# ENVIRONMENTAL RE-EVALUATION CONSULTATION

**Note: The purpose of this worksheet is to assist sponsoring agencies in gathering and organizing materials for re-evaluations required under the National Environmental Policy Act (NEPA). It is designed to provide FTA with information needed to do a re-evaluation. In lieu of the worksheet, the sponsoring agency may submit the same information in a different format. Submission of the worksheet by itself does not meet NEPA requirements. FTA must concur in writing with its determination and/or the sponsoring agency's NEPA recommendation.**

| *For Agency Use*<br>*Date Received:* | |
|---|---|
| *Recommendation by Planner or Engineer:*<br>☐ *Accept* ☐ *Return for Revisions*<br>☐ *Not Eligible* | *Reviewed By:*<br>*Date:* |
| *Comments:* | |
| *Concurrence by Regional Counsel:*<br>☐ *Accept Recommendation* ☐ *Return with Comments* | *Reviewed By:*<br>*Date:* |
| *Comments:* | |
| *Concurrence by Approving Official:* | *Date:* |

Please answer the following questions, fill out the impact chart and attach project area and site maps. Figures have been prepared for this Environmental Re-evaluation Consultation to show project revisions and are provided in Attachment A. The figures are numbered to correspond with similar figures presented in the EA/FONSI (e.g., Figure 3-11a compares with EA/FONSI Figure 3-11).

| **PROJECT TITLE**<br>Walk Bridge Replacement Project<br>Bridge No. 042884, Norwalk, Connecticut<br>Connecticut State Project No. 0301-0176 |
|---|

| **LIST CURRENT, APPROVED ENVIRONMENTAL DOCUMENTS (e.g. EIS/ROD, EA/FONSI, BA, RE-EVALUATION, etc.) If Re-evaluation, briefly describe.** |
|---|
| **Title: Walk Bridge Replacement Project Environmental Assessment/Section 4(f) Evaluation and Environmental Impact Evaluation (EA/EIE) Date: August 2016**<br>**Type and Date of Last Federal Action: Finding of No Significant Impact (EA/FONSI), July 17, 2017** |
| **Title: Environmental Re-evaluation Consultation Date: July 12, 2019**<br>**Type and Date of Last Federal Action: Affirmation that July 17, 2017 FONSI remains valid, September 19, 2019** |
| **Title: Date: Type and Date of Last Federal Action** |

**HAS THE MOST CURRENT AND OTHER PERTINENT APPROVED ENVIRONMENTAL DOCUMENTS BEEN *RE-READ* TO COMPARE PROPOSED PROJECT CHANGES?**

☐ **NO (STOP! The most current approved environmental document MUST be re-read prior to completing a re-evaluation.)**

☒ **YES NAME: Walk Bridge Replacement Project EA/EIE DATE: August 2016**
**Environmental Re-evaluation Consultation July 12, 2019**

**IS THE PROJECT CURRENTLY UNDER ☒ DESIGN OR ☐ CONSTRUCTION?**

**REASON FOR RE-EVALUATION**

A Value Engineering (VE) Study for the Walk Bridge Replacement Project was prepared for the Connecticut Department of Transportation (CTDOT) and the Federal Transit Administration (FTA) to identify opportunities to improve project value (HNTB Corporation and Strategic Value Solutions, Inc., September 2019). The VE Study includes a recommendation for an alternative construction concept for the fabrication of the replacement bridge lift spans. This VE recommendation to facilitate construction (FC-14) consists of the following: fabricate the replacement bridge lift spans off-site at a steel fabricator's facility and deliver to the bridge site in lieu of constructing the lift spans at the Marine Staging Yard (68-90 Water Street). CTDOT is proposing to construct the lift spans at an existing storage and staging area with waterfront access: the site of the de-commissioned NRG Energy power plant at Manresa Island. Improved project value will result from using a smaller, pre-existing staging and storage area for assembling the lift spans, as opposed to constructing a Marine Staging Yard that was proposed in the 60 percent project design. This refinement in the proposed construction approach necessitates a re-evaluation of potential environmental impacts.

Design refinements of the Fort Point Street Bridge relocation and roadway realignment will replace a stone retaining wall potentially eligible for the National Register of Historic Places (NRHP). Also, proposed pedestrian improvements on Marshall Street are located in two potentially eligible NRHP-districts. These design refinements necessitate additional review of potential impacts to Section 106 resources and a re-evaluation of potential environmental impacts.

Construction requirements relative to sediment and soil management have been refined. In addition to the proposed waste stockpile area, CTDOT will use two re-use stockpile areas for recycling and re-using soils on the project site. This refinement in the construction approach necessitates a re-evaluation of potential environmental impacts.

**DESCRIPTION OF PROJECT CHANGES OR NEW INFORMATION**

**Construction Methods Refinement – Fabricate the Replacement Lift Spans at a Staging and Storage Yard at Manresa Island**

The ***EA/FONSI*** indicates that Walk Bridge construction and operation will require the use of 22 parcels, including Parcels 2/84/19, 2/84/3, and 2/84/63 (68, 70 and 90 Water Street), for temporary storage of construction equipment and supplies, contractor assembly and staging of equipment, and dredged/excavated sediment temporary storage and management, among other uses.

The concept presented in the ***September 2019 Environmental Re-evaluation Consultation*** is to construct the lift spans for the replacement bridge at a marine staging yard at 68, 70 and 90 Water Street [identified as Serials # 7, 8 and 9 per Program Right of Way (ROW) maps], which is located less than 0.2 nautical mile south of the existing bridge. The construction materials and equipment would be stored landside, and the lift spans would be constructed on a barge and then floated into position. A bulkhead would be constructed along the waterfront of 68 and 90 Water Street to provide a mooring location for the barges that would support assembly of the two lift spans. The placement of the assembly barges adjacent to the bulkhead would enable transfer of equipment and materials from land to construction barges. The bulkhead would remain in place at the completion of the project. Dredging in vegetated tidal wetlands would be required for the bulkhead construction.

In the ***revised construction approach***, CTDOT proposes a new location to construct the lift spans for the replacement bridge: the existing wharf and adjacent work area at Manresa Island, the site of the decommissioned NRG Energy power plant located approximately 2.1 nautical miles south of the existing bridge. A small portion of the developed southern parcel on Manresa Island (approximately 15 percent of the 33-acre parcel) will be used as a Staging and Storage Yard during project construction only. Once the lift spans are constructed, the spans will be floated by barge to the bridge site to be put into place. The following summarizes the plan for the proposed Staging and Storage Yard at Manresa Island, which is shown in Attachment B:

CTDOT will acquire a construction easement in the southern parcel of Manresa Island (Parcel 5/86/1) for approximately 48 months for use as a Staging and Storage Yard for the project. Construction and employee vehicle access to the Staging and Storage Yard will be provided from Longshore Avenue via the existing paved site access road (Figure B-1). The approximate 4.7+-acre Staging and Storage Yard will consist of two general areas on this previously disturbed site: an approximate 120,000 square foot (sf) work area and an approximate 87,500 sf construction equipment and material laydown area (Figure B-2). The work area will include potential use of an existing industrial office building as a project construction office and use of an existing parking area for employee parking. No buildings will be constructed. Storage containers (approximately 8-foot x 40-foot) will be required for construction tools and materials. A lift span assembly barge, a work barge, and miscellaneous material barges will be stationed at the existing dock. The barges will be anchored by spud piles. Based on a water-side inspection of the existing bulkhead, the marine structure can be used in its "as is" condition without improvements. No dredging will be required for use of the existing dock/wharf area.

Proposed uses of the work area will include:
1) Pre-assembly of structural components (i.e. lift tower);
2) Full assembly of both lift span trusses (south and north trusses) before float-in to the final location;
3) Berthing of safety boat vessel(s) and emergency rescue operations that are associated with construction of the lift spans; and
4) Temporary berthing of construction vessels and barges.

Proposed uses of the laydown area will include:
1) Storage of construction materials for trestles (pipe piles, girders, etc.) and sheet piles for marine enclosures (if space is available), including transfer of materials from trucks and/or barges and to barges;
2) Temporary storage of components from demolition of the existing bridge that are free of hazardous materials, such as stone masonry and concrete debris, including off-loading and transfer of materials from barges to trucks for off-site disposal; and
3) Off-loading and temporary storage of components from demolition of the existing bridge and the project site that contain hazardous materials, such as treated or painted timber cribbing/pilings, structural steel members, and timber ties. Existing bridge components will be barged to Manresa Island as needed. (No dredged material will be transported to or stored on the site.)

Protective measures/best management practices (BMPs) will be incorporated into the Manresa Staging and Storage Yard. In addition to a layer of geotextile fabric covered with six inches of crushed stone that will be placed over the non-paved areas of the Staging and Storage Yard, in the material laydown area, a polyethylene covering will be placed directly beneath any existing bridge component delivered to the site that is characterized as containing potentially hazardous materials (e.g., lead paint; creosote) as an additional layer of protection against contact with the ground surface. The contractor will also perform site testing for lead before and after staging and storage operations. The entire Storage and Staging Yard will be surrounded with temporary construction fencing to segregate the site from pre-existing uses; access to the site will be from a secure access gate. Table 1 (pages 18 - 32) includes additional description of the contractor's proposed means and methods and BMPs.

The Water Street parcels (Serials #7, 8 and 9) will continue to be used for the project construction, as previously cited in the ***EA/FONSI***. A bulkhead may be constructed along the waterfront of 68 and 90 Water Street, as cited in the ***September 2019 Environmental Re-evaluation Consultation***. In the ***revised construction approach***, with the planned assembly of the replacement lift spans at the Manresa Staging and Storage Yard, the Water Street parcels will not be used for marine based construction, and elimination of the bulkhead will be considered. The primary purpose of the Water Street parcels will be for storage of land-based construction equipment and material; construction equipment and material will be transferred to and from the site by truck.

**Summary of Impact:** The revised construction approach increases the total number of parcels required for the construction and operation of the project from 22 to 23 parcels (shown in Attachment A, Figures 3-12a and 3-12b). It does not change the method of lift span construction; only the location of the lift span construction is changed. This revised construction approach will not result in permanent impacts. By relocating the lift span assembly location to Manresa Island, this revised approach will reduce the temporary impacts in downtown Norwalk. Table 1 presents an assessment of impacts associated with the fabrication of the replacement lift spans at Manresa Island.

In response to public comments received during and following the public meeting to present the proposed temporary use, CTDOT provided documentation of alternative lift span assembly locations and completed evaluations of potential impacts to the neighborhoods north of the staging and storage yard at Manresa Island. Table 1 summarizes the results of the evaluations and anticipated traffic and noise impacts of the temporary staging and storage yard. Attachment C provides the evaluations. Attachment D provides an assessment of the proposed temporary staging and storage yard upon existing cultural resources and the Connecticut State Historic Protection Office's (CTSHPO's) concurrence with CTDOT's recommendation.

**<u>Engineering Design Refinements – Abandonment and Replacment of Fort Point Street/Railroad Corridor Stone Retaining Wall</u>**

Subsequent to the presentation of the Fort Point Street Bridge Relocation and Roadway Realignment in the ***July 2019 Re-evaluation Consultation Worksheet***, design has advanced. The concept presented in the ***September 2019 Environmental Re-evaluation Consultation*** is to replace the Fort Point Street Bridge via a realignment of the bridge and roadway, with the replacement bridge located approximately 100 feet west of the existing bridge. Based on this concept, a portion of the existing stone masonry wall located along a short section of Fort Point Street running east-west and extending north of the railroad bridge would be demolished, and a new wall would be constructed to tie into the remaining existing stone wall.

Based on the outcomes of the Value Engineering study and other design and future maintenance parameters, the entire existing wall will require a functional replacement, described as follows. ***In advanced design,*** the entirety of the existing northeast stone masonry retaining wall between Fort Point Street and the rail corridor will be abandoned in place and replaced with a new soil nail wall (Wall 310), to be installed immediately in front of the existing masonry wall, with soil nails extending through the existing wall. While the existing wall will not be removed, a new retaining wall is required to accommodate added loading due to a raise in track profile necessary to tie in to the proposed Fort Point Street Bridge and Walk Bridge, as well as a future raise in vertical alignment (6-inch track raise) requested by Metro-North Railroad for future maintenance purposes. While the existing stone retaining wall will not be removed, it will be functionally replaced.

Analysis of the existing wall based on available core data indicates that the wall is unlikely to satisfy American Railway Engineering and Maintenance-of-Way Association (AREMA) stability factor of safety requirements under the revised loading conditions. Alternatives were analyzed to maintain and reinforce the existing retaining wall, including installation of post-tensioned ground anchors and repointing of masonry joints, but the reinforcement options resulted in excessive quantities of anchors and would require construction of multiple rows of steel or concrete wales across the front face of the existing wall, resulting in significant aesthetic implications. Any option that would maintain the existing wall also would require reliance on existing mortar in rubble masonry backfill to ensure stability of the masonry for the remaining service life of the structure. To satisfy design life requirements and ensure the safety of the public, it was determined that the existing Fort Point Street stone retaining wall is not adequate and will be faced and strengthened with construction of a new wall (Wall 310).

**Summary of Impact**: The existing stone masonry wall is a contributing component to the railroad ROW as a National Register of Historic Places (NRHP)-eligible linear historic district. Abandonment in place and construction of a new wall directly in front of the existing stone retaining wall would be a functional replacement of the wall. CTDOT recommends that this change would constitute an adverse effect to historic resources. Table 2 (page 33) provides an assessment of impacts due to advanced design. Attachment D provides an assessment of the design change upon existing historical resources and CTSHPO's concurrence with CTDOT's recommendation.

**<u>Mitigation Design Requirements – Marshall Street Pedestrian Improvements</u>**

To accommodate pedestrian traffic during limited closures of North Water Street during construction, CTDOT proposes improvements and alterations along the south side of Marshall Street to develop a pedestrian route compliant with Americans with Disabilities Act (ADA) requirements. Changes in the streetscape include removing several existing light poles on Marshall Street and replacing them after construction and constructing permanent sidewalk and driveway improvements. Additionally, prior to construction, the existing brick pavers at the Marshall Street/North Water Street intersection will be removed and replaced with asphalt pavement. Upon construction completion, the intersection will remain asphalt, and the asphalt pavement at the three crosswalks will be removed and then restored with brick pavers. CTDOT is designing improvements in coordination with the City of Norwalk.

**Summary of Impact**: Marshall Street is located in the South Main and Washington Streets Historic District and the Former Norwalk Iron Works NRHP-eligible Historic District, as identified in the Historic Resources Evaluation Report prepared for the project (AHS, August 2016). CTDOT recommends that these pedestrian improvements would not result in an adverse effect on the historic buildings or their settings, however. Table 2 provides an assessment of impacts due to the mitigation design. Attachment D provides an assessment of the changes relative to the existing historic properties and settings and CTSHPO's concurrence with CTDOT's recommendation.

**<u>Construction Methods Refinement - Ferry and Research Vessel Dock Relocations</u>**

The ***<u>EA/FONSI</u>*** and the ***<u>September 2019 Environmental Re-evaluation Consultation</u>*** indicate that temporary relocation of the Sheffield Island Ferry and Maritime Aquarium vessel operations and docks will be required. During construction, the existing docks and vessel operations will be temporarily closed and relocated elsewhere in Norwalk Harbor. CTDOT has been coordinating and will continue to coordinate with water-dependent users, including the City of Norwalk, the Norwalk Harbor Management Commission, the Norwalk Seaport Association, and the Maritime Aquarium, to discuss solutions which will minimize impact to operations and explore mitigation where warranted and feasible.

***In the revised construction approach***, the Construction Manager/General Contractor (CM/GC) has revised the design of the southwest construction platform (trestle) to allow the existing docks of the Sheffield Island Ferry and Maritime Aquarium to remain in their general current location (waterward of 4 North Water Street, Parcel 2/19/1) during project construction. The existing docking facilities will be replaced with a single new dock and accessible gangway to provide operational flexibility as needed. The new docking facility is expected to remain in place when construction is completed. In coordination with the owners, the City of Norwalk, the Norwalk Harbor Management Commission, and federal and state regulators, CTDOT is evaluating options for passenger loading and unloading and vessel storage that will minimize impacts on vessel operations while maintaining safety for waterway users. Options include: 1) maintaining all passenger operations at the current location; 2) temporarily relocating passenger operations during certain construction activities and vessel storage to a new temporary docking facility waterward of 68 and 90 Water Street (Parcels 2/84/19 and 2/84/33); or 3) a combination of 1) and 2). Following bridge construction, all operations of the Sheffield Island Ferry and the Maritime Aquarium vessel will resume waterward of Parcel 2/19/1 and the temporary docking facility at the Marine Staging Yard will be removed.

**Summary of Impact**: Similar to the approach described in the EA/FONSI and the September 2019 Environmental Re-evaluation Consultation, CTDOT is continuing to coordinate these options for the vessel operations in Norwalk Harbor with the owners, the City of Norwalk, and other stakeholders; the selected option will be made in coordination with these stakeholders.

**Construction Methods Refinement – Waste Stockpile Areas and Reuse Stockpile Areas**

The ***EA/FONSI*** indicated that the Walk Bridge Replacement Project will generate sediment, groundwater, soil, ballast, and sub-ballast that will require testing, management and disposal. For the handling of controlled (impacted) material, the ***EA/FONSI*** indicated that temporary waste stockpile area(s) (WSAs) will be constructed, managed and dismantled in accordance with CTDEEP regulatory and permit requirements. The EA/FONSI does not identify specific sites but notes that CTDOT has identified approved upland facility sites for the disposal of excess soil and sediments.

***In the refined construction approach,*** CTDOT will use both WSAs and Reuse Stockpile Areas (RSAs) for the project construction. CTDOT anticipates that approximately two acres in total will be needed for sediment management (including staging and transfer) for the Walk Bridge Program, which includes the Walk Bridge Replacement Project and other nearby New Haven Line (NHL) infrastructure improvement projects. The WSAs will be used to stockpile, manage, and test controlled material for disposal at out-of-state landfills. Additionally, CTDOT will use RSAs to stockpile borrow and to test and approve, or blend if needed, excavated embankment material for reuse as pervious structural backfill on the project site. Three CTDOT-owned areas in the city of Norwalk, currently used for sediment management for ongoing CTDOT-projects, are identified for use: 1) as a WSA - the I-95/Route 7 interchange area, located south of I-95 off the Route 7 southbound off-ramp and adjacent to West Avenue; 2) as a WSA/RSA - the Route 7 Exit 2 (New Canaan Avenue) northbound infield area and adjacent to the northbound on-ramp; and 3) as a RSA - the Glover Avenue Construction Yard, near the terminus of Route 7 at Grist Mill Road.

**Summary of Impact:** As design and the construction approach have advanced, CTDOT has clarified the sediment management approach for the project. In addition to the need for a WSA for the project as previously identified in the EA/FONSI, CTDOT will use two existing areas as WSAs/RSAs for the Walk Bridge Program. Table 2 provides an assessment of impacts due to this construction methods refinement.

**HAVE ANY NEW OR REVISED LAWS OR REGULATIONS BEEN ISSUED SINCE APPROVAL OF THE LAST ENVIRONMENTAL DOCUMENT THAT AFFECTS THIS PROJECT? If yes, please explain.**

☒ **NO**
☐ **YES**

**WILL THE NEW INFORMATION HAVE THE POTENTIAL TO CAUSE A CHANGE IN THE DETERMINATION OF IMPACTS FROM WHAT WAS DESCRIBED IN THE ORIGINAL ENVIRONMENTAL DOCUMENT FOR ANY OF THE AREAS LISTED BELOW?** For each impact category, please indicate whether there will be a change in impacts. For all categories with a change, continue to the table at the end of this worksheet and provide detailed descriptions of the impacts as initially disclosed, new impacts and a discussion of the changes. The change in impact may be beneficial or adverse. **Table 1 provides an assessment of the temporary construction-related impacts due to the use of Parcel 5/86/1 on Manresa Island as a staging and storage yard. Table 2 provides an assessment of impacts due to advanced design.**

**The table below identifies both temporary and permanent impacts addressed in this Re-evaluation Consultation Worksheet.**

| | | |
|---|---|---|
| **Transportation** | ☒ **Yes** | ☐ **No** (temporary; Tables 1 & 2) |
| **Land Use and Economics** | ☒ **Yes** | ☐ **No** (temporary; Table 1) |
| **Acquisitions, Displacements, & Relocations** | ☒ **Yes** | ☐ **No** (temporary; Table 1) |
| **Neighborhoods & Populations (Social)** | ☒ **Yes** | ☐ **No** (temporary; Table 1) |
| **Visual Resources & Aesthetics** | ☒ **Yes** | ☐ **No** (Table 2) |
| **Air Quality** | ☐ **Yes** | ☒ **No** |
| **Noise & Vibration** | ☐ **Yes** | ☒ **No** |
| **Ecosystems (Vegetation & Wildlife)** | ☒ **Yes** | ☐ **No** (temporary; Table 1) |
| **Water Resources** | ☐ **Yes** | ☒ **No** |
| **Energy & Natural Resources** | ☐ **Yes** | ☒ **No** |
| **Geology & Soils** | ☐ **Yes** | ☒ **No** |
| **Hazardous Materials** | ☒ **Yes** | ☐ **No** (temporary; Table 1) |
| **Public Services** | ☐ **Yes** | ☒ **No** |
| **Utilities** | ☐ **Yes** | ☒ **No** |
| **Historic, Cultural & Archaeological Resources** | ☒ **Yes** | ☐ **No** (Table 2) |
| **Parklands & Recreation** | ☐ **Yes** | ☒ **No** |
| **Construction** | ☒ **Yes** | ☐ **No** (Tables 1 & 2) |
| **Secondary and Cumulative** | ☐ **Yes** | ☒ **No** |

**Will the changed conditions or new information result in revised documentation or determination under the following federal regulations?**

| | | |
|---|---|---|
| **Endangered Species Act** | ☐ **Yes** | ☒ **No** Explanation included |
| **Magnuson-Stevens Act** | ☐ **Yes** | ☒ **No** Explanation included |
| **Farmland Preservation Act** | ☐ **Yes** | ☒ **No** |
| **Section 404-Clean Water Act** | ☐ **Yes** | ☒ **No** |
| **Floodplain Management Act** | ☒ **Yes** | ☐ **No** |
| **Hazardous Materials** | ☐ **Yes** | ☒ **No** Explanation included |
| **Section 106 National Historic Preservation Act** | ☒ **Yes** | ☐ **No** |
| **Uniform Relocation Act** | ☐ **Yes** | ☒ **No** |
| **Section 4(f) Lands** | ☐ **Yes** | ☒ **No** Explanation included |
| **Section 6(f) Lands** | ☐ **Yes** | ☒ **No** |
| **Wild & Scenic Rivers** | ☐ **Yes** | ☒ **No** |
| **Coastal Barriers** | ☐ **Yes** | ☒ **No** |
| **Coastal Zone** | ☐ **Yes** | ☒ **No** Explanation included |
| **Sole Source Aquifer** | ☐ **Yes** | ☒ **No** |
| **National Scenic Byways** | ☐ **Yes** | ☒ **No** |
| **Other EO12898 Environmental Justice** | ☐ **Yes** | ☒ **No** Explanation included |

**If you checked yes to any of these, describe how the changes impact compliance and any actions needed to ensure compliance of the new project:**

**Floodplain Management Act, FTA Floodplain Management Conditions.** The project complies with EO 11988, Floodplain Management and FTA's Floodplain Management Conditions (shown in italics), as listed in Grants CT-44-X004 and CT-2017-015-00:

*11a.) The Recipient agrees to follow Executive Order (EO) 11988, as amended, Floodplain Management, and any other guidance that FTA develops or amends regarding floodplain management, except as FTA determines otherwise in writing.* The project exceeds the requirements of EO 11988; it was designed to comply with EO 13690, Establishing a Federal Flood Risk Management Standard, prior to the repeal of EO 13690.

*11b.) The Recipient agrees that it will not use FTA funds for any construction activity or any permanent repairs in an area delineated as a "special flood hazard area," or equivalent, as labeled in FEMA's most recent and current data source, unless, prior to seeking FTA funds for such action, the Recipient designs or modifies its actions in a manner that minimizes potential harm to or within the floodplain.* Parcel 5/86/1 is in a Special Flood Hazard Area (Zone AE). CTDOT will develop a Flood Contingency Plan for the 4.7+-acre Staging and Storage Yard, will incorporate floodproofing into design as needed, and will include the additional construction parcel in its application to the Connecticut Department of Energy and Environmental Protection (CTDEEP) for Flood Management Certification for the project.

*11c.) The Recipient agrees that it will use the "best available information" as identified by FEMA, which includes advisory data such as Advisory Base Flood Elevations (ABFE), preliminary and final Flood Insurance Rate Maps (FIRM), and Flood Insurance Studies.* The project references the latest available FEMA maps and studies (effective July 2013). No ABFE mapping or preliminary studies are available for the proposed construction area at Manresa Island.

*11d.) If FTA and the Recipient determine that FEMA data is unavailable or insufficiently detailed, then other Federal, State, or local data may be used as the "best available information."* Not applicable; FEMA data is available and sufficiently detailed for the project area.

*11e.) If an FTA funded project activity is located in a floodplain, then the "best available information" requires a minimum baseline standard for elevation of no less than that found in FEMA's ABFEs, where available, plus one foot (ABFE+1), or if that is not available, then a minimum baseline standard for elevation of no less than FIRM plus one foot (FIRM+1).* The project exceeds the FIRM + 1 requirement.

**Section 106 National Historic Preservation Act.** Investigations were conducted on Manresa Island to determine if the use of Parcel 5/86/1 as a Staging and Storage Yard could potentially impact above- or below-ground historic resources. Parcel 5/86/1 consists of ten NRG Energy Power Plant buildings constructed during the late 1950s. New Areas of Potential Effects (APEs) for above-ground and below-ground resources were delineated for Parcel 5/86/1. CTDOT Cultural Resources staff conducted desktop and field assessments of the proposed Staging and Storage Yard to determine the potential for impacts related to proposed alterations to existing buildings and compaction of subsurface conditions due to the application of a 6-inch crushed stone overlay of the Staging and Storage Yard (Figure B-2). Attachment D-1 contains the Supplemental Cultural Resources Evaluation Memorandum documenting the historical and archaeological evaluations conducted for the proposed Staging and Storage Yard.

The area to be occupied by the proposed Staging and Storage Yard on Manresa Island was developed as a Jesuit retreat center known as the Manresa Institute during the early 1900s. The Institute was relocated to Staten Island in 1911 and the property fell vacant until 1952 when it was purchased by the Connecticut Light & Power Company (CL&P). Maps from the early 1920s indicate that the compound consisted of 17 buildings, these were located in an area to the south of the extant main power plant building. CL&P redeveloped the property for use as a coal-fired powerplant during the late 1950s. At that time, the entirety of the parcel was cleared of all structures, and tidal flats to the north of the former retreat center were filled in. The portion of the property proposed to be used as parking and work areas will be located on areas of previously placed artificial fill, while the entirety of the area proposed to be used for storage was occupied by a large, open coal dump. After the plant was converted to burn fuel oil in 1972, the coal dump was cleared, graded, and backfilled with gravel and topsoil, and three large fuel oil tanks constructed, thus creating the conditions visible today.

It is the opinion of CTDOT Cultural Resources staff that the proposed use of Parcel 5/86/1 as a Staging and Storage Yard would result in No Historic Properties Affected. All of the structures formerly associated with the Manresa Institute were cleared when the power plant was constructed during the late 1950s, and while the power plant buildings themselves are over 50 years of age, they do not possess historical, architectural, or technological significance worthy of listing on the NRHP. Furthermore, the entirety of the APE has experienced extensive soil disturbances, associated with the construction and subsequent demolition of the Manresa Institute, construction of the power plant and infilling of adjacent wetlands by CL&P, regrading of the former coal storage area, and construction of the oil-storage tanks after conversion to that fuel type. Given the aforementioned conditions, it is the opinion of CTDOT's Cultural Resources staff that there is minimal foreseeable potential to impact intact archaeological resources within the project area and no further study is recommended. The CTSHPO concurred with the conclusion of No Historic Properties Affected, provided as Attachment D-2.

Design advancement from 60 to 100 percent has required two additional evaluations to determine the potential effect of design upon existing Section 106 resources, documented in the *Historic Resources Evaluation Report, Walk Bridge Replacement Project* (Archaeological and Historical Services, Inc., August 2016). The first evaluation is required due to design requirements associated with functional replacement of the entirety of an historic stone masonry wall in the Fort Point Street area with a new retaining wall (Wall 310), which would constitute an adverse effect on historic resources. The stone retaining walls along the rail line between the New York/Connecticut border and New Haven are contributing to a National Register of Historic Places (NRHP)-eligible linear historic district. The *Historic Resources Evaluation Report* indicated that the removal of the high towers, catenary support structures, stone retaining walls, and Fort

Point Street Railroad Bridge will be adverse effects on the overall rail line as an eligible historic district. CTDOT's recommends that the additional loss of stone masonry and replacement with Wall 310 would further contribute to the adverse effect on the overall rail line as an eligible historic district; however, mitigation of adverse effects due to this design change have been addressed through the Walk Bridge Replacement Project Memorandum of Agreement (MOA). Per Stipulation No. 3 of the MOA, the stone retaining wall was included in *Written and Photographic Documentation: New York, New Haven & Hartford Railroad, South Norwalk and East Norwalk, Norwalk Connecticut* (Archaeological and Historical Services., Inc. (AHS), August 2018). Attachment D-3 provides documentation of CTDOT's assessment and recommendation.

The second evaluation is required due to proposed alterations that accommodate an ADA-compliant sidewalk on the south side of Marshall Street. Properties along the west end of Marshall Street are included in the NRHP-listed South Main and Washington Streets Historic District. Additionally, the Norwalk Lock Company Factory, on the south side of Marshall Street, was determined to be NRHP-eligible. CTDOT recommends that the proposed improvements and alterations not be considered as an adverse effect on the NRHP-listed or NRHP-eligible properties or their settings. Attachment D-4 provides documentation of CTDOT's assessment and recommendation.

Attachment D-5 provides CTSHPO's concurrence with CTDOT's recommendations for the two evaluations.

***Additional Explanation for Regulations checked "No"*:**

**Endangered Species Act/Magnuson-Stevens Act.** CTDOT has consulted with the National Oceanic and Atmospheric Administration/ National Marine Fisheries Service (NOAA/NMFS) Greater Atlantic Regional Office (GARFO) Protected Resources Division for Endangered Species Act (ESA) Section 7 species and the Habitat Conservation Division for Essential Fish Habitat (EFH) regarding the project action area, which includes construction barge traffic from vessel mooring locations in outer Norwalk Harbor (proximate to and south of Manresa Island) north on the Norwalk River to approximately 1.3 miles north of the bridge site. Coordination with the United States Fish & Wildlife Service (USFWS) regarding the Northern Long Eared Bat has been concluded under the 4(d) rule. Attachments E-1 and E-2 include coordination with NMFS and USFWS on the addition of Parcel 5/86/2 as a construction use parcel. Coordination with federal and State agencies will continue through design. Directives of the agencies will be incorporated in applications for required approvals and permits, listed in Attachment E-3.

**Hazardous Materials.** The following information on existing impacted areas at Manresa Island is summarized from the *Norwalk Power Economic Impact Analysis Findings & Recommendations Report* (City of Norwalk and Manresa Association, 12/14/18). The Manresa Island site was previously identified as a large quantity generator of hazardous waste. The entire site, consisting of the northern parcel (Parcel 5/86/2) and the southern parcel (Parcel 5/86/1), is currently enrolled in the U.S. Environmental Protection Agency (USEPA)/CTDEEP's Property Transfer Program/Resource Conservation Recovery Act (RCRA) program. USEPA/CTDEEP have been addressing investigations and remedial activities under the combined program since 2006. Site-wide groundwater has been impacted by the former power plant operations; RCRA closure groundwater monitoring has been completed since 1989. Deep excavations could encounter and generate impacted groundwater (wastewater). Depth to groundwater ranges from 6 to 15 feet below ground. There are twelve Areas of Concern (AOCs) or locations/areas where hazardous substances and/or hazardous substances (including petroleum) could have been used, treated, handled, disposed of or spilled and released to the environment in both the northern and southern parcels.

As shown in Figure F-1 (Attachment F), there are four AOCs located within or with boundaries overlapping the proposed Staging and Storage Yard: AOC-1, a former ash disposal area; AOC-2, a former gasoline underground storage tank (UST); AOC-4, a former coal storage area; and AOC-10, a former RCRA impoundment. The current remediation approach focuses on an Engineering Control for AOC-1 and AOC-4, including (but not limited to): installation of 6-inch earth covers and 5-inch aggregate covers in the southern portion of AOC-1 (in the vicinity of the polishing basin and equalization basins) and within AOC-4. No remediation was recommended for AOC-2 or AOC-10.

In accordance with direction from CTDOT's Office of Environmental Compliance (OEC), provided the Staging and Storage Yard activities avoid the AOCs, then coordination with CTDEEP is not required. CTDOT has designed the activities at the site to limit the disturbance of existing soils. To provide a layer of separation from AOC-1 and AOC-4, the ground surface of the Staging and Storage Yard will be covered with 6-inches of crushed stone over geotextile fabric. Additional BMPs for temporary staging and storage operations are presented in Table 1. The type of construction fencing, including the amount and location of excavation associated with installation of fence and gate posts, will be reviewed and approved by OEC. If allowed, minimal excavation will occur associated with installing the temporary construction fence surrounding the construction area, and as required to install a secure construction access gate. Gate posts will be drilled into the ground and filled with concrete. Per CTDOT OEC, excess materials from fencing posts will be handled in accordance with project specifications, including transport to the project WSA for temporary staging, characterization and off-site disposal. As needed, CTDOT OEC will coordinate with Norwalk Energy, the property owner, regarding any issues related to the Property Transfer Act and RCRA closure.

**Section 4(f) of the Department of Transportation Act**. With no adverse effects to Section 4(f) resources proposed at Manresa Island, Section 4(f) would not apply. While the design refinements in the Fort Point Street area would result in an adverse effect to a cultural resource, the existing stone masonry wall is a feature of the rail line and therefore exempt from Section 4(f) pursuant to provisions in the FAST Act. In the Marshall Street area, the permanent pedestrian improvements would not require ROW takings from the individually listed resources or resources contributing to the Historic District, therefore Section 4(f) would not apply.

**Coastal Zone.** Manresa Island is located within the coastal boundary; coastal resources in proximity to the Staging and Storage Yard include developed shorefront, tidal and freshwater wetlands, coastal hazard area, and shellfish concentration area (shown in Figure 3-24a in Attachment A). In compliance with the Connecticut Coastal Management Act, CTDOT will demonstrate consistency with coastal uses and activities and address any potential impacts upon coastal resources in the Structures, Dredge and Fill application to be submitted to CTDEEP.

**EO 12898, Environmental Justice.** The EA/FONSI identifies three U.S. census tracts, Tracts 440, 441 and 442, as comprising the Walk Bridge Project Area (Figure 1a). Based on the 2013 - 2017 American Community Survey (ACS) 5-year estimates, Tracts 440, 441 and 442, are identified as Environmental Justice (EJ) Communities of Concern and as Title VI/Limited English Proficiency (LEP) areas. In the ***revised construction approach***, through the addition of an easement at Manresa Island for the Staging and Storage Yard, a fourth U.S. Census tract, Tract 444, will be included in the Walk Bridge Project area, as shown in Figure 1b.

In accordance with South Western Region Metropolitan Planning Organization's (SWRMPO's) *2019-2045 Long-Range Transportation Plan (LRTP)* (Draft, March 2019), for SWRMPO planning efforts to comply with EJ mandates, characteristics of the area populations are evaluated against three criteria at the census tract level: 1) percent minority, measured by an MPO minority threshold of 33.8% of the population; 2) per capita income, measured by an MPO per capita income threshold of $65,632; and 3) percent below poverty level, measured by an MPO below poverty level threshold of 7.2%. The criteria for a Limited English Language Proficiency (LEP) area is either 1,000 speakers or 5% of the population in an area with limited English proficiency. The following table identifies the Walk Bridge Project census tracts relative to SWRMPO's Title VI thresholds. As shown in the table below, Tract 444 is an EJ Community of Concern and an LEP area.

| Characteristic | SWRMPO/ Title VI Thresholds[a] | City of Norwalk | Census Tract 440 | Census Tract 441 | Census Tract 442 | Census Tract 444 |
|---|---|---|---|---|---|---|
| Total Population | ------ | 88,537 | 6,380 | 3,350 | 3,997 | 3,760 |
| Percent Minority | 33.80% | 48.00% | 77.80% | 66.10% | 59.30% | 77.23% |
| Per Capita Income | $65,632 | $44,888 | $28,640 | $50,649 | $33,162 | $30,100 |
| Percent Below Poverty Level | 7.20% | 9.20% | 18.50% | 18.90% | 10.10% | 22.40% |
| Limited English Proficiency (LEP)[b] | 5% | 16.00% | 28.90% | 27.80% | 18.90% | 21.00% |

a. *Threshold levels have increased from those identified in the EA/EIE.
b. Census Tract 444 provides the percentage of Spanish or Spanish Creole persons that speak English less than "very well."

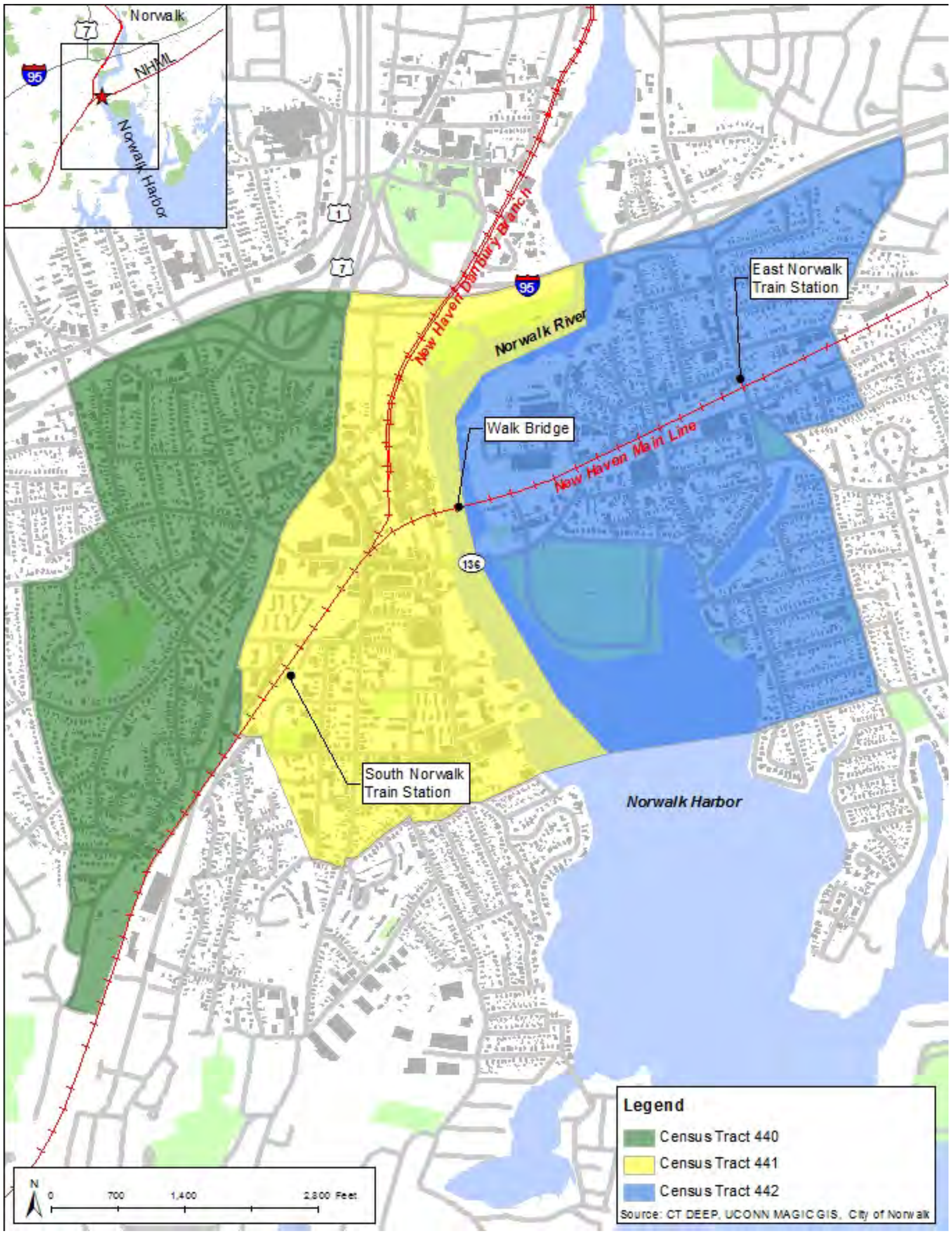


**Figure 1a – Walk Bridge Project Census Tracts and EJ Communities of Concern**


**Figure 1b – Manresa Island Census Tract and EJ Communities of Concern**

Revisions to the Walk Bridge Project resulting from the ***revised construction approach*** will not create disproportionately adverse impacts to EJ Communities of Concern. Table 1 presents an assessment of potential impacts of the Staging and Storage Yard at Manresa Island upon the community relative to traffic, noise, air quality, and safety. The proposed Staging and Storage Yard is relatively isolated from neighborhoods and community uses; as shown in Figure E-2, the closest neighborhood/residence is approximately 0.4 mile from the work area to the north. Impacts on the neighborhoods northwest of the site (and Tract 444 in general) will be limited to traffic to and from the Staging and Storage Yard and will occur mainly during typical daytime business hours. Relative to existing truck traffic on Woodward Avenue, the additional traffic on surrounding roads due to the Staging and Storage Yard will have minimal impact on existing conditions.

By using the southern tip of Manresa Island, a site relatively distant from sensitive receptors, for the replacement bridge lift span assembly, as opposed to the downtown Norwalk Water Street parcels, there will be less construction noise impacts upon Tract 441, a densely populated downtown area and also an EJ Community of Concern [*Manresa Island Construction Noise Study* (WSP USA, October 2020), provided as Attachment C-3].

As stated in the EA/FONSI, the project is located on an existing rail corridor located in an EJ Community of Concern. As shown in Figures 1a and 1b, the bridge site and all the construction properties to be used for the project, by parcel acquisition or easement, including the southern portion of Manresa Island, are located within EJ Communities of Concern. The project will create a substantial benefit to New Haven Line (NHL) and Norwalk River users equally; the project represents an overall benefit to the entire community and is important to the continued economic prosperity of the region. Further, the use of a small portion of Parcel 5/86/1 as a temporary Staging and Storage Yard parcel will not displace any existing uses.

The Walk Bridge Program Communications Management Plan includes an EJ Outreach Plan. An Online Public Information meeting was held on June 16, 2020 to discuss the potential use of Manresa Island as a construction-period staging and storage yard. The meeting was conducted in conformance with the guidance provided by FTA, including providing a report of the meeting and meeting materials. The interactive meeting was available online and included a telephone alternative for those without internet connection. Advance hard copies of the presentation were available upon request. The meeting was advertised in minority language publications and translation services and Americans with Disabilities Act (ADA) accommodations were offered in advance of the meeting.

For updates on the project, CTDOT translates the project factsheets and annual Walk Bridge Program brochure into both Spanish and Haitian Creole (which are available at the public meetings and Welcome Center), and the project website (www.walkbridgect.com) is ADA-accessible and includes a Google translate feature for over 50 languages. Additionally, all program notices have been updated to include the following statements (provided in English, Spanish and Haitian/French Creole): “The Walk Bridge Program offers translation services for all Spanish and French Creole speakers. Please contact the Program’s Public Information Office for more information by sending us an email at info@walkbridgect.com, or calling (833) 462-9255 (GO2-WALK).”

**Will these changes or new information likely result in substantial public controversy?**

☐ **Yes** ☒ **No**

**Comments:** To facilitate public comment regarding the potential temporary use of a portion of the southern parcel at Manresa Island for construction of the Walk Bridge Replacement Project, CTDOT held an Online Public Information Meeting on June 16, 2020 to present the proposed construction use and to address community questions. The meeting was advertised on the Walk Bridge Program’s website and social media accounts. Print and online advertisements were posted in the following media outlets: *The Hour, El Sol, La Voz*, News 12 CT and Nancy on Norwalk; and targeted mailers were sent to residents in neighborhoods directly abutting or proximate to Manresa Island. A total of 149 people attended the Online Public Meeting, which consisted of a live/recorded presentation followed by an open question and answer period. During the meeting, attendees posted 70 questions through the online chat feature. The Walk Bridge Program Team answered approximately 36 questions live during the meeting. CTDOT received a variety of questions related to land-based and water-based traffic, hours of operation, selection of the site, site security, lighting, visibility of the construction from the water and the surrounding areas, noise, existing wildlife habitat, and environmental concerns. The Walk Bridge Program Team responding to comments included the Office of

Environmental Planning, the Office of Environmental Compliance, and the Construction Manager/General Contractor. A public comment period was held following the meeting. The public had the opportunity to submit questions or comments through the Program's website until July 3, 2020. The Program received a total of 106 questions and comments between those submitted during the meeting and through the public comment period. On August 31, 2020, CTDOT sent written responses to those who submitted questions and comments regarding the potential use of Manresa Island as a construction staging and storage yard and posted comments and responses on the Program website. These responses are provided as Attachment C-5.

Prior to the Online Public Information Meeting, on June 16, 2020, CTDOT conducted a similar meeting with State and local elected officials on June 11, 2020 to present the proposed use plan and address questions.

In addition to providing specific comment responses, CTDOT provided documentation of the alternatives siting study on the lift span construction location, prepared a Factsheet of *Environmental Frequently Asked Questions*, and conducted an assessment of potential traffic impacts and an assessment of potential noise impacts associated with the proposed staging and storage yard.

As documented in the *Assessment of Lift Span Assembly Yard Locations* (Cianbro/Middlesex Joint Venture, 10/15/2020). CTDOT determined that the use of an existing dock facility at Manresa Island as an off-site lift span assembly location, as opposed to development of an on-site North Water Street location (Marine Staging Yard) or use of a non-local site, will be most cost-effective; will create less environmental impacts; will minimize adverse impacts to river navigation and marine users; and will optimize the coordination, logistics and risks associated with the lift span assembly.

Based on a traffic operations and safety analysis (*Manresa Island Traffic Study*, WSP USA, October 2020), CTDOT determined that the expected increase in trucks and vehicles destined for Manresa Island will have only minor impacts in terms of traffic operations. CTDOT will implement mitigation measures to address these impacts. Based on an analysis of existing and anticipated noise from the proposed lift span assembly activities at Manresa Island (*Manresa Island Construction Noise Study*, WSP USA, October 2020), CTDOT determined that although noise from the Staging and Storage Yard will be audible at times, the construction noise levels will be below CTDOT noise limits for the Walk Bridge Project at all modeled community locations, and well below noise limits at the Manresa Island locations. In addition, noise increases from construction-related traffic along the proposed Woodward Avenue truck route are not expected to be significant.

Table 1 contains summaries of the evaluations, which are provided in their entirety as Attachment C. These evaluations were posted to the Program website. As of 11/9/2020, CTDOT has received one request for a hard copy of a study report. CTDOT will continue to monitor comments and address any inquiries sent directly to the Program website. All inquiries and responses will be documented.

**COMMENTS:**

**CONCLUSIONS AND RECOMMENDATIONS:**

After review of the proposed refinements in construction methods and advanced design, and assessment of their corresponding potential impacts, CTDOT has concluded that these changes do not represent a significant impact to the environment.

CTDOT determined that, in comparison to on-site city locations and non-local sites, the use of an existing dock facility at Manresa Island as an off-site lift span assembly location in the City of Norwalk will result in the least amount of environmental impacts and risks and maximize coordination and logistics associated with construction of the replacement bridge. The proposed staging and storage yard at Manresa Island will require a temporary easement at Parcel 5/86/1 anticipated to be actively used for less time than the duration of the project. Use of a small portion of the parcel will not impact the site's current use as a decommissioned power plant, nor will it impact Eversource Energy's current operations on the site. Additionally, the CTSHPO concurred with CTDOT's recommendation that no further study is required regarding intact archaeological resources at Manresa Island. Following project completion, Parcel 5/86/1 will be restored to pre-construction conditions and the construction easement will be released. The proposed use of Manresa Island as a construction Staging and Storage Yard will be included within applications for federal and state permits and approvals as listed in Attachment E-3; this revised construction approach will not trigger additional permits.

After review of the design refinements and potential impacts to Section 106 resources, CTDOT recommended that there is no reasonable alternative to the adverse impact to the additional section of stone retaining wall in the Fort Point Street area, and that the impact has been adequately addressed in the existing project MOA. Additionally, CTDOT recommended that the Marshall Street pedestrian improvements will not adversely affect the NRHP-listed or NRHP-eligible properties or their settings. The CTSHPO concurred with both of these recommendations.

For the Walk Bridge Replacement Project, CTDOT is implementing BMPs and time of year restrictions as resource protection measures, developing a wetland mitigation plan, and conducting ongoing coordination with federal and state agencies in compliance with federal and state environmental regulations. CTDOT is implementing the stipulations of the project MOA in cooperation with local stakeholders and the CTSHPO. Further, CTDOT is continuing to develop construction coordination plans in cooperation with the City of Norwalk to minimize construction impacts upon the local community. The construction coordination plans, applicable to the bridge site, the railroad corridor, and all construction use parcels, include an Air Quality-Dust Control Plan, Materials Management Plan, Land-Based Noise and Vibration Control Plan, and Safety and Security Management Plan.

It is our recommendation that FTA determine that the project FONSI issued on July 17, 2017 remains valid.

**LIST OF ATTACHMENTS**:

Attachment A Revised EA/EIE Figures

- Figure 3-11a Land Use and Zoning in Vicinity of Manresa Island Staging and Storage Yard
- Figure 3-12a Locations of Proposed Parcel Use in Vicinity of Walk Bridge
- Figure 3-12b Location of Proposed Parcel Use in Vicinity of Manresa Island
- Figure 3-15a Water Quality Classification in Vicinity of Manresa Island Staging and Storage Yard
- Figure 3-16a Tidal and Freshwater Wetlands in Vicinity of Manresa Island Staging and Storage Yard
- Figure 3-20a Floodplains in Vicinity of Manresa Island Staging and Storage Yard
- Figure 3-22a Aquatic Resources in Vicinity of Manresa Island Staging and Storage Yard
- Figure 3-24a Coastal Boundary in Vicinity of Manresa Island Staging and Storage Yard
- Figure 3-26a Parklands and Public Recreation Areas in Vicinity of Manresa Island Staging and Storage Yard
- Figure 4-2a Hurricane Inundation Existing Conditions – Manresa Island

Attachment B Proposed Staging and Storage Yard, Manresa Island (Parcel 5/86/1)

- Figure B-1 Proposed Work Area and Site Access, Manresa Island (Parcel 5/86/1)
- Figure B-2 Proposed Staging and Storage Yard Activities, Manresa Island (Parcel 5/86/1)

Attachment C Manresa Island Evaluations and Responses to Comments

- Attachment C-1 Assessment of Lift Span Assembly Yard Locations, 10/15/20
- Attachment C-2 Manresa Island Traffic Study, October 2020
- Attachment C-3 Manresa Island Construction Noise Study, October 2020
- Attachment C-4 Environmental Frequently Asked Questions, October 2020
- Attachment C-5 Manresa Island Public Meeting Responses to Questions, August 2020

Attachment D Section 106 Assessments

- Attachment D-1 Supplemental Cultural Resources Evaluation Memorandum, 5/1/2020
- Attachment D-2 CTSHPO's Concurrence, Temporary Use of Manresa Island, 6/15/2020
- Attachment D-3 Supplemental Information, Fort Point Street Wall 310, 11/23/2020
- Attachment D-4 Supplemental Information, Marshall Street Pedestrian Detour Improvements, 11/23/2020
- Attachment D-5 CTSHPO's Concurrence, Walk Bridge Supplemental Information, 12/24/2020

Attachment E Federal and State Reviews, Approvals, and Permit Requirements

- Attachment E-1 Coordination with NOAA/NMFS, June 2020 – January 2021
- Attachment E-2 USFWS No Effect Determination, 6/24/2020
- Attachment E-3 Table of Federal and State Permits and Approvals
- Attachment E-4 CTDEEP Natural Diversity Data Base Determination, 4/16/2020
- Attachment E-5 Coordination with CTDEEP Division of Wildlife, 3/18/2020

Attachment F Environmental Effects Mapping

- Figure F-1 Areas of Concern at Manresa Island Staging and Storage Yard
- Figure F-2 Proximity of Sensitive Receptors to Manresa Island Staging and Storage Yard
- Figure F-3 Manresa Island Staging and Storage Yard Barge Berthing Layout
- Figure F-4 Habitat at Manresa Island

**SUBMITTED BY:**

By signing this, I certify that to the best of my knowledge this document is complete and accurate.

| | |
|---|---|
| Name Kevin F. Carifa<br><br>Title Transportation Assistant Planning Director, Office of Environmental Planning | Date February 4, 2021 |

**Table 1 – Assessment of Potential Temporary Impacts: Use of Parcel 5/86/1 as Manresa Staging and Storage Yard**

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
|---|---|---|---|
| **Marine Transportation** | The existing bulkhead and slip developed for the NRG Energy Power Plant previously was used for loading and offloading of American Bureau of Shipping ABS-classified ocean-going barges. The NRG Energy Power Plant has been decommissioned since 2013, with no use of the existing dock or marine transportation. | Barges to be used for the construction and transport of the lift span include equipment, material, and lift span barges, as shown in Figure E-3. The barges will be anchored by spud piles.<br><br>The estimated number and type of barges required for project construction will not change; only the barge travel distance will increase with the use of Manresa Island as a Staging and Storage Yard. The assembled lift spans will be transported via barge from Manresa Island to the existing bridge site, and bridge demolition materials will be transported via barge from the existing bridge site to Manresa Island, approximately 2.1 nautical miles from Walk Bridge. A hydrographic survey of Manresa basin indicates that the existing water depth is adequate for berthing and movement of construction barges. Deep water vessels drawing more than 7-feet would need to enter and exit the dock area only at high tide. | Using Manresa Island as a water-based construction Staging and Storage Yard, as opposed to parcels at the bridge site, will minimize encroachment into the Norwalk River navigation channel. At Manresa Island, berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel, as shown in Figure E-3. In comparison, berthing of these barges at 68-90 Water Street (the 60% design marine staging yard), would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).<br><br>The spud piles required to anchor the barges will produce minimal impacts to the river bottom. Barge movements in and around Manresa Basin will take place such that there will be no impact to the river bottom. |
| **Transportation - Traffic, Transit and Parking** | The NRG Energy power plant has been decommissioned since 2013, with no traffic. Minimal traffic is associated with the Eversource Energy electrical substation. Within the southern parcel, there is an employee parking lot (71 spaces).<br><br>Access to the southern parcel from Woodward Avenue (Ave.) and Longshore Ave., local roads that are primarily | Traffic to and from the site will increase temporarily from employee and construction vehicles associated with the Staging and Storage Yard. Employee and construction vehicle-related traffic will generally occur during a 6-day work week, during daytime hours (e.g., 8:00 am to 4:00 pm), for up to 60 months, with substantial work occurring for 48 months. Night and weekend deliveries to and from the site will be rare. Truck traffic using two truck routes | Roadways within and immediately northwest of Manresa Island are deemed adequate for the proposed construction vehicles, and the roadways have previously sustained truck traffic associated with building and maintaining components of the Manresa Island Power Plant.<br><br>The *Manresa Island Traffic Study* concluded that the expected increase in trucks and vehicles destined for Manresa |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
|---|---|---|---|
| | residential, is via a paved concrete driveway. Longshore Ave. is paved and wide enough (30-35 feet) for continuing truck traffic.<br><br>CTDOT's *Manresa Island Traffic Study* (WSP USA, October 2020) identified the existing conditions along the proposed truck haul routes (for trucks under 13'-9" and trucks over 13'-9") between Manresa Island and Interstate (I)-95, including the intersections of Martin Luther King Jr. Drive & Monroe Street (St.); South Main St. & Monroe St.; South Main St. & Henry St.; South Main St. & Woodward Ave./Concord Place; Woodward Ave. & Grove St. Route 136-south leg (Woodward Ave.) & Route 136 (Burritt Ave.); Route 136-north leg (Woodward Ave.) & Route 136 (Meadows St.) as follows:<br>• Overall operational conditions for each intersection are acceptable in the future 2024 conditions.<br>• The Woodward & Grove St./Route 136 (Burritt Ave.) location is the most crash prone intersection in the area.<br>• The Route 136 (Burritt Ave.) westbound approach currently experiences high delays and failed level of service (LOS F) in the weekday morning and afternoon peak hours.<br>• The acute angle of the intersection of Route 136 (Meadows Street) and Woodward Ave. presents difficulties for oversize truck movements. | (for trucks under 13'-9" and trucks over 13'-9") is estimated between Manresa Island and I-95.<br><br>Use of Parcel 5/86/1 will generate a maximum of three construction truck trips per day and 20 vehicle (employee) trips per day, for a total of 23 trips in the morning peak period and 23 trips in the afternoon peak period.<br><br>The *Manresa Island Traffic Study* included a traffic operations and safety analysis for the proposed use of Manresa Island for the lift span construction and determined the following:<br>• The additional 20 vehicles (employees) on the Route 136 (Burritt Ave.) westbound approach will slightly increase existing delays.<br>• Except for the Woodward Ave. & Route 136 (Burritt Ave.) intersection, the overall operational conditions for each intersection are acceptable for the 2024 conditions with the additional Manresa Island traffic. This intersection will experience the longest delays during the morning peak with the additional Manresa Island traffic.<br>• There are no expected impacts to transit. | Island will have only minor impacts in terms of traffic operations. The proposed mitigation measures will improve current and anticipated traffic conditions due to the proposed staging and storage yard at Manresa Island:<br><br>• Add pavement markings for the crosswalks on Grove St. and Burritt Ave. and trim vegetation that interferes with the sight line from Burritt St.<br><br>• Provide flaggers to assist with navigation of oversize trucks through the Route 136 (Meadows St.)/ Woodward Ave. intersection.<br><br>Attachment C-2 provides the *Manresa Island Traffic Study*. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
|---|---|---|---|
| **Land Use, Temporary Easements, and Displacements** | Manresa Island consists of two parcels that occupy 125 acres of the Norwalk shoreline. Both parcels are owned by Norwalk Power LLC (a subsidiary of NRG Energy) and are zoned for B Residence. Per the City of Norwalk, land use for the entire site is utility (Figure 3-11a).<br><br>The 92-acre northern parcel contains historic fill (contaminated material), dense forest cover, tidal and freshwater wetlands, and critical habitat. Due to the level of contamination, it is not considered suitable for development.<br><br>The 33-acre southern parcel contains the decommissioned NRG Energy Manresa Island Power Plant and supporting facilities, an active Eversource Energy electrical substation, dock, and harbor. Prior to the closure of the power plant, the site was an active plant for over 50 years. In 1960, a power plant was commissioned by Connecticut Light & Power. The plant began operations as a coal fired plant but was converted to oil in 1972. In 1999, the property was acquired by NRG Energy and operated as a power plant until 2012. In 2013, the power plant was de-commissioned and has been dormant ever since.<br><br>Manresa Island abuts three neighborhoods to the north - Village Creek, Harbor Shores and Harborview - consisting primarily of single-family homes. Figure 3-26a shows park and recreational facilities proximate to Manresa Island. | CTDOT will acquire a construction easement on the southern parcel (Parcel 5/86/1) from Norwalk Power LLC for 60 months, to accommodate the use as a temporary Staging and Storage Yard. The use of the property will be for a lesser period (estimated 48 months) than the overall project construction period. Following completion of the project, the site will revert to its pre-construction use. | Use of Parcel 5/86/1 will result in an additional partial-parcel construction easement for project construction that will be eventually released, resulting in 23 parcels required for the Walk Bridge Replacement Project construction and/or operation (as shown in Figures 3-12a and 3-12b).<br><br>The Staging and Storage Yard activities will be consistent with existing industrial-type land uses. Because the proposed use will require only a construction easement, there will be no impact on existing zoning. No existing uses will be impacted by the project; the Staging and Storage Yard will not affect the existing land uses as a decommissioned power plant and as an Eversource electrical substation.<br><br>Following project completion, the property will be restored to pre-construction conditions and the construction easement will be released. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
|---|---|---|---|
| | A large industrial area on Route 136 (Meadows Street) and on Woodward Avenue (south of Route 136), northwest of Manresa Island, brings truck volume to the area. | | |
| **Socioeconomics** | Parcel 5/86/1 is a substantial source of tax revenue to the city. The 2018 assessed value of Parcel 5/86/1 (land and improvements) is $38,653,771. The parcel generates $761,838 in property tax revenue annually, representing 0.26 percent of the Norwalk Grand List. | Use of 4.7+-acre area on the Manresa Island southern parcel as a partial-parcel Construction Easement for project construction that will be acquired for 60 months (with substantial construction activity for approximately 48 months) and eventually released. | The parcel will be encumbered with a construction easement temporarily acquired from Norwalk Power LLC. Use of approximately 4.7+acres on Parcel 5/86/1 as a Staging and Storage Yard will not impact its current use as a decommissioned power plant, nor will it impact Eversource Energy's current operations on the site. The parcel will be returned to its pre-construction conditions following project completion. |
| **Water Quality** | Figure 3.15a shows the current water quality classifications proximate to/on Manresa Island.<br><br>Site-wide groundwater has been impacted by historic power plant operations. The site was previously characterized as a large quantity generator of hazardous waste. It is currently enrolled in USEPA/CTDEEP's Property Transfer Program and RCRA Corrective Action Program, requiring regular groundwater monitoring. RCRA closure groundwater monitoring has been completed since 1989. A Technical Impracticability Variance submitted in 2012 concluded the groundwater plume is stable and has a low potential for environmental risk. CTDEEP currently is reviewing this determination. | Staging and Storage Yard activities will not result in impacts to water quality, including groundwater, on the site. | No impacts to the existing water quality are anticipated due to Staging and Storage Yard activities. CTDOT will adhere to proper erosion and sedimentation control measures on site in accordance with the Connecticut 2002 Erosion & Sediment Control Guidelines.<br><br>Further, water quality will be ensured through CTDOT's Standard Specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with the Department's Required Best Management Practices (BMPs), which are standard practice for CTDOT and are designed to protect water quality. Additionally, CTDOT's Construction Inspectors and Environmental Coordinators will verify site conditions to ensure that the Contractor |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
|---|---|---|---|
| | | | upholds the environmental requirements on the project. |
| **Tidal Wetlands** | Tidal wetlands are present in the Manresa Island northern parcel, Parcel 5/86/2. CTDOT OEP confirmed in a site walk conducted in March 2020 that there are no tidal wetlands in the proposed Staging and Storage Yard; however, tidal wetlands are in the southern parcel, Parcel 5/86/1 adjacent to the north side of the work area. Adjacent tidal marshes include low marsh vegetation consisting of smooth cordgrass (*Spartina alterniflora*) and high marsh vegetation consisting of salt hay (*Spartina patens*) and high tide bush (*Iva frutescens*), with a common reed (*Phragmites australis*) perimeter as the marsh slopes to the upland area. Figure 3-16a presents tidal wetlands on Manresa Island. | There will be no additional tidal wetland impacts associated with the use of Manresa Island. The boundary of the Staging and Storage Yard is south and outside of the existing tidal wetland. Existing access roadway widths have been determined to be wide enough to accommodate anticipated truck and equipment traffic without roadway widening (and wetland impacts). | No additional impacts to tidal wetlands are anticipated. |
| **Freshwater Wetlands** | CTDOT OEP confirmed in a site walk conducted in March 2020 that there is one freshwater wetland complex located in Parcel 5/86/2, the northern parcel, just north of the site boundary with Parcel 5/86/1, the southern parcel (Figure 3-16a). | There will be no freshwater wetland impacts associated with the use of Manresa Island. | No additional impacts to freshwater wetlands are anticipated. |
| **Floodplains** | Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the entire southern parcel (Parcel 5/86/1) is located within the 100-year Flood Zone AE – Special Flood Hazards Area, which also extends into the parcel's intertidal area (Figure 3-20a). Figure 4-2a presents current hurricane inundation conditions. | Additional fill associated with the storage of material and equipment will be placed on the site. The materials and equipment will be properly secured or removed, if flooding or coastal storms are anticipated. Flood-proof containers will be used on the site for secure storage and to provide weather protection. Critical activities, such as petroleum fuels, oil tanks for site generators, and other construction related hazardous or flammable materials, will be stored within double-walled and flood-proof containers. The size of containers will be | CTDOT will develop a Flood Contingency Plan for Parcel 5/86/1, incorporate additional flood proofing into the project design and operation as needed, and include the proposed Staging and Storage Yard activities in its application for Flood Management Certification for the project. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
|---|---|---|---|
| | | limited to less than 1,300 gallons. In the event of a forecasted storm, containerized materials will be moved off-site. | |
| **Terrestrial Resources** | Figure E-4 shows habitat at Manresa Island.<br><br>According to the December 2019 CTDEEP Natural Diversity Database (NDDB) map, state and federal listed species exist on Manresa Island; the area generally west of Manresa Island Road is identified by CTDEEP NDDB as critical habitat (Figure E-4). The USFWS Northeast Coastal Areas Study lists the Tidal Wetlands Complex (Site 20), which includes Manresa Island, as a significant and unique coastal habitat (1991). | The Staging and Storage Yard will be limited to approximately 4.7 acres of mowed grass and previously disturbed area in the southern-most portion of Manresa Island. Except for traversing the access road to and from the yard, no construction activities will occur outside of the designated Staging and Storage Yard.<br><br>To protect listed species during Staging and Storage Yard operations, CTDOT will use protection protocols and time of year (TOY) restrictions, as referenced in Attachments E-4 and E-5. | No impacts to terrestrial resources are anticipated. In its NDDB Determination, CTDEEP concurred with CTDOT's use of the species protection protocols (Attachment E-4) as a means to lessen adverse impact on identified species.<br><br>CTDOT re-initiated consultation with CTDEEP Wildlife and will implement protection strategies as required for identified species (Attachment E-5). |
| **Aquatic Resources** | The waters of the Long Island Sound, adjacent to Manresa Island, are designated as Essential Fish Habitat for species under jurisdiction of the New England Fisheries Management Council and the Mid-Atlantic Fisheries Management Council. The portion of Norwalk Harbor between Manresa Island and Walk Bridge is closed to recreational shell fishing. Aquatic resources are shown in Figure 3-22a. Coastal boundaries are shown in Figure 3-24a. | Transfer of the lift span assembly activities from the Water Street parcels to Manresa Island will not change the number or schedule of barges to traverse the Norwalk River between the Staging and Storage Yard and bridge site, but the transfer will increase the barge travel distance from 0.2 nautical mile to approximately 2.1 nautical miles, thereby increasing the potential for impacts upon the aquatic environment. Consultation with NOAA/NMFS regarding potential impacts to EFH and Section 7 species included the Norwalk River and Harbor proximate to and south of Manresa Island. | Shell fishing is prohibited on this portion of the Norwalk estuary as it is deemed impaired by CTDEEP [indicating bacteria exceeding the State's total maximum daily load (TMDL)]. Because shell fishing is prohibited, no adverse impacts to harvestable shellfish will result from the use of the southern portion of Manresa Island as a Staging and Storage Yard.<br><br>The project will incorporate mitigation measures and best management practices to protect EFH within the Norwalk River and special concern species within the surrounding wetlands. The use of Manresa Island as a Staging and Storage Yard will not affect the other prior commitments that CTDOT will implement to protect aquatic resources. There will be no additional natural aquatic resources affected by the use |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | | | of this area. Confirmation by NOAA/NMFS is included in Attachment E-1. |
| **Endangered, Threatened, & Special Concern Species** | Endangered, threatened, and special concern species occur on Manresa Island. Per the NDDB Determination of 4/16/20, CTDEEP has records for State Threatened Peregrine falcon (*Falco peregrinus*) and State Special Concern Northern diamondback terrapin (*Malaclemys t. terrapin*) in the project vicinity.<br><br>The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPAC) tool (2/24/20) identified the following species:<br>• Northern Long-Eared Bat (*Myotis septentrionalis*), Threatened;<br>• Red Knot (*Calidris canutus rufa*), Threatened;<br>• Roseate Tern (*Sterna dougallii dougalii*), Endangered.<br><br>IPaC mapping did not identify critical habitat on Manresa Island. The IPaC resource list (3/9/20) identifies 29 migratory birds that are of particular concern either because they occur on the USFWS Birds of Conservation Concern list or warrant special attention in the project location. Five of the bird species are protected under the Migratory Bird Treaty Act and six are protected under the Bald and Golden Eagle Protection Act.<br><br>The National Marine Fisheries Greater Atlantic Region Endangered Species Act (ESA) mapper identified potential for the following species: | The Staging and Storage Yard will be limited to approximately 4.7 acres in the southern-most and heavily disturbed and developed portion of Manresa Island. Except for traversing the access road to and from the site, no construction activities will occur outside of the designated Staging and Storage Yard.<br><br>Use of the Manresa Island Site as a Staging and Storage Yard will increase the barge travel distance on the Norwalk River from 0.2 nautical mile to approximately 2.1 nautical mile. Consultation with NOAA/NMFS regarding Section 7 species included the Norwalk River and Harbor proximate to and south of Manresa Island. NOAA/NMFS reviews and approvals are provided as Attachment E-1.<br><br>Attachment E-2 provides the USFWS' No Effect determination for the Northern long-eared bat.<br><br>The proposed Staging and Storage Yard has the potential to intersect nesting habitat areas for the Northern diamondback terrapin in the vicinity of the access roads, as the turtles may utilize habitat in close proximity during breeding season.<br><br>To protect the State-listed peregrine falcon and northern diamondback terrapin, CTDOT will use protection protocols for both species during Staging and Storage | The proposed Staging and Storage Yard is within an already disturbed portion of the parcel, and the site itself will not result in direct impact to species or their habitat. Construction noise and human presence for the duration of construction does have the potential to temporarily disrupt species adjacent to the area.<br><br>In its NDDB Determination, CTDEEP concurred with CTDOT's use of the species protection protocols (Attachment E-4) as a means to lessen adverse impact on identified species. As required by CTDEEP Wildlife (Attachment E-5), CTDOT will implement TOY restrictions to protect species.<br><br>Protection protocols and TOY restrictions will be incorporated into permit applications and the contract specifications. By utilizing avoidance and minimization measures such as TOY restrictions for the various species, no adverse impacts to listed species or their habitat are anticipated. Confirmation by NOAA/NMFS is provided as Attachment E-1. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | • Atlantic sturgeon (*Acipenser oxyriynchus oxyriynchus*), Endangered.<br>• Shortnose sturgeon (Acipenser *brevirostrum*). Endangered.<br>• Green sea turtle (*Chelonia mydas*). Threatened.<br>• Leatherback sea turtle (*Dermochelys coriacea*. Endangered.<br>• Loggerhead sea turtle (*Caretta caretta*). Threatened.<br>• Kemp's ridley sea turtle (*Lepidochelys kempii*). Endangered.<br><br>The NMFS ESA Mapper did not identify any critical habitat at or adjacent to Manresa Island.<br><br>A field investigation conducted by CTDOT on 03/12/20 revealed a Peregrine Falcon pair and nest in the area of the proposed Staging and Storage Yard. Additionally, up to three potentially active osprey (*Pandion haliaetus*) nests in proximity to the proposed Staging and Storage Yard were observed, as shown in Figure E-4. | Yard operations, as included in Attachment E-4.<br><br>The osprey nests observed during a March 2020 field visit may be within distance to be affected by the Staging and Storage Yard activities.<br><br>CTDOT has re-initiated consultation with CTDEEP Wildlife and will implement protection strategies as required for identified species. Mitigative measures include implementing speed restrictions along the access roads and educating personnel on site regarding the possible occurrence of the Northern diamondback terrapin. Specific work Time of year (TOY) restrictions will be implemented as requested by CTDEEP Division of Wildlife to avoid disruption to listed bird species or their nests during the active breeding/nesting season. Attachment E-5 includes coordination with CTDEEP Wildlife.<br><br>. | |
| **Water-Dependent Uses** | The existing dock area of 150-feet wide, 850-feet long, and 12-feet deep connects directly to existing Norwalk Harbor navigation channel. The bulkhead and slip are water-dependent uses which are currently inactive.<br><br>The existing wharf at the Manresa Island site can receive large / heavy deliveries via ocean-going barges; however, barge maneuvers and berthing configurations can be complicated as there is only one | Proposed use of the Staging and Storage Yard includes utilizing the existing dock area for various barges necessary for construction and transport of the lift spans to the bridge site. A water-side inspection of the existing bulkhead indicated that there are no existing condition issues that would prohibit its use during Staging and Storage Yard operations. Spuds will be used as needed for anchoring the barges and will be included in permit applications. | The temporary use of the existing bulkhead and slip at Manresa Island for a proposed Staging and Storage Yard will not impact the future use of the facility as a water dependent use. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | entrance to the wharf and the wharf slip is relatively narrow (approximately 150 feet wide). | | |
| **Visual Resources** | The *Norwalk Power Economic Impact Analysis Findings and Recommendations Report* indicated that approximately 300 properties, including those from the northern neighborhoods, Bell Island, and Calf Pasture Park, have a view of the NRG Energy power plant building and/or smokestack. However, other features on the property, such as the substation, are far less visible. | The barges and construction equipment will result in temporary changes to the views of the site, but the overall utility/industrial character of the site will not change.<br><br>Neighborhoods and other sensitive receptors with views of the site (Figure E-2) include:<br><br>• Longshore Avenue neighborhood, 0.4 mile to the north;<br>• Harbor View Beach, 0.5 mile to the north;<br>• Outer Road neighborhood, 0.5 mile to the northwest;<br>• Village Creek Harbor, 0.6 mile to the north west<br>• Woodward Avenue Park, 0.8 mile to the northwest;<br>• Valley Road neighborhood, 0.8 mile to the west;<br>• Calf Pasture Beach, 0.8 miles to the northeast;<br>• Bell Island, 1.1 mile to the southwest. | The temporary altered visual setting will not result in an adverse visual effect. Due to the distance of the Staging and Storage Yard from the neighboring communities and the smaller scale of the proposed Staging and Storage Yard activities compared to the existing power plant and smokestack, changes in visual impacts will be negligible. |
| **Air Quality** | Since 2013, the NRG Energy power plant has been closed with no activity. However, prior to its closure, the site had been an active power plant since 1960. The Eversource electrical substation does not generate air emissions. | Emissions will result from construction activities at the Staging and Storage Yard and construction vehicle traffic to and from the site. Construction activities generally will be limited to weekday day-light hours; night-time and weekend work will be rare. Figure E-2 shows distances of sensitive receptors to the Staging and Storage Yard. | Per USEPA's *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in* $PM_{2.5}$ *and* $PM_{10}$ *Nonattainment and Maintenance Areas* (November 2015), emissions from construction-related activities are not required to be included in PM hot-spot analysis if such emissions are considered temporary, per 40 CFR 93.123(c)(5). |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | | Emissions from Staging and Storage Yard activities at Parcel 5/86/1 are considered temporary per 40 CFR 93.123(c)(5): they will occur only during the construction phase and will last five years or less at any individual site. | Air quality will be ensured via CTDOT's Standard Specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with CTDOT's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs comprise CTDOT's standard practice and are designed to protect air quality. During construction, CTDOT's Construction Inspectors and Environmental Coordinators will verify site conditions to ensure that the Contractor upholds the environmental requirements on the project. |
| **Noise & Vibration** | Since 2013, NRG Energy power plant has been closed with no activity. However, prior to its closure, the site had been an active power plant since 1960. In general, any noise generated by the existing electrical substation would be local to the substation and not at an amplitude that would extend beyond the parcel boundaries; neither noise nor vibration is an existing issue.<br><br>Ambient noise measured at five residential locations proximate to Manresa Island indicate that daytime background noise levels ($L_{90}$) are in the range of 42-45 dBA, mostly attributed to local neighborhood activities, beach sounds, motor-vehicle traffic on nearby streets, and biogenic sources such as bird song and insect noises (*Manresa Island Construction Noise Study*, WSP USA, October 2020). | Noise will result from activities at the Storage and Staging Yard and construction vehicle traffic to and from the site. Construction activities generally will be limited to day-light hours during a 6-day work week; night-time work will be rare. Figure E-2 shows distances of sensitive receptors to the Staging and Storage Yard.<br><br>Noise and vibration will result from barges traversing the Norwalk River between the Manresa Island Storage and Staging Yard and the bridge site.<br><br>CTDOT's *Manresa Island Construction Noise Study* used FTA's "Transit Noise and Vibration Impact Assessment Manual" (FTA Report No. 0123, September 2018) to predict construction noise levels generated by lift span assembly activities at the Manresa Island Staging and Storage Yard. | The results of the *Manresa Island Construction Noise Study* indicate that although noise from the Staging and Storage Yard will be audible at times, the construction noise levels will be below CTDOT's noise limits for the Walk Bridge Replacement Project at all modeled community locations, and well below noise limits at the Manresa Island locations. In addition, noise increases from construction-related traffic along the Woodward Avenue truck route are not expected to be significant.<br><br>CTDOT will maintain on-going dialogue with the community through construction completion. CTDOT will investigate community complaints and will implement revisions to construction means and methods as needed. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | | The results indicate projected worst-case construction noise levels, limited to daytime hours, in the range of 50-64 dBA, which are well below CTDOT's noise limit of 90 dBA. Given that the daytime background noise levels ($L_{90}$) are in the range of 42-45 dBA at the ambient measurement sites, construction activities at Manresa Island are likely to be audible at some outdoor locations during quiet periods of time.<br><br>CTDOT's *Manresa Island Construction Noise Study* used Federal Highway Administration (FHWA) procedures to predict and assess construction traffic noise in comparison to ambient noise measurement results proximate to Woodward Avenue. The predictions indicated that construction-related traffic will result in an increase of no more than one decibel at locations along the proposed truck route, which is an insignificant change. Furthermore, the exposure to construction-related traffic will occur during a limited number of hours during the day. | The use of Manresa Island as a Staging and Storage Yard will not affect CTDOT's previous commitments to protect species relative to noise and vibration. |
| **Cultural Resources** | Manresa Island (formerly also known as Bouton's Island or Keyser Island) was developed as a Jesuit retreat center known as the Manresa Institute during the early 1900s. The center relocated to Staten Island in 1911, and the property was acquired by CL&P for use as a coal-fired power plant in 1952. The plant's ten existing industrial buildings and structures were built during the late 1950s and completed by ca. 1960. The | An existing industrial building (built ca. 1960) may be altered for use as a construction office for the Staging and Storage Yard. Site preparation for the Staging and Storage Yard will include fill of 6-inches of crushed stone atop an area currently consisting of introduced gravel fill topped with topsoil. To secure the Staging and Storage Yard's perimeter fencing and gate posts, a minimal amount of sub-surface drilling may be required. | The proposed use of Parcel 5/86/1, including potential alteration of existing buildings and soil impacts resultant of site compaction and limited sub-surface drilling associated with the preparation of the Staging and Storage Yard and construction fencing, will result in No Historic Properties Affected. All of the buildings associated with the former Manresa Institute have been demolished and cleared and the structures associated with the existing power plant |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | facility converted to oil fuel in 1972 and remained in operation until 2013. | | have been determined to be Not Eligible for the NRHP. Furthermore, the soils throughout the entirety of the Archaeological APE have been heavily disturbed during the construction and demolition of the Manresa Institute, and the construction and continued development of the power plant. As such, there is also minimal foreseeable potential to impact intact archaeological resources within the project area. Attachment D contains the Supplemental Cultural Resources Evaluation Memorandum documenting the historical and archaeological evaluations conducted for the proposed Staging and Storage Yard and CTSHPO's concurrence with the finding of No Historic Properties Affected. |
| **Hazardous & Contaminated Materials** | Currently a Brownfield site, the site has been enrolled in USEPA/CTDEEP's Property Transfer Program/RCRA Closure since 2006. The northern parcel contains contaminated fill and is not suitable for development.<br><br>There are 12 Areas of Concern (AOCs) or locations/areas where hazardous substances and/or hazardous substances (including petroleum) could have been used, treated, handled, disposed of or spilled and released to the environment in both the northern and southern parcel (Figure F-1). | The proposed work area will overlap with existing AOC-1 and AOC-4, as shown on Figure F-1. To provide a layer of separation from AOC-1 and AOC-4, the ground surface of the Staging and Storage Yard will be covered with 6-inches of crushed stone over geotextile fabric. In the material laydown area, a polyethylene covering will be placed directly beneath existing bridge components with potentially hazardous materials (e.g., lead paint; creosote) as an additional layer of separation from the ground surface. The contractor will also perform site testing for lead before and after staging and storage operations.<br><br>CTDOT will implement additional BMPs into the daily operations of the Staging and Storage Yard to contain hazardous materials. The steel members of the | CTDOT will coordinate with Norwalk Power LLC regarding the acquisition of a temporary construction easement and potential impacts relative to the Property Transfer Program/RCRA Closure. CTDOT's use of temporary construction easements instead of full parcel acquisitions will not require remediation of existing hazardous substances at either the Water Street parcels or Parcel 5/86/1.<br><br>In accordance with project permits and contract specifications, CTDOT will manage and characterize excess materials and dispose of materials off-site at approved locations. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | | existing bridge brought to the Staging and Storage Yard via barge will be cut (sheared) to smaller pieces which will allow them to be transported over the road for off-site disposal. The lead-containing fragments from the shearing process will be stored in drums that will be removed from the site at the end of every workday. Timber piles and other bridge and railroad components (including railroad ties and catenary components as needed) with hazardous materials will be stored on site until removal. Hazardous material will include petroleum fuels/oil tanks for site generators, which will be stored in double-walled and flood-proof containers and will be sized less than 1,300 gallons. In the event of a forecasted storm, containerized materials will be moved off-site.<br><br>Minimal excavation will occur due to the temporary fence installation: gate posts will be drilled into the ground and filled with concrete. Per CTDOT OEC, excess materials from fencing posts will be handled in accordance with project specifications, including transporting material to the project Waste Stockpile Area for characterization and disposal. | |
| **Safety and Security** | The Manresa Island Power Plant is not open to the public. | Temporary construction fencing will be installed around perimeter of work area with construction gate access. Only construction employees and people associated with the Walk Bridge Project will access the site. There will be no public access. | The use of Manresa Island (Parcel 5/86/1) as a construction staging parcel will be incorporated into the project safety and security documents, including the Safety and Security Management Plan (SSMP), Preliminary Hazard Analysis (PHA), Threat, Vulnerability and Risk Assessment (TVRA), Health and Safety Plan (HASP), |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | | | Construction Site Safety and Security Plan, and Emergency Response Plan. |
| **Public Utilities & Service** | No natural gas or sewer infrastructure exists on the site. A septic leach field exists on Parcel 5/86/1; septic discharges are directed to an existing septic leach field located within southwest corner of the southern parcel. Water and electrical service are available to the site. Electrical power is no longer supplied to the light poles. | Pending agreement with Norwalk Power LLC, water and electrical service will be provided by the site owner. Alternatively, potable water will be provided via a water truck, and electrical service will be provided via a portable generator. Portable toilets will be used. | The temporary use of existing utilities and services on Manresa Island is not anticipated to result in adverse impacts. |
| **Neighborhoods & Populations (Social) Title VI and Environmental Justice** | Parcel 5/86/1 is located within a Census Tract (Tract 444) identified as an Environmental Justice (EJ) Community of Concern. | The Walk Bridge is on an existing rail corridor; the bridge and all construction staging parcels, including the Staging and Storage Yard at Manresa Island, are located within EJ Communities of Concern. The project will improve accessibility and reliability of both Walk Bridge and Fort Point Street Bridge, as well as the navigational opening of the Norwalk River, providing an overall benefit to the entire community.<br><br>Use of Parcel 5/86/1 will not adversely affect any existing uses, located on site or abutting the site. The proposed Staging and Storage Yard at Manresa Island is relatively isolated from neighborhoods and community uses; as shown in Figure E-2, the closest neighborhood/residence is approximately 0.4 mile from the work area to the north. Impacts on the community northwest of the site (and Tract 444 in general) will be limited to traffic to and from the Staging and Storage Yard. Relative to existing truck traffic on Woodward Avenue, the additional traffic on surrounding roads due to the Staging and | The EA/FONSI design and previous NEPA Re-evaluation concluded that the project will not create disproportionate temporary or permanent impacts to EJ populations in the study area, inclusive of Census Tracts 440, 441, and 442. The EA/FONSI concluded that the project is important to the continued economic prosperity of the community and the region and will benefit EJ communities, which comprise the study area as well as a substantial portion of the local community. The finding of the EA/FONSI continues to be valid with this proposed refinement in construction approach. |

| Impact Category | Existing Conditions – Manresa Island (southern portion) | New Impacts: Use of Parcel 5/86/1 (portion) – Manresa Island | Assessment of Impacts |
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| | | Storage Yard will have minimal impact on existing conditions. Further, by using an isolated site for the replacement bridge lift span assembly, as opposed to the downtown Norwalk Water Street parcels, there will be less construction traffic, noise, and air quality impacts upon Tract 441, a densely development downtown area and an EJ Community of Concern. For these reasons, the use of Parcel 5/86/1 as a Staging and Storage Yard will not disproportionately affect EJ populations. | |

## Table 2 - Assessment of Potential Impacts: Design Refinements and Refined Construction Approach

| Impact Category | Impacts as Previously Presented | Impacts – Advanced Design; Refined Construction | Change in Impacts |
|---|---|---|---|
| **Transportation - Traffic, Transit and Parking** | **Marshall Street Pedestrian Improvements.** Pedestrian access during construction was not presented in prior design submittals. | To accommodate pedestrian traffic during limited closures of North Water Street during construction, CTDOT proposes improvements and alterations along the south side of Marshall Street to develop a pedestrian access compliant with Americans with Disabilities Act (ADA) requirements, including sidewalk and driveway improvements and signage as needed. These permanent improvements will not require ROW takings. CTDOT will coordinate with the City of Norwalk as the design for Marshall Street improvements is finalized. | The sidewalk and driveway improvements on the south side of Marshall Street will be retained in the permanent condition, thereby expanding ADA accessibility in downtown Norwalk. |
| **Visual Resources** | **Abandonment and Replacment of Fort Point Street/Railroad Corridor Stone Retaining Wall.** The existing stone retaining wall along Fort Point Street consists of irregular rubble stone. It adjoins Fort Point Street Bridge's east abutment, which is composed of ashlar masonry. | The entirety of the existing stone retaining wall between Fort Point Street and the rail corridor will be abandoned in place and a new wall (Wall 310) will be installed directly in front of the wall, with soil nails extending through the existing wall. The face of the new concrete wall (prefabricated modular wall) will be stamped and colored to resemble the Fort Point Bridge's east abutment ashlar masonry stone wall in dimension and color. | The face of Wall 310 will be designed to resemble in dimension and color the east abutment of the Fort Point Bridge. While it will be a change from existing conditions, the continuity of appearance between the east abutment and Wall 310 will result in minimal visual impact. |
| | **Marshall Street Pedestrian Improvements.** Pedestrian access during construction was not presented in prior design submittals. | The Marshall Street improvements will be limited to upgrading existing modern paving and curb cuts to current ADA standards. Pole-mounted streetlights on the south side of Marshall Street will be removed during construction and replaced in-kind following project completion. CTDOT is coordinating the streetlight replacement with the City of Norwalk. | The pole-mounted streetlights will be replaced in-kind. Their replacement, and the limited sidewalk and driveway improvements, will result in minimal changes to the overall visual character of Marshall Street. |

| Impact Category | Impacts as Previously Presented | Impacts – Advanced Design; Refined Construction | Change in Impacts |
|---|---|---|---|
| **Historic, Cultural & Archaeological Resources** | **Abandonment and Replacment of Fort Point Street/Railroad Corridor Stone Retaining Wall.** As reported in the Historic Resources Evaluation Report prepared for the Walk Bridge Replacement Project, (AHS, August 2016), the stone retaining walls along the rail line between the New York/Connecticut border and New Haven are contributing to a NRHP-eligible linear historic district. The Historic Resources Evaluation Report indicated that the removal of the high towers, catenary support structures, stone retaining walls, and Fort Point Street Railroad Bridge will be adverse effects on the overall rail line as an eligible historic district. Attachment D-3 provides documentation and Attachment D-4 provides the CTSHPO's concurrence.<br><br>**Marshall Street Pedestrian Improvements.** Pedestrian access during construction was not presented in prior design submittals. | CTDOT recommends that the additional loss of stone masonry and replacement with Wall 310 will further contribute to the adverse effect on the overall rail line as an eligible historic district. Under the provisions of the FAST Act, CTDOT recommends that Section 4(f) would not apply to this action.<br><br>CTDOT recommends that the proposed sidewalk and other pedestrian improvements not be considered as an adverse effect on the NRHP-listed or NRHP-eligible properties or their settings. Further, the permanent pedestrian improvements would not require ROW takings from the individually listed resources or resources contributing to the Historic District, therefore Section 4(f) would not apply. | It is CTDOT's opinion that mitigation of adverse effects due to this design change in the Fort Point Street area has been addressed through the Walk Bridge Replacement Project MOA. Per Stipulation No. 3, the stone retaining wall was included in *Written and Photographic Documentation: New York, New Haven & Hartford Railroad, South Norwalk and East Norwalk, Norwalk Connecticut* (Archaeological and Historical Services., Inc. (AHS), August 2018).<br><br>CTDOT recommends no adverse effect to Section 106 resources. CTDOT recommends that Section 4(f) would not apply to the improvements. |
| **Construction** | The EA/FONSI indicated that the Walk Bridge Replacement Project will generate sediment, groundwater, soil, ballast, and sub-ballast that will require testing, management and disposal. The EA/FONSI indicated that temporary WSA(s) will be constructed, managed and dismantled in accordance with CTDEEP regulatory and | Three CTDOT-owned areas are proposed for use as WSAs and RSAs for the Walk Bridge Program, which includes the Walk Bridge Replacment Project and other nearby NHL improvement projects:<br><br>1) WSA: I-95/Route 7 interchange area, located south of I-95 off the Route 7 | The use of RSAs will facilitate the reuse of existing on-site materials as structural fill needed for the project. The recycling will allow the diversion of minimally impacted materials from landfills. It will also reduce the air pollution caused both by trucking this |

| Impact Category | Impacts as Previously Presented | Impacts – Advanced Design; Refined Construction | Change in Impacts |
|---|---|---|---|
| | permit requirements. The EA/FONSI did not identify specific RSA sites, but noted that CTDOT has identified approved upland facility sites for the disposal of excess soil and sediments. | southbound off-ramp and adjacent to West Avenue;<br>2) WSA/RSA: Route 7 Exit 2 (New Canaan Avenue) northbound infield area and adjacent to the northbound on-ramp;<br>3) RSA: Glover Avenue Construction Yard, near the terminus of Route 7 at Grist Mill Road.<br><br>The three proposed areas currently are in use by CTDOT as sediment management areas for other ongoing construction projects. The three areas are outside the 100-year and 500-year floodplains. None of the areas are located within wetlands or protected habitat, per CTDEEP NDDB current mapping. All of the sites have immediate highway (I-95 or Route 7) access. Access to and from the sites would not require travel through residential streets, thereby avoiding impacts to sensitive receptors.<br><br>Project-generated material at the WSAs and RSAs will be managed in accordance with the CTDEEP General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer). When not actively being used, stockpiled materials at the WSAs and RSAs will be covered with polyethylene plastic sheeting and secured with sandbags. Sorbent booms will be placed along the perimeter of the WSAs and RSAs if needed. The Contractor will prepare a specific operations and management plan for the project-generated material, which will include tracking procedures, emergency and preparedness | material to out-of-state landfills and importing new material onto the project site.<br><br>CTDOT will manage the operation of the WSAs and RSAs in accordance with project permits and contract specifications. The WSAs and RSAs will be included in the Walk Bridge Program's Construction General Permit and General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer). |

| Impact Category | Impacts as Previously Presented | Impacts – Advanced Design; Refined Construction | Change in Impacts |
|---|---|---|---|
| | | plans, and inspection and maintenance procedures. Wastewater generated during dewatering activities will be managed in accordance with CTDEEP requirements.<br><br>The WSAs and RSAs will be included in the Walk Bridge Program Stormwater Pollution Control Plan (SWPCP) and covered under the Program's General Permit for Discharge of Stormwater and Dewatering Wastewaters from Construction Activity (Construction General Permit).<br><br>CTDOT's Office of Construction/ District 5 will be responsible for directing and overseeing the operation of the WSAs and RSAs, in coordination with the Construction Engineering and Inspection (CE&I) team. | |

