5. Construction Period Impacts

5.1. Introduction

Chapter 5 presents a general overview of construction activities and sequencing of the Build Alternative. This chapter also describes potential temporary, construction-related impacts and mitigation measures. Construction impacts of the Bascule Bridge are generally similar to those of the Vertical Lift Bridge, but differences are noted, especially impacts that are related to the shorter construction duration associated with the long span Vertical Lift Bridge (Option 11).

Construction sequencing and staging is conceptual at this preliminary level of design and will be refined as design progresses in future phases of project development.

5.2. Construction Schedule and Sequencing

Construction of the Build Alternative is expected to occur over approximately three and one-half to four years, depending on the option. The construction period for the project with a short span Vertical Lift Bridge may take several months less time than construction of a Bascule Bridge, and construction of a long span Vertical Lift Bridge is expected to take several fewer months than the short span. The project will involve typical bridge and railroad construction activities, including work in and over water, such as:

- Implementation of mitigation measures;
- Installation and maintenance of erosion and sedimentation controls throughout duration of project;
- Movement of materials and equipment;
- Excavation;
- Drilling foundation shafts;
- Pile driving;
- Installing and removing sheeting and cofferdams;
- Placement of fill;
- Compacting;
- Construction of retaining walls;
- Grading;
- Dredging;
- Water Handling;
- Bridge construction including erection of structural elements;
- Demolition;
- Installation of electrical and mechanical equipment;
- Construction of control house and associated electrical and plumbing work;
- Pouring concrete;
- Installation of railroad track, signal systems and OCS;

- Installation of temporary traffic controls;
- Installation of temporary, in-water trestle work platforms; and
- Use of barges during construction.

5.2.1. Sequencing with the Bascule Bridge (Option 4S)

Construction will occur in multiple stages over the construction period with the objective of accommodating railroad and marine traffic to the greatest extent possible. Relocation of the Eversource Energy wires will occur before bridge construction commences. Metro-North wires will be transferred to an underground duct bank and submarine cable early in construction. Construction sequencing and staging is conceptual at this preliminary level of design and will be refined as design progresses in future phases of project development. However, it is currently envisioned that the work for the project with the Bascule Bridge option will generally proceed in the following sequence with use of a temporary run-around structure. A run-around consists of a temporary two-track bridge structure placed on an alignment north of Walk Bridge. Once the run-around becomes functional, train operations shift from the existing bridge to the runaround; replacement of Walk Bridge then proceeds while rail service is accommodated on the run-around. The run-around is removed once rail service on the replacement bridge is fully operational.

- Implement mitigation measures;
- Build temporary trestles and temporary gravel access platform on the west bank under the bridge;
- Build retaining walls on the east side;
- Build run-around structure (if used) and switch rail traffic to Tracks 1 and 3 on run-around structure and close Tracks 2 and 4;
- Float out existing swing span;
- Demolish existing piers and fenders within sheet pile marine enclosures;
- Build retaining wall on west side;
- Build new approach spans;
- Demolish existing high towers;
- Install new control house;
- Float in new south bascule span and complete control house, counterweight, mechanical, and OCS systems for both spans;
- Finish track and OCS for Tracks 2 and 4 and open them to rail traffic;
- Float in new north bascule span;
- Finish work on north bascule if needed; install Tracks 1 and 3 and OCS and open them to rail traffic;
- Remove any remaining trestles; and
- Stabilize construction sites following removal of all construction-related equipment.

Modifying the temporary trestles, backfilling earth excavations and behind retaining walls and abutments, installing drilled shaft foundation and pier caps, and modifying OCS will occur as needed at various times during construction.

In general, construction sequencing will be similar under the "online" construction option, which does not build run-around tracks. Instead of using temporary run-around tracks, rail traffic will operate on the existing northern tracks (Tracks 1 and 3) while the southern portion of the bridge and approaches are first demolished, and the new bridge and tracks are then built (Tracks 2 and 4). Once the southern side is finished and Tracks 2 and 4 are operational, rail traffic is shifted to these new tracks from Tracks 1 and 3, and the northern portion of the bridge and approaches is first demolished, and new Tracks 1 and 3 and approaches are then built.

5.2.2. Sequencing with the Vertical Lift Bridge Short Span Option (Option 8A)

Construction will occur in multiple stages over the construction period with the objective of accommodating railroad and marine traffic to the greatest extent possible. Relocation of the Eversource Energy wires will occur before bridge construction commences. Metro-North wires will be transferred to an underground duct bank and submarine cable early in construction. Construction sequencing and staging is conceptual at this preliminary level of design and will be refined as design progresses in future phases of project development. However, it is currently envisioned that the work for the project with the short span option will generally proceed in the following sequence:

- Implement mitigation measures;
- Build temporary trestles and temporary gravel access platform on the west bank under the bridge;
- Relocate existing control house;
- Build east retaining wall on the south side;
- Close tracks 2 and 4;
- Remove existing approach spans for tracks 2 and 4;
- Partially remove existing swing span;
- Demolish existing high towers;
- Erect lift span towers on south side;
- Build south approach spans;
- Build west retaining wall on south side;
- Build new approach spans;
- Float in new south lift span; install counterweight, mechanical, and OCS systems, and testing;
- Install new control house;
- Demolish pivot pier;
- Finish track and OCS for Tracks 2 and 4 and open them to rail traffic;
- Remove approach spans on north side;
- Build west retaining wall on north side;
- Build north approach spans;
- Erect towers on north side;
- Float in new north lift span; install counterweight, mechanical, OCS systems, and testing;

- Install Tracks 1 and 3 and OCS and open them to rail traffic;
- Remove any remaining trestles; and
- Stabilize construction sites following removal of all construction-related equipment.

Modifying the temporary trestles, backfilling earth excavations and behind retaining walls and abutments, installing drilled shaft foundation, pier caps, and modifying OCS will occur as needed at various times during construction.

5.2.3. Sequencing with the Vertical Lift Bridge Long Span Option (Option 11C)

Construction will occur in multiple stages over the construction period with the objective of accommodating railroad and marine traffic to the greatest extent possible. Relocation of the Eversource Energy wires will occur before bridge construction commences. Metro-North wires will be transferred to an underground duct bank and submarine cable early in construction. Construction sequencing and staging is conceptual at this preliminary level of design and will be refined as design progresses in future phases of project development. However, it is currently envisioned that the work for the project with the long span option will generally proceed in the following sequence:

- Implement mitigation measures;
- Build temporary trestles and temporary gravel access platform on the west bank under the bridge;
- Relocate existing control house;
- Build new lift span foundations;
- Demolish existing high towers;
- Build lift span piers;
- Remove Track 2 and 4 superstructure;
- Build west approach substructure and walls;
- Build east abutment and retaining walls;
- Place new Track 2 and 4 superstructure;
- Build west approach;
- Build east approach;
- Erect lift span towers on south side;
- Remove existing swing span;
- Demolish pivot pier;

- Float in new vertical lift span for Tracks 2 and 4; install counterweight, mechanical, OCS system, and testing;
- Open Tracks 2 and 4; Lift span operational;
- Remove existing fender system and piers;
- Remove Track 1 and 3 superstructure;
- Build west approach substructure and walls;
- Build east abutment;
- Place new Track 1 and 3 superstructure;
- Build west approach;
- Build east approach;
- Erect lift span towers on north side;
- Float in new vertical lift span for Tracks 1 and 3; install counterweight, mechanical, OCS system, and testing;
- Open Tracks 1 and 3; Lift span operational;
- Remove any remaining trestles; and
- Stabilize construction sites following removal of all construction-related equipment.

