           | Brookfield             | 31.46               | 31.96    | Slope             | Woodbridge fine sandy loam        |
| New Milford Station                            | New Milford            | 38.35               | 38.35    | Developed         | Udorthents-Urban Land Complex     |
| New Milford Passing Siding at Station          | New Milford            | 38.0                | 38.46    | Developed         | Udorthents-Urban Land Complex     |
| <b>Undergrade Bridges</b>                      |                        |                     |          |                   |                                   |
| Still River                                    | Danbury                | 26.6                | 26.6     | River             | Rippowam fine sandy loam          |
| Junction Rd. (Rt. 133)                         | Brookfield             | 29.47               | 29.47    | Street            | Udorthents-Urban Land Complex     |
| Farm Pass                                      | Brookfield             | 29.9                | 29.9     | Railroad          | Raypol silt loam                  |
| Old Middle Rd.                                 | Brookfield             | 33.07               | 33.07    | Street            | Copake fine sandy loam            |
| Still River                                    | New Milford            | 35.1                | 35.1     | River             | Haven & Enfield soils             |
| Housatonic Ave.                                | New Milford            | 38.62               | 38.62    | Street            | Urban Land                        |
| <b>Traction Power System - Electrification</b> |                        |                     |          |                   |                                   |
| Catenary and support structures                | Danbury to New Milford | 23.9                | 39.0 +/- | Railroad          | RR Embankment                     |
| Raise Bridge - White St.                       | Danbury                | 24.33               | 24.33    | Urban             | Urban Land                        |
| Raise Bridge - I-84                            | Danbury                | 26.2                | 26.2     | Highway           | Urban Land                        |
| Raise Bridge - I-84                            | Danbury                | 26.2                | 26.2     | Highway           | Urban Land                        |
| Substation (SUB-BRK)                           | Brookfield             | 29.5                | 29.5     | Street & RR       | Agawam fine sandy loam            |
| Raise Bridge - Silvermine Rd.                  | Brookfield             | 30.2                | 30.2     | Street            | Hinckly gravelly sandy loam       |
| Raise Bridge - Whisconier Rd. (Rt. 25)         | Brookfield             | 31.26               | 31.26    | Street            | Woodbridge fine sandy loam        |
| Raise Bridge - Old Pumpkin Hill Rd.            | New Milford            | 33.9                | 33.9     | Street            | Scarboro Muck                     |
| Raise Bridge - Erickson Rd.                    | New Milford            | 34.74               | 34.74    | Street            | Hero gravelly loam                |
| Substation                                     | New Milford            | 39.0 +/-            | 39.0 +/- | Developed         | Udorthents-Urban Land Complex     |
| <b>Curve Reconfigurations</b>                  |                        |                     |          |                   |                                   |
| Curve 1A                                       | Brookfield             | 28.22               | 28.43    | Railroad          | Udorthents-Urban Land Complex     |
| Curve 1B                                       | Brookfield             | 28.72               | 28.82    | Railroad          | Udorthents-Urban Land Complex     |
| Curve 6A                                       | New Milford            | 33.2                | 33.35    | Railroad          | Copake fine sandy loam            |
| Curve 8A                                       | New Milford            | 33.53               | 35.6     | Railroad          | Haven & Enfield soils             |
| Curve 9A                                       | New Milford            | 35.96               | 36.12    | Railroad          | Haven & Enfield soils             |
| <b>Storage Sidings</b>                         |                        |                     |          |                   |                                   |
| Storage Siding                                 | Danbury/Brookfield     | 27.24               | 27.58    | Railroad          | Udorthents-Pits complex, gravelly |
| <b>Rail Storage and Maintenance Yards</b>      |                        |                     |          |                   |                                   |
| New Milford Yard                               | New Milford            | 39.0 +/-            | 39.0 +/- | Developed         | Udorthents-Urban Land Complex     |

**Table 3: Alternative E - Potentially Impacted Topography, Geology, and Soils**

| Improvement Type                               | Location           | Study Milepost (MP) |      | Topography   | Geology/Soils                 |
|--|--------------------|---------------------|------|--------------|-------------------------------|
| <b>Existing Stations (Upgrades)</b>            |                    |                     |      |              |                               |
| Merritt 7                                      | Norwalk            | 3.6                 | 3.6  | Developed    | Urban Land                    |
| <b>Undergrade Bridges</b>                      |                    |                     |      |              |                               |
| Washington & South Main St.                    | Norwalk            | 0.0                 | 0.0  | Urban        | Udorthents-Urban Land complex |
| Marshall St.                                   | Norwalk            | 0.1                 | 0.1  | Urban        | Udorthents-Urban Land complex |
| Ann St.  | Norwalk            | 0.2                 | 0.2  | Urban        | Udorthents-Urban Land complex |
| Norwalk River                                  | Norwalk            | 3.2                 | 3.2  | River        | Urban Land<br>Rock Outcrops   |
| Small stream                                   | Norwalk            | 5.12                | 5.12 | River/Stream | Haven & Enfield soils         |
| Small stream                                   | Norwalk            | 6.43                | 6.43 | River/Stream | Urban Land                    |
| Norwalk River                                  | Wilton             | 6.64                | 6.64 | River        | Pootatuck fine sandy loam     |
| <b>Traction Power System - Electrification</b> |                    |                     |      |              |                               |
| Catenary and support structures                | Norwalk to Danbury | 1.1                 | 23.9 | Railroad     | RR Embankment                 |
| RTU (CP401)                                    | Norwalk            | 0.63                | 0.63 | Developed    | Udorthents-Urban Land complex |
| Substation (SUB-170D)                          | Wilton             | 7.25                | 7.25 | Developed    | Urban Land                    |
| <b>Track Reconfigurations</b>                  |                    |                     |      |              |                               |
| CP 241   | Norwalk            | 0                   | 0.3  | Urban        | Urban Land                    |
| Curves 0E, 1A & 1B                             | Norwalk            | 1                   | 1.7  | Developed    | Urban Land                    |
| Curves 2B, 3A, 3B & 3C                         | Norwalk            | 2.7                 | 4    | River        | Urban Land                    |
| Curve 3D                                       | Norwalk            | 3.82                | 3.96 | River        | Urban Land                    |
| Curve 4C                                       | Wilton             | 4.8                 | 4.97 | Street & RR  | Haven & Enfield soils         |
| Curve 5  | Wilton             | 5.75                | 5.83 | Railroad     | Haven & Enfield soils         |
| Curve 6A                                       | Wilton             | 6.07                | 6.24 | Railroad     | Haven & Enfield soils         |
| Curve 6B                                       | Wilton             | 6.53                | 6.68 | River        | Urban Land                    |