# FEDERAL TRANSIT ADMINISTRATION ENVIRONMENTAL RE-EVALUATION CONSULTATION

## ATTACHMENTS

### Attachment A Additional EA/EIE Figures



### Attachment B Proposed Staging and Storage Yard, Manresa Island (Parcel 5/86/1)



### Attachment C Manresa Island Evaluations and Responses to Comments



### Attachment D Section 106 Assessments



### Attachment E Federal and State Reviews, Approvals, and Permit Requirements

## Attachment F Environmental Effects Mapping

# Attachment A Additional EA/EIE Figures

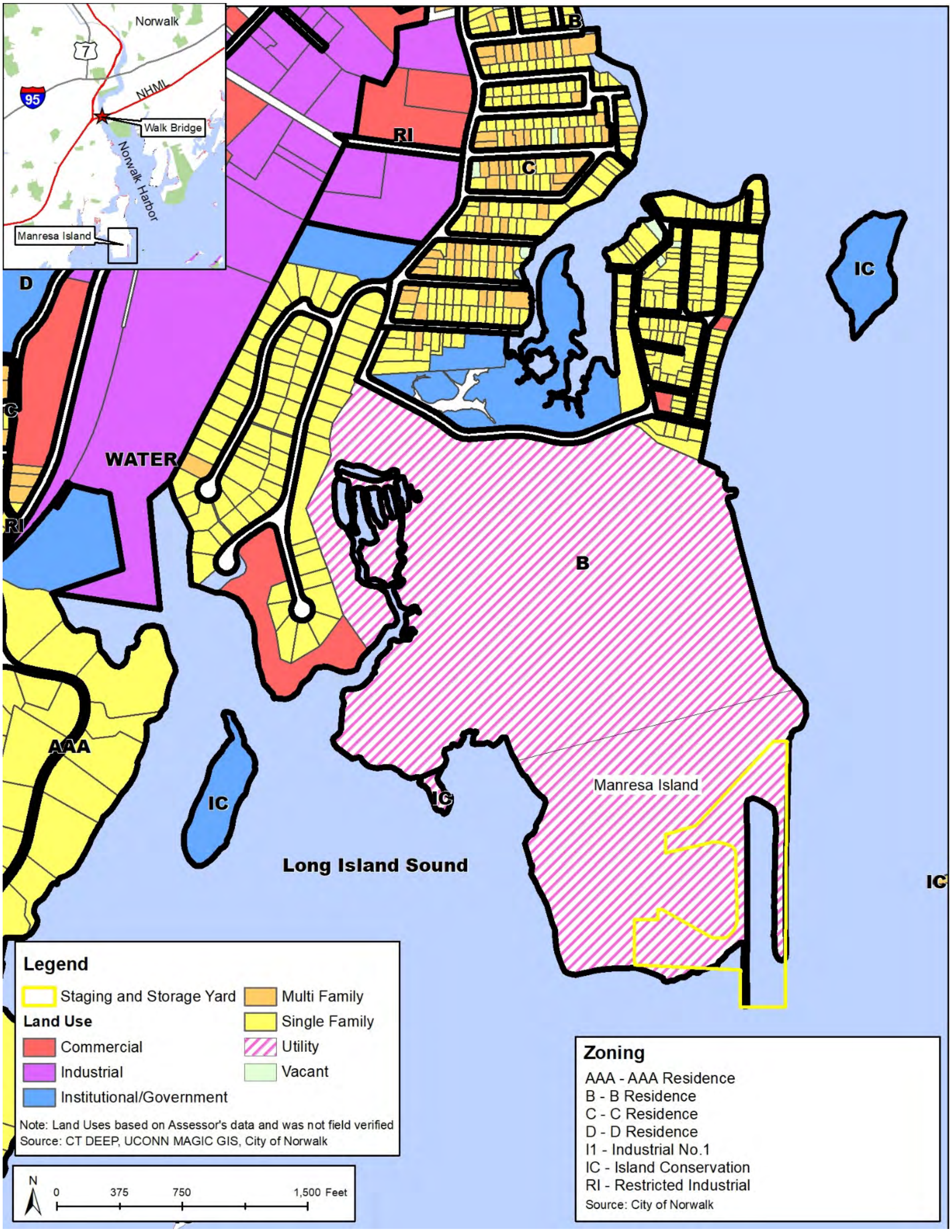



**Figure 3-11a—Land Use and Zoning in Vicinity of Manresa Island Staging and Storage Yard**

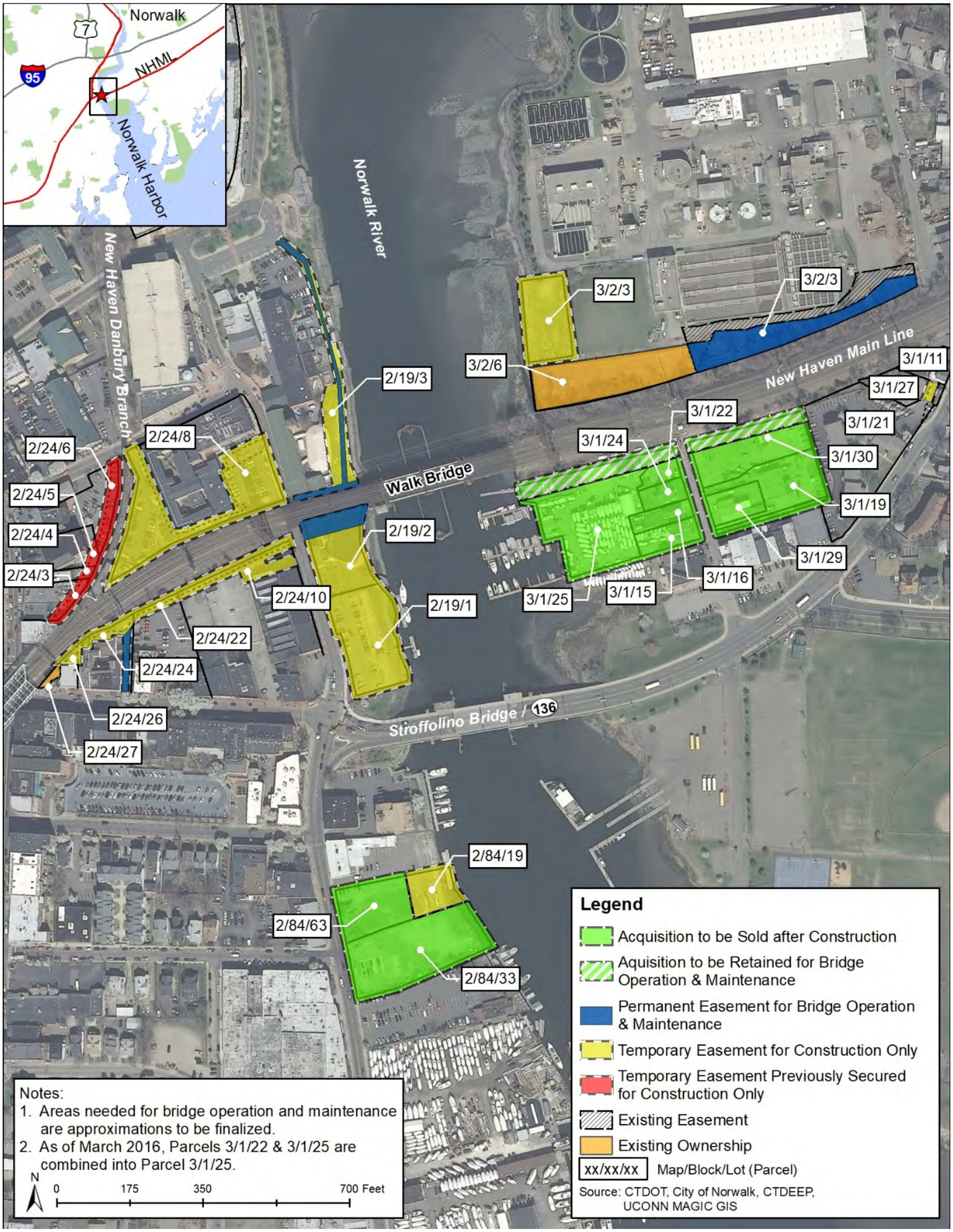



**Figure 3-12a—Locations of Proposed Parcel Use in Vicinity of Walk Bridge**


**Figure 3-12b—Locations of Proposed Parcel Use in Vicinity of Manresa Island**


**Figure 3-15a—Water Quality Classification in Vicinity of Manresa Island Staging and Storage Yard**

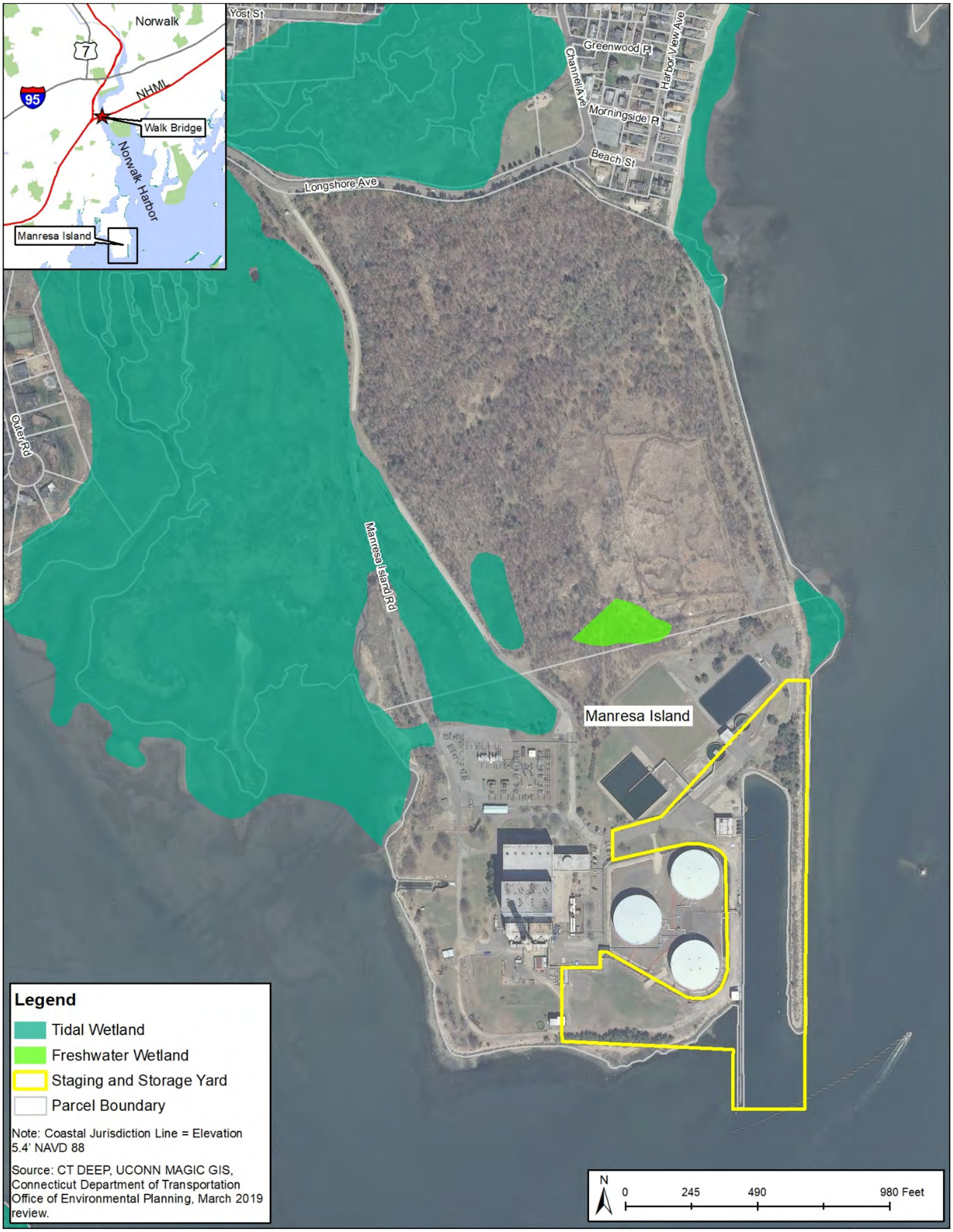



**Figure 3-16a—Tidal & Freshwater Wetlands in Vicinity of Manresa Island Staging and Storage Yard**


**Figure 3-20a—Floodplains in Vicinity of Manresa Island Staging and Storage Yard**

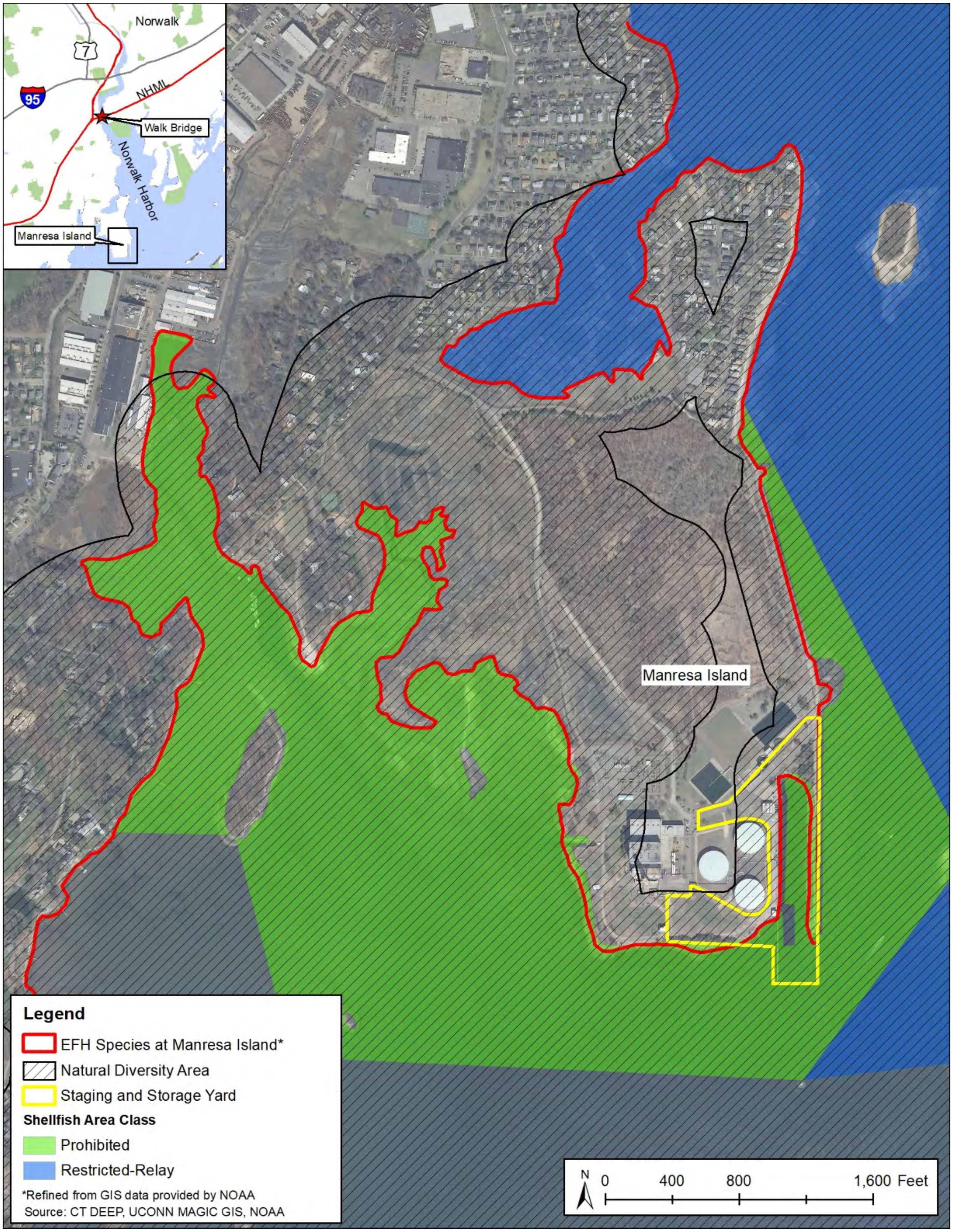



**Figure 3-22a—Aquatic Resources in Vicinity of Manresa Island Staging and Storage Yard**


**Figure 3-24a—Coastal Boundary in Vicinity of Manresa Island Staging and Storage Yard**


**Figure 3-26a—Parklands & Public Recreation in Vicinity of Manresa Island**

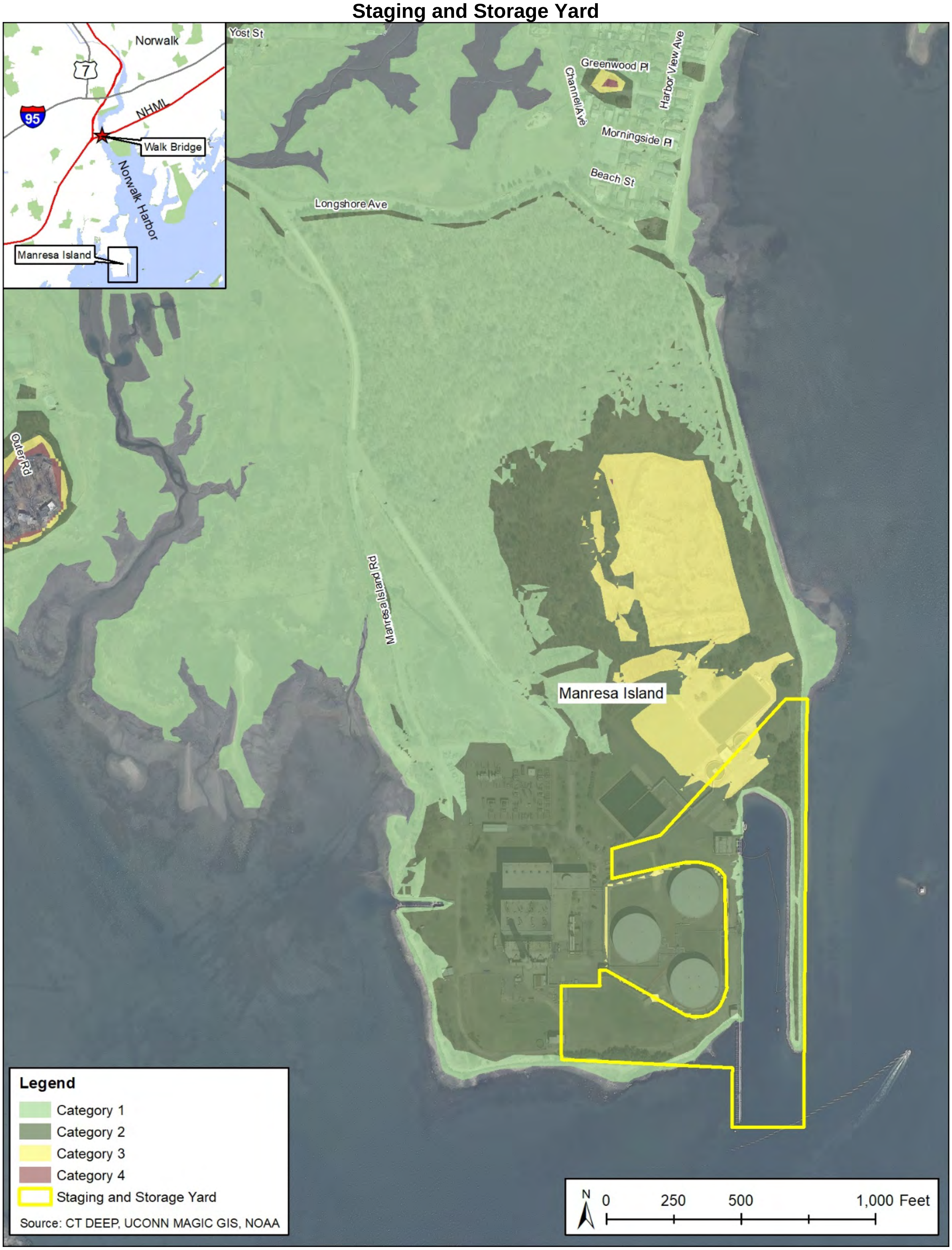



**Figure 4-2a—Hurricane Inundation Existing Conditions – Manresa Island**

## Attachment B Proposed Staging and Storage Yard, Manresa Island (Parcel 5/86/1)


**Figure B1—Proposed Work Area and Site Access, Manresa Island (Parcel 5/86/1)**


**Figure B2—Proposed Staging and Storage Yard Activities, Manresa Island (Parcel 5/86/1)**

# Attachment C Manresa Island Evaluations and Responses to Comments

## Attachment C-1 - Assessment of Lift Span Assembly Yard Locations, 10/15/20

# Location of Lift Span Assembly Yard

*Assessment and Recommendation*

The Walk Bridge Program is a large-scale project in Norwalk, CT funded by the State of Connecticut, the Federal Railroad Administration and the Federal Transit Administration. The major project in the Program is the replacement of the existing swing railroad bridge (Walk Bridge) over the Norwalk River. The new bridge is comprised of two, side-by-side, vertical lift span bridges installed in two phases, south span in phase 1 and north span in phase 2, to maintain railroad operations on a minimum of two tracks at all times. Each lift span will be fully assembled, including the installation of the track and overhead catenary systems, and the completed span will be transported to the project location via a barge. Once the barge is floated into place, the new span will be lifted into its final position. The Program favors offsite assembly compared to in-place assembly because of the marine vessel impacts associated with river construction; constructability difficulties when working on the water; and noise implications from the steel assembly's proximity to SONO. The Program identified an assembly location near the project site that would be cost effective; created limited impacts to the area's environmental resources, river navigation and river-users; and would optimize the coordination, logistics and risks associated with the lift span assembly.

When the Program first began researching potential local properties to be used as an assembly area and barge transfer location, the construction manager (CM) suggested renting space at the abandoned NRG power plant (i.e. Manresa Island). The CM noted that the property had enough space for a staging yard, and by utilizing the existing bulkhead and slip, an assembly barge could be docked adjacent to the property - removing the need to transfer the assembly from land to barge.

The Program also identified a set of properties along the west bank of the Norwalk River, south of the Stroffolino bridge, as a potential assembly yard location and proceeded with a feasibility analysis of using these properties. The analysis indicated the following: a significant bulkhead would need to be constructed along the waterfront; the river bottom adjacent to the properties would need to be dredged to increase the draft needed for the loaded barge next to the bulkhead; and the barge would encroach on the river navigational channel in the approach leading to the Stroffolino bridge. In addition, the properties' proximity to SONO would create additional environmental impacts and impacts to river navigation and river-users. The Program concluded that the use of these sites as an assembly yard would require significant additional costs compared to other locations.

Subsequently, the Program entered discussions with NRG to use the property, bulkhead and slip at the abandoned power plant site (Manresa Island) as an assembly yard. The Program advanced the concept of using Manresa Island for an offsite assembly yard and brought the proposal to a public meeting.

While the Program had previously discussed utilizing non-local assembly yards, local yards were preferred by the Program. As a result of concerns raised during the public meeting, foremost being the noise pollution and additional traffic, the Program and CM revisited the concept of utilizing non-local locations for an assembly yard and proceeded with traffic and noise studies at the Norwalk sites. Several assembly yards and transfer sites along the East Coast (U.S.) and Gulf of Mexico, as well as the Hudson River, were identified and information was gathered on the transportation costs, assembly and barge transfer costs, quality control complications, and associated risk with open water transportation of the assembled spans.

The preliminary review of the information indicates the estimated cost for material transportation, offsite assembly and marine transport of the lift spans were similar to the estimated cost for using Manresa Island – which can be seen in Figure 1. However, what is not captured in the cost comparison are the risks associated with the marine transportation, as well as the increased complexities to inspection and construction logistics that would add costs to the Program due to the use of a non-local assembly location. In addition, the non-local sites are subject to future availability considerations and prioritization of work, while a local location can be permitted and provided to the contractor.

Assembling the lift spans near Norwalk removes the risk of transporting the structure on ABS (ocean-going) barges. Transporting material in open water increases the risk of damage to the structure during transport, or even the complete loss of material. In recent years, the number of tropical storms and hurricanes has increased substantially with appearances as early as May and as late as November. While additional insurance would be added to the Program to cover said damage/loss, these policies will only cover the cost for materials, not the labor to repair/replace the structure. Any damage/loss would also impact the schedule of the Program and would result in a delay to the completion of the project. In addition to schedule delays caused by damage/loss, severe storms could delay the shipping date of the structure, once again impacting the Program schedule. Normally, to mitigate the potential schedule delay, the structure would be shipped a month or two in advance of the “required-by” date. However, there is limited docking space in Norwalk for a shipment this large; therefore, the ABS barge would need to be docked at a location that has the capacity for such a large barge/structure (e.g. Bridgeport or New Haven), adding additional risk of damage/loss and additional cost for docking. By using Manresa Island as the assembly yard, the lift span structure is better protected from severe storms because it is docked in the existing slip that was used for the loading/offloading of ABS barges when the power plant was operational.

In addition, by moving the assembly to a non-local location, the field inspection staff onsite who are involved with the day-to-day construction of the Walk Bridge are not as involved with the inspection staff of the lift span assembly. While these activities can work independently of one another, the communication between the two entities is reduced drastically when they are not in the same general area. This lack of communication means that when conflicts arise in the field, they are not always relayed to the assembly team. If the assembly yard is close to the Walk Bridge, when issues, questions, and conflicts arise as the work progresses, the Walk Bridge field team can easily visit the lift span assembly team and resolve any open items quickly and face-to-face. An offsite assembly team would require communication be mainly carried out through emails, photographs/videos, and phone calls with sporadic site visits. This can result in information not being completely understood and may allow issues/conflicts to be overlooked. This additional staffing need, solely hired to inspect the lift span assembly, would add approximately $0.8 million to $1 million in additional inspection costs to the non-local yards seen in Figure 1.

These added risks and complexities make the initially similar cost estimate for assembly/delivery not as easily comparable to one another. While risk is not a “concrete” cost to the Program, it is very critical in the decision-making process. Since the costs are relatively similar, these added complexities result in the Department favoring an assembly yard near Norwalk. When comparing Manresa Island and the North Water Street parcels, the Manresa Island site is preferred as it eliminates the impacts to the river navigational channel. In addition, the Program completed a noise study at the prospective local properties and have concluded that having the assembly yard at Manresa Island will have less of a noise impact to the general public than if it located at the North Water Street parcels. Furthermore, based on the study, the noise impacts from assembly operations at Manresa Island will have minimal-to-negligible impacts to the surrounding neighborhoods (see the “Manresa Island Construction Noise Study” for additional information).

Based upon the evaluation of all the options, the Department has selected Manresa Island as the assembly yard for the Walk Bridge lift spans.

# Appendix

| Location | Property and Site Cost[1] | Lift Span Assembly & Transportation Cost | Additional Construction Inspection Cost | *Total Cost* | *Difference from Manresa Island* |
|---|---|---|---|---|---|
| **Manresa Island - Norwalk, CT** | $1,475,000 | $25,298,801 | - | **$26,698,976** | **-** |
| **MNO / 90 Water St - Norwalk, CT** | $13,090,000[2] | $25,833,412 | - | **$37,145,412** | ***$10,446,436*** |
| **Cianbro Marine Yard - Baltimore, MD** | $1,209,650 | $26,131,468 | $1,000,000 | **$28,341,118** | ***$1,642,142*** |
| **Port of Coeymans - Albany, NY (near)** | $1,628,240 | $25,750,664 | $800,000 | **$28,178,904** | ***$1,479,928*** |
| **Steel Fabricator Full Offsite Assembly - Iuka, MS** | - | $24,897,694 | $1,000,000 | **$25,897,694** | ***-$801,282*** |

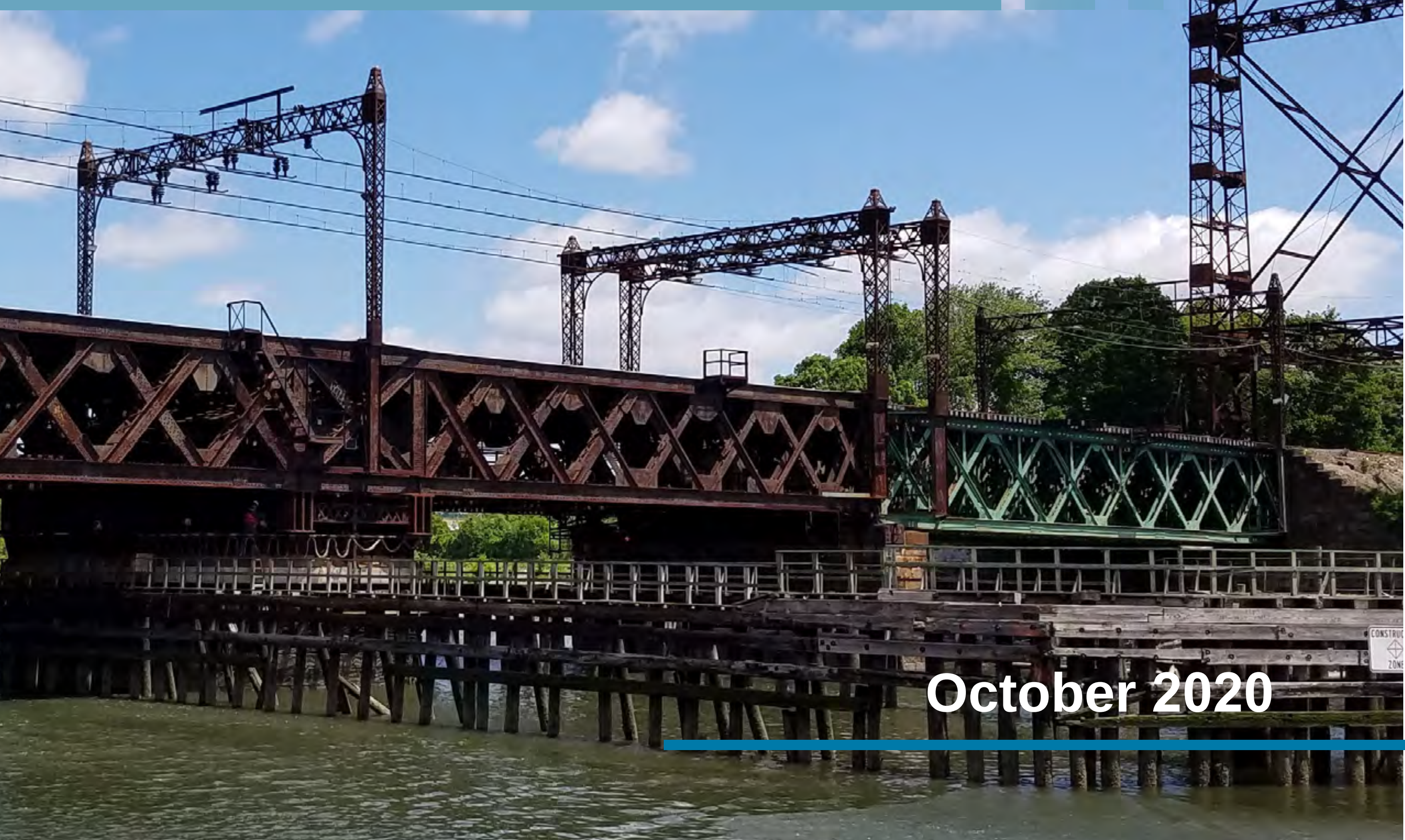
*Notes: [1] Includes parcel acquisition/rental costs, site prep costs, and site restoration costs.*
*[2]While the parcel cost is a negative value due to the resale of the property once the Walk Bridge Program is complete, this option requires a bulkhead be constructed in order to use as an assembly yard (approx.. $12.5 million).*

Figure 1: Lift Span Assembly Cost Comparison

## Attachment C-2 - Manresa Island Traffic Study, October 2020

# Walk Bridge Program
# Norwalk, CT

## Manresa Island Traffic Study



October 2020

Prepared for:

Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06111

Prepared by:

WSP USA
500 Winding Brook Drive
Glastonbury, Connecticut 06033

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# 1 Introduction

## 1.1 Project Background

The Walk Bridge Program seeks to replace the existing deteriorated four-track railroad bridge that crosses the Norwalk River, connecting South and East Norwalk. It is part of Metro-North Railroad's (MNR) New Haven Line and a critical link in connecting Boston, New York, and Washington D.C. The Walk Bridge carries approximately 125,000 riders each year. The project also includes simple span bridge replacements at Ann Street, Fort Point Street, Osborne Avenue, and East Avenue.

The Connecticut Department of Transportation (CTDOT) is planning to relocate the construction of the vertical replacement bridge lift span from the vacant properties at 68, 70 and 90 Water Street to Manresa Island, Norwalk, Connecticut. Manresa Island is located at southern tip of Norwalk, near the Harbor View neighborhood. The island is the site of a former power plant which was severely damaged by Hurricane Sandy in 2012, leading to its permanent closure in 2013 and has been vacant ever since. Figure 2 shows the project location.

Relocating the construction to Manresa Island would be beneficial given that it already has the infrastructure in place, as opposed to the vacant lots in South Norwalk which would require the state to dredge parts of the harbor and build a bulkhead at the location. CTDOT would use the southern part of Manresa Island for construction, storage of construction materials, safety boat vessels, construction boats and barges. The vacant Water Street lots #7, #8, and #9 would still be used for some stages of the construction process.

The project will be using the Manresa Island site for 60 months with substantial work occurring during an approximate 4 year period for construction of the vertical lift spans, with a six-day per week schedule that would normally run from 8 a.m. to 4 p.m. The traffic going to Manresa Island would originate from I-95 and would consist of trucks making three (3) roundtrips on average per day as well as the number of contractor employees destined to Manresa Island. There are two proposed truck haul routes depending on the truck height. For trucks under 13'-9", the proposed truck haul route bringing the materials to Manresa Island would follow (from I-95) West Avenue, Martin Luther King Drive, Monroe Street, South Main Street, Woodward Avenue, and Longshore Avenue, as shown on Figure 2 and described as Truck Route A. For trucks over 13'-9", the proposed truck haul route would follow (from I-95) West Avenue, Martin Luther King Jr. Drive, Route 136 (Wilson Avenue), Route 136 (Meadows Street), Woodward Avenue, and Longshore Avenue, as shown on Figure 3 and described as Truck Route B.

This traffic study summarizes existing intersection operational conditions along the truck haul routes and the anticipated construction related traffic impacts associated with the relocation of the vertical lift bridge construction site to Manresa Island. Findings presented within this document are current as of the date of this report.

The traffic study was performed using various sources of traffic data. The latest available traffic data, obtained from the City of Norwalk and the CTDOT, from 2017 was used for each study area intersection for analysis purposes. Traffic modeling software (Synchro 10) was utilized to evaluate the operations at the impacted intersections.

WSP was tasked with:

- Traffic data collection and summarization
- Traffic analysis for the truck haul route for year 2024
- Traffic analysis for the truck haul route with additional trucks and contractor employees for year 2024
- Crash data analysis

The Traffic Engineering Technical Memorandum (TETM) is a separate, living document, prepared by WSP, and a supplement to the Transportation Management Plan. The TETM summarizes existing operational conditions and anticipated construction related traffic impacts associated with the construction of the Walk Bridge, including Metro-North Railroad (MNR) bridge replacements at Ann Street, Fort Point Street, Osborne Avenue and East Avenue. This traffic study is a supplement to the TETM.

This traffic study is a supplement to the Transportation Management Plan and is a dynamic, living document that will be monitored, adjusted and updated as warranted based on field observations, operational information (planned roadway closures), and lessons learned to achieve safe and effective transportation operations.


**Figure 1: Project Location**


**Figure 2: Truck Route A – Truck Height Under 13’-9”**


**Figure 3: Truck Route B – Truck Height Over 13'-9"**

# 2 Roadway Information

## 2.1 Project Study Area Limits

WSP has carefully reviewed and field verified the proposed truck haul routes going to and from Manresa Island, and discussed the proposed routes with CTDOT and the City for identifying impacts at key intersections within the study area as follows:

1. Martin Luther King Jr. Drive & Monroe Street
2. South Main Street & Monroe Street
3. South Main Street & Henry Street
4. South Main Street & Woodward Avenue/Concord Place
5. Woodward Avenue & Grove Street
6. Route 136-south leg (Woodward Avenue) & Route 136 (Burritt Avenue)
7. Route 136-north leg (Woodward Avenue) & Route 136 (Meadows Street)

These intersections are in primarily residential areas as shown on

Figure *4*.


**Figure 4: Critical Intersections**

## 2.2 Existing Roadway and Intersection Geometry

WSP conducted field inventory of the affected intersections in the study area. The intersection geometry, traffic controls, land use, parking regulations, and pedestrian accommodations were evaluated.

### 2.2.1 MARTIN LUTHER KING JR. DRIVE & MONROE STREET

Martin Luther King Jr. Drive & Monroe Street is a signalized T-intersection with video detection on all approaches.

Martin Luther King Jr. Drive is classified as a Minor Arterial (per City of Norwalk DPW) and has a speed limit of 35 mph. The northbound approach has one through lane and one shared through-right lane. The southbound approach has two through lanes, and one dedicated left turn lane with a storage of approximately 180 feet.

Monroe Street, the eastern leg of the intersection, consists of one left turn lane and one right turn lane. It provides a bike lane between the turning lanes for the westbound direction and a bike lane on the shoulder side for the eastbound direction. Monroe is classified as a Major Collector with a speed limit of 30 mph.

The intersection provides sidewalks on the east side of Martin Luther King Jr. Drive and on both sides of Monroe Street. A signalized pedestrian crosswalk is provided across Monroe Street.

The South Norwalk Train Station drop-off/pick-up driveway is located approximately 200 feet east of the intersection, while the parking garage exit driveway is located approximately 400 feet east of the intersection.

The Monroe Street railroad underpass, located approximately 525 feet east of the intersection, provides a 13'-9" vertical clearance which is adequate for trucks traveling on Truck Route A.

Figure 5 shows an aerial image of the intersection.


FIGURE 5: MARTIN LUTHER KING JR. DR & MONROE ST AERIAL IMAGE

### 2.2.2 SOUTH MAIN STREET & MONROE STREET/HANFORD PLACE

South Main Street & Monroe Street/Hanford Place is a four-way signalized intersection with video detection on all approaches.

South Main Street is classified as a Minor Arterial and has a speed limit of 30 mph north of the intersection and a speed limit of 25 mph south of the intersection. The northbound approach has one shared left-through-right lane.

The southbound approach has one shared left-through lane, and one dedicated right turn lane with a storage of approximately 95 feet. North of the intersection, parking is allowed on the eastside of South Main Street at approximately 75 feet from the intersection. South of the intersection, parking is allowed on both sides of South Main Street at approximately 30 feet from the intersection.

Monroe Street, the western leg of the intersection, consists of one dedicated left turn lane and one shared through-right turn lane. It provides a bike lane for both the eastbound and westbound direction. It is classified as a Major Collector with a speed limit of 30 mph.

Hanford Place, the eastern leg of the intersection, consists of one shared left-through-right lane. It is classified as a Minor Arterial with a speed limit of 30 mph.

The intersection provides sidewalks on every side of the intersection as well as crosswalks on all approaches. Pedestrian signals are provided across every approach to the intersection.

There are two (2) mid-block crosswalks along Monroe Street between Martin Luther King Jr. Drive and South Main Street. One is located approximately 260 feet west of the South Main Street & Monroe Street/Hanford Place intersection and the other one is approximately 650 feet west of the intersection. Both midblock crosswalks provide rapid rectangular flashing beacons to increase motorist awareness of pedestrians in the crosswalks. The additional crosswalks serve pedestrian traffic to and from the South Norwalk Train Station

Figure 6 shows an aerial image of the intersection.


**Figure 6: South Main Street & Monroe St Aerial Image**

### 2.2.3 SOUTH MAIN STREET & HENRY STREET

South Main Street & Henry Street is a signalized T-intersection with no detection.

South Main Street is classified as a Minor Arterial and has a speed limit of 25 mph. The northbound approach has one shared left-through lane. The southbound approach has one shared through-right lane. Parking is not allowed on either side of South Main Street north of the intersection between Henry Street and Raymond Street. South of the intersection, parking is allowed on both sides of South Main Street.

Henry Street is a westbound one-way road and consists of a 24-foot wide lane with parking allowed on both sides, except during school hours. It is classified as a Minor Arterial and has a speed limit of 25 mph.

The intersection provides sidewalks on all sides of the intersection and provides signalized crosswalks across Henry Street and across the southbound approach of South Main Street.

Although not part of the intersection, Raymond Street is located approximately 100 feet north of the intersection. Raymond Street is an eastbound one-way road.

Figure 7 shows an aerial image of the intersection.


**Figure 7: South Main Street & Henry Street Aerial Image**

### 2.2.4 SOUTH MAIN STREET & WOODWARD AVENUE/CONCORD STREET

South Main Street & Woodward Avenue/Concord Place is a five-legged signalized intersection with video detection on all approaches.

South Main Street is classified as a Minor Arterial and has a speed limit of 25 mph. The northbound approach has one shared left-through lane. The southbound approach has one shared through-right lane. North of the intersection, parking is allowed on both sides of South Main Street, however, for the southbound direction is it only allowed at approximately 65 feet from the stop bar. South of the intersection, parking is allowed only on the west side of South Main Street.

Concord Place, the western leg of the intersection, consists of one shared through-right lane and one dedicated left turn lane with a storage of approximately 50 feet. The eastern leg of the intersection consists of one shared left-through-right lane.  West of the intersection, parking is allowed only on the north side of Concord Place. East of the intersection, parking is not allowed. It is classified as a Minor Arterial with a speed limit of 25 mph.

Woodward Avenue consists of a shared left-through-right lane. It is classified as a Minor Arterial with a speed limit of 25 mph. Parking is only allowed on the east side of the road.

The intersection provides sidewalks on all sides of the intersection and provides signalized crosswalks across all approaches.

Figure 8 shows an aerial image of the intersection.


**Figure 8:  South Main St & Woodward Ave/Concord St Aerial Image**

### 2.2.5 WOODWARD AVENUE & GROVE STREET

Woodward Avenue & Grove Street is a one-way, stop-controlled T-intersection.

Woodward Avenue is classified as a Minor Arterial with a has speed limit of 25 mph. The northbound approach has one shared left-through lane and the southbound has one shared through-right lane. Woodward Avenue is free flow. Parking is allowed on the east side of Woodward Avenue.

Grove Street is stop controlled and consists of one shared left-right lane. It is classified as a Minor Arterial with a speed limit of 25 mph. Parking is allowed on the south side of the road.

The intersection provides sidewalks on all directions and there is an unmarked crosswalk on Grove Street.

Route 136 (Burritt Avenue) is located approximately 50 feet south of the intersection.

Figure 9 shows an aerial image of the intersection.


**Figure 9: Woodward Ave & Grove St Aerial Image**

### 2.2.6 WOODWARD AVENUE & ROUTE 136 (BURRITT AVENUE)

Woodward Avenue & Burritt Avenue is a one-way, stop-controlled T-intersection.

Woodward Avenue is classified as a Minor Arterial and has speed limit of 25 mph. The northbound approach (Route 136) has one shared through-right lane and the southbound has one shared left-through lane. Woodward Avenue is free flow. Parking is allowed on the west side of Woodward Avenue.

Route 136 (Burritt Avenue) is stop controlled and consists of one shared left-right lane. It is classified as a Minor Arterial with a speed limit of 25 mph. Parking is not allowed on this road.

The intersection provides sidewalks on all directions and there is an unmarked crosswalk on Route 136 (Burritt Avenue).

Figure 10 shows an aerial image of the intersection.


**Figure 10: Woodward Ave & Route 136 (Burritt Ave) Aerial Image**

### 2.2.7 WOODWARD AVENUE & ROUTE 136 (MEADOWS STREET)

Woodward Avenue & Route 136 (Meadows Street) is an all-way stop-controlled T-intersection.

Woodward Avenue is classified as a Minor Arterial with a speed limit of 25 mph. The northbound approach has one shared left-through lane and the southbound has one shared through-right lane. Parking is allowed on the west side of Woodward Avenue.

Route 136 (Meadows Street) consists of one shared left-right lane. It is classified as a Minor Arterial with a speed limit of 30 mph. Parking is allowed only on the north side of the road. Trucks coming from Route 136 (Meadows Street) making the right turn onto southbound Woodward Avenue will have difficulty given the acute angle of the intersection and the small radius. This intersection is on Truck Route B for oversized trucks.

The intersection provides sidewalks for all directions and there is a crosswalk across Route 136 (Meadows Street).

Figure 11 shows an aerial image of the intersection.


**Figure 11: Woodward Ave & Route 136 (Meadows St) Aerial Image**

## 2.3 Land Use

Land use provides an important role in defining the character of a community and directly impacts how well a transportation corridor functions. Land use decisions directly impact the transportation system generating vehicle trips that would lead to traffic congestion and roadway capacity improvements. The current land use around the study area is shown on Figure 12. The Woodward Avenue area is mainly residential passing through Industrial and Restricted Industrial zones. There is an active industrial area on Route 136 (Meadow Street). These industrial zones currently bring truck volume to the area. The blue line shown on Figure 12 is the location of Woodward Avenue.

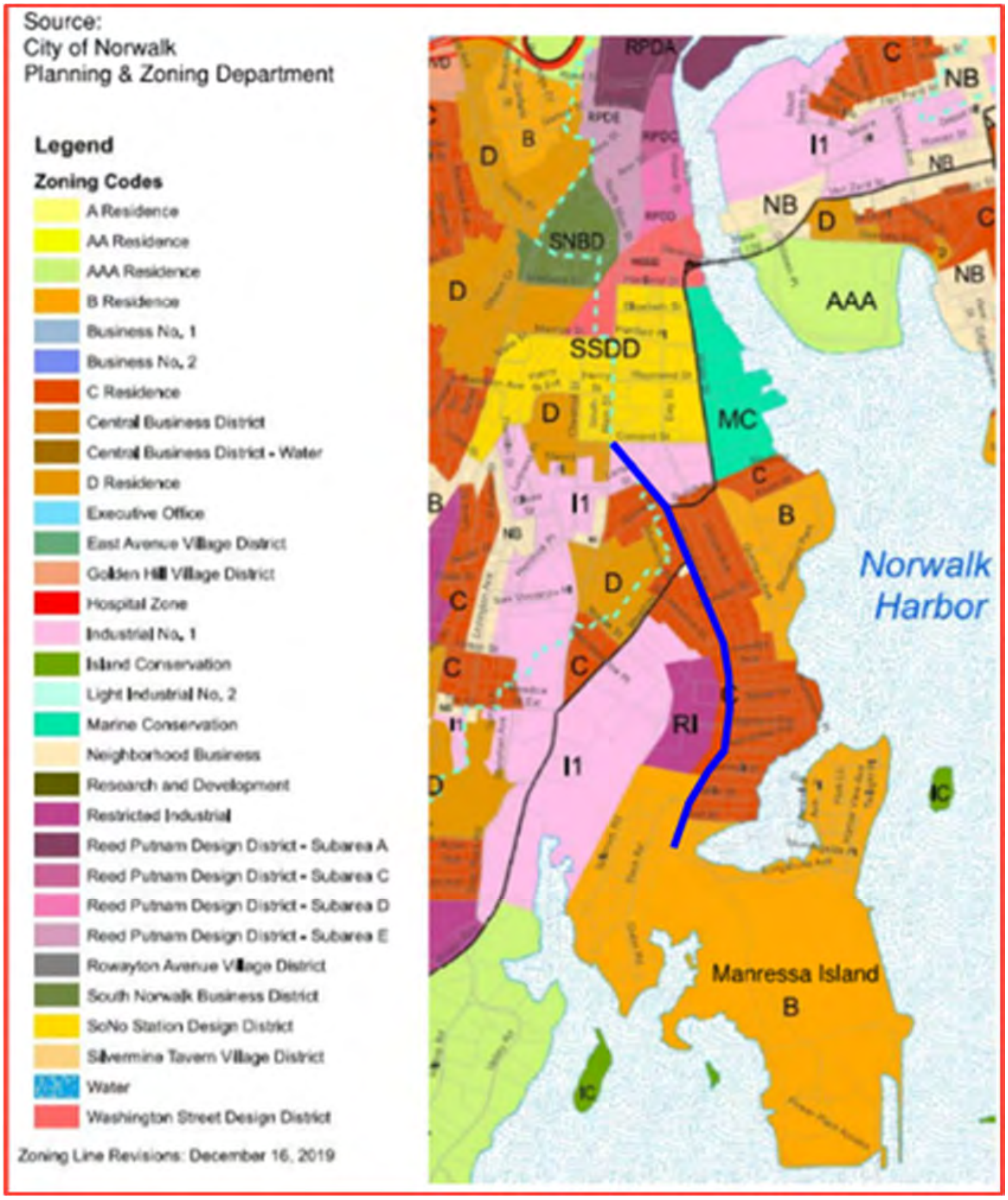



**Figure 12: Land Use**

## 2.4 Multimodal Use

Multimodal transportation combines the use of multiple modes of transportation including bus, bicycles, and pedestrians.

### 2.4.1 PEDESTRIAN

Currently, there are pedestrian accommodations and crosswalks at these key intersections in the study area:

- Martin Luther King Jr. Drive & Monroe Street
- South Main Street & Monroe Street/Hanford Place

- South Main Street & Henry Street
- South Main Street & Concord Street/Woodward Avenue
- Woodward Avenue & Grove Street
- Woodward Avenue & Route 136 (Burritt Avenue)
- Woodward Avenue & Route 136(Meadows Street)

ADA (Americans With Disability Act) wheelchair ramps with tactile warning strips are available at each intersection, except for Woodward Avenue & Grove Street intersection.

Pedestrian signalization and phasing are incorporated in the signal timing at these intersections:

- Martin Luther King Jr. Drive & Monroe Street
- South Main Street & Monroe Street/Hanford Place
- South Main Street & Henry Street
- South Main Street & Concord Street/Woodward Avenue

Sidewalks are provided at every intersection. Currently, Woodward Avenue has a mix of sidewalk facilities, concrete and bituminous concrete with varying quality. There are areas where sidewalk is only on one side of the road. It should be noted that recently the City's Public Works Committee approved an approximate $275,000 contract that will improve curbs and sidewalk primarily along Woodward Avenue. Construction has begun on this contract.

### 2.4.2 BIKE

In terms of bicycles, bike lanes are provided along Monroe Street, for both the eastbound and westbound direction. The City's Bike Plan proposes a future bike lane on Martin Luther King Jr. Drive. The City also proposes shared lane markings ("sharrows") on South Main Street and Woodward Avenue. Figure 13 shows the existing and proposed bicycle facilities in the study area.


**Figure 13: Bicycle Facilities**

### 2.4.3 COMMUTER RAIL

The South Norwalk Train Station and its parking garage are located within the study area. The parking garage exit intersects with Monroe Street approximately 400 feet east of Martin Luther King Jr. Drive & Monroe Street intersection. The garage has a capacity of 709 vehicles and on a typical weekday in 2018 was at 80% capacity. The South Norwalk Train Station carries approximately 125,000 riders each year.

### 2.4.4 TRANSIT

The Norwalk Transit District has the following bus routes and shuttles services within the study area:

- WHEELS Route 9 (Monroe Street, Hanford Place, South Main Street, Woodward Avenue)
- WHEELS Route 10 (Monroe Street, South Main Street)
- WHEELS Route 11 (Monroe Street, South Main Street)
- Connecticut Avenue Shuttle (South Main Street)
- Connecticut Avenue Shuttle Sunday (South Main Street)
- Main Avenue Shuttle [Route 136 (Burritt Avenue), Woodward Avenue]
- Main Avenue Shuttle Sunday [Route 136 (Burritt Avenue), Woodward Avenue]

Buses running on these routes operate on weekdays from 5:55 a.m. to 8:15 p.m. and on Saturdays from 5:55 a.m. to 7:35 p.m. There is no Sunday service for the regular bus routes. Connecticut Avenue Shuttle and the Main Avenue Shuttle operate weekday evenings, Saturday evenings and all day on Sunday. The bus schedules are shown in Table 2.1.

Figure 14 shows the bus routes within the study area.

| | Destinations | Days of Operation | Schedule | Frequency |
|---|---|---|---|---|
| WHEELS Route 9 | • WHEELS Hub<br>• Norwalk Hospital<br>• Cedar Street<br>• Monroe Street<br>• Burritt Avenue & Woodward Avenue | Monday - Friday | 5:55 a.m. – 7:15 p.m. | 20 minutes |
| | | Saturday | 5:55 a.m. – 6:55 p.m. | 40 minutes |
| WHEELS Route 10 | • WHEELS Hub<br>• South Norwalk Metro-North<br>• Roodner Court<br>• Washington Street & Main Street<br>• YMCA | Monday - Friday | 5:51 a.m. – 7:35 p.m. | 20 minutes |
| | | Saturday | 6:31 a.m. – 6:55 p.m. | 40 minutes |
| WHEELS Route 11 | • WHEELS Hub<br>• South Norwalk Metro-North<br>• Scribner Avenue & Connecticut Avenue<br>• Norwalk Community College | Monday - Friday | 5:40 a.m. – 8:15 p.m. | 40 minutes |
| | | Saturday | 6:17 a.m. – 7:35 p.m. | 40 minutes |
| Connecticut Avenue Shuttle | • WHEELS Hub<br>• Maple & Van Buren<br>• Darinor Shopping Plaza<br>• Norwalk Community College<br>• Connecticut Avenue & Stuart<br>• Mathew's Park<br>• South Norwalk Metro–North<br>• Roodner Court<br>• Wilson Avenue | Weekdays Evening | 7:20 p.m. to 10:32 p.m. | 60 minutes |
| | | Saturday Evening | 6:37 p.m. to 9:32 p.m. | 60 minutes |
| | | Sunday | 8:40 a.m. to 7:25 p.m. | 80 minutes |
| Main Avenue Shuttle | • WHEELS Hub<br>• Stop & Shop<br>• Merritt 7<br>• Wal-Mart<br>• Washington Street & Main Street<br>• Burritt Avenue & Water Street<br>• Dock | Weekdays Evening | 7:20 p.m. to 10:32 p.m. | 60 minutes |
| | | Saturday Evening | 6:32 p.m. to 9:32 p.m. | 60 minutes |
| | | Sunday | 8:40 a.m. to 7:16 p.m. | 80 minutes |

**Table 2.1: Norwalk Transit District Bus Schedules**


**Figure 14: Norwalk Transit District Bus Routes**

# 3 Analysis Methodology

## 3.1 Traffic Operational Analysis Methodology

The traffic operations for each intersection were analyzed based on the methodologies outlined in the Highway Capacity Manual (HCM).

The level of service (LOS) is a calculation of control delay for an intersection. It is a qualitative measure of the effect of several factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. LOS is defined by an index from A through F, with A being the best and F being the worst. The HCM lists the following definitions for each grade:

- A = Free Flow
- B = Reasonably free flow
- C = Stable flow
- D = Approaching unstable flow
- E = Unstable flow
- F = Forced flow, volume is greater than capacity

Four (4) of the intersections are signalized, while three (3) of the intersections are stop-controlled (one being all-way). The LOS for a signalized intersection is defined in terms of a weighted average control delay for the entire intersection. The LOS for all-way stop-controlled (AWSC) intersections is expressed in terms of the average delay of all movements, much like that of a signalized intersection. The LOS for the two-way stop-controlled (TWSC) is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements (Source: HCM 2010).

Capacity is a measurement of the ability of an intersection design to accommodate all movements within the intersection. Delay is the measure of the user quality of service.

The LOS assignments for signalized intersections as compared to delay values are shown in Table 3.1.

| Level of Service | Average Delay (seconds) |
|---|---|
| A | ≤ 10 |
| B | > 10 and ≤ 20 |
| C | > 20 and ≤ 35 |
| D | > 35 and ≤ 55 |
| E | > 55 and ≤ 80 |
| F | > 80 |

**Table 3.1: Signalized Intersection Level of Service Criteria**

The LOS assignments for both TWSC and AWSC intersections as compared to delay values are shown in Table 3.2.

| Level of Service | Average Delay (seconds) |
|---|---|
| A | ≤ 10 |
| B | > 10 and ≤ 15 |
| C | > 15 and ≤ 25 |
| D | > 25 and ≤ 35 |
| E | > 35 and ≤ 50 |
| F | > 50 |

**Table 3.2: TWSC & AWSC Intersection Level of Service Criteria**

Trafficware's Synchro 10/SimTraffic software was used to perform the traffic analysis. Synchro/SimTraffic implements the methods outlined in the Highway Capacity Manual (HCM) and provides delay/vehicle and queue length results.

Below are some pertinent assumptions that were used for the capacity analyses. Other inputs not described below were kept at their default values:

- Lane widths and storage bay lengths are based on pavement markings per traffic signal plans and verified on field conditions
- Grades were assumed to be level
- Right turn on red (RTOR) was assumed based on traffic signal plans and verified based on field conditions
- Signal timings were taken from signal timing plans obtained from CTDOT and the City of Norwalk
- Peak hour factors and heavy vehicles percentages were derived from traffic count data
- Pedestrian and bicycle calls per hour were assumed based on pedestrian activity at each intersection and field observations of pedestrian push button usage

In addition to level of service analyses, queue lengths were reviewed to determine adequacy of the vehicle storage at each intersection. The 95$^{th}$ percentile queue length was used in determining the queuing of traffic at study area intersection approaches. The 95$^{th}$ percentile queue is not typical of what an average driver would experience but represents the queue length where there is only a 5 percent probability of the queue length being exceeded during a peak hour.

### 3.2 Safety Analysis Methodology

Crash analyses were performed for all study area intersections. Crash data was downloaded from the University of Connecticut's (UConn) Crash Data Repository. UConn publishes crash data from CTDOT, which complies with the newly adopted standard in Connecticut, the MMUCC or the "Model Minimum Uniform Crash Criteria" Standard. For the purposes of this traffic study, the MMUCC data was obtained and analyzed for the latest available three-year period.

# 4 Traffic Operational Analysis

## 4.1 Traffic Data Collection

WSP coordinated with CTDOT and the City of Norwalk to obtain the latest available traffic data (pre-COVID-19 conditions), which included traffic count data, and traffic signal plans.

The following sources of data were used to develop base year traffic volumes for both the Martin Luther King Jr. Drive & Monroe Street intersection and the South Main Street & Monroe Street intersection:

Traffic Engineering Technical Memo (TETM)

The following sources of data were used to obtain the turning movement counts for both the South Main Street & Henry Street intersection and the South Main Street & Woodward Avenue/Concord Street intersection.

Traffic Signal Timing Plans

The following sources of data were used to develop base year traffic volumes for the rest of the intersections:

CTDOT ArcGIS Traffic Monitoring Station Viewer (2017)

Table 4.1 summarizes the sources and year of the collected traffic data.

| Intersection | Source | Year |
|---|---|---|
| Martin Luther King Jr Dr. & Monroe Street | TETM | 2017 |
| South Main Street & Monroe Street/Hanford Place | TETM | 2017 |
| South Main Street & Henry Street | Traffic Signal Timing Plans | 2012 |
| South Main Street & Woodward Ave/Concord St | Traffic Signal Timing Plans | 2012 |
| Woodward Avenue & Grove Street | CTDOT ArcGIS Traffic Monitoring Station Viewer | 2017 |
| Woodward Avenue & Route 136 (Burritt Avenue) | CTDOT ArcGIS Traffic Monitoring Station Viewer | 2017 |
| Woodward Avenue & Route 136 (Meadows Street) | CTDOT ArcGIS Traffic Monitoring Station Viewer | 2017 |

**Table 4.1: Traffic Data Sources**

Raw traffic data is provided in Appendix J. Bicycle and pedestrian data was also collected in addition to vehicular traffic data at certain locations.

## 4.2 Traffic Volumes

### 4.2.1 TRAFFIC VOLUMES

The peak hour periods, typical of commuter, commercial and retail developments, in the Walk Bridge study area are:

AM Peak 7:00 – 9:00; Midday Peak 11:00 – 1:00; PM Peak 4:00 – 6:00; SAT Midday 11:00 – 1:00

However, the traffic generated by Manresa Island is expected to occur within the AM Peak and PM Peak period when contractors are expected to come in (AM) and come out (PM). Therefore, the AM peak and PM Peak periods were analyzed in this study. Truck deliveries will occur throughout the day. For this study, they were assumed to come and go during the AM and Pm Peak periods as described below in Section 4.2.2.

The turning movement counts (TMC) for these three intersections were not available:

- Woodward Avenue & Grove Street
- Woodward Avenue & Route 136 (Burritt Avenue)
- Route 136 (Woodward Avenue) & Route 136 (Meadows Street)

The most recent Average Daily Traffic (ADT) for Woodward Avenue, Burritt Avenue, and Route 136 (Meadows Street) were used to develop the TMC. From the ADT for each of these roads, the turning movement volumes were proportionally calculated based on the ADT from each of the approaches at a given intersection. Once the TMC were calculated for each of the intersections, the volumes were balanced between the South Main Street & Woodward Avenue/Concord Street intersection and the Woodward Avenue & Grove Street intersection. This way, the traffic entering and exiting the Woodward Avenue & Grove Street intersection matches the volume entering and exiting the South Main Street & Woodward Avenue/Concord Street intersection taken from the available TMC at this intersection.

Given that the construction is expected to last 60 months, a growth factor was applied for each of the TMC to grow the volume to 2024 conditions. The growth factor was calculated from the available historical ADT counts in the area. Table 4.2 shows the calculated growth factor.

| Location | 2011 ADT | 2017 ADT | Growth Rate |
|---|---|---|---|
| Martin Luther King Jr. Drive | 13,000 | 13,700 | 0.88% |
| Monroe Street | 5,800 | 7,000 | 3.18% |
| South Main Street | 8,900 | 9,300 | 0.74% |
| Woodward Avenue (north of Grove Street) | 5,000 | 4,200 | -2.86% |
| Route 136 (Woodward Avenue, south of Burritt Avenue) | 8,000 | 9,800 | 3.44% |
| Route 136 (Burritt Avenue) | 5,400 | 6,600 | 3.40% |
| Route 136 (Meadows Street) | 6,100 | 6,100 | 0.00% |
| Average Growth Rate | | | 1.25% |

**Table 4.2: Average Growth Factor**

The 2024 traffic volumes for each intersection are shown in Appendix A.

### 4.2.2 MANRESA ISLAND TRIP GENERATION

The trips generated by Manresa Island will consist of:

1. Trucks trips carrying materials and equipment, and
2. Vehicle trips

The expected trips generated by Manresa Island are presented in the following subsections.

### TRUCK TRIPS

There are two scenarios regarding truck trips, a short-term and long-term. The short-term scenario involves the installation of the stone storage pad and will last two weeks at the beginning of the construction and two weeks at the end of the construction. The long-term scenario involves the construction activities and is expected to last 48 months.

**Short-Term**

For the installation of the stone storage pad, a total of 125-140 dump truck trips are expected at the beginning of the job over a two-week period to lay the stone. Then over a two-week period, there will be 125-140 dump truck trips at the end of the job to remove the stone. This translates to a maximum of 14 truck roundtrips per day (14 trucks in and 14 trucks out). These dump trucks will be using the Truck Route A (under 13’-9”). During the 8-hour work period, this translated to approximately 2 truck trips per hour.

**Long-Term**

During construction activities, the expected truck trips to Manresa Island will be composed of 480 tractor trailer loads and 480 straight delivery trucks for a total of 960 truck trips over 48 months. Deliveries will be during the day. Night and weekend deliveries will be very rare. The approximate load counts are:

Lift span, 180

Lift tower, 190

Crane mats, pipe piling, sheet piling, 280

Mechanical/operating equipment, 60

Erection/yard materials, 120

Rebar, 60

Precast structural components, 70

The 960 truck trips over 48 months translate to about 5 truck roundtrips per week (5 trucks in and 5 trucks out). However, it is estimated that there will be a maximum of 3 truck roundtrips in any single day (3 trucks in and 3 trucks out). Out of these 3 truck roundtrips, it is assumed that 2 will be using Truck Route A (under 13’-9”) and 1 will be using Truck Route B (over 13’-9”). For the purpose of the traffic analysis, it will be assumed that the trips will be done during the peak hours.

### VEHICLE TRIPS

Vehicle trips will consist of employees destined to Manresa Island. During construction activities, it is estimated a total of 20 personal vehicles per day (20 vehicles in and 20 vehicles out). These are composed of:

Span erection crew, 12-14 personnel

Yard crew, 4-6 personnel

CTDOT crew, 2 personnel

### TRIP GENERATION SUMMARY

Although the short-term activities will have more truck trips per week than the long-term activities, it is expected that the vehicle trips will not be as high. However, for analysis purposes, the long-term activities will be analyzed using the 3 trucks trips during the peak hours, which will be one truck higher than the short-term activities which carries an average of 2 truck trips per hour. Therefore, the long-term activities are analyzed as the worst-case scenario.

For traffic analysis purposes, the trips going in are assumed to be in the AM Peak, while the trips going out are assumed to be in the PM Peak. Table 4.3 summarized the Manresa Island trip generation.

| | AM Peak | | PM Peak | |
|---|---|---|---|---|
| | In | Out | In | Out |
| Truck Trips | 3 | 0 | 0 | 3 |
| Vehicle Trips | 20 | 0 | 0 | 20 |

**Table 4.3: Manresa Island Daily Trip Generation**

### 4.2.3 MANRESA ISLAND TRIP DISTRIBUTION

The trips generated by Manresa Island construction activities will be distributed based on the truck sizes, and the origin and destination of the Manresa Island personnel.

#### TRUCK TRIPS

The truck trips will be distributed according to their sizes and will use these two routes:

- Truck Route A – for trucks under 13'-9" height (Figure 2 and Appendix B)
- Truck Route B – for trucks over 13'-9" height (Figure 3 and Appendix C)

Out of the 3 truck trips, 2 trucks will use Truck Route A, and 1 truck will use Truck Route B.

Appendix D shows the additional truck volume at the each of the critical intersections.

#### VEHICLE TRIPS

There is a total of 20 vehicle trips per day generated by Manresa Island construction activities. It is assumed that 10 vehicle trips will be coming from northbound I-95, while the other 10 vehicle trips will be coming from southbound I-95.

For vehicles traveling northbound I-95, the shortest route would be I-95 Exit 14, Fairfield Avenue, Washington Street, South Main Street, Woodward Avenue, and Longshore Avenue as shown in Figure 15 and Appendix E.

For vehicles traveling southbound I-95, the I-95 Exit 16, East Avenue, Van Zant Street, Route 136 (Washington Street), Route 136 (Water Street), Route 136 (Burritt Avenue), Route 136 (Woodward Avenue), and Longshore Avenue as shown in Figure 16 and Appendix F.

Appendix G shows the additional vehicle volume at each of the critical intersections based on the trip distribution.

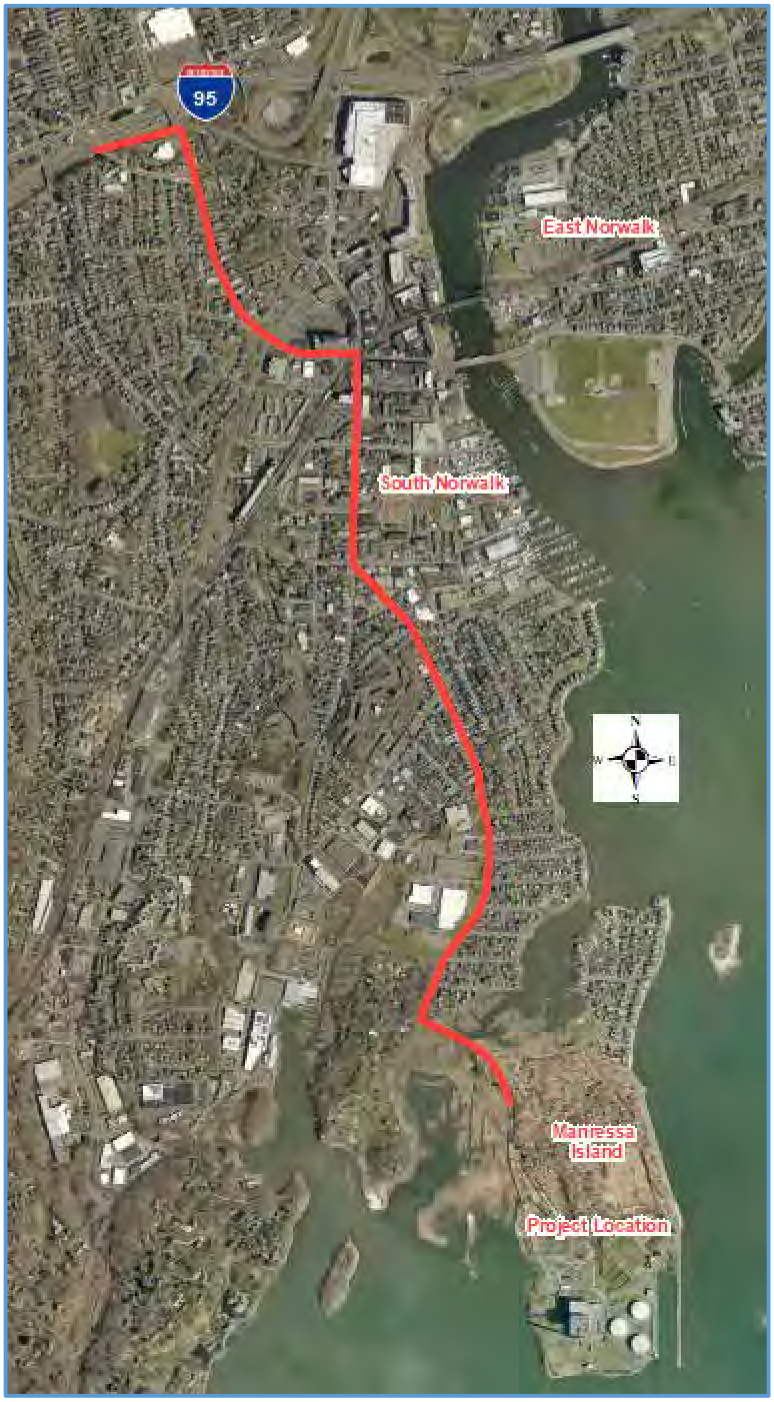



**Figure 15: Vehicle Route – Northbound I-95 Vehicles**


**Figure 16: Vehicle Route – Southbound I-95 Vehicles**

### 4.2.4 MANRESA ISLAND TRAFFIC VOLUMES

The additional Manresa Island traffic volumes for each of the critical intersections were added to the existing traffic volumes for both the AM peak and the PM peak. The resulted traffic volumes are shown in Appendix H.

## 4.3 Traffic Modeling & Analysis

Synchro 10 models were developed for the weekday AM peak hour, and PM peak hour. In addition to traffic volumes, other traffic data such as peak hour factors, heavy vehicle percentages and existing signal timings were compiled and inputted into the models. The Synchro network volumes were balanced as necessary to achieve a more realistic model. Site visits were performed to support the development of the traffic model. Google Earth satellite data was also utilized to gather additional site-specific information.

The results of the traffic operations for each of the critical intersections are shown in the following tables. The tables compare the existing conditions without the Manresa Island traffic and the existing conditions with the Manresa Island traffic. The operational results are also shown in Appendix I. The Synchro outputs are shown in Appendix K.

Table 4.4: Synchro Analysis Results – Martin Luther King Jr. Drive & Monroe St

Table 4.5: Synchro Analysis Results – South Main Street & Monroe St/Hanford Pl

Table 4.6: Synchro Analysis Results – South Main Street & Henry St

Table 4.7: Synchro Analysis Results – South Main Street & Woodward Ave/Concord St

Table 4.8: Synchro Analysis Results – Woodward Avenue & Grove St

Table 4.9: Synchro Analysis Results – Woodward Avenue & Route 136 (Burritt Ave

Table 4.10: Synchro Analysis Results – Woodward Avenue & Route 136 (Meadows Street)

Table 4.11 shows the overall intersection delays and LOS for each critical intersection.

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound MLK Jr. Dr | TR | 15.2 | B | 195 | 14.6 | B | 220 | 15.2 | B | 195 | 14.6 | B | 221 |
| Southbound MLK Jr. Dr. | L | 7.9 | A | 95 | 6.3 | A | 91 | 7.9 | A | 96 | 6.3 | A | 91 |
| | T | 7.8 | A | 225 | 4.5 | A | 98 | 7.8 | A | 225 | 4.5 | A | 98 |
| Westbound Monroe St | L | 47.3 | D | 116 | 48.1 | D | 91 | 47.4 | D | 116 | 48.3 | D | 89 |
| | R | 25.7 | C | 112 | 25.9 | C | 128 | 25.7 | C | 113 | 26.6 | C | 128 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.4: Synchro Analysis Results – Martin Luther King Jr. Drive & Monroe Street**

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound S. Main St | LTR | 27.8 | C | 353 | 27.4 | C | 257 | 27.6 | C | 352 | 26.4 | C | 260 |
| Southbound S. Main St | LT | 19.2 | B | 145 | 19.9 | B | 184 | 19.3 | B | 168 | 19.0 | B | 184 |
| | R | 3.7 | A | < 25 | 4.1 | A | < 25 | 3.7 | A | < 25 | 4.0 | A | < 25 |
| Eastbound Monroe St | L | 17.9 | B | 63 | 18.8 | B | 68 | 18.0 | B | 64 | 19.6 | B | 68 |
| | TR | 15.2 | B | 81 | 18.4 | B | 142 | 15.4 | B | 82 | 19.3 | B | 142 |
| Westbound Hanford Pl | LTR | 24.3 | C | 167 | 22.8 | C | 96 | 24.4 | C | 167 | 23.6 | C | 96 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.5: Synchro Analysis Results – South Main Street & Monroe St/Hanford Place**

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound S. Main St | LT | 0.6 | A | < 25 | 1.1 | A | < 25 | 0.6 | A | < 25 | 1.1 | A | < 25 |
| Southbound S. Main St | TR | 0.3 | A | < 25 | 0.3 | A | < 25 | 0.3 | A | < 25 | 0.3 | A | < 25 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.6: Synchro Analysis Results – South Main Street & Henry Street**

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound S. Main St | LTR | 13.7 | B | 184 | 11.9 | B | 125 | 13.7 | B | 184 | 12.3 | B | 128 |
| Southbound S. Main St | LTR | 24.7 | C | 317 | 11.0 | B | 138 | 26.0 | C | 339 | 11.5 | B | 138 |
| Eastbound Concord St | L | 40.2 | D | 58 | 41.8 | D | 38 | 40.2 | D | 58 | 41.8 | D | 38 |
| | TR | 34.1 | C | 59 | 39.8 | D | 65 | 34.1 | C | 59 | 39.8 | D | 65 |
| Westbound Concord St | LTR | 2.1 | A | <25 | 7.8 | A | 26 | 2.1 | A | < 25 | 7.8 | A | < 25 |
| Northwest-bound Woodward Ave | LTR | 27.2 | C | 144 | 27.9 | C | 152 | 27.2 | C | 144 | 28.7 | C | 161 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.7: Synchro Analysis Results – South Main Street & Woodward Ave/Concord Street**

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound Woodward Ave | LTR | 1.4 | A | < 25 | 1.2 | A | < 25 | 1.4 | A | < 25 | 1.2 | A | < 25 |
| Southbound Woodward Ave | LTR | 0.0 | A | < 25 | 0.0 | A | < 25 | 0.0 | A | < 25 | 0.0 | A | < 25 |
| Eastbound Grove St | LTR | 10.4 | B | < 25 | 10.8 | B | < 25 | 10.5 | B | < 25 | 10.9 | B | < 25 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.8: Synchro Analysis Results – Woodward Avenue & Grove Street (One-Way Stop Controlled)**

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound Woodward Ave | LTR | 0.0 | A | < 25 | 0.0 | A | < 25 | 0.0 | A | < 25 | 0.0 | A | < 25 |
| Southbound Woodward Ave | LTR | 5.3 | A | < 25 | 4.6 | A | < 25 | 5.1 | A | < 25 | 4.7 | A | < 25 |
| Westbound Burritt Ave | LTR | 124.0 | F | 444 | 100.5 | F | 370 | 142.4 | F | 486 | 111.1 | F | 389 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.9: Synchro Analysis Results – Woodward Avenue & Route 136 (Burritt Avenue)**

**(One-Way Stop Controlled)**

| Movement | | 2024 Conditions | | | | | | 2024 Conditions + Manresa Island Traffic | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Approach | Lane Group | Weekday AM Peak | | | Weekday PM Peak | | | Weekday AM Peak | | | Weekday PM Peak | | |
| | | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] | Delay[1] | LOS | 95th Queue[2] |
| Northbound Woodward Ave | LTR | 15.1 | C | 70 | 14.2 | B | 60 | 15.3 | C | 70 | 15.2 | C | 70 |
| Southbound Woodward Ave | LTR | 22.5 | C | 145 | 18.3 | C | 125 | 20.1 | C | 140 | 18.8 | C | 128 |
| Eastbound Route 136 (Meadows St) | LTR | 18.2 | C | 120 | 20.7 | C | 130 | 23.2 | C | 150 | 21.3 | C | 135 |

1 Delay is reported in seconds per vehicle.

2 95th Queue Delay is reported in feet.

**Table 4.10: Synchro Analysis Results – Woodward Avenue & Route 136 (Meadows Street)**

**(All-Way Stop Controlled)**

| Intersection | 2024 Conditions | | | | 2024 Conditions + Manresa Island Traffic | | | |
|---|---|---|---|---|---|---|---|---|
| | Weekday AM Peak | | Weekday PM Peak | | Weekday AM Peak | | Weekday PM Peak | |
| | Delay[1] | LOS | Delay[1] | LOS | Delay[1] | LOS | Delay[1] | LOS |
| MLK Jr. Dr & Monroe St | 15.5 | B | 14.2 | B | 15.5 | B | 14.3 | B |
| S. Main St & Monroe St | 21.5 | C | 21.7 | C | 21.5 | C | 21.5 | C |
| S. Main St & Henry St | 0.4 | A | 0.8 | A | 0.4 | A | 0.8 | A |
| S. Main St & Woodward Ave/Concord St | 22.2 | C | 17.7 | B | 22.6 | C | 18.4 | B |
| Woodward Ave & Grove St | 1.8 | A | 1.7 | A | 1.7 | A | 1.6 | A |
| Woodward Ave & Burritt Ave | 47.4 | E | 36.7 | E | 54.6 | F | 39.7 | E |
| Woodward Ave & Route 136 (Meadows St) | 19.0 | C | 18.2 | C | 20.0 | C | 18.8 | C |

**Table 4.11: Synchro Analysis Results – Overall Intersection Operations**

Except for one location, the overall operational conditions for each intersection are acceptable for both the 2024 conditions and the 2024 conditions with the additional Manresa Island traffic. The intersection with the longest delays is Woodward Avenue & Route 136 (Burritt Avenue) with a LOS F during the AM Peak with the additional Manresa Island traffic. The Route 136 (Burritt Avenue) westbound approach at this intersection currently fails with a LOS F as shown in Table 4.9.

The Route 136 (Burritt Avenue) westbound approach is stop-controlled and carry between 350 to 400 vehicles per hour in the peak hours, while Woodward Avenue is free flow. It is expected that there will be an additional 10 vehicles in the AM peak for the employees heading to Manresa Island. These additional vehicles translate to an increase of 14% in delay and a 10% increase in the 95$^{th}$ queue length. Although there is an increase in delay and queue length, the increases are not significant. Therefore, it is expected that the additional Manresa Island traffic will not significantly affect the existing intersection operations.

# 5 Safety Analysis

## 5.1 Crash Summaries

A crash analysis was performed for six (6) intersection within the study area. Crash data was collected for the most recent three-year period (January 1, 2016-December 31, 2018) from the UConn's Crash Data Repository using the MMUCC dataset. Data from 2019 was initially evaluated but the crashes seemed to be significantly lower than the other years, therefore, 2019 was not considered in the analysis. For the purpose of the crash analysis, both the Woodward Avenue & Grove Street intersection and the Woodward Avenue & Route 136 (Burritt Avenue) intersection were considered as one intersection due to their proximity.

Table 5.1 summarizes the crash data for each study area intersections for the most recent three-year period. In addition to the amount of crashes, summaries by collision type, crash severity are shown in Table 5.2. Roadway pavement condition, and roadway lighting condition are also provided in Table 5.3.

| Year | Martin Luther King Jr. Dr & Monroe St | South Main St & Monroe St | South Main St & Henry St | South Main St & Woodward Ave/ Concord St | Woodward Ave & Grove St/Route 136 (Burritt Ave) | Woodward Ave & Route 136 (Meadows St) |
|---|---|---|---|---|---|---|
| Crashes by Intersection | | | | | | |
| 2016 | 9 | 5 | 2 | 3 | 10 | 3 |
| 2017 | 6 | 7 | 7 | 9 | 5 | 3 |
| 2018 | 6 | 10 | 4 | 10 | 12 | 8 |
| Total | 21 | 22 | 13 | 22 | 27 | 14 |

**Table 5.1: Crashes by Intersection - 3-Year Period**

| Type & Severity | Martin Luther King Jr. Dr & Monroe St | South Main St & Monroe St | South Main St & Henry St | South Main St & Woodward Ave/ Concord St | Woodward Ave & Grove St/Route 136 (Burritt Ave) | Woodward Ave & Route 136 (Meadows St) | Total |
|---|---|---|---|---|---|---|---|
| Collision Type | | | | | | | |
| Angle | 5 | 4 | 2 | 2 | 4 | 1 | 18 |
| Front to Front | 0 | 0 | 0 | 1 | 2 | 0 | 3 |
| Front to Rear | 10 | 10 | 6 | 10 | 5 | 3 | 44 |
| Not Applicable | 1 | 1 | 2 | 3 | 2 | 1 | 10 |
| Other | 2 | 2 | 1 | 2 | 4 | 1 | 12 |
| Unknown | 1 | 1 | 2 | 1 | 1 | 2 | 8 |
| Rear to Side | 1 | 0 | 0 | 1 | 1 | 2 | 5 |
| Rear to Rear | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Sideswipe, Opposite Direction | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| Sideswipe, Same Direction | 1 | 3 | 0 | 1 | 7 | 3 | 15 |
| Crash Severity | | | | | | | |
| Property Damage Only (PDO) | 16 | 20 | 11 | 14 | 24 | 11 | 96 |
| Possible Injury | 1 | 2 | 1 | 4 | 3 | 2 | 13 |
| Suspected Minor Injury | 4 | 0 | 1 | 4 | 0 | 1 | 10 |
| Fatality | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 5.2: Crashes by Collision Type & Severity**

| Type & Severity | Martin Luther King Jr. Dr & Monroe St | South Main St & Monroe St | South Main St & Henry St | South Main St & Woodward Ave/ Concord St | Woodward Ave & Grove St/Route 136 (Burritt Ave) | Woodward Ave & Route 136 (Meadows St) | Total |
|---|---|---|---|---|---|---|---|
| Road Surface Condition | | | | | | | |
| Dry | 16 | 20 | 10 | 16 | 17 | 13 | 92 |
| Wet | 4 | 2 | 2 | 6 | 5 | 1 | 20 |
| Snow | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Slush | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ice / Frost | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| Mud, Dirt, Gravel | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unknown | 1 | 0 | 1 | 0 | 1 | 0 | 3 |
| Light Condition | | | | | | | |
| Daylight | 19 | 17 | 12 | 17 | 16 | 8 | 89 |
| Dawn | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dusk | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dark-Lighted | 2 | 5 | 1 | 4 | 9 | 6 | 27 |
| Other | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Unknown | 0 | 0 | 0 | 0 | 2 | 0 | 2 |

**Table 5.3: Crashes by Road Surface & Light Condition**

## 5.2 Crash Trends & Patterns

A total of 119 crashes occurred within the study area over the three-year analysis period. Approximately eighty-one (81%) percent of crashes were minor and involved property damage only. Rear end crashes represent thirty-six (36%)

percent of all crashes in the area followed by angle crashes. Most crashes occurred under clear weather conditions, during daylight conditions, and on dry roadway surfaces.

Every intersection, except for Martin Luther King Jr Drive & Monroe Street, is experiencing an upward trend in crashes as shown Figure 17.

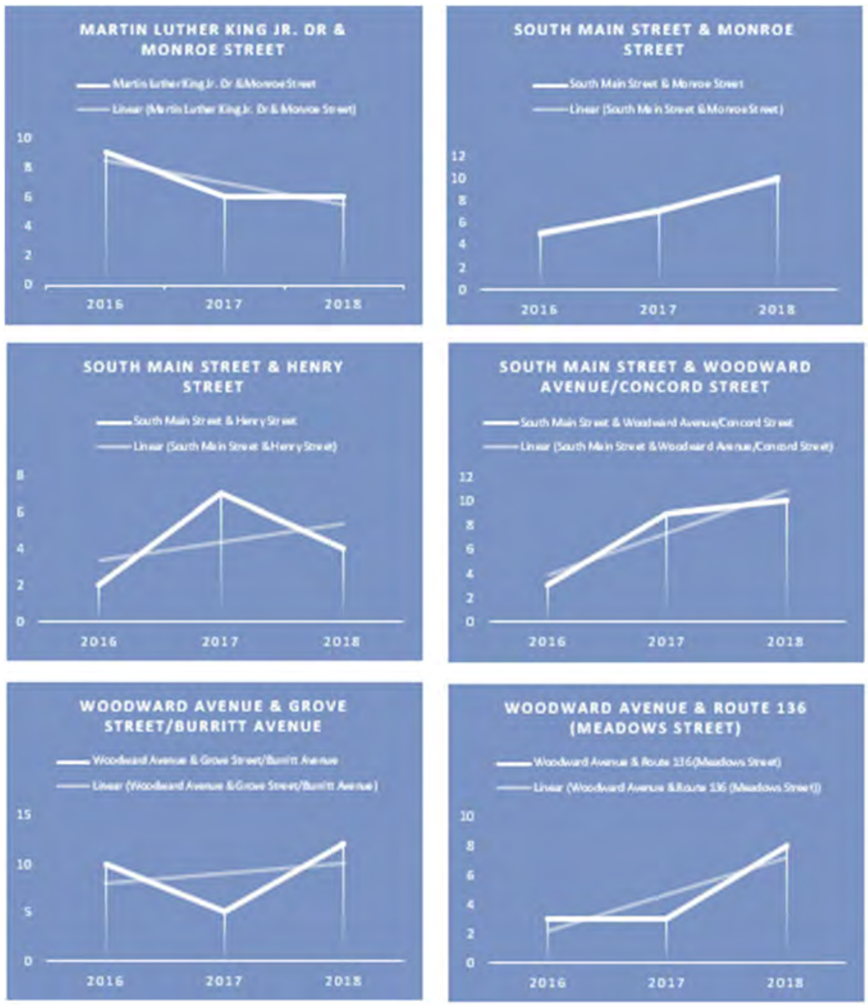



**Figure 17: Crash Trends**

The construction of the vertical lift span at Manresa Island is expected to last four (4) years, with a six-day week schedule that would normally run from 8 a.m. to 4 p.m. Although thirty-eight (38%) percent of the crashes occurred during the winter months (December-March), the crashes are evenly distributed throughout the year with a slight increase in those winter months. Many of the crashes occurred in the weekday between Monday and Wednesday, accounting for fifty-eight (58%) percent of the total crashes in the study area. A little over half of the crashes (51%) occurred within the 8 a.m. to 4 p.m. timeframe.