Modifying the temporary trestles, backfilling earth excavations and behind retaining walls and abutments, installing drilled shaft foundation and pier caps, and modifying OCS will occur as needed at various times during construction.

5.3. Potential Impacts and Mitigation Measures

In general, potential construction impacts among the three Build options are the same or similar. The duration of those impacts would vary among the Build options, with the long span Vertical Lift Bridge (Option 11C) having the shortest duration of impacts, followed by the short span Vertical Lift Bridge (Option 8A). The Bascule Bridge option (Option 4S) would have the longest duration of construction period impacts.

5.3.1. Rail Transportation

CTDOT will strive to minimize disruptions to rail traffic by maintaining train service on as many tracks as possible during the project construction. Currently, rail transportation over Walk Bridge consists of a four-track operation. The normal four-track operation includes routine work windows, where certain tracks are taken out of service for maintenance as well as routine, scheduled time periods when all four-tracks are out of service to accommodate navigation traffic.

Throughout nearly all of the construction period, CTDOT intends to maintain weekday passenger train service by keeping at least two tracks in service. Long-term two-track outages, where a pair of tracks is taken out of service (Tracks 2 and 4 or Tracks 1 and 3), will be required. CTDOT estimates that over the course of the approximate four-year construction period, a four-track outage will be required in the Build Alternative (all three options) for limited periods of time. These limited four-track outage instances will be during the removal of the swing span, installation of temporary fixed spans, installation of new movable spans, and final operational adjustments of the new bridge. Each four-track outage will be of short-duration (several days); to the extent possible, the four-track outages will be scheduled during an off-peak and/or weekend period.

Prior to implementing the long-term, two-track outages, CTDOT will complete facility upgrades on the NHL to ensure continued train operations along the NHL and to minimize potential adverse impacts to Metro-North and Amtrak service. The two projects, which are described in Section 3.1, include improvements to the Danbury Branch at Dock Yard (State Project 0301-0180) and construction of a universal interlocking at CP-243 (State Project No. 0301-0181). While these projects have utility for improving NHL operations independent of the Walk Bridge Replacement Project, they also will minimize adverse effects of the Build Alternative during construction. Both NHL improvement projects will facilitate considerable train movement flexibility on the NHL main line. These improvements also will minimize the number of schedule adjustments required during the long-term track outages required for construction of the Build Alternative.

Construction of the long span Vertical Lift Bridge (Option 11C) would be approximately 40 months from construction start to restoration of four-track rail service; a two-track outage would be required for up to 30 months. Construction of the short span Vertical Lift Bridge (Option 8A) would be approximately 44 months from construction start to restoration of four-track rail service; a two-track outage would be required for up to 34 months. Construction of the Bascule Bridge (Option 4S) would be approximately 47 months from construction start to restoration of four-track rail service; a two-track outage would be required for up to 37 months.

CTDOT is coordinating the construction of the Build Alternative with other CTDOT projects located in close proximity to Walk Bridge. To reduce the number and duration of track outages in the vicinity of Walk Bridge, CTDOT will stage the construction of the Build Alternative with two other bridge replacement projects located along the NHL in Norwalk: the East Avenue Railroad Bridge Project (Bridge No. 42.14; State Project No. 170-1375) and the Osborne Avenue Railroad Bridge Project (Bridge No. 41.96; State Project No. 301-0161). Section 3.1 presents additional information about these projects. During final design and throughout the construction period, CTDOT will work with Metro-North, Amtrak, and freight service providers to ensure that train operations proceed in a manner that maintains service, facilitates passenger boarding and alighting at East Norwalk and South Norwalk Stations, and prioritizes the overall safety of the railroad corridor.

5.3.2. Marine Transportation

During construction, the Build Alternative will temporarily impact the navigation channel and marine transportation in the immediate vicinity of the bridge. Channel impacts will include channel closures, horizontal restrictions, and vertical restrictions. Construction-related marine impacts would vary among the three Build options.

Full channel closures consist of activities during which no waterway traffic can transit through the bridge, required for activities such as removing the existing swing span, erecting the new movable spans, and constructing and removing temporary supports. Full channel closure for these activities, each of which could require several days, would represent a very small percentage of the total anticipated in-water

construction time for the Build options. Depending upon the contractor's means and methods, the Bascule Bridge (Option 4S) and the short span Vertical Lift Bridge (Option 8A) could require three separate full closures, and the long span Vertical Lift Bridge (Option 11C) could require two separate full closures.

Depending upon the Build option and the contractor's means and methods, construction equipment may at times fully block the channel. Full, temporary blockage of the channel due to barges and work boats would be more likely to occur during construction of the Bascule Bridge (Option 4S) or the short span Vertical Lift Bridge (Option 8A). With Options 4S and 8A, the contractor's flexibility to work on either side of the river would be limited. Once the new bridge foundations are constructed in the east channel, the east channel becomes fully (and permanently) blocked, and all construction is limited to the west channel. At that stage of construction, channel restrictions or channel blockages are likely to occur. With the long span Vertical Lift Bridge (Option 11C), the contractor would have more flexibility to work on either side of the river, allowing one channel to remain open for much of the construction period.

Horizontal restrictions consist of activities during which the channel is partially blocked and the flow of vessels is restricted. Horizontal restrictions will be required during certain construction periods of the Build Alternative, such as during installation and use of temporary supports, removal of existing piers in the river, and installation of a new fender system. Horizontal restrictions also will be required due to the location of construction equipment in the river, such as barges and work boats.

Vertical restrictions consist of activities during which a fixed (non-movable) structure is placed over the channel, limiting the height of vessels allowed to pass through the channel at the bridge. Vertical restrictions during the in-water work period are anticipated, including when the swing span is not operable during relocation and/or removal of the existing control house, when the swing span is immobilized to allow construction in the east channel, when temporary channel spans are in place, and when one or both proposed movable spans are in place but not yet operable.

Due to the location of the east lift span tower foundation and elimination of the eastern intermediate approach span pier, the long span Vertical Lift Bridge (Option 11C) would require less work time in the river. Option 11C would allow the existing swing span to remain open for marine traffic for up to 14 months during foundation, wall and superstructure work. The long span Vertical Lift Bridge (Option 11C) would require a vertical navigation restriction for as few as 16 months, as opposed to an estimated 34-month vertical navigation restriction in the short span Vertical Lift Bridge (Option 8A) and an estimated 37-month vertical navigation restriction in the Bascule Bridge (Option 4S). If the run-around alignment were used, vertical navigation restrictions for Option 4S would be extended by approximately three months to complete installation of run-around bridge foundation and superstructure elements within the path of the swing span, during which the swing span will be immobilized.

Mitigation of adverse effects to marine users and water-dependent facilities during project construction will be varied and developed on a case-by-case basis. For example, vertical restrictions will affect barge and tug movements. One possible solution would be to provide tugboat-to-tugboat barge hand-offs at the vertical constraint. This would require the temporary posting of a tugboat upstream or downstream of the bridge to meet the incoming or outgoing tugboat and barge, as well as accommodations for secure transfer of the barge beneath the bridge. Depending upon the use of the run-around alignment and timing of the bridge opening restriction, a smaller harbor work tug, or lower profile tug, may be needed to assist in the transfers. Another potential mitigation measure may be to assist the upstream businesses that typically use barges for transporting aggregate with using trucks as an alternative means of transportation during the period of navigation constraints.