The most crash prone intersection is the Woodward & Grove Street/Route 136 (Burritt Avenue) location with an average of 9 crashes per year. Most of the crashes occurred during the daylight (76%) and involved property damage only (81%). The winter months also accounted for most of the crashes for this intersection with fifty-eight (58%) percent. For this intersection, most of the crashes also occurred in the weekday between Monday and Wednesday, accounting for fifty-eight (58%) percent of the crashes recorded at the intersection. However, for this intersection, the crashes occurring within the 8 a.m. to 4 p.m. timeframe totaled 15 crashes or forty-five (45%) percent of the total crashes recorded at the intersection.

## 5.3 Crash Rates

Crash rates describe the number of crashes that occur at a given location during a specified time period divided by a measure of exposure for the same period. For intersections, the measure of exposure is the total number of vehicles entering the intersection for a year, which in this case, it would be the AADT. The intersection crash rates, expressed as Million Entering Vehicles (MEV) is as follow:

$$Crash\ Rate = \frac{1{,}000{,}000\ \times C}{365\ \times N\ \times V}$$

Where,

C = Total number of intersection crashes in the study period.

N = Number of years of data.

V = Traffic volumes entering the intersection daily.

The crash rates for each of the intersections are shown in Table 5.4.

| Crash Rate | Martin Luther King Jr. Dr & Monroe St | South Main St & Monroe St | South Main St & Henry St | South Main St & Woodward Ave/ Concord St | Woodward Ave & Grove St/Route 136 (Burritt Ave) | Woodward Ave & Route 136 (Meadows St) |
|---|---|---|---|---|---|---|
| AADT | 17,200 | 15,500 | 9,300 | 13,500 | 13,500 | 10,000 |
| By Total Crashes | 1.12 | 1.30 | 1.28 | 1.49 | 1.83 | 1.28 |
| By Fatality | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| By Injury | 0.27 | 0.12 | 0.20 | 0.54 | 0.20 | 0.27 |
| By Property Damage Only(PDO) | 0.85 | 1.18 | 1.08 | 0.95 | 1.62 | 1.00 |

**Table 5.4: Crash Rates**

# 6 Conclusions & Recommendations

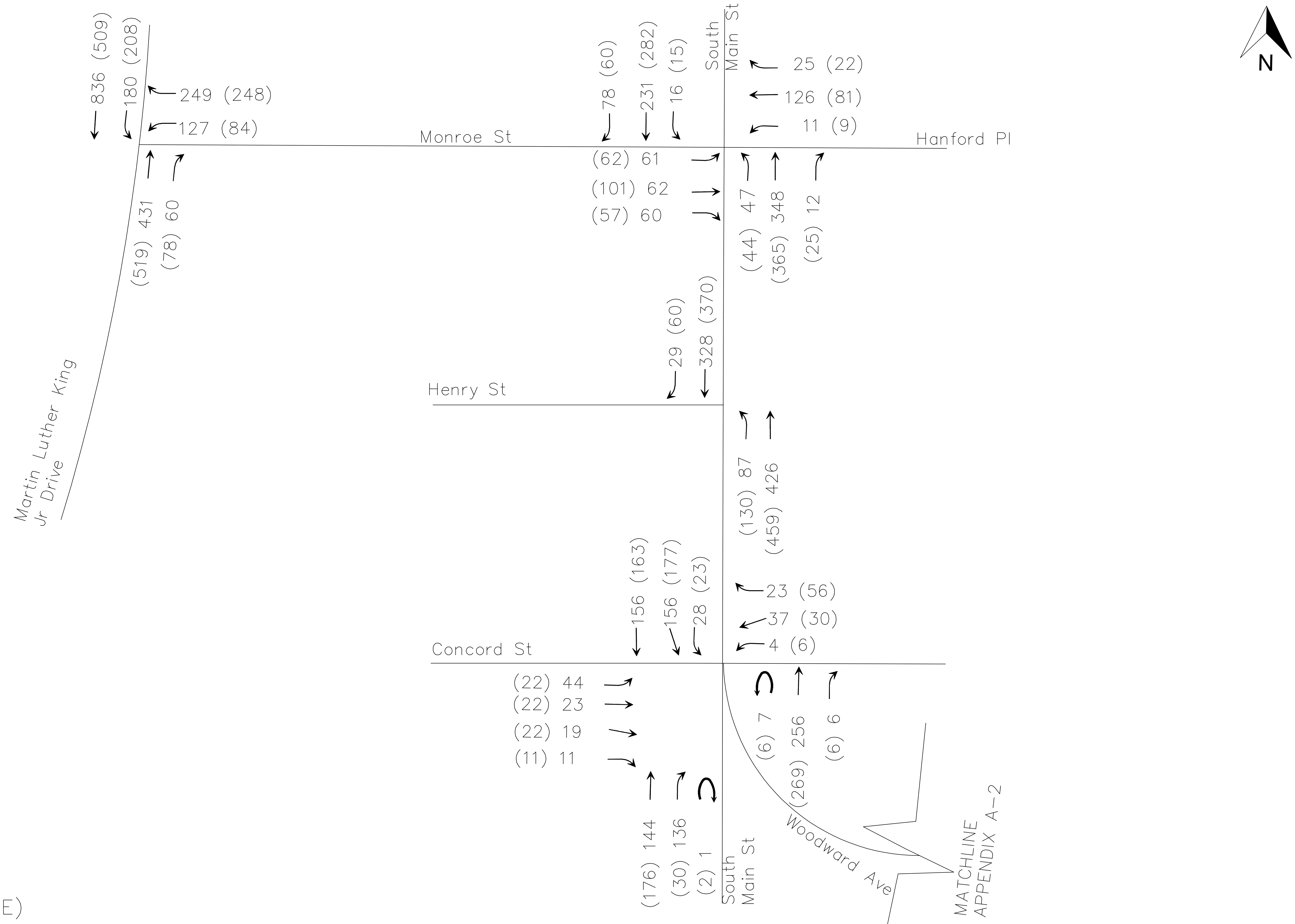
WSP has completed the traffic operations and safety analysis for the proposed use of Manresa Island for the construction of the vertical lift and has reached the following conclusions and recommendations:

- The expected increase in trucks and vehicles destined for Manresa Island is shown to have only minor impacts in terms of traffic operations. As discussed in the study, Woodward Avenue & Grove Street/Route 136 (Burritt Avenue) is the most critical intersection. The Route 136 (Burritt Avenue) westbound approach currently experiences high delays and the additional 20 vehicles (employees) would slightly increase these delays. This intersection also experiences a high volume of crashes with an average of 9 crashes per year. It is recommended to add pavement markings for the crosswalks on Grove Street and Burritt Avenue and trim vegetation that interferes with the sight line from Burritt Street.

- Trucks coming from Route 136 (Meadows Street) and making the right turn into southbound Woodward Avenue will have difficulties due to the acute angle of the intersection. This road is part of Truck Route B for oversized trucks. However, the oversized trucks are expected to be infrequent and it is recommended that flaggers be in place to assist with navigation through the intersection.
- There are no expected impacts to transit. Three (3) bus routes currently operate in the study area, during the expected work hours in Manresa Island, with a frequency of 20-40 minutes.
- The Monroe Street railroad underpass vertical clearance is adequate for tucks traveling on Truck Route A.
- There is currently a large industrial area on Route 136 (Meadows Street) and on Woodward Avenue (south of Route 136), that brings truck volume to the area.

# APPENDIX

## A 2024 TRAFFIC VOLUMES




LEGEND

## - AM VOLUME

(##) - (PM VOLUME)

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

DESIGNER/DRAFTER:

CHECKED BY:

NOT TO SCALE
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX A-1
2024 TRAFFIC VOLUMES

PROJECT NO.
0301-0176
DRAWING NO.

SHEET NO.


| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

DESIGNER/DRAFTER:
CHECKED BY:
NOT TO SCALE
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
FILENAME:
PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX A-2
2024 TRAFFIC VOLUMES

PROJECT NO.
0301-0176
DRAWING NO.
SHEET NO.

# APPENDIX

## B MANRESA ISLAND TRUCK ROUTE A- UNDER 13’-9”


| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

DESIGNER/DRAFTER:

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SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO–NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX B
MANRESA ISLAND ROUTE A – UNDER 13'9"

PROJECT NO.
0301–0176

DRAWING NO.

SHEET NO.

# APPENDIX

## C MANRESA ISLAND TRUCK ROUTE B- OVER 13’-9”


| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

DESIGNER/DRAFTER:

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SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN: NORWALK

DRAWING TITLE:
APPENDIX C
MANRESA ISLAND ROUTE B – OVER 13'9"

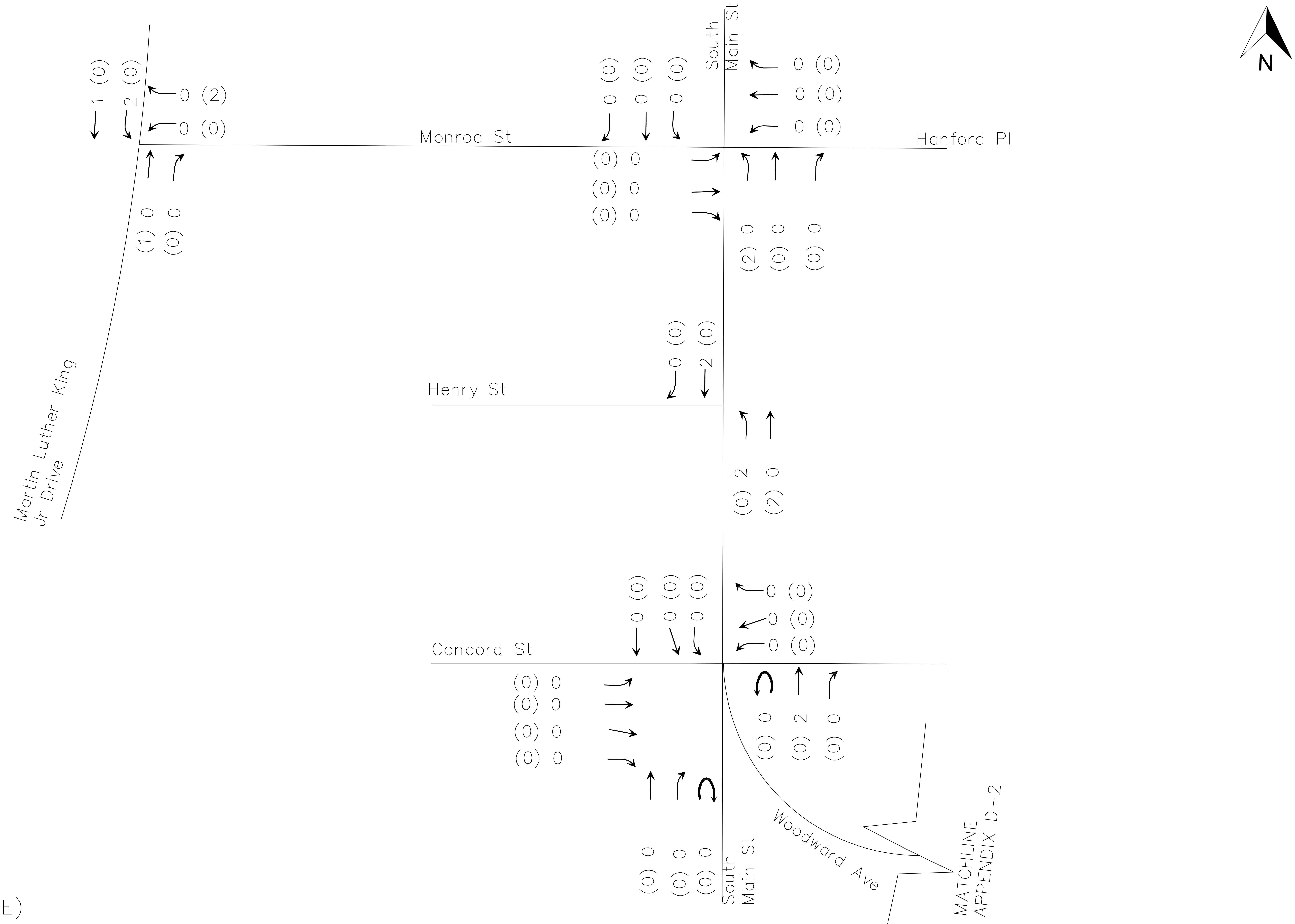
PROJECT NO. 0301-0176

DRAWING NO.

SHEET NO.

# APPENDIX

# D MANRESA ISLAND TRUCK VOLUME




LEGEND

## – AM VOLUME

(##) – (PM VOLUME)

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SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

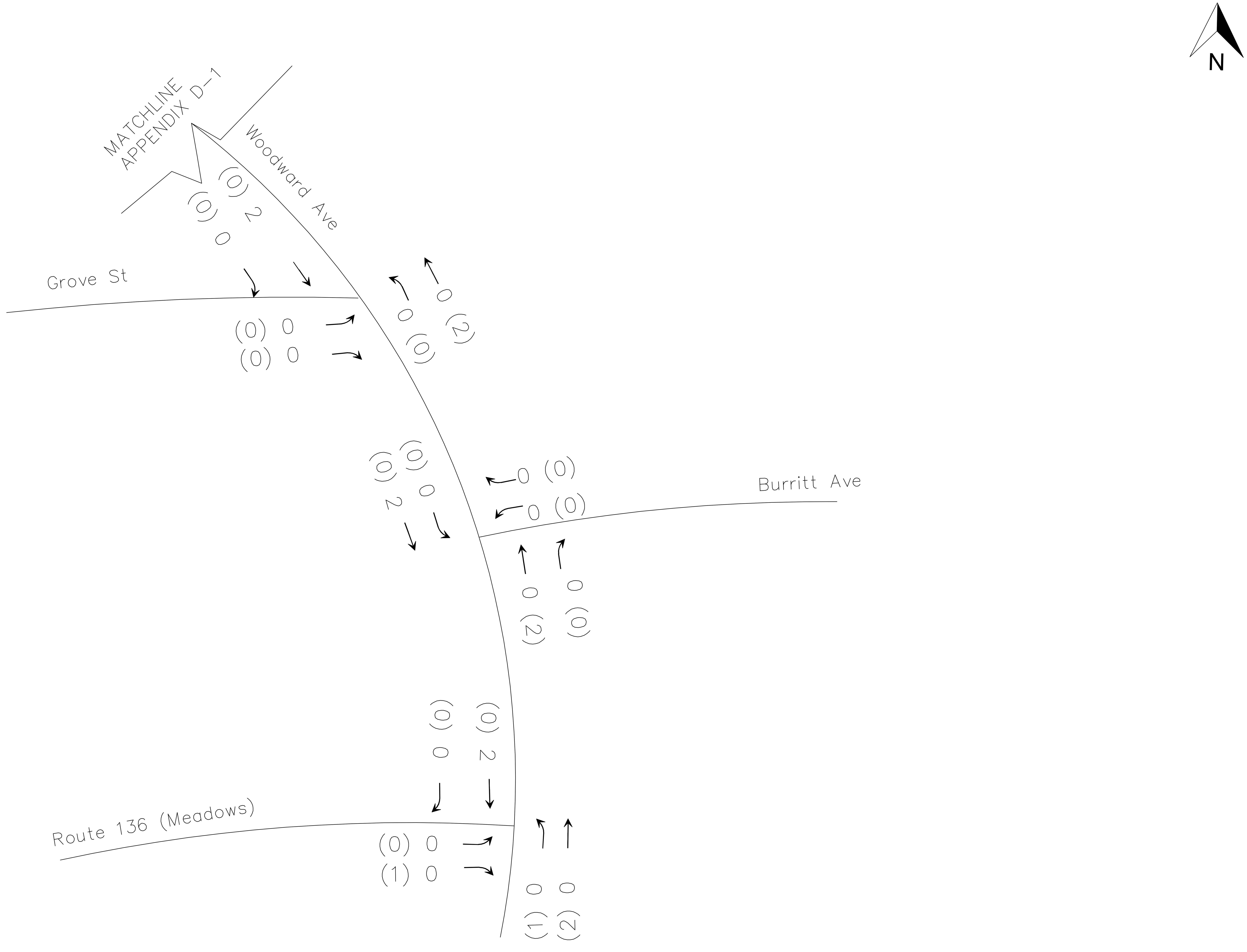
TOWN:
NORWALK

DRAWING TITLE:
APPENDIX D-1
MANRESA ISLAND TRUCK VOLUMES

PROJECT NO.
0301-0176

DRAWING NO.

SHEET NO.




LEGEND

## - AM VOLUME

(##) - (PM VOLUME)

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
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NOT TO SCALE
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
FILENAME:
PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX D-2
MANRESA ISLAND TRUCK VOLUMES

PROJECT NO.
0301-0176
DRAWING NO.
SHEET NO.

# APPENDIX

## E MANRESA ISLAND VEHICULAR ROUTE A- FROM NB I-95


| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|
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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO–NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX E
MANRESA ISLAND VEHICULAR ROUTE A – FROM NB I–95

PROJECT NO.
0301–0176

DRAWING NO.

SHEET NO.

# APPENDIX

## F MANRESA ISLAND VEHICULAR ROUTE B- FROM SB I-95


REV. DATE REVISION DESCRIPTION SHEET NO.

DESIGNER/DRAFTER:

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NOT TO SCALE
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX F
MANRESA ISLAND VEHICULAR ROUTE B –
FROM SB I-95

PROJECT NO.
0301-0176

DRAWING NO.

SHEET NO.

# APPENDIX

## G MANRESA ISLAND VEHICULAR VOLUME


| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

DESIGNER/DRAFTER:

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NOT TO SCALE
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

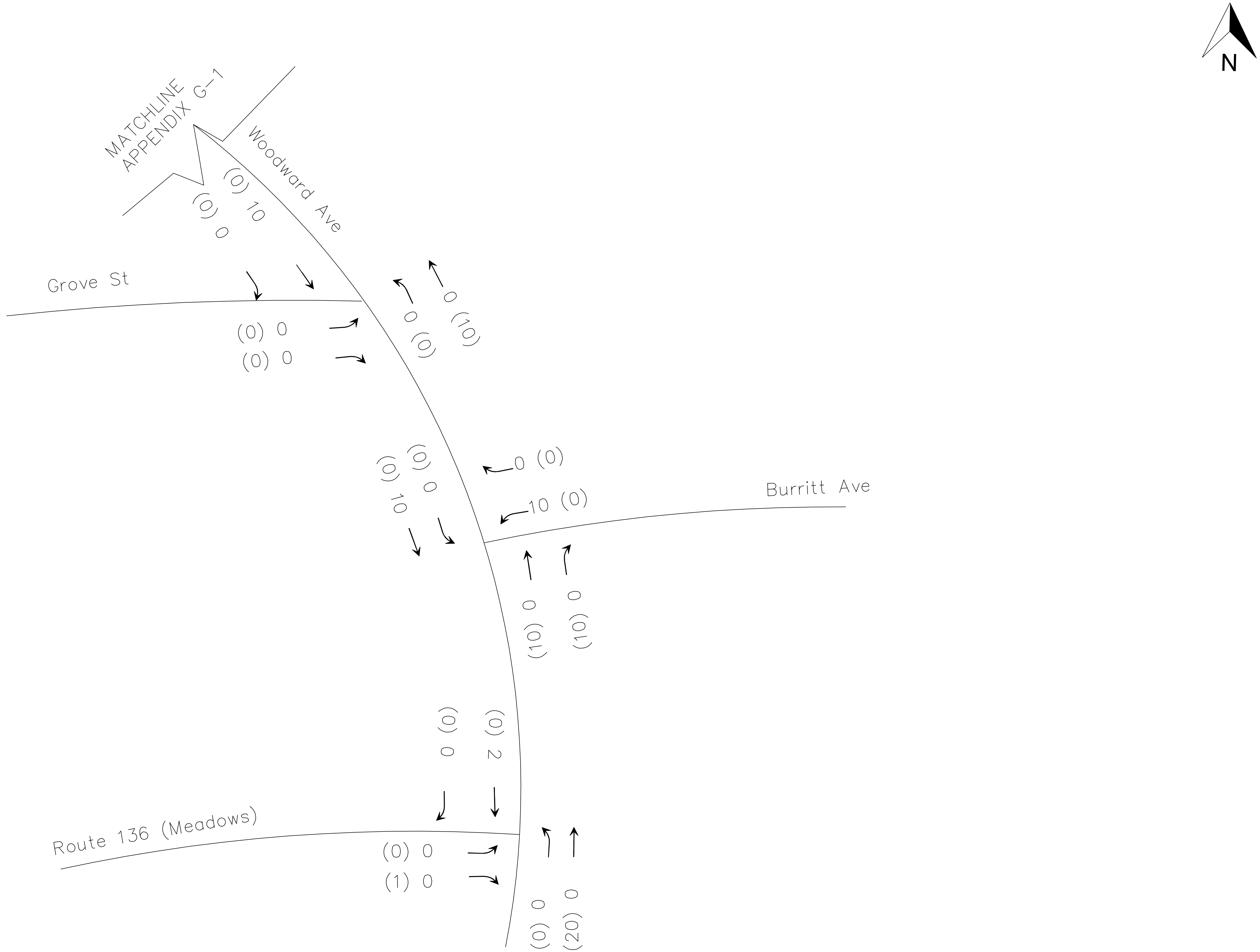
FILENAME:
PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX G-1
MANRESA ISLAND VEHICULAR VOLUMES

PROJECT NO.
0301-0176
DRAWING NO.
SHEET NO.




LEGEND

## - AM VOLUME

(##) - (PM VOLUME)

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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX G-2
MANRESA ISLAND VEHICULAR VOLUMES

PROJECT NO.
0301-0176
DRAWING NO.
SHEET NO.

# APPENDIX

## H FUTURE 2024 + MANRESA ISLAND TRAFFIC VOLUMES


| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

DESIGNER/DRAFTER:
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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

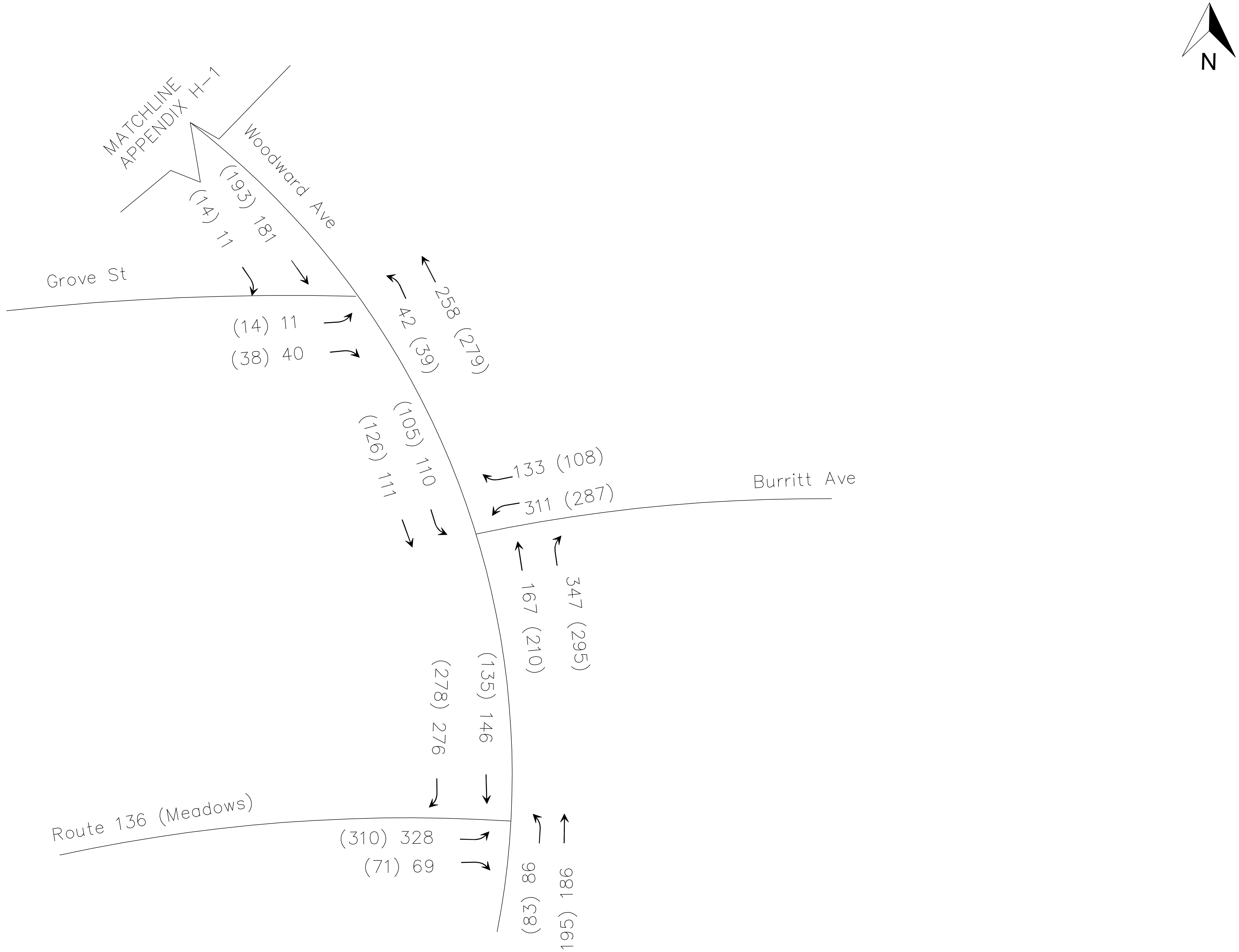
FILENAME:
PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO-NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX H-1
FUTURE 2024 + MANRESA ISLAND TRAFFIC VOLUMES

PROJECT NO.
0301-0176
DRAWING NO.
SHEET NO.




LEGEND

\#\# – AM VOLUME

(\#\#) – (PM VOLUME)

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
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STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME:

PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO–NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX H–2
FUTURE 2024 + MANRESA ISLAND TRAFFIC VOLUMES

PROJECT NO.
0301–0176

DRAWING NO.

SHEET NO.

# APPENDIX

## I OPERATIONAL RESULTS


REV. DATE REVISION DESCRIPTION SHEET NO.

DESIGNER/DRAFTER:
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NOT TO SCALE
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO–NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX I–1
OPERATIONAL RESULTS

PROJECT NO.
0301–0176
DRAWING NO.
SHEET NO.


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| STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION | |
| FILENAME: | PLOTTED DATE: |
| PROJECT TITLE: | BRIDGE NO. 03691R REPLACEMENT METRO–NORTH RAILROAD MP42.14 OVER EAST AVENUE |
| TOWN: | NORWALK |
| DRAWING TITLE: | APPENDIX I–2 OPERATIONAL RESULTS |
| PROJECT NO. | 0301–0176 |
| DRAWING NO. | |
| SHEET NO. | |
| REV. DATE | REVISION DESCRIPTION SHEET NO. |


REV. DATE REVISION DESCRIPTION SHEET NO.

DESIGNER/DRAFTER:
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SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
FILENAME: PLOTTED DATE:

PROJECT TITLE:
BRIDGE NO. 03691R REPLACEMENT
METRO–NORTH RAILROAD MP42.14
OVER EAST AVENUE

TOWN:
NORWALK

DRAWING TITLE:
APPENDIX I–3
OPERATIONAL RESULTS

PROJECT NO.
0301–0176
DRAWING NO.
SHEET NO.

# APPENDIX

## J TRAFFIC COUNTS

## MOVEMENT DIAGRAM

NONE

| NTOR | | PHASE 1 | | | PHASE 2 | | | PHASE 3 | | | PHASE 4 | | | PHASE 5 | | | PHASE 6 | | | PHASE 7 | | | PHASE 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FACE # | FLASH | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL |
| 2 | Y | | | | G | Y | R | R | R | R | | | | | | | R | R | R | | | | | | |
| 6 | Y | | | | R | R | R | R | R | R | | | | | | | G | Y | R | | | | | | |
| P | OFF | | | | ← DW → | | | WØ | ← DW → | | | | | | | | ← DW → | | | | | | | | |
| | | | | | ←YIELD | | | | | | | | | | | | ←YIELD | | | | | | | | |
| MIN | | | | | 10 | 3.0 | 1.0 | 7 \| 8 | 4 | 0 | | | | | | | 10 | 3.0 | 1.0 | | | | | | |
| MAX | | | | | 90 | 5.0 | 3.0 | 10 \| 10 | 4 | 0 | | | | | | | 90 | 5.0 | 3.0 | | | | | | |

| INTERVALS | PHASE 1 | PHASE 2 | PHASE 3 | PHASE 4 | PHASE 5 | PHASE 6 | PHASE 7 | PHASE 8 |
|---|---|---|---|---|---|---|---|---|
| MIN GRN | | 15 | | | | 15 | | |
| WALK | | | 7 | | | | | |
| PED CLR | | | 8 | | | | | |
| VEH EXT | | | | | | | | |
| MAX 1 | | 50 | | | | 50 | | |
| MAX 2 | | 60 | | | | 60 | | |
| YELLOW | | 3.2 | 4 | | | 3.2 | | |
| RED | | 1.9 | 0 | | | 1.9 | | |
| ADD INIT | | | | | | | | |
| MAX INIT | | | | | | | | |
| TBR | | | | | | | | |
| TTR | | | | | | | | |
| MIN GAP | | | | | | | | |
| MODE | OFF | MAX RECALL | NON-LOCK | OFF | OFF | MAX RECALL | OFF | OFF |
| INT START | | THIS PHASE | | | | THIS PHASE | | |

COUNTDOWN PEDESTRIAN SIGNAL

| DETECTORS | | | | PROGRAM | | | COORDINATION TYPE- CENTRAL SYSTEM | | | | | | | | | | | | | PERMIS PERIOD | SYSTEM LOC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IDENT | SIZE (WXL) | TURNS | MODE | FUNCTION | TIME | DAYS | CYCLE | OFFSET SEC | OFFSET % | Ø1 | Ø2 | Ø3 | Ø4 | Ø5 | Ø6 | Ø7 | Ø8 | Ø | SEC | | MASTER |
| | | | | FLASH | FUTURE | | | | | | | | | | | | | | | | CITY HALL |
| | | | | PATTERN 1 | 0600-0900 | M-F | 90 | 53 | 59 | | 78 / 87 | 12 / 13 | | | 78 / 87 | | | | | | INT# 49 |
| | | | | PATTERN 2 | ALL OTHER TIMES | DAILY | 80 | 48 | 60 | | 68 / 85 | 12 / 15 | | | 68 / 85 | | | | | | INT# 50 |
| | | | | PATTERN 3 | 0900-1500 | M-F | 80 | 48 | 60 | | 68 / 85 | 12 / 15 | | | 68 / 85 | | | | | | INT# 51 |
| | | | | PATTERN 4 | 1500-1900 | M-F | 90 | 50 | 56 | | 78 / 85 | 12 / 15 | | | 78 / 85 | | | | | | INT# 52 |
| | | | | PATTERN 5 | 1000-1600 | SA-SU | 80 | 43 | 54 | | 78 / 85 | 12 / 13 | | | 78 / 85 | | | | | | INT# 53 |
| | | | | | | | | | | | 68 / 78 | 12 / 15 | | | 68 / 78 | | | | | | INT# 54 |
| | | | | MAX 1 | ALL OTHER TIMES | | | | | | | | | | | | | | | | |
| | | | | MAX 2 | FUTURE | | | | | | | | | | | | | | | | |
| | | | | FREE | FUTURE | | | | | | | | | | | | | | | | |

### TECHNICAL NOTES

1. STANDARD OVERLAP SKIP FEATURES APPLY
2. MANUAL AND INTERVAL ADVANCE PHASE TO BE DISCONNECTED DURING PHASE 3 PEDESTRIAN CLEARANCE INTERVAL.
3. COUNTDOWN DISPLAYS SHALL NOT BE USED DURING THE WALK INTERVAL NOR DURING THE YELLOW CHANGE INTERVAL OF A CONCURRENT VEHICULAR PHASE.
4. FLOATING FORCE-OFFS SHALL BE IN EFFECT.
5. TIMING SHOWN REFLECT FREE OPERATION. ACTUAL PHASE SPLITS TO BE DETERMINED BY THE COORDINATION PROGRAM.
6. PHASE SPLITS SHOWN REPRESENT PRELIMINARY COORDINATION DATA.

LEGEND: R RED, Y YELLOW, G GREEN; RED ARROW, YELLOW ARROW, GREEN ARROW; WØ WALK/ PED. CLR, D.W. DON'T WALK, FL. FLASHING

ENERGY BY- CITY | METER # - | INTERSECTION # 53
MAINT LEVEL | SERVICE POLE- SNEW# A-33
METERED SERVICE | OFFICE RECORD

SIGNAL FACES

12" R Y G — 2,6
16" 9" SOLID-OVERLAP HAND/PERSON — P

ALL INDICATIONS TO HAVE L.E.D. LAMPS.

PEDESTRIAN SIGNAL FACE TO HAVE COUNTDOWN TIMER.

STC # | SM #

SIGNAL REVISED

SIGNAL REVISED UNDER PROJECT 102-337. NEW TRAFFIC SIGNAL EQUIPMENT INSTALLED AND CONNECTED TO COMPUTERIZED CENTRAL SYSTEM.

# CITY SIGNAL

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUR. OF ENGINEERING & HWY OPERATIONS
DIVISION OF TRAFFIC ENGINEERING
TRAFFIC CONTROL SIGNAL

CITY OF NORWALK
SOUTH MAIN STREET AT
HENRY STREET

REV # | TRAFFIC DATE | ELECTRICAL DATE
ENGINEER / DRAFTER / CHECKED BY / SUBMITTED BY / APPROVED BY / DATE

Vanasse Hangen Brustlin, Inc.
Transportation & Land Development & Environmental Services
54 Tuttle Place, Middletown, Connecticut 06457-1847
Tel: 860 632-1500 & Fax: 860 632-7879

## CONSTRUCTION NOTES

ALL TRAFFIC SIGNAL EQUIPMENT SHALL BE NEW, EXCEPT AS NOTED.

CONTRACTOR SHALL STAKE ALL R.O.W. PRIOR TO EXCAVATION. ALL WORK, INCLUDING ALL FOUNDATIONS SHALL BE WITHIN THE R.O.W EXCEPT AS NOTED.

INSTALL RACK BASED NEMA TS2 TYPE 1-4 PHASE CONTROLLER IN A CABINET ATTACHED TO THE MAST ARM (P) AS SPECIFIED IN THE BID DOCUMENTS.

CONTRACTOR SHALL INSTALL AN AUXILLARY EQUIPMENT CABINET (AEC) ATTACHED TO THE MAST ARM P AS SPECIFIED IN THE BID DOCUMENTS.

CONTROLLER BACK TO ALWAYS FACE THE INTERSECTION, SERVICE METERS TO BE INSTALLED ON THE SIDE OF THE CABINET.

CONTRACTOR SHALL REMOVE ALL ABANDONED TRAFFIC SIGNAL EQUIPMENT INCLUDING BUT NOT LIMITED TO FOUNDATIONS, HANDHOLES, CONDUIT RISERS & CABLE, AND STEEL POLES.

ALL HANDHOLES ARE TYPE II UNLESS OTHERWISE SPECIFIED. CONTRACTOR SHALL INSTALL HANDHOLES APPROXIMATELY 1 FOOT BEHIND CURB OR EDGE OF ROADWAY UNLESS OTHERWISE SPECIFIED.

CONTRACTOR SHALL TELEPHONE "CALL BEFORE YOU DIG" AT 1-800-922-4455 48 HOURS PRIOR TO ANY EXCAVATION. CONTRACTOR SHALL CONTACT UTILITY REPRESENTATIVES AND CITY AGENCIES FOUR WEEKS PRIOR TO EXCAVATION.

| REPRESENTATIVE | UTILITY | TELEPHONE |
|---|---|---|
| FRANCO CHIEFFALO | FIRST DISTRICT WATER DEPT. | (203) 847-7387 |
| GEORGE LEARY | THIRD TAXING DISTRICT DEPT. | (203) 838-7445 |
| DAN HERMAN | AT&T/SBC | (866) 365-3256 |
| BILL HUGHES | AT&T (LOCAL) | (203) 846-9063 |
| GEORGE REBENTISCH | CABLEVISION | (203) 750-5600 |
| JIM CALABRESE | CL&P | (203) 854-3664 |
| RON TARINI | AT&T (LONG LINES) | (203) 269-2567 |
| WALTER MASHECK | SOUTH NORWALK ELECTRICITY AND WATER (ELECTRICITY DEPARTMENT) | (203) 866-3366 |
| SCOTT WHITTIER | SOUTH NORWALK ELECTRICITY AND WATER (WATER DEPARTMENT) | (203) 866-4446 |
| DAN FITZSIMMONS | YANKEE GAS | (203) 854-6459 |
| CONNIE BLAIR | NORWALK DEPT. OF PUBLIC WORKS CALL CENTER | (203) 854-3200 |

THE CONTRACTOR SHALL CONTACT MR. FRED ESHRAGHI, CITY OF NORWALK TRAFFIC ENGINEER, AT (203) 854-7791 PRIOR TO ANY EXCAVATION AND DELIVERY OF ALL SALVAGE MATERIAL.

THE CONTRACTOR SHALL OBTAIN ALL NECESSARY STATE AND CITY PERMITS, INCLUDING BUT NOT LIMITED TO: SIDEWALK, CURB, AND ROAD OPENING.

CONTRACTOR SHALL REPLACE ALL PAVEMENT MARKINGS 200 FEET ALONG ALL APPROACHES AS SHOWN ON THE PLANS. NEW STOP BARS, CROSSWALKS AND LEGENDS SHALL BE INSTALLED AS SHOWN ON THE PLANS. THE NEW PAVEMENT MARKINGS TO MATCH THE EXISTING PAVEMENT MARKINGS. ALL CONFLICTING PAVEMENT MARKINGS TO BE REMOVED.

INSTALL PAVEMENT MARKINGS IN ACCORDANCE WITH MISCELLANEOUS DETAIL SHEET # 62 "SPECIAL DETAILS AND TYPICAL PAVEMENT MARKINGS FOR TWO-WAY HIGHWAYS."

TRAFFIC SIGNAL APPURTENANCES (CONTROLLERS, MAST ARM, SPAN POLES, PEDESTALS AND HAND HOLES) WHEN IN OR ADJACENT TO SIDEWALKS SHALL BE FIELD LOCATED BY THE CONTRACTOR TO PROVIDE A FREE PATH OF NOT LESS THAN 3 FEET. ANY PROPOSED REVISIONS TO THE LOCATIONS OF THE APPURTENANCES SHOWN ON THE PLAN MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE CITY OF NORWALK TRAFFIC ENGINEER PRIOR TO INSTALLATION.

TRAFFIC SIGNAL APPURTENANCES (CONTROLLERS, MAST ARM, AND PEDESTALS) WHEN IN OR ADJACENT TO SIDEWALKS SHALL BE FIELD LOCATED BY THE CONTRACTOR TO PROVIDE A FREE PATH OF NOT LESS THAN 3 FEET.

ALL SIGNS DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT HIS EXPENSE.

CONTRACTOR WILL BE REQUIRED TO TRIM TREE BRANCHES AT EACH APPROACH TO OBTAIN CLEAR SIGHTLINE TO THE SIGNAL HEADS. TREE BRANCHES SHALL BE TRIMMED BACK TO THE CURB LINE FOR A MINIMUM OF 300' FEET BACK FROM THE STOP BAR. THIS WORK SHALL BE PAID FOR UNDER ITEM NO. 0952001A "SELECTIVE CLEARING AND THINNING".

CONTRACTOR SHALL REMOVE ALL EXISTING SIGNS THAT CONFLICT WITH THE PROPOSED SIGNS. AS DIRECTED BY THE ENGINEER. THIS WORK SHALL BE PAID FOR UNDER ITEM NO. 1206023A "REMOVAL AND RELOCATION OF EXISTING SIGNS".

INSTALL SIGNS AND METAL SIGN POSTS IN ACCORDANCE WITH MISCELLANEOUS DETAIL SHEET # 55 "TYPICAL SIGNS, SUPPORTS AND SIGN PLACEMENT DETAILS" AND SHEET # 56 "TYPICAL METAL SIGN POSTS AND SIGN MOUNTING DETAILS."

CONTRACTOR SHALL TRIM ALL NECESSARY BUSHES, SHRUBS, TREES, ETC. OBSTRUCTING ANY TRAFFIC SIGNAL EQUIPMENT OR VISIBILITY OF SIGNAL HEADS.

CONTRACTOR SHALL REMOVE ALL EXISTING SIGNS THAT CONFLICT WITH THE PROPOSED SIGNS.

CONTRACTOR SHALL REPLACE IN KIND ALL DISTURBED AREAS (CURBING, SIDEWALK, LANDSCAPE ETC.) ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT. THE LIMIT OF WORK ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT SHALL BE A MINIMUM OF TEN (10) FEET UNLESS OTHERWISE SPECIFIED.

ALL DISTURBED LANDSCAPE AREAS SHALL BE TREATED WITH TOP SOIL AND SEEDING PAID FOR UNDER ITEM NO. 944001 "FURNISHING AND PLACING TOPSOIL" AND ITEM NO. 950005 "TURF ESTABLISHMENT".

A VERTICAL CLEARANCE OF 16 TO 18 FEET OVER ROADWAY PAVEMENT IS REQUIRED FOR TRAFFIC SIGNALS.

CONTRACTOR TO PROVIDE FOUR SETS OF CABINET WIRING DIAGRAMS IN THE CABINET.

CONTRACTOR SHALL INSTALL 1.5" RISER ON SERVICE POLE INDICATED ON PLAN FOR ELECTRICAL SERVICE.

CONTRACTOR SHALL REPLACE THE ENTIRE SECTION OF SIDEWALK DAMAGED DUE TO INSTALLATION OF CONDUIT, HANDHOLE, OR FOUNDATION. THE SIDEWALK SHALL BE RESTORED WITHIN 48 HOURS OF DISTURBANCE.

(X) CONTRACTOR SHALL INSTALL FIBER OPTIC SPLICE ENCLOSURE IN THE HANDHOLE FOR THE INSTALLATION OF FIBER OPTIC DROP CABLE.

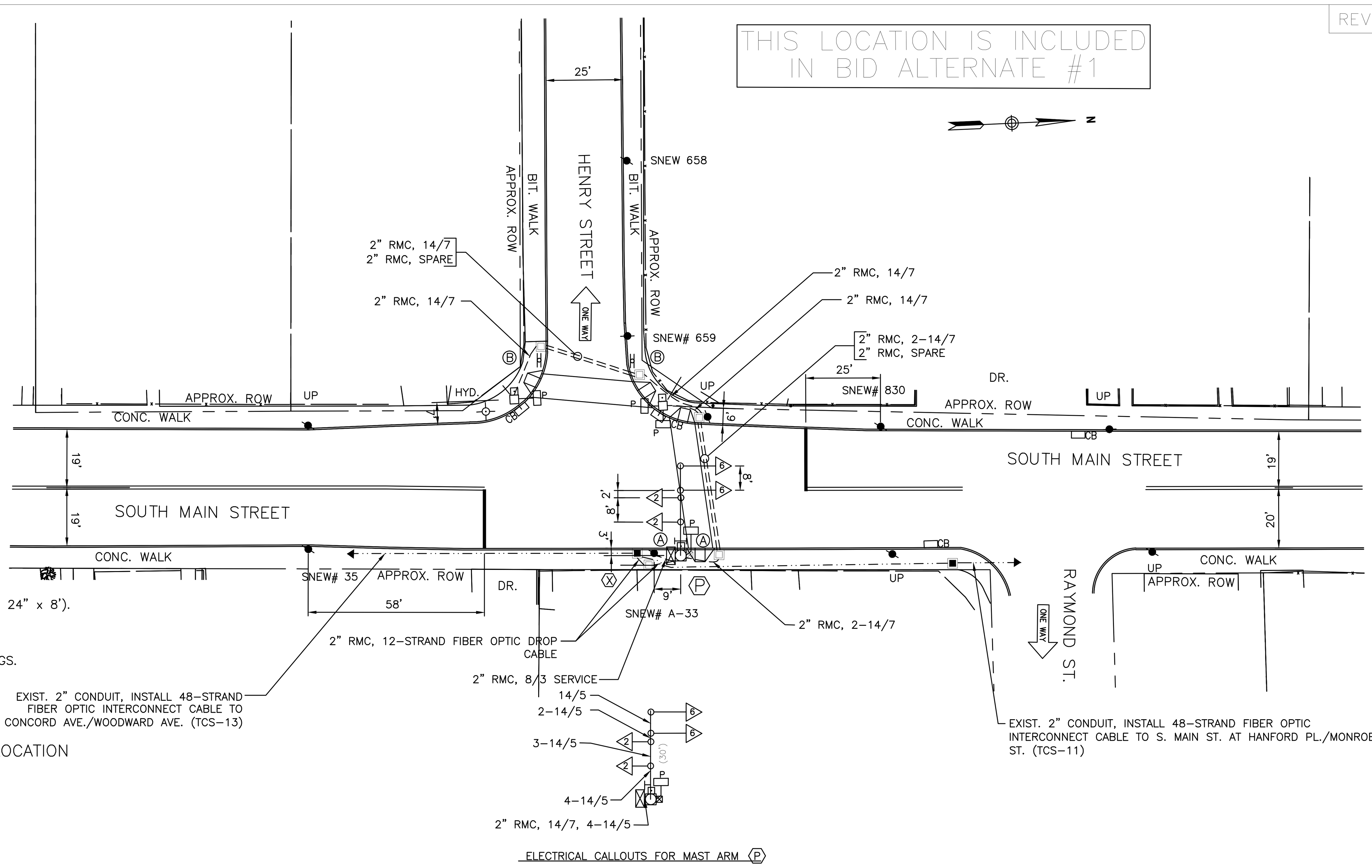
## SIGN LEGEND

(A) INSTALL HENRY ST - OVERHEAD MOUNT
(B) INSTALL 31-1177Z (ONE WAY →) 31-1188Z (ONE WAY ←)

NOTE:
ALL SIGNS TO BE MAINTAINED BY THE CITY OF NORWALK

THIS LOCATION IS INCLUDED IN BID ALTERNATE #1

REV. | INTERSECTION # 53




Ø2&6
Ø3

25 (15) [52] [30]
282 (268) [319] [275]
75 (42) [112] [6]
367 (326) [396] [388]

KEY: AM PEAK (MIDDAY PEAK) [PM PEAK] {SAT PEAK}
2012 PEAK HOUR TRAFFIC VOLUMES

PAVEMENT MARKING NOTES:

WHITE CROSSWALKS TO BE BAR TYPE CROSSWALKS (24" x 24" x 8").

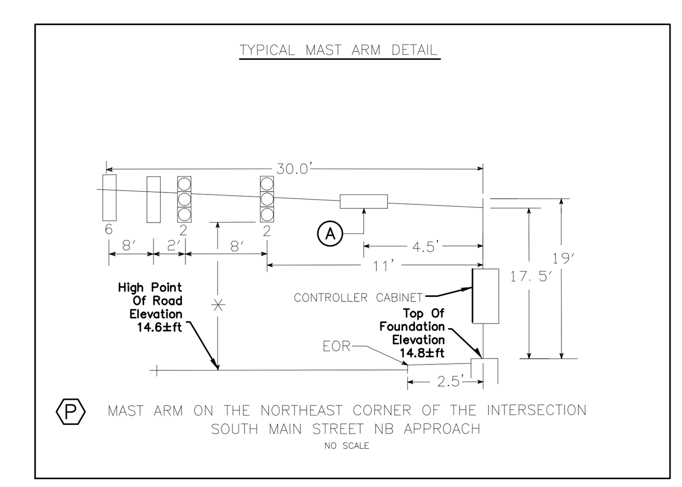
WHITE STOP BAR SHALL BE 24" WIDE.

ALL PAVEMENT MARKINGS SHALL BE EPOXY RESIN MARKINGS.

ALL PAVEMENT MARKINGS TO BE MAINTAINED BY THE CITY OF NORWALK.

MAST ARM DESIGN CRITERIA PER SPECIFIC LOCATION

| ID | SHAFT HEIGHT | ARM LENGTH | LOAD CASE |
|---|---|---|---|
| (P) | 19' | 30' | 30-1W |




DISTANCE BETWEEN ROAD AND SIGNAL HEAD SHALL BE 16' TO 18'.

CROSS SECTION IS IN LINE WITH MAST ARM.
CONTRACTOR TO VERIFY MAST ARM INFORMATION PRIOR TO ORDERING MAST ARMS, PER SPECIAL PROVISIONS.
ALL MAST ARM MOUNTED TRAFFIC SIGNALS ARE FIXED MOUNTED TO THE ARM BY THE USE OF ADJUSTABLE BRACKETS.
OPTICAL PRE-EMPTION EQUIPMENT AND STREET SIGNS TO BE FIELD LOCATED.
EOR = EDGE OF ROADWAY

LEGEND: PROPOSED WOOD SPAN POLE; EXISTING WOOD SPAN POLE; PROPOSED STEEL MAST ARM; EXISTING STEEL SPAN POLE; BOLLARD; EXISTING PTZ CAMERA; PROPOSED UTILITY POLE; EXISTING UTILITY POLE; PEDESTAL MOUNTING; PEDESTRIAN PUSH BUTTON & SIGN; ELECTRIC VAULT; TRAFFIC SIGNAL FACE; PEDESTRIAN SIGNAL HEAD; AUDIBLE PEDESTRIAN SIGNAL; LOOP DETECTOR; PTZ CAMERA CONTROLLER; DETECTED MOVEMENT; SYSTEM DETECTOR; OPTICAL DETECTOR; PROPOSED CONTROLLER; EXISTING CONTROLLER; PROPOSED HANDHOLE; EXISTING HANDHOLE; PROPOSED R.M.C. (RIGID METAL CONDUIT); EXIST. INTERCONNECT CONDUIT; FIBER OPTIC SPLICE ENCLOSURE; EXISTING R.M.C. (RIGID METAL CONDUIT); CABLE CLOSURE; DET. LEADS IN SAW CUT; OVERHEAD SIGN; VIDEO DETECTOR; STRAIN INSULATOR; AUXILIARY TERMINATION CABINET; AUXILIARY EQUIPMENT CABINET; APPROXIMATE DETECTOR AIMING ZONE

TRAFFIC CONTROL SIGNAL LAYOUT
CADD FILE NAME: TCS-12_S Main St @ Henry St.dwg
DATE PLOTTED: Apr 01, 2011
SCALE - 1"=30'

# CITY SIGNAL

CITY OF NORWALK
SOUTH MAIN STREET AT
HENRY STREET

NO. | DATE | INIT. | DESCRIPTION — REVISIONS

CONNECTICUT DEPARTMENT OF TRANSPORTATION
PROJECT TITLE: PHASE I - NORWALK TRAFFIC SIGNAL CONTROLLER/SYSTEM UPGRADE
PROJECT NO.: 0301-0176
TOWN: NORWALK
DRAWING NO.: TCS-12
DRAWING TITLE: SOUTH MAIN STREET AT HENRY STREET
SHEET NO.: 34

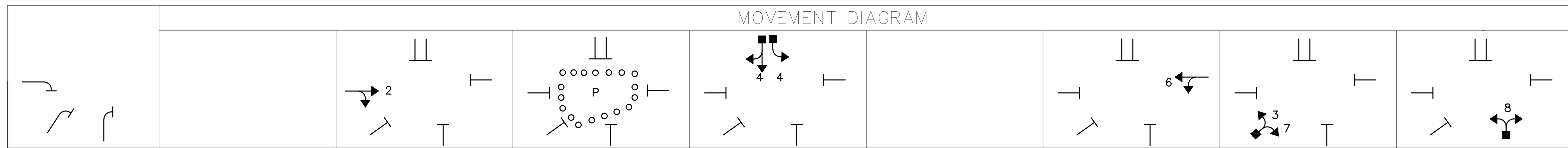
REV. | INTERSECTION # 53

THIS LOCATION IS INCLUDED IN BID ALTERNATE #1

G:\TRAFFIC\Traffic Projects\Traffic Signal Upgrade, Phase I & II\Phase I\Traffic Signal Plan, Auto Cad\TCS-12_S Main St @ Henry St.dwg
4/1/2011 10:23:17 AM

G:\TRAFFIC\Traffic Projects\Traffic Signal Upgrade, Phase I & II\Phase I\Traffic Signal Plan, Auto Cad\TCS-13_S Main St @ Woodward Ave & Concord Ave.dwg,
4/1/2011 10:23:53 AM

## MOVEMENT DIAGRAM



| NTOR | | PHASE 1 | | | PHASE 2 | | | PHASE 3 | | | PHASE 4 | | | PHASE 5 | | | PHASE 6 | | | PHASE 7 | | | PHASE 8 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FACE # | FLASH | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL | GRN | CL | CL |
| 2 | Y | | | | G | Y | R | R | R | R | R | R | R | | | | R | R | R | R | R | R | R | R | R |
| 3 | R | | | | R | R | R | R | R | R | R | R | R | | | | R | R | R | ←G | Y | R | R | R | R |
| 4 | R | | | | R | R | R | R | R | R | G | Y | R | | | | R | R | R | R | R | R | R | R | R |
| 6 | Y | | | | R | R | R | R | R | R | R | R | R | | | | G | Y | R | R | R | R | R | R | R |
| 7 | R | | | | R | R | R | R | R | R | R | R | R | | | | R | R | R | G | Y | R | R | R | R |
| 8 | R | | | | R | R | R | R | R | R | R | R | R | | | | R | R | R | R | R | R | G | Y | R |
| P | OFF | | | | ← | DW | → | WØ | ← DW | → | ← | DW | → | | | | ← | DW | → | ← | DW | → | ← | DW | → |
| | | | | | | ←YIELD | | | | | | | | | | | | ←YIELD | | | | | | | |
| MIN | | | | | 10 | 3 | 1 | 7 \| 9 | 4 | 0 | 6 | 3 | 1 | | | | 10 | 3 | 1 | 6 | 3 | 1.5 | 10 | 3 | 1 |
| MAX | | | | | 50 | 5 | 3 | 10 \| 11 | 4 | 0 | 25 | 5 | 3 | | | | 50 | 5 | 3 | 45 | 4 | 3.0 | 50 | 5 | 3 |

| INTERVALS | PHASE 1 | PHASE 2 | PHASE 3 | PHASE 4 | PHASE 5 | PHASE 6 | PHASE 7 | PHASE 8 |
|---|---|---|---|---|---|---|---|---|
| MIN GRN | | 15 | | 7 | | 15 | 10 | 10 |
| WALK | | | 7 | | | | | |
| PED CLR | | | 9 | | | | | |
| VEH EXT | | | COUNTDOWN PEDESTRIAN SIGNAL | 3 | | | 3 | 3 |
| MAX 1 | | 30 | | 20 | | 30 | 30 | 20 |
| MAX 2 | | 40 | | 25 | | 40 | 40 | 25 |
| YELLOW | | 3.2 | 4 | 3.3 | | 3.2 | 3.1 | 3.3 |
| RED | | 2.5 | 0 | 3.4 | | 2.5 | 1.6 | 3.4 |
| ADD INIT | | | | | | | | |
| MAX INIT | | | | | | | | |
| TBR | | | | | | | | |
| TTR | | | | | | | | |
| MIN GAP | | | | | | | | |
| MODE | OFF | MAX RECALL | NON-LOCK | NON-LOCK | OFF | MAX RECALL | NON LOCK | NON-LOCK |
| INT START | | THIS PHASE | | | | THIS PHASE | | |

### DETECTORS

| IDENT | SIZE (WXL) | DELAY/EXT | MODE |
|---|---|---|---|
| D4 | 6' x 50' | 0 | VIDEO DETECTION |
| D4A | 6' x 50' | 0 | VIDEO DETECTION |
| D7 | 12' x 50' | 0 | VIDEO DETECTION |
| D8 | 6' x 50' | 0 | VIDEO DETECTION |
| SD1 | 12' x 6' | 0 | VIDEO DETECTION |
| SD2 | 12' x 6' | 0 | VIDEO DETECTION |
| SD3 | 6' x 6' | 0 | VIDEO DETECTION |
| SD4 | 6' x 6' | 0 | VIDEO DETECTION |
| SD5 | 6' x 6' | 0 | VIDEO DETECTION |
| SD6 | 6' x 6' | 0 | VIDEO DETECTION |
| SD7 | 12' x 6' | 0 | VIDEO DETECTION |
| SD8 | 6' x 6' | 0 | VIDEO DETECTION |

### PROGRAM / COORDINATION TYPE– CENTRAL SYSTEM

| FUNCTION | TIME | DAYS | CYCLE | OFFSET SEC | OFFSET % | ø1 | ø2 | ø3 | ø4 | ø5 | ø6 | ø7 | ø8 | PERMIS PERIOD ø | SEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FLASH | FUTURE | | | | | | | | | | | | | | |
| PATTERN 1 | 0600–0900 | M–F | 90 | 45 | 50 | | 29/32 | 12/13 | 22/24 | | 29/32 | 27/30 | 22/24 | | |
| PATTERN 2 | ALL OTHER TIMES | DAILY | 80 | 0 | 0 | | 23/29 | 12/15 | 22/27 | | 23/29 | 23/29 | 22/27 | | |
| PATTERN 3 | 0900–1500 | M–F | 80 | 0 | 0 | | 23/29 | 12/15 | 22/27 | | 23/29 | 23/29 | 22/27 | | |
| PATTERN 4 | 1500–1900 | M–F | 90 | 89 | 99 | | 31/35 | 12/13 | 20/22 | | 31/35 | 27/30 | 20/22 | | |
| PATTERN 5 | 1000–1600 | SA–SU | 80 | 79 | 99 | | 25/31 | 12/15 | 20/25 | | 25/31 | 23/29 | 20/25 | | |
| MAX 1 | ALL OTHER TIMES | | | | | | | | | | | | | | |
| MAX 2 | FUTURE | | | | | | | | | | | | | | |
| FREE | FUTURE | | | | | | | | | | | | | | |

PHASE SPLITS SEC/%

| SYSTEM LOC |
|---|
| MASTER |
| CITY HALL |
| INT# 49 |
| INT# 50 |
| INT# 51 |
| INT# 52 |
| INT# 53 |
| INT# 54 |

### TECHNICAL NOTES

1. STANDARD OVERLAP SKIP FEATURES APPLY.
2. MANUAL AND INTERVAL ADVANCE PHASE TO BE DISCONNECTED DURING PHASE 3 PEDESTRIAN CLEARANCE INTERVAL.
3. COUNTDOWN DISPLAYS SHALL NOT BE USED DURING THE WALK INTERVAL NOR DURING THE YELLOW CHANGE INTERVAL OF A CONCURRENT VEHICULAR PHASE.
4. FLOATING FORCE–OFFS SHALL BE IN EFFECT.
5. TIMING SHOWN REFLECT FREE OPERATION. ACTUAL PHASE SPLITS TO BE DETERMINED BY THE COORDINATION PROGRAM.
6. PHASE SPLITS SHOWN REPRESENT PRELIMINARY COORDINATION DATA.

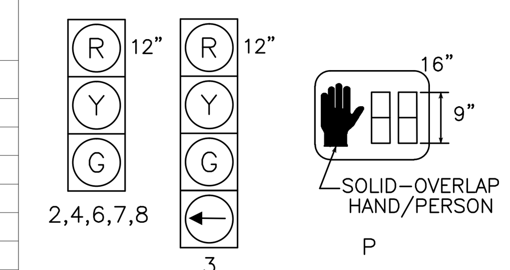
LEGEND:
R RED / Y YELLOW / G GREEN
←R RED ARROW / ←Y YELLOW ARROW / ← GREEN ARROW
WØ WALK/ PED. CLR / D.W. DON'T WALK / FL. FLASHING

ENERGY BY– CITY | METER # –
MAINT LEVEL | SERVICE POLE– SNEW A–44
METERED SERVICE

## INTERSECTION # 54

OFFICE RECORD

### SIGNAL FACES




ALL INDICATIONS TO HAVE L.E.D. LAMPS.

SIGNAL HEADS 3,4,7,8 TO HAVE 5" LOUVERED BACK PLATES.

SIGNAL HEAD 8 TO HAVE RIGHT CUT–OFF LOUVERS.

SIGNAL HEAD 2 TO HAVE LEFT CUT–OFF LOUVERS.

PEDESTRIAN SIGNAL FACE TO HAVE COUNTDOWN TIMER.

STC # | SM #

SIGNAL REVISED

SIGNAL REVISED UNDER PROJECT 102–337. NEW TRAFFIC SIGNAL EQUIPMENT INSTALLED AND CONNECTED TO COMPUTERIZED CENTRAL

# CITY SIGNAL

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUR. OF ENGINEERING & HWY OPERATIONS
DIVISION OF TRAFFIC ENGINEERING

TRAFFIC CONTROL SIGNAL

CITY OF NORWALK
SOUTH MAIN STREET AT
WOODWARD AVENUE/CONCORD AVENUE

| REV # | TRAFFIC | DATE | ELECTRICAL | DATE |
|---|---|---|---|---|
| ENGINEER | | | | |
| DRAFTER | | | | |
| CHECKED BY | | | | |
| SUBMITTED BY | | | | |
| APPROVED BY | | | | |
| DATE | | | | |

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## CONSTRUCTION NOTES

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CONTRACTOR SHALL STAKE ALL R.O.W. PRIOR TO EXCAVATION. ALL WORK, INCLUDING ALL FOUNDATIONS SHALL BE WITHIN THE R.O.W EXCEPT AS NOTED.

INSTALL RACK MOUNT NEMA TS2 TYPE 1 CONTROLLER IN A CABINET AS SPECIFIED IN THE BID DOCUMENTS.

(M) CONTRACTOR SHALL INSTALL NEW CONTROLLER CABINET ON EXISTING FOUNDATION AS SHOWN ON THE PLAN.

CONTROLLER BACK TO ALWAYS FACE THE INTERSECTION, SERVICE METERS TO BE INSTALLED ON THE SIDE OF THE CABINET.

CONTRACTOR SHALL REMOVE ALL ABANDONED TRAFFIC SIGNAL EQUIPMENT INCLUDING BUT NOT LIMITED TO FOUNDATIONS, HANDHOLES, CONDUIT RISERS & CABLE, AND STEEL POLES.

ALL HANDHOLES ARE 30" x 30" UNLESS OTHERWISE SPECIFIED. CONTRACTOR SHALL INSTALL HANDHOLES APPROXIMATELY 1 FOOT BEHIND CURB OR EDGE OF ROADWAY UNLESS OTHERWISE SPECIFIED.

CONTRACTOR SHALL TELEPHONE "CALL BEFORE YOU DIG" AT 1–800–922–4455 48 HOURS PRIOR TO ANY EXCAVATION. CONTRACTOR SHALL CONTACT UTILITY REPRESENTATIVES AND CITY AGENCIES FOUR WEEKS PRIOR TO EXCAVATION.

| REPRESENTATIVE | UTILITY | TELEPHONE |
|---|---|---|
| FRANCO CHIEFFALO | FIRST DISTRICT WATER DEPT. | (203) 847–7387 |
| GEORGE LEARY | THIRD TAXING DISTRICT DEPT. | (203) 838–7445 |
| JOHN ROBINSON | AT&T/SBC | (203) 238–7407 |
| BILL HUGHES | AT&T (LOCAL) | (203) 846–9063 |
| GEORGE REBENTISCH | CABLEVISION | (203) 750–5600 |
| STEVE KLUBNIK | CL&P | (860) 665–2473 |
| MARK BURKHART | AT&T (LONG LINES) | (203) 266–4372 |
| WALTER MASHECK | SOUTH NORWALK ELECTRICITY AND WATER (ELECTRICITY DEPARTMENT) | (203) 866–3366 |
| SCOTT WHITTIER | SOUTH NORWALK ELECTRICITY AND WATER (WATER DEPARTMENT) | (203) 866–4446 |
| DAN FITZSIMMONS | YANKEE GAS | (203) 854–6450 |
| CONNIE BLAIR | NORWALK DEPT. OF PUBLIC WORKS CALL CENTER | (203) 854–3200 |

THE CONTRACTOR SHALL CONTACT MR. FRED ESHRAGHI, CITY OF NORWALK TRAFFIC ENGINEER AT (203) 854–7791 PRIOR TO ANY EXCAVATION AND DELIVERY OF ALL SALVAGE MATERIAL.

THE CONTRACTOR SHALL OBTAIN ALL NECESSARY STATE AND CITY PERMITS, INCLUDING BUT NOT LIMITED TO: SIDEWALK, CURB, AND ROAD OPENING.

CONTRACTOR SHALL REPLACE ALL PAVEMENT MARKINGS 200 FEET ALONG ALL APPROACHES AS SHOWN ON THE PLANS. NEW STOP BARS, CROSSWALKS AND LEGENDS SHALL BE INSTALLED AS SHOWN ON THE PLANS. THE NEW PAVEMENT MARKINGS TO MATCH THE EXISTING PAVEMENT MARKINGS. ALL CONFLICTING PAVEMENT MARKINGS TO BE REMOVED.

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CONTRACTOR WILL BE REQUIRED TO TRIM TREE BRANCHES AT EACH APPROACH TO OBTAIN CLEAR SIGHTLINE TO THE SIGNAL HEADS. TREE BRANCHES SHALL BE TRIMMED BACK TO THE CURB LINE FOR A MINIMUM OF 300' FEET BACK FROM THE STOP BAR. THIS WORK SHALL BE PAID FOR UNDER ITEM NO. 0952001A "SELECTIVE CLEARING AND THINNING".

CONTRACTOR SHALL REMOVE ALL EXISTING SIGNS THAT CONFLICT WITH THE PROPOSED SIGNS. AS DIRECTED BY THE ENGINEER. THIS WORK SHALL BE PAID FOR UNDER ITEM NO. 1206023A "REMOVAL AND RELOCATION OF EXISTING SIGNS".

INSTALL SIGNS AND METAL SIGN POSTS IN ACCORDANCE WITH MISCELLANEOUS DETAIL SHEET # 55 "TYPICAL SIGNS, SUPPORTS AND SIGN PLACEMENT DETAILS" AND SHEET # 56 "TYPICAL METAL SIGN POSTS AND SIGN MOUNTING DETAILS."

VIDEO DETECTION CAMERAS AND DETECTOR ZONE LOCATIONS ARE FOR ILLUSTRATION ONLY. EXACT LOCATIONS AND DETECTOR ZONE SIZES SHALL BE DETERMINED BY THE MANUFACTURER. ALL CABLES ARE TO BE INSTALLED BY THE CONTRACTOR CONTINUOUS BETWEEN EACH VIDEO DETECTION CAMERA TO THE CONTROLLER CABINET.

CONTRACTOR SHALL REPLACE IN KIND ALL DISTURBED AREAS (CURBING, SIDEWALK, LANDSCAPE ETC.) ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT. THE LIMIT OF WORK ASSOCIATED WITH THE CONSTRUCTION OF SIGNAL EQUIPMENT SHALL BE A MINIMUM OF TEN (10) FEET UNLESS OTHERWISE SPECIFIED.

ALL DISTURBED LANDSCAPE AREAS SHALL BE TREATED WITH TOP SOIL AND SEEDING PAID FOR UNDER ITEM NO. 944001 "FURNISHING AND PLACING TOPSOIL" AND ITEM NO. 950005 "TURF ESTABLISHMENT".

A VERTICAL CLEARANCE OF 16 TO 18 FEET OVER ROADWAY PAVEMENT IS REQUIRED FOR TRAFFIC SIGNALS.

CONTRACTOR TO PROVIDE FOUR SETS OF CABINET WIRING DIAGRAMS IN THE CABINET.

CONTRACTOR SHALL REPLACE THE ENTIRE SECTION OF SIDEWALK DAMAGED DUE TO INSTALLATION OF CONDUIT, HANDHOLE, OR FOUNDATION. THE SIDEWALK SHALL BE RESTORED WITHIN 48 HOURS OF DISTURBANCE.

CONTRACTOR SHALL INSTALL 96" RISER ON MAST ARMS BEHIND THE SIGNAL HEADS FOR INSTALLING VIDEO CAMERA AS SHOWN ON THE PLAN. CONTRACTOR SHALL REFER TO SPECIAL PROVISIONS FOR THE TYPICAL INSTALLATION DETAIL FOR CAMERAS MOUNTED ON EXTENSION BRACKETS AND RISERS.

CONTRACTOR SHALL PROVIDE TEMPORARY SIGNALIZATION AT THIS LOCATION UNDER ITEM# 1118057A (SITE NO.7)

(X) CONTRACTOR SHALL INSTALL FIBER OPTIC SPLICE ENCLOSURE IN THE HANDHOLE FOR THE INSTALLATION OF FIBER OPTIC DROP CABLE.

### SIGN LEGEND

(A) INSTALL SOUTH MAIN ST – SHAFT MOUNT

(B) INSTALL [↖ WOODWARD AVE / ← CONCORD AVE] – OVERHEAD MOUNT

(C) INSTALL WOODWARD AVE – SHAFT MOUNT

(D) INSTALL 31–0823Z (NO TURN ON RED–OVERHEAD MOUNT)

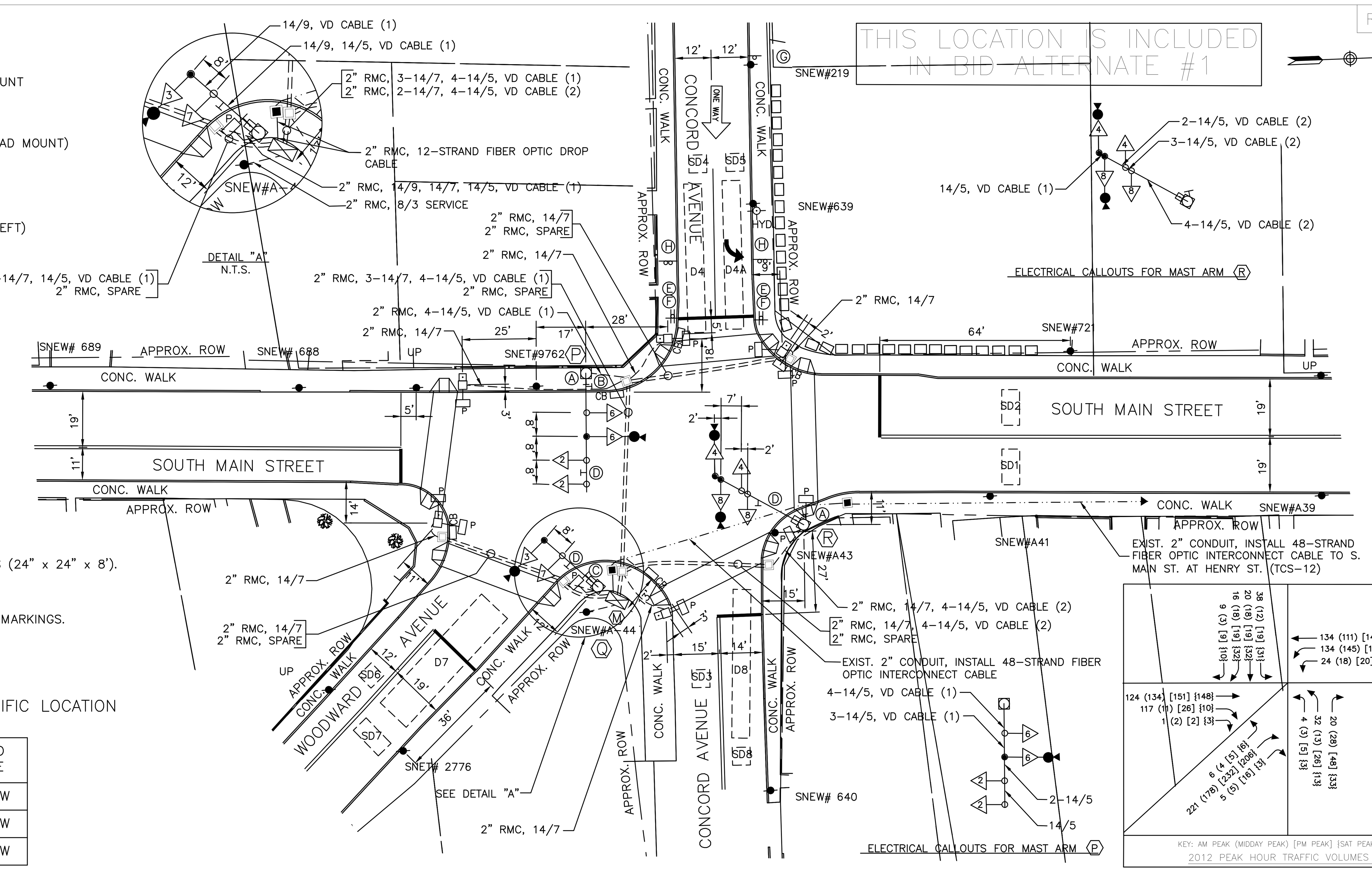
(E) EXISTING 31–1177Z (ONE WAY →)
31–1188Z (ONE WAY ←)

(F) EXISTING 31–1111Z (DO NOT ENTER)

(G) RELOCATE 31–0117Z (LEFT LANE MUST TURN LEFT)

(H) INSTALL 31–0282Z (↰ ONLY ↱)

NOTE:
ALL SIGNS TO BE MAINTAINED BY THE CITY OF NORWALK




PAVEMENT MARKING NOTES:

WHITE CROSSWALKS TO BE BAR TYPE CROSSWALKS (24" x 24" x 8').

WHITE STOP BAR SHALL BE 24" WIDE.

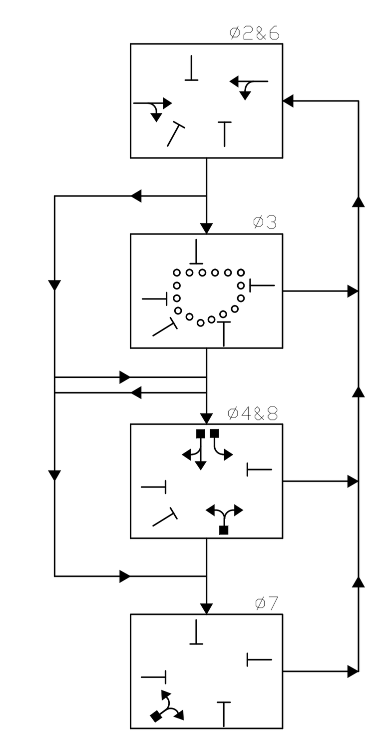
ALL PAVEMENT MARKINGS SHALL BE EPOXY RESIN MARKINGS.

ALL PAVEMENT MARKINGS TO BE MAINTAINED BY THE CITY OF NORWALK.

### MAST ARM DESIGN CRITERIA PER SPECIFIC LOCATION

| ID | SHAFT HEIGHT | ARM LENGTH | LOAD CASE |
|---|---|---|---|
| (P) | 18' | 40' | 40–1W |
| (Q) | 19' | 25' | 25–1W |
| (R) | 18' | 35' | 35–1W |

INTERSECTION # 54

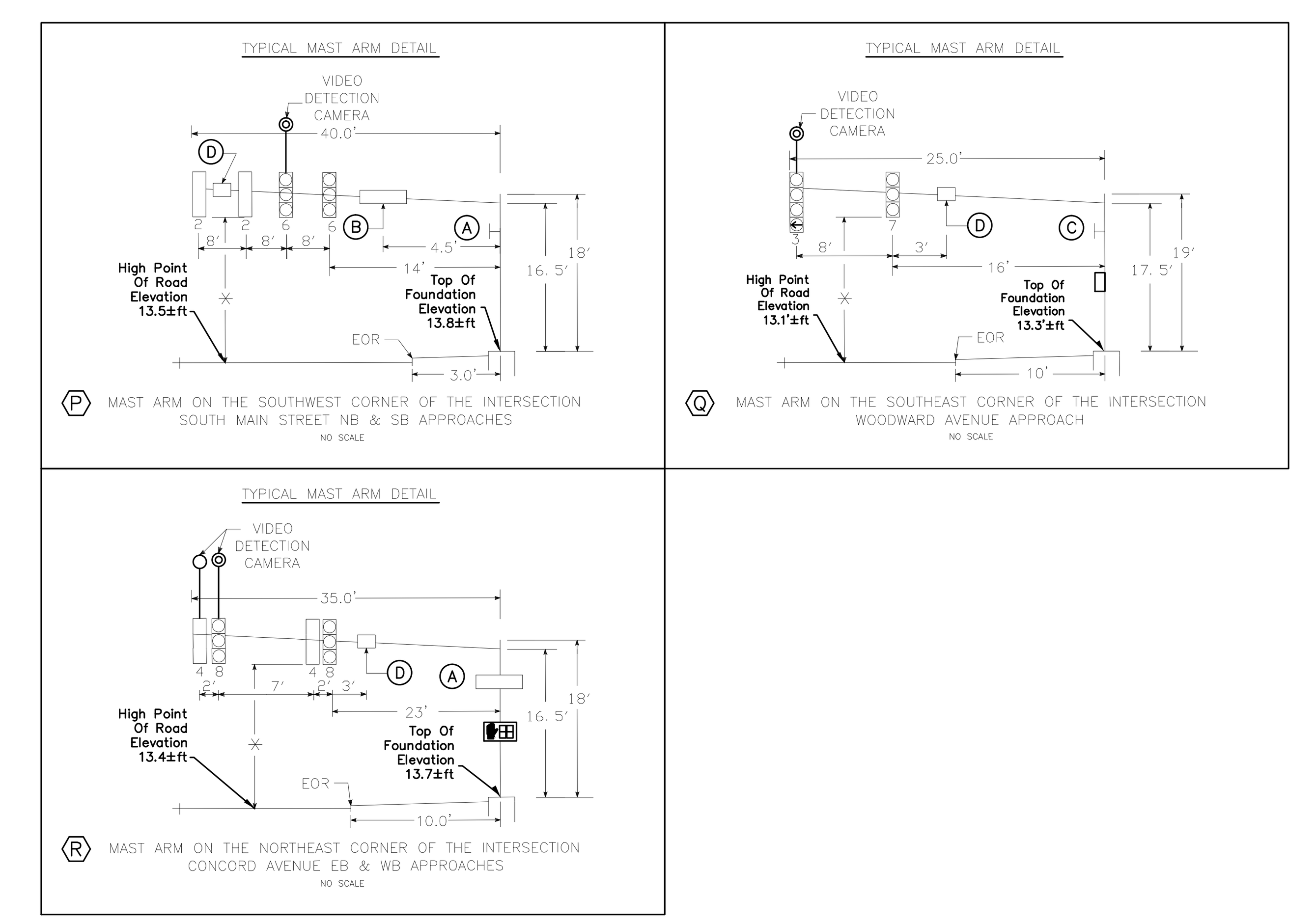



### DETECTOR CHART

| DETECTOR | LOCAL | SYSTEM |
|---|---|---|
| D4 | ø4 C&E | – |
| D4A | ø4 C&E | – |
| D7 | ø7 C&E | – |
| D8 | ø8 C&E | – |
| SD1 | – | SD1 |
| SD2 | – | SD2 |
| SD3 | – | SD3 |
| SD4 | – | SD4 |
| SD5 | – | SD5 |
| SD6 | – | SD6 |
| SD7 | – | SD7 |
| SD8 | – | SD8 |

C&E = CALL AND EXTEND

CITY SIGNAL




✳ DISTANCE BETWEEN ROAD AND SIGNAL HEAD SHALL BE 16' TO 18'.

CROSS SECTION IS IN LINE WITH MAST ARM.
CONTRACTOR TO VERIFY MAST ARM INFORMATION PRIOR TO ORDERING MAST ARMS, PER SPECIAL PROVISIONS.
ALL MAST ARM MOUNTED TRAFFIC SIGNALS ARE FIXED MOUNTED TO THE ARM BY THE USE OF ADJUSTABLE BRACKETS.
OPTICAL PRE–EMPTION EQUIPMENT AND STREET SIGNS TO BE FIELD LOCATED.
EOR = EDGE OF ROADWAY

LEGEND:
PROPOSED WOOD SPAN POLE
EXISTING WOOD SPAN POLE
PROPOSED STEEL MAST ARM
EXISTING STEEL SPAN POLE
BOLLARD
EXISTING PTZ CAMERA
PROPOSED UTILITY POLE
EXISTING UTILITY POLE
PEDESTAL MOUNTING
PEDESTRIAN PUSH BUTTON & SIGN
ELECTRIC VAULT
TRAFFIC SIGNAL FACE
PEDESTRIAN SIGNAL HEAD
AUDIBLE PEDESTRIAN SIGNAL
LOOP DETECTOR
PTZ CAMERA CONTROLLER
DETECTED MOVEMENT
SYSTEM DETECTOR
OPTICAL DETECTOR
PROPOSED CONTROLLER
EXISTING CONTROLLER
PROPOSED HANDHOLE
EXISTING HANDHOLE
PROPOSED R.M.C. (RIGID METAL CONDUIT)
EXIST. INTERCONNECT CONDUIT
FIBER OPTIC SPLICE ENCLOSURE
EXISTING R.M.C. (RIGID METAL CONDUIT)
CABLE CLOSURE
DET. LEADS IN SAW CUT
OVERHEAD SIGN
VIDEO DETECTOR
STRAIN INSULATOR
AUXILIARY TERMINATION CABINET
AUXILIARY EQUIPMENT CABINET
APPROXIMATE VIDEO DETECTOR AIMING ZONE

TRAFFIC CONTROL SIGNAL LAYOUT
CADD FILE NAME: TCS-13_S Main St @ Woodward Ave & Concord Ave.dwg
DATE PLOTTED: Apr 01, 2011
=30'

CITY OF NORWALK
SOUTH MAIN STREET AT
WOODWARD AVENUE/CONCORD AVENUE

| NO. | DATE | INIT. | DESCRIPTION |
|---|---|---|---|
| | | | |

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

PROJECT TITLE: PHASE I – NORWALK TRAFFIC SIGNAL CONTROLLER/SYSTEM UPGRADE

DIVISION OF TRAFFIC ENGINEERING CADD
OFFICE OF ENGINEERING

TOWN: NORWALK
DRAWING TITLE: S. MAIN ST. AT WOODWARD AVE/ CONCORD AVE
PROJECT NO.: 0301–0176
DRAWING NO.: TCS–13
SHEET NO.: 35

REV. | INTERSECTION # 54

THIS LOCATION IS INCLUDED IN BID ALTERNATE #1

# APPENDIX

## K SYNCHRO RESULTS

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 19 |
| Intersection LOS | C |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 86 | 186 | 124 | 276 | 328 | 68 |
| Future Vol, veh/h | 86 | 186 | 124 | 276 | 328 | 68 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 93 | 202 | 135 | 300 | 357 | 74 |
| Number of Lanes | 0 | 1 | 1 | 0 | 1 | 0 |

| Approach | NB | SB | NE |
|---|---|---|---|
| Opposing Approach | SB | NB | |
| Opposing Lanes | 1 | 1 | 0 |
| Conflicting Approach Left | NE | | SB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | | NE | NB |
| Conflicting Lanes Right | 0 | 1 | 1 |
| HCM Control Delay | 15.1 | 18.2 | 22.5 |
| HCM LOS | C | C | C |

| Lane | NELn1 | NBLn1 | SBLn1 |
|---|---|---|---|
| Vol Left, % | 83% | 32% | 0% |
| Vol Thru, % | 0% | 68% | 31% |
| Vol Right, % | 17% | 0% | 69% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 396 | 272 | 400 |
| LT Vol | 328 | 86 | 0 |
| Through Vol | 0 | 186 | 124 |
| RT Vol | 68 | 0 | 276 |
| Lane Flow Rate | 430 | 296 | 435 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.712 | 0.497 | 0.652 |
| Departure Headway (Hd) | 5.953 | 6.057 | 5.401 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 603 | 591 | 665 |
| Service Time | 4.021 | 4.145 | 3.482 |
| HCM Lane V/C Ratio | 0.713 | 0.501 | 0.654 |
| HCM Control Delay | 22.5 | 15.1 | 18.2 |
| HCM Lane LOS | C | C | C |
| HCM 95th-tile Q | 5.8 | 2.8 | 4.8 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 18.2 |
| Intersection LOS | C |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 82 | 173 | 135 | 278 | 310 | 71 |
| Future Vol, veh/h | 82 | 173 | 135 | 278 | 310 | 71 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 89 | 188 | 147 | 302 | 337 | 77 |
| Number of Lanes | 0 | 1 | 1 | 0 | 1 | 0 |

| Approach | NB | SB | NE |
|---|---|---|---|
| Opposing Approach | SB | NB | |
| Opposing Lanes | 1 | 1 | 0 |
| Conflicting Approach Left | NE | | SB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | | NE | NB |
| Conflicting Lanes Right | 0 | 1 | 1 |
| HCM Control Delay | 14.2 | 18.3 | 20.7 |
| HCM LOS | B | C | C |

| Lane | NELn1 | NBLn1 | SBLn1 |
|---|---|---|---|
| Vol Left, % | 81% | 32% | 0% |
| Vol Thru, % | 0% | 68% | 33% |
| Vol Right, % | 19% | 0% | 67% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 381 | 255 | 413 |
| LT Vol | 310 | 82 | 0 |
| Through Vol | 0 | 173 | 135 |
| RT Vol | 71 | 0 | 278 |
| Lane Flow Rate | 414 | 277 | 449 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.68 | 0.462 | 0.662 |
| Departure Headway (Hd) | 5.909 | 6.005 | 5.312 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 609 | 596 | 673 |
| Service Time | 3.973 | 4.085 | 3.383 |
| HCM Lane V/C Ratio | 0.68 | 0.465 | 0.667 |
| HCM Control Delay | 20.7 | 14.2 | 18.3 |
| HCM Lane LOS | C | B | C |
| HCM 95th-tile Q | 5.2 | 2.4 | 5 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 20 |
| Intersection LOS | C |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 86 | 186 | 146 | 276 | 328 | 68 |
| Future Vol, veh/h | 86 | 186 | 146 | 276 | 328 | 68 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 93 | 202 | 159 | 300 | 357 | 74 |
| Number of Lanes | 0 | 1 | 1 | 0 | 1 | 0 |

| Approach | NB | SB | NE |
|---|---|---|---|
| Opposing Approach | SB | NB | |
| Opposing Lanes | 1 | 1 | 0 |
| Conflicting Approach Left | NE | | SB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | | NE | NB |
| Conflicting Lanes Right | 0 | 1 | 1 |
| HCM Control Delay | 15.3 | 20.1 | 23.2 |
| HCM LOS | C | C | C |

| Lane | NELn1 | NBLn1 | SBLn1 |
|---|---|---|---|
| Vol Left, % | 83% | 32% | 0% |
| Vol Thru, % | 0% | 68% | 35% |
| Vol Right, % | 17% | 0% | 65% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 396 | 272 | 422 |
| LT Vol | 328 | 86 | 0 |
| Through Vol | 0 | 186 | 146 |
| RT Vol | 68 | 0 | 276 |
| Lane Flow Rate | 430 | 296 | 459 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.72 | 0.502 | 0.694 |
| Departure Headway (Hd) | 6.023 | 6.116 | 5.443 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 598 | 585 | 661 |
| Service Time | 4.096 | 4.211 | 3.527 |
| HCM Lane V/C Ratio | 0.719 | 0.506 | 0.694 |
| HCM Control Delay | 23.2 | 15.3 | 20.1 |
| HCM Lane LOS | C | C | C |
| HCM 95th-tile Q | 6 | 2.8 | 5.6 |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 127 | 249 | 431 | 60 | 180 | 836 | |
| Future Volume (vph) | 127 | 249 | 431 | 60 | 180 | 836 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Storage Length (ft) | 0 | 155 | | 0 | 180 | | |
| Storage Lanes | 1 | 1 | | 0 | 1 | | |
| Taper Length (ft) | 25 | | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | |
| Frt | | 0.850 | 0.977 | | | | |
| Flt Protected | 0.950 | | | | 0.950 | | |
| Satd. Flow (prot) | 1719 | 1482 | 3039 | 0 | 1626 | 3438 | |
| Flt Permitted | 0.950 | | | | 0.380 | | |
| Satd. Flow (perm) | 1719 | 1482 | 3039 | 0 | 650 | 3438 | |
| Right Turn on Red | | No | | No | | | |
| Satd. Flow (RTOR) | | | | | | | |
| Link Speed (mph) | 30 | | 35 | | | 35 | |
| Link Distance (ft) | 1185 | | 556 | | | 566 | |
| Travel Time (s) | 26.9 | | 10.8 | | | 11.0 | |
| Peak Hour Factor | 0.66 | 0.95 | 0.92 | 0.70 | 0.91 | 0.90 | |
| Heavy Vehicles (%) | 5% | 9% | 17% | 11% | 11% | 5% | |
| Adj. Flow (vph) | 192 | 262 | 468 | 86 | 198 | 929 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 192 | 262 | 554 | 0 | 198 | 929 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Right | Left | Left | |
| Median Width(ft) | 24 | | 12 | | | 12 | |
| Link Offset(ft) | 0 | | 0 | | | 0 | |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | | |
| Number of Detectors | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Right | Thru | | Left | Thru | |
| Leading Detector (ft) | 20 | 20 | 100 | | 20 | 100 | |
| Trailing Detector (ft) | 0 | 0 | 0 | | 0 | 0 | |
| Detector 1 Position(ft) | 0 | 0 | 0 | | 0 | 0 | |
| Detector 1 Size(ft) | 20 | 20 | 6 | | 20 | 6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(ft) | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | | 6 | | | 6 | |
| Detector 2 Type | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | | 0.0 | | | 0.0 | |
| Turn Type | Prot | pm+ov | NA | | pm+pt | NA | |
| Protected Phases | 8 | 1 | 2 | | 1 | 6 | 3 |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Permitted Phases | | 8 | | | 6 | | |
| Detector Phase | 8 | 1 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 7.0 | 5.0 | 15.0 | | 5.0 | 15.0 | 1.0 |
| Minimum Split (s) | 20.0 | 9.5 | 20.5 | | 9.5 | 20.5 | 7.0 |
| Total Split (s) | 35.0 | 15.0 | 28.0 | | 15.0 | 43.0 | 12.0 |
| Total Split (%) | 38.9% | 16.7% | 31.1% | | 16.7% | 47.8% | 13% |
| Maximum Green (s) | 30.7 | 10.9 | 22.5 | | 10.9 | 37.5 | 8.0 |
| Yellow Time (s) | 3.3 | 4.0 | 4.3 | | 4.0 | 4.3 | 4.0 |
| All-Red Time (s) | 1.0 | 0.1 | 1.2 | | 0.1 | 1.2 | 0.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 4.3 | 4.1 | 5.5 | | 4.1 | 5.5 | |
| Lead/Lag | Lag | Lead | Lag | | Lead | | Lead |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Recall Mode | None | None | C-Min | | None | C-Min | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 10 |
| Act Effct Green (s) | 15.4 | 29.4 | 48.6 | | 63.8 | 62.4 | |
| Actuated g/C Ratio | 0.17 | 0.33 | 0.54 | | 0.71 | 0.69 | |
| v/c Ratio | 0.65 | 0.54 | 0.34 | | 0.35 | 0.39 | |
| Control Delay | 47.3 | 25.7 | 15.2 | | 7.9 | 7.8 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 47.3 | 25.7 | 15.2 | | 7.9 | 7.8 | |
| LOS | D | C | B | | A | A | |
| Approach Delay | 34.8 | | 15.2 | | | 7.8 | |
| Approach LOS | C | | B | | | A | |

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

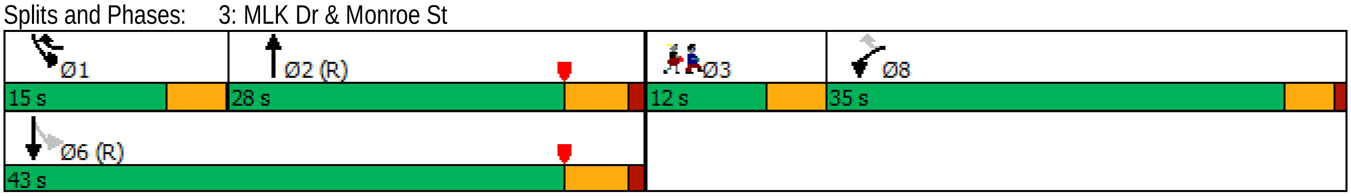
Maximum v/c Ratio: 0.65

Intersection Signal Delay: 15.5 Intersection LOS: B

Intersection Capacity Utilization 42.4% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: MLK Dr & Monroe St



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 61 | 62 | 60 | 11 | 126 | 26 | 47 | 348 | 12 | 16 | 231 | 78 |
| Future Volume (vph) | 61 | 62 | 60 | 11 | 126 | 26 | 47 | 348 | 12 | 16 | 231 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 80 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 95 |
| Storage Lanes | 1 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 1 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.937 | | | 0.973 | | | 0.993 | | | | 0.850 |
| Flt Protected | 0.950 | | | | 0.995 | | | 0.994 | | | 0.997 | |
| Satd. Flow (prot) | 1719 | 1682 | 0 | 0 | 1782 | 0 | 0 | 1621 | 0 | 0 | 1810 | 1495 |
| Flt Permitted | 0.574 | | | | 0.964 | | | 0.926 | | | 0.000 | |
| Satd. Flow (perm) | 1039 | 1682 | 0 | 0 | 1727 | 0 | 0 | 1510 | 0 | 0 | 0 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 35 | | | 12 | | | 3 | | | | 95 |
| Link Speed (mph) | | 30 | | | 30 | | | 25 | | | 30 | |
| Link Distance (ft) | | 1185 | | | 837 | | | 620 | | | 729 | |
| Travel Time (s) | | 26.9 | | | 19.0 | | | 16.9 | | | 16.6 | |
| Peak Hour Factor | 0.79 | 0.69 | 0.93 | 0.50 | 0.84 | 0.60 | 0.79 | 0.90 | 0.46 | 0.94 | 0.93 | 0.82 |
| Heavy Vehicles (%) | 5% | 5% | 7% | 10% | 2% | 4% | 30% | 14% | 9% | 0% | 5% | 8% |
| Adj. Flow (vph) | 77 | 90 | 65 | 22 | 150 | 43 | 59 | 387 | 26 | 17 | 248 | 95 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 77 | 155 | 0 | 0 | 215 | 0 | 0 | 472 | 0 | 0 | 265 | 95 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 0 | | | 0 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 35 | | | 40 | | | 30 | | | 20 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | | 20 | 6 | | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | 6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Prot | NA | Perm |
| Protected Phases | | 2 | | | 6 | | | 8 | | 7 | 4 | |

| Lane Group | Ø3 |
|---|---|
| Lane Configurations | |
| Traffic Volume (vph) | |
| Future Volume (vph) | |
| Ideal Flow (vphpl) | |
| Storage Length (ft) | |
| Storage Lanes | |
| Taper Length (ft) | |
| Lane Util. Factor | |
| Frt | |
| Flt Protected | |
| Satd. Flow (prot) | |
| Flt Permitted | |
| Satd. Flow (perm) | |
| Right Turn on Red | |
| Satd. Flow (RTOR) | |
| Link Speed (mph) | |
| Link Distance (ft) | |
| Travel Time (s) | |
| Peak Hour Factor | |
| Heavy Vehicles (%) | |
| Adj. Flow (vph) | |
| Shared Lane Traffic (%) | |
| Lane Group Flow (vph) | |
| Enter Blocked Intersection | |
| Lane Alignment | |
| Median Width(ft) | |
| Link Offset(ft) | |
| Crosswalk Width(ft) | |
| Two way Left Turn Lane | |
| Headway Factor | |
| Turning Speed (mph) | |
| Number of Detectors | |
| Detector Template | |
| Leading Detector (ft) | |
| Trailing Detector (ft) | |
| Detector 1 Position(ft) | |
| Detector 1 Size(ft) | |
| Detector 1 Type | |
| Detector 1 Channel | |
| Detector 1 Extend (s) | |
| Detector 1 Queue (s) | |
| Detector 1 Delay (s) | |
| Detector 2 Position(ft) | |
| Detector 2 Size(ft) | |
| Detector 2 Type | |
| Detector 2 Channel | |
| Detector 2 Extend (s) | |
| Turn Type | |
| Protected Phases | 3 |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Permitted Phases | 2 | | | 6 | | | 8 | | | | 7 | 4 |
| Detector Phase | 2 | 2 | | 6 | 6 | | 8 | 8 | | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | | 10.0 | 10.0 | | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | 20.9 |
| Total Split (s) | 21.0 | 21.0 | | 21.0 | 21.0 | | 32.0 | 32.0 | | 16.0 | 48.0 | 48.0 |
| Total Split (%) | 23.3% | 23.3% | | 23.3% | 23.3% | | 35.6% | 35.6% | | 17.8% | 53.3% | 53.3% |
| Maximum Green (s) | 16.1 | 16.1 | | 16.1 | 16.1 | | 27.1 | 27.1 | | 11.1 | 43.1 | 43.1 |
| Yellow Time (s) | 3.3 | 3.3 | | 3.3 | 3.3 | | 3.2 | 3.2 | | 3.2 | 3.2 | 3.2 |
| All-Red Time (s) | 1.6 | 1.6 | | 1.6 | 1.6 | | 1.7 | 1.7 | | 1.7 | 1.7 | 1.7 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Lost Time (s) | 4.9 | 4.9 | | | 4.9 | | | 4.9 | | | 4.9 | 4.9 |
| Lead/Lag | | | | | | | Lag | Lag | | Lead | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 |
| Recall Mode | C-Min | C-Min | | C-Min | C-Min | | None | None | | None | None | None |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 34.6 | 34.6 | | | 34.6 | | | 37.4 | | | 37.4 | 37.4 |
| Actuated g/C Ratio | 0.38 | 0.38 | | | 0.38 | | | 0.42 | | | 0.42 | 0.42 |
| v/c Ratio | 0.19 | 0.23 | | | 0.32 | | | 0.75 | | | 0.35 | 0.14 |
| Control Delay | 17.9 | 15.2 | | | 24.3 | | | 27.8 | | | 19.2 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Delay | 17.9 | 15.2 | | | 24.3 | | | 27.8 | | | 19.2 | 3.7 |
| LOS | B | B | | | C | | | C | | | B | A |
| Approach Delay | | 16.1 | | | 24.3 | | | 27.8 | | | 15.1 | |
| Approach LOS | | B | | | C | | | C | | | B | |

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 11 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

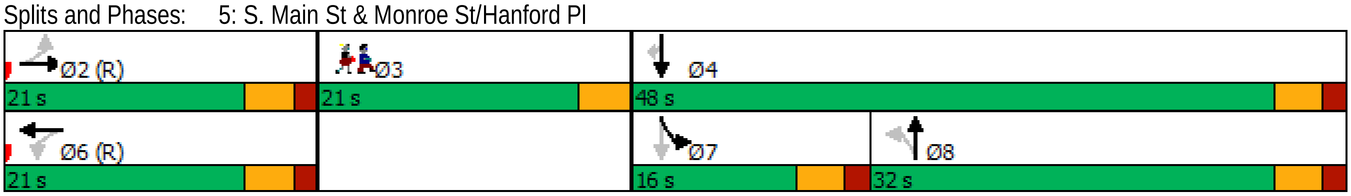
Maximum v/c Ratio: 0.75

Intersection Signal Delay: 21.5 Intersection LOS: C

Intersection Capacity Utilization 72.1% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: S. Main St & Monroe St/Hanford Pl



| Lane Group | Ø3 |
|---|---|
| Permitted Phases | |
| Detector Phase | |
| Switch Phase | |
| Minimum Initial (s) | 4.0 |
| Minimum Split (s) | 21.0 |
| Total Split (s) | 21.0 |
| Total Split (%) | 23% |
| Maximum Green (s) | 17.5 |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 0.0 |
| Lost Time Adjust (s) | |
| Total Lost Time (s) | |
| Lead/Lag | |
| Lead-Lag Optimize? | |
| Vehicle Extension (s) | 3.0 |
| Recall Mode | None |
| Walk Time (s) | 4.0 |
| Flash Dont Walk (s) | 13.0 |
| Pedestrian Calls (#/hr) | 20 |
| Act Effct Green (s) | |
| Actuated g/C Ratio | |
| v/c Ratio | |
| Control Delay | |
| Queue Delay | |
| Total Delay | |
| LOS | |
| Approach Delay | |
| Approach LOS | |

Intersection Summary

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 0 | 0 | 87 | 426 | 328 | 29 | |
| Future Volume (vph) | 0 | 0 | 87 | 426 | 328 | 29 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | | | | 0.989 | | |
| Flt Protected | | | | 0.992 | | | |
| Satd. Flow (prot) | 0 | 0 | 0 | 1848 | 1842 | 0 | |
| Flt Permitted | | | | 0.873 | | | |
| Satd. Flow (perm) | 0 | 0 | 0 | 1626 | 1842 | 0 | |
| Right Turn on Red | | Yes | | | | Yes | |
| Satd. Flow (RTOR) | | | | | 10 | | |
| Link Speed (mph) | 25 | | | 25 | 25 | | |
| Link Distance (ft) | 360 | | | 541 | 620 | | |
| Travel Time (s) | 9.8 | | | 14.8 | 16.9 | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 0 | 0 | 95 | 463 | 357 | 32 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 0 | 0 | 558 | 389 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Left | Left | Right | |
| Median Width(ft) | 0 | | | 0 | 0 | | |
| Link Offset(ft) | 0 | | | 0 | 0 | | |
| Crosswalk Width(ft) | 16 | | | 50 | 50 | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 | |
| Number of Detectors | | | 1 | 2 | 2 | | |
| Detector Template | | | Left | Thru | Thru | | |
| Leading Detector (ft) | | | 20 | 100 | 100 | | |
| Trailing Detector (ft) | | | 0 | 0 | 0 | | |
| Detector 1 Position(ft) | | | 0 | 0 | 0 | | |
| Detector 1 Size(ft) | | | 20 | 6 | 6 | | |
| Detector 1 Type | | | Cl+Ex | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | | | 0.0 | 0.0 | 0.0 | | |
| Detector 1 Queue (s) | | | 0.0 | 0.0 | 0.0 | | |
| Detector 1 Delay (s) | | | 0.0 | 0.0 | 0.0 | | |
| Detector 2 Position(ft) | | | | 94 | 94 | | |
| Detector 2 Size(ft) | | | | 6 | 6 | | |
| Detector 2 Type | | | | Cl+Ex | Cl+Ex | | |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | | | 0.0 | 0.0 | | |
| Turn Type | | | Perm | NA | NA | | |
| Protected Phases | | | | 2 | 6 | | 3 |
| Permitted Phases | | | 2 | | | | |
| Detector Phase | | | 2 | 2 | 6 | | |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | | | 15.0 | 15.0 | 15.0 | | 4.0 |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Split (s) | | | 23.1 | 23.1 | 23.4 | | 26.0 |
| Total Split (s) | | | 64.0 | 64.0 | 64.0 | | 26.0 |
| Total Split (%) | | | 71.1% | 71.1% | 71.1% | | 29% |
| Maximum Green (s) | | | 58.9 | 58.9 | 58.9 | | 22.0 |
| Yellow Time (s) | | | 3.2 | 3.2 | 3.2 | | 4.0 |
| All-Red Time (s) | | | 1.9 | 1.9 | 1.9 | | 0.0 |
| Lost Time Adjust (s) | | | | 0.0 | 0.0 | | |
| Total Lost Time (s) | | | | 5.1 | 5.1 | | |
| Lead/Lag | | | | | | | |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | | 3.0 |
| Recall Mode | | | C-Max | C-Max | C-Max | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | | | 90.0 | 90.0 | | |
| Actuated g/C Ratio | | | | 1.00 | 1.00 | | |
| v/c Ratio | | | | 0.34 | 0.21 | | |
| Control Delay | | | | 0.6 | 0.3 | | |
| Queue Delay | | | | 0.0 | 0.0 | | |
| Total Delay | | | | 0.6 | 0.3 | | |
| LOS | | | | A | A | | |
| Approach Delay | | | | 0.6 | 0.3 | | |
| Approach LOS | | | | A | A | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 53 (59%), Referenced to phase 2:NBTL and 6:SBT, Start of Green | |
| Natural Cycle: 60 | |
| Control Type: Actuated-Coordinated | |
| Maximum v/c Ratio: 0.34 | |
| Intersection Signal Delay: 0.4 | Intersection LOS: A |
| Intersection Capacity Utilization 54.8% | ICU Level of Service A |
| Analysis Period (min) 15 | |

Splits and Phases: 8: S. Main St & Henry St

| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 44 | 23 | 19 | 11 | 4 | 37 | 0 | 23 | 144 | 136 | 1 | 28 |
| Future Volume (vph) | 44 | 23 | 19 | 11 | 4 | 37 | 0 | 23 | 144 | 136 | 1 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 50 | | 0 | | | 0 | | 0 | | 0 | | |
| Storage Lanes | 1 | | 0 | | | 0 | | 0 | | 0 | | |
| Taper Length (ft) | 25 | | | | | 25 | | | | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.915 | | | | | 0.951 | | 0.934 | | | |
| Flt Protected | 0.950 | | | | | | 0.969 | | | | | |
| Satd. Flow (prot) | 1770 | 1704 | 0 | 0 | 0 | 0 | 1717 | 0 | 1740 | 0 | 0 | 0 |
| Flt Permitted | 0.858 | | | | | | 0.772 | | | | | |
| Satd. Flow (perm) | 1598 | 1704 | 0 | 0 | 0 | 0 | 1368 | 0 | 1740 | 0 | 0 | 0 |
| Right Turn on Red | | | | Yes | | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 12 | | | | | 138 | | | | | |
| Link Speed (mph) | | 25 | | | | | 25 | | 25 | | | |
| Link Distance (ft) | | 344 | | | | | 721 | | 778 | | | |
| Travel Time (s) | | 9.4 | | | | | 19.7 | | 21.2 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 48 | 25 | 21 | 12 | 4 | 40 | 0 | 25 | 157 | 148 | 1 | 30 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 48 | 58 | 0 | 0 | 0 | 0 | 69 | 0 | 306 | 0 | 0 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Left | Left | Right | Left | Right | Right | Left |
| Median Width(ft) | | 12 | | | | | 12 | | 0 | | | |
| Link Offset(ft) | | 0 | | | | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 30 | | | | | 35 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 9 | 15 | 15 | | 9 | | 9 | 9 | 15 |
| Number of Detectors | 1 | 2 | | | 1 | 1 | 2 | | 2 | | | 1 |
| Detector Template | Left | Thru | | | Left | Left | Thru | | Thru | | | Left |
| Leading Detector (ft) | 20 | 100 | | | 20 | 20 | 100 | | 100 | | | 20 |
| Trailing Detector (ft) | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | 0 |
| Detector 1 Position(ft) | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | 0 |
| Detector 1 Size(ft) | 20 | 6 | | | 20 | 20 | 6 | | 6 | | | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | | | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Detector 2 Position(ft) | | 94 | | | | | 94 | | 94 | | | |
| Detector 2 Size(ft) | | 6 | | | | | 6 | | 6 | | | |
| Detector 2 Type | | Cl+Ex | | | | | Cl+Ex | | Cl+Ex | | | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Turn Type | Perm | NA | | | Perm | Perm | NA | | NA | | | Perm |
| Protected Phases | | 4 | | | | | 8 | | 2 | | | |
| Permitted Phases | 4 | | | | 8 | 8 | | | | | | 6 |

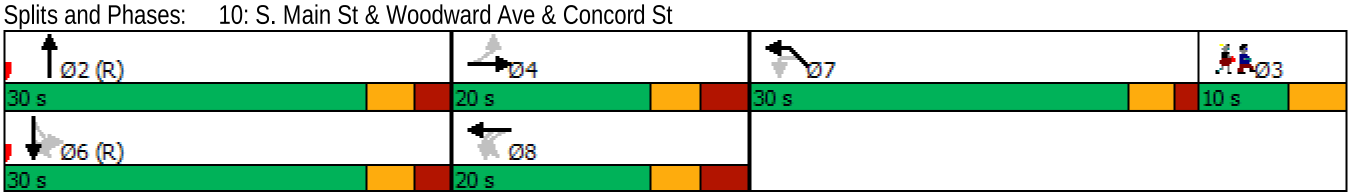
| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 156 | 156 | 7 | 0 | 256 | 6 | |
| Future Volume (vph) | 156 | 156 | 7 | 0 | 256 | 6 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Storage Length (ft) | 0 | | | 0 | 0 | | |
| Storage Lanes | 0 | | | 1 | 0 | | |
| Taper Length (ft) | 25 | | | 25 | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | | | 0.869 | | | |
| Flt Protected | | 0.974 | | 0.999 | | | |
| Satd. Flow (prot) | 0 | 1814 | 0 | 1617 | 0 | 0 | |
| Flt Permitted | | 0.641 | | 0.999 | | | |
| Satd. Flow (perm) | 0 | 1194 | 0 | 1617 | 0 | 0 | |
| Right Turn on Red | | | | | | Yes | |
| Satd. Flow (RTOR) | | | | 162 | | | |
| Link Speed (mph) | | 25 | | 25 | | | |
| Link Distance (ft) | | 541 | | 844 | | | |
| Travel Time (s) | | 14.8 | | 23.0 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 170 | 170 | 8 | 0 | 278 | 7 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 370 | 0 | 293 | 0 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Left | Left | Left | Right | Right | |
| Median Width(ft) | | 0 | | 12 | | | |
| Link Offset(ft) | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 50 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | | 15 | 15 | 9 | 9 | |
| Number of Detectors | 1 | 2 | 1 | 1 | | | |
| Detector Template | Left | Thru | Left | Left | | | |
| Leading Detector (ft) | 20 | 100 | 20 | 20 | | | |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | | | |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | | | |
| Detector 1 Size(ft) | 20 | 6 | 20 | 20 | | | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | | |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Detector 2 Position(ft) | | 94 | | | | | |
| Detector 2 Size(ft) | | 6 | | | | | |
| Detector 2 Type | | Cl+Ex | | | | | |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | | | |
| Turn Type | Perm | NA | Perm | Prot | | | |
| Protected Phases | | 6 | | 7 | | | 3 |
| Permitted Phases | 6 | | 7 | 7 | | | |

| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector Phase | 4 | 4 | | | 8 | 8 | 8 | | 2 | | | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 7.0 | 7.0 | | | 10.0 | 10.0 | 10.0 | | 15.0 | | | 15.0 |
| Minimum Split (s) | 24.7 | 24.7 | | | 24.7 | 24.7 | 24.7 | | 23.7 | | | 23.7 |
| Total Split (s) | 20.0 | 20.0 | | | 20.0 | 20.0 | 20.0 | | 30.0 | | | 30.0 |
| Total Split (%) | 22.2% | 22.2% | | | 22.2% | 22.2% | 22.2% | | 33.3% | | | 33.3% |
| Maximum Green (s) | 13.3 | 13.3 | | | 13.3 | 13.3 | 13.3 | | 24.3 | | | 24.3 |
| Yellow Time (s) | 3.3 | 3.3 | | | 3.3 | 3.3 | 3.3 | | 3.2 | | | 3.2 |
| All-Red Time (s) | 3.4 | 3.4 | | | 3.4 | 3.4 | 3.4 | | 2.5 | | | 2.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | 6.7 | 6.7 | | | | | 6.7 | | 5.7 | | | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 |
| Recall Mode | None | None | | | None | None | None | | C-Min | | | C-Min |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 9.9 | 9.9 | | | | | 10.5 | | 51.3 | | | |
| Actuated g/C Ratio | 0.11 | 0.11 | | | | | 0.12 | | 0.57 | | | |
| v/c Ratio | 0.27 | 0.29 | | | | | 0.25 | | 0.31 | | | |
| Control Delay | 40.2 | 34.1 | | | | | 2.1 | | 13.7 | | | |
| Queue Delay | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Delay | 40.2 | 34.1 | | | | | 2.1 | | 13.7 | | | |
| LOS | D | C | | | | | A | | B | | | |
| Approach Delay | | 36.9 | | | | | 2.1 | | 13.7 | | | |
| Approach LOS | | D | | | | | A | | B | | | |

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 45 (50%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 115
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 80.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 10: S. Main St & Woodward Ave & Concord St



| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Detector Phase | 6 | 6 | 7 | 7 | | | |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | 10.0 | 10.0 | | | 4.0 |
| Minimum Split (s) | 23.7 | 23.7 | 22.7 | 22.7 | | | 21.0 |
| Total Split (s) | 30.0 | 30.0 | 30.0 | 30.0 | | | 10.0 |
| Total Split (%) | 33.3% | 33.3% | 33.3% | 33.3% | | | 11% |
| Maximum Green (s) | 24.3 | 24.3 | 25.3 | 25.3 | | | 6.0 |
| Yellow Time (s) | 3.2 | 3.2 | 3.1 | 3.1 | | | 4.0 |
| All-Red Time (s) | 2.5 | 2.5 | 1.6 | 1.6 | | | 0.0 |
| Lost Time Adjust (s) | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | | 5.7 | | 4.7 | | | |
| Lead/Lag | | | Lead | Lead | | | Lag |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Recall Mode | C-Min | C-Min | None | None | | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | 51.3 | | 14.4 | | | |
| Actuated g/C Ratio | | 0.57 | | 0.16 | | | |
| v/c Ratio | | 0.54 | | 0.74 | | | |
| Control Delay | | 24.7 | | 27.2 | | | |
| Queue Delay | | 0.0 | | 0.0 | | | |
| Total Delay | | 24.7 | | 27.2 | | | |
| LOS | | C | | C | | | |
| Approach Delay | | 24.7 | | 27.2 | | | |
| Approach LOS | | C | | C | | | |

Intersection Summary

| Lane Group | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 42 | 258 | 169 | 11 | 11 | 40 |
| Future Volume (vph) | 42 | 258 | 169 | 11 | 11 | 40 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.865 | | 0.894 | |
| Flt Protected | | 0.950 | | | 0.989 | |
| Satd. Flow (prot) | 0 | 1770 | 1611 | 0 | 1647 | 0 |
| Flt Permitted | | 0.950 | | | 0.989 | |
| Satd. Flow (perm) | 0 | 1770 | 1611 | 0 | 1647 | 0 |
| Link Speed (mph) | | 25 | 25 | | 25 | |
| Link Distance (ft) | | 91 | 844 | | 641 | |
| Travel Time (s) | | 2.5 | 23.0 | | 17.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 46 | 280 | 184 | 12 | 12 | 43 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 326 | 196 | 0 | 55 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Right |
| Median Width(ft) | | 12 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 15 | 9 | 9 | 15 | 9 |
| Sign Control | | Free | Free | | Stop | |

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 26.6% ICU Level of Service A

Analysis Period (min) 15

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 301 | 133 | 167 | 347 | 110 | 99 |
| Future Volume (vph) | 301 | 133 | 167 | 347 | 110 | 99 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.959 | | 0.909 | | | |
| Flt Protected | 0.967 | | | | | 0.974 |
| Satd. Flow (prot) | 1727 | 0 | 1693 | 0 | 0 | 1814 |
| Flt Permitted | 0.967 | | | | | 0.974 |
| Satd. Flow (perm) | 1727 | 0 | 1693 | 0 | 0 | 1814 |
| Link Speed (mph) | 25 | | 25 | | | 25 |
| Link Distance (ft) | 380 | | 640 | | | 91 |
| Travel Time (s) | 10.4 | | 17.5 | | | 2.5 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 327 | 145 | 182 | 377 | 120 | 108 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 472 | 0 | 559 | 0 | 0 | 228 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Right | Left | Left |
| Median Width(ft) | 12 | | 0 | | | 0 |
| Link Offset(ft) | 0 | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | |
| Sign Control | Stop | | Free | | | Free |

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 76.2% ICU Level of Service D

Analysis Period (min) 15

| Lane Group | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 86 | 186 | 124 | 276 | 328 | 68 |
| Future Volume (vph) | 86 | 186 | 124 | 276 | 328 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.907 | | 0.977 | |
| Flt Protected | | 0.984 | | | 0.960 | |
| Satd. Flow (prot) | 0 | 1833 | 1690 | 0 | 1747 | 0 |
| Flt Permitted | | 0.984 | | | 0.960 | |
| Satd. Flow (perm) | 0 | 1833 | 1690 | 0 | 1747 | 0 |
| Link Speed (mph) | | 25 | 25 | | 30 | |
| Link Distance (ft) | | 616 | 640 | | 489 | |
| Travel Time (s) | | 16.8 | 17.5 | | 11.1 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 93 | 202 | 135 | 300 | 357 | 74 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 295 | 435 | 0 | 431 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Left | Right | Left | Right |
| Median Width(ft) | | 0 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | | 9 | 15 | 9 |
| Sign Control | | Stop | Stop | | Stop | |

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 70.3% ICU Level of Service C

Analysis Period (min) 15

| Movement | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 39 | 267 | 193 | 14 | 14 | 38 |
| Future Volume (Veh/h) | 39 | 267 | 193 | 14 | 14 | 38 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 42 | 290 | 210 | 15 | 15 | 41 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | 844 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 225 | | | | 592 | 218 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 225 | | | | 592 | 218 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 97 | | | | 97 | 95 |
| cM capacity (veh/h) | 1344 | | | | 455 | 822 |

| Direction, Lane # | NB 1 | SE 1 | NE 1 |
|---|---|---|---|
| Volume Total | 332 | 225 | 56 |
| Volume Left | 42 | 0 | 15 |
| Volume Right | 0 | 15 | 41 |
| cSH | 1344 | 1700 | 676 |
| Volume to Capacity | 0.03 | 0.13 | 0.08 |
| Queue Length 95th (ft) | 2 | 0 | 7 |
| Control Delay (s) | 1.2 | 0.0 | 10.8 |
| Lane LOS | A | | B |
| Approach Delay (s) | 1.2 | 0.0 | 10.8 |
| Approach LOS | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.7 | | |
| Intersection Capacity Utilization | 27.0% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 287 | 108 | 198 | 285 | 105 | 126 |
| Future Volume (Veh/h) | 287 | 108 | 198 | 285 | 105 | 126 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 312 | 117 | 215 | 310 | 114 | 137 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 735 | 370 | | | 525 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 735 | 370 | | | 525 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 9 | 83 | | | 89 | |
| cM capacity (veh/h) | 344 | 676 | | | 1042 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 429 | 525 | 251 |
| Volume Left | 312 | 0 | 114 |
| Volume Right | 117 | 310 | 0 |
| cSH | 398 | 1700 | 1042 |
| Volume to Capacity | 1.08 | 0.31 | 0.11 |
| Queue Length 95th (ft) | 370 | 0 | 9 |
| Control Delay (s) | 100.5 | 0.0 | 4.6 |
| Lane LOS | F | | A |
| Approach Delay (s) | 100.5 | 0.0 | 4.6 |
| Approach LOS | F | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 36.7 | | |
| Intersection Capacity Utilization | 72.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | | Stop | Stop | | Stop | |
| Traffic Volume (vph) | 82 | 173 | 135 | 278 | 310 | 71 |
| Future Volume (vph) | 82 | 173 | 135 | 278 | 310 | 71 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 89 | 188 | 147 | 302 | 337 | 77 |

| Direction, Lane # | NB 1 | SB 1 | NE 1 |
|---|---|---|---|
| Volume Total (vph) | 277 | 449 | 414 |
| Volume Left (vph) | 89 | 0 | 337 |
| Volume Right (vph) | 0 | 302 | 77 |
| Hadj (s) | 0.10 | -0.37 | 0.09 |
| Departure Headway (s) | 6.1 | 5.4 | 6.0 |
| Degree Utilization, x | 0.47 | 0.67 | 0.68 |
| Capacity (veh/h) | 550 | 642 | 570 |
| Control Delay (s) | 14.3 | 18.6 | 20.9 |
| Approach Delay (s) | 14.3 | 18.6 | 20.9 |
| Approach LOS | B | C | C |

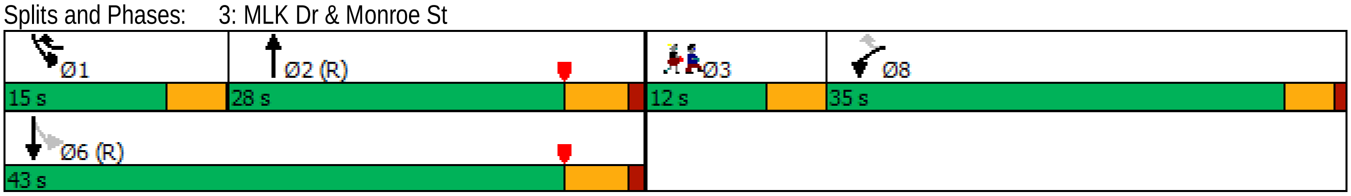
| Intersection Summary | | | |
|---|---|---|---|
| Delay | 18.4 | | |
| Level of Service | C | | |
| Intersection Capacity Utilization | 69.3% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 127 | 249 | 431 | 60 | 182 | 837 | |
| Future Volume (vph) | 127 | 249 | 431 | 60 | 182 | 837 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Storage Length (ft) | 0 | 155 | | 0 | 180 | | |
| Storage Lanes | 1 | 1 | | 0 | 1 | | |
| Taper Length (ft) | 25 | | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | |
| Frt | | 0.850 | 0.977 | | | | |
| Flt Protected | 0.950 | | | | 0.950 | | |
| Satd. Flow (prot) | 1719 | 1482 | 3039 | 0 | 1626 | 3438 | |
| Flt Permitted | 0.950 | | | | 0.380 | | |
| Satd. Flow (perm) | 1719 | 1482 | 3039 | 0 | 650 | 3438 | |
| Right Turn on Red | | No | | No | | | |
| Satd. Flow (RTOR) | | | | | | | |
| Link Speed (mph) | 30 | | 35 | | | 35 | |
| Link Distance (ft) | 1185 | | 556 | | | 566 | |
| Travel Time (s) | 26.9 | | 10.8 | | | 11.0 | |
| Peak Hour Factor | 0.66 | 0.95 | 0.92 | 0.70 | 0.91 | 0.90 | |
| Heavy Vehicles (%) | 5% | 9% | 17% | 11% | 11% | 5% | |
| Adj. Flow (vph) | 192 | 262 | 468 | 86 | 200 | 930 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 192 | 262 | 554 | 0 | 200 | 930 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Right | Left | Left | |
| Median Width(ft) | 24 | | 12 | | | 12 | |
| Link Offset(ft) | 0 | | 0 | | | 0 | |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | | |
| Number of Detectors | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Right | Thru | | Left | Thru | |
| Leading Detector (ft) | 20 | 20 | 100 | | 20 | 100 | |
| Trailing Detector (ft) | 0 | 0 | 0 | | 0 | 0 | |
| Detector 1 Position(ft) | 0 | 0 | 0 | | 0 | 0 | |
| Detector 1 Size(ft) | 20 | 20 | 6 | | 20 | 6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(ft) | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | | 6 | | | 6 | |
| Detector 2 Type | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | | 0.0 | | | 0.0 | |
| Turn Type | Prot | pm+ov | NA | | pm+pt | NA | |
| Protected Phases | 8 | 1 | 2 | | 1 | 6 | 3 |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Permitted Phases | | 8 | | | 6 | | |
| Detector Phase | 8 | 1 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 7.0 | 5.0 | 15.0 | | 5.0 | 15.0 | 1.0 |
| Minimum Split (s) | 20.0 | 9.5 | 20.5 | | 9.5 | 20.5 | 7.0 |
| Total Split (s) | 35.0 | 15.0 | 28.0 | | 15.0 | 43.0 | 12.0 |
| Total Split (%) | 38.9% | 16.7% | 31.1% | | 16.7% | 47.8% | 13% |
| Maximum Green (s) | 30.7 | 10.9 | 22.5 | | 10.9 | 37.5 | 8.0 |
| Yellow Time (s) | 3.3 | 4.0 | 4.3 | | 4.0 | 4.3 | 4.0 |
| All-Red Time (s) | 1.0 | 0.1 | 1.2 | | 0.1 | 1.2 | 0.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 4.3 | 4.1 | 5.5 | | 4.1 | 5.5 | |
| Lead/Lag | Lag | Lead | Lag | | Lead | | Lead |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Recall Mode | None | None | C-Min | | None | C-Min | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 10 |
| Act Effct Green (s) | 15.4 | 29.4 | 48.6 | | 63.8 | 62.4 | |
| Actuated g/C Ratio | 0.17 | 0.33 | 0.54 | | 0.71 | 0.69 | |
| v/c Ratio | 0.65 | 0.54 | 0.34 | | 0.35 | 0.39 | |
| Control Delay | 47.4 | 25.7 | 15.2 | | 7.9 | 7.8 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 47.4 | 25.7 | 15.2 | | 7.9 | 7.8 | |
| LOS | D | C | B | | A | A | |
| Approach Delay | 34.8 | | 15.2 | | | 7.8 | |
| Approach LOS | C | | B | | | A | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow | |
| Natural Cycle: 60 | |
| Control Type: Actuated-Coordinated | |
| Maximum v/c Ratio: 0.65 | |
| Intersection Signal Delay: 15.5 | Intersection LOS: B |
| Intersection Capacity Utilization 42.5% | ICU Level of Service A |
| Analysis Period (min) 15 | |

Splits and Phases: 3: MLK Dr & Monroe St



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 61 | 62 | 62 | 11 | 126 | 26 | 47 | 348 | 12 | 16 | 241 | 78 |
| Future Volume (vph) | 61 | 62 | 62 | 11 | 126 | 26 | 47 | 348 | 12 | 16 | 241 | 78 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 80 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 95 |
| Storage Lanes | 1 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 1 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.936 | | | 0.973 | | | 0.993 | | | | 0.850 |
| Flt Protected | 0.950 | | | | 0.995 | | | 0.994 | | | 0.997 | |
| Satd. Flow (prot) | 1719 | 1680 | 0 | 0 | 1782 | 0 | 0 | 1621 | 0 | 0 | 1809 | 1495 |
| Flt Permitted | 0.573 | | | | 0.964 | | | 0.925 | | | 0.000 | |
| Satd. Flow (perm) | 1037 | 1680 | 0 | 0 | 1727 | 0 | 0 | 1508 | 0 | 0 | 0 | 1495 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 36 | | | 12 | | | 3 | | | | 95 |
| Link Speed (mph) | | 30 | | | 30 | | | 25 | | | 30 | |
| Link Distance (ft) | | 1185 | | | 837 | | | 620 | | | 729 | |
| Travel Time (s) | | 26.9 | | | 19.0 | | | 16.9 | | | 16.6 | |
| Peak Hour Factor | 0.79 | 0.69 | 0.93 | 0.50 | 0.84 | 0.60 | 0.79 | 0.90 | 0.46 | 0.94 | 0.93 | 0.82 |
| Heavy Vehicles (%) | 5% | 5% | 7% | 10% | 2% | 4% | 30% | 14% | 9% | 0% | 5% | 8% |
| Adj. Flow (vph) | 77 | 90 | 67 | 22 | 150 | 43 | 59 | 387 | 26 | 17 | 259 | 95 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 77 | 157 | 0 | 0 | 215 | 0 | 0 | 472 | 0 | 0 | 276 | 95 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 0 | | | 0 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 35 | | | 40 | | | 30 | | | 20 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | | 20 | 6 | | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | 6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Prot | NA | Perm |
| Protected Phases | | 2 | | | 6 | | | 8 | | 7 | 4 | |

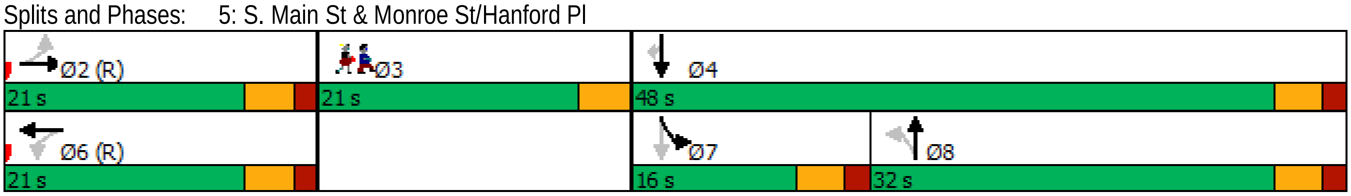
| Lane Group | Ø3 |
|---|---|
| Lane Configurations | |
| Traffic Volume (vph) | |
| Future Volume (vph) | |
| Ideal Flow (vphpl) | |
| Storage Length (ft) | |
| Storage Lanes | |
| Taper Length (ft) | |
| Lane Util. Factor | |
| Frt | |
| Flt Protected | |
| Satd. Flow (prot) | |
| Flt Permitted | |
| Satd. Flow (perm) | |
| Right Turn on Red | |
| Satd. Flow (RTOR) | |
| Link Speed (mph) | |
| Link Distance (ft) | |
| Travel Time (s) | |
| Peak Hour Factor | |
| Heavy Vehicles (%) | |
| Adj. Flow (vph) | |
| Shared Lane Traffic (%) | |
| Lane Group Flow (vph) | |
| Enter Blocked Intersection | |
| Lane Alignment | |
| Median Width(ft) | |
| Link Offset(ft) | |
| Crosswalk Width(ft) | |
| Two way Left Turn Lane | |
| Headway Factor | |
| Turning Speed (mph) | |
| Number of Detectors | |
| Detector Template | |
| Leading Detector (ft) | |
| Trailing Detector (ft) | |
| Detector 1 Position(ft) | |
| Detector 1 Size(ft) | |
| Detector 1 Type | |
| Detector 1 Channel | |
| Detector 1 Extend (s) | |
| Detector 1 Queue (s) | |
| Detector 1 Delay (s) | |
| Detector 2 Position(ft) | |
| Detector 2 Size(ft) | |
| Detector 2 Type | |
| Detector 2 Channel | |
| Detector 2 Extend (s) | |
| Turn Type | |
| Protected Phases | 3 |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Permitted Phases | 2 | | | 6 | | | 8 | | | | 7 | 4 |
| Detector Phase | 2 | 2 | | 6 | 6 | | 8 | 8 | | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | | 10.0 | 10.0 | | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | 20.9 |
| Total Split (s) | 21.0 | 21.0 | | 21.0 | 21.0 | | 32.0 | 32.0 | | 16.0 | 48.0 | 48.0 |
| Total Split (%) | 23.3% | 23.3% | | 23.3% | 23.3% | | 35.6% | 35.6% | | 17.8% | 53.3% | 53.3% |
| Maximum Green (s) | 16.1 | 16.1 | | 16.1 | 16.1 | | 27.1 | 27.1 | | 11.1 | 43.1 | 43.1 |
| Yellow Time (s) | 3.3 | 3.3 | | 3.3 | 3.3 | | 3.2 | 3.2 | | 3.2 | 3.2 | 3.2 |
| All-Red Time (s) | 1.6 | 1.6 | | 1.6 | 1.6 | | 1.7 | 1.7 | | 1.7 | 1.7 | 1.7 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Lost Time (s) | 4.9 | 4.9 | | | 4.9 | | | 4.9 | | | 4.9 | 4.9 |
| Lead/Lag | | | | | | | Lag | Lag | | Lead | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 |
| Recall Mode | C-Min | C-Min | | C-Min | C-Min | | None | None | | None | None | None |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 34.4 | 34.4 | | | 34.4 | | | 37.6 | | | 37.6 | 37.6 |
| Actuated g/C Ratio | 0.38 | 0.38 | | | 0.38 | | | 0.42 | | | 0.42 | 0.42 |
| v/c Ratio | 0.19 | 0.24 | | | 0.32 | | | 0.75 | | | 0.37 | 0.14 |
| Control Delay | 18.0 | 15.4 | | | 24.4 | | | 27.6 | | | 19.3 | 3.7 |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Delay | 18.0 | 15.4 | | | 24.4 | | | 27.6 | | | 19.3 | 3.7 |
| LOS | B | B | | | C | | | C | | | B | A |
| Approach Delay | | 16.2 | | | 24.4 | | | 27.6 | | | 15.3 | |
| Approach LOS | | B | | | C | | | C | | | B | |

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 11 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 21.5 Intersection LOS: C
Intersection Capacity Utilization 72.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: S. Main St & Monroe St/Hanford Pl



| Lane Group | Ø3 |
|---|---|
| Permitted Phases | |
| Detector Phase | |
| Switch Phase | |
| Minimum Initial (s) | 4.0 |
| Minimum Split (s) | 21.0 |
| Total Split (s) | 21.0 |
| Total Split (%) | 23% |
| Maximum Green (s) | 17.5 |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 0.0 |
| Lost Time Adjust (s) | |
| Total Lost Time (s) | |
| Lead/Lag | |
| Lead-Lag Optimize? | |
| Vehicle Extension (s) | 3.0 |
| Recall Mode | None |
| Walk Time (s) | 4.0 |
| Flash Dont Walk (s) | 13.0 |
| Pedestrian Calls (#/hr) | 20 |
| Act Effct Green (s) | |
| Actuated g/C Ratio | |
| v/c Ratio | |
| Control Delay | |
| Queue Delay | |
| Total Delay | |
| LOS | |
| Approach Delay | |
| Approach LOS | |

| Intersection Summary |
|---|

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 0 | 0 | 87 | 426 | 340 | 29 | |
| Future Volume (vph) | 0 | 0 | 87 | 426 | 340 | 29 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | | | | 0.989 | | |
| Flt Protected | | | | 0.992 | | | |
| Satd. Flow (prot) | 0 | 0 | 0 | 1848 | 1842 | 0 | |
| Flt Permitted | | | | 0.871 | | | |
| Satd. Flow (perm) | 0 | 0 | 0 | 1622 | 1842 | 0 | |
| Right Turn on Red | | Yes | | | | Yes | |
| Satd. Flow (RTOR) | | | | | 10 | | |
| Link Speed (mph) | 25 | | | 25 | 25 | | |
| Link Distance (ft) | 360 | | | 541 | 620 | | |
| Travel Time (s) | 9.8 | | | 14.8 | 16.9 | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 0 | 0 | 95 | 463 | 370 | 32 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 0 | 0 | 558 | 402 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Left | Left | Right | |
| Median Width(ft) | 0 | | | 0 | 0 | | |
| Link Offset(ft) | 0 | | | 0 | 0 | | |
| Crosswalk Width(ft) | 16 | | | 50 | 50 | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 | |
| Number of Detectors | | | 1 | 2 | 2 | | |
| Detector Template | | | Left | Thru | Thru | | |
| Leading Detector (ft) | | | 20 | 100 | 100 | | |
| Trailing Detector (ft) | | | 0 | 0 | 0 | | |
| Detector 1 Position(ft) | | | 0 | 0 | 0 | | |
| Detector 1 Size(ft) | | | 20 | 6 | 6 | | |
| Detector 1 Type | | | Cl+Ex | Cl+Ex | Cl+Ex | | |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | | | 0.0 | 0.0 | 0.0 | | |
| Detector 1 Queue (s) | | | 0.0 | 0.0 | 0.0 | | |
| Detector 1 Delay (s) | | | 0.0 | 0.0 | 0.0 | | |
| Detector 2 Position(ft) | | | | 94 | 94 | | |
| Detector 2 Size(ft) | | | | 6 | 6 | | |
| Detector 2 Type | | | | Cl+Ex | Cl+Ex | | |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | | | 0.0 | 0.0 | | |
| Turn Type | | | Perm | NA | NA | | |
| Protected Phases | | | | 2 | 6 | | 3 |
| Permitted Phases | | | 2 | | | | |
| Detector Phase | | | 2 | 2 | 6 | | |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | | | 15.0 | 15.0 | 15.0 | | 4.0 |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Split (s) | | | 23.1 | 23.1 | 23.4 | | 26.0 |
| Total Split (s) | | | 64.0 | 64.0 | 64.0 | | 26.0 |
| Total Split (%) | | | 71.1% | 71.1% | 71.1% | | 29% |
| Maximum Green (s) | | | 58.9 | 58.9 | 58.9 | | 22.0 |
| Yellow Time (s) | | | 3.2 | 3.2 | 3.2 | | 4.0 |
| All-Red Time (s) | | | 1.9 | 1.9 | 1.9 | | 0.0 |
| Lost Time Adjust (s) | | | | 0.0 | 0.0 | | |
| Total Lost Time (s) | | | | 5.1 | 5.1 | | |
| Lead/Lag | | | | | | | |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | | 3.0 |
| Recall Mode | | | C-Max | C-Max | C-Max | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | | | 90.0 | 90.0 | | |
| Actuated g/C Ratio | | | | 1.00 | 1.00 | | |
| v/c Ratio | | | | 0.34 | 0.22 | | |
| Control Delay | | | | 0.6 | 0.3 | | |
| Queue Delay | | | | 0.0 | 0.0 | | |
| Total Delay | | | | 0.6 | 0.3 | | |
| LOS | | | | A | A | | |
| Approach Delay | | | | 0.6 | 0.3 | | |
| Approach LOS | | | | A | A | | |

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 53 (59%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.34

Intersection Signal Delay: 0.4 Intersection LOS: A

Intersection Capacity Utilization 55.4% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: S. Main St & Henry St

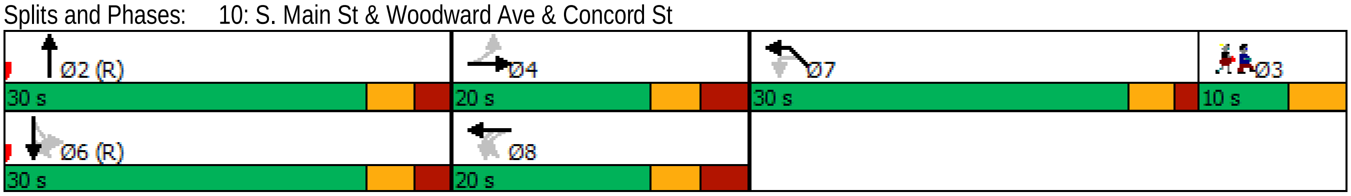
| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 44 | 23 | 19 | 11 | 4 | 37 | 0 | 23 | 144 | 136 | 1 | 28 |
| Future Volume (vph) | 44 | 23 | 19 | 11 | 4 | 37 | 0 | 23 | 144 | 136 | 1 | 28 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 50 | | 0 | | | 0 | | 0 | | 0 | | |
| Storage Lanes | 1 | | 0 | | | 0 | | 0 | | 0 | | |
| Taper Length (ft) | 25 | | | | | 25 | | | | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.915 | | | | | 0.951 | | 0.934 | | | |
| Flt Protected | 0.950 | | | | | | 0.969 | | | | | |
| Satd. Flow (prot) | 1770 | 1704 | 0 | 0 | 0 | 0 | 1717 | 0 | 1740 | 0 | 0 | 0 |
| Flt Permitted | 0.858 | | | | | | 0.772 | | | | | |
| Satd. Flow (perm) | 1598 | 1704 | 0 | 0 | 0 | 0 | 1368 | 0 | 1740 | 0 | 0 | 0 |
| Right Turn on Red | | | | Yes | | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 12 | | | | | 138 | | | | | |
| Link Speed (mph) | | 25 | | | | | 25 | | 25 | | | |
| Link Distance (ft) | | 344 | | | | | 721 | | 778 | | | |
| Travel Time (s) | | 9.4 | | | | | 19.7 | | 21.2 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 48 | 25 | 21 | 12 | 4 | 40 | 0 | 25 | 157 | 148 | 1 | 30 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 48 | 58 | 0 | 0 | 0 | 0 | 69 | 0 | 306 | 0 | 0 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Left | Left | Right | Left | Right | Right | Left |
| Median Width(ft) | | 12 | | | | | 12 | | 0 | | | |
| Link Offset(ft) | | 0 | | | | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 30 | | | | | 35 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 9 | 15 | 15 | | 9 | | 9 | 9 | 15 |
| Number of Detectors | 1 | 2 | | | 1 | 1 | 2 | | 2 | | | 1 |
| Detector Template | Left | Thru | | | Left | Left | Thru | | Thru | | | Left |
| Leading Detector (ft) | 20 | 100 | | | 20 | 20 | 100 | | 100 | | | 20 |
| Trailing Detector (ft) | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | 0 |
| Detector 1 Position(ft) | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | 0 |
| Detector 1 Size(ft) | 20 | 6 | | | 20 | 20 | 6 | | 6 | | | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | | | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Detector 2 Position(ft) | | 94 | | | | | 94 | | 94 | | | |
| Detector 2 Size(ft) | | 6 | | | | | 6 | | 6 | | | |
| Detector 2 Type | | Cl+Ex | | | | | Cl+Ex | | Cl+Ex | | | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Turn Type | Perm | NA | | | Perm | Perm | NA | | NA | | | Perm |
| Protected Phases | | 4 | | | | | 8 | | 2 | | | |
| Permitted Phases | 4 | | | | 8 | 8 | | | | | | 6 |

| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 168 | 156 | 7 | 0 | 256 | 6 | |
| Future Volume (vph) | 168 | 156 | 7 | 0 | 256 | 6 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Storage Length (ft) | 0 | | | 0 | 0 | | |
| Storage Lanes | 0 | | | 1 | 0 | | |
| Taper Length (ft) | 25 | | | 25 | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frt | | | | 0.869 | | | |
| Flt Protected | | 0.973 | | 0.999 | | | |
| Satd. Flow (prot) | 0 | 1812 | 0 | 1617 | 0 | 0 | |
| Flt Permitted | | 0.635 | | 0.999 | | | |
| Satd. Flow (perm) | 0 | 1183 | 0 | 1617 | 0 | 0 | |
| Right Turn on Red | | | | | | Yes | |
| Satd. Flow (RTOR) | | | | 162 | | | |
| Link Speed (mph) | | 25 | | 25 | | | |
| Link Distance (ft) | | 541 | | 844 | | | |
| Travel Time (s) | | 14.8 | | 23.0 | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Adj. Flow (vph) | 183 | 170 | 8 | 0 | 278 | 7 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 383 | 0 | 293 | 0 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Left | Left | Left | Right | Right | |
| Median Width(ft) | | 0 | | 12 | | | |
| Link Offset(ft) | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 50 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | | 15 | 15 | 9 | 9 | |
| Number of Detectors | 1 | 2 | 1 | 1 | | | |
| Detector Template | Left | Thru | Left | Left | | | |
| Leading Detector (ft) | 20 | 100 | 20 | 20 | | | |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | | | |
| Detector 1 Position(ft) | 0 | 0 | 0 | 0 | | | |
| Detector 1 Size(ft) | 20 | 6 | 20 | 20 | | | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | | |
| Detector 1 Channel | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Detector 2 Position(ft) | | 94 | | | | | |
| Detector 2 Size(ft) | | 6 | | | | | |
| Detector 2 Type | | Cl+Ex | | | | | |
| Detector 2 Channel | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | | | |
| Turn Type | Perm | NA | Perm | Prot | | | |
| Protected Phases | | 6 | | 7 | | | 3 |
| Permitted Phases | 6 | | 7 | 7 | | | |

| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector Phase | 4 | 4 | | | 8 | 8 | 8 | | 2 | | | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 7.0 | 7.0 | | | 10.0 | 10.0 | 10.0 | | 15.0 | | | 15.0 |
| Minimum Split (s) | 24.7 | 24.7 | | | 24.7 | 24.7 | 24.7 | | 23.7 | | | 23.7 |
| Total Split (s) | 20.0 | 20.0 | | | 20.0 | 20.0 | 20.0 | | 30.0 | | | 30.0 |
| Total Split (%) | 22.2% | 22.2% | | | 22.2% | 22.2% | 22.2% | | 33.3% | | | 33.3% |
| Maximum Green (s) | 13.3 | 13.3 | | | 13.3 | 13.3 | 13.3 | | 24.3 | | | 24.3 |
| Yellow Time (s) | 3.3 | 3.3 | | | 3.3 | 3.3 | 3.3 | | 3.2 | | | 3.2 |
| All-Red Time (s) | 3.4 | 3.4 | | | 3.4 | 3.4 | 3.4 | | 2.5 | | | 2.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | 6.7 | 6.7 | | | | | 6.7 | | 5.7 | | | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 |
| Recall Mode | None | None | | | None | None | None | | C-Min | | | C-Min |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 9.9 | 9.9 | | | | | 10.5 | | 51.3 | | | |
| Actuated g/C Ratio | 0.11 | 0.11 | | | | | 0.12 | | 0.57 | | | |
| v/c Ratio | 0.27 | 0.29 | | | | | 0.25 | | 0.31 | | | |
| Control Delay | 40.2 | 34.1 | | | | | 2.1 | | 13.7 | | | |
| Queue Delay | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Delay | 40.2 | 34.1 | | | | | 2.1 | | 13.7 | | | |
| LOS | D | C | | | | | A | | B | | | |
| Approach Delay | | 36.9 | | | | | 2.1 | | 13.7 | | | |
| Approach LOS | | D | | | | | A | | B | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 45 (50%), Referenced to phase 2:NBT and 6:SBTL, Start of Green | |
| Natural Cycle: 115 | |
| Control Type: Actuated-Coordinated | |
| Maximum v/c Ratio: 0.74 | |
| Intersection Signal Delay: 22.6 | Intersection LOS: C |
| Intersection Capacity Utilization 81.0% | ICU Level of Service D |
| Analysis Period (min) 15 | |

Splits and Phases: 10: S. Main St & Woodward Ave & Concord St



| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Detector Phase | 6 | 6 | 7 | 7 | | | |
| Switch Phase | | | | | | | |
| Minimum Initial (s) | 15.0 | 15.0 | 10.0 | 10.0 | | | 4.0 |
| Minimum Split (s) | 23.7 | 23.7 | 22.7 | 22.7 | | | 21.0 |
| Total Split (s) | 30.0 | 30.0 | 30.0 | 30.0 | | | 10.0 |
| Total Split (%) | 33.3% | 33.3% | 33.3% | 33.3% | | | 11% |
| Maximum Green (s) | 24.3 | 24.3 | 25.3 | 25.3 | | | 6.0 |
| Yellow Time (s) | 3.2 | 3.2 | 3.1 | 3.1 | | | 4.0 |
| All-Red Time (s) | 2.5 | 2.5 | 1.6 | 1.6 | | | 0.0 |
| Lost Time Adjust (s) | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | | 5.7 | | 4.7 | | | |
| Lead/Lag | | | Lead | Lead | | | Lag |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Recall Mode | C-Min | C-Min | None | None | | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | 51.3 | | 14.4 | | | |
| Actuated g/C Ratio | | 0.57 | | 0.16 | | | |
| v/c Ratio | | 0.57 | | 0.74 | | | |
| Control Delay | | 26.0 | | 27.2 | | | |
| Queue Delay | | 0.0 | | 0.0 | | | |
| Total Delay | | 26.0 | | 27.2 | | | |
| LOS | | C | | C | | | |
| Approach Delay | | 26.0 | | 27.2 | | | |
| Approach LOS | | C | | C | | | |

Intersection Summary

| Lane Group | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 42 | 258 | 181 | 11 | 11 | 40 |
| Future Volume (vph) | 42 | 258 | 181 | 11 | 11 | 40 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.865 | | 0.894 | |
| Flt Protected | | 0.950 | | | 0.989 | |
| Satd. Flow (prot) | 0 | 1770 | 1611 | 0 | 1647 | 0 |
| Flt Permitted | | 0.950 | | | 0.989 | |
| Satd. Flow (perm) | 0 | 1770 | 1611 | 0 | 1647 | 0 |
| Link Speed (mph) | | 25 | 25 | | 25 | |
| Link Distance (ft) | | 91 | 844 | | 641 | |
| Travel Time (s) | | 2.5 | 23.0 | | 17.5 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 46 | 280 | 197 | 12 | 12 | 43 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 326 | 209 | 0 | 55 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Right |
| Median Width(ft) | | 12 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 15 | 9 | 9 | 15 | 9 |
| Sign Control | | Free | Free | | Stop | |

Intersection Summary
Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 26.6% ICU Level of Service A
Analysis Period (min) 15

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 311 | 133 | 167 | 347 | 110 | 111 |
| Future Volume (vph) | 311 | 133 | 167 | 347 | 110 | 111 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.959 | | 0.909 | | | |
| Flt Protected | 0.966 | | | | | 0.976 |
| Satd. Flow (prot) | 1726 | 0 | 1693 | 0 | 0 | 1818 |
| Flt Permitted | 0.966 | | | | | 0.976 |
| Satd. Flow (perm) | 1726 | 0 | 1693 | 0 | 0 | 1818 |
| Link Speed (mph) | 25 | | 25 | | | 25 |
| Link Distance (ft) | 380 | | 640 | | | 91 |
| Travel Time (s) | 10.4 | | 17.5 | | | 2.5 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 338 | 145 | 182 | 377 | 120 | 121 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 483 | 0 | 559 | 0 | 0 | 241 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Right | Left | Left |
| Median Width(ft) | 12 | | 0 | | | 0 |
| Link Offset(ft) | 0 | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | |
| Sign Control | Stop | | Free | | | Free |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Control Type: Unsignalized | |
| Intersection Capacity Utilization 77.4% | ICU Level of Service D |
| Analysis Period (min) 15 | |

| Lane Group | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 86 | 186 | 146 | 276 | 328 | 68 |
| Future Volume (vph) | 86 | 186 | 146 | 276 | 328 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | 0.912 | | 0.977 | |
| Flt Protected | | 0.984 | | | 0.960 | |
| Satd. Flow (prot) | 0 | 1833 | 1699 | 0 | 1747 | 0 |
| Flt Permitted | | 0.984 | | | 0.960 | |
| Satd. Flow (perm) | 0 | 1833 | 1699 | 0 | 1747 | 0 |
| Link Speed (mph) | | 25 | 25 | | 30 | |
| Link Distance (ft) | | 616 | 640 | | 489 | |
| Travel Time (s) | | 16.8 | 17.5 | | 11.1 | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Adj. Flow (vph) | 93 | 202 | 159 | 300 | 357 | 74 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 295 | 459 | 0 | 431 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Left | Right | Left | Right |
| Median Width(ft) | | 0 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | | 9 | 15 | 9 |
| Sign Control | | Stop | Stop | | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Control Type: Unsignalized | |
| Intersection Capacity Utilization 71.5% | ICU Level of Service C |
| Analysis Period (min) 15 | |

| Movement | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 42 | 258 | 181 | 11 | 11 | 40 |
| Future Volume (Veh/h) | 42 | 258 | 181 | 11 | 11 | 40 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 46 | 280 | 197 | 12 | 12 | 43 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | 844 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 209 | | | | 575 | 203 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 209 | | | | 575 | 203 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 97 | | | | 97 | 95 |
| cM capacity (veh/h) | 1362 | | | | 464 | 838 |

| Direction, Lane # | NB 1 | SE 1 | NE 1 |
|---|---|---|---|
| Volume Total | 326 | 209 | 55 |
| Volume Left | 46 | 0 | 12 |
| Volume Right | 0 | 12 | 43 |
| cSH | 1362 | 1700 | 712 |
| Volume to Capacity | 0.03 | 0.12 | 0.08 |
| Queue Length 95th (ft) | 3 | 0 | 6 |
| Control Delay (s) | 1.4 | 0.0 | 10.5 |
| Lane LOS | A | | B |
| Approach Delay (s) | 1.4 | 0.0 | 10.5 |
| Approach LOS | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.7 | | |
| Intersection Capacity Utilization | 26.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 311 | 133 | 167 | 347 | 110 | 111 |
| Future Volume (Veh/h) | 311 | 133 | 167 | 347 | 110 | 111 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 338 | 145 | 182 | 377 | 120 | 121 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 732 | 370 | | | 559 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 732 | 370 | | | 559 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 1 | 79 | | | 88 | |
| cM capacity (veh/h) | 343 | 675 | | | 1012 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 483 | 559 | 241 |
| Volume Left | 338 | 0 | 120 |
| Volume Right | 145 | 377 | 0 |
| cSH | 402 | 1700 | 1012 |
| Volume to Capacity | 1.20 | 0.33 | 0.12 |
| Queue Length 95th (ft) | 486 | 0 | 10 |
| Control Delay (s) | 142.4 | 0.0 | 5.1 |
| Lane LOS | F | | A |
| Approach Delay (s) | 142.4 | 0.0 | 5.1 |
| Approach LOS | F | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 54.6 | | |
| Intersection Capacity Utilization | 77.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | | Stop | Stop | | Stop | |
| Traffic Volume (vph) | 86 | 186 | 146 | 276 | 328 | 68 |
| Future Volume (vph) | 86 | 186 | 146 | 276 | 328 | 68 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 93 | 202 | 159 | 300 | 357 | 74 |

| Direction, Lane # | NB 1 | SB 1 | NE 1 |
|---|---|---|---|
| Volume Total (vph) | 295 | 459 | 431 |
| Volume Left (vph) | 93 | 0 | 357 |
| Volume Right (vph) | 0 | 300 | 74 |
| Hadj (s) | 0.10 | -0.36 | 0.10 |
| Departure Headway (s) | 6.2 | 5.5 | 6.1 |
| Degree Utilization, x | 0.51 | 0.70 | 0.73 |
| Capacity (veh/h) | 541 | 627 | 562 |
| Control Delay (s) | 15.5 | 20.6 | 23.6 |
| Approach Delay (s) | 15.5 | 20.6 | 23.6 |
| Approach LOS | C | C | C |

| Intersection Summary | | | |
|---|---|---|---|
| Delay | 20.4 | | |
| Level of Service | C | | |
| Intersection Capacity Utilization | 71.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

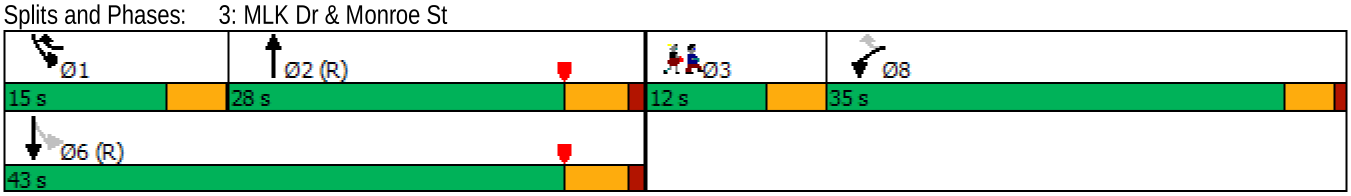
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 84 | 248 | 519 | 78 | 208 | 509 | |
| Future Volume (vph) | 84 | 248 | 519 | 78 | 208 | 509 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | |
| Grade (%) | 0% | | 0% | | | 0% | |
| Storage Length (ft) | 0 | 155 | | 0 | 180 | | |
| Storage Lanes | 1 | 1 | | 0 | 1 | | |
| Taper Length (ft) | 25 | | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | |
| Ped Bike Factor | | | | | | | |
| Frt | | 0.850 | 0.980 | | | | |
| Flt Protected | 0.950 | | | | 0.950 | | |
| Satd. Flow (prot) | 1703 | 1568 | 3478 | 0 | 1626 | 3406 | |
| Flt Permitted | 0.950 | | | | 0.318 | | |
| Satd. Flow (perm) | 1703 | 1568 | 3478 | 0 | 544 | 3406 | |
| Right Turn on Red | | No | | No | | | |
| Satd. Flow (RTOR) | | | | | | | |
| Link Speed (mph) | 30 | | 35 | | | 35 | |
| Link Distance (ft) | 1185 | | 556 | | | 566 | |
| Travel Time (s) | 26.9 | | 10.8 | | | 11.0 | |
| Confl. Peds. (#/hr) | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | |
| Peak Hour Factor | 0.80 | 0.90 | 0.88 | 0.86 | 0.85 | 0.96 | |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | |
| Heavy Vehicles (%) | 6% | 3% | 2% | 0% | 11% | 6% | |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parking (#/hr) | | | | | | | |
| Mid-Block Traffic (%) | 0% | | 0% | | | 0% | |
| Adj. Flow (vph) | 105 | 276 | 590 | 91 | 245 | 530 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 105 | 276 | 681 | 0 | 245 | 530 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Right | Left | Left | |
| Median Width(ft) | 24 | | 12 | | | 12 | |
| Link Offset(ft) | 0 | | 0 | | | 0 | |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | | |
| Number of Detectors | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Right | Thru | | Left | Thru | |
| Leading Detector (ft) | 20 | 20 | 100 | | 20 | 100 | |
| Trailing Detector (ft) | 0 | 0 | 0 | | 0 | 0 | |
| Turn Type | Prot | pm+ov | NA | | pm+pt | NA | |
| Protected Phases | 8 | 1 | 2 | | 1 | 6 | 3 |
| Permitted Phases | | 8 | | | 6 | | |
| Detector Phase | 8 | 1 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 7.0 | 5.0 | 15.0 | | 5.0 | 15.0 | 1.0 |
| Minimum Split (s) | 20.0 | 9.5 | 20.5 | | 9.5 | 20.5 | 7.0 |
| Total Split (s) | 35.0 | 15.0 | 28.0 | | 15.0 | 43.0 | 12.0 |
| Total Split (%) | 38.9% | 16.7% | 31.1% | | 16.7% | 47.8% | 13% |
| Maximum Green (s) | 30.7 | 10.9 | 22.5 | | 10.9 | 37.5 | 8.0 |
| Yellow Time (s) | 3.3 | 4.0 | 4.3 | | 4.0 | 4.3 | 4.0 |
| All-Red Time (s) | 1.0 | 0.1 | 1.2 | | 0.1 | 1.2 | 0.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 4.3 | 4.1 | 5.5 | | 4.1 | 5.5 | |
| Lead/Lag | Lag | Lead | Lag | | Lead | | Lead |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Minimum Gap (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Time Before Reduce (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Recall Mode | None | None | C-Min | | None | C-Min | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 10 |
| Act Effct Green (s) | 11.0 | 28.0 | 50.0 | | 70.5 | 70.2 | |
| Actuated g/C Ratio | 0.12 | 0.31 | 0.56 | | 0.78 | 0.78 | |
| v/c Ratio | 0.50 | 0.57 | 0.35 | | 0.40 | 0.20 | |
| Control Delay | 48.1 | 25.9 | 14.6 | | 6.3 | 4.5 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 48.1 | 25.9 | 14.6 | | 6.3 | 4.5 | |
| LOS | D | C | B | | A | A | |
| Approach Delay | 32.0 | | 14.6 | | | 5.1 | |
| Approach LOS | C | | B | | | A | |

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 45.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: MLK Dr & Monroe St



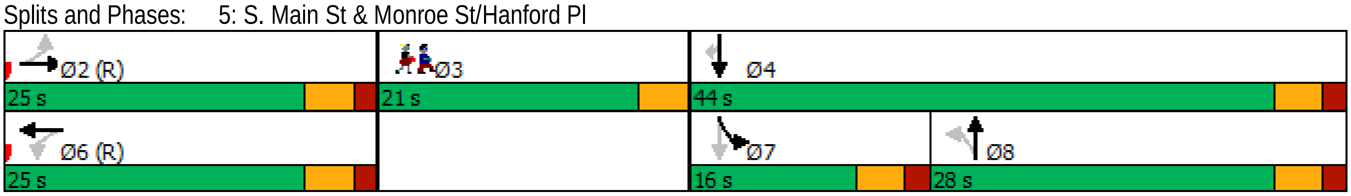
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 62 | 101 | 57 | 9 | 81 | 22 | 44 | 365 | 25 | 15 | 282 | 60 |
| Future Volume (vph) | 62 | 101 | 57 | 9 | 81 | 22 | 44 | 365 | 25 | 15 | 282 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | | | 0% | | | 0% | | | 0% | |
| Storage Length (ft) | 80 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 95 |
| Storage Lanes | 1 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 1 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | | | | | | | |
| Frt | | 0.943 | | | 0.976 | | | 0.991 | | | | 0.850 |
| Flt Protected | 0.950 | | | | 0.995 | | | 0.994 | | | 0.997 | |
| Satd. Flow (prot) | 1752 | 1733 | 0 | 0 | 1780 | 0 | 0 | 1813 | 0 | 0 | 1793 | 1583 |
| Flt Permitted | 0.635 | | | | 0.966 | | | 0.923 | | | 0.000 | |
| Satd. Flow (perm) | 1171 | 1733 | 0 | 0 | 1728 | 0 | 0 | 1683 | 0 | 0 | 0 | 1583 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 31 | | | 11 | | | 4 | | | | 86 |
| Link Speed (mph) | | 30 | | | 30 | | | 25 | | | 30 | |
| Link Distance (ft) | | 1185 | | | 837 | | | 620 | | | 729 | |
| Travel Time (s) | | 26.9 | | | 19.0 | | | 16.9 | | | 16.6 | |
| Confl. Peds. (#/hr) | | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | | | | | | |
| Peak Hour Factor | 0.81 | 0.76 | 0.70 | 0.60 | 0.70 | 0.80 | 0.73 | 0.89 | 0.72 | 0.88 | 0.95 | 0.70 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 3% | 0% | 9% | 0% | 5% | 0% | 0% | 4% | 0% | 0% | 6% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | | | | | | | |
| Mid-Block Traffic (%) | | 0% | | | 0% | | | 0% | | | 0% | |
| Adj. Flow (vph) | 77 | 133 | 81 | 15 | 116 | 28 | 60 | 410 | 35 | 17 | 297 | 86 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 77 | 214 | 0 | 0 | 159 | 0 | 0 | 505 | 0 | 0 | 314 | 86 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 0 | | | 0 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 35 | | | 40 | | | 30 | | | 20 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Prot | NA | Perm |
| Protected Phases | | 2 | | | 6 | | | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | | 7 | 4 |
| Detector Phase | 2 | 2 | | 6 | 6 | | 8 | 8 | | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |

| Lane Group | Ø3 |
|---|---|
| Lane Configurations | |
| Traffic Volume (vph) | |
| Future Volume (vph) | |
| Ideal Flow (vphpl) | |
| Lane Width (ft) | |
| Grade (%) | |
| Storage Length (ft) | |
| Storage Lanes | |
| Taper Length (ft) | |
| Lane Util. Factor | |
| Ped Bike Factor | |
| Frt | |
| Flt Protected | |
| Satd. Flow (prot) | |
| Flt Permitted | |
| Satd. Flow (perm) | |
| Right Turn on Red | |
| Satd. Flow (RTOR) | |
| Link Speed (mph) | |
| Link Distance (ft) | |
| Travel Time (s) | |
| Confl. Peds. (#/hr) | |
| Confl. Bikes (#/hr) | |
| Peak Hour Factor | |
| Growth Factor | |
| Heavy Vehicles (%) | |
| Bus Blockages (#/hr) | |
| Parking (#/hr) | |
| Mid-Block Traffic (%) | |
| Adj. Flow (vph) | |
| Shared Lane Traffic (%) | |
| Lane Group Flow (vph) | |
| Enter Blocked Intersection | |
| Lane Alignment | |
| Median Width(ft) | |
| Link Offset(ft) | |
| Crosswalk Width(ft) | |
| Two way Left Turn Lane | |
| Headway Factor | |
| Turning Speed (mph) | |
| Number of Detectors | |
| Detector Template | |
| Leading Detector (ft) | |
| Trailing Detector (ft) | |
| Turn Type | |
| Protected Phases | 3 |
| Permitted Phases | |
| Detector Phase | |
| Switch Phase | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | | 10.0 | 10.0 | | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | 20.9 |
| Total Split (s) | 25.0 | 25.0 | | 25.0 | 25.0 | | 28.0 | 28.0 | | 16.0 | 44.0 | 44.0 |
| Total Split (%) | 27.8% | 27.8% | | 27.8% | 27.8% | | 31.1% | 31.1% | | 17.8% | 48.9% | 48.9% |
| Maximum Green (s) | 20.1 | 20.1 | | 20.1 | 20.1 | | 23.1 | 23.1 | | 11.1 | 39.1 | 39.1 |
| Yellow Time (s) | 3.3 | 3.3 | | 3.3 | 3.3 | | 3.2 | 3.2 | | 3.2 | 3.2 | 3.2 |
| All-Red Time (s) | 1.6 | 1.6 | | 1.6 | 1.6 | | 1.7 | 1.7 | | 1.7 | 1.7 | 1.7 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Lost Time (s) | 4.9 | 4.9 | | | 4.9 | | | 4.9 | | | 4.9 | 4.9 |
| Lead/Lag | | | | | | | Lag | Lag | | Lead | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 |
| Minimum Gap (s) | 0.2 | 0.2 | | 0.2 | 0.2 | | 0.2 | 0.2 | | 0.2 | 0.2 | 0.2 |
| Time Before Reduce (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Recall Mode | C-Min | C-Min | | C-Min | C-Min | | None | None | | None | None | None |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 32.8 | 32.8 | | | 32.8 | | | 39.2 | | | 39.2 | 39.2 |
| Actuated g/C Ratio | 0.36 | 0.36 | | | 0.36 | | | 0.44 | | | 0.44 | 0.44 |
| v/c Ratio | 0.18 | 0.33 | | | 0.25 | | | 0.69 | | | 0.40 | 0.12 |
| Control Delay | 18.8 | 18.4 | | | 22.8 | | | 27.4 | | | 19.9 | 4.1 |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Delay | 18.8 | 18.4 | | | 22.8 | | | 27.4 | | | 19.9 | 4.1 |
| LOS | B | B | | | C | | | C | | | B | A |
| Approach Delay | | 18.5 | | | 22.8 | | | 27.4 | | | 16.5 | |
| Approach LOS | | B | | | C | | | C | | | B | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 11 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green | |
| Natural Cycle: 95 | |
| Control Type: Actuated-Coordinated | |
| Maximum v/c Ratio: 0.69 | |
| Intersection Signal Delay: 21.7 | Intersection LOS: C |
| Intersection Capacity Utilization 64.3% | ICU Level of Service C |
| Analysis Period (min) 15 | |

Splits and Phases: 5: S. Main St & Monroe St/Hanford Pl



| Lane Group | Ø3 |
|---|---|
| Minimum Initial (s) | 4.0 |
| Minimum Split (s) | 21.0 |
| Total Split (s) | 21.0 |
| Total Split (%) | 23% |
| Maximum Green (s) | 17.5 |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 0.0 |
| Lost Time Adjust (s) | |
| Total Lost Time (s) | |
| Lead/Lag | |
| Lead-Lag Optimize? | |
| Vehicle Extension (s) | 3.0 |
| Minimum Gap (s) | 3.0 |
| Time Before Reduce (s) | 0.0 |
| Time To Reduce (s) | 0.0 |
| Recall Mode | None |
| Walk Time (s) | 4.0 |
| Flash Dont Walk (s) | 13.0 |
| Pedestrian Calls (#/hr) | 20 |
| Act Effct Green (s) | |
| Actuated g/C Ratio | |
| v/c Ratio | |
| Control Delay | |
| Queue Delay | |
| Total Delay | |
| LOS | |
| Approach Delay | |
| Approach LOS | |

| Intersection Summary |
|---|

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 0 | 0 | 130 | 459 | 370 | 60 | |
| Future Volume (vph) | 0 | 0 | 130 | 459 | 370 | 60 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | |
| Grade (%) | 0% | | | 0% | 0% | | |
| Storage Length (ft) | 0 | 0 | 0 | | | 0 | |
| Storage Lanes | 0 | 0 | 0 | | | 0 | |
| Taper Length (ft) | 25 | | 25 | | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Ped Bike Factor | | | | | | | |
| Frt | | | | | 0.981 | | |
| Flt Protected | | | | 0.989 | | | |
| Satd. Flow (prot) | 0 | 0 | 0 | 1842 | 1827 | 0 | |
| Flt Permitted | | | | 0.807 | | | |
| Satd. Flow (perm) | 0 | 0 | 0 | 1503 | 1827 | 0 | |
| Right Turn on Red | | Yes | | | | Yes | |
| Satd. Flow (RTOR) | | | | | 19 | | |
| Link Speed (mph) | 25 | | | 25 | 25 | | |
| Link Distance (ft) | 360 | | | 541 | 620 | | |
| Travel Time (s) | 9.8 | | | 14.8 | 16.9 | | |
| Confl. Peds. (#/hr) | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parking (#/hr) | | | | | | | |
| Mid-Block Traffic (%) | 0% | | | 0% | 0% | | |
| Adj. Flow (vph) | 0 | 0 | 141 | 499 | 402 | 65 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 0 | 0 | 640 | 467 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Left | Left | Right | |
| Median Width(ft) | 0 | | | 0 | 0 | | |
| Link Offset(ft) | 0 | | | 0 | 0 | | |
| Crosswalk Width(ft) | 16 | | | 50 | 50 | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 | |
| Number of Detectors | | | 1 | 2 | 2 | | |
| Detector Template | | | Left | Thru | Thru | | |
| Leading Detector (ft) | | | 20 | 100 | 100 | | |
| Trailing Detector (ft) | | | 0 | 0 | 0 | | |
| Turn Type | | | Perm | NA | NA | | |
| Protected Phases | | | | 2 | 6 | | 3 |
| Permitted Phases | | | 2 | | | | |
| Detector Phase | | | 2 | 2 | 6 | | |
| Switch Phase | | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | | | 15.0 | 15.0 | 15.0 | | 4.0 |
| Minimum Split (s) | | | 23.1 | 23.1 | 23.4 | | 26.0 |
| Total Split (s) | | | 64.0 | 64.0 | 64.0 | | 26.0 |
| Total Split (%) | | | 71.1% | 71.1% | 71.1% | | 29% |
| Maximum Green (s) | | | 58.9 | 58.9 | 58.9 | | 22.0 |
| Yellow Time (s) | | | 3.2 | 3.2 | 3.2 | | 4.0 |
| All-Red Time (s) | | | 1.9 | 1.9 | 1.9 | | 0.0 |
| Lost Time Adjust (s) | | | | 0.0 | 0.0 | | |
| Total Lost Time (s) | | | | 5.1 | 5.1 | | |
| Lead/Lag | | | | | | | |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | | 3.0 |
| Minimum Gap (s) | | | 3.0 | 3.0 | 3.0 | | 3.0 |
| Time Before Reduce (s) | | | 0.0 | 0.0 | 0.0 | | 0.0 |
| Time To Reduce (s) | | | 0.0 | 0.0 | 0.0 | | 0.0 |
| Recall Mode | | | C-Max | C-Max | C-Max | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | | | 90.0 | 90.0 | | |
| Actuated g/C Ratio | | | | 1.00 | 1.00 | | |
| v/c Ratio | | | | 0.43 | 0.26 | | |
| Control Delay | | | | 1.1 | 0.3 | | |
| Queue Delay | | | | 0.0 | 0.0 | | |
| Total Delay | | | | 1.1 | 0.3 | | |
| LOS | | | | A | A | | |
| Approach Delay | | | | 1.1 | 0.3 | | |
| Approach LOS | | | | A | A | | |

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 50 (56%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.43
Intersection Signal Delay: 0.8 Intersection LOS: A
Intersection Capacity Utilization 63.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 8: S. Main St & Henry St

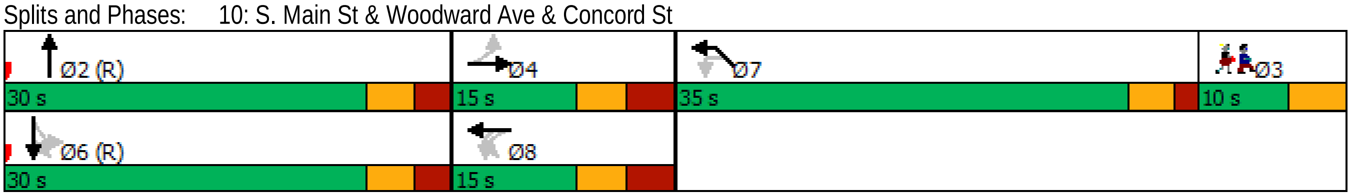
| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 22 | 22 | 22 | 11 | 6 | 30 | 0 | 56 | 176 | 30 | 2 | 23 |
| Future Volume (vph) | 22 | 22 | 22 | 11 | 6 | 30 | 0 | 56 | 176 | 30 | 2 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | | | | | 0% | | 0% | | | |
| Storage Length (ft) | 50 | | 0 | | | 0 | | 0 | | 0 | | |
| Storage Lanes | 1 | | 0 | | | 0 | | 0 | | 0 | | |
| Taper Length (ft) | 25 | | | | | 25 | | | | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | | | | | | | |
| Frt | | 0.910 | | | | | 0.918 | | 0.979 | | | |
| Flt Protected | 0.950 | | | | | | 0.981 | | | | | |
| Satd. Flow (prot) | 1770 | 1695 | 0 | 0 | 0 | 0 | 1678 | 0 | 1824 | 0 | 0 | 0 |
| Flt Permitted | 0.748 | | | | | | 0.844 | | | | | |
| Satd. Flow (perm) | 1393 | 1695 | 0 | 0 | 0 | 0 | 1443 | 0 | 1824 | 0 | 0 | 0 |
| Right Turn on Red | | | | Yes | | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 11 | | | | | 138 | | | | | |
| Link Speed (mph) | | 25 | | | | | 25 | | 25 | | | |
| Link Distance (ft) | | 344 | | | | | 721 | | 778 | | | |
| Travel Time (s) | | 9.4 | | | | | 19.7 | | 21.2 | | | |
| Confl. Peds. (#/hr) | | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | | | | | | | |
| Mid-Block Traffic (%) | | 0% | | | | | 0% | | 0% | | | |
| Adj. Flow (vph) | 24 | 24 | 24 | 12 | 7 | 33 | 0 | 61 | 191 | 33 | 2 | 25 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 24 | 60 | 0 | 0 | 0 | 0 | 101 | 0 | 226 | 0 | 0 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Left | Left | Right | Left | Right | Right | Left |
| Median Width(ft) | | 12 | | | | | 12 | | 0 | | | |
| Link Offset(ft) | | 0 | | | | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 30 | | | | | 35 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 9 | 15 | 15 | | 9 | | 9 | 9 | 15 |
| Number of Detectors | 1 | 2 | | | 1 | 1 | 2 | | 2 | | | 1 |
| Detector Template | Left | Thru | | | Left | Left | Thru | | Thru | | | Left |
| Leading Detector (ft) | 20 | 100 | | | 20 | 20 | 100 | | 100 | | | 20 |
| Trailing Detector (ft) | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | 0 |
| Turn Type | Perm | NA | | | Perm | Perm | NA | | NA | | | Perm |
| Protected Phases | | 4 | | | | | 8 | | 2 | | | |
| Permitted Phases | 4 | | | | 8 | 8 | | | | | | 6 |
| Detector Phase | 4 | 4 | | | 8 | 8 | 8 | | 2 | | | 6 |
| Switch Phase | | | | | | | | | | | | |

| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 177 | 163 | 6 | 0 | 269 | 6 | |
| Future Volume (vph) | 177 | 163 | 6 | 0 | 269 | 6 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | |
| Grade (%) | | 0% | | 0% | | | |
| Storage Length (ft) | 0 | | | 0 | 0 | | |
| Storage Lanes | 0 | | | 1 | 0 | | |
| Taper Length (ft) | 25 | | | 25 | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Ped Bike Factor | | | | | | | |
| Frt | | | | 0.868 | | | |
| Flt Protected | | 0.973 | | 0.999 | | | |
| Satd. Flow (prot) | 0 | 1812 | 0 | 1615 | 0 | 0 | |
| Flt Permitted | | 0.709 | | 0.999 | | | |
| Satd. Flow (perm) | 0 | 1321 | 0 | 1615 | 0 | 0 | |
| Right Turn on Red | | | | | | Yes | |
| Satd. Flow (RTOR) | | | | 162 | | | |
| Link Speed (mph) | | 25 | | 25 | | | |
| Link Distance (ft) | | 541 | | 844 | | | |
| Travel Time (s) | | 14.8 | | 23.0 | | | |
| Confl. Peds. (#/hr) | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parking (#/hr) | | | | | | | |
| Mid-Block Traffic (%) | | 0% | | 0% | | | |
| Adj. Flow (vph) | 192 | 177 | 7 | 0 | 292 | 7 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 394 | 0 | 306 | 0 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Left | Left | Left | Right | Right | |
| Median Width(ft) | | 0 | | 12 | | | |
| Link Offset(ft) | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 50 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | | 15 | 15 | 9 | 9 | |
| Number of Detectors | 1 | 2 | 1 | 1 | | | |
| Detector Template | Left | Thru | Left | Left | | | |
| Leading Detector (ft) | 20 | 100 | 20 | 20 | | | |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | | | |
| Turn Type | Perm | NA | Perm | Prot | | | |
| Protected Phases | | 6 | | 7 | | | 3 |
| Permitted Phases | 6 | | 7 | 7 | | | |
| Detector Phase | 6 | 6 | 7 | 7 | | | |
| Switch Phase | | | | | | | |

| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 7.0 | 7.0 | | | 10.0 | 10.0 | 10.0 | | 15.0 | | | 15.0 |
| Minimum Split (s) | 24.7 | 24.7 | | | 24.7 | 24.7 | 24.7 | | 23.7 | | | 23.7 |
| Total Split (s) | 15.0 | 15.0 | | | 15.0 | 15.0 | 15.0 | | 30.0 | | | 30.0 |
| Total Split (%) | 16.7% | 16.7% | | | 16.7% | 16.7% | 16.7% | | 33.3% | | | 33.3% |
| Maximum Green (s) | 8.3 | 8.3 | | | 8.3 | 8.3 | 8.3 | | 24.3 | | | 24.3 |
| Yellow Time (s) | 3.3 | 3.3 | | | 3.3 | 3.3 | 3.3 | | 3.2 | | | 3.2 |
| All-Red Time (s) | 3.4 | 3.4 | | | 3.4 | 3.4 | 3.4 | | 2.5 | | | 2.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | 6.7 | 6.7 | | | | | 6.7 | | 5.7 | | | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 |
| Minimum Gap (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 |
| Time Before Reduce (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Recall Mode | None | None | | | None | None | None | | C-Min | | | C-Min |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 8.0 | 8.0 | | | | | 8.3 | | 52.4 | | | |
| Actuated g/C Ratio | 0.09 | 0.09 | | | | | 0.09 | | 0.58 | | | |
| v/c Ratio | 0.19 | 0.37 | | | | | 0.39 | | 0.21 | | | |
| Control Delay | 41.8 | 39.8 | | | | | 7.8 | | 11.9 | | | |
| Queue Delay | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Delay | 41.8 | 39.8 | | | | | 7.8 | | 11.9 | | | |
| LOS | D | D | | | | | A | | B | | | |
| Approach Delay | | 40.4 | | | | | 7.8 | | 11.9 | | | |
| Approach LOS | | D | | | | | A | | B | | | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 89 (99%), Referenced to phase 2:NBT and 6:SBTL, Start of Green | |
| Natural Cycle: 105 | |
| Control Type: Actuated-Coordinated | |
| Maximum v/c Ratio: 0.75 | |
| Intersection Signal Delay: 17.7 | Intersection LOS: B |
| Intersection Capacity Utilization 80.6% | ICU Level of Service D |
| Analysis Period (min) 15 | |

Splits and Phases: 10: S. Main St & Woodward Ave & Concord St



| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 15.0 | 15.0 | 10.0 | 10.0 | | | 4.0 |
| Minimum Split (s) | 23.7 | 23.7 | 22.7 | 22.7 | | | 21.0 |
| Total Split (s) | 30.0 | 30.0 | 35.0 | 35.0 | | | 10.0 |
| Total Split (%) | 33.3% | 33.3% | 38.9% | 38.9% | | | 11% |
| Maximum Green (s) | 24.3 | 24.3 | 30.3 | 30.3 | | | 6.0 |
| Yellow Time (s) | 3.2 | 3.2 | 3.1 | 3.1 | | | 4.0 |
| All-Red Time (s) | 2.5 | 2.5 | 1.6 | 1.6 | | | 0.0 |
| Lost Time Adjust (s) | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | | 5.7 | | 4.7 | | | |
| Lead/Lag | | | Lead | Lead | | | Lag |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Minimum Gap (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Time Before Reduce (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| Recall Mode | C-Min | C-Min | None | None | | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | 52.4 | | 15.2 | | | |
| Actuated g/C Ratio | | 0.58 | | 0.17 | | | |
| v/c Ratio | | 0.51 | | 0.75 | | | |
| Control Delay | | 11.0 | | 27.9 | | | |
| Queue Delay | | 0.0 | | 0.0 | | | |
| Total Delay | | 11.0 | | 27.9 | | | |
| LOS | | B | | C | | | |
| Approach Delay | | 11.0 | | 27.9 | | | |
| Approach LOS | | B | | C | | | |