Taller vessels, such as sailboats or powerboats with fixed equipment extending above the vertical clearance, may be accommodated through temporary relocation to marine facilities south of Walk Bridge, or to other harbors nearby for winter storage, summer use, or both. For vessels requiring longer-term boat repairs or winter storage at upstream facilities, dropping sailboat masts downstream of Walk Bridge would facilitate passage to upstream facilities. This would require establishing agreements with a marine facility downstream of the bridge for dropping and stepping (raising) masts. Depending upon the mast type and boat, it may be possible for the vessel to carry the mast on-board through the construction area to its destination.

Smaller boats using the river, including rowing shells, generally will have access through the project construction area. With the exception of limited channel closures for specific bridge demolition and construction activities, as well as restrictions or closures due to construction equipment, the west channel would be available for smaller boats without vertical clearance challenges in all three Build Alternative options. Due to the construction flexibility of the long span Vertical Lift Bridge (Option 11C), smaller boats would incur less impacts in Option 11C than in either Option 4S or Option 8A.

CTDOT will coordinate channel closures with the City of Norwalk, USCG, USACE, and waterway users. In cooperation with USCG, USACE, the City of Norwalk, and the Norwalk Harbor Management Commission, CTDOT will continue to work with commercial and recreational marine users, including rowing groups, to develop mitigation strategies to address impacts to marine users during the project construction period.

5.3.3. Traffic, Transit, Parking, Pedestrians, and Bicyclists

Temporary adverse impacts to project area roadways are expected with the Build Alternative in the areas of North Water Street, Fort Point Street, and Goldstein Place due to partial lane closures or full street closures. These temporary impacts generally will be similar for the Bascule or Vertical Lift Bridge options. Full closure to public access of a portion of Goldstein Place, roughly from the back of existing buildings on Liberty Square north to the dead end is required, as properties north of this point on Goldstein Place will be temporarily needed during construction. Access to businesses on Liberty Square will be maintained. Partial lane closures and full street closures of North Water Street will be needed at times to safely conduct certain construction activities. During periods of partial and full closures, pedestrian and vehicular access to adjacent buildings and parking will be maintained. Partial lane closures of about a month and full street closures of Fort Point Street also will be needed at times to safely conduct certain construction activities. Full closures will generally be of short duration, typically on weekends. Access to businesses and downtown locations will be maintained, and disruptions from construction will be minimized to the extent possible.

There are no Norwalk Transit District (NTD) WHEELS buses that pass directly by these temporary lane or street closures on North Water Street or Fort Point Street. Therefore, an impact on these services is not anticipated.

If temporary closure of the NPA's North Water Street parking lot is necessary due to the temporary construction easement, ample replacement parking is available nearby, including the NPA's Haviland Street and Webster Street lots and the Maritime Garage. Similarly due to this easement, the portion of the NRVT adjacent to this parking lot might be closed to the public during construction. North Water Street and its sidewalks can be used by pedestrians and bicyclists. The Sheffield Island and Maritime Aquarium ferry docks also will be temporarily closed and relocated elsewhere in Norwalk Harbor. Section 5.3.12 describes potential impacts to ferry operations. Temporary lane or street closures of North Water Street may have an effect on existing routing to the Maritime Garage at 11 North Water Street. Except as previously noted, access to this and other parking facilities will be maintained and not be affected, but

some patrons may need to follow detour routes at times when a full street closure is in effect at the Walk Bridge. Detour routing with appropriate signage and traffic control will be used for temporary street closures of North Water Street and Fort Point Street. CTDOT will finalize the detour routes during advanced design phases in coordination with the City of Norwalk.

In addition to the temporary closure of a small section of the NRVT, as previously noted, disruptions to pedestrian and bicycle circulation may occur during construction; however, these impacts would be short-term in nature. Signage and flagging should be employed during construction to minimize impacts to pedestrian and bicyclist safety.

5.3.4. Land Use, Temporary Easements, and Displacements

In addition to the nine parcels to be acquired (as described in Section 3.6), CTDOT will require temporary easements on 12 parcels in South Norwalk and East Norwalk during construction of the Build Alternative. CTDOT will expand one existing easement (at the WWTP site) and will acquire 11 new full-parcel and partial-parcel easements. Temporary easements consist of access easements and construction easements. Temporary access easements will be minimally intrusive, and will provide access to the railroad ROW during construction. Construction easements will provide space for all aspects of construction, including equipment assembly and staging, equipment and materials storage, and river access for loading and unloading materials, equipment, and bridge elements. It is anticipated that the temporary easements will be in place through the duration of construction. In cooperation with the property owners and as design advances, CTDOT will determine the size of the temporary easements to be required. Properties in South Norwalk and East Norwalk would be similarly impacted in the three Build options.

As shown in Table 3-5, of the 12 temporary easements required for the project, six of the easements will not involve any displaced uses. At 18 Marshall Street (Parcel 2/24/8), the historic Lock Building site currently used by multiple businesses, CTDOT will potentially acquire access and construction easements on an area currently used for employee parking, including accessible parking, and service van delivery. South of the Stroffolino Bridge in South Norwalk, displaced uses on Water Street include a privately-owned parking area and a vacant warehouse. Temporary access and construction easements also will be required on the City of Norwalk's Maritime Aquarium property (Parcels 2/19/3 and 2/19/2) and the NPA's North Water Street parking lot (Parcel 2/19/1). Potential impacts to Parcel 2/19/3 include removal of the tensile structure, relocation of outdoor animal exhibits, and modifications to existing outdoor animal exhibits. In coordination with the City of Norwalk and the Maritime Aquarium, CTDOT is evaluating potential impacts to Parcel 2/19/2 (IMAX Theater). Potential impacts to Parcel 2/19/1 include temporary closure of the NPA's North Water Street parking facility.

If existing parking at the Lock Building (18 Marshall Street) or the NPA's North Water Street facility is affected, ample replacement parking is available nearby, including the NPA's Maritime Garage, and the 50 Webster Street lot and 8 Haviland Street lots. For employees of the office building at 68 Water Street, private parking and on-street parking is available in the vicinity. As needed, CTDOT will work with affected property owners to arrange for suitable temporary replacement parking.

As discussed in Section 5.3.2, restrictions on navigation during construction will affect upstream uses, including at least five industrial users/businesses and four recreational boatyards or clubs. This will be a temporary impact to navigation, and CTDOT will work with affected users and businesses to communicate regarding scheduled periods of access limitation and to identify appropriate mitigation options.

5.3.5. Socioeconomics

Construction-related socioeconomic impacts of the Build Alternative will include both temporary adverse impacts to land-based and water-dependent businesses and short-term economic gains due to construction jobs.

Access Impacts

As previously described, channel restrictions and a limited number of full channel closures will occur over the approximate four-year construction period. All Build options would incur these temporary impacts. The long span Vertical Lift Bridge option (Option 11C) would require the least amount and shortest duration of channel closures over the construction period, resulting in the least impact to water-based businesses. The Bascule Bridge option (Option 4S) would require the greatest amount and longest duration of channel closures, resulting in the greatest impact to water-based businesses. CTDOT has conducted meetings with water-based businesses upriver from Walk Bridge to ascertain their requirements during construction. Business owners indicated that channel closures of more than seven to ten days could be detrimental to their operations.

Both land-based and marine-based construction activities will occur around the Maritime Aquarium. Required construction easements on Parcels 2/19/2 and 2/19/3 may affect some of the Aquarium's facilities and operations. CTDOT has initiated meetings with the Maritime Aquarium to understand facility requirements and to apprise the Aquarium of potential construction impacts. In coordination with the Aquarium and the City of Norwalk, CTDOT is evaluating potential impacts to Parcel 2/19/2 (IMAX Theater). CTDOT will continue to work with the City and the Aquarium to determine the economic effects of these impacts, and to develop appropriate mitigation measures, including compensation.

Pedestrian and vehicular access to businesses and other downtown locations, including the Maritime Parking Garage, will be maintained, and disruptions from construction will be minimized to the extent possible. Potential parking impacts may occur at the NPA's North Water Street parking facility and at two private business sites in South Norwalk due to construction easements. CTDOT will coordinate with the City of Norwalk and stakeholders to minimize adverse effects of the project construction upon local land-based and water-based businesses. CTDOT will develop a business coordination plan, which will entail providing regular construction updates to the business community, including regular navigable channel impact updates on the project website.

Construction Job Impacts

The Build Alternative will result in temporary benefits to the local economy through new construction jobs and construction-related spending. USDOT estimates that there are 13,000 short-term job-years created per one billion dollars of government investment (or $76,923 per job-year in 2014 dollars).[1] This job-year estimate includes direct on-site jobs, indirect jobs in supplier industries, and jobs that are induced in consumer goods and services industries as workers with direct and indirect jobs spend their increased incomes. Based upon this federal guidance, and the anticipated construction costs and construction duration for each option, Table 5-1 presents the estimated range of job-years generated each year during construction for the three Build Alternative options.

[1] USDOT, *TIGER Benefit-Cost Analysis (BCA) Resource Guide*, updated 3/27/2015, a supplement to the *2015 Benefit-Cost Analysis Guidance for TIGER Grant Applicants.* (http://www.dot.gov/tiger/guidance)

Table 5-1—Potential Construction Period Job-Years per Build Alternative Option

Build Option	Construction Cost Range (in 2020 dollars)	Construction Duration (months)	Range of Job-Years Generated Each Year During Construction
Bascule Bridge (Option 4S)	$330 to $365 million	44	1,100 to 1,200
Short Span Vertical Lift Bridge (Option 8A)	$380 to $415 million	40	1,300 to 1,500
Long Span Vertical Lift Bridge (Option 11C)	$425 to $460 million	37	1,600 to 1,700

5.3.6. Water Quality

Construction activities are the most probable source of potential releases of soils or sediments, or entrained contaminants, which can contribute to water quality impacts. Work in the Norwalk River will be unavoidable and will require disturbance to sediments for construction of new piers, temporary trestles, work areas, dredging and removal of existing piers. Land based work similarly will expose soils which have the potential to erode, or get dispersed by wind and eventually settle in water bodies. Water quality controls will be implemented during construction and where necessary to control releases of sediments or minimize turbidity in the Norwalk River.

CTDOT will employ Best Management Practices (BMPs) while conducting all work within the water. CTDOT will remove existing granite piers and timber support piles within cofferdams to allow work to be conducted in the dry and to protect against releases of sediments and potential contaminants to the watercourse. Drilled shafts for the new bridge will be installed using sheet pile marine enclosures or oversized pipe enclosures to isolate work and to protect against releases of sediments to the water. Installation of contractor trestles and fender piles (and run-around bents if the run-around alignment is used with the Bascule Bridge option) likely will be constructed using some form of hydraulic vibro–hammer, then seated with either a diesel or hydraulic impact hammer. The Build Alternative will require confined excavation of sediment associated with the installation of piers, fenders, and contractor work elements. The Bascule Bridge option will require the removal of approximately 6,800 cy of confined sediment while the Vertical Lift Bridge options will require approximately 8,200 cy and 7,600 cy of confined sediment removal for the short span Vertical Lift Bridge option and the long span Vertical Lift Bridge option respectively.

The run-around alignment, if used for the Bascule Bridge option, would be constructed in one of two ways: it would be constructed as an open deck structure, where all runoff would fall directly into the river; or it would be constructed as a waterproof, steel pan closed ballasted deck, where runoff would be collected, and either directly discharged into the river or channeled landward to some means of temporary water treatment such as an oil/water separator. Rail wheel greasers may be used as a noise control measure due to the tight radius of the run-around track. Using a closed ballasted deck system will help protect from oil and grease releases to the river.

CTDOT will conduct dredging in two locations to widen the navigation channel necessary to support the expanded width of the new bridge span. Approximately 4,100 cy of dredging will be required in the Bascule Bridge option and the short span Vertical Lift Bridge option, and approximately 4,900 cy of dredging will be required in the long span Vertical Lift Bridge option. Channel dredging will be conducted using a hydraulic clamshell bucket during the approved in-water work months, typically November through January where containment is not required. Similarly, CTDOT likely will use a clamshell bucket system to excavate approximately 4,200 cy of sediment for installation of the permanent submarine utility cable and the submarine bridge controls, and removal of the temporary submarine cable

installed as part of the CP-243 Interlocking Project.[2] It is anticipated that both the channel dredging and conduit installation work will be conducted in unconfined water during the appropriate allowable work windows.

Sediment requiring management from confined and unconfined excavation and dredging totals approximately 15,100 cy for the Bascule Bridge option and approximately 16,700 cy of sediment for the two Vertical Lift Bridge options. CTDOT's Office of Environmental Compliance (OEP) will conduct sediment testing and will investigate sediment disposal options, including upland, off shore, or in-water (confined aquatic disposal [CAD]) methods. Pending the results of the sediment testing, up to 100 percent of the excavated and dredged sediments will be dewatered at an adjacent staging or construction site, and then removed for reuse/recycling/disposal at an off-site land-based facility, an offshore disposal location, or an in-water CAD location in accordance with reuse/recycling/disposal regulations. Decanted water from the dredged materials will be tested and appropriately treated and returned to the river or disposed off-site in accordance with CTDOT specifications and permit requirements.

The submarine trench backfill will consist of clean material matching the grain size characteristics of the removed sediments, and placed to restore the riverbed to its original state.

To create a temporary working surface and access area, a small area on the west bank near the Build Alternative's western movable bridge span pier will be filled with gravel and stone. Containment methods (such as turbidity curtains, sheeting, geotextile encapsulation) will be required for this contractor-proposed gravel and stone work area. The turbidity curtains will extend from the surface to the bottom of the river around the work area to ensure that sediment does not release to the river. Depending upon the fill materials, geotextile fabric encapsulation may be used to contain fine sediments within the fill. It is expected that this fill will be removed following completion of the project. Silt curtain containment also will be used during the removal of the contractor work area.

For discharges into waters of the U.S., a Section 401 Water Quality Certification will be required from CTDEEP and a Section 404 General Permit will be required from USACE. These permits will stipulate that this work is consistent with the federal Clean Water Act and the Connecticut Water Quality Standards. A National Pollutant Discharge Elimination System (NPDES) permit will also be required as administered by the State of Connecticut via a General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities.[3]

Pursuant to Section 402 of the Clean Water Act and CGS Section 22a-430b, General Conditions Applicable to Water Discharge Permits and Procedures and Criteria for Issuing Water Discharge Permits, the project will require a site-specific Stormwater Pollution Prevention Plan (SWPPP). The SWPPP will identify potential pollutant source areas and describe BMPs to be used for erosion and sedimentation control, temporary stormwater management, dust control, and site stabilization. All land-based activities will use erosion and sedimentation control BMPs to limit debris and runoff from entering the watercourse or offsite areas. The SWPPP will be completed during the project's final design phase and will be implemented by the Construction Manager/General Contractor (CM/GC).