Intersection Summary

| Lane Group | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 39 | 267 | 193 | 14 | 14 | 38 |
| Future Volume (vph) | 39 | 267 | 193 | 14 | 14 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | 0% | | 0% | |
| Storage Length (ft) | | 0 | 0 | | 0 | 0 |
| Storage Lanes | | 1 | 1 | | 1 | 0 |
| Taper Length (ft) | | 25 | | | 25 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | |
| Frt | | | 0.865 | | 0.901 | |
| Flt Protected | | 0.950 | | | 0.987 | |
| Satd. Flow (prot) | 0 | 1770 | 1611 | 0 | 1657 | 0 |
| Flt Permitted | | 0.950 | | | 0.987 | |
| Satd. Flow (perm) | 0 | 1770 | 1611 | 0 | 1657 | 0 |
| Link Speed (mph) | | 25 | 25 | | 25 | |
| Link Distance (ft) | | 91 | 844 | | 641 | |
| Travel Time (s) | | 2.5 | 23.0 | | 17.5 | |
| Confl. Peds. (#/hr) | | | | | | |
| Confl. Bikes (#/hr) | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | |
| Mid-Block Traffic (%) | | 0% | 0% | | 0% | |
| Adj. Flow (vph) | 42 | 290 | 210 | 15 | 15 | 41 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 332 | 225 | 0 | 56 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Right |
| Median Width(ft) | | 12 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 15 | 9 | 9 | 15 | 9 |
| Sign Control | | Free | Free | | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Control Type: Unsignalized | |
| Intersection Capacity Utilization 27.0% | ICU Level of Service A |
| Analysis Period (min) 15 | |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 287 | 108 | 198 | 285 | 105 | 126 |
| Future Volume (vph) | 287 | 108 | 198 | 285 | 105 | 126 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | 0% | | 0% | | | 0% |
| Storage Length (ft) | 0 | 0 | | 0 | 0 | |
| Storage Lanes | 1 | 0 | | 0 | 0 | |
| Taper Length (ft) | 25 | | | | 25 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | |
| Frt | 0.963 | | 0.920 | | | |
| Flt Protected | 0.965 | | | | | 0.978 |
| Satd. Flow (prot) | 1731 | 0 | 1714 | 0 | 0 | 1822 |
| Flt Permitted | 0.965 | | | | | 0.978 |
| Satd. Flow (perm) | 1731 | 0 | 1714 | 0 | 0 | 1822 |
| Link Speed (mph) | 25 | | 25 | | | 25 |
| Link Distance (ft) | 380 | | 640 | | | 91 |
| Travel Time (s) | 10.4 | | 17.5 | | | 2.5 |
| Confl. Peds. (#/hr) | | | | | | |
| Confl. Bikes (#/hr) | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | |
| Mid-Block Traffic (%) | 0% | | 0% | | | 0% |
| Adj. Flow (vph) | 312 | 117 | 215 | 310 | 114 | 137 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 429 | 0 | 525 | 0 | 0 | 251 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Right | Left | Left |
| Median Width(ft) | 12 | | 0 | | | 0 |
| Link Offset(ft) | 0 | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | |
| Sign Control | Stop | | Free | | | Free |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Control Type: Unsignalized | |
| Intersection Capacity Utilization 72.8% | ICU Level of Service C |
| Analysis Period (min) 15 | |

| Lane Group | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 82 | 173 | 135 | 278 | 310 | 71 |
| Future Volume (vph) | 82 | 173 | 135 | 278 | 310 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | 0% | | 0% | |
| Storage Length (ft) | 0 | | | 0 | 0 | 0 |
| Storage Lanes | 0 | | | 0 | 1 | 0 |
| Taper Length (ft) | 25 | | | | 25 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | |
| Frt | | | 0.909 | | 0.975 | |
| Flt Protected | | 0.984 | | | 0.961 | |
| Satd. Flow (prot) | 0 | 1833 | 1693 | 0 | 1745 | 0 |
| Flt Permitted | | 0.984 | | | 0.961 | |
| Satd. Flow (perm) | 0 | 1833 | 1693 | 0 | 1745 | 0 |
| Link Speed (mph) | | 25 | 25 | | 30 | |
| Link Distance (ft) | | 616 | 640 | | 489 | |
| Travel Time (s) | | 16.8 | 17.5 | | 11.1 | |
| Confl. Peds. (#/hr) | | | | | | |
| Confl. Bikes (#/hr) | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | |
| Mid-Block Traffic (%) | | 0% | 0% | | 0% | |
| Adj. Flow (vph) | 89 | 188 | 147 | 302 | 337 | 77 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 277 | 449 | 0 | 414 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Left | Right | Left | Right |
| Median Width(ft) | | 0 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | | 9 | 15 | 9 |
| Sign Control | | Stop | Stop | | Stop | |

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 69.3% ICU Level of Service C
Analysis Period (min) 15

| Movement | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 42 | 258 | 169 | 11 | 11 | 40 |
| Future Volume (Veh/h) | 42 | 258 | 169 | 11 | 11 | 40 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 46 | 280 | 184 | 12 | 12 | 43 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | 844 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 196 | | | | 562 | 190 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 196 | | | | 562 | 190 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 97 | | | | 97 | 95 |
| cM capacity (veh/h) | 1377 | | | | 472 | 852 |

| Direction, Lane # | NB 1 | SE 1 | NE 1 |
|---|---|---|---|
| Volume Total | 326 | 196 | 55 |
| Volume Left | 46 | 0 | 12 |
| Volume Right | 0 | 12 | 43 |
| cSH | 1377 | 1700 | 724 |
| Volume to Capacity | 0.03 | 0.12 | 0.08 |
| Queue Length 95th (ft) | 3 | 0 | 6 |
| Control Delay (s) | 1.4 | 0.0 | 10.4 |
| Lane LOS | A | | B |
| Approach Delay (s) | 1.4 | 0.0 | 10.4 |
| Approach LOS | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.8 | | |
| Intersection Capacity Utilization | 26.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 301 | 133 | 167 | 347 | 110 | 99 |
| Future Volume (Veh/h) | 301 | 133 | 167 | 347 | 110 | 99 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 327 | 145 | 182 | 377 | 120 | 108 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 718 | 370 | | | 559 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 718 | 370 | | | 559 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 6 | 79 | | | 88 | |
| cM capacity (veh/h) | 349 | 675 | | | 1012 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 472 | 559 | 228 |
| Volume Left | 327 | 0 | 120 |
| Volume Right | 145 | 377 | 0 |
| cSH | 409 | 1700 | 1012 |
| Volume to Capacity | 1.15 | 0.33 | 0.12 |
| Queue Length 95th (ft) | 444 | 0 | 10 |
| Control Delay (s) | 124.0 | 0.0 | 5.3 |
| Lane LOS | F | | A |
| Approach Delay (s) | 124.0 | 0.0 | 5.3 |
| Approach LOS | F | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 47.4 | | |
| Intersection Capacity Utilization | 76.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | | Stop | Stop | | Stop | |
| Traffic Volume (vph) | 86 | 186 | 124 | 276 | 328 | 68 |
| Future Volume (vph) | 86 | 186 | 124 | 276 | 328 | 68 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 93 | 202 | 135 | 300 | 357 | 74 |

| Direction, Lane # | NB 1 | SB 1 | NE 1 |
|---|---|---|---|
| Volume Total (vph) | 295 | 435 | 431 |
| Volume Left (vph) | 93 | 0 | 357 |
| Volume Right (vph) | 0 | 300 | 74 |
| Hadj (s) | 0.10 | -0.38 | 0.10 |
| Departure Headway (s) | 6.1 | 5.5 | 6.0 |
| Degree Utilization, x | 0.50 | 0.66 | 0.72 |
| Capacity (veh/h) | 547 | 629 | 568 |
| Control Delay (s) | 15.2 | 18.5 | 22.8 |
| Approach Delay (s) | 15.2 | 18.5 | 22.8 |
| Approach LOS | C | C | C |

| Intersection Summary | | | |
|---|---|---|---|
| Delay | 19.3 | | |
| Level of Service | C | | |
| Intersection Capacity Utilization | 70.3% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 18.8 |
| Intersection LOS | C |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 83 | 195 | 135 | 278 | 310 | 71 |
| Future Vol, veh/h | 83 | 195 | 135 | 278 | 310 | 71 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 90 | 212 | 147 | 302 | 337 | 77 |
| Number of Lanes | 0 | 1 | 1 | 0 | 1 | 0 |

| Approach | NB | SB | NE |
|---|---|---|---|
| Opposing Approach | SB | NB | |
| Opposing Lanes | 1 | 1 | 0 |
| Conflicting Approach Left | NE | | SB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | | NE | NB |
| Conflicting Lanes Right | 0 | 1 | 1 |
| HCM Control Delay | 15.2 | 18.8 | 21.3 |
| HCM LOS | C | C | C |

| Lane | NELn1 | NBLn1 | SBLn1 |
|---|---|---|---|
| Vol Left, % | 81% | 30% | 0% |
| Vol Thru, % | 0% | 70% | 33% |
| Vol Right, % | 19% | 0% | 67% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 381 | 278 | 413 |
| LT Vol | 310 | 83 | 0 |
| Through Vol | 0 | 195 | 135 |
| RT Vol | 71 | 0 | 278 |
| Lane Flow Rate | 414 | 302 | 449 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.688 | 0.505 | 0.67 |
| Departure Headway (Hd) | 5.981 | 6.021 | 5.371 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 600 | 595 | 669 |
| Service Time | 4.05 | 4.107 | 3.449 |
| HCM Lane V/C Ratio | 0.69 | 0.508 | 0.671 |
| HCM Control Delay | 21.3 | 15.2 | 18.8 |
| HCM Lane LOS | C | C | C |
| HCM 95th-tile Q | 5.4 | 2.8 | 5.1 |

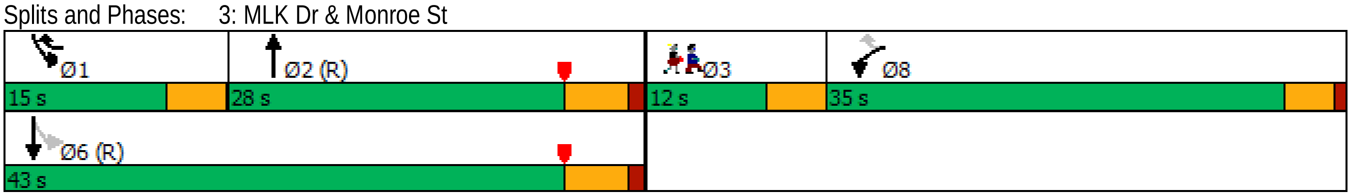
| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 84 | 250 | 520 | 78 | 208 | 509 | |
| Future Volume (vph) | 84 | 250 | 520 | 78 | 208 | 509 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | |
| Grade (%) | 0% | | 0% | | | 0% | |
| Storage Length (ft) | 0 | 155 | | 0 | 180 | | |
| Storage Lanes | 1 | 1 | | 0 | 1 | | |
| Taper Length (ft) | 25 | | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | |
| Ped Bike Factor | | | | | | | |
| Frt | | 0.850 | 0.980 | | | | |
| Flt Protected | 0.950 | | | | 0.950 | | |
| Satd. Flow (prot) | 1703 | 1568 | 3478 | 0 | 1626 | 3406 | |
| Flt Permitted | 0.950 | | | | 0.317 | | |
| Satd. Flow (perm) | 1703 | 1568 | 3478 | 0 | 543 | 3406 | |
| Right Turn on Red | | No | | No | | | |
| Satd. Flow (RTOR) | | | | | | | |
| Link Speed (mph) | 30 | | 35 | | | 35 | |
| Link Distance (ft) | 1185 | | 556 | | | 566 | |
| Travel Time (s) | 26.9 | | 10.8 | | | 11.0 | |
| Confl. Peds. (#/hr) | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | |
| Peak Hour Factor | 0.80 | 0.90 | 0.88 | 0.86 | 0.85 | 0.96 | |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | |
| Heavy Vehicles (%) | 6% | 3% | 2% | 0% | 11% | 6% | |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parking (#/hr) | | | | | | | |
| Mid-Block Traffic (%) | 0% | | 0% | | | 0% | |
| Adj. Flow (vph) | 105 | 278 | 591 | 91 | 245 | 530 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 105 | 278 | 682 | 0 | 245 | 530 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Right | Left | Left | |
| Median Width(ft) | 24 | | 12 | | | 12 | |
| Link Offset(ft) | 0 | | 0 | | | 0 | |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | | |
| Number of Detectors | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Right | Thru | | Left | Thru | |
| Leading Detector (ft) | 20 | 20 | 100 | | 20 | 100 | |
| Trailing Detector (ft) | 0 | 0 | 0 | | 0 | 0 | |
| Turn Type | Prot | pm+ov | NA | | pm+pt | NA | |
| Protected Phases | 8 | 1 | 2 | | 1 | 6 | 3 |
| Permitted Phases | | 8 | | | 6 | | |
| Detector Phase | 8 | 1 | 2 | | 1 | 6 | |
| Switch Phase | | | | | | | |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 7.0 | 5.0 | 15.0 | | 5.0 | 15.0 | 1.0 |
| Minimum Split (s) | 20.0 | 9.5 | 20.5 | | 9.5 | 20.5 | 7.0 |
| Total Split (s) | 35.0 | 15.0 | 28.0 | | 15.0 | 43.0 | 12.0 |
| Total Split (%) | 38.9% | 16.7% | 31.1% | | 16.7% | 47.8% | 13% |
| Maximum Green (s) | 30.7 | 10.9 | 22.5 | | 10.9 | 37.5 | 8.0 |
| Yellow Time (s) | 3.3 | 4.0 | 4.3 | | 4.0 | 4.3 | 4.0 |
| All-Red Time (s) | 1.0 | 0.1 | 1.2 | | 0.1 | 1.2 | 0.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 4.3 | 4.1 | 5.5 | | 4.1 | 5.5 | |
| Lead/Lag | Lag | Lead | Lag | | Lead | | Lead |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Minimum Gap (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Time Before Reduce (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Recall Mode | None | None | C-Min | | None | C-Min | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 10 |
| Act Effct Green (s) | 11.0 | 28.1 | 49.9 | | 70.5 | 70.2 | |
| Actuated g/C Ratio | 0.12 | 0.31 | 0.55 | | 0.78 | 0.78 | |
| v/c Ratio | 0.50 | 0.57 | 0.35 | | 0.40 | 0.20 | |
| Control Delay | 48.3 | 26.6 | 14.6 | | 6.3 | 4.5 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 48.3 | 26.6 | 14.6 | | 6.3 | 4.5 | |
| LOS | D | C | B | | A | A | |
| Approach Delay | 32.6 | | 14.6 | | | 5.1 | |
| Approach LOS | C | | B | | | A | |

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 14.3 Intersection LOS: B
Intersection Capacity Utilization 45.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: MLK Dr & Monroe St



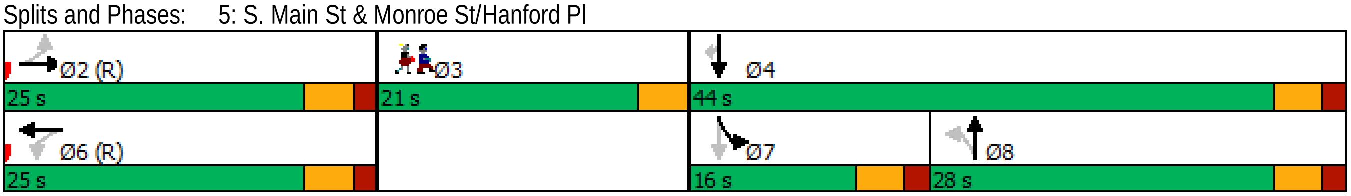
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 62 | 101 | 57 | 9 | 81 | 22 | 46 | 375 | 25 | 15 | 282 | 60 |
| Future Volume (vph) | 62 | 101 | 57 | 9 | 81 | 22 | 46 | 375 | 25 | 15 | 282 | 60 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | | | 0% | | | 0% | | | 0% | |
| Storage Length (ft) | 80 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 95 |
| Storage Lanes | 1 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 1 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | | | | | | | |
| Frt | | 0.943 | | | 0.976 | | | 0.991 | | | | 0.850 |
| Flt Protected | 0.950 | | | | 0.995 | | | 0.994 | | | 0.997 | |
| Satd. Flow (prot) | 1752 | 1733 | 0 | 0 | 1780 | 0 | 0 | 1813 | 0 | 0 | 1793 | 1583 |
| Flt Permitted | 0.629 | | | | 0.966 | | | 0.920 | | | 0.000 | |
| Satd. Flow (perm) | 1160 | 1733 | 0 | 0 | 1728 | 0 | 0 | 1678 | 0 | 0 | 0 | 1583 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 31 | | | 11 | | | 4 | | | | 86 |
| Link Speed (mph) | | 30 | | | 30 | | | 25 | | | 30 | |
| Link Distance (ft) | | 1185 | | | 837 | | | 620 | | | 729 | |
| Travel Time (s) | | 26.9 | | | 19.0 | | | 16.9 | | | 16.6 | |
| Confl. Peds. (#/hr) | | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | | | | | | |
| Peak Hour Factor | 0.81 | 0.76 | 0.70 | 0.60 | 0.70 | 0.80 | 0.73 | 0.89 | 0.72 | 0.88 | 0.95 | 0.70 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 3% | 0% | 9% | 0% | 5% | 0% | 0% | 4% | 0% | 0% | 6% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | | | | | | | |
| Mid-Block Traffic (%) | | 0% | | | 0% | | | 0% | | | 0% | |
| Adj. Flow (vph) | 77 | 133 | 81 | 15 | 116 | 28 | 63 | 421 | 35 | 17 | 297 | 86 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 77 | 214 | 0 | 0 | 159 | 0 | 0 | 519 | 0 | 0 | 314 | 86 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 0 | | | 0 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 35 | | | 40 | | | 30 | | | 20 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Prot | NA | Perm |
| Protected Phases | | 2 | | | 6 | | | 8 | | 7 | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | | 7 | 4 |
| Detector Phase | 2 | 2 | | 6 | 6 | | 8 | 8 | | 7 | 4 | 4 |
| Switch Phase | | | | | | | | | | | | |

| Lane Group | Ø3 |
|---|---|
| Lane Configurations | |
| Traffic Volume (vph) | |
| Future Volume (vph) | |
| Ideal Flow (vphpl) | |
| Lane Width (ft) | |
| Grade (%) | |
| Storage Length (ft) | |
| Storage Lanes | |
| Taper Length (ft) | |
| Lane Util. Factor | |
| Ped Bike Factor | |
| Frt | |
| Flt Protected | |
| Satd. Flow (prot) | |
| Flt Permitted | |
| Satd. Flow (perm) | |
| Right Turn on Red | |
| Satd. Flow (RTOR) | |
| Link Speed (mph) | |
| Link Distance (ft) | |
| Travel Time (s) | |
| Confl. Peds. (#/hr) | |
| Confl. Bikes (#/hr) | |
| Peak Hour Factor | |
| Growth Factor | |
| Heavy Vehicles (%) | |
| Bus Blockages (#/hr) | |
| Parking (#/hr) | |
| Mid-Block Traffic (%) | |
| Adj. Flow (vph) | |
| Shared Lane Traffic (%) | |
| Lane Group Flow (vph) | |
| Enter Blocked Intersection | |
| Lane Alignment | |
| Median Width(ft) | |
| Link Offset(ft) | |
| Crosswalk Width(ft) | |
| Two way Left Turn Lane | |
| Headway Factor | |
| Turning Speed (mph) | |
| Number of Detectors | |
| Detector Template | |
| Leading Detector (ft) | |
| Trailing Detector (ft) | |
| Turn Type | |
| Protected Phases | 3 |
| Permitted Phases | |
| Detector Phase | |
| Switch Phase | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 15.0 | 15.0 | | 15.0 | 15.0 | | 10.0 | 10.0 | | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | | 20.9 | 20.9 | 20.9 |
| Total Split (s) | 25.0 | 25.0 | | 25.0 | 25.0 | | 28.0 | 28.0 | | 16.0 | 44.0 | 44.0 |
| Total Split (%) | 27.8% | 27.8% | | 27.8% | 27.8% | | 31.1% | 31.1% | | 17.8% | 48.9% | 48.9% |
| Maximum Green (s) | 20.1 | 20.1 | | 20.1 | 20.1 | | 23.1 | 23.1 | | 11.1 | 39.1 | 39.1 |
| Yellow Time (s) | 3.3 | 3.3 | | 3.3 | 3.3 | | 3.2 | 3.2 | | 3.2 | 3.2 | 3.2 |
| All-Red Time (s) | 1.6 | 1.6 | | 1.6 | 1.6 | | 1.7 | 1.7 | | 1.7 | 1.7 | 1.7 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Lost Time (s) | 4.9 | 4.9 | | | 4.9 | | | 4.9 | | | 4.9 | 4.9 |
| Lead/Lag | | | | | | | Lag | Lag | | Lead | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 |
| Minimum Gap (s) | 0.2 | 0.2 | | 0.2 | 0.2 | | 0.2 | 0.2 | | 0.2 | 0.2 | 0.2 |
| Time Before Reduce (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Recall Mode | C-Min | C-Min | | C-Min | C-Min | | None | None | | None | None | None |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 31.2 | 31.2 | | | 31.2 | | | 40.8 | | | 40.8 | 40.8 |
| Actuated g/C Ratio | 0.35 | 0.35 | | | 0.35 | | | 0.45 | | | 0.45 | 0.45 |
| v/c Ratio | 0.19 | 0.34 | | | 0.26 | | | 0.68 | | | 0.39 | 0.11 |
| Control Delay | 19.6 | 19.3 | | | 23.6 | | | 26.4 | | | 19.0 | 4.0 |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | 0.0 |
| Total Delay | 19.6 | 19.3 | | | 23.6 | | | 26.4 | | | 19.0 | 4.0 |
| LOS | B | B | | | C | | | C | | | B | A |
| Approach Delay | | 19.4 | | | 23.6 | | | 26.4 | | | 15.7 | |
| Approach LOS | | B | | | C | | | C | | | B | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Cycle Length: 90 | |
| Actuated Cycle Length: 90 | |
| Offset: 11 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green | |
| Natural Cycle: 95 | |
| Control Type: Actuated-Coordinated | |
| Maximum v/c Ratio: 0.68 | |
| Intersection Signal Delay: 21.5 | Intersection LOS: C |
| Intersection Capacity Utilization 65.0% | ICU Level of Service C |
| Analysis Period (min) 15 | |

Splits and Phases: 5: S. Main St & Monroe St/Hanford Pl



| Lane Group | Ø3 |
|---|---|
| Minimum Initial (s) | 4.0 |
| Minimum Split (s) | 21.0 |
| Total Split (s) | 21.0 |
| Total Split (%) | 23% |
| Maximum Green (s) | 17.5 |
| Yellow Time (s) | 3.5 |
| All-Red Time (s) | 0.0 |
| Lost Time Adjust (s) | |
| Total Lost Time (s) | |
| Lead/Lag | |
| Lead-Lag Optimize? | |
| Vehicle Extension (s) | 3.0 |
| Minimum Gap (s) | 3.0 |
| Time Before Reduce (s) | 0.0 |
| Time To Reduce (s) | 0.0 |
| Recall Mode | None |
| Walk Time (s) | 4.0 |
| Flash Dont Walk (s) | 13.0 |
| Pedestrian Calls (#/hr) | 20 |
| Act Effct Green (s) | |
| Actuated g/C Ratio | |
| v/c Ratio | |
| Control Delay | |
| Queue Delay | |
| Total Delay | |
| LOS | |
| Approach Delay | |
| Approach LOS | |

| Intersection Summary |
|---|

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 0 | 0 | 130 | 471 | 370 | 60 | |
| Future Volume (vph) | 0 | 0 | 130 | 471 | 370 | 60 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | |
| Grade (%) | 0% | | | 0% | 0% | | |
| Storage Length (ft) | 0 | 0 | 0 | | | 0 | |
| Storage Lanes | 0 | 0 | 0 | | | 0 | |
| Taper Length (ft) | 25 | | 25 | | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Ped Bike Factor | | | | | | | |
| Frt | | | | | 0.981 | | |
| Flt Protected | | | | 0.989 | | | |
| Satd. Flow (prot) | 0 | 0 | 0 | 1842 | 1827 | 0 | |
| Flt Permitted | | | | 0.810 | | | |
| Satd. Flow (perm) | 0 | 0 | 0 | 1509 | 1827 | 0 | |
| Right Turn on Red | | Yes | | | | Yes | |
| Satd. Flow (RTOR) | | | | | 19 | | |
| Link Speed (mph) | 25 | | | 25 | 25 | | |
| Link Distance (ft) | 360 | | | 541 | 620 | | |
| Travel Time (s) | 9.8 | | | 14.8 | 16.9 | | |
| Confl. Peds. (#/hr) | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parking (#/hr) | | | | | | | |
| Mid-Block Traffic (%) | 0% | | | 0% | 0% | | |
| Adj. Flow (vph) | 0 | 0 | 141 | 512 | 402 | 65 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 0 | 0 | 653 | 467 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Right | Left | Left | Left | Right | |
| Median Width(ft) | 0 | | | 0 | 0 | | |
| Link Offset(ft) | 0 | | | 0 | 0 | | |
| Crosswalk Width(ft) | 16 | | | 50 | 50 | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | 9 | 15 | | | 9 | |
| Number of Detectors | | | 1 | 2 | 2 | | |
| Detector Template | | | Left | Thru | Thru | | |
| Leading Detector (ft) | | | 20 | 100 | 100 | | |
| Trailing Detector (ft) | | | 0 | 0 | 0 | | |
| Turn Type | | | Perm | NA | NA | | |
| Protected Phases | | | | 2 | 6 | | 3 |
| Permitted Phases | | | 2 | | | | |
| Detector Phase | | | 2 | 2 | 6 | | |
| Switch Phase | | | | | | | |

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | | | 15.0 | 15.0 | 15.0 | | 4.0 |
| Minimum Split (s) | | | 23.1 | 23.1 | 23.4 | | 26.0 |
| Total Split (s) | | | 64.0 | 64.0 | 64.0 | | 26.0 |
| Total Split (%) | | | 71.1% | 71.1% | 71.1% | | 29% |
| Maximum Green (s) | | | 58.9 | 58.9 | 58.9 | | 22.0 |
| Yellow Time (s) | | | 3.2 | 3.2 | 3.2 | | 4.0 |
| All-Red Time (s) | | | 1.9 | 1.9 | 1.9 | | 0.0 |
| Lost Time Adjust (s) | | | | 0.0 | 0.0 | | |
| Total Lost Time (s) | | | | 5.1 | 5.1 | | |
| Lead/Lag | | | | | | | |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | | | 3.0 | 3.0 | 3.0 | | 3.0 |
| Minimum Gap (s) | | | 3.0 | 3.0 | 3.0 | | 3.0 |
| Time Before Reduce (s) | | | 0.0 | 0.0 | 0.0 | | 0.0 |
| Time To Reduce (s) | | | 0.0 | 0.0 | 0.0 | | 0.0 |
| Recall Mode | | | C-Max | C-Max | C-Max | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | | | 90.0 | 90.0 | | |
| Actuated g/C Ratio | | | | 1.00 | 1.00 | | |
| v/c Ratio | | | | 0.43 | 0.26 | | |
| Control Delay | | | | 1.1 | 0.3 | | |
| Queue Delay | | | | 0.0 | 0.0 | | |
| Total Delay | | | | 1.1 | 0.3 | | |
| LOS | | | | A | A | | |
| Approach Delay | | | | 1.1 | 0.3 | | |
| Approach LOS | | | | A | A | | |

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 50 (56%), Referenced to phase 2:NBTL and 6:SBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.43

Intersection Signal Delay: 0.8 Intersection LOS: A

Intersection Capacity Utilization 63.6% ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: S. Main St & Henry St

| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 22 | 22 | 22 | 11 | 6 | 30 | 0 | 56 | 176 | 30 | 2 | 23 |
| Future Volume (vph) | 22 | 22 | 22 | 11 | 6 | 30 | 0 | 56 | 176 | 30 | 2 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | | | | | 0% | | 0% | | | |
| Storage Length (ft) | 50 | | 0 | | | 0 | | 0 | | 0 | | |
| Storage Lanes | 1 | | 0 | | | 0 | | 0 | | 0 | | |
| Taper Length (ft) | 25 | | | | | 25 | | | | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | | | | | | | |
| Frt | | 0.910 | | | | | 0.918 | | 0.979 | | | |
| Flt Protected | 0.950 | | | | | | 0.981 | | | | | |
| Satd. Flow (prot) | 1770 | 1695 | 0 | 0 | 0 | 0 | 1678 | 0 | 1824 | 0 | 0 | 0 |
| Flt Permitted | 0.748 | | | | | | 0.844 | | | | | |
| Satd. Flow (perm) | 1393 | 1695 | 0 | 0 | 0 | 0 | 1443 | 0 | 1824 | 0 | 0 | 0 |
| Right Turn on Red | | | | Yes | | | | Yes | | | Yes | |
| Satd. Flow (RTOR) | | 11 | | | | | 138 | | | | | |
| Link Speed (mph) | | 25 | | | | | 25 | | 25 | | | |
| Link Distance (ft) | | 344 | | | | | 721 | | 778 | | | |
| Travel Time (s) | | 9.4 | | | | | 19.7 | | 21.2 | | | |
| Confl. Peds. (#/hr) | | | | | | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | | | | | | | |
| Mid-Block Traffic (%) | | 0% | | | | | 0% | | 0% | | | |
| Adj. Flow (vph) | 24 | 24 | 24 | 12 | 7 | 33 | 0 | 61 | 191 | 33 | 2 | 25 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 24 | 60 | 0 | 0 | 0 | 0 | 101 | 0 | 226 | 0 | 0 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Left | Left | Right | Left | Right | Right | Left |
| Median Width(ft) | | 12 | | | | | 12 | | 0 | | | |
| Link Offset(ft) | | 0 | | | | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 30 | | | | | 35 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 9 | 15 | 15 | | 9 | | 9 | 9 | 15 |
| Number of Detectors | 1 | 2 | | | 1 | 1 | 2 | | 2 | | | 1 |
| Detector Template | Left | Thru | | | Left | Left | Thru | | Thru | | | Left |
| Leading Detector (ft) | 20 | 100 | | | 20 | 20 | 100 | | 100 | | | 20 |
| Trailing Detector (ft) | 0 | 0 | | | 0 | 0 | 0 | | 0 | | | 0 |
| Turn Type | Perm | NA | | | Perm | Perm | NA | | NA | | | Perm |
| Protected Phases | | 4 | | | | | 8 | | 2 | | | |
| Permitted Phases | 4 | | | | 8 | 8 | | | | | | 6 |
| Detector Phase | 4 | 4 | | | 8 | 8 | 8 | | 2 | | | 6 |
| Switch Phase | | | | | | | | | | | | |

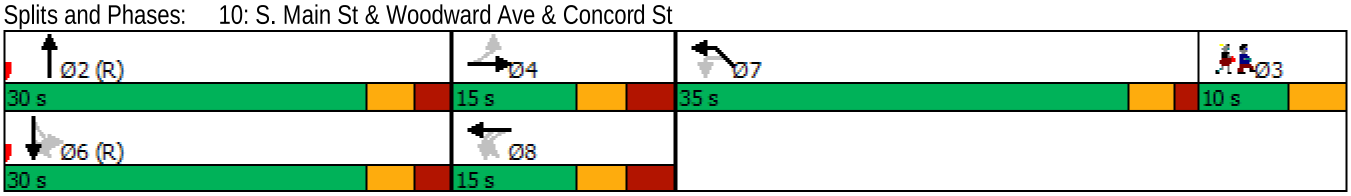
| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | |
| Traffic Volume (vph) | 177 | 163 | 6 | 0 | 281 | 6 | |
| Future Volume (vph) | 177 | 163 | 6 | 0 | 281 | 6 | |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 | |
| Grade (%) | | 0% | | 0% | | | |
| Storage Length (ft) | 0 | | | 0 | 0 | | |
| Storage Lanes | 0 | | | 1 | 0 | | |
| Taper Length (ft) | 25 | | | 25 | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Ped Bike Factor | | | | | | | |
| Frt | | | | 0.868 | | | |
| Flt Protected | | 0.973 | | 0.999 | | | |
| Satd. Flow (prot) | 0 | 1812 | 0 | 1615 | 0 | 0 | |
| Flt Permitted | | 0.709 | | 0.999 | | | |
| Satd. Flow (perm) | 0 | 1321 | 0 | 1615 | 0 | 0 | |
| Right Turn on Red | | | | | | Yes | |
| Satd. Flow (RTOR) | | | | 162 | | | |
| Link Speed (mph) | | 25 | | 25 | | | |
| Link Distance (ft) | | 541 | | 844 | | | |
| Travel Time (s) | | 14.8 | | 23.0 | | | |
| Confl. Peds. (#/hr) | | | | | | | |
| Confl. Bikes (#/hr) | | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% | |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% | |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | |
| Parking (#/hr) | | | | | | | |
| Mid-Block Traffic (%) | | 0% | | 0% | | | |
| Adj. Flow (vph) | 192 | 177 | 7 | 0 | 305 | 7 | |
| Shared Lane Traffic (%) | | | | | | | |
| Lane Group Flow (vph) | 0 | 394 | 0 | 319 | 0 | 0 | |
| Enter Blocked Intersection | No | No | No | No | No | No | |
| Lane Alignment | Left | Left | Left | Left | Right | Right | |
| Median Width(ft) | | 0 | | 12 | | | |
| Link Offset(ft) | | 0 | | 0 | | | |
| Crosswalk Width(ft) | | 50 | | 60 | | | |
| Two way Left Turn Lane | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Turning Speed (mph) | 15 | | 15 | 15 | 9 | 9 | |
| Number of Detectors | 1 | 2 | 1 | 1 | | | |
| Detector Template | Left | Thru | Left | Left | | | |
| Leading Detector (ft) | 20 | 100 | 20 | 20 | | | |
| Trailing Detector (ft) | 0 | 0 | 0 | 0 | | | |
| Turn Type | Perm | NA | Perm | Prot | | | |
| Protected Phases | | 6 | | 7 | | | 3 |
| Permitted Phases | 6 | | 7 | 7 | | | |
| Detector Phase | 6 | 6 | 7 | 7 | | | |
| Switch Phase | | | | | | | |

| Lane Group | EBL | EBT | EBR | EBR2 | WBL2 | WBL | WBT | WBR | NBT | NBR | NBR2 | SBL2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 7.0 | 7.0 | | | 10.0 | 10.0 | 10.0 | | 15.0 | | | 15.0 |
| Minimum Split (s) | 24.7 | 24.7 | | | 24.7 | 24.7 | 24.7 | | 23.7 | | | 23.7 |
| Total Split (s) | 15.0 | 15.0 | | | 15.0 | 15.0 | 15.0 | | 30.0 | | | 30.0 |
| Total Split (%) | 16.7% | 16.7% | | | 16.7% | 16.7% | 16.7% | | 33.3% | | | 33.3% |
| Maximum Green (s) | 8.3 | 8.3 | | | 8.3 | 8.3 | 8.3 | | 24.3 | | | 24.3 |
| Yellow Time (s) | 3.3 | 3.3 | | | 3.3 | 3.3 | 3.3 | | 3.2 | | | 3.2 |
| All-Red Time (s) | 3.4 | 3.4 | | | 3.4 | 3.4 | 3.4 | | 2.5 | | | 2.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | 6.7 | 6.7 | | | | | 6.7 | | 5.7 | | | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 |
| Minimum Gap (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | | 3.0 | | | 3.0 |
| Time Before Reduce (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | | 0.0 | | | 0.0 |
| Recall Mode | None | None | | | None | None | None | | C-Min | | | C-Min |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 8.0 | 8.0 | | | | | 8.3 | | 51.7 | | | |
| Actuated g/C Ratio | 0.09 | 0.09 | | | | | 0.09 | | 0.57 | | | |
| v/c Ratio | 0.19 | 0.37 | | | | | 0.39 | | 0.22 | | | |
| Control Delay | 41.8 | 39.8 | | | | | 7.8 | | 12.3 | | | |
| Queue Delay | 0.0 | 0.0 | | | | | 0.0 | | 0.0 | | | |
| Total Delay | 41.8 | 39.8 | | | | | 7.8 | | 12.3 | | | |
| LOS | D | D | | | | | A | | B | | | |
| Approach Delay | | 40.4 | | | | | 7.8 | | 12.3 | | | |
| Approach LOS | | D | | | | | A | | B | | | |

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 89 (99%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 105
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 18.4 Intersection LOS: B
Intersection Capacity Utilization 81.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 10: S. Main St & Woodward Ave & Concord St



| Lane Group | SBL | SBT | NWL2 | NWL | NWR | NWR2 | Ø3 |
|---|---|---|---|---|---|---|---|
| Minimum Initial (s) | 15.0 | 15.0 | 10.0 | 10.0 | | | 4.0 |
| Minimum Split (s) | 23.7 | 23.7 | 22.7 | 22.7 | | | 21.0 |
| Total Split (s) | 30.0 | 30.0 | 35.0 | 35.0 | | | 10.0 |
| Total Split (%) | 33.3% | 33.3% | 38.9% | 38.9% | | | 11% |
| Maximum Green (s) | 24.3 | 24.3 | 30.3 | 30.3 | | | 6.0 |
| Yellow Time (s) | 3.2 | 3.2 | 3.1 | 3.1 | | | 4.0 |
| All-Red Time (s) | 2.5 | 2.5 | 1.6 | 1.6 | | | 0.0 |
| Lost Time Adjust (s) | | 0.0 | | 0.0 | | | |
| Total Lost Time (s) | | 5.7 | | 4.7 | | | |
| Lead/Lag | | | Lead | Lead | | | Lag |
| Lead-Lag Optimize? | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Minimum Gap (s) | 3.0 | 3.0 | 3.0 | 3.0 | | | 3.0 |
| Time Before Reduce (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| Time To Reduce (s) | 0.0 | 0.0 | 0.0 | 0.0 | | | 0.0 |
| Recall Mode | C-Min | C-Min | None | None | | | None |
| Walk Time (s) | | | | | | | 7.0 |
| Flash Dont Walk (s) | | | | | | | 15.0 |
| Pedestrian Calls (#/hr) | | | | | | | 0 |
| Act Effct Green (s) | | 51.7 | | 15.9 | | | |
| Actuated g/C Ratio | | 0.57 | | 0.18 | | | |
| v/c Ratio | | 0.52 | | 0.76 | | | |
| Control Delay | | 11.5 | | 28.7 | | | |
| Queue Delay | | 0.0 | | 0.0 | | | |
| Total Delay | | 11.5 | | 28.7 | | | |
| LOS | | B | | C | | | |
| Approach Delay | | 11.5 | | 28.7 | | | |
| Approach LOS | | B | | C | | | |

Intersection Summary

| Lane Group | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 39 | 279 | 193 | 14 | 14 | 38 |
| Future Volume (vph) | 39 | 279 | 193 | 14 | 14 | 38 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | 0% | | 0% | |
| Storage Length (ft) | | 0 | 0 | | 0 | 0 |
| Storage Lanes | | 1 | 1 | | 1 | 0 |
| Taper Length (ft) | | 25 | | | 25 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | |
| Frt | | | 0.865 | | 0.901 | |
| Flt Protected | | 0.950 | | | 0.987 | |
| Satd. Flow (prot) | 0 | 1770 | 1611 | 0 | 1657 | 0 |
| Flt Permitted | | 0.950 | | | 0.987 | |
| Satd. Flow (perm) | 0 | 1770 | 1611 | 0 | 1657 | 0 |
| Link Speed (mph) | | 25 | 25 | | 25 | |
| Link Distance (ft) | | 91 | 844 | | 641 | |
| Travel Time (s) | | 2.5 | 23.0 | | 17.5 | |
| Confl. Peds. (#/hr) | | | | | | |
| Confl. Bikes (#/hr) | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | |
| Mid-Block Traffic (%) | | 0% | 0% | | 0% | |
| Adj. Flow (vph) | 42 | 303 | 210 | 15 | 15 | 41 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 345 | 225 | 0 | 56 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Right | Left | Right |
| Median Width(ft) | | 12 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 15 | 9 | 9 | 15 | 9 |
| Sign Control | | Free | Free | | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Control Type: Unsignalized | |
| Intersection Capacity Utilization 27.6% | ICU Level of Service A |
| Analysis Period (min) 15 | |

| Lane Group | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 287 | 108 | 210 | 295 | 105 | 126 |
| Future Volume (vph) | 287 | 108 | 210 | 295 | 105 | 126 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | 0% | | 0% | | | 0% |
| Storage Length (ft) | 0 | 0 | | 0 | 0 | |
| Storage Lanes | 1 | 0 | | 0 | 0 | |
| Taper Length (ft) | 25 | | | | 25 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | |
| Frt | 0.963 | | 0.921 | | | |
| Flt Protected | 0.965 | | | | | 0.978 |
| Satd. Flow (prot) | 1731 | 0 | 1716 | 0 | 0 | 1822 |
| Flt Permitted | 0.965 | | | | | 0.978 |
| Satd. Flow (perm) | 1731 | 0 | 1716 | 0 | 0 | 1822 |
| Link Speed (mph) | 25 | | 25 | | | 25 |
| Link Distance (ft) | 380 | | 640 | | | 91 |
| Travel Time (s) | 10.4 | | 17.5 | | | 2.5 |
| Confl. Peds. (#/hr) | | | | | | |
| Confl. Bikes (#/hr) | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | |
| Mid-Block Traffic (%) | 0% | | 0% | | | 0% |
| Adj. Flow (vph) | 312 | 117 | 228 | 321 | 114 | 137 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 429 | 0 | 549 | 0 | 0 | 251 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Right | Left | Left |
| Median Width(ft) | 12 | | 0 | | | 0 |
| Link Offset(ft) | 0 | | 0 | | | 0 |
| Crosswalk Width(ft) | 16 | | 16 | | | 16 |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | 9 | | 9 | 15 | |
| Sign Control | Stop | | Free | | | Free |

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 74.1% ICU Level of Service D

Analysis Period (min) 15

| Lane Group | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 83 | 195 | 135 | 278 | 310 | 71 |
| Future Volume (vph) | 83 | 195 | 135 | 278 | 310 | 71 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (ft) | 12 | 12 | 12 | 12 | 12 | 12 |
| Grade (%) | | 0% | 0% | | 0% | |
| Storage Length (ft) | 0 | | | 0 | 0 | 0 |
| Storage Lanes | 0 | | | 0 | 1 | 0 |
| Taper Length (ft) | 25 | | | | 25 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | | | | | |
| Frt | | | 0.909 | | 0.975 | |
| Flt Protected | | 0.985 | | | 0.961 | |
| Satd. Flow (prot) | 0 | 1835 | 1693 | 0 | 1745 | 0 |
| Flt Permitted | | 0.985 | | | 0.961 | |
| Satd. Flow (perm) | 0 | 1835 | 1693 | 0 | 1745 | 0 |
| Link Speed (mph) | | 25 | 25 | | 30 | |
| Link Distance (ft) | | 616 | 640 | | 489 | |
| Travel Time (s) | | 16.8 | 17.5 | | 11.1 | |
| Confl. Peds. (#/hr) | | | | | | |
| Confl. Bikes (#/hr) | | | | | | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Growth Factor | 100% | 100% | 100% | 100% | 100% | 100% |
| Heavy Vehicles (%) | 2% | 2% | 2% | 2% | 2% | 2% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 |
| Parking (#/hr) | | | | | | |
| Mid-Block Traffic (%) | | 0% | 0% | | 0% | |
| Adj. Flow (vph) | 90 | 212 | 147 | 302 | 337 | 77 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 0 | 302 | 449 | 0 | 414 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Left | Right | Left | Right |
| Median Width(ft) | | 0 | 0 | | 12 | |
| Link Offset(ft) | | 0 | 0 | | 0 | |
| Crosswalk Width(ft) | | 16 | 16 | | 16 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | | 9 | 15 | 9 |
| Sign Control | | Stop | Stop | | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: Other | |
| Control Type: Unsignalized | |
| Intersection Capacity Utilization 70.5% | ICU Level of Service C |
| Analysis Period (min) 15 | |

| Movement | NBL2 | NBL | SER | SER2 | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 39 | 279 | 193 | 14 | 14 | 38 |
| Future Volume (Veh/h) | 39 | 279 | 193 | 14 | 14 | 38 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 42 | 303 | 210 | 15 | 15 | 41 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | 844 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 225 | | | | 604 | 218 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 225 | | | | 604 | 218 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 97 | | | | 97 | 95 |
| cM capacity (veh/h) | 1344 | | | | 447 | 822 |

| Direction, Lane # | NB 1 | SE 1 | NE 1 |
|---|---|---|---|
| Volume Total | 345 | 225 | 56 |
| Volume Left | 42 | 0 | 15 |
| Volume Right | 0 | 15 | 41 |
| cSH | 1344 | 1700 | 671 |
| Volume to Capacity | 0.03 | 0.13 | 0.08 |
| Queue Length 95th (ft) | 2 | 0 | 7 |
| Control Delay (s) | 1.2 | 0.0 | 10.9 |
| Lane LOS | A | | B |
| Approach Delay (s) | 1.2 | 0.0 | 10.9 |
| Approach LOS | | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 1.6 | | |
| Intersection Capacity Utilization | 27.6% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 287 | 108 | 210 | 295 | 105 | 126 |
| Future Volume (Veh/h) | 287 | 108 | 210 | 295 | 105 | 126 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 312 | 117 | 228 | 321 | 114 | 137 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 754 | 388 | | | 549 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 754 | 388 | | | 549 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 7 | 82 | | | 89 | |
| cM capacity (veh/h) | 335 | 660 | | | 1021 | |

| Direction, Lane # | WB 1 | NB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 429 | 549 | 251 |
| Volume Left | 312 | 0 | 114 |
| Volume Right | 117 | 321 | 0 |
| cSH | 387 | 1700 | 1021 |
| Volume to Capacity | 1.11 | 0.32 | 0.11 |
| Queue Length 95th (ft) | 389 | 0 | 9 |
| Control Delay (s) | 111.1 | 0.0 | 4.7 |
| Lane LOS | F | | A |
| Approach Delay (s) | 111.1 | 0.0 | 4.7 |
| Approach LOS | F | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 39.7 | | |
| Intersection Capacity Utilization | 74.1% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

| Movement | NBL | NBT | SBT | SBR | NEL | NER |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | | Stop | Stop | | Stop | |
| Traffic Volume (vph) | 83 | 195 | 135 | 278 | 310 | 71 |
| Future Volume (vph) | 83 | 195 | 135 | 278 | 310 | 71 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 90 | 212 | 147 | 302 | 337 | 77 |

| Direction, Lane # | NB 1 | SB 1 | NE 1 |
|---|---|---|---|
| Volume Total (vph) | 302 | 449 | 414 |
| Volume Left (vph) | 90 | 0 | 337 |
| Volume Right (vph) | 0 | 302 | 77 |
| Hadj (s) | 0.09 | -0.37 | 0.09 |
| Departure Headway (s) | 6.1 | 5.4 | 6.0 |
| Degree Utilization, x | 0.51 | 0.68 | 0.69 |
| Capacity (veh/h) | 551 | 635 | 563 |
| Control Delay (s) | 15.3 | 19.2 | 21.5 |
| Approach Delay (s) | 15.3 | 19.2 | 21.5 |
| Approach LOS | C | C | C |

| Intersection Summary | | | |
|---|---|---|---|
| Delay | 19.0 | | |
| Level of Service | C | | |
| Intersection Capacity Utilization | 70.5% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 30.7 |
| Intersection LOS | D |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 311 | 133 | 167 | 347 | 110 | 111 |
| Future Vol, veh/h | 311 | 133 | 167 | 347 | 110 | 111 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 338 | 145 | 182 | 377 | 120 | 121 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|---|---|---|---|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 32.7 | 35.8 | 15 |
| HCM LOS | D | E | B |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|---|---|---|---|
| Vol Left, % | 0% | 70% | 50% |
| Vol Thru, % | 32% | 0% | 50% |
| Vol Right, % | 68% | 30% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 514 | 444 | 221 |
| LT Vol | 0 | 311 | 110 |
| Through Vol | 167 | 0 | 111 |
| RT Vol | 347 | 133 | 0 |
| Lane Flow Rate | 559 | 483 | 240 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.876 | 0.832 | 0.444 |
| Departure Headway (Hd) | 5.643 | 6.206 | 6.66 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 642 | 589 | 540 |
| Service Time | 3.689 | 4.206 | 4.719 |
| HCM Lane V/C Ratio | 0.871 | 0.82 | 0.444 |
| HCM Control Delay | 35.8 | 32.7 | 15 |
| HCM Lane LOS | E | D | B |
| HCM 95th-tile Q | 10.3 | 8.7 | 2.3 |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 24.2 |
| Intersection LOS | C |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 287 | 108 | 210 | 295 | 105 | 126 |
| Future Vol, veh/h | 287 | 108 | 210 | 295 | 105 | 126 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 312 | 117 | 228 | 321 | 114 | 137 |
| Number of Lanes | 1 | 0 | 1 | 0 | 0 | 1 |

| Approach | WB | NB | SB |
|---|---|---|---|
| Opposing Approach | | SB | NB |
| Opposing Lanes | 0 | 1 | 1 |
| Conflicting Approach Left | NB | | WB |
| Conflicting Lanes Left | 1 | 0 | 1 |
| Conflicting Approach Right | SB | WB | |
| Conflicting Lanes Right | 1 | 1 | 0 |
| HCM Control Delay | 23.5 | 29.2 | 14.4 |
| HCM LOS | C | D | B |

| Lane | NBLn1 | WBLn1 | SBLn1 |
|---|---|---|---|
| Vol Left, % | 0% | 73% | 45% |
| Vol Thru, % | 42% | 0% | 55% |
| Vol Right, % | 58% | 27% | 0% |
| Sign Control | Stop | Stop | Stop |
| Traffic Vol by Lane | 505 | 395 | 231 |
| LT Vol | 0 | 287 | 105 |
| Through Vol | 210 | 0 | 126 |
| RT Vol | 295 | 108 | 0 |
| Lane Flow Rate | 549 | 429 | 251 |
| Geometry Grp | 1 | 1 | 1 |
| Degree of Util (X) | 0.826 | 0.723 | 0.446 |
| Departure Headway (Hd) | 5.42 | 6.06 | 6.396 |
| Convergence, Y/N | Yes | Yes | Yes |
| Cap | 659 | 593 | 567 |
| Service Time | 3.512 | 4.148 | 4.396 |
| HCM Lane V/C Ratio | 0.833 | 0.723 | 0.443 |
| HCM Control Delay | 29.2 | 23.5 | 14.4 |
| HCM Lane LOS | D | C | B |
| HCM 95th-tile Q | 8.8 | 6 | 2.3 |

# Attachment C-3 - Manresa Island Construction Noise Study, October 2020

# Walk Bridge Program
# Norwalk, CT

# Walk Bridge Program- Manresa Island Construction Noise Study

October 2020

**Prepared for:**

Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06111

**Prepared by:**

WSP USA
500 Winding Brook Drive
Glastonbury, Connecticut 06033

# Table of Contents

# Introduction

WSP was requested by the Connecticut Department of Transportation (CTDOT) to implement a noise study to model conditions anticipated to result from work at the proposed bridge assembly site on Manresa Island south of Norwalk Harbor. This work is part of the Walk Bridge Replacement Project (SPN 0301-0176) in Norwalk, CT. As part of the study, data collected in early September 2020 documented background ambient noise levels at five (5) locations adjacent to Manresa Island. This information was then compared to a model of future construction noise levels based on Manresa Island work activities. Additionally, a site in downtown Norwalk near 70 Water Street had previously been considered for bridge assembly work and additional comparisons were made between the Manresa Island locations and sites in downtown Norwalk.

WSP retained the services of Cross Spectrum Acoustics (CSA) of Longmeadow, MA to prepare the Manresa Noise Study; including background noise monitoring, analysis of monitoring results and modeling of construction phase noise levels for both Manresa Island and downtown Norwalk. CSA deployed noise monitoring systems at representative locations in neighborhoods adjacent to Manresa Island. Monitoring devices were placed on private property as coordinated with and agreed to by the property owners and/or representatives. Downtown Norwalk background noise levels were obtained from a previous study for the Walk Bridge Test Pile Program, conducted between summer of 2018 and winter of 2019.

The study (Attachment A) is supplemented by appendices that provide noise measurement site photographs (Appendix A), noise measurement results graphs (Appendix B) and additional graphics representing the expected noise levels for both the Manresa Island areas and downtown Norwalk (Appendix C).

# Attachment A - Manresa Island Construction Noise Study

Cross-Spectrum Acoustics

**Cross-Spectrum Acoustics Inc.**

Massachusetts
Utah
California

## TECHNICAL MEMORANDUM

| | |
|---|---|
| From: | David Towers & Herbert Singleton, Cross-Spectrum Acoustics Inc. |
| Date: | October 9, 2020 |
| Project Reference: | J2018-1050 – Walk Bridge Project - Manresa Island Construction Noise Study (SPN 301-176) |

## 1. INTRODUCTION

This technical memorandum provides a summary of a noise study for proposed Walk Bridge Project construction activities at Manresa Island in Norwalk, CT. The study included pre-construction background ambient noise measurements at nearby noise-sensitive locations as well as predictions of future construction noise levels at these locations. The projected noise levels in nearby neighborhoods from the proposed construction activities at Manresa Island are compared to noise levels in downtown Norwalk from the same activities if conducted at the Marine Staging Yard on Water Street, south of the Stroffolino Bridge.

## 2. BACKGROUND AMBIENT NOISE MEASUREMENTS

**Sound** is defined as small changes in air pressure above and below the standard atmospheric pressure. Noise is usually considered to be unwanted sound. The level of sound is the magnitude of air pressure change above and below atmospheric pressure and is expressed in A-weighted decibels (dBA) to correspond with the characteristics of human hearing. Typical sounds fall within a range between 0 dBA (the approximate lower limit of human hearing) and 120 dBA (the highest sound level generally experienced in the environment). A 3-dB change in sound level is perceived as a barely noticeable change outdoors and a 10-dB change in sound level is perceived as a doubling (or halving) of loudness. Because environmental noise is constantly changing, it is common to use various metrics to describe the overall noise exposure. Some of these metrics are described below:

> $\mathbf{L_{eq}}$ is the "equivalent" sound level over a time period, typically 1 hour or 24-hours. It is the level of steady sound that has the same energy as a fluctuating sound measured over the same time period. $L_{eq}$ is indicative of the average sound level during the measurement period.
>
> $\mathbf{L_{xx}}$**:** represents "percentile" levels, i.e. the sound level that is exceeded over "xx" percent of the time during the measurement period. For example, the $L_{90}$ is the sound level that is exceeded 90% of the time during the measurement period and is the metric commonly associated with the background noise. $L_{10}$ and $L_{50}$ are sound levels that are exceeded 10% of the time and 50% of the time, respectively. $L_{10}$ and $L_{50}$ are used by the Connecticut Department of Energy and Environmental Protection to assess noise levels.
>
> $\mathbf{L_{max}}$ is the maximum sound level and is used to describe the highest level over a measurement period .
>
> $\mathbf{L_{dn}}$ is the day-night sound level which is used by federal agencies to describe daily community noise exposure. $L_{dn}$ is a cumulative equivalent noise level over a 24-hour period that is similar to $L_{eq}$. However, $L_{dn}$ adds a night-time penalty of 10 decibels to events measured between 10:00 PM and 7:00 AM to account for increased nighttime sensitivity to noise.

## 2.1. AMBIENT NOISE MEASUREMENT LOCATIONS

Long-term noise measurements were conducted over a 48-hour weekday period between September 1 and September 3, 2020 at the five locations around Manresa Island shown in Figure 1, denoted as Sites MAN-1 through MAN-5. The measurements were performed using NTi Audio model XL2 sound level meters that conform to American National Standard Institute (ANSI) standards for Class 1 (Precision) sound measurement equipment. Calibrations, traceable to the National Institute of Standards and Technology (NIST), were conducted before and after each measurement. The monitors were set to continuously monitor noise levels and report the hourly equivalent noise level ($L_{eq}$), maximum noise level ($L_{max}$), and $10^{th}$, $50^{th}$ and $90^{th}$ percentile sound level ($L_{10}$, $L_{50}$ and $L_{90}$) metrics over the measurement periods.

The weather during the measurement period was mostly dry, except for some periods of rain on September 2, and temperatures in the area ranged from 60 to 80 degrees Fahrenheit. Wind speeds were generally below 10 mph. Windscreens were used to minimize wind noise in the measurements. CSA staff performed short-term on-site observations during the measurement periods to note sound sources and typical activities.

In addition to the September 2020 measurements, the existing noise data from measurement sites N-6 (at 50 Water Street) and N-7 (100 Water Street) collected in July 2018[1] are also presented in Figure 2. These results are intended to represent the existing noise conditions near newly constructed apartment buildings located west of Water Street between Hanford Place and Raymond Street. Because construction is still occurring at one building, it was not feasible to conduct additional long-term measurements in this area.

A summary of each location is provided below, and photographs of the measurement sites are included in Appendix A.

**MAN-1: 10 Woodland Road.** This measurement location was intended to represent the existing noise environment for homes in the southeast portion of the Wilson Point Community located west of the Manresa Island site. The noise monitor was located in the backyard of the home at 10 Woodland Road, facing toward the location of the proposed construction site. The major existing noise sources at this location were neighborhood activity, activity on the water, wind in the trees and birdsong.

**MAN-2: 8 Valley Road.** This measurement location was intended to represent the existing noise environment for homes in the northeast portion of the Wilson Point Community located west of the Manresa Island site. The noise monitor was located on the rear patio of the home at 8 Valley Road. Noise sources affecting this location included neighborhood activity, activity on the water, wind in the trees and birdsong.

**MAN-3: 14 Outer Road.** This measurement location was intended to represent the existing noise environment at the residences in the Village Creek community located to the northwest of Manresa Island. The noise monitor was located in the back yard of the 14 Outer Road residence, along the floodwall near the shore. Major noise sources at this location included wave motion, activity on the water, wind in the trees, birdsong, and neighborhood activity.

**MAN-4: 4 Yost Street.** This measurement location was intended to represent the existing noise environment along the proposed Woodward Avenue truck route, north of Manresa Island. The noise monitor was located at the edge of the side yard to the west of the 4 Yost Street residence, along Woodward Ave. The major noise sources affecting this location were traffic on Woodward Avenue and neighborhood activity.

**MAN-5: 5 ½ Longshore Ave.** This measurement location was intended to represent the existing noise environment at the Harborshore community, located to the north of Manresa Island. The noise monitor was located south of the property, along the fence separating the residence and the NRG property, near the water. The major noise sources affecting this location were wave action, activities on the water, local activity, wind in the trees and birdsong.

[1] "Walk Bridge Background Noise and Vibration Background Measurement Program – (SPN 301-176)," Technical Memorandum from David Towers and Herbert Singleton, Cross-Spectrum Acoustics Inc., September 5, 2018

**N-6: 50 Water Street (2018).** This measurement location was intended to represent the existing noise environment at the buildings in the vicinity of 50-68 Water Street, located south of Washington Street between Water Street and the Norwalk River. The noise monitor was located near the bottom of the stairway on the south side of the building. Noise at this location was continuously monitored for a 48-hour weekday period from July 9 to July 11, 2018, and for a 24-hour weekend period from July 14 to July 15, 2018. The major noise sources affecting this location were traffic on the Washington Street bridge and trains on the Walk Bridge, as well as local parking lot and boat dock activity.

**N-7: 100 Water Street (2018).** This measurement location was intended to represent the existing noise environment in the dock area in the vicinity of 100 Water Street, located south of Washington Street between Water Street and the Norwalk River. The noise monitor was located in the parking lot adjacent to the Sono Seaport Seafood building. Noise at this location was continuously monitored for a 48-hour weekday period from July 11 to July 13, 2018, and for a 24-hour weekend period from July 14 to July 15, 2018. The major noise sources affecting this location were traffic on the Washington Street bridge and Water Street, local parking lot and boat dock activity and a nearby air conditioning unit.

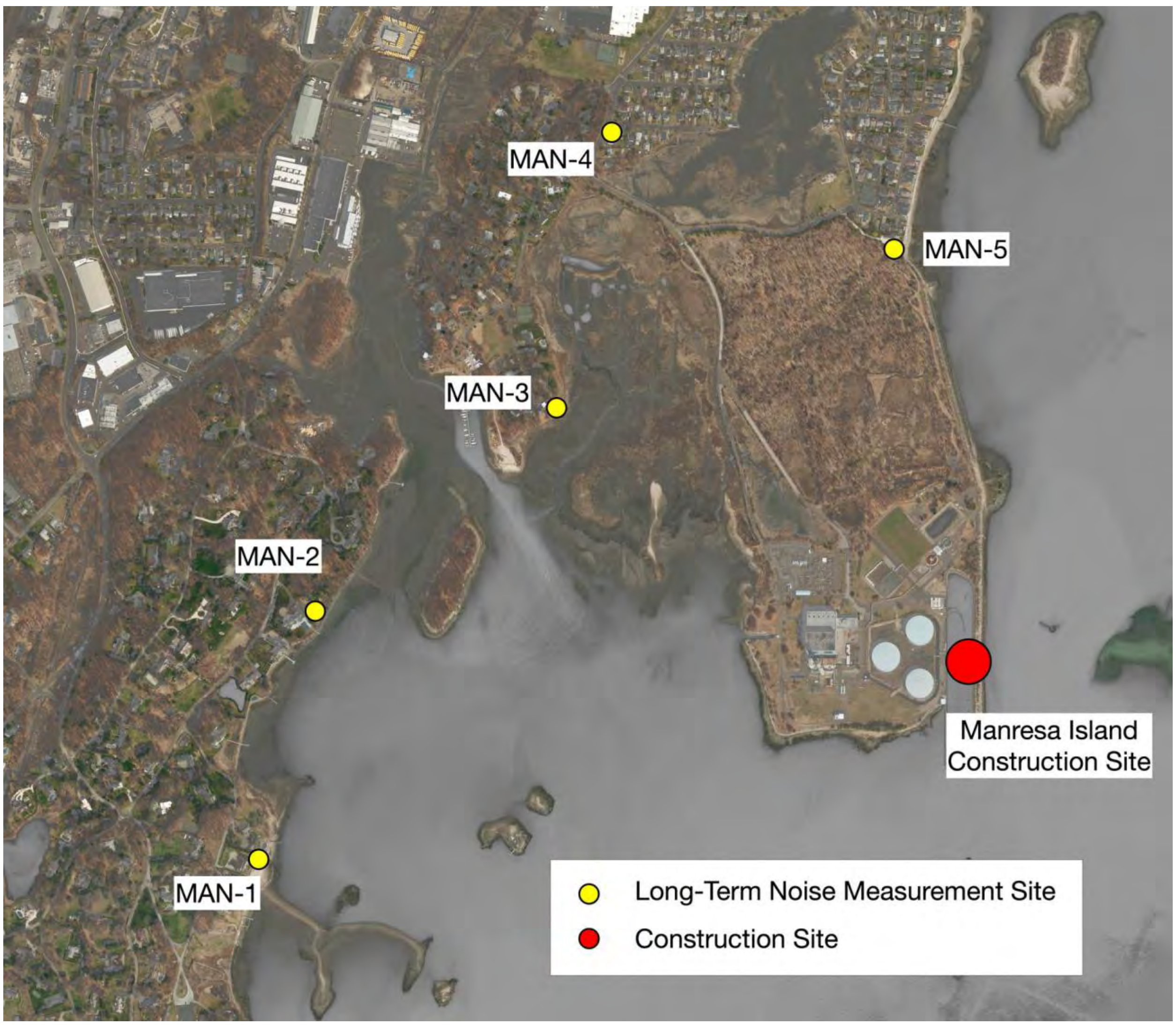



**Figure 1. Noise Monitoring Locations Near Manresa Island**

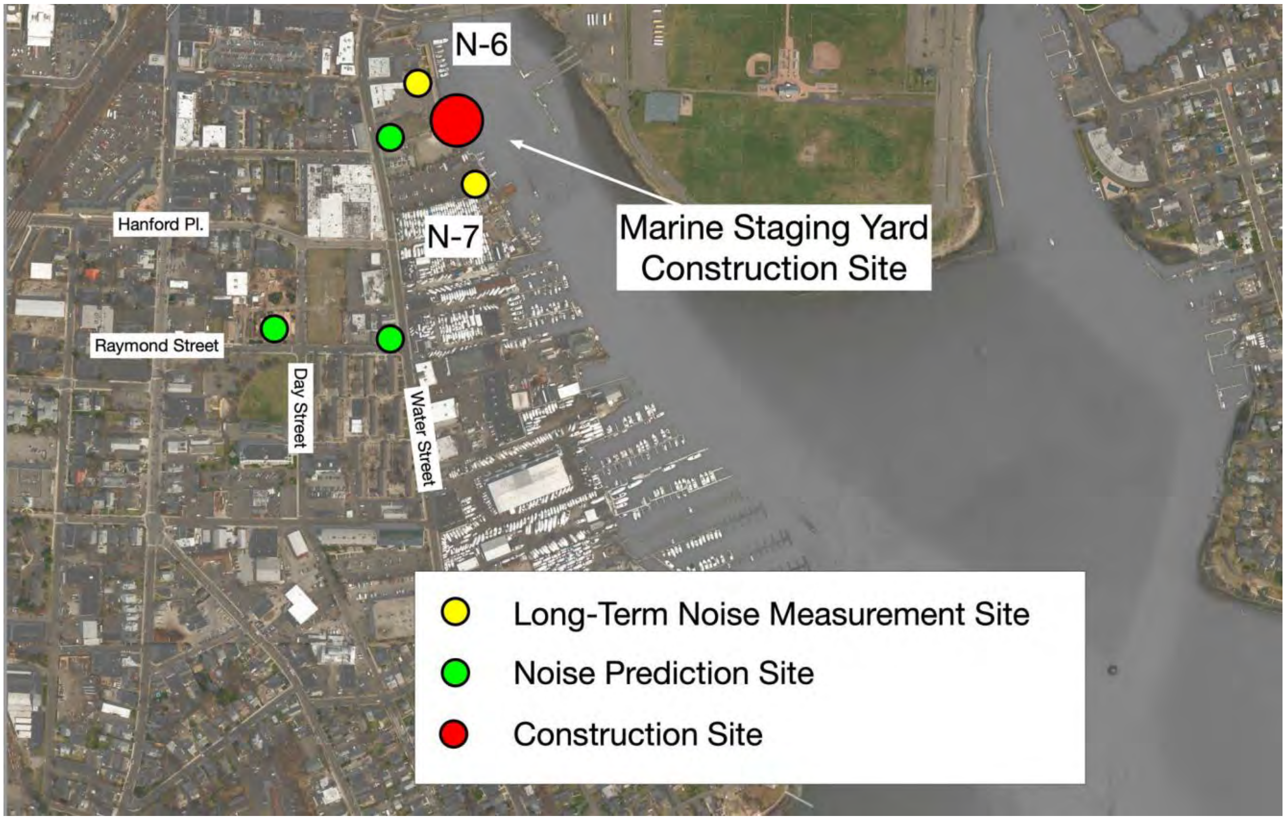



**Figure 2. Noise Prediction Locations Near the Marine Staging Yard**

## 2.2. AMBIENT NOISE MEASUREMENT RESULTS

The ambient long-term noise measurement results are presented in Table 1 for the 48-hour weekday measurements. The results are summarized in terms of the various noise metrics that were collected over the monitoring periods. The noise metrics presented here are consistent with those collected for previous Walk Bridge construction noise studies. Most of the noise near the project site was due to local neighborhood activities, beach sounds, motor-vehicle traffic on nearby streets, and biogenic sources such as bird song and insect noises. The hourly noise metrics for each position over the monitoring periods are presented in Appendix B.

**Table 1. Long-Term (48-hour) Weekday Noise Measurement Results**

| Measurement Location | | Start of Measurement | | Measured Sound Level (dBA) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $L_{dn}$ | $L_{eq(24)}$ | Day (7 AM – 6 PM) | | | | Evening (6 PM – 10 PM) | | | | Night (10 PM - 7 AM) | | | |
| Site No. | Address | Date | Time | | | $L_{eq}$ | $L_{10}$ | $L_{90}$ | $L_{max}$ | $L_{eq}$ | $L_{10}$ | $L_{90}$ | $L_{max}$ | $L_{eq}$ | $L_{10}$ | $L_{90}$ | $L_{max}$ |
| MAN-1 | 10 Woodland Rd | 9/1/20 | 10:00 am | 56.7 | 49.9 | 49.2 | 50.4 | 44.1 | 69.2 | 48.9 | 52.6 | 47.8 | 66.3 | 50.4 | 54.5 | 45.2 | 59.8 |
| MAN-2 | 8 Valley Rd | 9/1/20 | 11:00 am | 62.1 | 58.7 | 61.7 | 56.3 | 44.1 | 97.0 | 53.4 | 56.6 | 50.2 | 66.0 | 54.1 | 58.0 | 43.3 | 64.9 |
| MAN-3 | 14 Outer Rd | 9/1/20 | 11:00 am | 63.9 | 61.0 | 63.8 | 53.1 | 42.0 | 104.4 | 51.9 | 55.1 | 50.5 | 67.6 | 55.0 | 58.6 | 48.5 | 64.3 |
| MAN-4 | 4 Yost St | 9/1/20 | 12:00 pm | 60.0 | 53.5 | 53.4 | 55.7 | 45.3 | 81.8 | 53.4 | 56.5 | 47.9 | 68.6 | 53.5 | 55.6 | 46.3 | 65.3 |
| MAN-5 | 5 ½ Longshore Ave | 9/1/20 | 1:00 pm | 63.1 | 54.8 | 49.9 | 56.4 | 43.9 | 68.2 | 55.8 | 58.7 | 54.6 | 65.4 | 57.2 | 58.8 | 49.7 | 66.9 |
| N-6* | 50 Water St | 7/9/18 | 9:30 am | 63.6 | 61.6 | 61.2 | 63.9 | 50.9 | 82.7 | 51.1 | 54.8 | 46.1 | 90.2 | 51.1 | 54.5 | 41.3 | 81.6 |
| N-7* | 100 Water St | 7/11/18 | 10:50 am | 62.1 | 59.5 | 57.2 | 58.3 | 50.2 | 86.5 | 59.6 | 62.5 | 52.1 | 87.9 | 50.5 | 50.9 | 43.2 | 83.9 |
| * 2018 measurement | | | | | | | | | | | | | | | | | |

# 3. NOISE PREDICTIONS

## 3.1. CONSTRUCTION ACTIVITIES

The construction noise predictions were carried out using the methodology contained in the U.S. Federal Transit Administration (FTA) "Transit Noise and Vibration Impact Assessment Manual" (FTA Report No. 0123, September 2018). Specifically, the predictions were based on the FTA methodology for a General Assessment, which assumes simultaneous full-power operation of the two noisiest pieces of equipment for each construction activity. The reference noise levels used for the computations are based on the FTA methodology and the Federal Highway Administration (FHWA) Roadway Construction Noise model (RCNM) data.

In accordance with FTA methodology, sound propagation from construction equipment assumes a point source model based on spherical spreading, with a reduction of 6 decibels per doubling of distance from the source. To be conservative, no excess sound attenuation due to ground or atmospheric effects is assumed. However, an even more conservative approach has been adopted in cases where the sound from the construction site propagates over large bodies of water. Based on guidance provided by a working group of the Institute of Acoustics,[2] cylindrical sound spreading (with a reduction of only 3 decibels per doubling of distance from the source) is assumed for noise propagation over large bodies of water at least 700 meters (2,300 feet) in extent.

Predictions of construction noise levels generated by Lift Span Assembly activities at Manresa Island are shown in Table 2. The results indicate projected worst-case construction noise levels in the range of 50-64 dBA at the representative ambient noise measurement locations, depending on construction activity and location. These noise levels are well below the CT DOT noise limit of 90 dBA and the construction will be limited to daytime hours. However, given that the daytime background noise levels ($L_{90}$) were in the range of 42-45 dBA at the ambient measurement sites, the construction activities at Manresa Island are likely to be audible at some outdoor locations during quiet periods of time.

For purposes of comparison, predictions of construction noise levels generated by Lift Span Assembly activities at the Marine Staging Yard in downtown Norwalk were made at the five locations shown in Figure 2, and the results are presented in Table 3. The results indicate projected worst-case construction noise levels in the range of 67-87 dBA at the representative noise-sensitive locations, depending on construction activity and location. Although these noise levels do not exceed the CT DOT noise limit of 90 dBA, they are significantly (on the order of 20 decibels) greater than those projected in the nearest neighborhoods for the same construction activities at Manresa Island.

## 3.2. CONSTRUCTION TRAFFIC

Construction-related traffic along the proposed Woodward Avenue route will include both delivery trucks and personal employee vehicles, and will be limited to the daytime hours. It expected that there will be about five truck trips (in and out) per week and about 20 automobile trips (in and out) per day. The posted speed limit on Woodward Avenue is 25 mph.

Noise from construction traffic was predicted in terms of one-hour $L_{eq}$ using FHWA procedures and was assessed by comparing the predictions with the ambient noise measurement results at Site MAN-4 (4 Yost Street). The measurement microphone at this site was directly behind a solid wood stockade fence, approximately 25 feet from the center of Woodward Avenue. Given the limited number of delivery truck trips, it was assumed that there would be one heavy truck traveling along the route during 10 different one-hour periods each week. For employee traffic, it was assumed that there would be 20 automobiles traveling along the route during two different one-hour periods each day. To be conservative, a speed of 30 mph was assumed for all vehicles traveling along Woodward Avenue (5 mph above the posted speed limit).

[2] A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, Supplementary Guidance Note 6: Noise Propagation Over Water for On-Shore Wind Turbines (December 2013)

The results of the noise predictions at Site MAN-4 indicate one-hour $L_{eq}$ values of 45 dBA for construction truck traffic and 44 dBA for employee vehicle traffic, assuming a -5 dB adjustment to account for shielding of road traffic noise by the fence adjacent to the measurement location. These predicted future construction-related traffic noise levels are lower than the measured existing daytime hourly Leq, which were in the range of 49-60 dBA and averaged 53 dBA. Combining the highest future traffic noise level (45 dBA) with the lowest existing noise level (49 dBA) results in a total future noise level of 50 dBA based on decibel addition (which is logarithmic rather than arithmetic). Therefore, it is concluded that construction-related traffic will result in an increase of no more than one decibel at locations along the proposed route, which is an insignificant change. Furthermore, the exposure to construction-related traffic will occur during a limited number of hours during the day.

## 4. SUMMARY OF RESULTS AND CONCLUSIONS

The results of the study indicate that, although noise from the proposed Lift Span Assembly construction activities at Manresa Island will be audible at times, the construction noise levels will be below the Connecticut Department of Transportation (CT DOT) noise limits for the Walk Bridge Project at all modeled community locations, and well below noise limits at the Manresa Island locations. In addition, noise increases from construction-related traffic along the proposed Woodward Avenue truck route are not expected to be significant.

The results of the study also indicate that although construction noise levels at nearby noise-sensitive locations are not projected to exceed the CT DOT noise limits, they would be significantly (on the order of 20 decibels) higher if the Lift Span Assembly activities were to occur at the Marine Staging Yard location. Therefore, it is concluded that relocating these construction activities to Manresa Island will result in significantly less community noise impact.

Finally, it should be noted that, although construction noise levels at noise-sensitive locations are not projected to exceed the CT DOT noise limits, the Department may consider mitigations to the extent that they are warranted and feasible as the program advances.

Additional graphics showing Manresa Island and the Marine Staging Yard noise predictions at specified distances from the work areas are presented in Appendix C.

**Table 2. Construction Noise Projections for Lift Span Assembly at Manresa Island**

| Construction Activity | Major Equipment Items | Maximum Projected Noise Level (dBA) at Given Site/Distance | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Reference Level at 50 feet | Calculated Level at 100 feet | MAN-1 (4,600 ft)† | MAN-2 (4,300 ft)‡ | MAN-3 (3,000 ft) | MAN-4 (4,000 ft) | MAN-5 (2,600 ft) |
| Grading, fabric, and stone installation for yard | Tri-Axle Dump Truck<br>Cat 950 Loader | 90 | 84 | 58 | 58 | 54 | 52 | 56 |
| Structural steel erection and boltup installation | Grove 60T Rough Terrain Yard Crane<br>Impact Wrench | 90 | 84 | 58 | 58 | 54 | 52 | 56 |
| Sand blasting and touchup paint | Sand Blaster<br>Air Compressor | 96 | 90 | 64 | 64 | 60 | 58 | 62 |
| Construction fencing installation | Cat 950 Loader<br>Skid Steer with Auger attachment | 88 | 82 | 56 | 56 | 52 | 50 | 54 |
| Lift Span Construction | Tri Axel Dump Truck<br>Grove 60T Rough Terrain Yard Crane | 91 | 85 | 59 | 59 | 55 | 53 | 57 |
| Temporary power, site lighting and water installation | Cat 950 Loader<br>Tri Axel Dump Truck | 90 | 84 | 58 | 58 | 54 | 52 | 56 |
| Lift span barge demobilization | Manitowoc 4100 Ringer on Barge<br>Tri-Axle Dump Truck | 91 | 85 | 59 | 59 | 55 | 53 | 57 |

† Assumes propagation over land for 1,200 feet and propagation over water for 3,400 feet.

‡ Assumes propagation over land for 1,300 feet and propagation over water for 3,000 feet.

**Table 3. Construction Noise Projections for Lift Span Assembly at the Marine Staging Yard**

| Construction Activity | Major Equipment Items | Maximum Projected Noise Level (dBA) at Given Site/Distance | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Reference Level at 50 feet | Calculated Level at 100 feet | N-6 50 Water Street (200 ft) | 70 Water Street (140 ft) | N-7 100 Water Street (250 ft) | 123 Water Street (550 ft) | 19 Day Street (550 ft) |
| Grading, fabric, and stone installation for yard | Tri-Axle Dump Truck<br>Cat 950 Loader | 90 | 84 | 78 | 81 | 76 | 69 | 69 |
| Structural steel erection and boltup installation | Grove 60T Rough Terrain Yard Crane<br>Impact Wrench | 90 | 84 | 78 | 81 | 76 | 69 | 69 |
| Sand blasting and touchup paint | Sand Blaster<br>Air Compressor | 96 | 90 | 84 | 87 | 82 | 75 | 75 |
| Construction fencing installation | Cat 950 Loader<br>Skid Steer with Auger attachment | 88 | 82 | 76 | 79 | 74 | 67 | 67 |
| Lift Span Construction | Tri Axel Dump Truck<br>Grove 60T Rough Terrain Yard Crane | 91 | 85 | 79 | 82 | 77 | 70 | 70 |
| Temporary power, site lighting and water installation | Cat 950 Loader<br>Tri Axel Dump Truck | 90 | 84 | 78 | 81 | 76 | 69 | 69 |
| Lift span barge demobilization | Manitowoc 4100 Ringer on Barge<br>Tri-Axle Dump Truck | 91 | 85 | 79 | 82 | 77 | 70 | 70 |

## APPENDIX A: NOISE MEASUREMENT SITE PHOTOGRAPHS

**MAN-1**

**MAN-2**


**MAN-3**

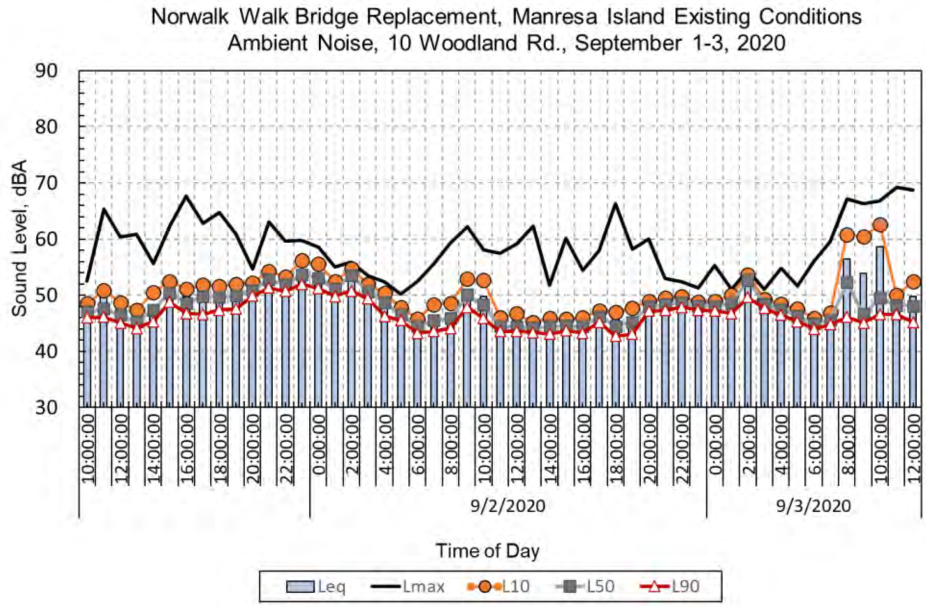

**MAN-4**


**MAN-5**

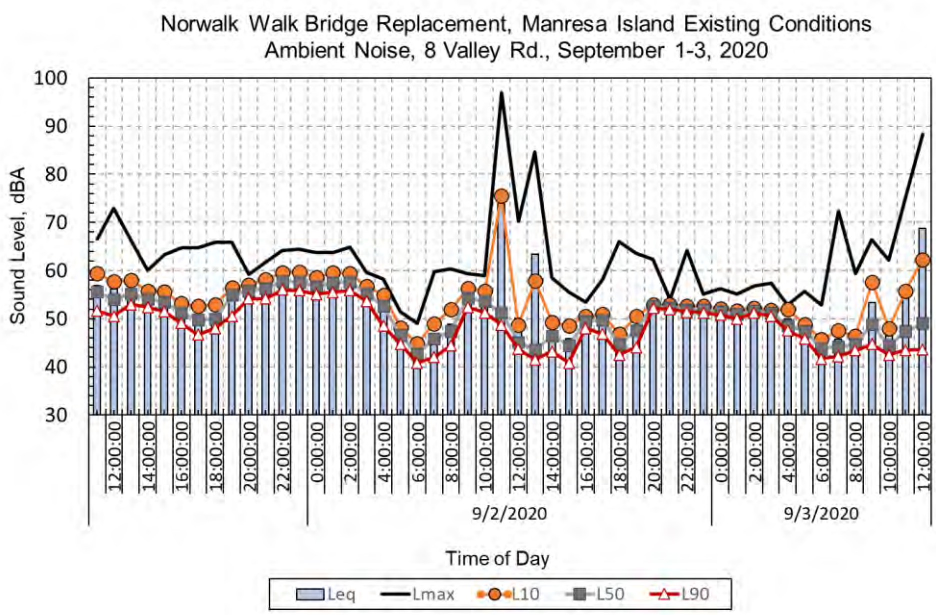

**N-6 (2018)**

**N-7 (2018)**

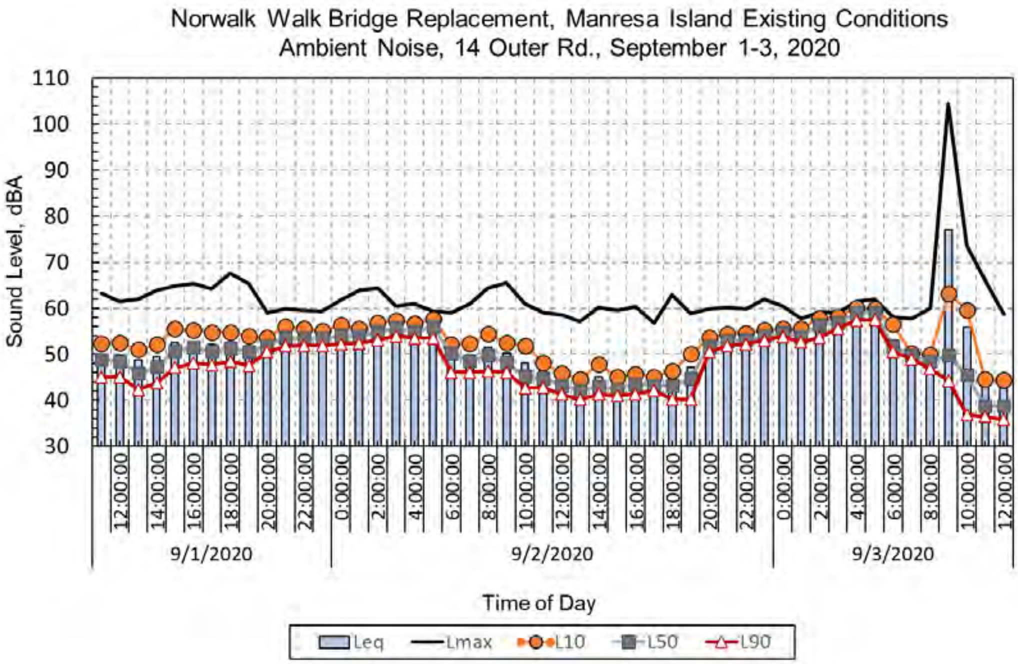
## APPENDIX B. NOISE MEASUREMENT RESULTS



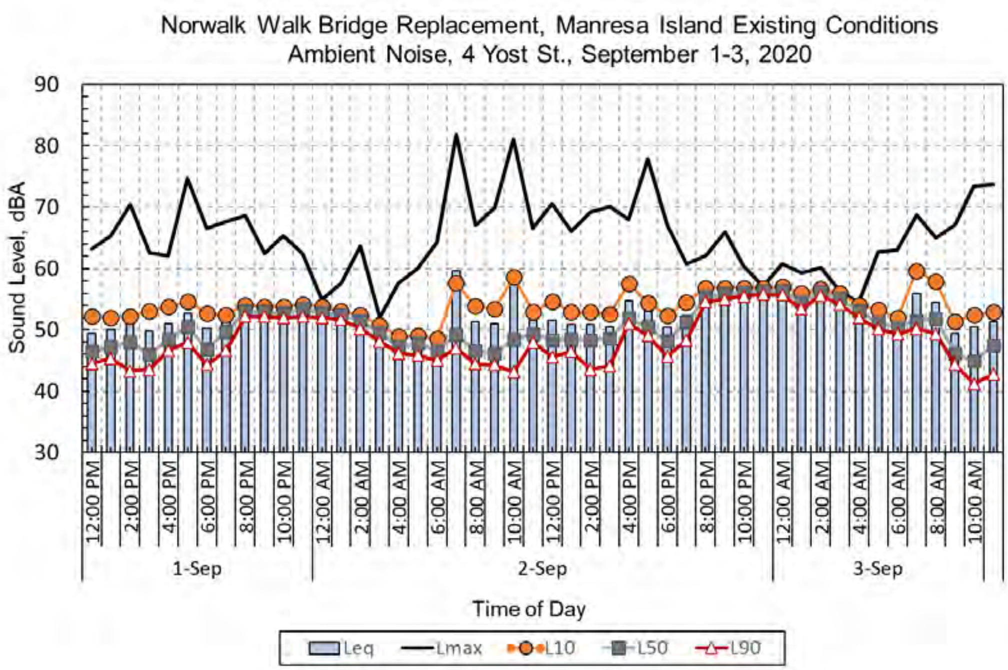

**MAN-1 10 Woodland Rd.**



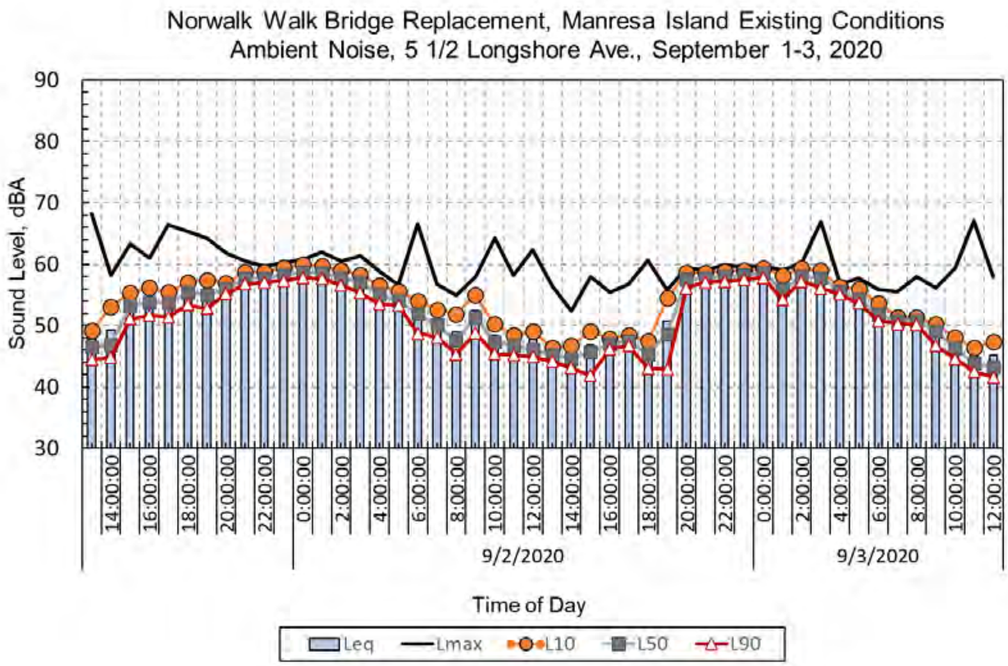

**MAN-2 8 Valley Rd**



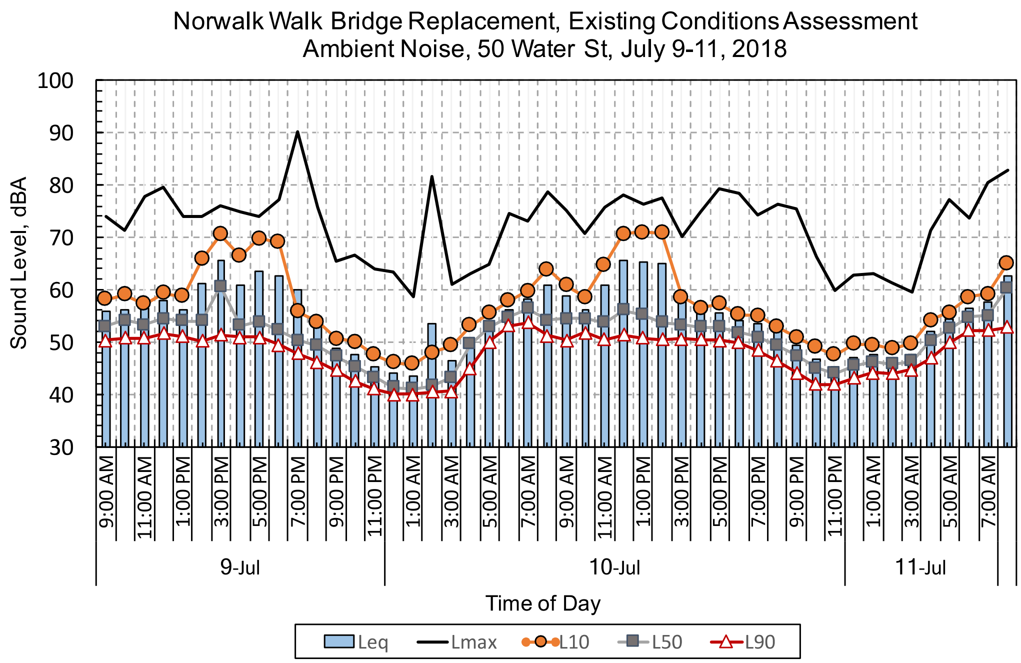

**MAN-3 14 Outer Rd.**



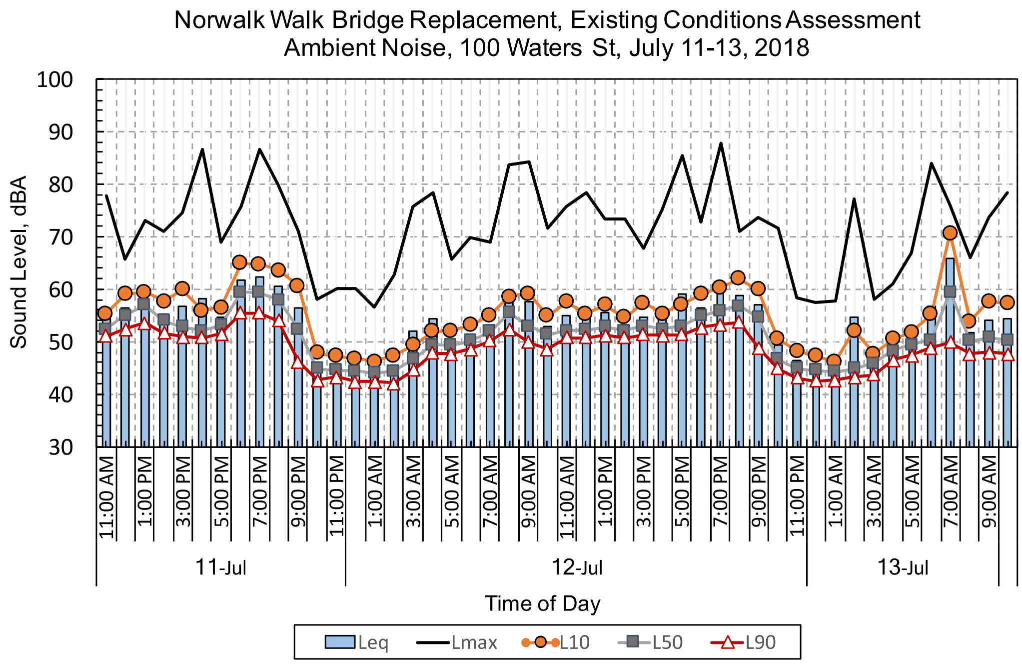

**MAN-4 4 Yost Street**




**MAN-5 5 ½ Longshore Ave**




**N-6 50 Water Street (Weekday)**




**N-7 100 Water Street (Weekday)**

## APPENDIX C: ADDITIONAL GRAPHICS

- **MANRESA NOISE PLAN 1 – MANRESA ISLAND 400 SCALE**
- **MANRESA NOISE PLAN 2 – MANRESA ISLAND 60 SCALE**
- **MARINA NOISE PLAN 1 – MARINE STAGING YARD 60 SCALE**


MANRESA NOISE PLAN 1 – MANRESA ISLAND 400 SCALE


**MANRESA NOISE PLAN 2 – MANRESA ISLAND 60 SCALE**


**MARINA NOISE PLAN 1 – MARINE STAGING YARD 60 SCALE**

## Attachment C-4 – Environmental Frequently Asked Questions, October 2020

# Environmental Frequently Asked Questions

## How will air and water quality be ensured?

Air and water quality will be ensured with the inclusion of the Department's standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with the Department's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for the Department and are designed to protect air and water quality. Additionally, the Department has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

Additionally, the site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

## Will there be baseline testing of the surrounding waters/soil to make sure there's no increase in contamination?

The proposed Department activities at the site have been designed to limit the disturbance of existing soils. The Department is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site (found within the document located here: http://www.manresaassociation.org/wp-content/uploads/2019/03/ManresaFinalReport-020119-Compressed2_20190201141607l727.pdf). The RAP outlines the potential remedial options for the site which includes capping, soil excavation and disposal, and long-term monitoring. The Department has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

Due to the limited disturbance and installation of the protective measures outlined above the Department will not be performing baseline testing of the surrounding areas.