5.3.7. Tidal and Freshwater Wetlands

Temporary impacts are defined as reversible impacts, indicating that the environmental resources will return to pre-disturbance conditions once the construction activities are completed and the areas are

[2] The CP-243 Interlocking Project is described in Section 3.12. The extent of removal of the temporary cable will be determined as design advances and during permit applications in accordance with federal and state requirements.
[3] United States Environmental Protection Agency. *Administration of the NPDES Stormwater Permit Program in New England.* Accessed February 2016 from: http://www3.epa.gov/region1/npdes/stormwater/administration.html.

restored. Temporary impacts to tidal and freshwater wetlands include indirect impacts due to shading of the contractor construction trestles, the run-around alignment, and contractor access and staging from the shore. Temporary loss of tidal wetland habitats will occur as a result of construction of the run-around alignment (if used, for the Bascule Bridge option), contractor staging/access, and from temporary contractor construction trestles (associated with all three Build Alternative options).

In the Build Alternative, the construction of the temporary contractor construction trestles located to the north and south of the existing Walk Bridge will result in the temporary indirect impact of approximately 1,900 sf of vegetated tidal wetlands due to shading for the Bascule Bridge option and 1,500 sf for either Vertical Lift Bridge option. The construction of contractor staging and access areas will result in the temporary indirect impact of approximately 900 sf of vegetated tidal wetlands for the Bascule Bridge option and 1,000 sf for either Vertical Lift Bridge option due to contractor staging and access areas in close proximity or spanning tidal wetlands. In total, between 2,500 and 2,800 sf of temporary indirect impact will occur to estuarine intertidal emergent wetlands. These areas will be restored after construction of the replacement bridge is completed, the contractor trestles have been removed, and other aspects of the construction are completed

There will be no temporary impacts to freshwater wetlands as a result of the construction phase for the Build Alternative. The impacts to the lone freshwater wetland are permanent.

5.3.8. Floodplains

Most of the area surrounding the bridge falls within the 100-year floodplain; as a result, many of the construction activities will take place in this resource. The activities associated with construction, including the contractor trestles, construction staging/access, and possible run-around alignment (Bascule Bridge option only), will encompass a total of approximately 230,000 sf of floodplain. The majority of this area, however, will be used for construction staging activities and access to the railroad ROW or the waterway; it will likely not alter the capacity of the area for flood storage, or inhibit any existing avenues for flood water movement.

During temporary construction work, the increase in the number and types of structures in the water at the bridge opening will contribute toward flow restrictions. Examples of structures include temporary trestle works for the contractor, work embankment, the run-around tracks, and cofferdam containment during removal of the existing piers. Additionally, at some point during the construction period, both the existing bridge piers and some of the new bridge piers will be located in the river simultaneously.

CTDOT will analyze the temporary conditions to assess effects and, if needed, will take steps to mitigate effects. The hydraulic analyses performed for the permitting phase of the project will include an evaluation of the temporary conditions, and will require approval from CT DEEP. Upon completion of the Walk Bridge Replacement Project, temporary features affecting the ground and floodplain will be restored.

5.3.9. Terrestrial Resources

Although construction activities have the potential to impact some terrestrial species, these impacts will be largely addressed via a combination of avoidance measures (construction phasing or sequencing, seasonal restrictions, etc.) and BMPs. Should any generation of surplus soil materials from upland areas occur, it will be managed in accordance with state and federal regulations for soil reuse/recycling/disposal. Loss of herbaceous coverage will be temporary, since upon completion of the bridge approach construction activity, all exposed bare soil areas will be stabilized via re-seeding.

No mitigation is needed for temporary impacts to characteristic terrestrial fauna, which are anticipated to be negligible.

5.3.10. Aquatic Resources

Temporary loss of intertidal habitat including mudflats, and subtidal habitat will occur as a result of construction of the run-around alignment (if used, for the Bascule Bridge option), and from contractor staging/access, temporary contractor construction trestles, and cofferdams used for removal of existing piers. The run-around alignment construction (if used) would impact approximately 50 sf of intertidal flat and 150 sf of subtidal habitat. These temporary impacts would not be applicable to either Vertical Lift Bridge option, which would not use the run-around alignment.

Temporary indirect impact also will occur due to the construction of contractor staging and access areas, impacting approximately 6,700 sf of intertidal flat and approximately 700 sf of subtidal habitat. The use of contractor trestles will temporarily impact approximately 100 sf of intertidal flat and 400 sf of subtidal habitat. Temporary impacts also will result from the use of cofferdams for removal of the existing piers, impacting approximately 700 sf of intertidal flat and 4,800 sf of subtidal habitat. Except where indicated, these impacts would apply to all three of the Build Alternative options.

Work requiring structures that contact the benthic environment, such as installing new support piles and fender piles and removing old piles and piers, will be conducted in accordance with CTDOT's Best Management Practices.[4] To minimize bottom sediment disturbance during construction of the replacement bridge, new drilled shaft pilings will be installed using either sheet pile marine enclosures or oversized pipe enclosures. This construction method, which would be used with all three Build Alternative options, will minimize turbidity and protect the water quality of the river. Water from inside the casing (and sheet pile enclosures) will be pumped to a treatment (i.e., settling or filtering) area to remove suspended sediments before being returned to the river, in accordance with the 2002 Erosion and Sedimentation Guidelines and CTDOT's Best Management Practices.

Other piles, such as those used to support contractor trestles and the run-around alignment (if needed) will be smaller diameter piles that are advanced directly through the unconsolidated sediment down to bedrock or a competent subsurface formation. The footprint of the casings and piles will represent a temporary loss of benthic habitat. Once construction activities are completed, they will be removed from the project area or cut below the sediment surface elevation, allowing the disturbed area to recolonize with benthic biota.

Dredging to install the bridge control submarine conduit would result in temporary impact to approximately 100 sf of intertidal flat and approximately 1,700 feet of subtidal habitat for the Bascule Bridge option. Because the bridge control cables in either of the Vertical Lift Bridge options would be located on the movable span, there would be no corresponding impacts associated with these options. Dredging to install the Metro-North submarine conduit will result in approximately 100 sf of impact to intertidal flat and 2,500 feet of subtidal habitat in the Build Alternative (any option). These portions of the benthic environment will be restored by the replacement of the removed material with clean fill of similar grain size characteristics as the native material removed to install the conduits. The surface will be naturally recolonized by benthic biota.

In sum, temporary impacts to habitat would include approximately 7,750 sf of impact to estuarine intertidal habitat, and approximately 10,250 sf of impact to estuarine subtidal habitat with the Bascule

[4] CTDOT, Standard Specifications for Roads, Bridges, Facilities, and Incidental Construction, Form 817, Section 1.10, Environmental Compliance. 2016

Bridge option. Essentially the same or slightly less impacts to intertidal habitats would occur with either of the Vertical Lift Bridge options (approximately 8,400 sf of impacts to subtidal habitat).

The intertidal and subtidal areas will be restored after construction of the replacement bridge, the contractor trestles have been removed, and other aspects of the construction are completed. During construction, incorporation of BMPs and low-impact, in-water construction methods will minimize temporary water quality impacts.

Estuarine fish species are adapted to survive frequent environmental fluctuations characteristic of estuaries such as temperature, salinity, and chemical changes. However, prolonged or permanent alterations of the physical and chemical parameters of their habitats due to human activities can be detrimental to the fish that reside in these habitats, resulting in behavioral and physical impairment. Therefore, the following measures will be utilized as appropriate for the protection of water resources during bridge demolition and construction of the new bridge to minimize any impact to finfish, shellfish, and other aquatic resources:

- Management of turbid water generated inside casing or cofferdam containments;
- Replacement of native materials cut from the submarine conduit alignments with clean fill matching grain size characteristics;
- Mechanical removal of select existing bridge components;
- Separation and removal of sediment-laden water from containment areas (e.g., inside cofferdams, and inside casings); and
- Avoidance of construction blasting.

These measures will be implemented regardless of which Build Alternative option is pursued.

CTDOT will prepare an EFH Assessment pursuant to the Magnuson-Stevens Fishery Conservation and Management Act for the Build Alternative as the design is further refined and as the contractor's means and methods of construction are advanced.

If elevated levels of pollutants of concern are found during sampling and testing required during the permitting phase of the project, additional BMPs may be warranted. If required, these BMPs will be evaluated and implemented through coordination with the regulatory agencies. Therefore, since BMPs will be incorporated into the project, and since impacts to the channel bottom will be regulated under the dredging permit process, no additional mitigation is needed for temporary impacts to water resources. The need for mitigation will continue to be assessed as project design advances.

Compensatory mitigation for habitat displacement due to the construction phase impacts is anticipated to use a 1:1 ratio for temporary direct impacts to intertidal and subtidal habitats, and for indirect shading impacts to tidal vegetated wetlands. This will involve in-place restoration or enhancement of temporary impact areas. This also will include restoring tidal marsh areas that may be temporarily impacted from trestle platform shading, and other compensatory mitigation options as determined in coordination with the USACE and CTDEEP through project permits.

5.3.11. Endangered, Threatened, and Special Concern Species

Endangered, threatened, and special concern species live in the project area; CTDOT's focus during construction activities will be to first avoid, then minimize disruption to these species and their habitats.

As noted in Section 3.15.3, the state endangered Peregrine Falcon was recently observed nesting on "High Tower 529." A potential construction period impact to the Peregrine Falcon is the temporary disruption of nesting on the high tower structures should falcons choose to nest in the project area and construction activities coincide with nesting season. To address the potential presence of nesting Peregrine Falcons in the project area, the contractor will be required to coordinate through the Resident Engineer at least ten days prior to the commencement of any construction activities to arrange for a CTDOT Environmental Inspector from the Office of Environmental Planning (OEP) (or an authorized delegate) to be available to meet and discuss proper protocol for maintaining environmental commitments made for the protection of this species and its habitat. The inspector will notify workers if a Peregrine Falcon is reported in the project area, and all workers will be apprised of the laws protecting them. Photographs and the laws protecting Peregrine Falcons will be posted in the Contractor's and CTDOT field offices. Species identification sheets will be obtained from CTDEEP or OEP. Any observations of this species will be immediately reported to OEP through the Resident Engineer.

Table 5-2 identifies the seasonal occurrence of federally-listed marine species in Long Island Sound according to NMFS. There is a chance that two sturgeon species and four sea turtles may occur within the Norwalk River or Harbor. Further consultation with NMFS Northeast Regional Office (NERO) may be required as the project design advances. In-water work with potential to temporarily impact these species (i.e., dredging the navigation channel and the installation and removal of utility conduits) will likely be subject to seasonal time of year restrictions when the federal trust species are not expected to occur in the Norwalk River estuary. Therefore, potential temporary impacts to these species will be avoided.

Table 5-2—Seasonal Occurrence of Federally-listed Marine Species Reported to Occur in Long Island Sound

Species	Status / Time of Occurrence in Coastal Long Island Sound Waters
Leatherback Sea Turtle	Enter northern waters in spring, maximum numbers occur in summer, retraction of turtles southward in autumn
Loggerhead Sea Turtle	Migration into New England waters in the spring, maximum numbers peaking in the summer, followed by a southward retraction of numbers in autumn
Atlantic Ridley Sea Turtle	Occurrence in northeastern waters documented by cold- stunned individuals stranded on beaches in autumn months, but distributional data lacking across all seasons.
Green Sea Turtle	Rarely encountered in New England waters.
Shortnosed Sturgeon	Only breeding population in CT is in the Connecticut River (but occasionally strays are reported in the Housatonic and Thames Rivers). After spawning upriver in April-May, they return to the lower tidal estuary between Haddam and Old Saybrook where they remain until June-July. Afterwards they retreat offshore to warmer waters in winter
Atlantic Sturgeon	Rarely seen in CT. Live in saltwater, occasionally entering freshwater rivers in April – June to spawn. After spawning, females return to ocean waters. Males may linger until fall. Young reside in river for 2-7 years before returning to ocean.

Sources: Klemens, 1993; Jacobs and Odonell, 2009.

Additional consultation with NMFS will occur for review and concurrence during the permitting process as final construction details are identified. Since no hibernacula or maternity roosts are reported to occur

within one-quarter-mile of the project area, as determined by CTDEEP,[5] specific alternative mitigation measures to protect the Northern Long-eared Bat are neither required nor proposed.

The potential concern for state special concern Common Tern and the state threatened Great Egret may be the temporary disruption of their foraging activities along the Norwalk River in immediate proximity due to turbidity induced from in-water work (e.g., dredging). However, since certain in-water work will be enclosed, and the river dredging will be scheduled to occur during the late fall to late winter dredging window when these species have migrated south, no permanent impact to these species is anticipated. To protect the Great Egret, Common Tern, the two sturgeon species, the four marine turtles, and EFH-designated fish species, no in-water work with potential to cause substantial and prolonged turbidity events will occur outside of the construction window established in the requisite permits, without use of proper controls. In addition, BMPs will be employed to avoid the deposition of demolition debris or other construction materials in the water and intertidal habitats. Therefore, no additional mitigation is anticipated.

The USFWS IPaC tool identified 24 migratory birds of Conservation Concern which have distributional ranges overlapping the project site and immediate vicinity. No impact is expected to occur to the majority of the migratory birds, because they are not expected to be present in the project vicinity due to the lack of suitable migratory stopover habitat. There is the potential for temporary construction impacts to affect four threatened or endangered migratory bird species in the vicinity of Walk Bridge. Table 5-3 identifies the threatened or endangered species from the IPaC list that are likely to be encountered at the site, the potential temporary impacts due to construction, and proposed conservation measures. As indicated in Table 5-3, measures will be taken to avoid and/or minimize impacts to the species during construction.

Table 5-3—Selected List of Migratory Birds of Conservation Concern in the Vicinity of Walk Bridge

Species Common Name / *Scientific Name*	Applicable Season	CT Status	Potential Impact	Conservation Measure
Bald Eagle *Haliaeetus leucocephalus*	Year round	Threatened	Disruption of foraging / winter roosting	Conduct vegetation clearing in early December before many of the eagles arrive in the area; monitor for eagle presence during construction
Least Tern *Sterna antillarum*	Breeding	Threatened	Disruption of foraging	BMPs to protect water quality
Pied-billed Grebe *Podilymbus podiceps*	Year-round	Endangered	Disruption of foraging outside of breeding season; Not expected to occur as a breeding resident	BMPs to protect water quality. This species was not reported by the CTDEEP NDDB as known to occur in the project area as a resident breeder
Snowy Egret *Egretta thula*	Breeding	Threatened	Temporary disruption(s) in foraging	Avoidance. In-water work with potential to disrupt foraging (dredging) will occur when this migratory species is essentially absent from CT

Source: USFWS, IPaC Report, January 2015.