## Will that testing extend to Village Creek and Hayes Creek?

The proposed site activities will be outside of the drainage area of both Village and Hayes Creek.

## How do you guarantee the coal ash and other contaminants already on the site will remain 100% undisturbed?

The Department has designed activities to prevent disturbance of existing on-site materials. The only anticipated material disturbance is for the installation of proposed fence posts to secure the site activities. All excess materials for the installation will be transferred to the project's Waste Stockpile Area for waste characterization and disposal at an off-site permitted disposal facility.

## Attachment C-5 - Manresa Island Public Meeting Responses to Questions, August 2020

Question

I am concerned about noise, effect on wildlife, including driving deer towards my area along with their ticks. What are you going to prevent and remediate damage? Are you going to lower our taxes? Property values will certainly be affected. Why are you rushing this decision? Those of us affected need real answers, not given on June 16.

Response

The Program is aware of the environmental factors and wildlife on Manresa Island. CTDOT coordinated with the CTDEEP NDDB Program and the CTDEEP Division of Wildlife regarding protected species. Time of year restrictions and protection protocols for State-listed species are included in permits and contract specifications. The area of Manresa Island that is proposed for use is already disturbed and not an attractive location for wildlife as is.

CTDOT is developing site-specific Construction Plans to minimize adverse impacts to the surrounding area. These plans will be available prior to work start and will be posted on the project website. These plans include a Stormwater Pollution Control Plan, identifying controls for managing stormwater at the site; Water Quality Control Plan, identifying protections for the Norwalk River; Air Quality/Dust Control Plan, identifying ways to minimize dust and air quality impacts; and a Materials Management Plan, specifying protections for material storage. The Plans will be posted on the Project website prior to construction start. Additionally, prior to work start, the contractor will be required to develop a Construction Safety and Security Plan that will address employee safety, fire life safety and emergency response procedures, maintenance of traffic in and around the construction site, security procedures, and safe work practices related to facilities, equipment, construction vehicles and CTDOT properties.

A minimal increase in traffic, less than 1% based on traffic data from 2017, is anticipated in the Manresa Island area due to Walk Bridge construction. During construction of the lift spans, the Program estimates one truck making one round-trip per day. At the peak of construction, we estimate three trucks each making one round-trip per day. Employee traffic is expected to be approximately 22 roundtrips per day, six days per week.

The Program plans to use the southern tip of Manresa Island as a worksite, which is 0.4 miles away from the nearest resident. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. Fuels and hazardous materials needed for construction will be securely stored in double-walled flood-proof containers and will be removed from the site for proper disposal. The work site will be fenced with a secure entrance gate for safety purposes. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface. The Program will leave the Manresa site as it was prior to Walk Bridge work.

For questions about local property taxes, please contact the City of Norwalk's Customer Service Department customerservice@norwalkct.org.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

Will there be baseline testing of the surrounding waters/soil to make sure there's no increase in contamination?

Response

The Walk Bridge Program will not be completing studies as no impacts on property values is expected as an outcome of Program work being completed on Manresa Island. For questions about local property taxes, please contact the City of Norwalk's Customer Service Department customerservice@norwalkct.org.

The proposed activities at the site have been designed to limit the disturbance of existing soils. CTDOT is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site. The RAP outlines the potential remedial options for the site, which includes capping, soil excavation and disposal, and long-term monitoring. The Department has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. Fuels and hazardous materials needed for construction will be securely stored in double-walled flood-proof containers and will be removed from the site for proper disposal. The work site will be fenced with a secure entrance gate for safety purposes.

At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

The site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

Due to the limited disturbance and installation of the protective measures outlined above and the Department will not be performing baseline testing of the surrounding areas.

Question

How will the trucks access Woodward - along MLK Blvd to Wilson Ave to Meadow to Woodward or thru South Norwalk, or along Water St to Burritt? How big are the trucks? Please address again why you discounted the Water Street location in favor of a more residential location?

Response

The trucks will be standard-size commercial construction vehicles and travel through South Norwalk.

The Manresa Island Staging and Storage Yard would be used in conjunction with the Water Street properties. The Water Street properties will be used for land-based storage of construction equipment. The parcels will not be used to accommodate construction and material barges. The potential use of Manresa Island accommodates certain water-based project construction, such as assembly of the new lift spans on barges. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location.

Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

Question

How do you plan on dealing with the truck traffic up and down an already congested Woodward ave? Will there be set hours for trucks to run up and down Woodward? Will this site be used for all 5 years of the construction timeline? There's a speeding problem on Woodward already once it opens up near Baxter. That 25% increase could significantly increase risk to the young residents who use the playground right off Woodward near Burwell. How are you planning on enforcing speed limits? Noise travels fairly well in this part of town. If we request it, can we have a noise study conducted What do you forecast the property value of surrounding houses to fall to with this increase in commercial activity, trucks, cranes, noise, etc.? Who would be granting permission for night time hours? Were any of the barrier islands evaluated to perform the same staging?

Response

The Project Team considered several properties for construction staging and storage. Due to a variety of factors and environmental concerns, the Water Street and Manresa Island locations are the locations being considered at this time.

The Program does not anticipate the contractor working overnight at Manresa Island. The overall intent is to perform work in the Manresa Island area during daytime hours, 7AM to 5PM. If the contractor needs lighting due to unforeseen circumstances, the Program will update the community through our weekly Construction News bulletin, website and social media accounts.

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck round trip per day. At the peak of construction, we estimate three trucks, for one round trip each per day. Employee traffic is expected to be approximately 22 roundtrips per day (6 days per week). Local police monitor speeding. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

For questions about local property taxes, please contact the City of Norwalk’s Customer Service Department customerservice@norwalkct.org.

Question

I don't understand why the public only had 3 weeks to comment on something that can have huge impact on neighboring residential communities. Why the rush?

Why Manresa and not the Water Street site, which is 2 miles closer to the bridge? And does not have as many residential neighbors?

What kind of environmental studies have you performed to ensure the safety and impact of the nearby residential communities? Have you explore what types of noise, pollution, car

Response

Since this was an informational public meeting and not a formal public hearing, there was no requirement in terms of a comment period. The Program had offered a three week period to provide comments and ask questions regarding the use Manresa Island, however, questions and comments will still be responded to via the comment submission form on the Program Website, emailing or calling the Public Information Office or visiting us at the Welcome Center (temporarily closed for the safety of the public and our staff).

The Project Team is considering several properties for construction staging and storage. The potential use of Manresa Island allows for the relocation of water-based construction of the lift spans to Manresa Island and the Water Street properties will still be used for land-based storage of construction equipment.

Manresa Island's use provides for specific water-based project construction, such as assembly of the new lift spans on barges. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and a current staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to build a robust steel bulkhead to accommodate construction barges, needed at the Water Street location.

Additionally, the use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will generally be 300 feet outside of the (200-foot) navigation channel. In comparison, berthing these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (250-feet wide at this location).

For the proposed use of Manresa Island as a staging and storage yard, The Connecticut Department of Transportation (CTDOT) will be submitting a comprehensive Environmental Impact Evaluation to the Federal Transit Administration (FTA). Environmental investigations included wildlife habitats, wetlands, and historical and archaeological resources. CTDOT coordinated reviews of the project, including the proposed staging and storage yard, with CTDEEP Divisions of Wildlife, Fisheries-Marine Fisheries, Natural Diversity Data Base Program; U.S. Fish and Wildlife Service; and National Marine Fisheries Program/Greater Atlantic Regional Fisheries Office. Best management practices and protection protocols will be incorporated into project permits and contract specifications required by federal and state agencies.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

CTDOT will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

What about the dust from dissembling the old bridge, particularly dust with lead from the old bridge. Can you please give an estimated decibel level at Outer Road?

Response

The steel members of the existing bridge brought to the staging and storage yard via a barge will be cut (sheared) to smaller pieces, which will allow them to be transported over the road for off-site disposal. The lead-containing fragments from the shearing process will be stored in drums removed from the site at the end of every workday. The contractor will be responsible for implementing the project's Air Quality/Dust Control Plan. Mitigation measures identified in the Plan include but are not limited to: covering transported materials to prevent the loss of material during transport before leaving the site and are to remain covered until the arrival at the selected treatment/recycling/disposal facility; using water-tight transport containers and using water and calcium chloride to minimize dust conditions.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area. A noise study will be completed as part of this work and a monitor will be placed in the vicinity of Outer Road.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

Is Cedar Hammocks Island included in your consideration of the impact of the Manresa Property on sensitive areas? What do you believe will be the impact of activities at Manresa on Cedar Hammocks Island?

Response

The Program does not anticipate traffic or noise impacts on Cedar Hammocks Island due to its distance from the Manresa Island site.

Question

What program will be in place to compensate property owners for any adverse impact on their property values? Can you provide details on the estimate that only 22 employees would be committing to the site. (22 workers sounds like a light workforce for the scope of this project). Thx. How many truckloads will be required for the initial crushed stone and other material to level the staging area? You said the ‘ average’ # of trips would be 3 at the peak. What is the median and absolute peak # of daily trips expected.

Response

For questions about local property taxes, please contact the City of Norwalk’s Customer Service Department customerservice@norwalkct.org.

The Program anticipates a minimal increase in traffic, less than 1% based on traffic data from 2017, in the Manresa Island area due to Walk Bridge construction. At peak, for a few weeks early in construction to move in materials, three trucks will make one round-trip each, per day each. This will be the most disruptive operation the contractor will have in terms of the total number of trucks in a short period, but once the material is at the site, the Program estimates one truck making a round-trip per day.

Employee traffic is to be approximately 22 round-trips per day, six days per week. The number of anticipated employees entering and exiting the site was coordinated with and verified by the contractor.

Question

You mentioned marine life but what has been done to study the impact to birds that seek sanctuary on Manresa? What will the city of Norwalk be doing to monitor the speed of the employees cars and the trucks on Woodward? what research was done to find a location closer to the walk bridge rather than driving through our residential streets?

Response

The Project Team considered several properties for construction staging and storage. Due to a variety of factors and environmental concerns, the Water Street and Manresa Island locations are the locations being considered at this time.

The potential use of Manresa Island allows for the relocation of water-based construction of the lift span to Manresa Island and the Water Street properties will still be used as a staging yard. Manresa Island has the existing infrastructure needed for the project already in place where additional construction would be needed at Water Street. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location.

Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

CTDOT coordinated with the CTDEEP NDDB Program and the CTDEEP Division of Wildlife regarding protected species. To protect listed species during Staging and Storage Yard operations, CTDOT will use protection protocols and time-of-year (TOY) restrictions. These protection protocols and TOY restrictions will be incorporated into permit applications and the contract specifications. Work, on behalf of the Program, will be completed in paved areas and will not require tree clearing.

Local police monitor speeding. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

Question

What other sites are being considered? Why not Water Street? Why is Manressa coming up as a site after all this time? This project has been under consideration for years. Why Manressa ? Why now?

Response

The Project Team is considering several properties for the construction of the replacement bridge lift spans. The use of Manresa Island provides for certain water-based project construction, such as assembly of the new lift spans on barges. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard.

Using Manresa Island to construct the lift spans will not require extensive dredging to construct a steel bulkhead that accommodates construction barges, which would be required at the Water Street location. Further, the use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift spans at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location) and additional construction would be needed.

As the Walk Bridge Replacement Project progresses, we remain committed to providing timely and transparent updates to the public. The potential use of Manresa Island is a development that we wanted to inform the community about well in advance of any work on the site and provide an opportunity for people to provide comments and ask questions.

Question

What is the regulatory significance of the 7/3 date? [Comments accepted by DOT until July 3.] Under what authority is it established?

Response

There is no specific significance to the July 3 date other than to share information with the public about the planning for the project. The Program wants to give a reasonable timeframe for people to provide comments.

There is no authority that dictates the public response period. The Program chose to hold the public involvement meeting and solicit feedback in keeping with CTDOT's desire to share information with the public. There will be other avenues by which to have discussions if there are concerns. The Program is continuing to coordinate has stayed in contact with the Harbor Management and the Shellfish Commissions and will be submitting permit applications this summer; and there will still be time for coordination as needed.

Question

Following public comment, what are the next steps to get approval for this use of Manresa?

Response

For the proposed use of Manresa Island as a construction staging and storage yard, CTDOT will be submitting a comprehensive environmental impact evaluation to the Federal Transit Administration (FTA). The FTA will review the evaluation and issue a final determination. Both, noise and traffic studies will be completed to evaluate the impacts of using Manresa Island as a construction staging site. The Program will be submitting permit applications to federal and state agencies, which will include a portion of Manresa Island as a construction staging and storage yard. Those permit applications will be open for public review and comment. The Walk Bridge Replacement Project is advancing through the design phase and anticipates design completion at the end of this year before construction starts in Fall 2021, following the receipt of federal and state permits.

Question

Are there any alternatives being considered or is this the only plan? What about the area off Selleck street for instance?

You mentioned 12 hour days and in the winter it is dark at 430. How will you work without additional lightings?

And what is the noise level antipathetic to be during the construction? How much time will it take to remove materials in case of a storm? How much advance notice and what will warrant the removal?

Response

Veteran's Memorial Park is a protected park under Section 4(f) of the U.S. Department of Transportation Act of 1966. According to Section 4(f), U.S. DOT agencies cannot approve the use of publicly owned parks and recreational areas of national, state, or local significance unless there is no feasible and prudent avoidance alternative to the use of the land. If a feasible and prudent alternative exists that avoids all Section 4(f) resources, it must be selected. CTDOT determined that the use of Manresa Island for construction of the lift spans is a prudent and feasible alternative to the use of Veteran's Memorial Park. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable. The work anticipated to be completed at the final site has the potential to last up to six years. This would significantly impact public use of the park.

Question

What kind of policing will you guarantee re trucks, speeding, oversized vehicles?

Specifically, what will be stored there?

What about flooding during bad storms? What kind of mitigation will you have for Runoff into the creek where our beach is? Or just the Sound in general? What about contaminated materials? There is no way that that area does not flood, during a bad storm or hurricane, which are inevitable.

Deep report?

What guarantee do we have that when the bridge project is done, everything that was "temporarily stored on Manresa", will be removed? Daily penalties.

What will the operating hours be?

Are you in any way exempt from Norwalks noise ordinance? city commitment to enforcing the noise ordinance?

Will this just be storage or will there be other activities going on?

Response

Manresa Island is identified as a potential location to construct the lift spans and offers overall project improvement by moving construction activities away from a more congested urban area. On-site work includes pre-assembly of structural components, temporary berthing of construction vessels and barges, material storage.

The contractor will submit a written Flood Contingency Plan to CTDOT prior to construction start. The plan will include the following:
• A description of the means by which the Contractor will protect and/or remove from within the 100-year floodplain (500-year floodplain for critical activities), all material, equipment, and personnel prior to a predicted major storm event. A major storm event is defined as a storm predicted by the National Oceanic and Atmospheric Administration (NOAA) weather service with a warning of flooding, severe thunderstorms, or similarly severe weather conditions or effects.
• Provisions for notifying workers engaged in work below the 500-year flood elevation of an impending storm.
• Provisions for securing work in progress prior to a major storm.

Water quality will be ensured with the inclusion of CTDOT's standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with CTDOT's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for CTDOT and are designed to protect air and water quality. CTDOT has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

The site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

The Program anticipates a minimal increase in traffic. At the peak of construction, a truck will make approximately 3 roundtrips per day (5-days per week during daylight hours). Employee traffic is anticipated to be 22 roundtrips per day (6 days per week). Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

The Program will comply with the Construction Noise Pollution standards set in the CTDOT's Form 818:

The Contractor shall take measures to minimize the noise caused by its construction operations, including but not limited to noise generated by equipment used for drilling, pile-driving, blasting, excavation or hauling. All methods and devices employed to minimize noise shall be subject to the continuing approval of the Engineer. The maximum allowable level of noise at the residence or occupied building nearest to the Site shall be 90 decibels on the "A"-weighted scale (dBA). The Contractor shall halt any Project operation that violates this standard at any time until the Contractor develops and implements a methodology that enables it to keep the noise from its Project operations below the 90-dBA limit.

The intent is to perform work in the Manresa Island area during daytime hours, 7AM to 5PM. If the contractor needs to work overnight due to unforeseen circumstances, the Program will update the community through our weekly Construction News.

Question

What is the financial arrangement with the property owner? Is rent being charged? How much?

What is the downside timeline? How long could the project go over the proposed timeline?

How loud and when is noise expected. Are compressors and/or other Pneumatic tools expected? How many shifts are planned and what will happen (in terms of extra shift...second shift? Weekends) if they get behind? Is there a decibel level that the project will be required to adhere to?

Is there a plan to add lighting to the area?

Will the bridge be painted at Manresa? How will air and water quality be ensured? Will there be baseline testing of the surrounding waters/soil to make sure there's no increase in contamination? Will that extend to VC and Hayes Creek? How will southern winds be accounted for, as these will carry to Village Creek and beyond? Why not use other sites? What are the specific benefits of Manresa vs. other sites?

Response

In due course, the Connecticut Department of Transportation will enter into conversations with NRG, the owners of Manresa Island, for the property rights needed for the Walk Bridge Replacement Project.

The Walk Bridge Replacement Project is slated to begin in Fall 2021 and construction is anticipated to take approximately 5-6 years.

The Program anticipates that work will happen during daytime hours on Manresa Island, therefore construction lighting will not be necessary. Should an activity require nighttime hours, the Community will be notified in advance of the work.

The Walk Bridge Program evaluated the potential use of Manresa Island early in the pre-construction phase of the Walk Bridge Replacement Project. As the design progressed and more details developed about construction of the Walk Bridge, the Program has identified Manresa Island as a location for staging materials and constructing the lift spans due to the docking capabilities and proximity to the construction site. Manresa Island is being considered as a staging site because it has the existing infrastructure necessary for the construction of the lift spans and allows the Project Team to move construction away from the more congested urban area. The Program will be using the southern tip of Manresa Island as a worksite, which is 0.4 miles away from the nearest resident.

Air and water quality will be ensured with the inclusion of the Department's standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with CTDOT's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for CTDOT and are designed to protect air and water quality. CTDOT has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

Additionally, the site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

The proposed activities at the site have been designed to limit the disturbance of existing soils. The Program is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site. The RAP outlines the potential remedial options for the site which includes capping, soil excavation and disposal, and long-term monitoring. CTDOT has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface. Due to the limited disturbance and installation of the protective measures outlined above and the Department will not be performing baseline testing of the surrounding areas.

The proposed site activities will be outside of the drainage area of both Village and Hayes Creek.

The Program will comply with the Construction Noise Pollution standards set in the CTDOT's Form 818:

The Contractor shall take measures to minimize the noise caused by its construction operations, including but not limited to noise generated by equipment used for drilling, pile-driving, blasting, excavation or hauling. All methods and devices employed to minimize noise shall be subject to the continuing approval of the Engineer. The maximum allowable level of noise at the residence or occupied building nearest to the Site shall be 90 decibels on the "A"-weighted scale (dBA). The Contractor shall halt any Project operation that violates this standard at any time until the Contractor develops and implements a methodology that enables it to keep the noise from its Project operations below the 90-dBA limit.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

CTDOT will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

The bridge components will be delivered to the site, pre-painted. Minor touch up painting will be required after the components are assembled. This work will be completed on the proposed Manresa site.

Question

There is a DEEP study of the lone star tick presently being conducted at Manresa. Are you aware of this? And how would the traffic effect the deer and the outcomes of that study?

Response

The Walk Bridge Program Team is aware of the CTDEEP Wildlife Division study regarding deer on Manresa Island. Coordination will continue with CTDEEP as part of permit application review.

The Program anticipates a minimal increase in traffic, less than 1% based on traffic data from 2017, in the Manresa Island area due to Walk Bridge construction. At peak, for a few weeks early in construction to move in materials, three trucks will make one round-trip each, per day each. This will be the most disruptive operation the contractor will have in terms of the total number of trucks in a short period, but once the material is at the site, the Program estimates one truck making a round-trip per day. Employee vehicles are expected to make 22 round trips per day, six days a week. This small increase in traffic is not anticipated to cause a significant impact on deer in the area.

Question

What is the alternate site? Ditto on the speeding. Will there be increased police presence? What type of noise can we expect while they do the work? Can any lead particles become airborne? So, "daytime hours" does not mean 9-5 or 8-6, or is potentially 12 hours? Will you be contributing to any of the existing environmental clean-up that need to happen on that site?

Response

The Project Team is considering several properties for the construction of the replacement bridge lift spans. The use of Manresa Island allows for the relocation of certain water-based project construction. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to build a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location. Further, the use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

Local police monitor speeding. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

The Program does not anticipate the contractor working overnight at Manresa Island. Work is anticipated to happen during the daytime hours of 7:00 AM – 5:00 PM. These hours may vary based on the construction activity and the community will be updated through weekly Construction News bulletins.

Air and water quality will be ensured with the inclusion of the Department's standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with the Department's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for the Department and are designed to protect air and water quality. CTDOT has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

Additionally, the site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

The proposed activities at the site have been designed to limit the disturbance of existing soils. The Program is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site. The RAP outlines the potential remedial options for the site which includes capping, soil excavation and disposal, and long-term monitoring. CTDOT has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Program will comply with the Construction Noise Pollution standards set in the CTDOT's Form 818:

The Contractor shall take measures to minimize the noise caused by its construction operations, including but not limited to noise generated by equipment used for drilling, pile-driving, blasting, excavation or hauling. All methods and devices employed to minimize noise shall be subject to the continuing approval of the Engineer. The maximum allowable level of noise at the residence or occupied building nearest to the Site shall be 90 decibels on the "A"-weighted scale (dBA). The Contractor shall halt any Project operation that violates this standard at any time until the Contractor develops and implements a methodology that enables it to keep the noise from its Project operations below the 90-dBA limit.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

Sound travels across water differently than through woods. I would expect that a great deal of noise will affect the Village Creek and Wilson Point neighborhoods. Has this been considered? Will the Manresa site be lit at night? This could be extremely disturbing to nearby waterfront communities.

Response

The Program does not anticipate the contractor working overnight at Manresa Island. The intent is to perform work in the Manresa Island area during daytime hours. If the contractor needs to work overnight due to unforeseen circumstances, there may be some additional lighting and the Program will update the community through our weekly Construction News bulletin, website and social media accounts. To receive our bulletin, please sign up on our website, www.walkbridgect.com.

A noise study is being prepared to evaluate impacts on the surrounding area, including how sounds propagates over water. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

On your presentation, you state there will be no perceptible increase in noise to the nearest receptor along with no additional impact to the aquatic protected species and habitat. How can you guarantee that? Trucks backing up would increase noise and disturb the habitat. Along with the constant noise from large trucks and employee traffic would increase noise. There will be construction noise for extended period 6 days a week for up to 60 months. How can you guarantee there will be no adverse effect to those who leave in the surrounding area and to the wildlife that live on Manresa Island? Who is going to be the watchdog overseeing your activities on Manresa Island? On truck traffic, what is considered daylight hours - 9 to 5? Also, what hours will there be employee traffic? Is it going to be 24 hours a day? Will the construction be 24 hours a day?

Response

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks making one round-trip per day. Employee traffic is expected to be approximately 22 roundtrips per day, 6 days per week. Work is anticipated to happen during the daytime hours of 7:00 AM – 5:00 PM. The Program does not anticipate the contractor working overnight at Manresa Island. If the contractor needs to work overnight due to unforeseen circumstances, there may be some additional lighting and the Program will update the community through our weekly

Construction News bulletin, website and social media accounts. To receive our bulletin, please sign up on our website, www.walkbridgect.com.

Air and water quality will be ensured with the inclusion of the Department's standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with the Department's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for the Department and are designed to protect air and water quality. Additionally, the Department has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

Additionally, the site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

CTDOT is developing site-specific Construction Plans to minimize adverse impacts to the surrounding area. These plans will be available prior to work start and will be posted on the project website. These plans include a Stormwater Pollution Control Plan, identifying controls for managing stormwater at the site; Water Quality Control Plan, identifying protections for the Norwalk River; Air Quality/Dust Control Plan, identifying ways to minimize dust and air quality impacts; and a Materials Management Plan, specifying protections for material storage. The Plans will be posted on the Project website prior to construction start. Additionally, prior to work start, the contractor will be required to develop a Construction Safety and Security Plan that will address employee safety, fire life safety and emergency response procedures, maintenance of traffic in and around the construction site, security procedures, and safe work practices related to facilities, equipment, construction vehicles and CTDOT properties. All work will be completed at the southern top of Manresa Island, approximately 0.4 miles from the nearest resident.

A noise study is being prepared to evaluate impacts on the surrounding area, including how sounds propagates over water. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

I would like to know the plans for Manresa Island to be used.

I am shocked there is nothing about the effect of all this traffic on the kids riding bikes and going to the park.

Nothing about all the nesting osprey on the pillings right where the barges will be.

Response

Manresa Island is identified as a potential location to construct the lift spans and offers overall project improvement by moving construction activities away from a more congested urban area. On-site work includes pre-assembly of structural components, temporary berthing of construction vessels and barges, material storage.

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks are making one round-trip each per day. Employee traffic is expected to be approximately 22 round-trips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

The Program is aware of the environmental factors and wildlife on Manresa Island. Time of year restrictions and protection protocols for State-listed species are included in permits and contract specifications. Work will start before April 15 or after August 1 to allow time for nesting ospreys to acclimate to noise levels.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

Question

What are plans to relocate - or accommodate the nesting needs - if the dozen or more Osprey which spend the summer on Manresa Island - all close to the marine base? At a minimum, you should plan on erecting another dozen nesting poles along the perimeter of the NRG property.

Response

The Program is aware of the environmental factors and wildlife on Manresa Island. CTDOT has coordinated with the CTDEEP Division of Wildlife regarding the protection of osprey. Time of year restrictions will be included in permits and contract specifications. Work at the site will start before April 15 or after August 1 to allow the nesting ospreys to acclimate to the disruption. The Program will continue to coordinate with State and Federal Environmental Agencies to avoid, minimize and mitigate impacts to the extent feasible and practicable.

Question

Are there any other options that are being considered? Would this be used in conjunction with the original Water street address? If they reach the point where they need to ask for additional hours, what power do the neighboring community to prevent it? What is the process of removing the geotextile and stone underlayer? How will that impact the already existing polluted soil that requires cleanup?

Response

The Project Team considered several properties for construction staging and storage. Due to a variety of factors and environmental concerns, the Water Street and Manresa Island locations are the locations being considered at this time. The potential use of Manresa Island allows for the relocation of water-based construction of the lift spans to Manresa Island and the Water Street properties will still be used as a staging yard. If the Program uses Manresa Island, it can avoid the additional dredging and construction of a bulkhead at the Water Street location. Manresa Island has the existing infrastructure needed for the project already in place, where further construction would be needed at Water Street to complete the project.

Work is anticipated to happen during the daytime hours of 7:00 AM – 5:00 PM. The Program does not anticipate the contractor working overnight at Manresa Island. If the contractor needs to work overnight due to unforeseen circumstances, the Program will update the community through our weekly Construction News bulletin, website and social media accounts. To receive our bulletin, please sign up on our website, www.walkbridgect.com.

The Department has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The only anticipated material disturbance is for the installation of proposed fence posts to secure the site activities. All excess materials for the installation will be transferred to the project's Waste Stockpile Area for waste characterization and disposal at an off-site permitted disposal facility. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

Question

There are at least 12 osprey nests (2 adults chicks) from March thru October at the south end of Manresa. They are situated on the man-made posts, on the maritime dolphins in the barge slip, on the roof of the shed, in the trees. The same ospreys usually come back to their nests year after year. What steps can be taken so they are not disrupted?

There has been a concern for years that the culvert running under the west end of Longshore Ave that connects the marshes is too small for the flow of the saltwater tides, especially in a storm. The buildup of tidal water in a noreaster in the north marsh bordering Harbor View is prone to flooding Longshore. With commercial construction traffic over the culvert, it might be an opportune time to widen and strengthen the culvert.

Response

The Connecticut Department of Transportation (CTDOT) has coordinated with the CTDEEP Division of Wildlife regarding the protection of osprey. Time of year restrictions and protection protocols for State-listed species are will be included in permits and contract specifications. Work at the site will start before April 15 or after August 1 to allow time for nesting ospreys to acclimate to noise levels.

Replacement of the culvert at Longshore Ave is outside the scope of work for this project.

Question

Longshore Ave is already a dangerous road clogged on fair weather days with bicycles, walkers, runners, bird watchers and photographers. Just today, 7\/2, a car stopped right in the middle of one of the blind curves, left all the doors open and got her children out to save a turtle crossing the road.

There is a fat, uneven shoulder on one side, but pedestrians often insist on traveling on the opposite side where there is no shoulder at all whatsoever.

I don't want the Manresa staging plan to move forward, but if it does, at the very least, the state should install a sidewalk and bike lane.

Response

Work to improve Longshore Ave. is outside the scope of work for this project.

For more information, please visit the Manresa Island Online Public Meeting Webpage. Should you have additional questions or comments, please don't hesitate to contact the Program's Public Information staff at info@walkbridgect.com.

Question

Will taxpayers be responsible for cleanup and decontamination of the site? What is the anticipated commencement date of work to start on the Walk Bridge? How much more congestion will this add to the Norwalk Harbor Channel?

Response

The Program is not responsible for the decontamination or cleanup of the existing NRG site at Manresa Island. In the area planned to be used, a layer of geotextile fabric and 6-inches of crushed stone will be placed as a barrier from existing areas of concern, so they are not disturbed. Fuels and hazardous materials needed for construction will be securely stored in double-walled flood-proof containers and will be removed from the site for proper disposal. The work site will be fenced with a secure entrance gate for safety purposes. The Program will remove the crushed stone and geotextile fabric and leave the Manresa site as it was prior to Walk Bridge work.

The Project is slated to begin in Fall 2021. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location. Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

The Program anticipates barges and construction equipment to be staged in the Norwalk River. The channels will remain open except for planned closures that will be coordinated with the United States Coast Guard, the Norwalk Harbor Management Commission, the Norwalk Shellfish Commission, Norwalk Harbormaster and marine users. Advance notice of closures will be sent to marine users and posted on the Walk Bridge Program's weekly Construction News bulletin, website and social media accounts.

Question

During the recent online meeting, I was shocked by the response regarding noise and how it carries by water. I think this rush response is very concerning...Has anyone looked at more appropriate sites not near residential communities available, given that the intent is to construct the spans on a barge and float them? What is the marginal cost of additional miles? There are many impacts regarding this project and I think it is being rushed through before totally thought out.

Response

The Project Team is considering several properties for the construction of the replacement bridge lift spans, staging and storage. The potential use of Manresa Island accommodates specific water-based project construction. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard.

During construction of the lift spans, the Program estimates one truck making a roundtrip per day. At the peak of construction, we estimate three trucks are making one roundtrip each, per day. Employee traffic is expected to be approximately 22 roundtrips per day, six days per week.

The Program anticipates that work will happen primarily during daytime hours on Manresa Island, minimizing the need for construction lighting. Should an activity require nighttime hours, any construction lighting will be directed to reduce impacts on the local neighborhoods while a safe and secure working environment is maintained.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

As you may not have been made aware by the Office of the Mayor of Norwalk, and Jessica Casey, Chief of Economic and Community Development, the 47 acres on the southern portion of Manresa Island is proposed as a solar energy facility for the citizens of Norwalk and Fairfield County (Fitzgerald and Halliday online report, Future of Manresa Island). Therefore, North Water Street should be the site for your construction needs as it would not interfere with the future use of Manresa Island. As to the marine terminal, your staging there should not disturb the initial building related to the solar facility.

We all understand that the building and stack related to the former fossil fuel installations will have to be dismantled, and that the toxic waste will have to be remediated.

Please advise us of your decision making in this regard.

Response

The Connecticut Department of Transportation (CTDOT) is in regular coordination with the City of Norwalk about all Walk Bridge Program-related plans. The Program is not responsible for the decontamination or cleanup of the existing NRG site at Manresa Island. In the area planned to be used, a layer of geotextile fabric and 6-inches of crushed stone will be placed as a barrier from existing areas of concern, so they are not disturbed. Fuels and hazardous materials needed for construction will be securely stored in double-walled flood-proof containers and will be removed from the site for proper disposal. The Program will remove the crushed stone and geotextile fabric and leave the Manresa site as it was prior to Walk Bridge work.

Question

Will any digging or road expansion be done north of the power plant. The marsh is a breeding area for terrapins and mantis shrimp (Squilla empusa)

Response

The Program plans to use the southern tip of Manresa Island as a worksite, which is 0.4 miles away from the nearest resident. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. No digging or expansion of the roadway north of the plant is included in the project scope.

CTDOT has coordinated with the CTDEEP Natural Diversity Data Base Program and the CTDEEP Division of Wildlife regarding the protection of listed species. Time-of-year restrictions and protection protocols for State-listed species will be included in permits and contract specifications.

Question

I am not pleased with the idea of the proposed construction for the bridge project on Manresa Island. I live at 1 Longshore Avenue and am concerned about the increased traffic and construction noise. I feel there are other sites that could be considered and not located near a residential area.

Response

The Project Team considered several properties for the construction of the replacement bridge lift spans. The potential use of Manresa Island accommodates certain water-based project construction, such as assembly of the new lift spans on barges.

Manresa Island has the existing infrastructure needed for the project in place:  a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location. Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift spans, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks making one round-trip per day. Employee traffic is expected to be approximately 22 roundtrips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

A noise study is being prepared to evaluate impacts on the surrounding area, including how sounds propagates over water. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

I oppose Manresa being used as a site for Walk Bridge, the noise and traffic on Woodward and the area will be too much. 20 extra cars each way? People already speed on Woodward daily.

Response

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift spans, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks making one round-trip per day. Employee traffic is expected to be approximately 22 roundtrips per day, six days per week.

Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

Question

There is a very active and robust terrapin population on Manresa Island. Will you make plans to address their vulnerability during construction?

Response

CTDOT has coordinated with the CTDEEP Natural Diversity Data Base (NDDB) Program for the protection of the Northern diamondback terrapin. CTDOT will incorporate special protocols for the terrapin's dormant period (Nov 1st to May 31st) and during its active period (April 1st through October 31st) into the project permits and contract specifications to ensure protection of this species.

The Program will provide environmental enhancements including tidal wetland restoration and sand berms for nesting terrapins as part of our Wetland Mitigation Plan.

Question

How much will the CT DOT be paying NRG for use of Manresa?

Response

In due course, the Connecticut Department of Transportation (CTDOT) will enter into conversations with NRG, the owners of Manresa Island, for the property rights needed for the Walk Bridge Replacement Project.

Question

When will it be done?

Response

The Project is slated to begin in Fall 2021. Construction is anticipated to take approximately 5-6 years.

Question

Is there any summary about what was discussed?

Response

A video of the Online Public Meeting and the presentation are available on the Manresa Island Online Public Meeting webpage at: [www.WalkBridgeCT.com](www.WalkBridgeCT.com).

Question

Manresa Island is the most logical piece of property in the entire city for the contractor to use. There will be many benefits to the city.

Response

We appreciate your comment regarding the potential use of Manresa Island as a staging area for the Walk Bridge Replacement Project.

Question

Re: the 3 round trips, is that for a single truck or multiple vehicles? Thank you

Response

At the peak of construction, we estimate three trucks making one round-trip per day. Employee traffic is expected to be approximately 22 roundtrips per day, six days per week.

Question

Has the city considered the impact on near by neighborhoods like Harborview and Village Creek? Seems like this would cause significant congestion on already busy and crowded roads. Further - there is only one way out of these neighborhoods - so construction traffic could cause significant delays.

Response

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making one round trip per day. At the peak of construction, we estimate three trucks making one round trip per day each. Employee traffic is expected to be approximately 22 roundtrips per day (six days per week).

Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

Requested a copy of the Meeting Minutes for the Manresa Island Online Public Meeting.

Response

Attached is a copy of the meeting minutes. A video recording of the meeting and the presentation are available on the Walk Bridge Program's website, www.walkbridgect.com.

Question

Why is Manresa being considered after all this time? How will traffic be impacted? How much is power plant being paid? My understanding was Manresa was not chosen as a location during all the town meetings over the last 2 years - what has changed?

Will this disrupt traffic on Longshore/Woodword?

How much money is the state (or federal) paying the powerplant at Manresa for staging?

What environmental impacts have been taken into consideration?

Response

The Project Team considered several properties for the construction of the replacement bridge lift spans. The potential use of Manresa Island accommodates certain water-based project construction, such as assembly of the new lift spans on barges.

Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location. Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making one round-trip, per day. At the peak of construction, we anticipate three trucks making one round-trip, each, per day. Employee vehicles will be making 22 round-trips per day, six days a week.

In due course, the Connecticut Department of Transportation (CTDOT) will enter into conversations with NRG, the owners of Manresa Island, for the property rights needed for the Walk Bridge Replacement Project.

Environmental investigations included wildlife habitat, wetlands, and historical and archaeological resources. CTDOT coordinated reviews of the project, including the proposed staging and storage yard, with CTDEEP Divisions of Wildlife, Fisheries-Marine Fisheries, Natural Diversity Data Base Program; U.S. Fish and Wildlife Service; and National Marine Fisheries Program/Greater Atlantic Regional Fisheries Office. Best management practices, time of year restrictions, and protection protocols for State-listed species are included in permits and contract specifications. The Program Team will continue to coordinate with relevant agencies throughout the duration of the project.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

Will taxpayers be responsible for clean-up and decontamination of the site. What is the anticipated commencement date of work to start on the Walk Bridge? how much more congestion will this add to the Norwalk Harbor Channel?

Response

The Program is not responsible for the decontamination or cleanup of the existing NRG site at Manresa Island. In the area planned to be used, a layer of geotextile fabric and 6-inches of crushed stone will be placed as a barrier from existing areas of concern, so they are not disturbed. Fuels and hazardous materials needed for construction will be securely stored in double-walled flood-proof containers and will be removed from the site for proper disposal. The work site will be fenced with a secure entrance gate for safety purposes. The Program will remove the crushed stone and geotextile fabric and leave the Manresa site as it was prior to Walk Bridge work.

The Project is slated to begin in Fall 2021. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location. Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

The Program anticipates barges and construction equipment to be staged in the Norwalk River. The channels will remain open except for planned closures that will be coordinated with the United States Coast Guard, the Norwalk Harbor Management Commission, the Norwalk Shellfish Commission, Norwalk Harbormaster and marine users. Advance notice of closures will be sent to marine users and posted on the Walk Bridge Program's weekly Construction News bulletin, website and social media accounts.

Question

I am concerned about significant increased traffic directly past my house [REDACTED], as well as increased truck and construction noise. How will these be controlled? What recourse do residents have for enforcement of controls? Lots of construction has been occurring there over the last 2 years that has NOT been consistent with being a good neighbor. Work crews starting at 7am most days including weekends, etc. Very noisy.

Manresa is covered in coal ash which is highly toxic. What ongoing mitigation and testing throughout the FIVE YEARS of the project will be assured and publicly available?

The city has already informed residents with a view of the power plant that if/when it comes down, our taxes will skyrocket, presumably because the "view will improve". What tax reductions will be in place during the FIVE YEARS that this noise, traffic, and toxicity risk nuisance cluster will be in place? If the city can place a value on the power plant being gone, it can SURE place a value on even worse conditions being intentionally created there and the impact it will have on quality of life, potential increased health risks, property values, and peace and quiet.

I would like the thoughtful satisfactory answers to these questions please. Publicly posted responses to these topics of inquiry would also be appreciated. Thank you.

Response

A minimal increase in traffic, less than 1% based on traffic data from 2017, is anticipated in the Manresa Island area due to Walk Bridge construction. During construction of the lift spans, the Program estimates one truck making one round-trip per day. At the peak of construction, we estimate three trucks making one round-trip each per day. Employee traffic is expected to be approximately 22 roundtrips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

The proposed activities at the site have been designed to limit the disturbance of existing soils. The Program is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site. The RAP outlines the potential remedial options for the site which includes capping, soil excavation and disposal, and long-term monitoring. The Department has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

Due to the limited disturbance and installation of the protective measures outlined above, the Department will not be performing baseline testing of the surrounding areas.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to the extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

For questions about local property taxes, please contact the City of Norwalk's Customer Service Department customerservice@norwalkct.org.

Question

Recording posted for public viewing?

Response

A video recording of the Public Meeting and the presentation are available on the Manresa Island Online Public Meeting webpage on the Walk Bridge Program's website, www.walkbridgect.com.

Question

What is the current status of the Eversource proposal to relocate the electric transmission line at the South Water Street site? How might the schedule for this project affect the anticipated staging or

work area on the South Water Street sites?
How will the proposed use of Manresa Island affect the previously planned staging sites on South Water Street? How will the proposed use of Manresa Island affect the previously planned staging sites on South Water Street?

Response

Eversource is finalizing its plans for the relocation of the overhead transmission lines; Eversource is responsible for the design, regulatory approvals, and permitting of this relocation. When Eversource completes its work and de-mobilized from the South Water Street Site, our contractor will then use the site for construction staging.

The potential use of Manresa Island accommodates certain water-based project construction. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to build a robust steel bulkhead to accommodate construction barges, required at the Water Street location. Additionally, the use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will generally be 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

Question

Will you be responsible for any damage done to the roads by the trucks?

Response

The Walk Bridge Program is not responsible for damage done to roads from the normal wear-and-tear of travel. Should any direct damage occur, the Program will address the situation accordingly.

Question

What about the unremediated contaminants which might be released into the environment?
I strongly oppose the use of Manresa Island as part of the Walk Bridge Replacement Project.

Response

Air and water quality will be ensured with the inclusion of the Department's standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with the Department's Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for the Department and are designed to protect air and water quality. Additionally, the Department has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

Additionally, the site activities will be subject to the Department of Energy & Environmental Protection's General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

The proposed activities at the site have been designed to limit the disturbance of existing soils. The Program is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site. The RAP outlines the potential remedial options for the site which includes capping, soil excavation and disposal, and long-term monitoring. CTDOT has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

Question

Please, consider using the Water Street site for this. We should be able to keep natural, serene, quiet places of Norwalk as is. Creating noise, traffic, and pollution here would be such a shame. We strongly urge you to direct this to another location. It would be a huge disappointment to the neighborhood and surrounding neighborhoods.

Response

The Project Team considered several properties for construction staging and storage. Due to a variety of factors and environmental concerns, the Water Street and Manresa Island locations are the locations being considered at this time.

The potential use of Manresa Island allows for the relocation of water-based construction of the lift span to Manresa Island and the Water Street properties will still be used as a staging yard. Manresa Island has the existing infrastructure needed for the project in place where additional construction would be needed at Water Street to complete the project. The Manresa Island Staging and Storage Yard would be used in conjunction with the Water Street properties. The Water Street properties will be used for land-based storage of construction equipment. The parcels will not be used to accommodate construction and material barges. The use of Manresa Island allows for certain water-based project construction. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and an existing staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to construct a robust steel bulkhead to accommodate construction barges, which would be required at the Water Street location.

Further, use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will be generally 300 feet outside of the (200-foot) navigation channel. In comparison, berthing of these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (which is 250-feet wide at this location).

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks are making one round-trip each per day to bring materials to and from the site. Employee traffic is expected to be approximately 22 round-trips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to the extent feasible and practicable.

CTDOT will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the City of Norwalk, stakeholders and the public in September 2020.

Question

Who is responsible for monitoring that the safety protocols at Manresa Island outlined in the Walk Bridge meeting are being followed?

Response

The Program Team, comprised of CTDOT staff and design, construction and inspection consultants are responsible for establishing, monitoring and enforcing safety protocols in compliance within the Federal and State regulations.

Question

Manresa Island has always been an issue. As a power plant an eyesore to the point that the city has said they would raise local taxes 20%if it came down. This use of Manresa with heavy boat and road traffic is nothing less than blight. Manresa is in a quiet residential neighborhood, people walk, cycle constantly. We strongly oppose this project on environmental grounds both marine and land. Is the city proposing a 20% decrease in property taxes by all those affected of using Manresa for the walk bridge?

Response

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks are making one round-trip each per day to bring materials to and from the site. Employee traffic is expected to be approximately 22 round-trips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to the extent feasible and practicable.

CTDOT will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the City of Norwalk, stakeholders and the public in September 2020.

For questions about local property taxes, please contact the City of Norwalk's Customer Service Department customerservice@norwalkct.org.

Question

Has NRG agreed to utilization of the site?  Is NRG being paid for use of the site?  If yes, how much? Will ConnDOT's use of the site prevent NRG from tearing down the power plant during the entire period that ConnDOT is utilizing it?

Response

In due course, the Connecticut Department of Transportation will enter into conversations with NRG, the owners of Manresa Island, for the property rights needed for the Walk Bridge Replacement Project.

Question

Three items of concern: 1) I understand and am unconcerned about the 20 employees driving to and from the site every day, as long as they obey the Speed Limit. I am concerned about the representation of an AVERAGE of 1 round trip Truck trip Per day during most periods, and 3 during peak periods. Over the course of 4-5 years those averages could result in 20+ trips per day during peak times, and many fewer or none at many others. Can you commit to a Maximum # of daily trips during peak times?

Response

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks are making one round-trip each per day to bring materials to and from the site. Employee traffic is expected to be approximately 22 round-trips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

Question

Is there a monetary reward for the contractor to conclude construction on or before a promised date?

Response

Currently, there is no monetary incentive for early completion of the Walk Bridge Replacement Project.

Question

Instead of the south portion could you use North Water Street, dividing up the sites?

What are you paying NRG for using their facilities?

Response

The Manresa Island staging and storage yard will be used in conjunction with the Water Street properties. The Water Street properties will be used for land-based storage of construction equipment, but both parcels will not be used to accommodate construction and material barges. The use of Manresa Island allows for the relocation of specific water-based project construction. Manresa Island has the existing infrastructure needed for the project in place: a large docking area with sufficient berthing depths to accommodate construction and material barges and a current staging and storage yard. Using Manresa Island to construct the lift spans will not require extensive dredging to build a robust steel bulkhead to accommodate construction barges, needed at the Water Street location.

Further, the use of Manresa Island will avoid encroachment into the Norwalk River navigation channel. Berthing of the largest barges for assembling the lift span at the Manresa Island dock will generally be 300 feet outside of the (200-foot) navigation channel. In comparison, berthing these barges at 68-90 Water Street would be approximately 28 feet within the navigation channel (250-feet wide at this location).

In due course, the Connecticut Department of Transportation will enter conversations with NRG, the owners of Manresa Island, for the property rights needed for the Walk Bridge Replacement Project.

Question

Every time a barge goes through--even when the testing begins on June 17, will the Stroffolino bridge be open and will traffic back up on Washington Street, Water Street etc.?
How many barges will go through during testing? How many barges will go through during the construction project? Will this be at random times of the day? or a bit more scheduled?

Response

Barges will travel through the Stroffolino only at the allowed times. No bridge openings are planned from Monday to Friday, from 07:00 AM to 08:45 AM, 11:45 AM to 13:15 and 16:00 to 18:00 PM. On average, only one barge will travel back and forth through the Stroffolino Bridge per day; in very few instances, a second barge will be required to pass.

Question

Can workers carpool to minimize traffic?

What impact will this have on nesting ospreys who have increased their population over the last years?

As a resident in Harborview, an impacted neighborhood, will there be a point person we can reach out to if concerns do arise?

Response

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks are making one round-trip each per day to bring materials to and from the site. Employee traffic is expected to be approximately 22 round-trips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

The Connecticut Department of Transportation (CTDOT) has coordinated with the CTDEEP Division of Wildlife regarding the protection of osprey. Time of year restrictions and protection protocols for State-listed species are included in permits and contract specifications. Work at the site will start before April 15 or after August 1 to allow the nesting ospreys to acclimate to noise levels.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to the extent feasible and practicable.

CTDOT will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the City of Norwalk, stakeholders and the public in September 2020.

Question

What noise studies have been undertaken to protect nearby residents? When you say "one truck" will be the norm, does that mean that truck will be coming and going all day? Is the truck's main purpose to be removing or delivering construction materials or debris?  Can you list the other properties that are under consideration for construction?

Response

The Project Team considered several properties for construction staging and storage. Due to a variety of factors and environmental concerns, the Water Street and Manresa Island locations are the locations being considered at this time. The potential use of Manresa Island allows for the relocation of water-based construction of the lift spans to Manresa Island and the Water Street properties will still be used as a staging yard. If the Program uses Manresa Island, it can avoid the additional dredging and construction of a bulkhead at the Water Street location. Manresa Island has the existing infrastructure needed for the project already in place, where further construction would be needed at Water Street to complete the project.

The Program anticipates a minimal increase in traffic in the Manresa Island area. During construction of the lift span, the Program estimates one truck making a round-trip per day. At the peak of construction, we estimate three trucks are making one round-trip each per day to bring materials to and from the site. Employee traffic is expected to be approximately 22 round-trips per day, six days per week. Speeding and other traffic regulations will be enforced by the local police. The Program plans to work closely with the City of Norwalk and police to facilitate safe travel for vehicles and pedestrians on local roads.

A noise study is being prepared to evaluate impacts on the surrounding area. The Program will avoid, minimize and mitigate impacts to the extent feasible and practicable.

The Connecticut Department of Transportation will further review potential traffic, noise and environmental concerns, as well as compile additional information for site staging alternatives for the Walk Railroad Bridge replacement project in response to public comment and feedback received through the online public informational meeting regarding the use of Manresa Island as a construction staging area.

The purpose of this effort is to add to the existing body of knowledge from previously conducted studies concerning these topics and inform and share this information with the city of Norwalk, stakeholders and the public in September 2020.

Question

I am very concerned about the coal ash being disturbed. What is being done to prevent this?

Response

The proposed activities at the site have been designed to limit the disturbance of existing soils. CTDOT is aware of the numerous investigations that have been conducted on the property as well as the proposed Remedial Action Plan (RAP) for the site. The RAP outlines the potential remedial options for the site which includes capping, soil excavation and disposal, and long-term monitoring. CTDOT has designed its proposed site activities to minimize the disturbance of existing on-site soils and sediment. The site activities will be limited to paved areas and in proposed areas where no pavement exists, existing soils will be protected with the installation of a separation geotextile that will be placed directly on top of existing soils and then six (6) inches of crushed stone will be placed to serve as the working surface for the construction activities. At the end of the project, the stone and geotextile will be removed from the area and the site will be reseeded for the reestablishment of a vegetated surface.

Question

I saw a mention of wastewater and stormwater from construction, but it didn't say how that would be captured and kept out of the Sound. Can you explain that process?

Response

Air and water quality will be ensured with the inclusion of CTDOT’s standard specification 1.10 Environmental Compliance under Form 818. The specification provides accountability to the Contractor to perform the construction in accordance with CTDOT’s Required Best Management Practices (BMPs) which include dust control, erosion and sediment control, vehicle emission control, and controls for hazardous materials. All of these BMPs are standard practice for the Department and are designed to protect air and water quality. CTDOT has Construction Inspectors and Environmental Coordinators who verify site conditions to ensure that the Contractor upholds the environmental requirements on the project.

For each of the Required Best Management Practices there are inspection requirements on the part of the Contractor and provisions to correct any identified protection failures within a timely manner (usually 24 hours). Provisions within the standard specifications allow the Department to correct any identified issues that the Contractor has not performed in a timely manner and the costs for said corrections would be withheld from payment to the Contractor.

Additionally, the site activities will be subject to the Department of Energy & Environmental Protection’s General Permit for the Discharge of Stormwater Associated with Construction and Dewatering Activities (General Permit). The General Permit requires the development of a Stormwater Pollution Control Plan which outlines Erosion & Sediment Control requirements that will be required to be implemented including inspections after rainfall events to ensure that the best management practices that prevent erosion are implemented and maintained and corrective actions are promptly implemented.

Question

There is an active bird population (ospreys, eagles, etc.) nesting on the site, especially in the slip area. What would be done to protect these animals? Thank you.

Response

CTDOT has coordinated with the CTDEEP Natural Diversity Data Base Program and the CTDEEP Division of Wildlife regarding the protection of listed species. Time-of-year restrictions and protection protocols for State-listed species will be included in permits and contract specifications.

Work at the site will start before April 15 or after August 1 to allow time for nesting ospreys to acclimate to noise levels.

Question

Why don’t you stop having any and all meetings about our city’s future plans until we can meet in a normal assembly? Let’s put all future impact plans on hold instead of using the current conditions to push them ahead.

Response

As holding an in-person meeting would have gone against Governor Lamont's Executive Order limiting gatherings, the Program Team chose to move forward with an online meeting. To date, the online public meeting holds the highest attendance numbers for any meeting held by the Walk Bridge Program.

As the Walk Bridge Replacement Project progresses, we remain committed to providing timely and transparent updates to the public. The potential use of Manresa Island is a development that we wanted to inform the community about well in advance of any work on the site and provide an opportunity for people to provide comments and ask questions.

# Attachment D Section 106 Assessments

# Attachment D-1 - Supplemental Cultural Resources Evaluation Memorandum, 5/1/2020

S T A T E O F C O N N E C T I C U T

*DEPARTMENT OF TRANSPORTATION*

**2800 BERLIN TURNPIKE, P.O. BOX 317546**
**NEWINGTON, CONNECTICUT 06131-7546**

# Supplemental Cultural Resources Evaluation Memorandum

| | | | |
|---|---|---|---|
| **Author:** | Lucas A. Karmazinas | **Date:** | May 1, 2020 |
| **Project:** | State No.: 301-176<br>Project Title: Walk Bridge Replacement Project<br>Town: Norwalk | | |

## Project Description

The Connecticut Department of Transportation (CTDOT) has proposed a series of improvements to the Metro-North Commuter Railroad's New Haven Line (NHL), among these being the replacement of Bridge #04288R (the Walk Bridge), which carries the rail line over the Norwalk River in Norwalk, Connecticut. A Value Engineering (VE) Study for the Walk Bridge Replacement Project (the Project) completed by HNTB Corporation and Strategic Value Solutions, Inc., in September 2019, included an alternative construction concept for the fabrication of the replacement bridge lift spans, this consisting of the recommendation that the replacement spans be constructed off-site at a Staging and Storage Yard (SSY) and then delivered by barge to the bridge site for installation. CTDOT is proposing, in coordination with the Project Management Team, to utilize a portion of the property occupied by the decommissioned NRG Energy power plant on Manresa Island in Norwalk as the SSY. This refinement in the proposed construction approach necessitates a re-evaluation of potential environmental impacts and this memorandum, completed by qualified cultural resources staff at the CTDOT's Office of Environmental Planning (OEP), considers the potential for effects to cultural resources resultant of the proposed use of a portion of the island occupied by the power plant (this identified in local Assessor's records as Parcel 5/86/1).

## Technical Review of Project Area Uses

In accordance with the recommendation presented by the VE Study, CTDOT proposes to secure a construction easement within the southern parcel of Manresa Island (Parcel 5/86/1) for use of the parcel as an SSY. The area occupied by the SSY will measure approximately 4.7+ acres and will consist of an approximately 120,000 square-foot (sf) Work Area and an approximately 87,500 sf construction equipment and material Storage Area (Figures 1 and 2). The bridge lift spans will be assembled at the existing wharf area at the southeast corner of Manresa Island and then floated by barge approximately 2.1 nautical miles north to the bridge site to be installed. Additional uses within the SSY on Manresa Island may include the pre-assembly of structural components (i.e. lift tower) and both lift span trusses, storage of construction materials for trestles and sheet piles for marine enclosures, transfer of materials to and from barges as needed, unloading and storage of components from demolition of the existing bridge, berthing of safety boat vessel(s) and emergency rescue operations that are associated with construction of the lift spans, and temporary berthing of construction vessels and barges.

Vehicle access to the SSY will be provided from Longshore Avenue via an existing paved access road (Figures 1 and 2). The Work Area will include potential use of an existing industrial office building as a project construction office, and use of an existing parking area for employee parking (Figure 2). No new buildings will be constructed, however, storage containers, these measuring approximately 8' x 40', will be required to house construction tools and weather-sensitive materials. Surface stabilization of the Work and Storage Areas will necessitate installation of a geotextile fabric topped with six inches of crushed stone (Figure 2). A lift span assembly barge, a work barge, and miscellaneous material barges will be stationed at the existing wharf area.

Cultural Resources Within the Area of Potential Effect (APE)

Investigations were conducted to determine if the use of Parcel 5/86/1 as an SSY could potentially impact above- or below-ground historic resources. Cultural Resources staff with CTDOT's OEP conducted desktop and field assessments of the area to be occupied by the SSY in order to determine the potential for impacts related to proposed alterations to existing buildings, installation of fencing, compaction of subsurface conditions due to general use of the property, and application of a 6" deep gravel overlay throughout the SSY. The Area of Potential Effects (APE) for above- and below-ground resources for the project consists of those portions of Parcel 5/86/1 slated for potential use in Figure 2.

Manresa Island (formerly also referred to as Bouton's Island or Keyser Island) was established as a Jesuit retreat center known as the Manresa Institute in 1889. At the time of its founding, the Manresa Institute was "the only establishment in the United States exclusively devoted to the work of private retreats to priests and laymen," and it offered year round accommodations in the "Manresa House," and warm-weather lodging in two large cottages called the "Gonzaga" and the "Xavier" (Figures 3-6).[1] A chapel and various other support buildings, including a dining room, kitchen, bowling alley, and recreation hall, rounded out the resort (Figure 7).

The Manresa Institute relocated to Staten Island in 1911, and the property fell vacant until it was acquired by the Connecticut Light & Power Company (CL&P) in 1952. Maps and aerial imagery from the early 1920s through the early 1950s indicate that the Manresa Institute compound then consisted of 17 buildings, these located in an area to the south of the extant main power plant building (Figures 7-9). When CL&P redeveloped the property for use as a coal-fired power plant during the late 1950s, however, the entirety of the parcel was cleared of all structures and portions of the tidal flats to the north of the former retreat center were filled in in order to accommodate for construction (Figure 10). As such, the area proposed to be used as the Work Area will be located on areas of artificial fill, while the entirety of the space proposed to be used as the Storage Area was occupied by a large, open coal dump (Figures 10-12).

Six of the power plant's existing industrial buildings and structures were built during the late 1950s and completed by ca. 1960. The facility converted to oil fuel in 1972, after which the coal dump

[1] "Manresa Institute, Keyser Island," *Sacred Heart Review*, Vol. 15, No. 24; June 13, 1896.

was cleared, graded, and backfilled with gravel and top soil, and three large fuel oil tanks were constructed, thus creating the campus and conditions visible today (Figures 10-12, and 14, Photographs 1-16). NRG Energy acquired the property from CL&P in 1999, and the facility remained in operation until 2013.

| **Extant Buildings Within the APE** | | |
|---|---|---|
| **Building/Structure (Building # Keyed to Figure X)** | **Date of Construction** | **Description** |
| Main Power Plant Building (#1) | Ca. 1960 | Three-story, steel-frame, flat-roofed building with metal and glass panel sheathing. Comprised of five primary blocks and adjoined to the south by a concrete smokestack. Fuel input and water discharge piping snakes across the property on the east side of the building. |
| Coal Conveyance Building (#2) | Ca. 1960 | Three-story, steel-frame, gable-roofed building with concrete and corrugated metal sheathing. |
| Coal Conveyance Wharf Building (#3) | Ca. 1960 | Two-story, steel-frame, gable-roofed building with corrugated metal sheathing. |
| Utility/Mechanical Building (#4) | Ca. 1960 | Two-story, steel-frame and brick, flat-roofed building. |
| Water Treatment Plant (#5) | Ca. 1960 | Two-story, steel-frame and concrete block, flat-roofed building. Adjoined to the east and west by open holding tanks, and to the northwest, north, and northeast by current and former leaching fields. |
| Electrical Transmission Station (#6) | Ca. 1960 | One-story, steel-frame, gable-roofed building with metal sheathing. Adjoined by chain-link, fenced-in, electrical transmission station. |
| Oil Conveyance Building (#7) | Ca. 1972 | Elevated one-story, steel-frame, flat-roofed building with metal and concrete panel sheathing. |
| Oil Tank (#8) | Ca. 1972 | Approximately three-story tall, metal-frame, flat-topped oil storage tank. Stands within a tank farm with two other identical tanks, all surrounded by a roughly 5' tall gravel berm. |
| Oil Tank (#9) | Ca. 1972 | Approximately three-story tall, metal-frame, flat-topped oil storage tank. Stands within a tank farm with two other identical tanks, all surrounded by a roughly 5' tall gravel berm. |
| Oil Tank (#10) | Ca. 1972 | Approximately three-story tall, metal-frame, flat-topped oil storage tank. Stands within a tank farm with two other tanks, all surrounded by a roughly 5' tall gravel berm. |

While six of the buildings and structures presently located within the APE are over 50 years of age – the minimum standard vintage required for listing on the National Register of Historic Places

(NRHP) – none exhibit design characteristics or associations with events, people, or technological or engineering developments that would make them eligible for listing on the NRHP.

Archaeological Conditions Within the APE

Soil classification maps maintained by the U.S. Natural Resources Conservation Service were examined in conjunction with predictive models developed within the State of Connecticut in order to assess the sensitivity of the project area for previously unknown archaeological resources. The entirety of the proposed SSY is located on soils classified as Udorthents-Urban Land Complex (0-35% slopes), these predicted to possess a "poor" likelihood of bearing archaeological resources, while the access road runs along the edge of an area classified as Udorthents-Urban Land Complex, this predicted to possess a "low" likelihood of archaeological sensitivity (Figure 13). The Office of State Archaeology database of archaeological sites identifies the Ted Jostrant #5 site (Site #103-34 or #6-FA-83), a grouping of multi-component campsite areas, as being located near the southern end of Manresa Island, however, the exact location of the site is not identified in state inventory forms.

Evaluation of historic aerial imagery, this combined with a field review conducted by OEP cultural resources staff on March 12, 2020, confirmed that the soils upon which the power plant are located were either heavily disturbed as part of construction or subsequent activities, or consist of artificial fill introduced to expand the footprint of the island (Figures 9-11, Photographs 1-16). As noted, the area formerly occupied by the Manresa Institute was entirely cleared to make way for the CL&P power plant during the late 1950s and has been further disturbed as part of subsequent construction projects, such as the plant's conversion to oil fuel during the early 1970s.

In specific regard to the proposed use of the property as an SSY, the entirety of the proposed Work Area is located on introduced fill, while the soils within the Storage and Staging Area were cleared for use by the power plant's coal dump, and then were graded and backfilled when the use of coal was discontinued. The power plant's access road is a paved surface that will not be altered and will continue to be used for its present purpose. As such, given the aforementioned conditions, OEP's Cultural Resources staff has determined that there is minimal foreseeable potential to impact intact archaeological resources within the project area and no further study is recommended.

**Recommendation**

It is the opinion of CTDOT's OEP Cultural Resources staff that the proposed use of Parcel 5/86/1 as a Staging and Storage area would result in No Historic Properties Affected. All of the structures formerly associated with the Manresa Institute were cleared when the power plant was constructed during the late 1950s, and while many of the power plant buildings themselves are over 50 years of age, they do not possess historical, architectural, or technological significance worthy of listing on the National Register of Historic Places (NRHP). Furthermore, despite the presence of a documented archaeological site on Manresa Island, the entirety of the APE has experienced extensive soil disturbances, these associated with the construction and subsequent demolition of the Manresa Institute, construction of the powerplant and infilling of adjacent wetlands by CL&P, regrading of the former coal storage area, and construction of the oil-storage tanks after conversion to that fuel type.

Given the aforementioned conditions, CTDOT cultural resources staff have determined that there is minimal foreseeable potential to impact intact archaeological resources within the Project Area and no further study is recommended.

Lucas A. Karmazinas
National Register Specialist
Office of Environmental Planning
Connecticut Department of Transportation

Attached Documents:

- [x] Maps
- [x] Photos
- [ ] Supporting Documents

cc: file
Kimberly Lesay
Mark McMillan

**Figure 1: Manresa Island – Proposed Access Route and Staging and Storage Yard (SSY).**

**Figure 2: Manresa Island – Detail of uses within proposed SSY, including the Work Area and Storage Area.**


**Figure 3: Manresa Island – Historic photograph of the Manresa Institute's "Manresa House," ca. 1895.**


**Figure 4: Manresa Island – Historic photograph of the Manresa Institute's "Xavier" cottage, ca. 1900.**


**Figure 5: Manresa Island – Historic photograph of the Manresa Institute's "Gonzaga" cottage, ca. 1900.**


**Figure 6: Manresa Island – Historic photograph of the Manresa Institute's Chapel, ca. 1900.**

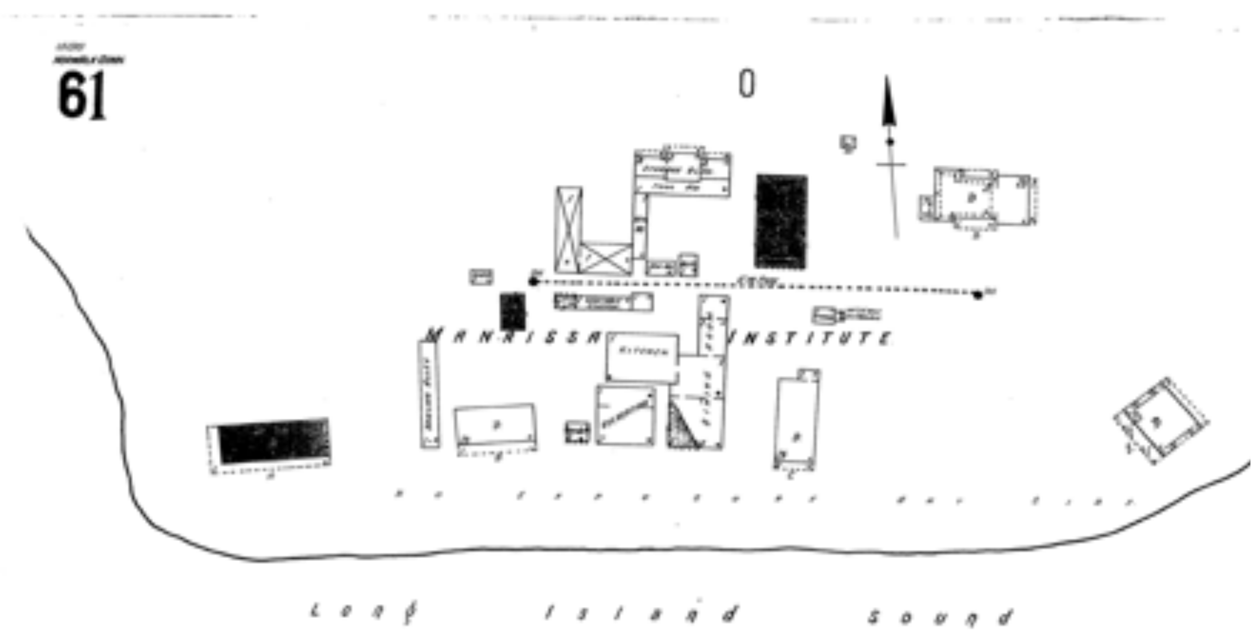



**Figure 7: Manresa Island - 1922 Sanborn Map identifying buildings associated with the Manresa Institute.**

**Figure 8: Manresa Island – 1934 Aerial Image. Approximate Manresa Institute footprint boundary (in red) for reference. Note sand bar and salt marshes to the northeast.**

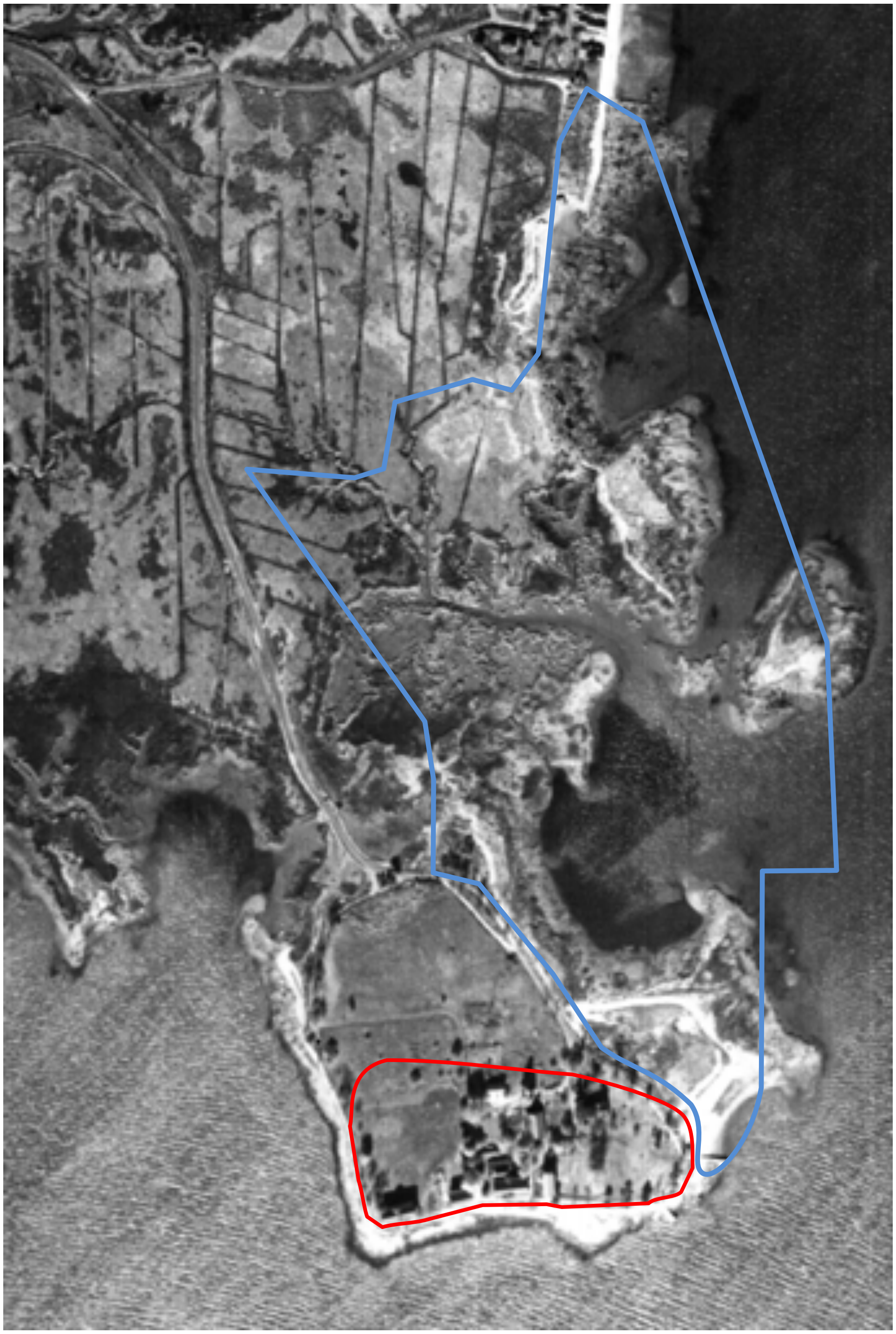


**Figure 9: Manresa Island – 1951 Aerial Image. Approximate Manresa Institute footprint boundary (in red) and initial areas of fill for the CL&P power plant (in blue) for reference. Note sand bar to the northeast.**

**Figure 10: Manresa Island – 1965 Aerial Image. Approximate footprint of the former Manresa Institute identified in red. Note the construction of sea walls and extensive fill (identified in blue) associated with the construction of the CL&P power plant to the northeast, as well as the new power plant and adjoining coal dump themselves.**

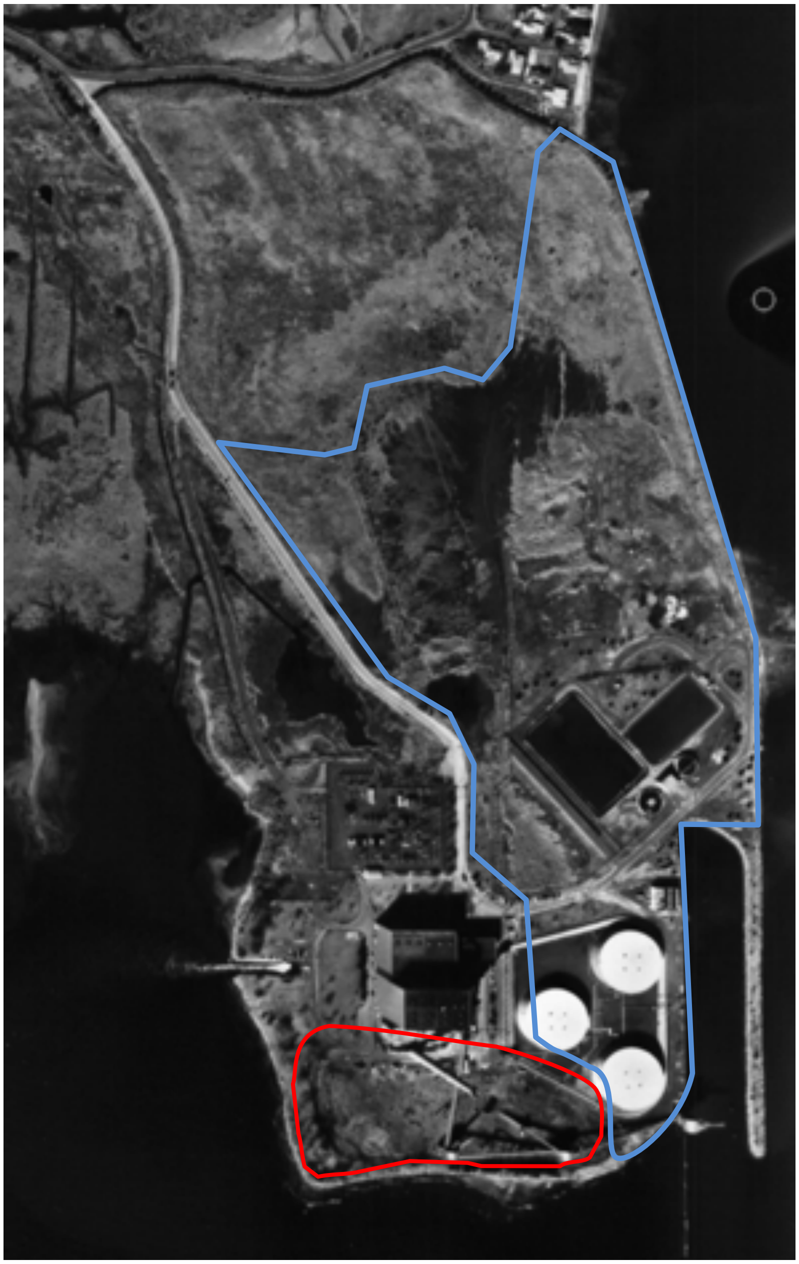


**Figure 11: Manresa Island – 1985 Aerial Image. Approximate footprint of the former Manresa Institute identified in red. Note the areas of fill (identified in blue), as well as the new construction, including new oil storage tanks, associated with the CL&P power plant to the northeast.**

**Figure 12: Manresa Island – 2016 aerial image of Staging and Storage Area. Approximate footprint of the former Manresa Institute identified in red, areas of fill for the CL&P power plant (in blue).**


**Figure 13: Manresa Island – Soil classification/archaeological predictive map with soil types and sensitivity identified. Note: The project area falls entirely within areas predicted to have poor or low archaeological sensitivity.**

**Photograph 1: View from Parcel 5/86/1, looking west within the Staging and Storage Area towards the power plant from the north side of the tank farm. Facing west. 3/12/2020.**

**Photograph 2: View from Parcel 5/86/1, looking south within the Staging and Storage Area along the east side of the tank farm and west side of the wharf area. Facing south. 3/12/2020.**

**Photograph 3: View from Parcel 5/86/1, looking southeast within the Staging and Storage Area towards the wharf area. Facing southeast. 3/12/2020.**

**Photograph 4: View from Parcel 5/86/1, looking southwest within the Staging and Storage Area at the tank farm located east of the power plant. Facing southwest. 3/12/2020.**

**Photograph 5: View from Parcel 5/86/1, looking west within the Staging and Storage Area past the tank farm towards the power plant. Facing west. 3/12/2020.**

**Photograph 6: View from Parcel 5/86/1, looking south within the Staging and Storage Area along the east side of the existing tank farm and west side of the wharf area. Facing south. 3/12/2020.**

**Photograph 7: View from Parcel 5/86/1, looking north within the Staging and Storage Area along the east side of the existing tank farm and west side of the wharf area. Facing north. 3/12/2020.**

**Photograph 8: View from Parcel 5/86/1, looking west within the Staging and Storage Area along the south side of the existing tank farm. Note the gravel surface conditions throughout the area. Facing west. 3/12/2020.**

**Photograph 9: View from Parcel 5/86/1, looking west within the Staging and Storage Area south of the power plant. Note the thin topsoil/turf over gravel fill throughout. Facing west. 3/12/2020.**

**Photograph 10: Detail of the thin topsoil/turf over gravel fill throughout. 3/12/2020.**


**Photograph 11: View from Parcel 5/86/1, looking east within the Staging and Storage Area south of the power plant. Facing east. 3/12/2020.**


**Photograph 12: View from Parcel 5/86/1, looking northwest within the Staging and Storage Area at the power plant. Facing northwest. 3/12/2020.**

**Photograph 13: View from Parcel 5/86/1, looking southeast within the Staging and Storage Area south of the power plant. Facing east. 3/12/2020.**

**Photograph 14: View from Parcel 5/86/1, looking southeast from just outside (northwest of) the Staging and Storage Area west of the power plant. Facing southeast. 3/12/2020.**

**Photograph 15: View from Parcel 5/86/1, looking northeast just outside (northwest) of the Staging and Storage Area along the west side of the power plant. Note the thin topsoil/turf over gravel fill throughout. Facing northeast. 3/12/2020.**

**Photograph 16: View from Parcel 5/86/1, looking southwest just outside (north of) the Staging and Storage Area looking southwest towards the power plant. Facing south. 3/12/2020.**

Figure 14: Manresa Island Staging and Storage Area - Photo Directions Map.

## Attachment D-2 – CTSHPO's Concurrence, Temporary Use of Manresa Island, 6/15/2020

# RE: WALK Bridge Re-Eval - Temporary Use of Manresa Island

Labadia, Catherine

Mon 6/15/2020 3:50 PM

To: Karmazinas, Lucas <Lucas.Karmazinas@ct.gov>;

Cc: McMillan, Mark J. <Mark.McMillan@ct.gov>;

Hello Lucas,
SHPO has reviewed the information submitted to our office regarding the use of Manressa Island to facilitate construction of the referenced project. Although an archaeologically sensitive and historically interesting location, it is unlikely that significant archaeological deposits would be impacted by the proposed activities. SHPO concurs with your conclusion that the proposed use of this location as
a Staging and Storage area would result in No Historic Properties Affected.
Thank you for the opportunity to comment,
Cathy

---

**From:** Karmazinas, Lucas <Lucas.Karmazinas@ct.gov>
**Sent:** Friday, June 5, 2020 10:04 AM
**To:** Labadia, Catherine <Catherine.Labadia@ct.gov>
**Cc:** McMillan, Mark J. <Mark.McMillan@ct.gov>
**Subject:** WALK Bridge Re-Eval - Temporary Use of Manresa Island

Hello Cathy,

I am not sure how much background you have on this issue other than what you might have gathered in passing, however, long story short, DOT is proposing to use a portion of the southern tip of Manresa Island in Norwalk for temporary staging, storage, and fabrication work associated with the WALK Bridge project. OEP was recently asked to prepare Re-Eval documentation for the use, this including a Cultural Resources Memo that evaluated the potential impacts on historic properties. I hate to do this to you again, however, there were some mixed signals in regards to whether FTA would be conducting consultation with your office directly or whether it should come from us with the end result being that it was not sent to you a month ago. I have attached the memo (here) and would very much appreciate if you could take a look at your earliest convenience and let me know if you have any questions or concerns. Also, rest assured that our office is reviewing our coordination protocols with FTA/FRA to prevent these communication lapses moving forward.

Thanks as always,

Lucas

Lucas A. Karmazinas
National Register Specialist
Office of Environmental Planning
Cultural Resources & Environmental Documents Unit
Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131

Phone: (860) 594-2136
Fax: (860) 594-3028
Email: Lucas.Karmazinas@ct.gov

## Attachment D-3 - Supplemental Information, Fort Point Street Wall 310, 11/23/2020

**WALK BRIDGE REPLACEMENT PROJECT**
**NORWALK, CONNECTICUT**
**STATE PROJECT 301-176**

**SUPPLEMENTAL INFORMATION**
**FORT POINT STREET**
**WALL 310**

**Prepared for HNTB Corporation**
**Boston, Massachusetts**

**by**

**Archaeological and Historical Services, Inc.**
**Storrs, Connecticut**

**November 23, 2020**

**Author:**
**Marguerite Carnell**

## Introduction

In the previous design, a section of the existing stone masonry wall, which is located on the south side of Fort Point Street and east of the Fort Point Street railroad bridge, would have been demolished and a new wall would have been constructed to tie into the remaining stone wall (Figure 1). In the final design, the entire existing wall will require replacement, primarily due to track grade raise and future track grade adjustments. The final design requires that the entirety of the stone masonry retaining wall between Fort Point Street and the rail corridor be abandoned in place, with a new soil nail wall (Wall 310, shown in Figure 2), to be installed immediately in front of the masonry wall, with soil nails extending through the existing wall (see attached drawings dated 11/09/2020).

This supplemental information augments a report prepared by Archaeological and Historical Services, Inc. (AHS), entitled *Supplementary Historic Resources Evaluation Report: Relocation of the Fort Point Street Railroad Bridge (State Bridge No. 0413R),* Bruce Clouette, Ph.D., February 2019, as well as the *Historic Resources Evaluation Report, Improvements to East Norwalk Station and Wall 27*, Norwalk, Connecticut, Marguerite Carnell, M.Phil. and Bruce Clouette, Ph.D., August 2017).

## Historic Resources

The railroad right-of-way within the Walk Bridge project area has been identified as an National Register of Historic Places (NRHP)-eligible linear historic district significant for its role in the transportation history of Connecticut (NRHP Criterion A) and for its numerous historic engineering features (Criterion C). Among the district's contributing components that are within or adjacent to the wall replacement area are the Fort Point Street Railroad Bridge and the section of stone masonry retaining wall along the south side of Fort Point Street, east of this bridge.

This retaining wall was included in "Written and Photographic Documentation: New York, New Haven & Hartford Railroad: South Norwalk and East Norwalk, Norwalk, Connecticut, Walk Bridge Replacement Project, Norwalk, Connecticut, State Project No. 0301-0176," which was prepared for the Connecticut Department of Transportation by Archaeological and Historical Services, Inc. in August 2018. In the state-level documentation, the wall was described as follows:

> On the east side of the Fort Point Street Railroad Bridge is a stone retaining wall on the north side of the railway, along the short section of Fort Point Street that runs east-west (Photographs 22 to 24). It is very similar in character to the walls west of North Water Street, although the brownstone capping stones lack the smooth borders. At the east end the wall is several feet high, gradually increasing to about 15' where it joins the brownstone bridge abutment at the west end (Photograph 24). There are no historic masonry retaining walls on the south side of the railway, either east or west of the bridge.

Photographs 22, 23 and 14 from the state-level documentation are included with this memo for reference (Figures 3 to 5).

## Scope of Work

The final design requires that the entirety of the existing northeast stone masonry retaining wall between Fort Point Street and the rail corridor be abandoned in place and replaced with a new soil nail wall (Wall 310), to be installed immediately in front of the existing masonry wall, with soil nails extending through the existing wall. The new retaining wall is required to accommodate added loading due to a raise in track profile necessary to tie in to the proposed new Fort Point Street Bridge and Walk Bridge, as well as for the future increase in vertical alignment (six-inch track raise) requested by Metro-North Railroad for future maintenance purposes. Analysis of the existing wall based on available core data indicates that the wall is unlikely to satisfy American Railway Engineering and Maintenance-of-Way Association (AREMA) stability factor of safety requirements under the revised loading conditions. Alternatives were analyzed to maintain and reinforce the existing retaining wall, including installation of post-tensioned ground anchors and repointing of masonry joints. These reinforcement options, however, resulted in excessive quantities of anchors and would require construction of multiple rows of steel or concrete wales across the front face of the existing wall, diminishing the wall's historical integrity. Any option that maintained the existing wall would also require reliance on existing mortar in rubble masonry backfill to ensure stability of the masonry for the remaining service life of the structure. It was determined that while the existing Fort Point Street stone retaining wall need not be removed, it must be strengthened and re-faced through the installation of a new wall immediately in front of it.