[5]CTDEEP, "Northern long-eared bat Areas of Concern in Connecticut to Assist with Federal Endangered Species Act Compliance," February 1, 2016.

5.3.12. Water-Dependent Uses

Existing water-dependent uses to be displaced by construction of the Build Alternative will include uses at 11 Goldstein Place (Parcel 3/1/25). Additionally, operations of the Sheffield Island Ferry and the Maritime Aquarium vessel will be impacted by project construction.

For the duration of the construction period, these impacted water-dependent uses will need to be relocated. Marina users displaced by the closure of Coastwise Boatworks (11 Goldstein Place) could be accommodated through a variety of solutions. One possible mitigation measure would be dispersal of marina users to other nearby marine facilities located upstream or downstream of Walk Bridge, or to nearby harbors, and as appropriate considering vertical clearance requirements. Discussions with the City of Norwalk indicate that a currently closed upstream marina may be available for temporary use by the current operator of Coastwise Boatworks. Use of the marina may be facilitated through lease or purchase, and potentially could become the long term solution to the displacement. Similarly, rowers based at the Coastwise Boatworks site may relocate to other facilities in the harbor or upriver from the site. It is anticipated that the Sheffield Ferry and Aquarium vessel operations will be relocated to docking facilities in Norwalk Harbor.

CTDOT has participated in several meetings with water-dependent users, including community-based and area-wide rowing groups, to determine their existing use of the Norwalk River and potential construction period impacts. Working in coordination with the City of Norwalk, the Norwalk Harbor Management Commission, rowing organizations, the Norwalk Seaport Association, and the Maritime Aquarium, CTDOT will continue to explore mitigation opportunities for addressing temporary impacts to marina users, rowers, and ferry and vessel operations.

Section 5.3.3 addresses potential temporary impacts to the pedestrian/bicycle path fronting the WWTP property and the pedestrian/bicycle path along the western side of the river at the Aquarium property. Following construction of the project, the pedestrian/bicycle paths and access to the paths will be restored to pre-construction conditions.

5.3.13. Parklands, Public Recreation, and Community Facilities

Given its close proximity to the bridge and due to the required construction easements, the Maritime Aquarium facilities will be impacted by the project. Potential impacts include removal of the tensile structure and modification and relocation of the outdoor animal exhibits currently located north of the bridge. South of the bridge, the construction easements potentially may affect use of the IMAX Theater. In coordination with the City of Norwalk and the Maritime Aquarium, CTDOT is evaluating impacts to the IMAX Theater. CTDOT is coordinating with the Maritime Aquarium to avoid or minimize impacts on aquarium animals, facilities, and operations to the extent possible.

As noted in Section 5.3.3, construction easements south of the IMAX Theater might potentially require temporary closure of the NPA's North Water Street parking lot and the adjacent portion of the NRVT. It is anticipated that the Sheffield Island and Maritime Aquarium ferry docks will be temporarily relocated elsewhere in Norwalk Harbor.

A temporary construction staging area will be located on the grounds of the Norwalk WWTP. Temporary construction activities will directly affect both the WWTP property and the Harbor Loop Trail where it extends through the WWTP property. This may affect the Harbor Loop Trail, but impacts will be limited by the fact that only a small portion at the end of the existing trail at Walk Bridge will be affected. The construction of the north-south pedestrian/bicycle connection at the southern end of the Harbor Loop Trail

may also result in temporary impacts to this portion of the trail. The operation of the WWTP will not be affected by the temporary construction staging.

Temporary construction activities may result in visual and noise impacts on users of the riverfront parks and trails. Construction activities and staging will occur in close proximity to the back and sides of the interlocking building, which houses the SONO Switch Tower Museum. Temporary impacts to the Switch Tower Museum are not anticipated at this time.

CTDOT has conducted consultation with the City of Norwalk, and will continue coordination regarding the temporary use of City-owned property, including parks or trails, during construction. Temporary park impacts will be mitigated to the extent possible by minimizing impacts from noise, as described in Section 5.3.16.

5.3.14. Visual Resources

The construction activities will involve temporary visual impacts due to construction staging, including use of temporary trestles in the water, and the introduction of the temporary run-around alignment in the river on the north side of the bridge, if this construction option is employed. These construction staging areas will be more visible from vantage points along the river, including parks, trails, and adjoining uses/buildings with water views.

During the construction period, views of the river will be changed. The temporary run-around tracks (if this option is employed) will be visible north of the bridge. Trestles and barges on the river, as well as construction and storage areas, also will be highly visible on the waterfront and around the Maritime Aquarium facility and other affected portions of the downtown. The potential removal of the Maritime Aquarium's tensile building in the northwest quadrant of the bridge would be a change to this viewshed.

5.3.15. Air Quality

Demolition and construction activities can result in short-term increases in dust and equipment-related particulate emissions in and around the project area. Equipment-related particulate emissions can be minimized if the equipment is well maintained. The potential air quality impacts will be short-term, occurring only while demolition and construction work is in progress.

Air quality impacts during construction will be generated by motor vehicle, machinery, and particulate emissions resulting from earthwork and other construction activities. Construction vehicle activity may result in increased motor vehicle emissions within certain areas. Construction vehicle emission impacts can be mitigated through implementing and maintaining a comprehensive traffic control plan, enforcing emission standards for gasoline and diesel construction equipment, and stipulating that unnecessary idling and equipment operation is to be avoided.

Several air quality construction mitigation best practices are available to assist in reducing diesel emission impacts from construction equipment. Off-road diesel engines can contribute substantially to the levels of particulate matter and nitrogen oxides in the air. In recent years, USEPA has set emissions standards for engines used in most new construction equipment. However, construction equipment can last for a long time, and it may take several years before all equipment is furnished with engines that meet USEPA standards. To address this, CTDOT and FTA can implement several strategies to reduce emissions from the older engines that are in operation today.

Reducing pollutant emissions from older off-road diesel engines can occur through a variety of strategies, including the following: reducing idling, properly maintaining equipment, using cleaner fuel, and retrofitting diesel engines with diesel-emission control devices. By reducing unnecessary idling at the construction site, emissions will be reduced, and fuel will be saved. Proper maintenance of the diesel engine also will allow the engine to perform better and emit less pollution through burning fuel more efficiently. Switching to fuels that contain lower levels of sulfur reduces particulate matter. Using ultra-low sulfur diesel does not require equipment changes or modification, and the fuel is readily available. Using fuels that contain a lower level of sulfur also tends to increase the effectiveness of retrofit technologies. Retrofitting off-road construction equipment with diesel-emission control devices can reduce particulate matter, nitrogen oxides, carbon monoxide, or hydrocarbons, in addition to other air pollutants. Diesel particulate filters can be used to physically trap and oxidize particulate matter in the exhaust stream, and diesel oxidation catalysts can be used to oxidize pollutants in the exhaust stream. In the final design phase, CTDOT will consider including the measures on a voluntary or mandatory basis.