The face of the new soil nail wall will be concrete that is stamped and stained to resemble stone masonry. The existing retaining wall is faced with rubble stone, which is difficult to convincingly replicate in concrete. Instead, the proposed wall will replicate the ashlar wall at the adjoining Fort Point Street bridge abutment (Figures 5 and 6).

**Anticipated Project Effects**

The Memorandum of Agreement (MOA) for the project contains the following stipulation:

> CTDOT shall prepare written and photographic documentation of other historic structures on the New Haven Line, within the limits of the Undertaking, to the professional standards of CTSHPO. The documentation will address the high towers, stone retaining walls, interlocking tower (South Norwalk Switch Tower Museum), Fort Point Street Railroad Bridge, and any historic trackside features such as mileposts.

The entirety of the stone masonry retaining wall between Fort Point Street and the rail corridor will be abandoned in place, with a new soil nail wall (Wall 310) to be installed immediately in front of the masonry wall, with soil nails extending through the existing wall. It is recommended that these changes be considered as an adverse effect on the NRHP-eligible linear historic district.

This retaining wall was included in "Written and Photographic Documentation: New York, New Haven & Hartford Railroad: South Norwalk and East Norwalk, Norwalk, Connecticut, Walk Bridge Replacement Project, Norwalk, Connecticut, State Project No. 0301-0176," which was prepared for the Connecticut Department of Transportation by Archaeological and Historical Services, Inc. in August 2018. Since this wall was included in the 2018 state-level documentation, no further mitigation is recommended.

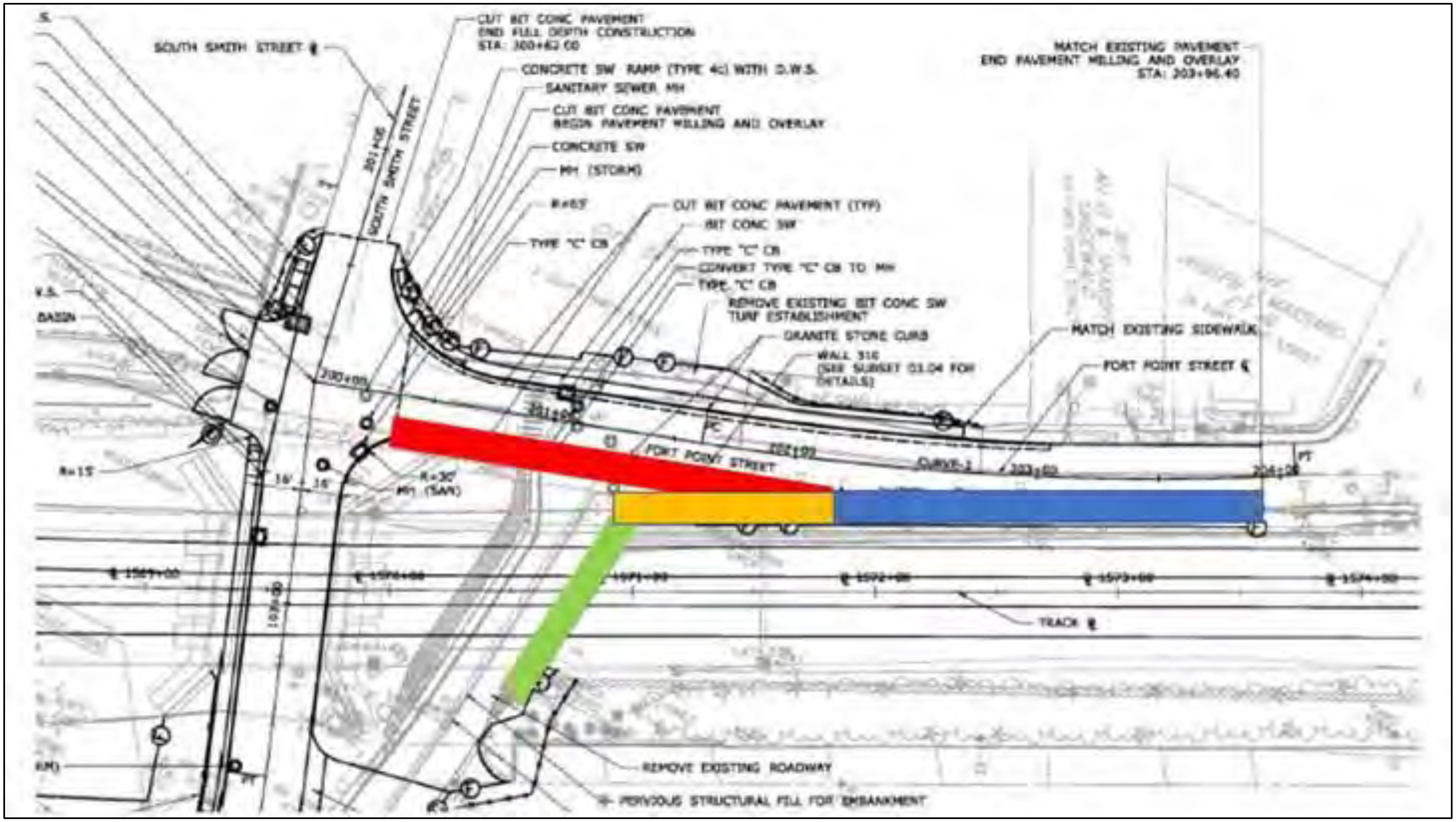


**Figure 1. Retaining Walls at Fort Point Street. The green and orange portions were the original limits of removal. The blue portion of the wall was originally going to remain intact, and the plan was to tie in the new wall (red) into the blue. Based on the updated design and change in track profile, the decision was made to fully replace the wall - - the entire length of the wall from the existing Fort Point Street Bridge (west) to the eastern limit of the existing wall - - the orange and blue segments.**

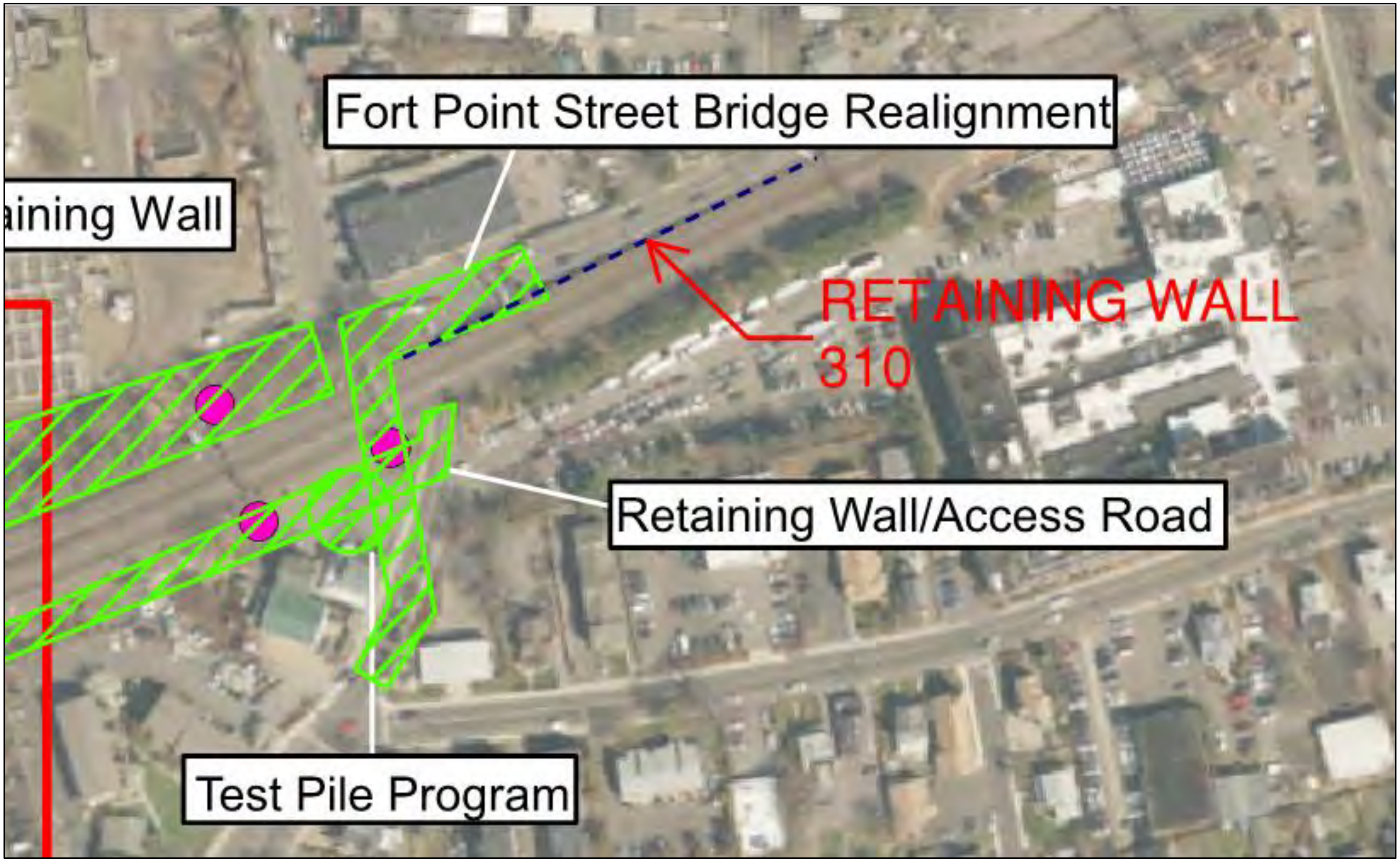



**Figure 2. Retaining Wall 310 at Fort Point Street, east of the Fort Point Street railroad bridge.**

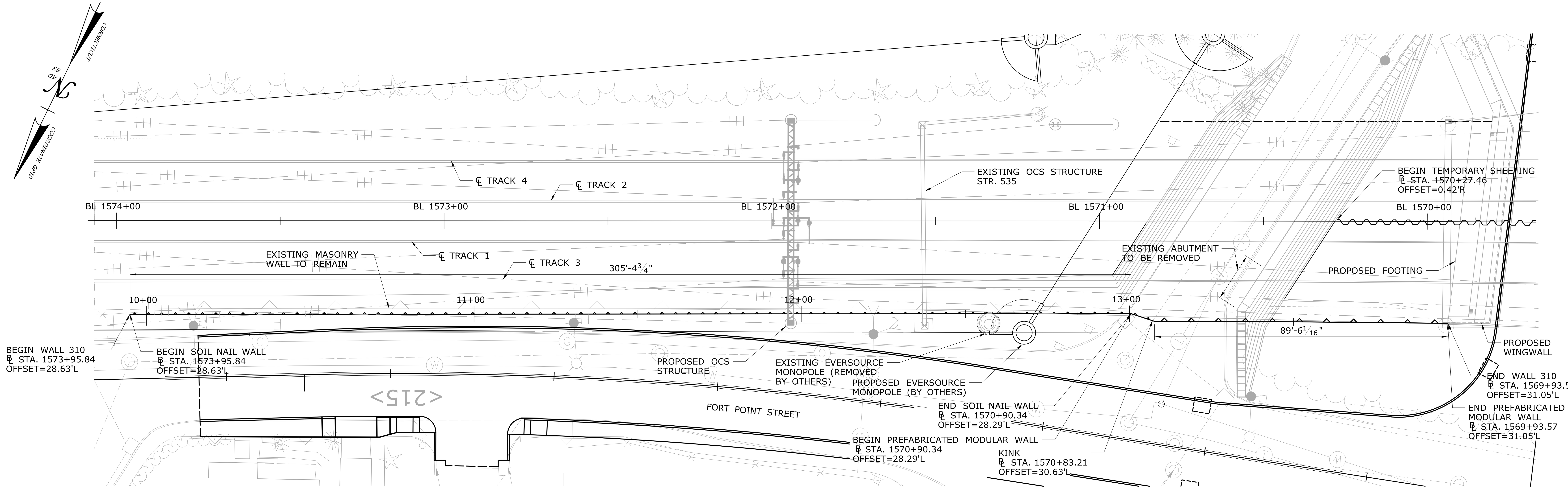
**Figure 3. State-Level Documentation Photograph 22. Retaining wall east of Fort Point Street Railroad Bridge, camera facing southwest (AHS photograph, 9/2017).**

**Figure 4. State-Level Documentation Photograph 23. Detail of masonry, retaining wall east of Fort Point Street Railroad Bridge, camera facing east (AHS photograph, 9/2017).**

**Figure 5. State-Level Documentation Photograph 24. Retaining wall east of Fort Point Street Railroad Bridge, detail of junction between the wall's rubble masonry and the bridge abutment's ashlar masonry, camera facing southeast (AHS photograph, 9/2017).**

**Figure 6. Fort Point Street Railroad Bridge, east abutment with ashlar stone masonry, camera facing southeast (AHS photograph, 9/2017).**


2 S Smith St
Norwalk, Connecticut
Google
Street View
END OF WALL 310
STOP
NOTES:
- EXISTING WALL TO REMAIN IN PLACE, COVERED WITH CONCRETE TO CREATE A NEW WALL
- PROPOSED CONCRETE FORM LINER TO REPLICATE EXISTING ABUTMENT STONE DIMENSIONS AND COLOR
Fort Point St
START OF WALL 310
WALL 310




**PLAN**

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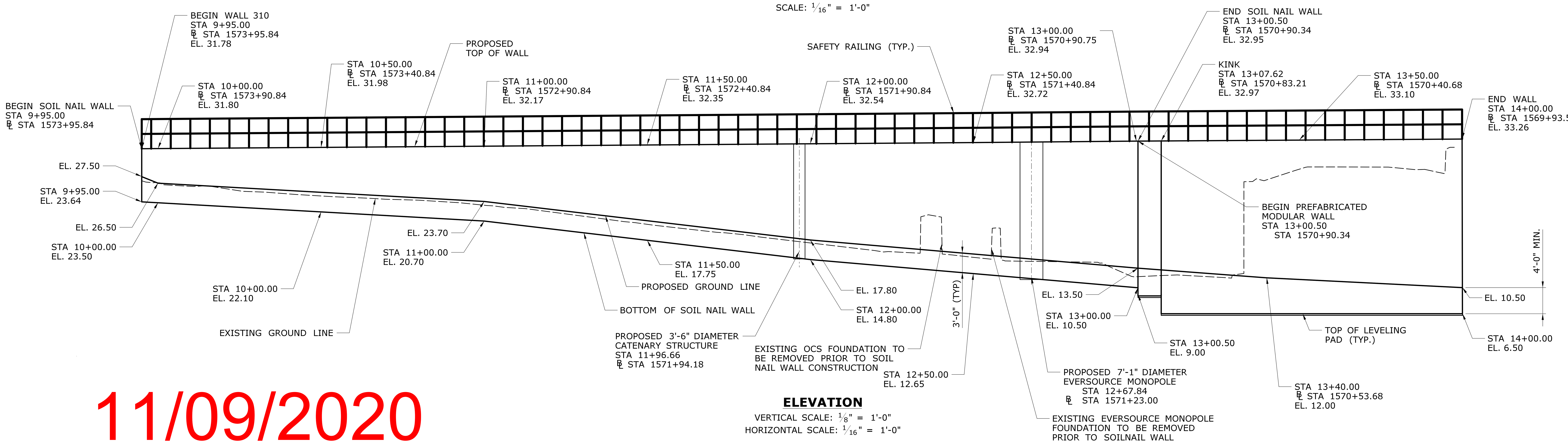



**ELEVATION**

VERTICAL SCALE: $^1/_8$" = 1'-0"
HORIZONTAL SCALE: $^1/_{16}$" = 1'-0"

11/09/2020

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: J. SONG

CHECKED BY: B. SUH

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-038_SB_Sheet_0301-0189_WALL310.dgn

SIGNATURE/
BLOCK:

PROJECT TITLE:
**BRIDGE NO. 04131R REPLACEMENT**
**METRO-NORTH RAILROAD MP 41.79**
**OVER FORT POINT STREET**

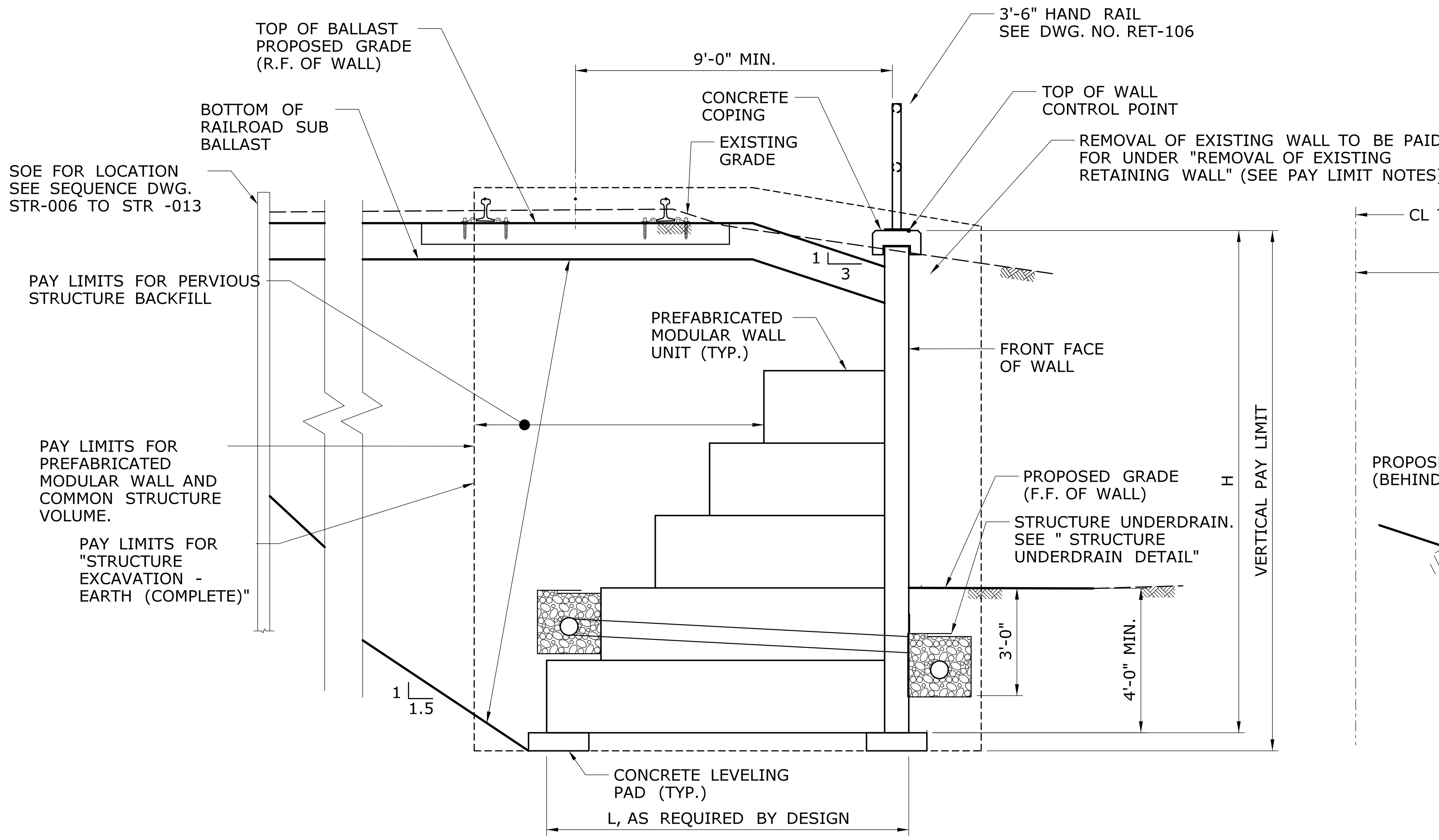
TOWN: **NORWALK**

DRAWING TITLE: **WALL 310 PLAN AND ELEVATION**

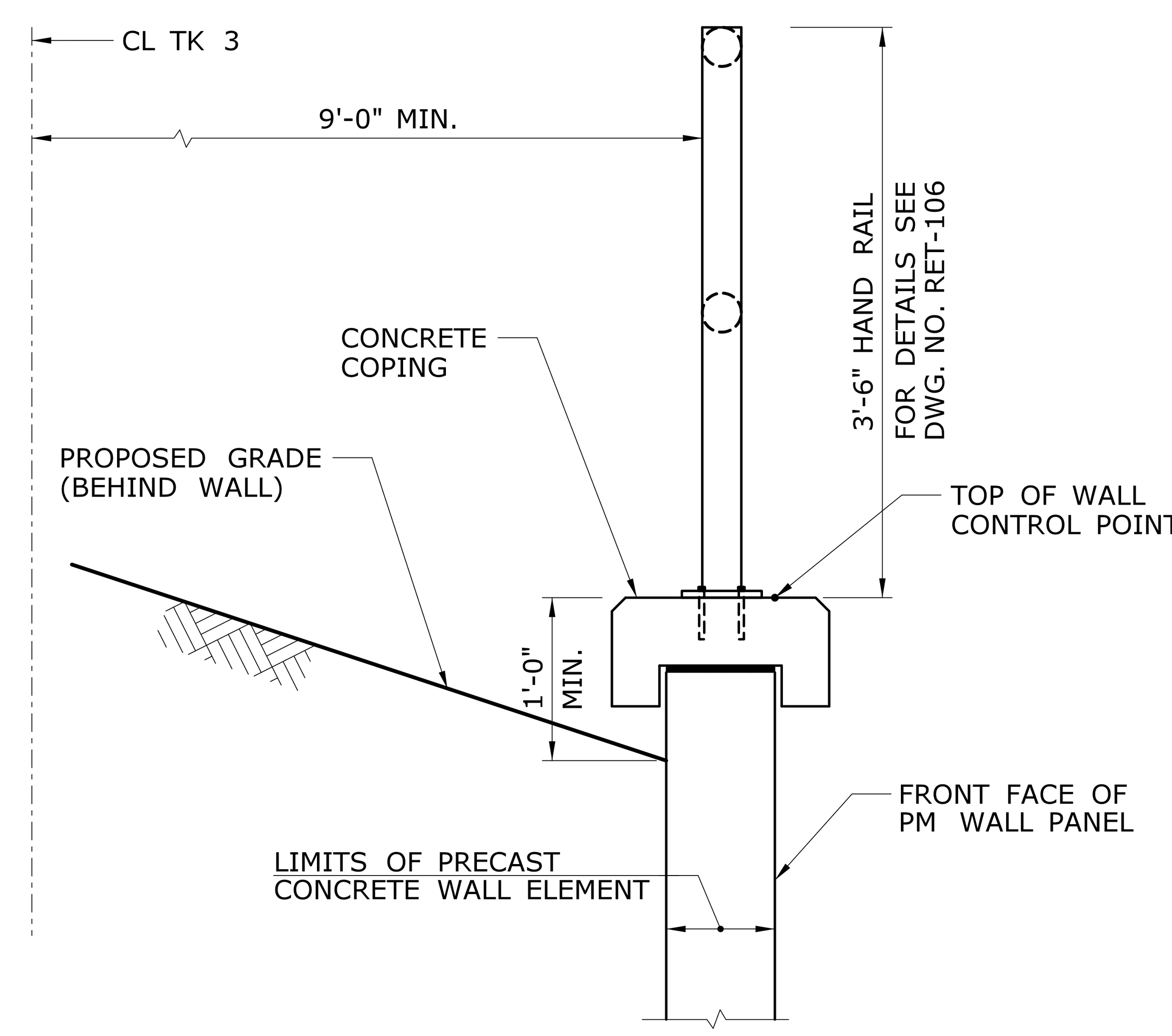
PROJECT NO. **0301-0189**

DRAWING NO. **STR-038**

SHEET NO.




**TYPICAL SECTION**
**PREFABRICATED MODULAR (PM) WALL**
NOT TO SCALE

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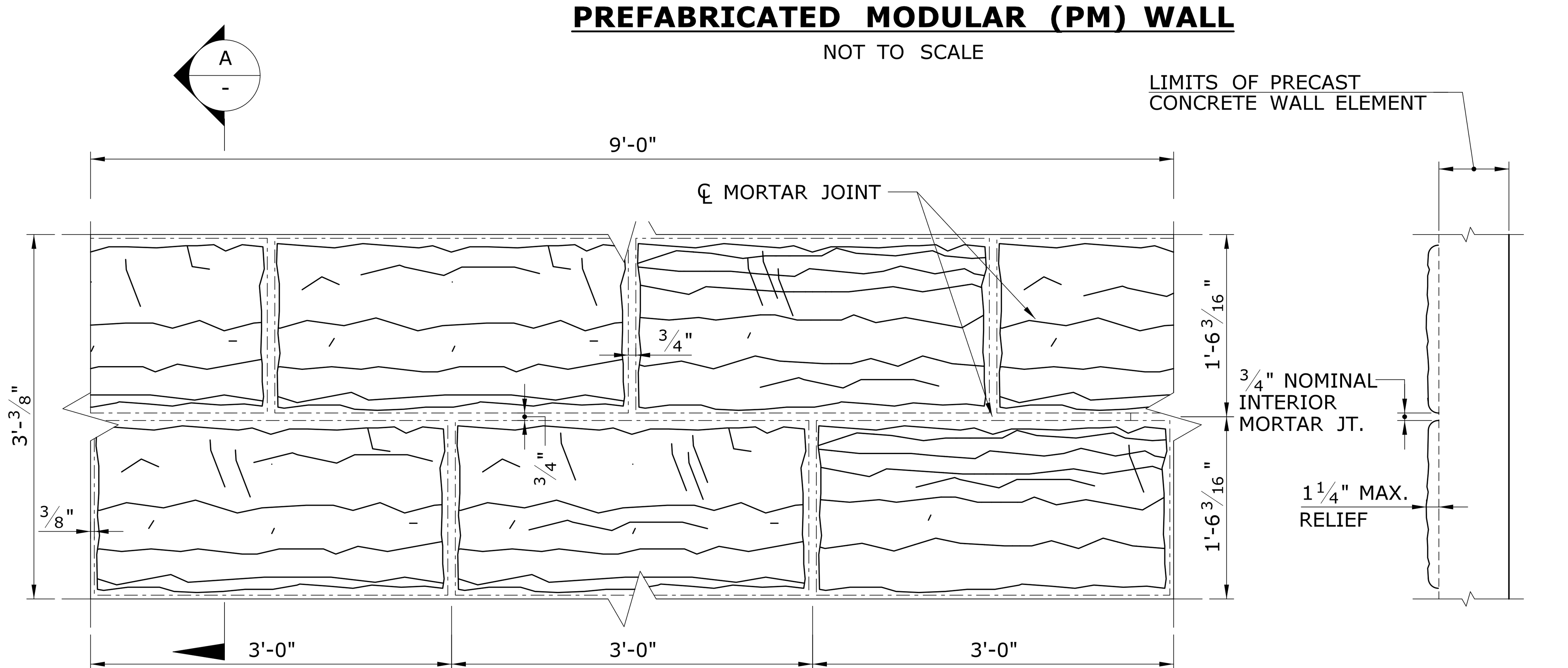



**FORM LINER DETAIL**
NOT TO SCALE

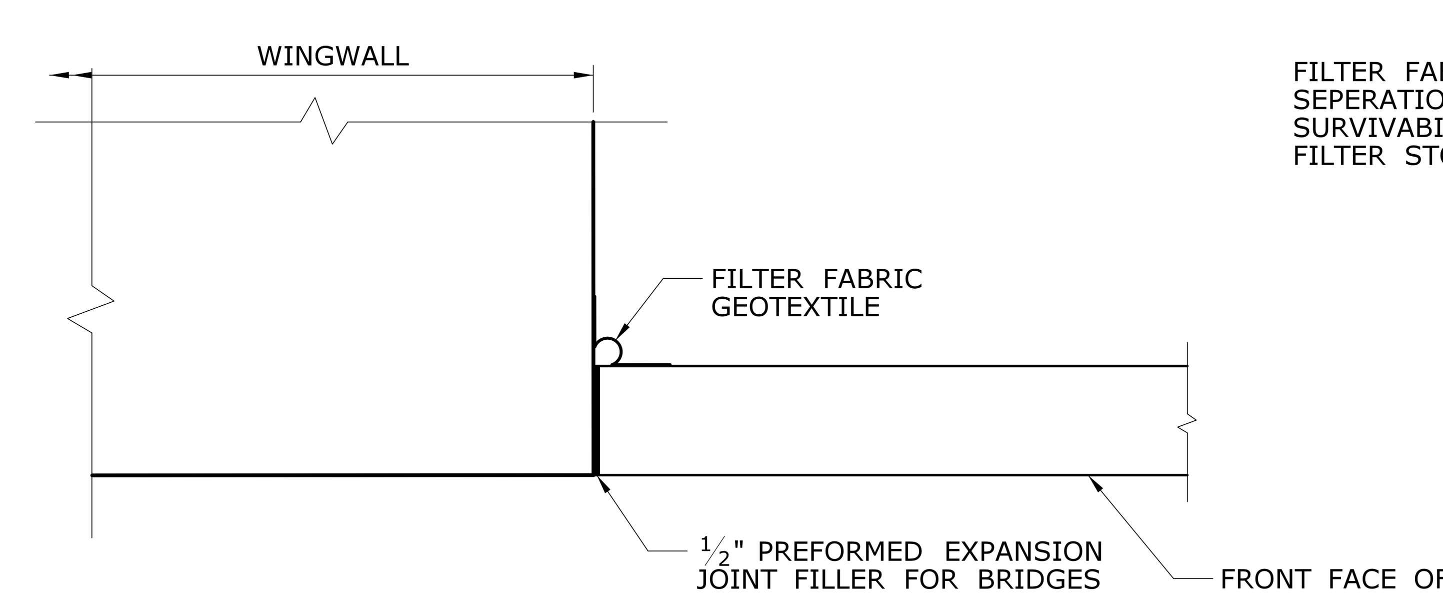
**A - SECTION**
NOT TO SCALE

## ARCHITECTURAL NOTES:

1. THE CONTRACTOR SHALL UTILIZE CONCRETE FORMLINERS ON THE FRONT FACE OF PREFABRICATED WALL PANELS TO SIMULATE STONE MASONRY CONSTRUCTION. THE COST OF THIS WORK SHALL BE INCLUDED IN THE UNIT PRICE FOR "RETAINING WALL (SITE NO. X)".
2. CONCRETE FORM LINERS SHALL CONFORM TO THE REQUIREMENTS OF "SIMULATED STONE MASONRY."
3. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL LAYOUT DRAWINGS OF ALL FORM LINERS SHOWING STONE SIZES, STONE CONFIGURATIONS, JOINT SPACING, AND ALL DIMENSIONS REQUIRED.
4. IN ADDITION TO THE DETAILS SHOWN ON THESE SHEETS, ALL EXPOSED EDGES SHALL RECEIVE A 1" X 1" BEVEL UNLESS DIMENSIONED OTHERWISE.
5. THE ARCHITECTURAL LINERS SHOWN ARE BASED ON FORM LINERS MANUFACTURED BY CUSTOM ROCK FORMLINER. THE STONE PATTERN IS BASED ON CUSTOM ROCK FORMLINER PATTERN NO. 2408, " 18" COURSING ASHLAR STONE (RUNNING BOND STONE, 1.25" RELIEF)."

RETAINING WALL DATA TABLE

| MAX WALL HEIGHT "H" (FT) | MIN. WIDTH OF WALL "L" (FT) | ALLOWABLE BEARING RESISTANCE (KSF) | ESTIMATED SETTLEMENT (IN) |
|---|---|---|---|
| 27.0 | 16.0 | 11.5 | <1 |



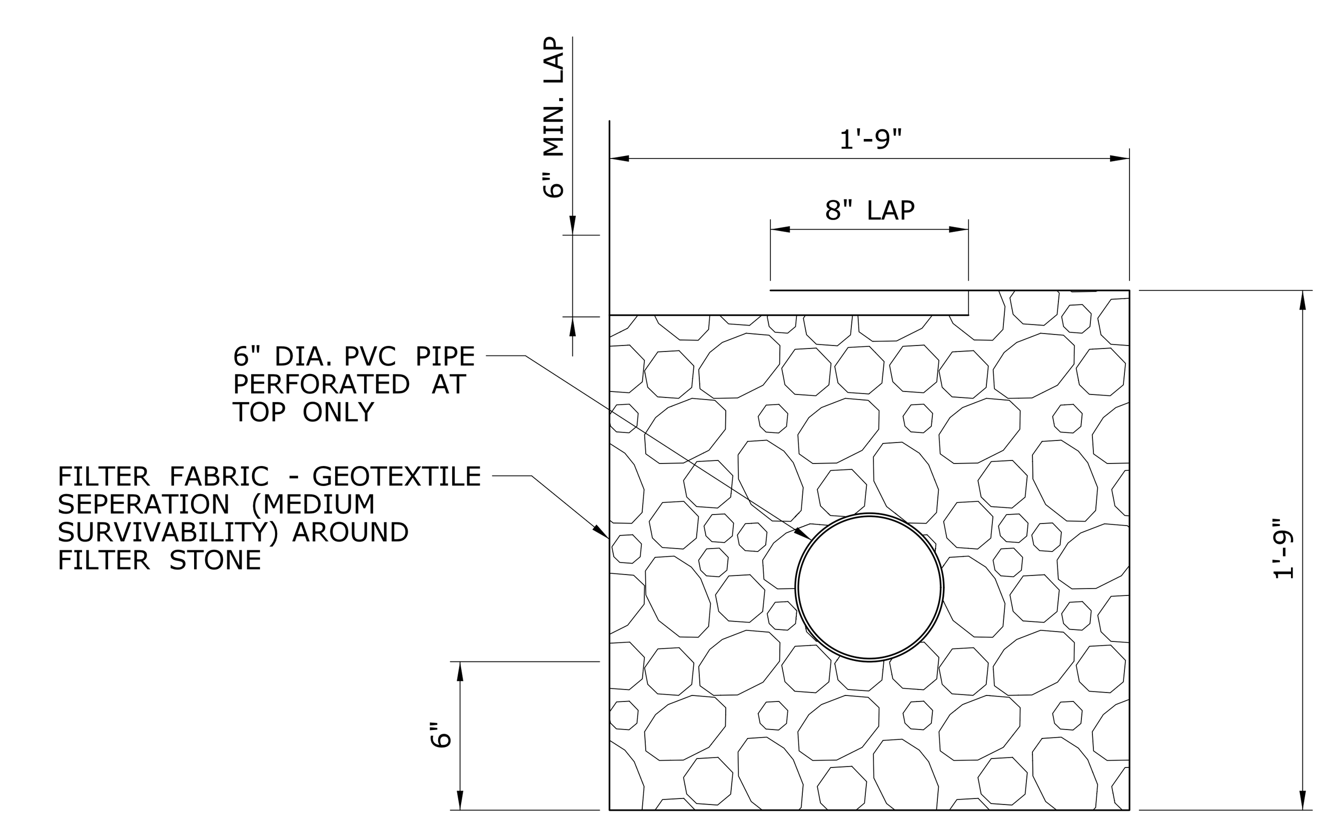

**END WALL DETAIL**
NOT TO SCALE

## PREFABRICATED MODULAR (PM) WALL NOTES:

1. DESIGN AND CONSTRUCT THE RETAINING WALL AS A PREFABRICATED MODULAR (PM) WALL IN ACCORDANCE WITH THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION (AREMA) MANUAL FOR RAILWAY ENGINEERING (2016), AS SUPPLEMENTED BY THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES (2002) AND BY THE CONNECTICUT DEPARMENT OF TRANSPORTATION BRIDGE DESIGN MANUAL (2003.)
2. SUBMIT TO THE ENGINEER FOR APPROVAL DESIGN CALCULATIONS AND WORKING DRAWINGS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF CONNECTICUT.
3. RELATION OF FRONT FACE OF WALL TO THE FRONT FACE OF COPING SHALL BE AS PER THE PM WALL MANUFACTURERS RECOMMENDED DETAILS. DETAILS SHOWN ARE FOR REPRESENTATIVE PURPOSES ONLY AND MAY BE MODIFIED BASED ON THE SPECIFIC WALL SYSTEM CHOSEN.
4. DETAILS SHOWN FOR THE CONCRETE COPING AND THE ALIGMENT AND CONNECTION TO THE PM WALL IS SHOWN FOR REPRESENTATIVE PURPOSES ONLY. DESIGN AND DETAILS FOR THE CONCRETE COPING, REINFORCEMENT, CONNECTION TO AND ALIGMENT WITH THE WALL SYSTEM IS THE RESPONSIBILITY OF THE CONTRACTOR AND IS DEPENDENT ON THE PM WALL MANUFACTURER CHOSEN.
5. THE MINIMUM WIDTHS OF WALL SHOWN IN THE TABLE ARE MINIMUM TRANSVERSE WIDTHS OF PREFABRICTED MODULAR RETAINING WALL REQUIRED FOR EXTERNAL AND GLOBAL STABILITY. THE PROPRIETARY WALL MANUFACTURER IS RESPONSIBLE FOR INTERNAL STABILITY OF THE RETAINING WALL. THE TRANSVERSE WIDTH USED IN THE CONSTRUCTION OF THE RETAINING WALL SHALL BE THE LONGER OF THAT REQUIRED FOR INTERNAL, EXTERNAL, OR GLOBAL STABILITY.
6. PERVIOUS STRUCTURE BACKFILL UNIT WEIGHT AND ANGLE OF INTERNAL FRICTION ARE 120 PCF AND 34° , RESPECTIVELY.
7. COORDINATE THE DESIGN, DETAILS AND ARRANGEMENT OF ALL WALL DRAINAGE COMPONENTS WITH THE PM WALL MANUFACTURER.
8. COORDINATE THE LOCATION OF ALL PROPOSED CATENARY STRUCTURE FOUNDATIONS WITH THE PM WALL MANUFACTURER. ENSURE THAT THERE IS NO CONFLICT BETWEEN THE PROPOSED FOUNDATIONS AND ANY COMPONENT OF THE PM WALL.

## PAY LIMIT NOTES:

1. DEPTH OF EXISTING WALL UNKNOWN. REMOVAL LIMITED TO 1'-0" BELOW TOP OF LEVELING PAD.
2. QUANTITY MEASURED FOR "REMOVAL OF EXISTING RETAINING WALL" SHALL NOT INCLUDE COMPACTED SOIL BETWEEN THE EXISTING WALL.
3. TEMPORARY EARTH RETAINING SYSTEM BELOW PAY LIMITS AND ANY TIEBACKS AND BRACING ASSOCIATED WITH THE SAME SHALL BE INCLUDED IN THE LUMP SUM COST OF THE WALL.
4. ANY ADDITIONAL PERVIOUS STRUCURE BACKFILL REQUIRED OUTSIDE OF THE WALL PAY LIMITS SHALL ALSO BE INCLUDED IN THE LUMP SUM COST OF THE WALL.
5. ALL WORK WITHIN THE WALL PAY LIMITS WILL NOT BE MEASURED FOR PAYMENT. INCLUDE ALL COSTS UNDER THE PAY ITEM "RETAINING WALL (SITE NO. X)".
6. ALL WORK REQUIRED TO CONSTRUCT THE WALL, INCLUDING PORTIONS THAT MAY EXTEND BEYOND THE WALL PAY LIMITS, WILL NOT BE MEASURED FOR PAYMENT. INCLUDE ALL COSTS UNDER THE PAY ITEM "RETAINING WALL (SITE NO. X)".
7. REINFORCEMENT STEEL IN LEVELING PADS, CONCRETE COPING, WALL UNITS, AND WALL PANELS WILL NOT BE MEASURED FOR PAYMENT. INCLUDE ALL COSTS UNDER THE PAY ITEM "RETAINING WALL (SITE NO. X)".




**STRUCTURE UNDERDRAIN DETAIL**
NOT TO SCALE

11/09/2020

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
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THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: B. SUH
CHECKED BY: B. SUH
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-039_SB_Sheet_0301-0189.dgn

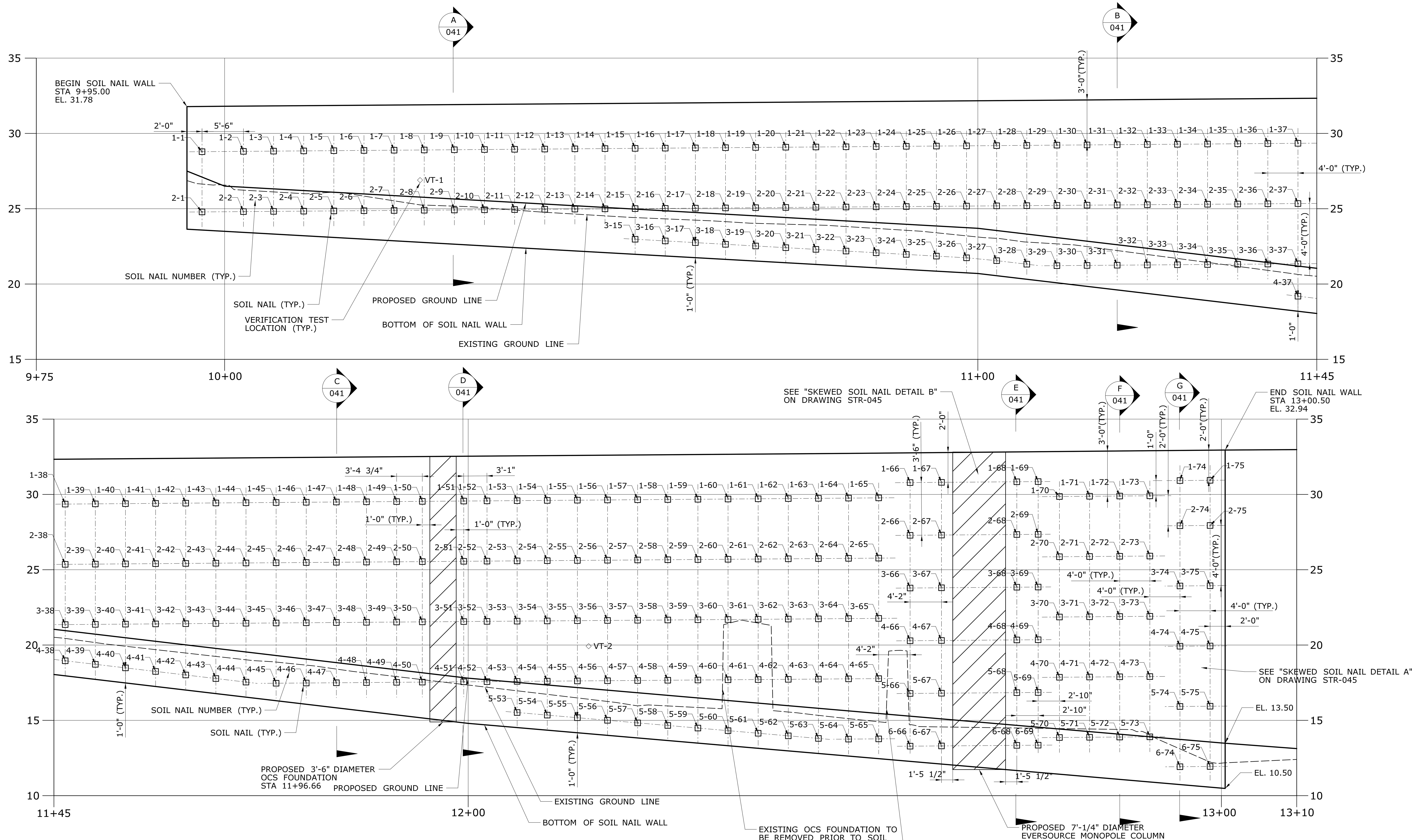
SIGNATURE/BLOCK:

PROJECT TITLE:
**BRIDGE NO. 04131R REPLACEMENT**
**METRO-NORTH RAILROAD MP 41.79**
**OVER FORT POINT STREET**

TOWN: **NORWALK**

DRAWING TITLE:
**PREFABRICATED MODULAR WALL DETAILS 1**

PROJECT NO. **0301-0189**
DRAWING NO. **STR-039**
SHEET NO.




## ELEVATION

VERTICAL SCALE: $\frac{5}{16}$" = 1'-0"
HORIZONTAL SCALE: $\frac{5}{32}$" = 1'-0"

NOTE: EXISTING OCS STRUCTURE AND EVERSOURCE MONOPOLE SHALL BE REMOVED AND PROPOSED STRUCTURES SHALL BE CONSTRUCTED BY OTHERS PRIOR TO CONSTRUCITON OF SOIL NAIL WALL.

11/09/2020

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

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Plotted Date: 10/23/2020

DESIGNER/DRAFTER: J. SONG
CHECKED BY: B. SUH
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-040_SB_Sheet_0301-189.dgn

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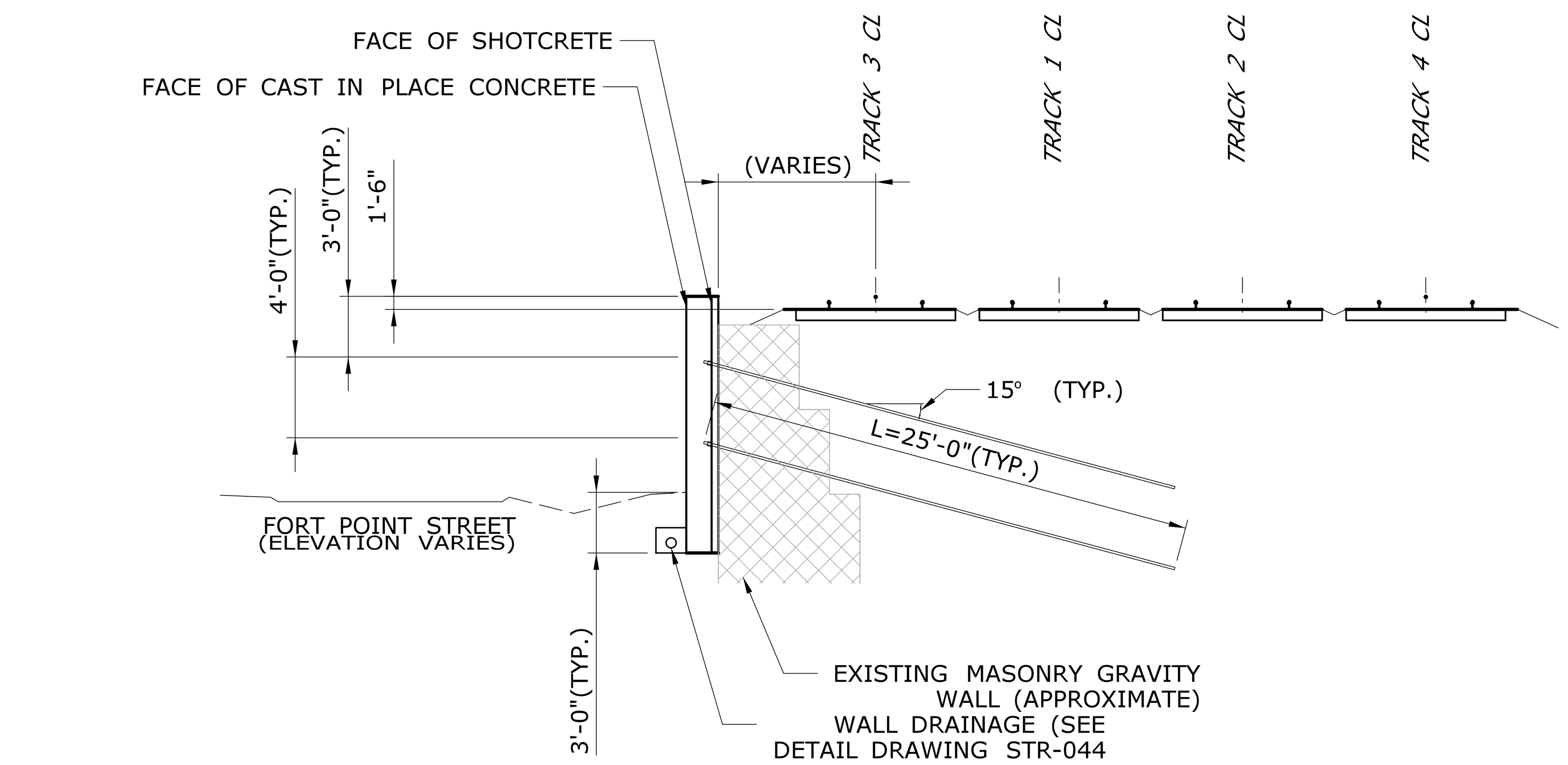
BRIDGE NO. 04131R REPLACEMENT
METRO-NORTH RAILROAD MP 41.79
OVER FORT POINT STREET

TOWN: NORWALK

DRAWING TITLE:
WALL 310 ELEVATION
SOIL NAIL LAYOUT

PROJECT NO. 0301-0189
DRAWING NO. STR-040
SHEET NO.

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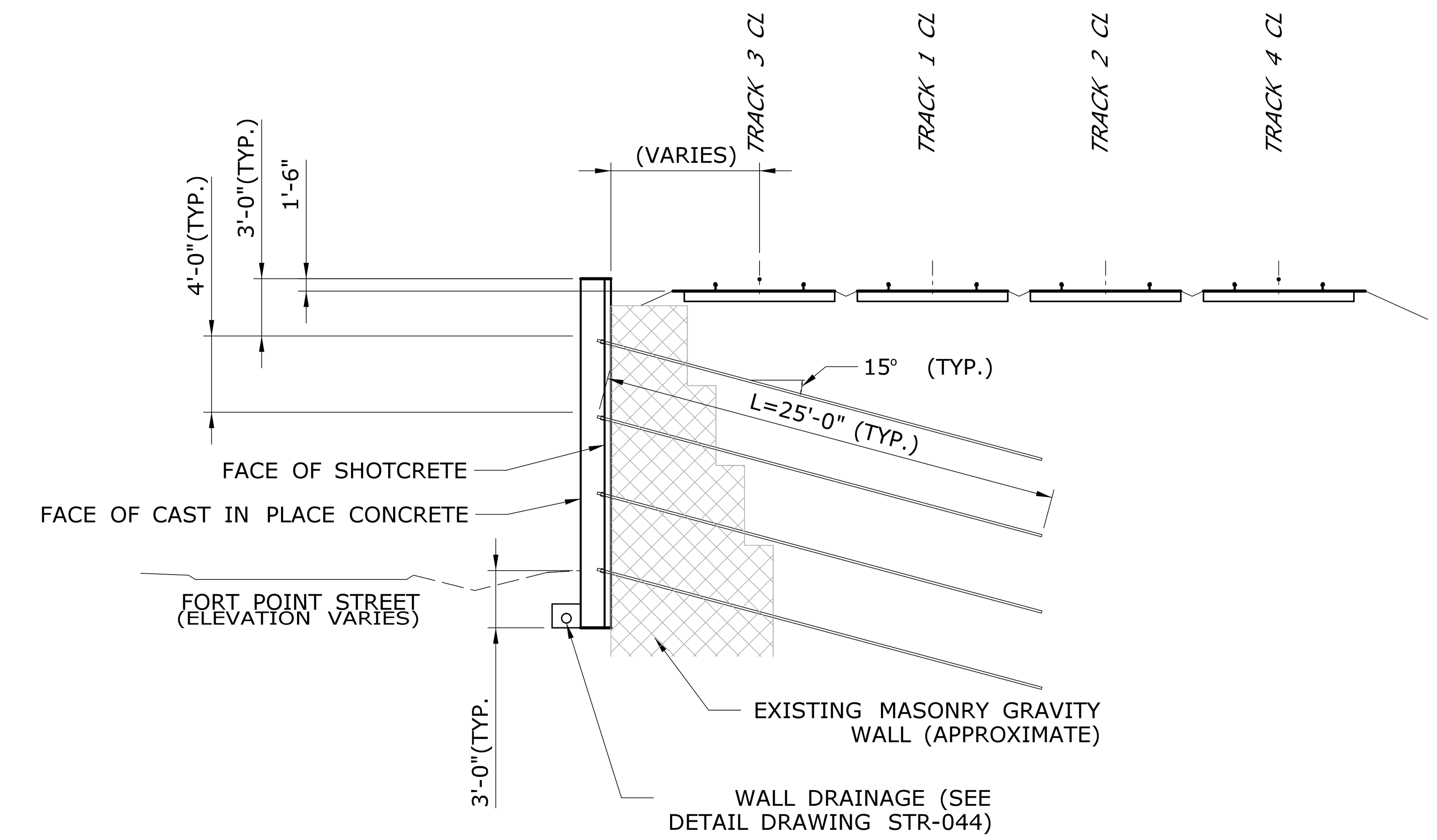


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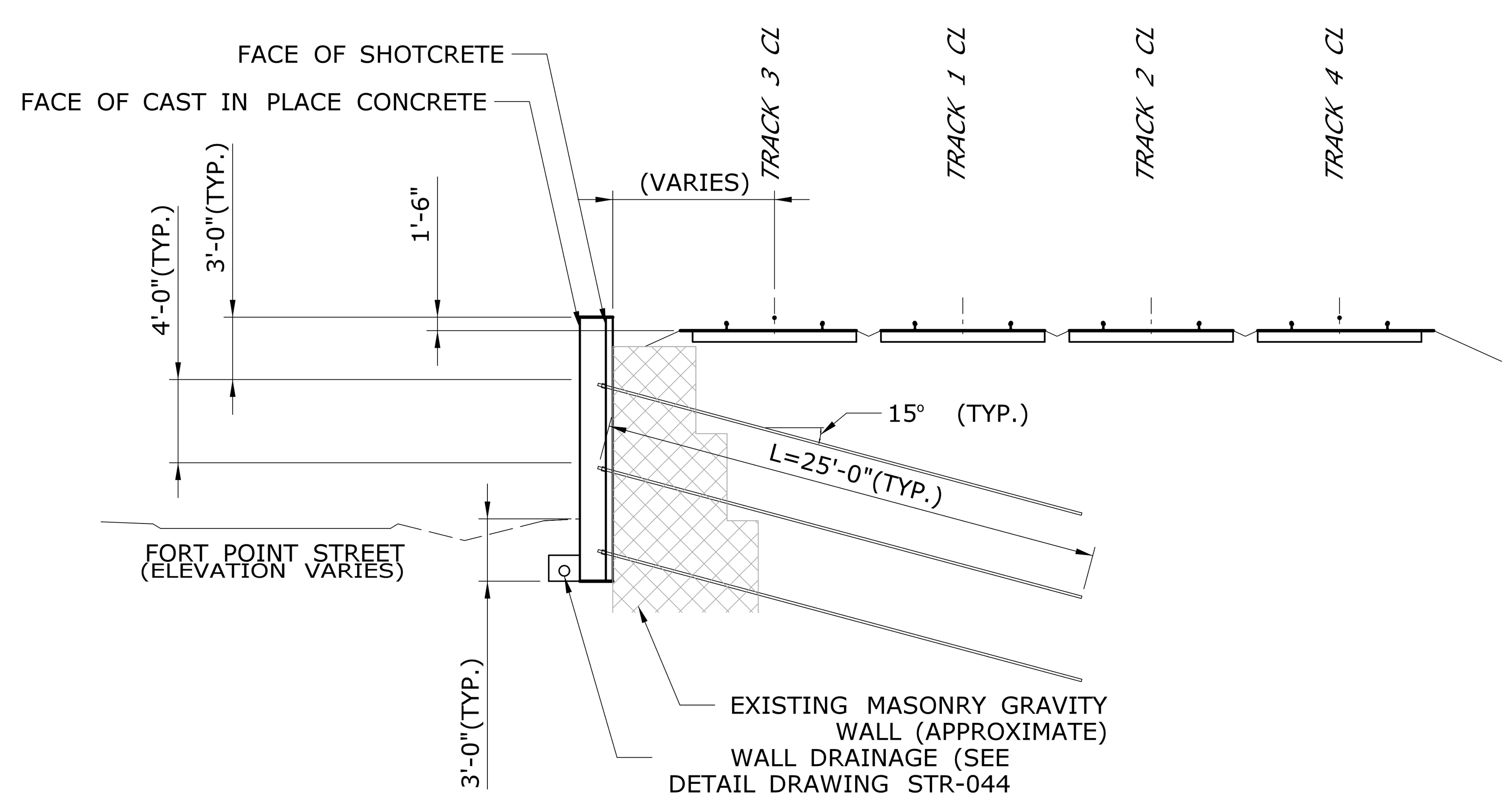


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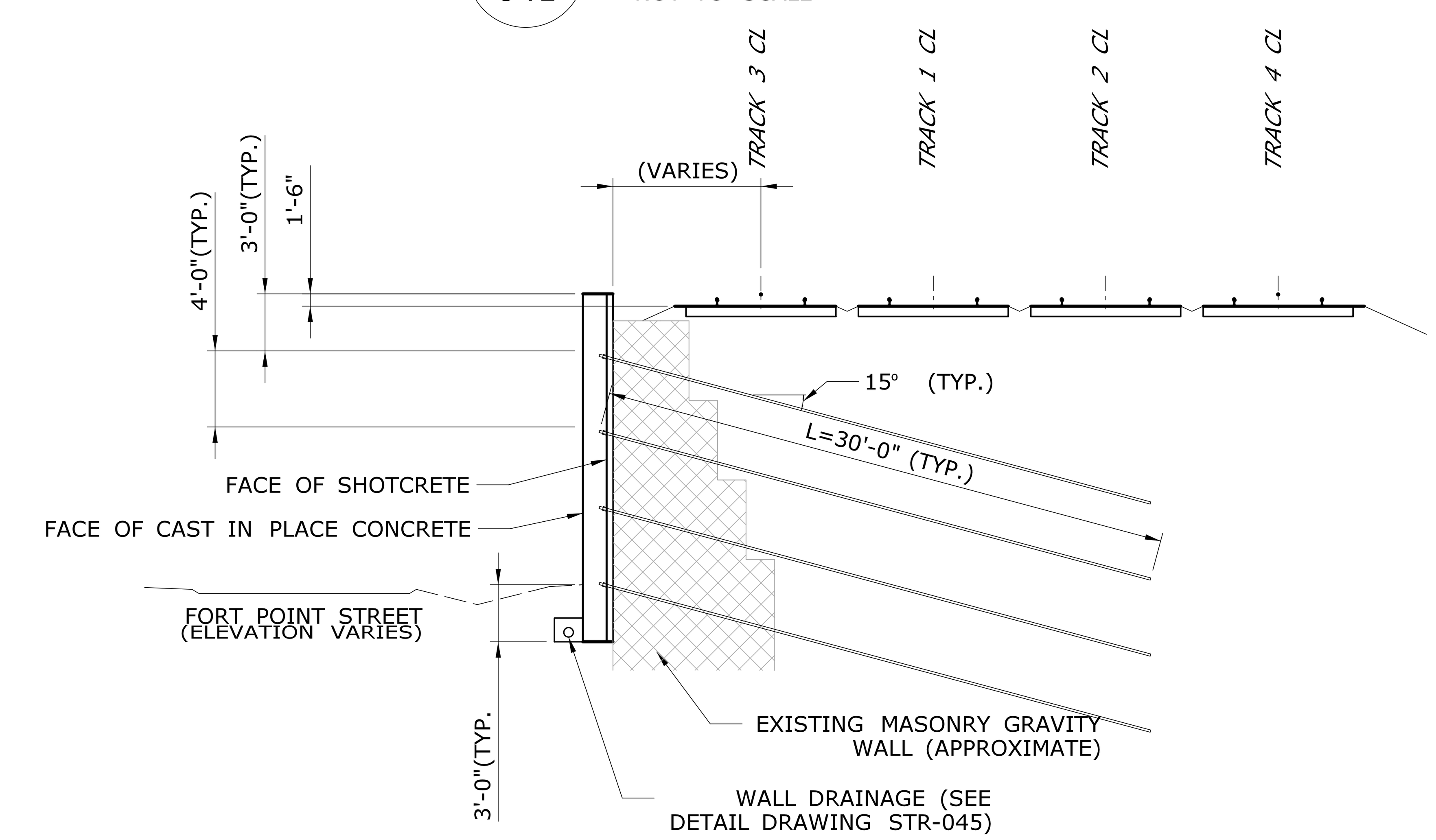


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041
**SECTION**
NOT TO SCALE
(COLUMN 50 AND 51 ONLY)

11/09/2020

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
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THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: B. SUH
CHECKED BY: B. SUH
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-042_SB_Sheet_0301-0189

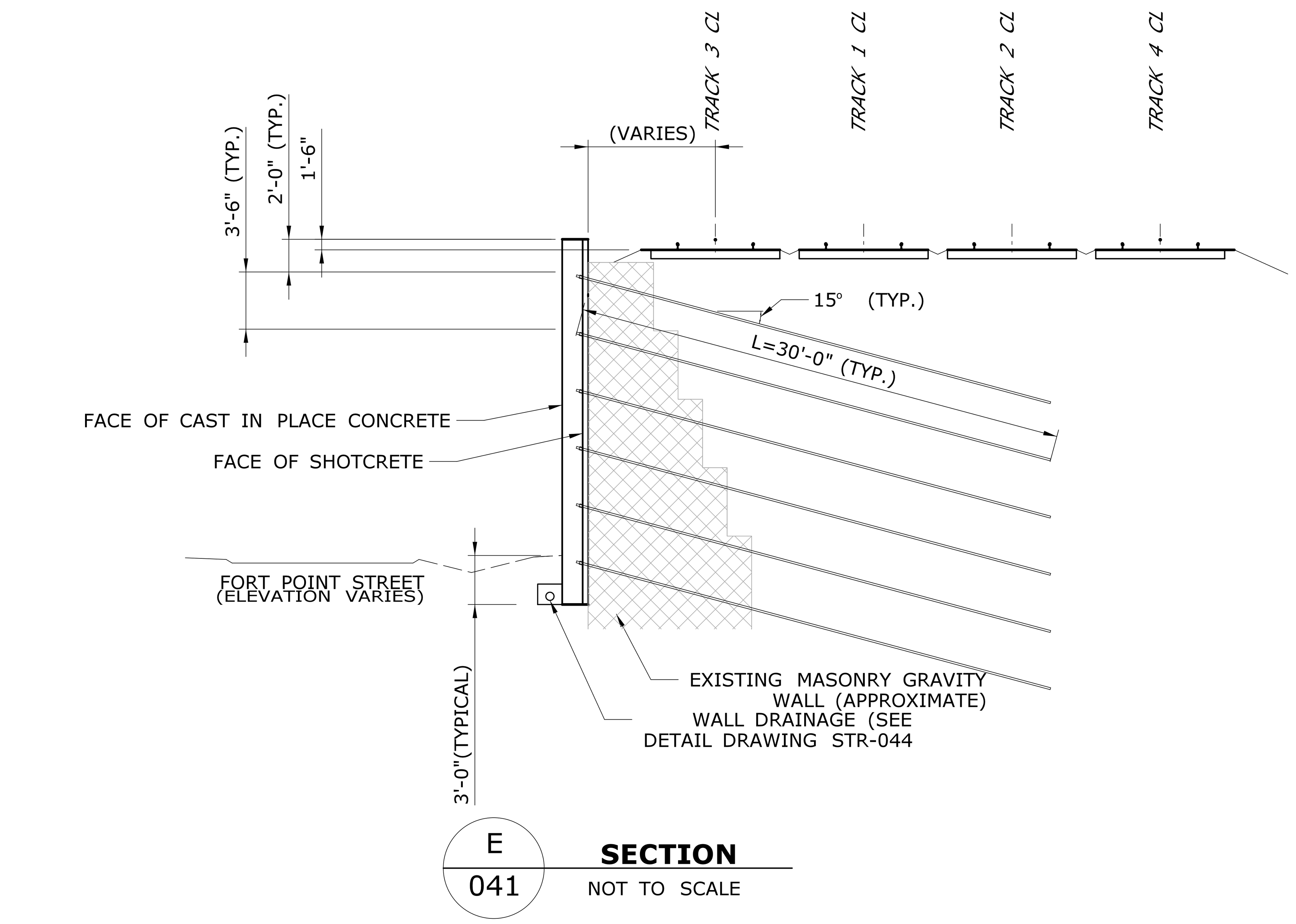
SIGNATURE/BLOCK:

PROJECT TITLE:
**BRIDGE NO. 04131R REPLACEMENT METRO-NORTH RAILROAD MP 41.79 OVER FORT POINT STREET**

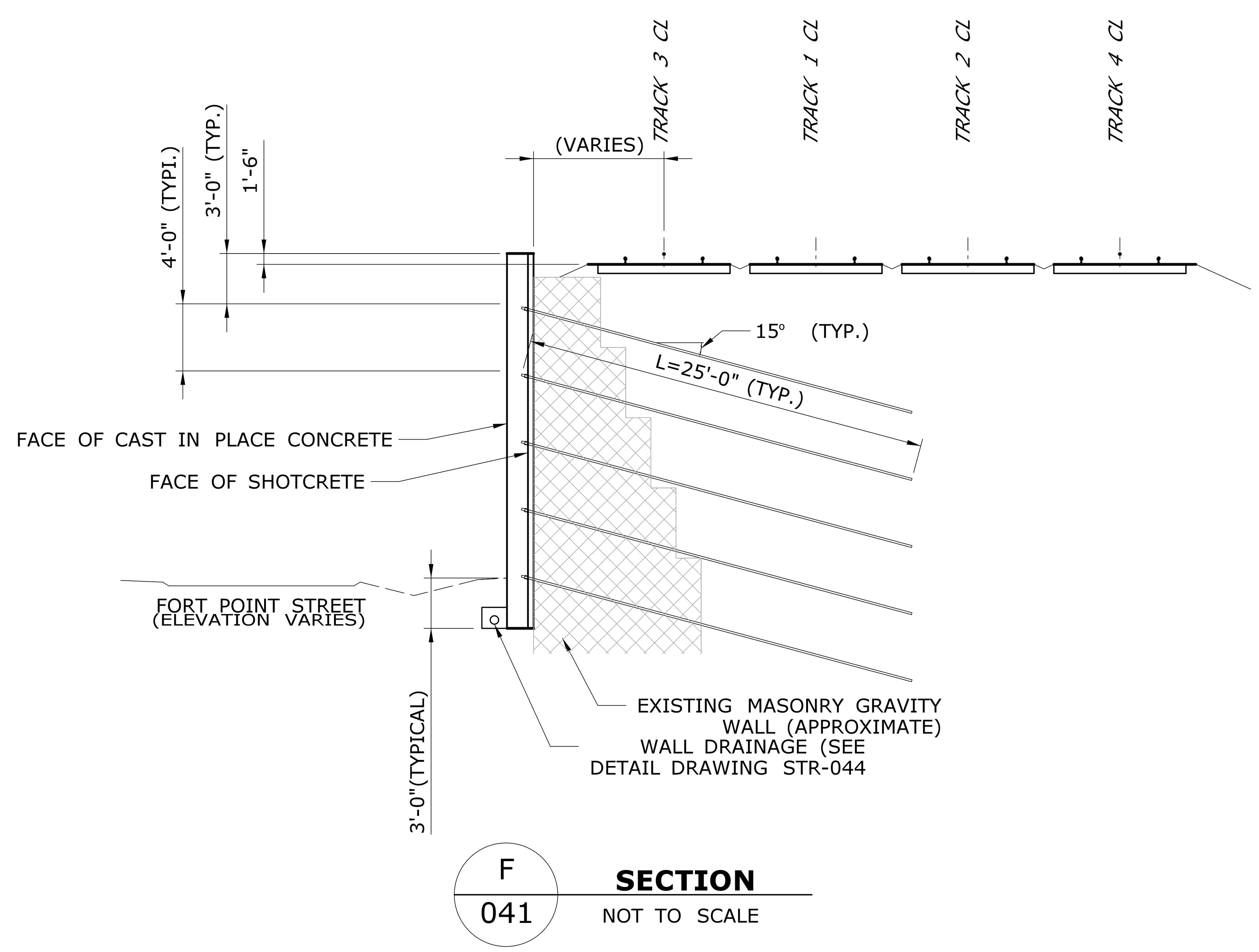
TOWN: **NORWALK**

DRAWING TITLE: **WALL 310 DETAILS**

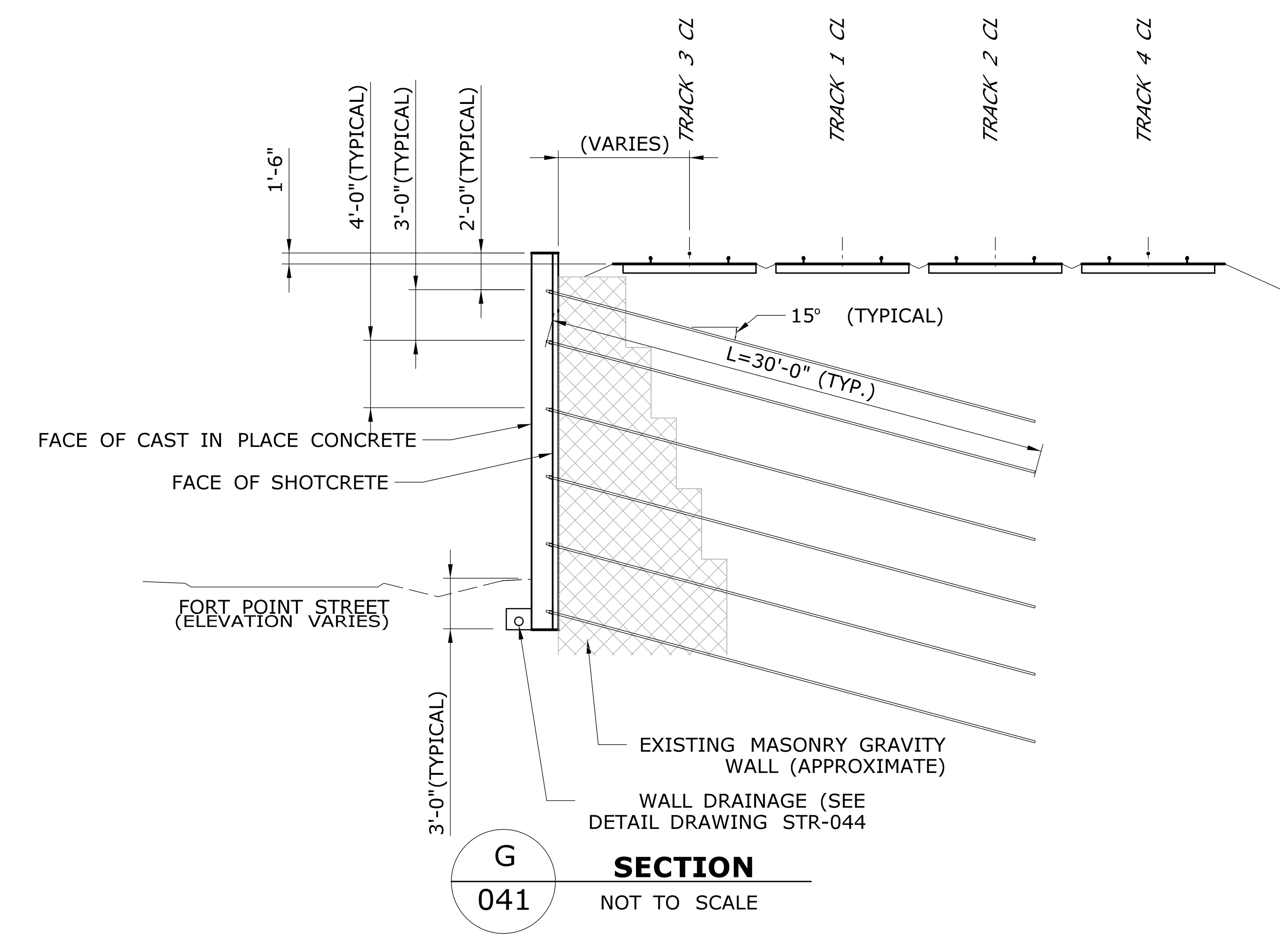
PROJECT NO. **0301-0189**
DRAWING NO. **STR-041**
SHEET NO.




**SECTION**
NOT TO SCALE




**SECTION**
NOT TO SCALE




**SECTION**
NOT TO SCALE

11/09/2020

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: B. SUH
CHECKED BY: B. SUH
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-043_SB_Sheet_0301-0189

SIGNATURE/ BLOCK:

PROJECT TITLE:
BRIDGE NO. 04131R REPLACEMENT
METRO-NORTH RAILROAD MP 41.79
OVER FORT POINT STREET

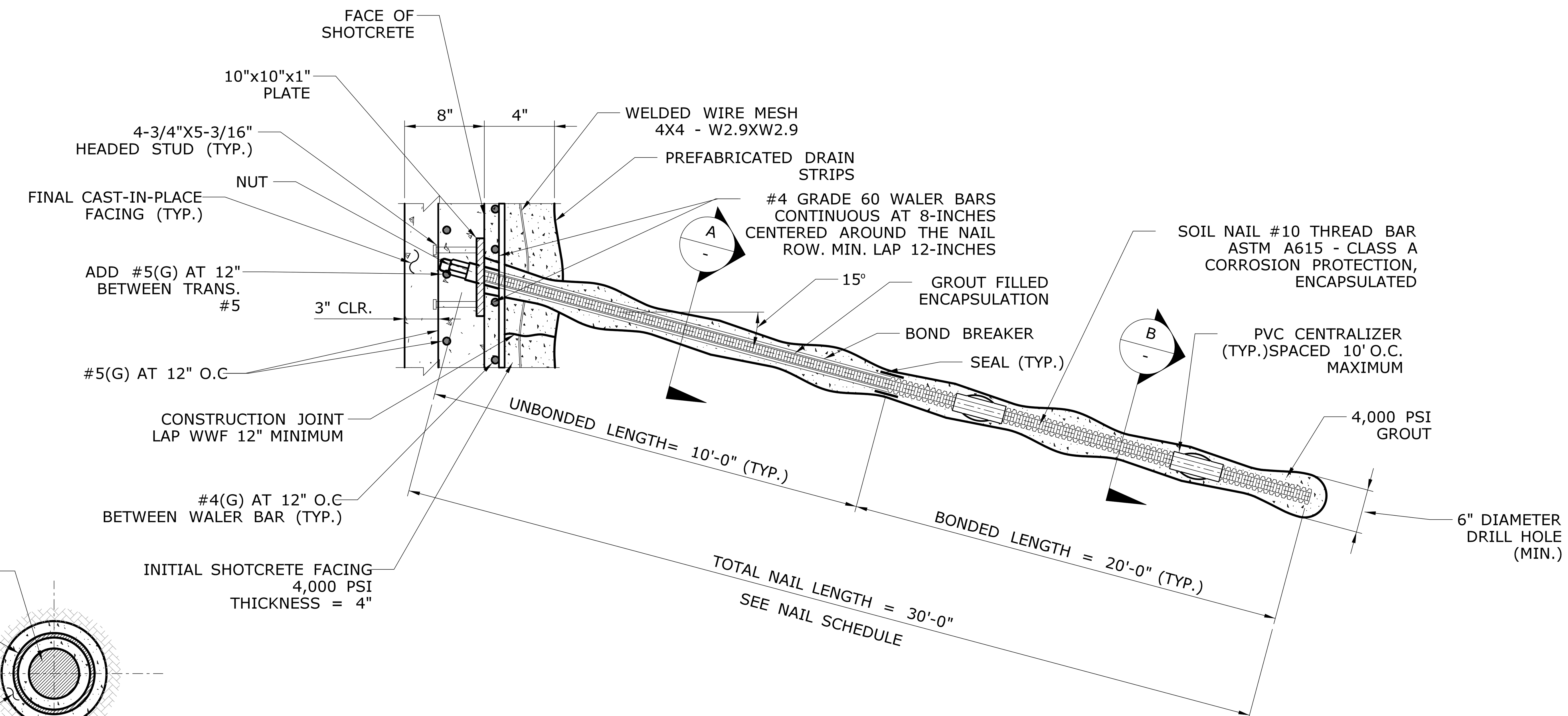
TOWN: NORWALK

DRAWING TITLE: WALL 310 DETAILS

PROJECT NO. 0301-0189
DRAWING NO. STR-042
SHEET NO.

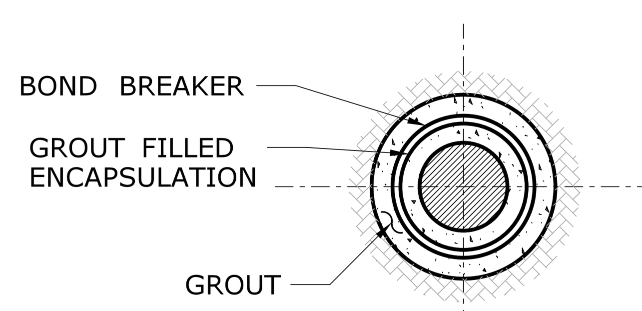
## SOIL NAIL WALL NOTES:

1. SOIL NAIL WALL TO BE INSTALLED IN ACCORDANCE WITH THE SOIL NAIL WALL SPECIAL PROVISION.
2. THE HOLE THROUGH THE EXISTING MASONRY WALL FOR THE NAIL AND WEEP HOLES SHALL BE ADVANCED BY CORING.
3. VERIFICATION LOAD TEST AND PROOF LOAD TEST TO BE PERFORMED IN ACCORDANCE WITH THE SOIL NAIL WALL SPECIAL PROVISION. MINIMUM REQUIRED BOND STRESS 3.2 KSF.
4. AFTER INSTALLATION OF ALL SOIL NAILS AND COMPLETION AND ACCEPTANCE OF PROOF LOAD TESTS, LOCK OFF ALL PRODUCTION NAILS AT THE LOCK OFF LOAD INDICATED IN THE NAIL SCHEDULE.
5. SOIL NAIL THREADED BAR SHALL BE ASTM A615 GRADE 75 BAR - CLASS A CORROSION PROTECTION, ENCAPSULATED. SEE SOIL NAIL SCHEDULE FOR SIZE.
6. BEARING PLATE SHALL CONFORM TO ASTM A36 OR ASTM 420 GRADE 36.
7. HEADED STUDS SHALL CONFORM TO ASTM A1044 GRADE 60.

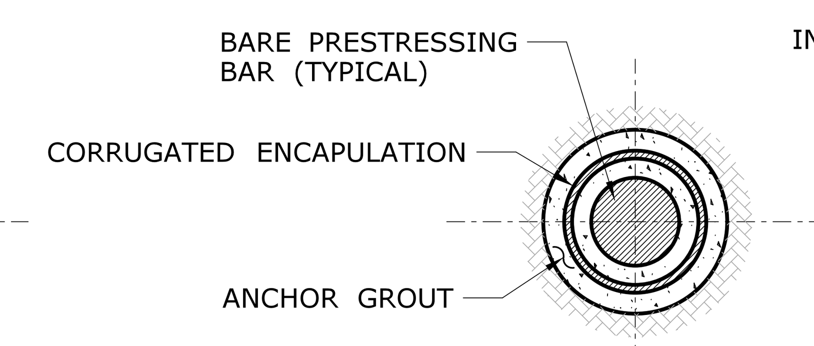



## ACTIVE SOIL NAILS DETAIL AT EVERSOURCE STRUCTURE

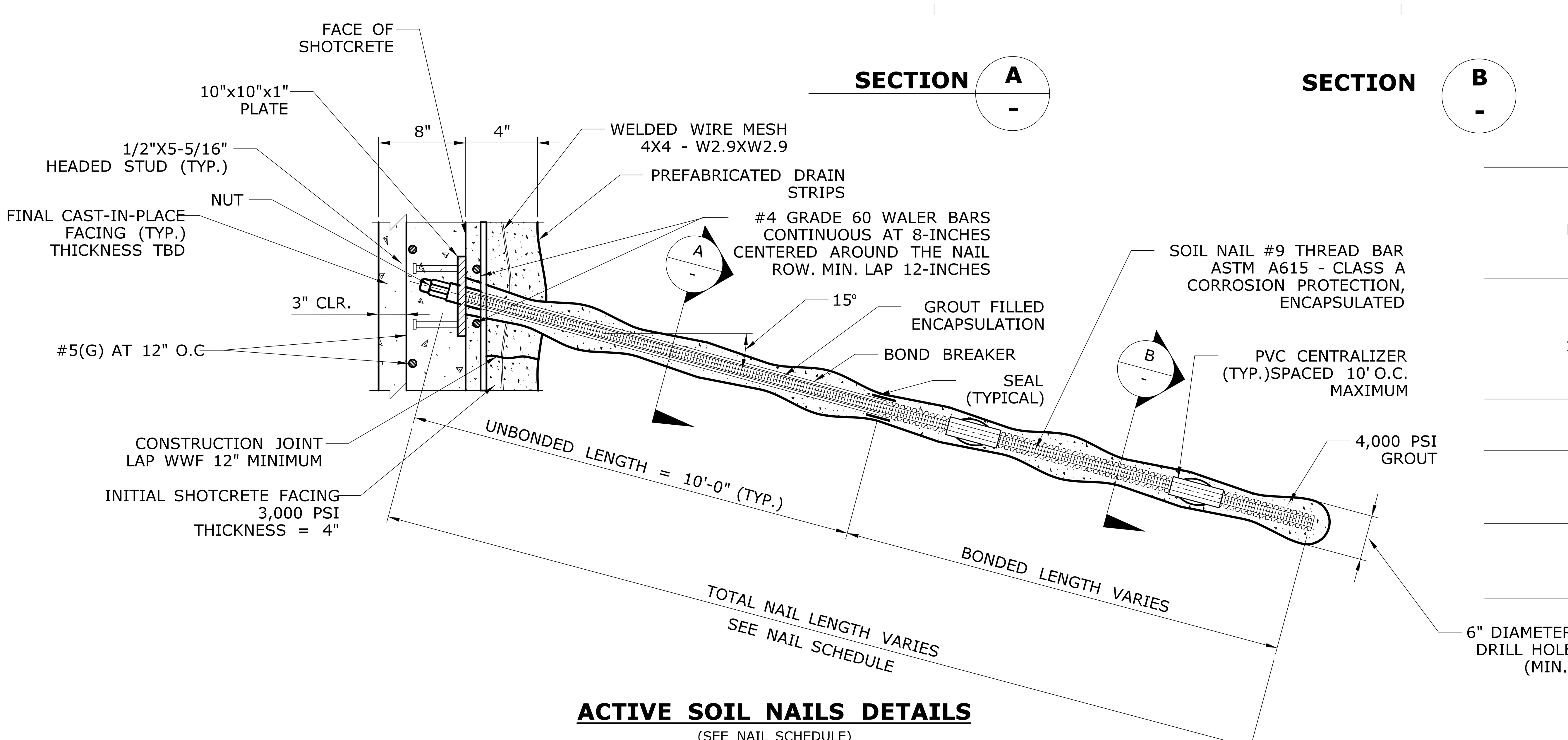
(SEE NAIL SCHEDULE)
NOT TO SCALE




**SECTION A -**




**SECTION B -**




## ACTIVE SOIL NAILS DETAILS

(SEE NAIL SCHEDULE)
NOT TO SCALE

| NAIL COLUMN | BAR SIZE | INCLINATION FROM HORIZONTAL (DEGREES) | HORIZONTAL SKEW ANGLE FROM PERPENDICULAR TO WALL (DEGREES) | UNBONDED LENGTH (FT) | BONDED LENGTH (FT) | SOIL NAIL LENGTH (FT) | DESIGN LOAD (KIPS) | ULTIMATE LOAD (KIPS) | LOCK OFF LOAD (KIPS) |
|---|---|---|---|---|---|---|---|---|---|
| 1-49, 52-65, 70-73 | #9 | 15 | 0 | 10 | 15 | 25 | 37 | 74 | 16 |
| 50-51 | #9 | 15 | 0 | 10 | 20 | 30 | 37 | 74 | 16 |
| 66-69 | #10 | 15 | 5 | 10 | 20 | 30 | 43 | 86 | 24 |
| 74-75 | #9 | 15 | 62.5 | 10 | 20 | 30 | 37 | 74 | 16 |

## NAIL SCHEDULE

(SEE SKEWED NAILED DETAILS ON STR-045 FOR SKEW ORIENTATOIN)

11/09/2020

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: B. SUH
CHECKED BY: B. SUH
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-044_SB_Sheet_0301-0189

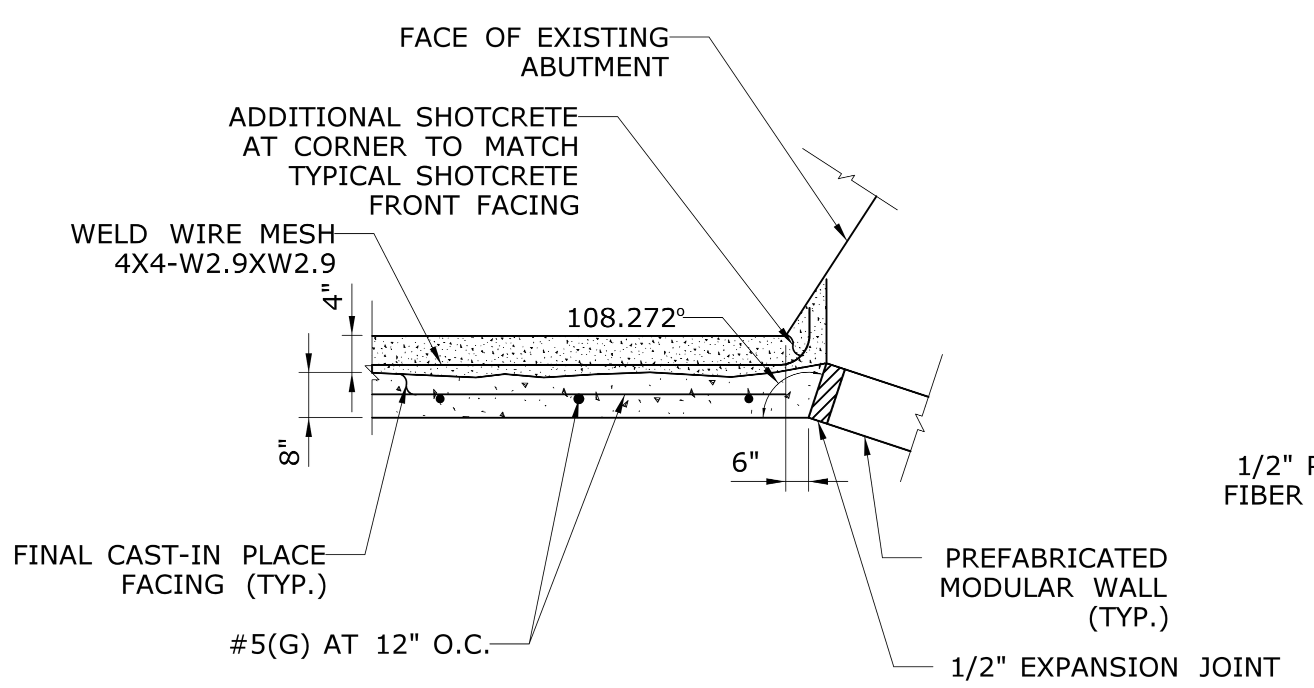
SIGNATURE/BLOCK:

PROJECT TITLE:
BRIDGE NO. 04131R REPLACEMENT
METRO-NORTH RAILROAD MP 41.79
OVER FORT POINT STREET

TOWN: NORWALK

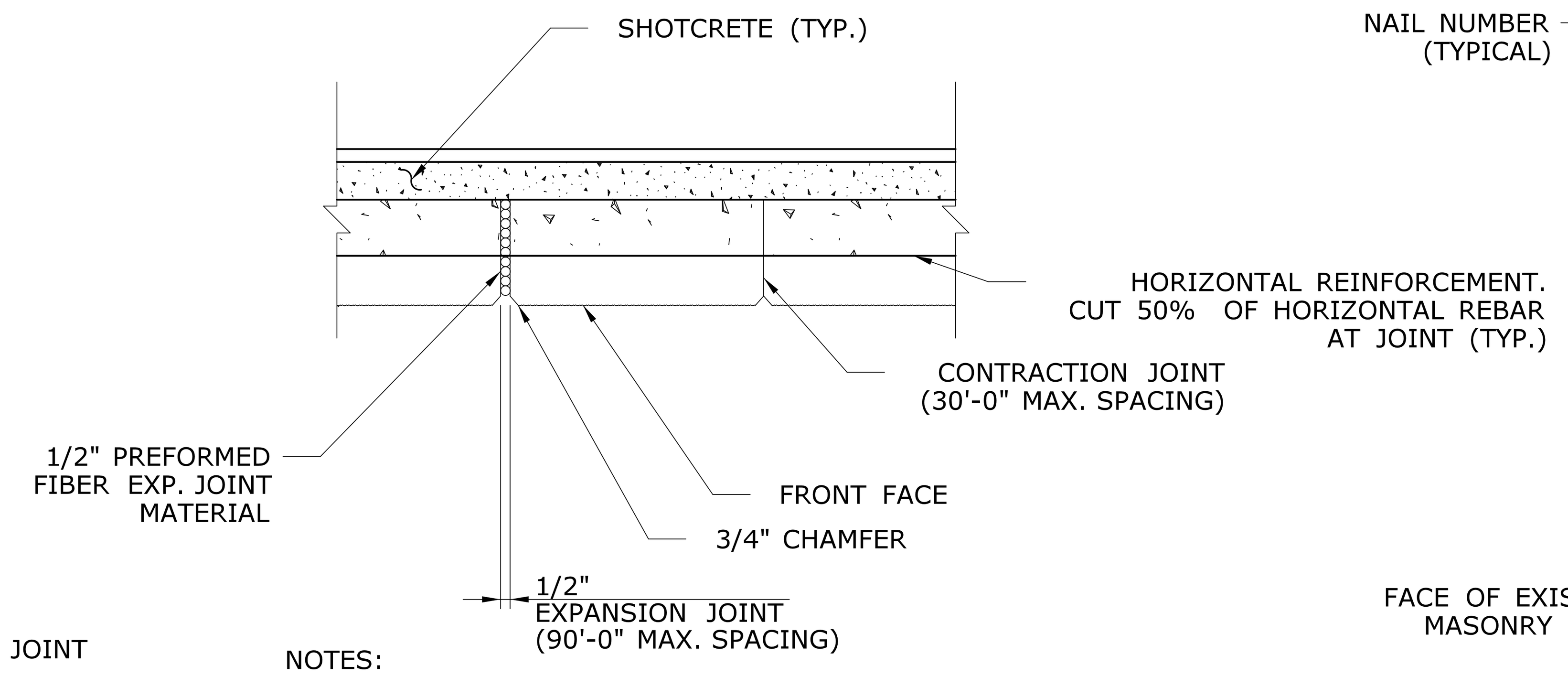
DRAWING TITLE: WALL 310 DETAILS

PROJECT NO. 0301-0189
DRAWING NO. STR-043
SHEET NO.




## CORNER DETAIL

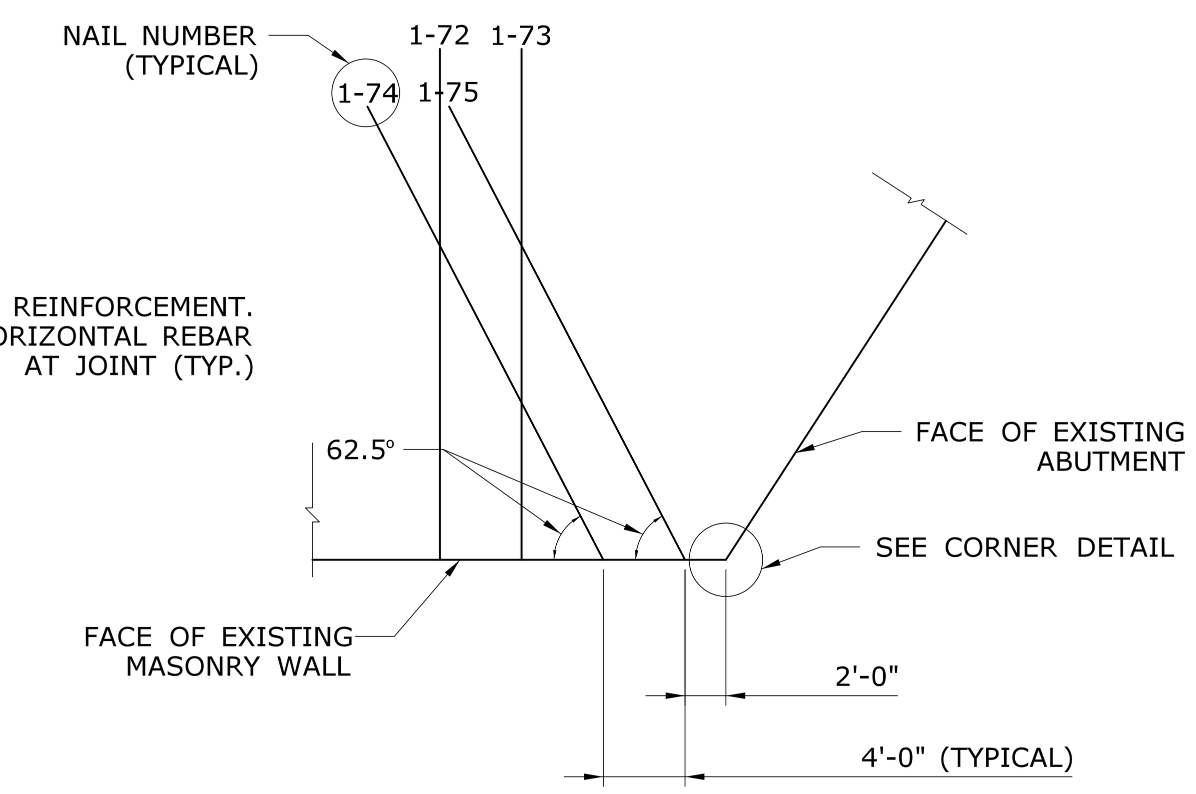
NOT TO SCALE




NOTES:
1. PLACE THE CONTROL JOINTS EVERY 30FT DISTANCE
2. LOCATE ALL JOINTS AT LEAST 18" AWAY FROM THE NAILS
3. ALL #4 BARS SHALL HAVE A MINIMUM LAP SPLICE OF 18"
4. MAINTAIN 1" CLEARANCE FROM THE ENDS OF THE LONGITUDINAL REINFORCEMENT TO EDGE OF EXPANSION JOINT.

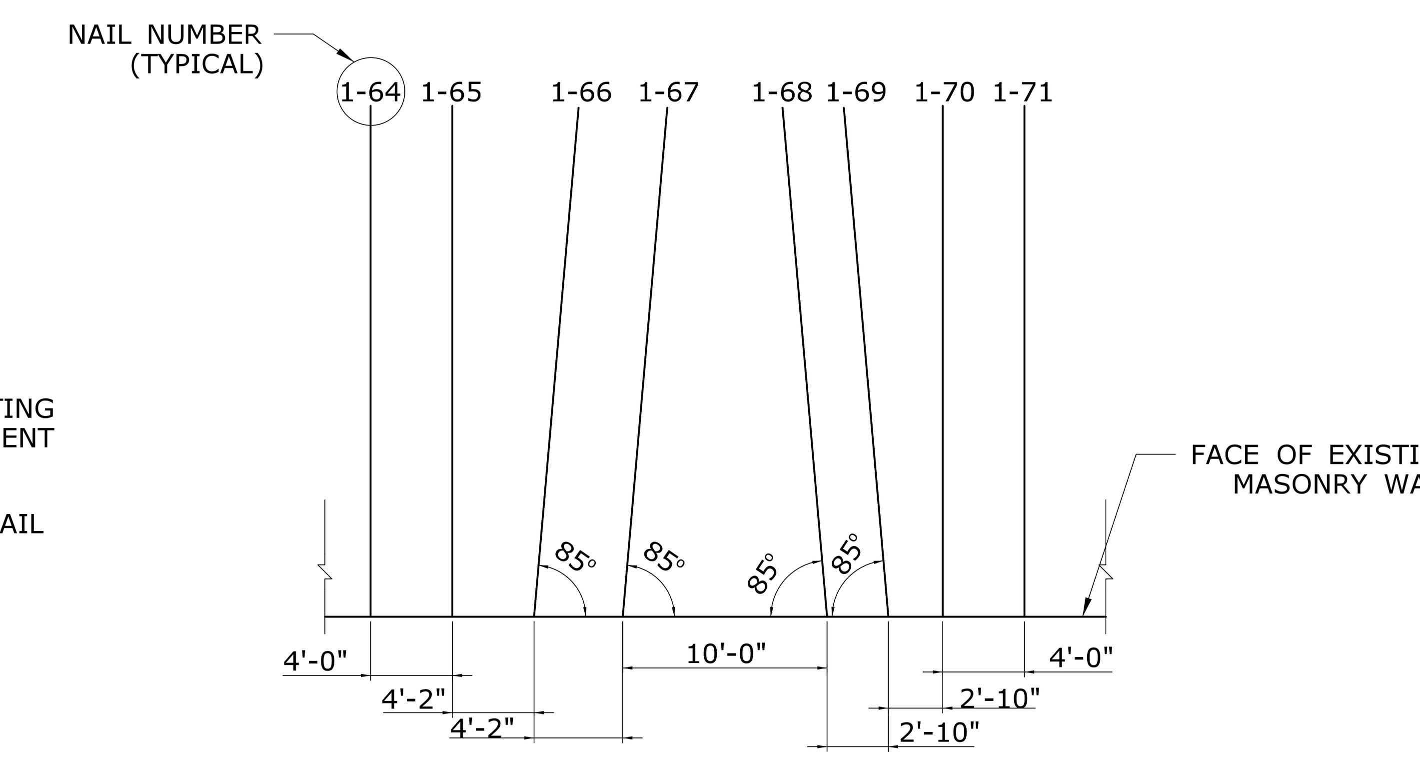
## PART PLAN SECTION THRU CONCRETE FACING (CIP WALL FACING)

NOT TO SCALE



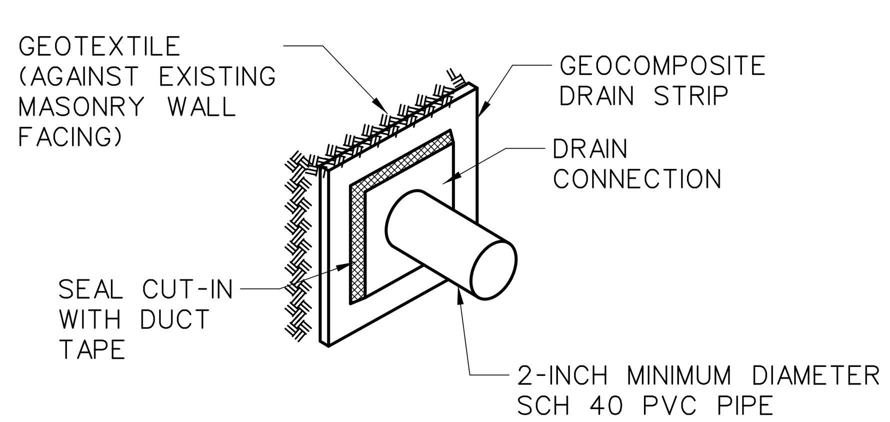

## SKEWED SOIL NAILS DETAIL A

NOT TO SCALE
(TYPICAL FOR ROWS BELOW)



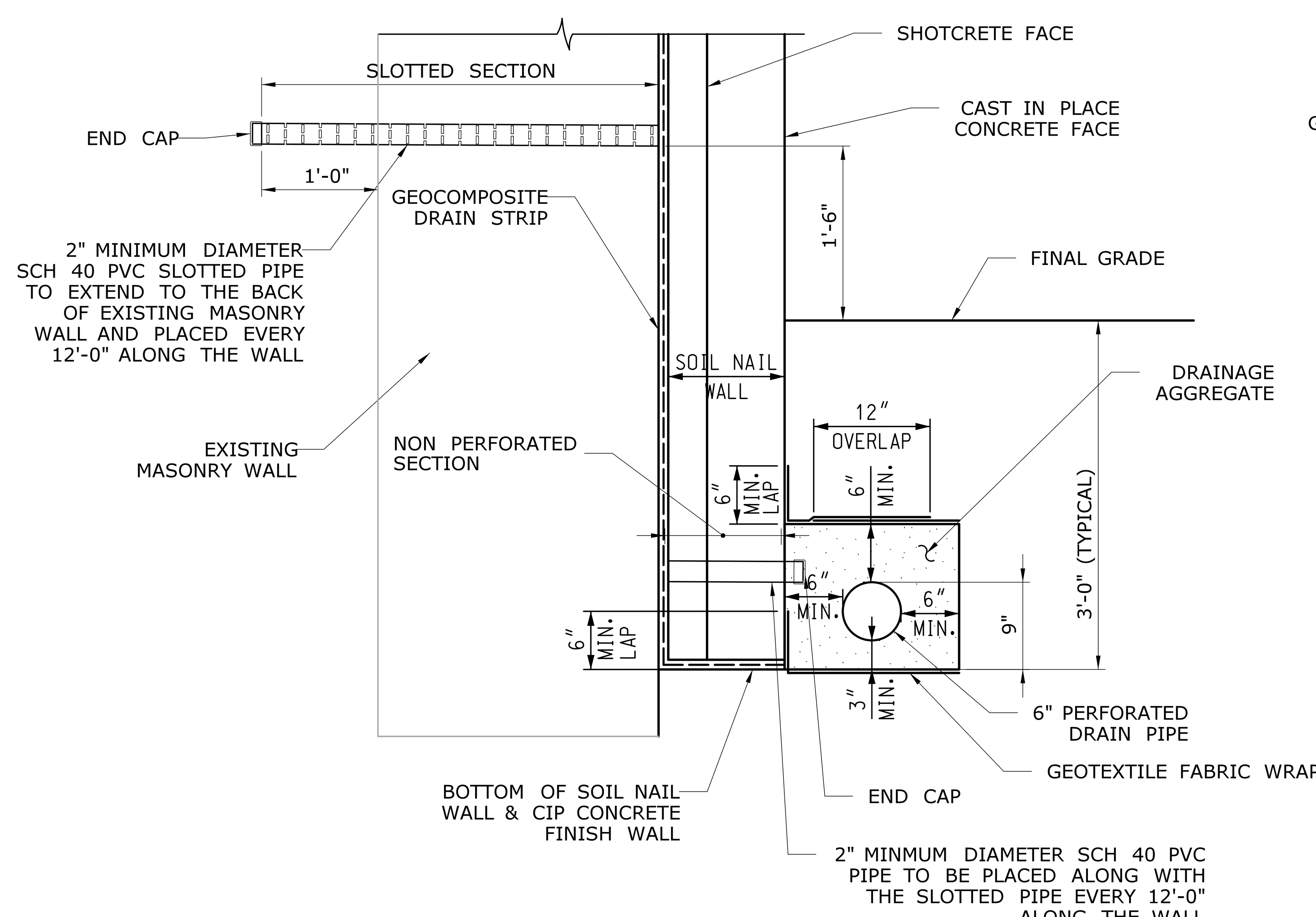

## SKEWED SOIL NAILS DETAIL B

NOT TO SCALE
(TYPICAL FOR ROWS BELOW)



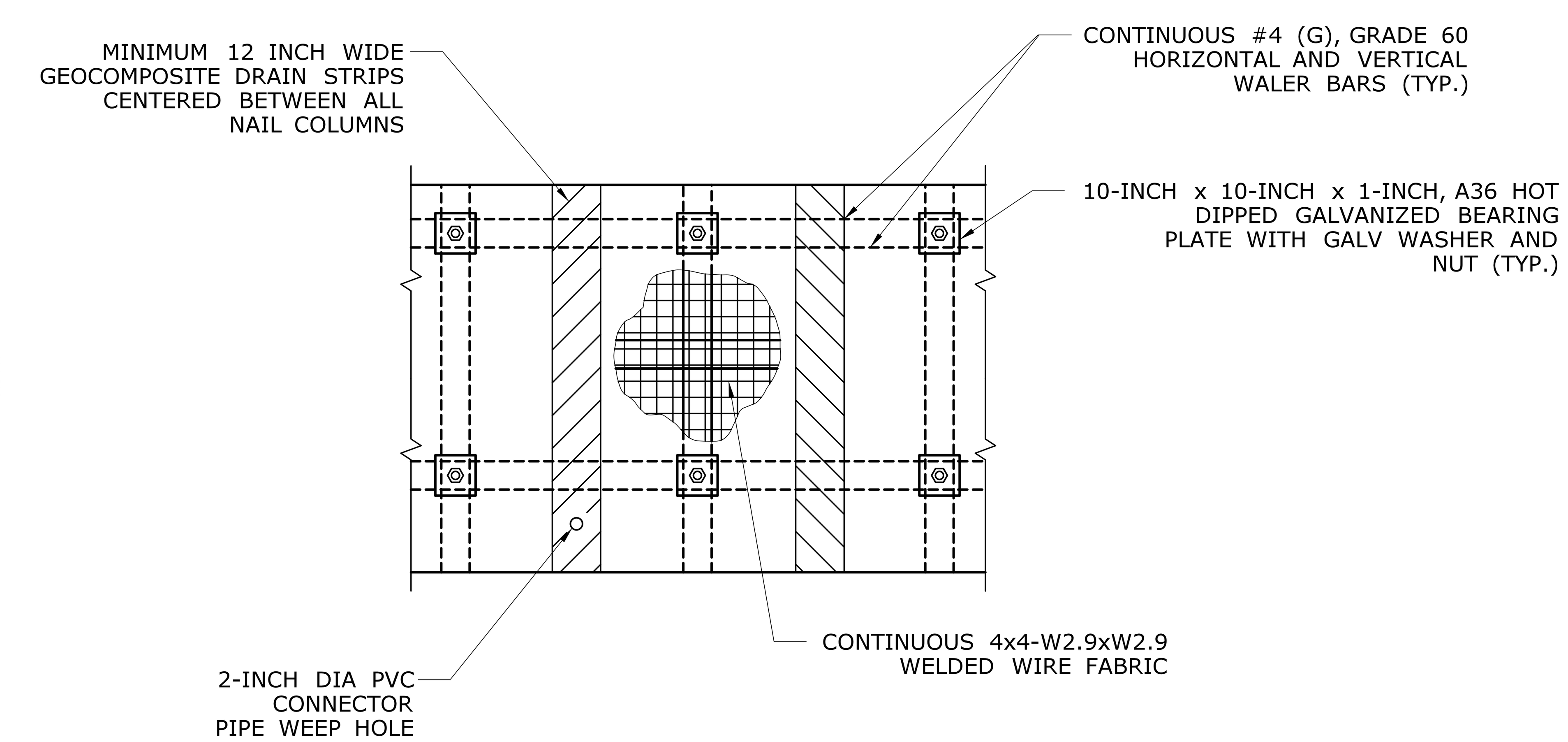

## OUTLET DETAIL

NOT TO SCALE




## WALL DRAINAGE DETAIL

NOT TO SCALE




## TEMPORARY FACING REINFORCEMENT AND DRAINAGE (TYP.)

NOT TO SCALE

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: B. SUH

CHECKED BY: B. SUH

SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-045_SB_Sheet_0301-0189

SIGNATURE/ BLOCK:

PROJECT TITLE:
BRIDGE NO. 04131R REPLACEMENT
METRO-NORTH RAILROAD MP 41.79
OVER FORT POINT STREET

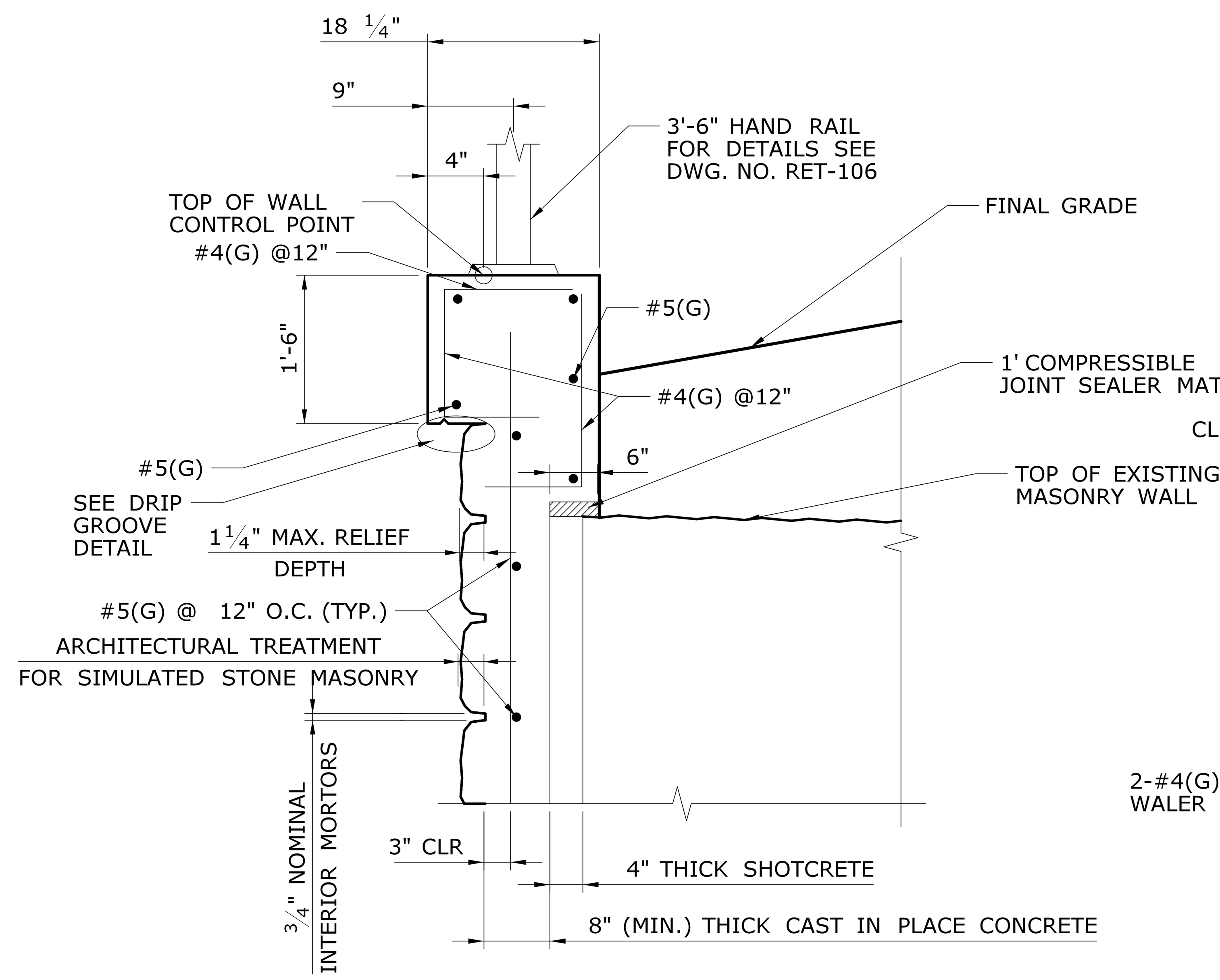
TOWN: NORWALK

DRAWING TITLE: WALL 310 DETAILS

PROJECT NO. 0301-0189

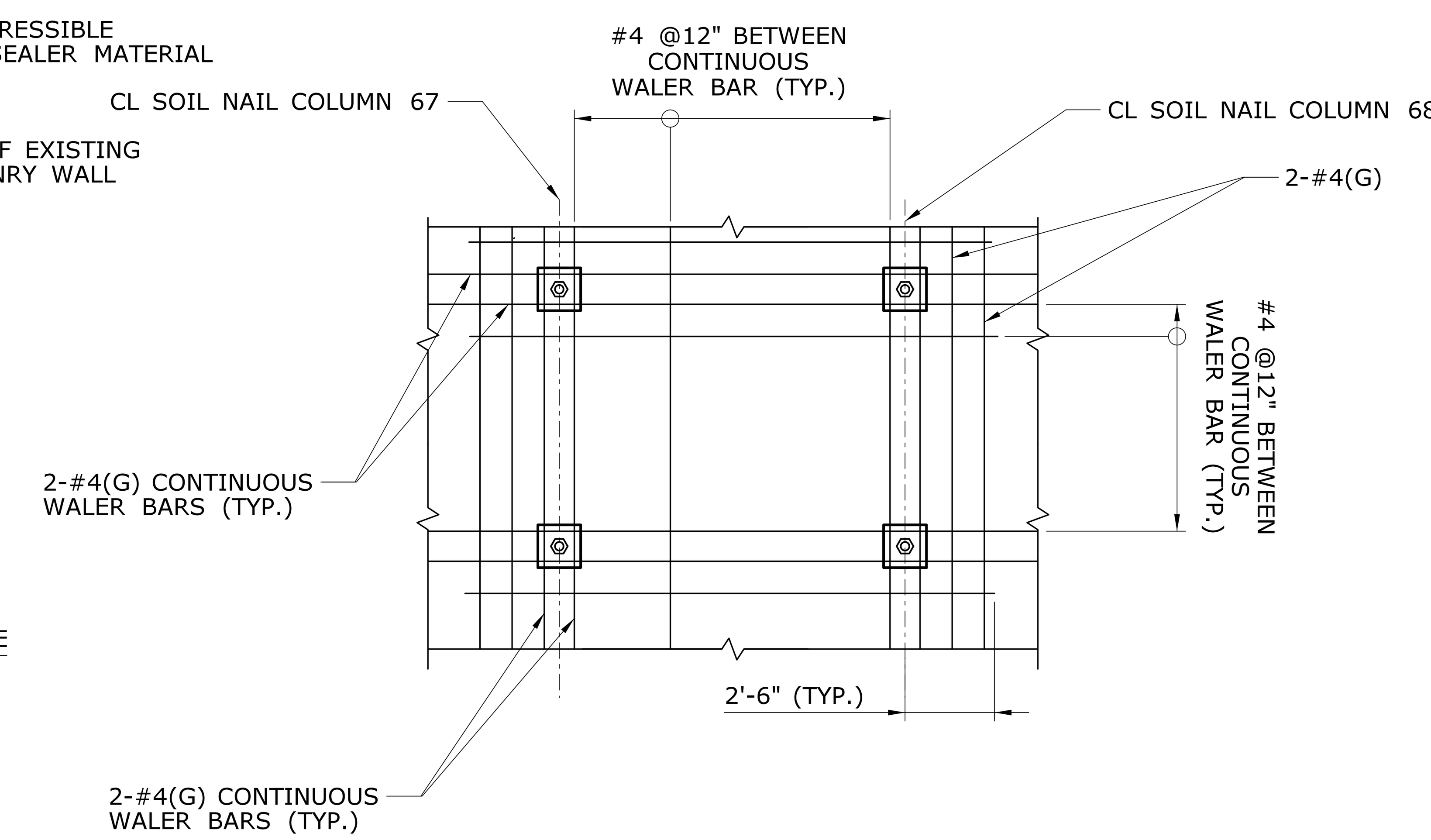
DRAWING NO. STR-044

SHEET NO.



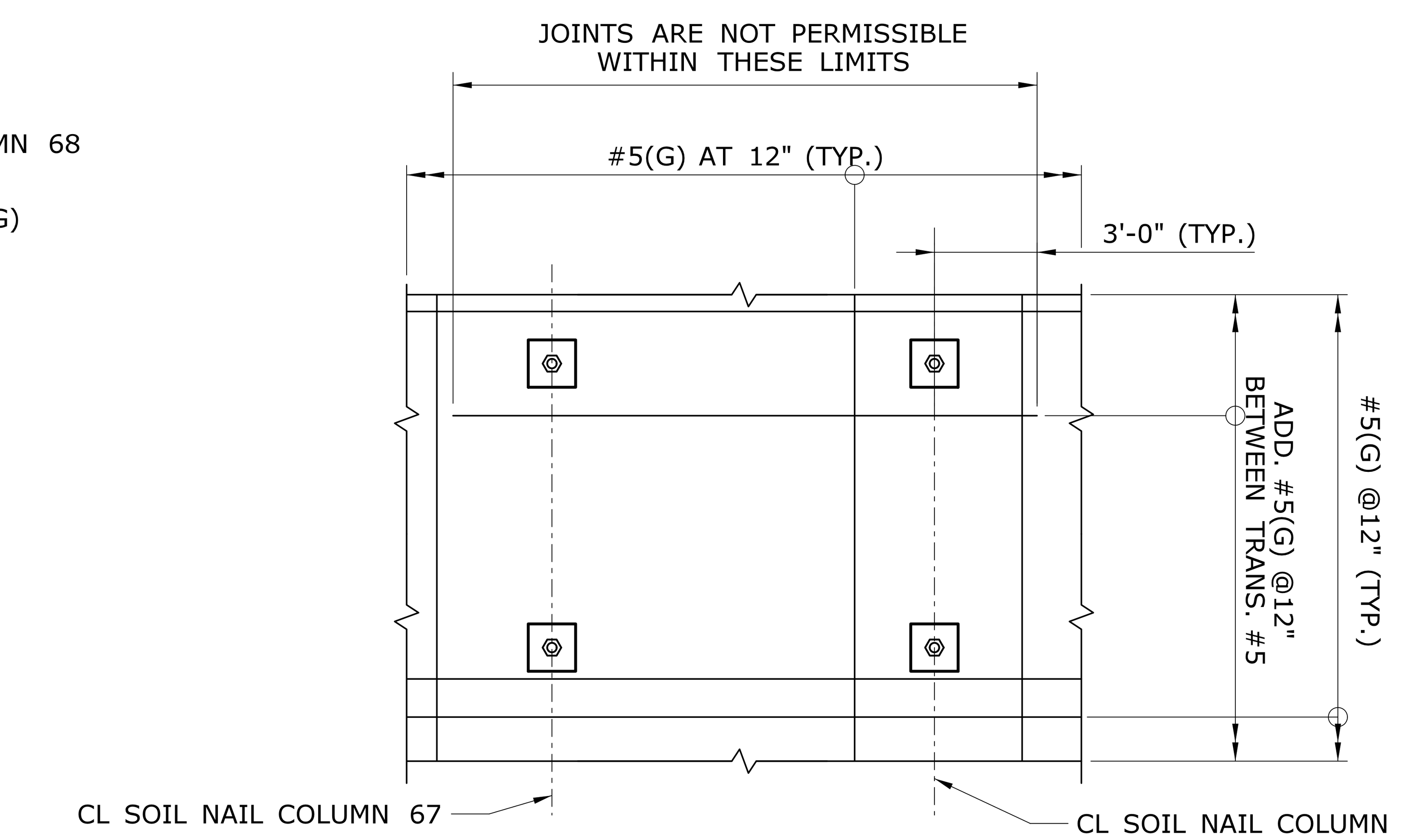

**ARCHITECTURAL TREATMENT DETAIL**

NOT TO SCALE
(ABUTMENT FACE SHOWN,
WINGWALLS SIMILAR)



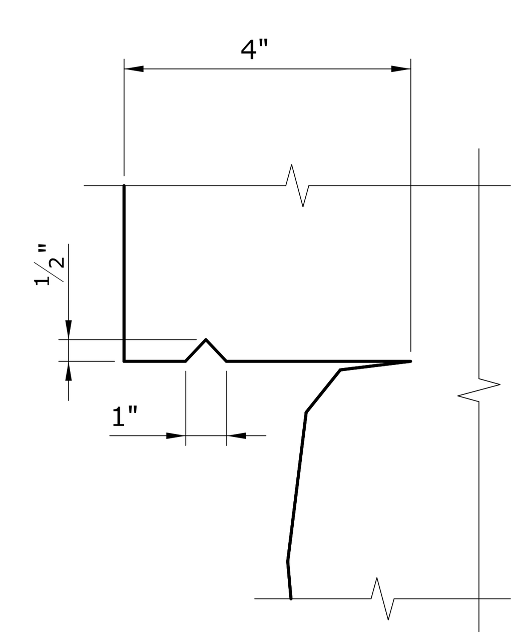

**TEMPORARY FACING REINFORCEMENT**
**AT EVERSOURCE STRUCTURE**
**STA 1571+19.49 TO 1571+26.51**

NOT TO SCALE



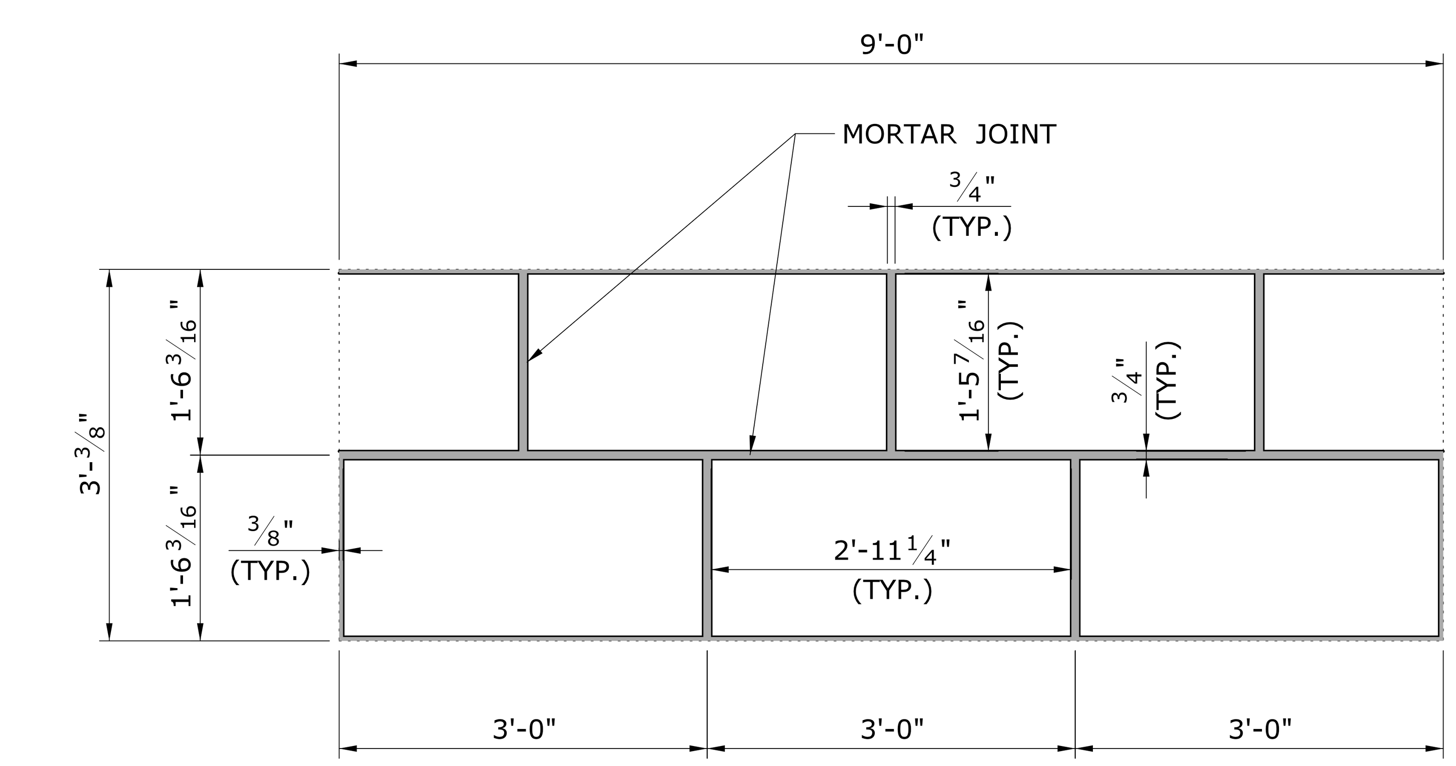

**C.I.P. FACING DETAILS**
**AT EVERSOURCE STRUCTURE**
**STA 1571+19.49 TO 1571+26.51**

NOT TO SCALE




**DRIP GROOVE DETAIL**

NOT TO SCALE




**FORMLINER DETAIL**

SCALE: 3/4" = 1'-0"

| REV. | DATE | REVISION DESCRIPTION | SHEET NO. |
|---|---|---|---|

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE CONDITIONS OF ACTUAL QUANTITIES OF WORK WHICH WILL BE REQUIRED.

Plotted Date: 10/23/2020

DESIGNER/DRAFTER: J. SONG
CHECKED BY: B. SUH
SCALE AS NOTED

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

Filename: ...\STR-046_SB_Sheet_0301-0189_WALL310

SIGNATURE/BLOCK:

PROJECT TITLE:
**BRIDGE NO. 04131R REPLACEMENT**
**METRO-NORTH RAILROAD MP 41.79**
**OVER FORT POINT STREET**

TOWN: **NORWALK**

DRAWING TITLE: **WALL 310 DETAILS**

PROJECT NO. **0301-0189**

DRAWING NO. **STR-045**

SHEET NO.

## Attachment D-4 - Supplemental Information, Marshall Street Pedestrian Improvements, 11/23/2020

**WALK BRIDGE REPLACEMENT PROJECT**
**NORWALK, CONNECTICUT**
**STATE PROJECT 301-176**

**SUPPLEMENTAL INFORMATION**
**MARSHALL STREET PEDESTRIAN DETOUR IMPROVEMENTS**

**Prepared for HNTB Corporation**
**Boston, Massachusetts**

**by**


**Archaeological and Historical Services, Inc.**
**Storrs, Connecticut**


**November 23, 2020**


**Author:**
**Marguerite Carnell**

**Introduction**

In order to provide safe pedestrian access during the Walk Bridge project construction, the sidewalk on the south side of Marshall Street will be upgraded to meet current Americans with Disabilities Act (ADA) standards. These improvements comprise new work that was not included in the previous design, but which will be part of the 100% project design. The proposed ADA improvements will be installed on Marshall Street between North Main and North Water streets, as labeled (1) through (7) on the attached annotated photographs.

This supplemental information augments a report prepared by Archaeological and Historical Consultants, Inc. (AHS), entitled *Historic Resources Evaluation Report, Walk Bridge Replacement Project,* Bruce Clouette, Marguerite Carnell Rodney, Stacey Vairo, August 2016.

**Historic Resources**

Properties along the west end of Marshall Street are included in the South Main and Washington Streets Historic District, which is listed in the National Register of Historic Places (NRHP). The Norwalk Lock Company Factory, on the south side of Marshall Street, was determined NRHP-eligible in 2000.

**Scope of Work**

During the Walk Bridge project construction, North Water Street will be closed to pedestrians for periods of time to ensure safety. CTDOT proposes improvements along the south side of Marshall Street to develop a pedestrian detour that is compliant with ADA requirements.

The proposed work includes the following elements:

- The sidewalk on the south side of Marshall Street will be made ADA accessible (1, 2, 3, and 4). A minimum 4-foot-wide sidewalk will be maintained for pedestrian use, if possible.
- If a 4-foot sidewalk cannot be maintained, the design will reduce roadway lanes to 11 feet, provide a temporary asphalt curb, provide a PVC pipe to maintain existing curb line drainage behind asphalt curb and existing granite stone curb, and provide signage for the pedestrian detour.
- Pole-mounted streetlights on the south side of Marshall Street (4 and 5) will be removed during construction and replaced in kind at the end of the project.
- Driveways on the south side of Marshall Street (2 and 3) will be reconstructed, including on the west side of the former Lock Company Factory (6), to meet ADA standards. Sidewalks crossing driveways will be concrete, including aprons between the roadway and sidewalk.
- Brick pavers at the Marshall Street/North Water Street intersection (7) will be removed and replaced with asphalt pavement during construction to prevent damage. When the project is complete, asphalt paving in crosswalks will be replaced with pavers. The rest of the intersection will remain asphalt.

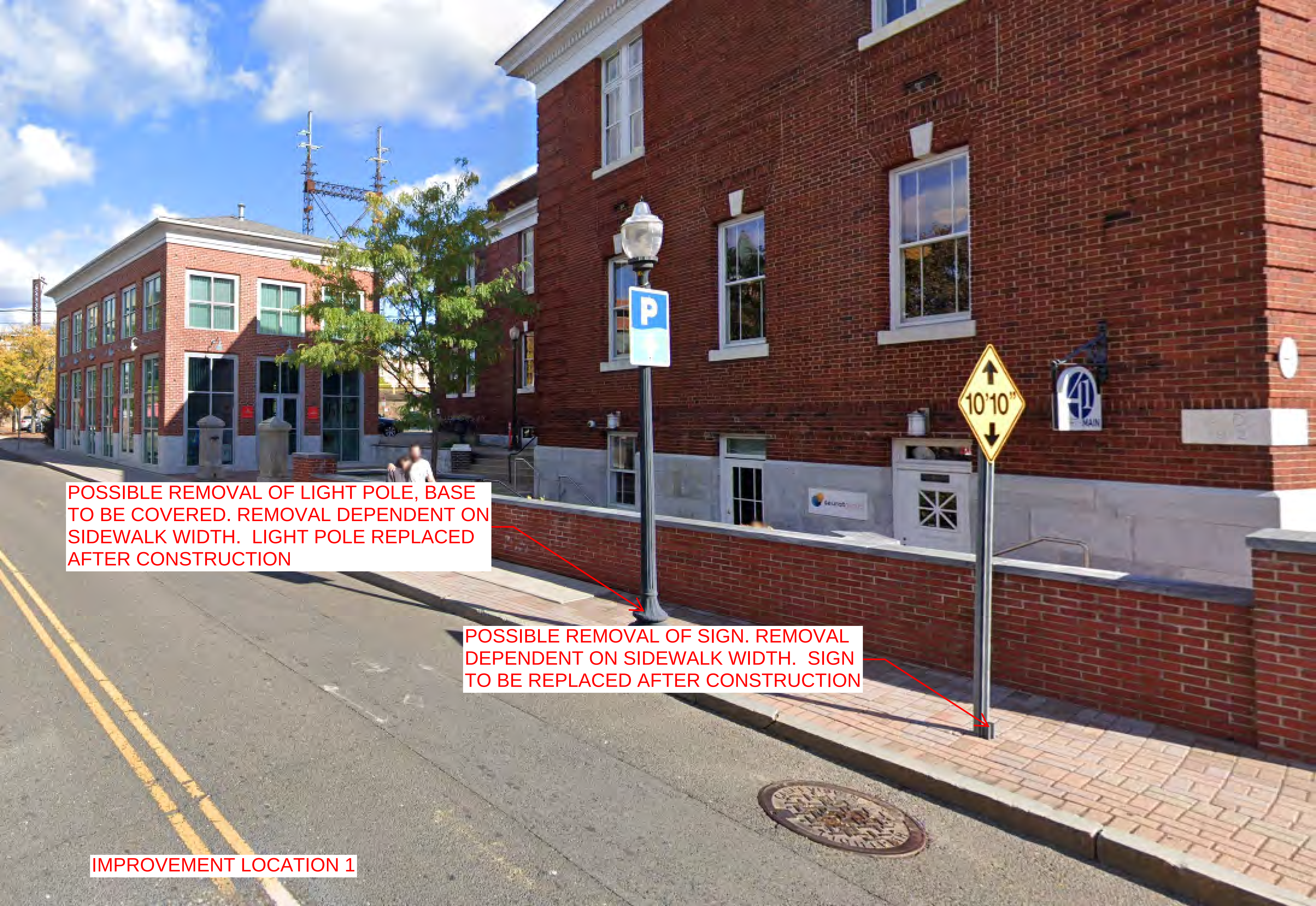
**Anticipated Project Effects**

The Memorandum of Agreement (MOA) for the project contains the following stipulation:

> After the execution of this MOA, if previously unidentified properties other than those discussed in this MOA are discovered that are eligible for the NRHP or that unanticipated effects on historic properties are found during the implementation of this MOA, CTDOT shall notify FTA, CTSHPO and appropriate concurring parties, and FTA shall follow the procedure specified in 36 C.F.R. 800.13.

The information herein, including the attached annotated photographs, is being provided to the MOA parties in fulfillment of this stipulation. The Marshall Street improvements are limited to upgrading existing modern paving and curb cuts to current ADA standards. It is recommended that these changes not be considered as an adverse effect on the NRHP-listed or NRHP-eligible properties or their settings.


Marshall Street Pedestrian Detour
- Detour for periodic closures of North Water Street
- Detour only on South Side of Marshall Street
Ann St
Sun Wok
Takeout
Caffe Social
Takeout • Delivery
Muse Paintbar - South Norwalk
Aventri
Maritime Garage
Marshall St
Marshall St
Marshall St
Marshall St
Marshall St
Marshall St
N Water St
N Water St
N Water St
N Main St
Triax Tec
Tenet Partners
The Lock Building
ONEnergy Inc
Shope Reno Wharton Architecture
1-25 N Water St Parking
Maclaren
Michael Smith Architects
Seurat Group
1
2
3
4
5
6
7


POSSIBLE REMOVAL OF LIGHT POLE, BASE TO BE COVERED. REMOVAL DEPENDENT ON SIDEWALK WIDTH. LIGHT POLE REPLACED AFTER CONSTRUCTION
POSSIBLE REMOVAL OF SIGN. REMOVAL DEPENDENT ON SIDEWALK WIDTH. SIGN TO BE REPLACED AFTER CONSTRUCTION
IMPROVEMENT LOCATION 1
P
10'10"


IMPROVEMENT LOCATION 4
REMOVAL OF LIGHT POLE, BASE TO BE COVERED. LIGHT POLE REPLACED AFTER CONSTRUCTION
41 NORTH MAIN PARKING ONLY
PRIVATE PROPERTY
NO PUBLIC PARKING
IMPROVEMENT LOCATION 2 - RECONSTRUCT DRIVEWAY TO MEET ADA STANDARDS
IMPROVEMENT LOCATION 3 - RECONSTRUCT DRIVEWAY TO MEET ADA STANDARDS
IMPROVEMENT LOCATION 2
IMPROVEMENT LOCATION 3
IMPROVEMENT LOCATION 4


IMPROVEMENT LOCATION 5
REMOVAL OF LIGHT POLE,
BASE TO BE COVERED.
LIGHT POLE REPLACED
AFTER CONSTRUCTION
IMPROVEMENT LOCATION 5


ONE WAY
NO
IMPROVEMENT LOCATION 6 - RECONSTRUCT DRIVEWAY TO MEET ADA STANDARDS
IMPROVEMENT LOCATION 6


Norwalk, Connecticut
Google
Street View
Marshall St
IMPROVEMENT LOCATION 7 - REMOVE EXISTNG PAVERS AND REPLACE WITH BITUMINOUS ASPHALT PAVEMENT. PRIOR TO COMPLETION OF CONSTRUCTION, REMOVE ASPHALT IN CROSS WALKS AND REPLACE WITH CONCRETE PAVERS.
IMPROVEMENT LOCATION 7
The Maritime Aquarium at Norwalk

## Attachment D-5 - CTSHPO Concurrence, Walk Bridge Supplemental Information, 12/24/2020

**From:** Kinney, Jonathan
**To:** McMillan, Mark J.; Labadia, Catherine
**Cc:** Hanifin, John D.; Sarah Walker; Lesay, Kimberly C; Fallon, James A
**Subject:** RE: WALK Bridge supplemental information re: historic properties
**Date:** Thursday, December 24, 2020 2:42:36 PM
**Attachments:** image001.png
image002.png
image003.png
image004.png
image005.png

---

Hello Mark,

Thank you for providing SHPO with additional information regarding the referenced project. We have reviewed the memos you sent and concur that the previously submitted written and photographic documentation for the Fort Point Street retaining wall (Wall 310) is consistent with the documentation expectations stipulated in the Memorandum of Agreement. SHPO also concurs that the ADA improvements along Marshall Street will not diminish the character defining features of the National Register listed South Main and Washington Streets Historic District. Thank you for the opportunity to review this additional information and if you have any questions, please do not hesitate to reach out.

**Jonathan Kinney**
**Director of Operations**
**Deputy State Historic Preservation Officer**

Connecticut State Historic Preservation Office
Department of Economic & Community Development
State of Connecticut
450 Columbus Boulevard, Suite 5
Hartford, CT 06103
O: 860.500.2380
Jonathan.kinney@ct.gov



---

**From:** McMillan, Mark J. <Mark.McMillan@ct.gov>

**Sent:** Wednesday, December 23, 2020 9:30 AM
**To:** Kinney, Jonathan <Jonathan.Kinney@ct.gov>; Labadia, Catherine <Catherine.Labadia@ct.gov>
**Cc:** Hanifin, John D. <John.Hanifin@ct.gov>; Sarah Walker <snwalker@hntb.com>; Lesay, Kimberly C <Kimberly.Lesay@ct.gov>; Fallon, James A <James.Fallon@ct.gov>
**Subject:** WALK Bridge supplemental information re: historic properties

Jonathan, Cathy,

Attached are two memos prepared by AHS. They document additional changes in the WALK Bridge Replacement Project that had not been previously considered when the undertaking was reviewed under §106 and a FONSI was prepared under NEPA. The additions are the result of design development rather than a substantial alteration of the project scope.

A brief summary of each memo follows:

<u>Fort Point Street Retaining Wall</u>

- A segment of masonry wall that supports the rail line will be altered by the addition of a new wall in front of this feature. The original masonry wall was identified as a contributing element to the NRHP-eligible rail line and has been documented in "Written and Photographic Documentation, NYNH&H Railroad…State Project #301-176" which was prepared in August, 2018.
- The consultant recommends that this will have an adverse effect to the masonry wall under §106, but that the previous documentation is adequate to mitigate for this effect. After reviewing the supplement report and documentation, CTDOT concurs with this recommendation.

<u>Marshall Street ADA Improvements</u>

- The need to provide safe pedestrian access during construction necessitates temporary improvements to sidewalks along Marshall Street. The area in question is within the NRHP-listed South Main and Washington Streets Historic District. The improvements will require the removal of 2 lightposts and portions of brick pavers in the sidewalk in order to be ADA-compliant. Following construction, these elements will be replaced in kind.
- CTDOT is developing designs to make the ADA-compliant improvements permanent in (rather than returning the sidewalks to their existing non-compliant condition). The details of this are still under design development, but they are not anticipated to impact any other features not already discussed in the memo.
- The consultant recommends that the lampposts and pavers are not historic / character-defining features of the historic district and that the proposed temporary changes to them with the restoration/replacement in-kind of these features will <u>not</u> constitute an adverse effect. CTDOT concurs with this recommendation.

We ask that your office review the supplement memos and invite you to provide comments and your opinion of effect in accordance with §106 of the National Historic Preservation Act.

If you have any questions about these memos or the project in general, please don't hesitate to contact me.

Thank you,

Mark

I am currently teleworking out of the office but am available via email.
If this is an urgent matter, please email me your telephone number and I will contact you.
Stay well!

***Mark McMillan***
Supervising Transportation Planner
Office of Environmental Planning
Environmental / Historical Documents Unit
Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131
☎ (860) 594-2135
☎ *(860) 594-3028 - Fax*
✉ mark.mcmillan@ct.gov

## Attachment E Federal and State Reviews, Approvals, and Permit Requirements

| | |
|---|---|
| Attachment E-1 | Coordination with NOAA/NMFS, June 2020 – January 2021 |
| Attachment E-2 | USFWS No Effect Determination, 6/24/2020 |
| Attachment E-3 | Table of Federal and State Permits and Approvals |
| Attachment E-4 | CTDEEP NDDB Determination, 4/16/2020 |
| Attachment E-5 | Coordination with CTDEEP Division of Wildlife, 3/18/2020 |

# Attachment E-1 - Coordination with NOAA/NMFS, June 2020 – January 2021

| | |
|---|---|
| **From:** | Samorajczyk, Christopher W |
| **To:** | Hanifin, John D. |
| **Cc:** | Davis, Andrew H; Lesay, Kimberly C; Joe Grilli; Bertoli, Richard; Sarah Walker; Lauren DiGovanni |
| **Subject:** | Fw: CTDOT 301-176_WALK Bridge _Extra Project Area Added_Manresa Island |
| **Date:** | Friday, January 8, 2021 1:13:41 PM |

This should close the EFH loop for the use of Manresa Island. Let me know if there are any questions.
Chris

---

**From:** Alison Verkade - NOAA Federal <alison.verkade@noaa.gov>
**Sent:** Friday, January 8, 2021 10:40 AM
**To:** Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov>
**Cc:** Lauren Sager - NOAA Affiliate <lauren.m.sager@noaa.gov>; Christopher Boelke - NOAA Federal <christopher.boelke@noaa.gov>
**Subject:** Re: CTDOT 301-176_WALK Bridge _Extra Project Area Added_Manresa Island



Hi Chris,

If there is no in-water work, re-initiation would not be necessary. Please let me know if you have any questions or concerns. Thank you, Alison

Alison T. Verkade
National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
Habitat and Ecosystem Services Division
55 Great Republic Drive
Gloucester, MA 01930
Office: 978-281-9266
Email: alison.verkade@noaa.gov

On Tue, Jan 5, 2021 at 7:42 AM Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov> wrote:

> Hi Alison-
> Happy New Year-
> Hope you had a great Holiday season--just checking in again to see if you could send me a concurrence for the additional WALK Bridge staging area at Manresa Island. The Department is ready to submit the NEPA RE-evaluation now and this is the last bit that FTA

wants tied up. Let me know if you want to discuss quick--Talk soon
Thanks, Chris

**Christopher W. Samorajczyk, CWB**
Natural Resource Planning
Connecticut Department of Transportation
Office of Environmental Planning
Bureau of Policy & Planning
P: 860-594-2938

---

**From:** Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov>
**Sent:** Wednesday, December 16, 2020 8:39 AM
**To:** Alison Verkade <alison.verkade@noaa.gov>
**Cc:** Davis, Andrew H <Andrew.H.Davis@ct.gov>; Lesay, Kimberly C <Kimberly.Lesay@ct.gov>; McMillan, Mark J. <Mark.McMillan@ct.gov>
**Subject:** Fw: CTDOT 301-176_WALK Bridge _Extra Project Area Added_Manresa Island

Hi Alison-
Hope all is well--Back in June we spoke at length about the WALK Bridge project in Norwalk, CT and the inclusion of the extra work area located out at the mouth of the harbor known as Manresa Island. Based on our discussion and scope of work you concluded that this area and the work being added would not have any new impacts on EFH species under your review (see below email). As part of the NEPA re-evaluation process FTA is looking for your written concurrence that CTDOT does not need to reinitiation consultation for EFH for this work. If you could respond to this email that should be all I need. If you have any questions or want to discuss quick give me a call--Talk soon
Thanks, Chris

**Christopher W. Samorajczyk, CWB**
Natural Resource Planning
Connecticut Department of Transportation
Office of Environmental Planning
Bureau of Policy & Planning
P: 860-594-2938

---

**From:** Samorajczyk, Christopher W
**Sent:** Monday, June 22, 2020 12:47 PM

**To:** 'alison.verkade@noaa.gov' <alison.verkade@noaa.gov>
**Cc:** Davis, Andrew H <Andrew.H.Davis@ct.gov>; Lesay, Kimberly C <Kimberly.Lesay@ct.gov>
**Subject:** CTDOT 301-176_WALK Bridge _Extra Project Area Added_Manresa Island

Hi Alison-
As discussed earlier this morning there are some changes with CTDOT 301-176 the replacement of the Metro North RR Bridge over the Norwalk River- Norwalk, CT. Originally we were going to build the bridge in a staging yard close to the existing bridge but a new change has now identified the area of the old decommissioned coal plant--Manresa Island-west side of Norwalk Harbor mouth -73.41/ 41.072- to be used as the staging yard. The Departments Contractor is going to be using this area—map attached, additional work area in yellow—to do most of the staging and bridge work. This is a much better area to use –one that the Town's Shellfish and Harbor Commissions have been really pushing for. The use of this area will be extremely less detrimental to the Rivers ecosystem and really a greater fit for the oyster industry and recreational boating on a whole –due to the large mooring areas for the construction barges. The possible use of this area will require a reevaluation to the NEPA document and that's why I'm reaching out----right now this area is within the EFH mapped area. The use of the area was almost entirely accounted for in the initial consultation. The only additional area would be the actual dredged man made barge slip along the bulkhead. I believe this additional area would be covered by the consultation and design comments already in place but just wanted to double check. The initial consultation addressed barges through this area already--just not into this particular slip. There will be some barges in the barge slip tied up to the existing bulkhead and some that will be spudded down. The fabrication yard is on land and is on old fill and is not located in the intertidal at all. All work on the upland will be done with no excavation and no demo of the existing structure. Please concur that the use of Manresa Island will not have any additional effects to Essential Fish Habitat under your review. Let me know if you have any questions--
Talk soon
Thanks, Chris

**Christopher W. Samorajczyk, CWB**
Natural Resource Planning
Connecticut Department of Transportation
Office of Environmental Planning
Bureau of Policy & Planning
P: 860-594-2938

| | |
|---|---|
| **From:** | Lesay, Kimberly C |
| **To:** | Sarah Walker |
| **Cc:** | Hanifin, John D.; Fallon, James A; Samorajczyk, Christopher W; Davis, Andrew H; "Bertoli, Richard" |
| **Subject:** | FW: CTDOT 301-176 WALK Bridge_Project Changes |
| **Date:** | Thursday, June 18, 2020 8:46:31 PM |

Sarah – please see correspondence below for inclusion into our re-evaluation for Manresa Island from NMFS. We still need concurrence from the EFH side of the shop, but this closes our loop on concurrence from the ESA side that re-initiation is not necessary due to the inclusion of utilizing Manresa for staging and storage.

Kimberly Lesay
Transportation Assistant Planning Director
Office of Environmental Planning
2800 Berlin Turnpike
Newington, CT
Office: (860) 594-2931
Cell: (860) 992-9759
Kimberly.Lesay@ct.gov

**From:** Zachary Jylkka - NOAA Federal <zachary.jylkka@noaa.gov>
**Sent:** Thursday, June 18, 2020 5:08 PM
**To:** Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov>
**Cc:** Davis, Andrew H <Andrew.H.Davis@ct.gov>; Lesay, Kimberly C <Kimberly.Lesay@ct.gov>; Alison Verkade - NOAA Federal <alison.verkade@noaa.gov>
**Subject:** Re: CTDOT 301-176 WALK Bridge_Project Changes

Hi Chris,

Thank you for the email. We agree with your review of the reinitiation triggers and concur that the project modifications you described do not require reinitiation of consultation at this time.

Regards,
Zach

On Thu, Jun 18, 2020 at 12:55 PM Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov> wrote:

Hi Zach-

 The Connecticut Department of Transportation has recently added a new staging and storage yard to CTDOT 301-176 Replacement of the Metro North RR Bridge over the Norwalk River in Norwalk, CT.  The addition of this area located at  -73.41/ 41.072-west side of Norwalk Harbor mouth is referred to as Manresa Island. This area has a deep water barge slip along side a decommissioned coal plant. The deep water slip connects directly to the dredged navigation channel. This is a much better area to use –one that the Town's Shellfish and Harbor Commissions have been really pushing for. The use of this area will be extremely less detrimental to the Rivers ecosystem and really a greater fit for the oyster industry and recreational boating on a whole –due to the large mooring areas for the construction barges. As well as the addition of the new staging area the Department also is implementing a longer dredge window for dredging outside of a marine enclosure. The new dredge window will be from December 1st through March 31st and will be within a TYPE III permeable turbidity curtain.

The addition of this new staging area and longer dredge window will not require re-initiation of project CTDOT 301-176 due to the following:

-The new information does not reveal effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered.

-The identified actions are subsequently modified in a manner that does not cause an effect to the listed species or critical habitat that was considered in the biological opinion or written concurrence.

-No new species have been listed or critical habitat designated that may be affected by the identified action.

The Department requests concurrence that the addition of Manresa Island and the turbidity curtain only dredge window Time of Year extension form 12/1-3/31 does not require reinitiation under Section 7 ESA. If there are any questions or concerns please do not hesitate to contact me -Talk soon

Thanks, Chris

**Christopher W. Samorajczyk, CWB**

Natural Resources Planning

Connecticut Department of Transportation

Office of Environmental Planning

Bureau of Policy & Planning

P: 860-594-2938

--

Zach Jylkka
Fisheries Biologist
Protected Resources Division
Greater Atlantic Regional Fisheries Office
NOAA Fisheries
Gloucester, MA 01930
zachary.jylkka@noaa.gov
*office*: (978) 282-8467
Pronouns: (he/him/his)

For additional ESA Section 7 information and Critical Habitat guidance, please see:
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance

| | |
|---|---|
| **From:** | Samorajczyk, Christopher W |
| **To:** | Joe Grilli; Sarah Walker |
| **Subject:** | Fw: CTDOT 301-176_WALK Bridge _Extra Project Area Added_Manresa Island |
| **Date:** | Wednesday, July 1, 2020 10:54:10 AM |
| **Attachments:** | ATT D_E_F_Proposed Staging and Storage Yard at Manresa Island.docx |

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**From:** Samorajczyk, Christopher W
**Sent:** Monday, June 22, 2020 12:47 PM
**To:** 'alison.verkade@noaa.gov'
**Cc:** Davis, Andrew H; Lesay, Kimberly C
**Subject:** CTDOT 301-176_WALK Bridge _Extra Project Area Added_Manresa Island

Hi Alison-
As discussed earlier this morning there are some changes with CTDOT 301-176 the replacement of the Metro North RR Bridge over the Norwalk River- Norwalk, CT. Originally we were going to build the bridge in a staging yard close to the existing bridge but a new change has now identified the area of the old decommissioned coal plant--Manresa Island-west side of Norwalk Harbor mouth -73.41/ 41.072- to be used as the staging yard. The Departments Contractor is going to be using this area—map attached, additional work area in yellow—to do most of the staging and bridge work. This is a much better area to use –one that the Town's Shellfish and Harbor Commissions have been really pushing for. The use of this area will be extremely less detrimental to the Rivers ecosystem and really a greater fit for the oyster industry and recreational boating on a whole –due to the large mooring areas for the construction barges. The possible use of this area will require a reevaluation to the NEPA document and that's why I'm reaching out----right now this area is within the EFH mapped area. The use of the area was almost entirely accounted for in the initial consultation. The only additional area would be the actual dredged man made barge slip along the bulkhead. I believe this additional area would be covered by the consultation and design comments already in place but just wanted to double check. The initial consultation addressed barges through this area already--just not into this particular slip. There will be some barges in the barge slip tied up to the existing bulkhead and some that will be spudded down. The fabrication yard is on land and is on old fill and is not located in the intertidal at all. All work on the upland will be done with no excavation and no demo of the existing structure. As discussed earlier today, please concur that the use of Manresa Island will not have any additional effects to Essential Fish Habitat under your review. Let me know if you have any questions--Talk soon
Thanks, Chris

**Christopher W. Samorajczyk, CWB**
Natural Resource Planning

Connecticut Department of Transportation
Office of Environmental Planning
Bureau of Policy & Planning
P: 860-594-2938


**Proposed Staging and Storage Yard at Manresa Island**

# Attachment E-2- USFWS No Effect Determination, 6/24/2020

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

IPaC Record Locator: 743-22288392 June 24, 2020

Subject: Consistency letter for the 'CTDOT 0301-0176_Manresa Island' project (TAILS 05E1NE00-2020-R-3038) under the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request to verify that the **CTDOT 0301-0176_Manresa Island** (Proposed Action) may rely on the revised February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq*.).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action will have no effect on the endangered Indiana bat (*Myotis sodalis*) or the threatened Northern long-eared bat (*Myotis septentrionalis*). If the Proposed Action is not modified, **no consultation is required for these two species.**

**For Proposed Actions that include bridge/structure removal, replacement, and/or maintenance activities:** If your initial bridge/structure assessments failed to detect Indiana bats, but you later detect bats during construction, please submit the Post Assessment Discovery of Bats at Bridge/Structure Form (User Guide Appendix E) to this Service Office. In these instances, potential incidental take of Indiana bats may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Red Knot, *Calidris canutus rufa* (Threatened)
- Roseate Tern, *Sterna dougallii dougallii* (Endangered)

# Project Description

The following project name and description was collected in IPaC as part of the endangered species review process.

## Name

CTDOT 0301-0176_Manresa Island

## Description

The Department is adding a new staging and storage. Originally we were going to build the bridge in a staging yard close to the existing bridge but a new change has now identified the area of the old decommissioned coal plant--Manresa Island-west side of Norwalk Harbor mouth -73.41/ 41.072- to be used as the staging yard. The Departments Contractor is going to be use the area referred to as Manresa Island to do most of the staging and bridge work. This is a much better area to use –one that the Town’s Shellfish and Harbor Commissions have been really pushing for. The use of this area will be extremely less detrimental to the Rivers ecosystem and really a greater fit for the oyster industry and recreational boating on a whole –due to the large mooring areas for the construction barges. There will be no wetland impacts and no tree clearing associated with this area.

# Determination Key Result

Based on the information you provided, you have determined that the Proposed Action will have no effect on the endangered Indiana bat and/or the threatened Northern long-eared bat. Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for these two species.

## Qualification Interview

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   **Automatically answered**
   *No*

2. Is the project within the range of the Northern long-eared bat[1]?

   [1] See Northern long-eared bat species profile

   **Automatically answered**
   *Yes*

3. Which Federal Agency is the lead for the action?
   *C) Federal Transit Administration (FTA)*

4. Are *all* project activities limited to non-construction[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

   [1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

   *Yes*

# Determination Key Description: FHWA, FRA, FTA Programmatic Consultation For Transportation Projects Affecting NLEB Or Indiana Bat

This key was last updated in IPaC on December 02, 2019. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the threatened **Northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

# Attachment E-3
## Table of Required Federal and State Permits

The following table identifies federal and state permits required for the Walk Bridge Replacement Project. Federal and state reviews specific to the proposed Staging and Storage Yard are identified in bold italics. All permit applications for the project will include the proposed Staging and Storage Yard.

| Federal/State Regulation | Review/Approval/Permit | Receipt Date |
|---|---|---|
| National Environmental Policy Act (42 USC 4321 et seq) | Finding of No Significant Impact (FONSI) | 07/17/2017 |
| ***Environmental Re-evaluation Consultation*** | Verification of FONSI | 09/19/2019 |
| | ***TBD*** | ***TBD*** |
| Connecticut Environmental Policy Act (CGS Section 22a-1-22a-1h) | Record of Decision | 07/06/2017 |
| Section 4(f), U.S. Department of Transportation Act (49 USC 303) | Individual Evaluation and Finding for potential use of Section 4(f) properties | 07/17/2017 |
| Executive Order 11988, Floodplain Protection, as amended by Executive Order 13690, Federal Flood Risk Management | Review for impact to floodplain | 07/17/2017 |
| Executive Order 11990, Wetlands Protection | Review for impact to wetlands | 07/17/2017 |
| Executive Order 12898, Environmental Justice | Review for assessment of impact to EJ communities | 07/17/2017 |
| Title VI Program/FTA Circular 4702.1B of October 1, 2012 | Environmental Equity Review | 07/17/2017 |
| Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 (42 USC 4601 et seq); Uniform Relocation Assistance Act (CGS Section 8-266 et seq) | Review/relocation assistance | ongoing |
| Clean Air Act (42 USC 7401 et seq) | Conformity Determination | 07/17/2017 |
| Section 106, National Historic Preservation Act (36 CFR 800) | Memorandum of Agreement | 05/25/2017 |
| Section 7, Endangered Species Act (16 USC 1531 et seq) | Finding/Not Likely to Adversely Affect | 07/17/2018, 08/01/2019, 08/20/2019, ***06/18/2020*** |
| Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 et seq) | Finding and Recommendations | 08/30/2018, ***01/08/2021*** |
| Coastal Zone Management Act/Connecticut Coastal Management Act (16 USC 1451 et seq) | Consistency Review | Pending |
| Section 9 of the Rivers and Harbors Act (33 USC 491) | Permit for construction of new bridge | Pending |
| Section 10 of the Rivers and Harbors Act (33 USC 403) | Permit for dredging and filling in navigable waters/ impacts to waters and wetlands of the U.S. | Pending |
| Section 404 of the Clean Water Act (33 USC 1344) | | Pending |

| Federal/State Regulation | Review/Approval/Permit | Receipt Date |
|---|---|---|
| Section 14 of the Rivers and Harbors Act (33 USC 408) | Permit for impact to federal navigation channel | Pending |
| Section 401 of the Clean Water Act (33 USC 1341); Connecticut Surface Water Quality Standards (CGS Section 221-426) | Water Quality Certification | Pending |
| Section 402 of the Clean Water Act (33 USC 1342); General Conditions Applicable to Water Discharge Permits and Procedures and Criteria for Issuing Water Discharge Permits (CGS Section 22a-430b) | General Permit for Discharge of Stormwater and Dewatering Wastewaters from Construction Activity | Filing Pending |
| 49 USC 44718; 14 CFR 77; Safe, Efficient Use and Preservation of the Navigable Airspace | Determination | 06/12/2019; 11/10/2020 (extension) |
| ***Connecticut Endangered Species Act (CGS Section 26-303)*** | Natural Diversity Database Review/Determination | 05/23/2019 |
| | ***Natural Diversity Database Review/Determination*** | ***04/16/2020*** |
| Connecticut Coastal Management Act; and Tidal Wetlands Regulations (CGS Section 22a-30-1) | Structures, Dredge and Fill, and Tidal Wetlands Permit | Pending |
| Connecticut Flood Management Program (CGS Sections 25-68b - 25-68h) | Flood Management Certification | Pending |
| CGS Section 22a-134, et seq., Hazardous Materials | Review of potential for hazardous material impacts, high-risk sites, site investigations, and environmental audits | Pending |
| CGS Section 22a-133z and 22a-208a | General Permit for Contaminated Soil and/or Sediment Management | Filing Pending |
| CGS Chapter 446d and 446k, RCSA Sections 22a-208a-1, 22a-209-1, and 22a-209-8 | Authorization for Disposal of Special Waste | Filing Pending |
| CGS Section 22a-430(b) | General Permit for the Discharge of Groundwater Remediation Wastewater | Filing Pending |

## Attachment E-4 – CTDEEP NDDB Determination, 4/16/2020

April 16, 2020

Christopher Samorajczyk
CT Department of Transportation
2800 Belin Turnpike
P.O. Box 317546
Newington, CT 06131
christopher.samorajczyk@ct.gov

Project: CTDOT Project # 301-176, Use of Manresa Island as Staging Area for Building Replacement of Metro North RR Walk Bridge over the Norwalk River in Norwalk, Connecticut
NDDB Determination No.: 202005282

Dear Christopher Samorajczyk,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map you provided for the proposed CTDOT Project # 301-176, Use of Manresa Island as Staging Area for Building Replacement of Metro North RR Walk Bridge over the Norwalk River in Norwalk, Connecticut. According to our information we have records for State Threatened *Falco peregrinus* (Peregrine falcon) and State Special Concern *Malaclemys t. terrapin* (Northern diamondback terrapin) from the vicinity of this project. Thank you for including the protocols you will follow to ensure the protection of the nesting peregrine falcon and northern diamondback terrapin with respect to this project. I concur that by utilizing these protection protocols it will lessen the adverse impact on these two species. I attached the protection plans you have proposed. This determination is good for two years. Please re-submit an NDDB Request for Review if the scope of work changes or if work has not begun on this project by April 16, 2022.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base. .
Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

  

# PEREGRINE FALCON
# Connecticut Threatened Species

**Protective Legislation:** *Federal* - Migratory Bird Treaty Act of 1918. *State* - Connecticut General Statutes Sec. 26-311.

**Scientific Name: *Falco peregrinus***

**Size:** 15-20 inches (38.1-50.8 cm) in length

**Wingspan:** 43-46 inches (109.2-116.8 cm)

**Habitat Type:**
Open country, from coastal lowlands to mountainous high country. High perches in urban areas, bridges and billboards.

**Coloration:**

- Adult peregrine falcons have long, pointed wings and a long, rounded tail with narrow, black bands, ending with a broad, dark band tipped with white.
- The barred upperparts are blue-gray, while the underparts are white to light buff and cross-barred with brown.
- The black crown and nape extend to the cheeks, forming a distinct black helmet.
- The feet are yellow.
- Immature peregrines are similar, but the back and underparts are brown and the throat is heavily streaked with brown.
- Both adult and immature peregrines have a bold, dark, vertical whisker-like mark (mustache mark) on the sides of the head.

**Characteristics:**

- Long-winged, medium-sized bird of prey.
- **Call:** A rasping kack-kack-kack. Also a long ascending wail, WEEchew-WEE-chew.
- **Typical Nesting Period**: April through July.
- Nest sites are located above open areas consisting of a hollow, unlined scrape on a cliff, ledge or rocky outcrop. There are falcon nest boxes (top, right photo) located on bridges across Connecticut. Abandoned hawk or raven nests may also be used.
- Pairs may use the same nest site for years

The peregrine falcon is a highly vocal and aggressive bird. Falcons pose a threat to anyone working around the nest area. Falcons will actively defend their nests by swooping and diving at predators. Falcons are capable of plunging from tremendous heights at speeds estimated at over 180 miles per hour. This is their preferred method of hunting. Falcons have sharp talons for grasping and holding prey and should not at anytime be approached or handled. It is required that there be no harassment, intentional or unintentional, to any falcons under state and federal law.

If any peregrine falcons are observed in or around the project area the Office of Environmental Planning (OEP) must be notified at 860-594-2937 or 860-594-2938. If OEP staff cannot be reached at either of the above referenced phone numbers, the District environmental coordinator will need to be contacted to facilitate further coordination with OEP's Water and Noise Compliance Unit.

## SECTION 1.10 ENVIRONMENTAL COMPLIANCE

### In Article 1.10.03-Water Pollution Control: REQUIRED BEST MANAGEMENT PRACTICES

*Add the following after Required Best Management Practices Number 13:*

14. The peregrine falcon (*Falco peregrinus*) is a State threatened species and Connecticut's largest falcon, measuring up to 20 inches. Adults are slate gray above and pale underneath with fine bars and spots of black; they have long pointed wings with a narrow tail. Young falcons have the same composition but are darker underneath and browner all over. Peregrine falcons have adapted to life in urban settings. In Connecticut, they sometimes utilize bridges for nesting and brood rearing purposes. Peregrines will actively and aggressively defend the nest. The peregrine will attack anyone or anything that comes within the area of its nest. The peregrine falcon nesting season occurs between the months of April and July. For this reason, special conditions regarding the timing of work on the structures, and immediate area that have nesting falcons must be adhered to.

    In order to protect this species and project personnel, any construction and/or inspection activities which are within 400 feet of an identified nest shall not be permitted during nesting season (between April 1st and July 31st.) Any change in construction sequencing or timing affecting work within 400 feet of a known nest shall not be permitted.

    The Contractor shall, through the Engineer, at least 10 days prior to the commencement of any construction activities, arrange for a CT DOT Environmental Inspector from the Office of Environmental Planning (OEP) or their authorized delegate to be available to meet and identify the nest location as well as discuss proper protocol for maintaining environmental commitments made to the protection of this species and habitat.

    This species is protected by State laws which prohibit killing, harming, taking, or keeping them in your possession. Workers shall be notified of the existence of peregrine falcons in the area and be apprised of the laws protecting them. Photographs of, and the laws protecting, peregrine falcons shall be posted in the Contractor's and DOT field offices (species ID sheets will be provided by OEP). Any observations of this species are to be immediately reported to the Department.


# Northern Diamondback Terrapin
# Connecticut Species of Special Concern

**Scientific Name*: Malaclemys t. terrapin***
**Size:** Males: 4-5.5 inches (10.2-14 cm) in length
Females: 6-9 inches (15.2-22.9 cm) in length

**Habitat Type:**

The Northern diamondback terrapin is the only species of turtle in North America, including Connecticut, that spends its life in brackish water (water that is less salty than sea water) which includes salt marshes, estuaries and tidal creeks. They hibernate in the winter submerged in the mud of tidal creeks. If a safety boat or barge is to be used, be cognizant of turtles possibly mating within the project area and proceed slowly when in tidal areas. Nests are constructed on the sandy borders of salt marshes and in dunes.

**Colorations:**

- The terrapin has both a dark and light variation. Both variations have carapaces (top of shell) patterned with concentric rings or ridges.
  - The dark variant has a completely black carapace (top of shell) with a yellow to off-white plastron (bottom chest plate). Their heads are gray to off-white with small black spots or streaks and their legs are dark gray to black.
  - The lighter variant has a gray to light brown carapace with yellow to greenish gray plastrons. Their heads are gray with small pepper-like gray spots and their legs are gray.
- The plastron may or may not be marked with bold, dark markings.
- The limbs and head may be spotted.
- Hatchlings are patterned similar to adults, but are brighter.

**Characteristics:**

- Small marine turtle. They spend their entire lives in a brackish environment.
- The carapace is wedge-shaped when viewed from above, with the widest part in the rear.
- They have large webbed feet.

**If any Northern diamondback terrapins are observed in or around the project area, the Office of Environmental Planning (OEP) must be notified at 860-594-2937 or 860-594-2938. If OEP staff cannot be reached at either of the above referenced phone numbers, the District Environmental Coordinator will need to be contacted to facilitate further coordination with OEP's Water and Noise Compliance Unit.**

## SECTION 1.10 - ENVIRONMENTAL COMPLIANCE

**In Article 1.10.03-Water Pollution Control:**
**REQUIRED BEST MANAGEMENT PRACTICES**

*Add the following after Required Best Management Practice Number 13:*

14. The Contractor is hereby notified that the State listed species of Special Concern Northern diamondback terrapin (*Malaclemys t. terrapin*), is present within the Project limits. Northern diamondback terrapins are the only species of turtle in North America that spends its life in brackish water (water that is less salty than sea water). They are most abundant in tidal estuaries and will also be found in salt marshes and tidal creeks. Northern diamondback terrapins nest on the sandy borders of these habitats from June to July. Northern diamondback terrapins hibernate during the winter submerged in the mud of tidal creeks. They enter hibernation as early as November and emerge as early as April through the end of May depending on water temperature.

    All construction activities taking place within the Project limits will need to be coordinated with the Office of Environmental Planning (OEP) through the Engineer. At least 10 days prior to the commencement of any physical construction activities, the Contractor shall, through the Engineer, arrange for a CTDOT OEP Environmental Inspector, or their authorized delegate, to meet and discuss proper protocol for maintaining environmental commitments made for the protection of this species and habitat. OEP will provide oversight through the Engineer to ensure that the following protocols are followed and maintained during the course of the Project.

    During the terrapin's dormant period (November 1 to May 31):

    - Once the areas within the Project limits have been inspected and cleared of any nest sites, construction activities will be allowed in upland areas.
    - Work is not allowed in wetland/watercourse and sandy border areas unless these areas were in active construction prior to November 1, and additionally, do not contain any areas of terrapin habitat.

    For any work done during the terrapin's active period, which includes the nesting and hatching period, (April 1 to October 31), the CTDOT will require the following precautionary measures to protect the terrapin and terrapin habitat:

    a. All construction personnel working within Northern diamondback terrapin habitat must be apprised of the species description and the possible presence of this listed species.

    b. Exclusionary practices will be required in order to prevent any Northern diamondback terrapin access to construction areas. These measures will need to be installed at the limits of disturbance as shown on the plans.

c. Exclusionary fencing shall be at least 20 inches tall and must be secured to and remain in contact with the ground. The Contractor shall regularly inspect and maintain the fencing to prevent any gaps or openings at ground level. Standard silt fence is adequate; fencing with netting shall not be used.

d. The Contractor must search the work area each morning for the presence of this listed species prior to any work being done.

e. Any Northern diamondback terrapins encountered within the immediate work area shall be carefully moved to an adjacent area outside of the excluded area and the Engineer shall be immediately informed to contact OEP with the location.

f. All staging and storage areas in the vicinity of Northern diamondback terrapin habitat, outside of previously paved locations, regardless of the duration of time they will be used, must be reviewed by and receive written approval from OEP through the Engineer.

g. No heavy machinery or vehicles may be parked in any identified Northern diamondback terrapin habitat.

h. Exclusionary fencing shall be removed when it is no longer needed, and silt fence shall be removed as soon as the area is stable, to allow for reptile and amphibian passage to resume.

i. If a safety boat or barge is required for this Project, the Contractor must use special caution when navigating within tidal creeks. Terrapins tend to congregate close to the surface during their active period. Maintaining slow speeds will ensure the turtles' safety.

These practices will be applied to the entire Project unless a sketch is attached which identifies specific areas of concern.

This species is protected by State laws, which prohibit killing, harming, taking, or keeping them in your possession. Photographs and the laws protecting Northern diamondback terrapin shall be posted in the Contractor's and CTDOT field offices (species ID sheet will be provided by OEP).

## Attachment E-5 – Coordination with CTDEEP Division of Wildlife, 3/18/2020

| | |
|---|---|
| **From:** | Samorajczyk, Christopher W |
| **To:** | Sarah Walker |
| **Cc:** | Davis, Andrew H |
| **Subject:** | Fw: Manresa Island Norwalk_Osprey |
| **Date:** | Wednesday, June 24, 2020 8:32:06 AM |

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**From:** Hess, Brian
**Sent:** Thursday, March 19, 2020 8:10 AM
**To:** Samorajczyk, Christopher W
**Cc:** Davis, Andrew H; Lesay, Kimberly C
**Subject:** RE: Manresa Island Norwalk

Sounds good, thanks, Chris,

I think that timing may still be a consideration. If there is going to be activity during the nesting season, it would be best if that activity could begin before the birds arrive.

If they are buying a house on a busy street, they should see what it looks like at rush hour, not just on a Sunday morning.

Thanks,
Brian

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**From:** Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov>
**Sent:** Wednesday, March 18, 2020 7:45 PM
**To:** Hess, Brian <Brian.Hess@ct.gov>
**Cc:** Davis, Andrew H <Andrew.H.Davis@ct.gov>; Lesay, Kimberly C <Kimberly.Lesay@ct.gov>
**Subject:** Re: Manresa Island Norwalk

Hi Brian-
Yes the central nest is on pole---the nests from west to east are on top of an out building approximately 40 feet in the air then the osprey pole located south of the security fence and then the east nest is atop one of the two dolphin pier clusters. The NRG folks seem to be aware of the ospreys, falcons, and the terrapins that frequent their land. There are a few other nesting poles that they erected around the island. I am planning on working with CTDOT Surveys to plot all the nests. I also plan on another visit in a few weeks to determine which osprey nests are active. Talk soon
Chris

---

**From:** Hess, Brian
**Sent:** Wednesday, March 18, 2020 5:08 PM
**To:** Samorajczyk, Christopher W; Dickson, Jenny
**Cc:** Davis, Andrew H; McKay, Dawn; Lesay, Kimberly C

**Subject:** RE: Manresa Island Norwalk

Hi Chris,

At just a cursory glance, I would agree about the falcons. That central nest is on a 30' telephone pole, right?

Thanks,
Brian

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**From:** Samorajczyk, Christopher W <Christopher.Samorajczyk@ct.gov>
**Sent:** Wednesday, March 18, 2020 4:23 PM
**To:** Dickson, Jenny <Jenny.Dickson@ct.gov>
**Cc:** Hess, Brian <Brian.Hess@ct.gov>; Davis, Andrew H <Andrew.H.Davis@ct.gov>; McKay, Dawn <Dawn.McKay@ct.gov>; Lesay, Kimberly C <Kimberly.Lesay@ct.gov>
**Subject:** Manresa Island Norwalk

Hi Jenny-
Hope all is well—just wanted to run something by you quick---The Department was recently granted access to survey Manresa Island in Norwalk for possible future use as a staging yard for the WALK Bridge replacement Project. Some of the early coordination is evaluating this area for inclusion into the Departments NEPA re-evaluation. Attached is the area potentially needed that the Contractor is proposing---there will not be any wetland impacts however we have multiple osprey nests on the island and the Norwalk falcons have relocated to the smoke stack. There are 3 potentially active osprey nests in close proximity to the proposed areas for the bridge construction (second attachment ospreys marked as O—Falcon marked as F) just looking for any big issues with us moving forward with this area right now—I believe the falcons are too high for us to impact and the ospreys are usually tolerable to some commotion---talk soon
Thanks, Chris

**Christopher W. Samorajczyk**
**Wildlife Biologist**
**Office of Environmental Planning**
**Connecticut Department of Transportation**
**☎Direct 860-594-2938 / F: 860-594-3028**
Christopher.Samorajczyk@ct.gov

# Attachment F Environmental Effects Mapping


**Figure F-1—Areas of Concern at Manresa Island Staging and Storage Yard**

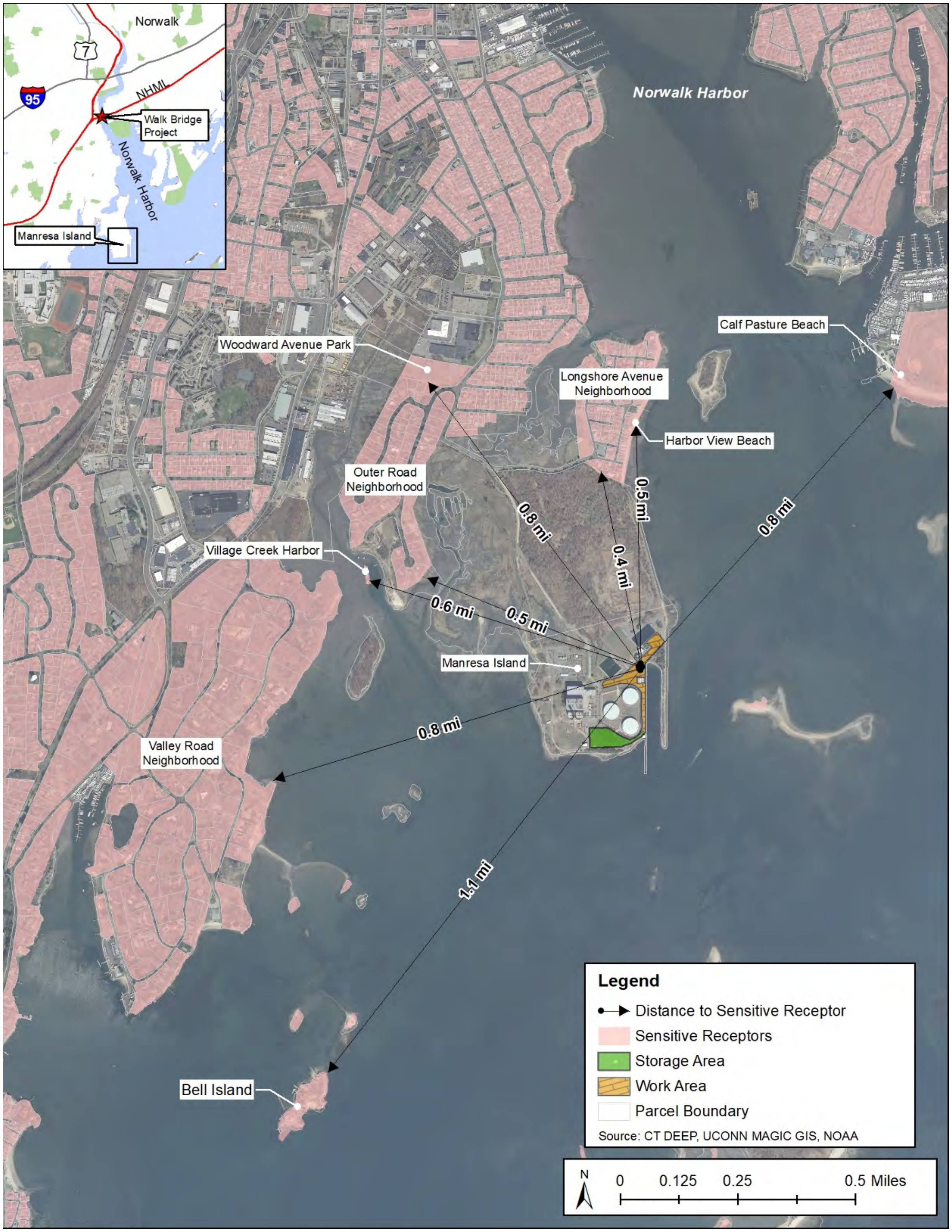


**Figure F-2—Proximity of Sensitive Receptors to Manresa Island Staging and Storage Yard**


**Figure F-3 – Manresa Island Staging and Storage Yard Barge Berthing Layout**

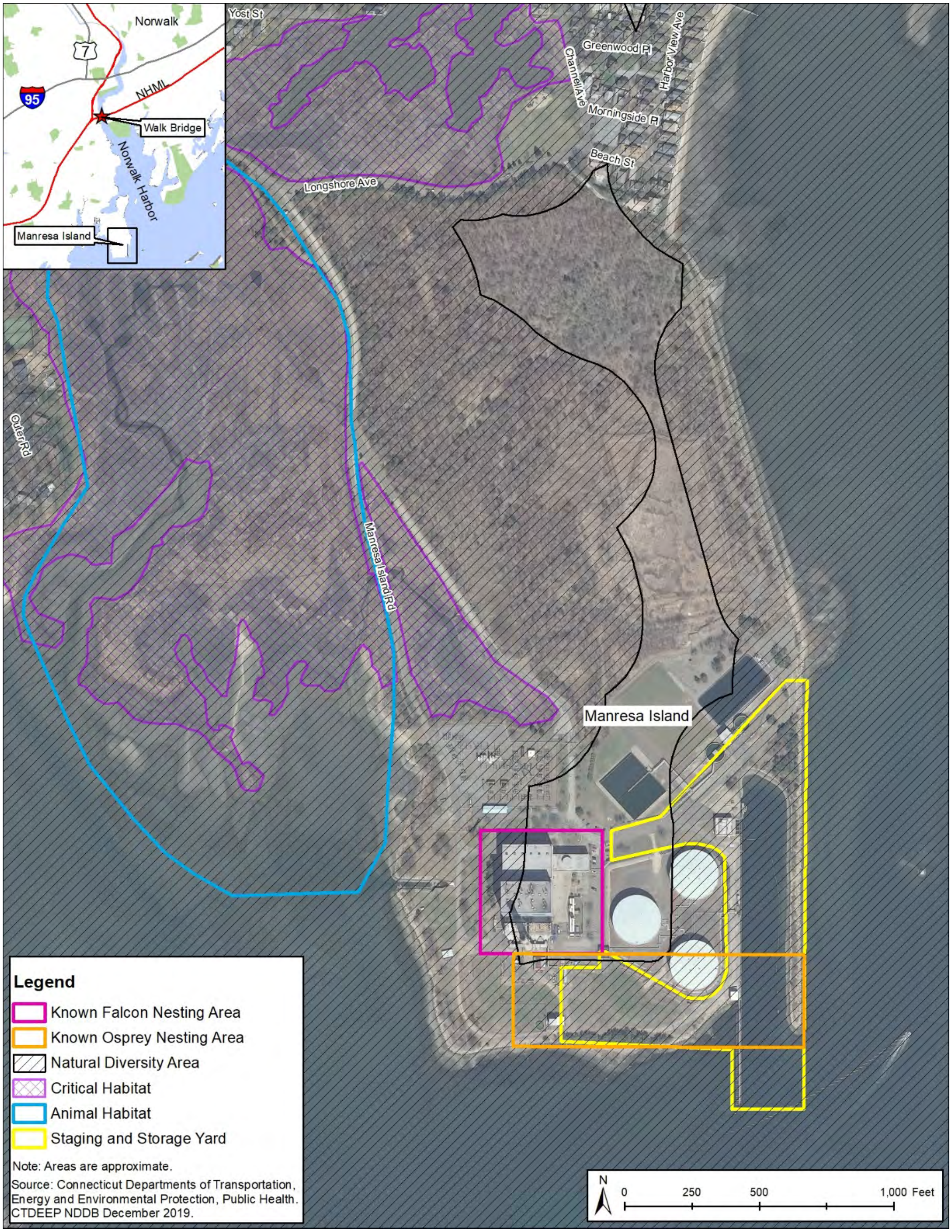


**Figure F-4 – Habitat at Manresa Island**