5.3.16. Noise and Vibration

The construction noise and vibration assessment was prepared according to the guidelines presented in FTA's guidance manual. At this stage in the project development, it is not feasible to perform a detailed analysis. However, following the FTA guidelines, it is possible to identify areas of potential impact that will need more detailed attention, as during final design and construction planning prior to contractor mobilization. The construction is projected to last up to four years. The project will be built while maintaining train traffic through the construction site. Work will most likely be scheduled with special tasks occurring at night when train operations are significantly lower than during the day. CTDOT anticipates that both daytime and nighttime construction noise will occur in the project area.

A general noise assessment was prepared by dividing the project area into four segments;

- At-grade track work west of the Walk Bridge;
- Demolition and re-construction of the Walk Bridge;
- At-grade track work east of the Walk Bridge; and
- The primary work staging area at 11 Goldstein Place.

The two noisiest pieces of anticipated construction equipment were then identified for each segment. The equipment had maximum noise source levels ranging from 101 to 88 dBA. The following is a list of equipment selected, in order with loudest piece of equipment first:

- Diesel hammer to drive piles for the temporary trestles along the shore of and in the river in all four quadrants of the Walk Bridge construction site, and adjacent to the proposed staging area southwest of Washington Street;
- Impact hammer to bust rivets during demolition of the existing Walk Bridge;
- Vibratory hammer to drive temporary sheet piles along the at-grade track sections to retain the existing fill during construction of new retaining walls;
- Rail saw to cut the rails to exact length prior to being welded together; and
- Crane to lift raw materials and finished bridge components.

The two noisiest pieces of construction equipment to be used on the at-grade track work west and east of the Walk Bridge will be the vibratory hammer and the rail saw. The construction equipment that will

create the most noise for the Walk Bridge (in-water) segment will be diesel hammers and the impact hammer for busting rivets. The diesel hammer will be loudest piece of equipment during construction of the loading trestle adjacent to 11 Goldstein Place. Once the loading trestle is built, the loudest piece of equipment will be a crane.

Table 5-4 presents the FTA's construction noise assessment criteria for different land uses. Even though most of the equipment will never be used simultaneously, the two noisiest project construction sources were combined into one source located at the center of each construction section to develop a maximum one-hour Leq noise level. These noise levels were then used to identify areas abutting the construction project where noise levels will exceed the values in Table 5-4.

Table 5-4—FTA Construction Noise Assessment Criteria

Land Use	One-hour Leq (dBA)	
	Day	Night
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: FTA Transit Noise and Vibration Impact Assessment, page 12-7

The 80 dBA Leq area encompasses a number of residential areas and the aquarium. Residences include properties along Water Street and N. Water Street from Hanford Place north to Ann Street, plus other properties on Elizabeth, Haviland, Washington, N. Main, and Marshall Streets west of the Norwalk River. East of the river, the 80 dBA Leq area includes properties along Goldstein Place, Fort Point Street, and Van Zant Street.

Considerably fewer properties are located in the 90 dBA Leq area than in the 80 dBA Leq area. At the center of the project, the aquarium is included in the 90 dBA zone. Along the at-grade track sections west and east of the river, only properties within 115 feet of the 4-track centerline are located in the 90 dBA Leq area and will be affected. There are no residential properties located within the 90 dBA area surrounding the primary construction staging area at 11 Goldstein Place.

The Bascule Bridge (Option 4S) potentially includes the construction of a run-around alignment to maintain train service through the corridor. The run-around would be constructed on a concrete deck with a ballasted track north of the existing Walk Bridge and slightly closer to the aquarium. Train speed on the run-around would be 15 mph compared to the existing limit of 45 mph on the Walk Bridge. The run-around would raise the train noise levels 1 dB at the aquarium.

As final design and construction planning continues, CTDOT will consider the following mitigation measures:

- Install temporary noise barriers between noise-sensitive receptors and noisy stationary equipment;
- Locate stationary equipment as far from residential areas as possible;
- Designate dedicated truck routes to keep construction trucks from residential areas; and
- Schedule noisy operations to be performed simultaneously, as the slightly louder noise levels will be offset by less exposure to the public.

Throughout the construction duration, CTDOT will keep the public informed of proposed construction schedules, noisy activities and nighttime work.

The Maritime Aquarium has provided the noise criteria presented in Table 5-5. CTDOT is working with the aquarium to ensure proper interpretation of these guidelines for the protection of its fish and animals.

Table 5-5—Aquarium Noise Level Guidelines

Species	Noise Level Guidelines	
	Normal	Short Term
Fish	85 dB	110 dB
Harbor Seals	85 dB	110 dB
Meerkats	80 dB	90 dB
Reptiles	85 dB	110 dB

Source: The Maritime Aquarium at Norwalk,

The FTA guidance manual provides a method to assess potential damage from construction-generated vibration levels, based on the peak particle velocity (PPV) in inches/second and human annoyance, expressed in terms of VdB,. The vibration criteria shown in Table 5-6, excerpted from the FTA guidance manual, were developed to be applied during the environmental assessment process to identify locations that will be addressed during final design.

Table 5-6—FTA Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

Source: FTA Transit Noise and Vibration Impact Assessment, Table 12-3

The FTA source data for diesel hammers and vibratory hammers were provided in an upper range and a typical range. Applying the upper range indicates that a PPV of 0.5 in/sec would be exceeded at 50 feet from the pile driving for the temporary trestles along the shore of and in the river in all four quadrants of the Walk Bridge construction site, and adjacent to the proposed staging area southwest of Washington Street. The 0.12 in/sec criteria would be exceeded within 140 feet of the pile driving. The typical range would only result in an exceedance of the 0.3 in/sec criteria within 50 feet of the pile driving. At a distance of 100 feet, the vibration levels would be below both the 0.2 in/sec criteria and the more stringent 0.12 in/sec criteria. Depending on the construction, the aquarium and IMAX Theater could be within the area of influence for the pile driving.

The vibratory hammer will be used to install temporary sheet piles along the at-grade track sections west and east of the Walk Bridge. The upper range source data for the vibratory hammer will create exceedances of the 0.2 in/sec criteria at 55 feet and the 0.12 in/sec criteria at 85 feet. The typical range for a vibratory hammer will not exceed any of the criteria at 50 feet.

Human annoyance from the construction vibration could extend much farther into the community than the PPV exceedances. The upper range source data for pile driving has the potential to create annoyance out to distance of 500 feet from the pile driving activities, and the typical range can extend 300 feet from the source. Annoyance from an upper range vibratory hammer would be the same as a typical pile driving operation. The typical range vibratory hammer has the potential to create annoyance within 100 feet of the source.

A vibratory compactor will create annoyance within 140 feet of the compactor. The use of a compactor is proposed during the construction of the northwest access road, located between the aquarium's outside exhibit and Walk Bridge; and during the construction of the gravel pad under the new bridge approaches between the aquarium and the IMAX Theater. Both instances could be a source of annoyance to persons visiting the aquarium facilities.

Hoe rams for breaking piers or bridge abutments, large bulldozers, drilled shafts and loaded trucks would create annoyance for residences located within 75 feet of these sources.

CTDOT is committed to preventing vibration damage to buildings in the areas affected by the pile driving and the use of the vibratory hammer. Mitigation measures could include:

- Conducting pre-construction surveys of potentially affected buildings to determine the appropriate building category and conditions of the structure;
- Establishing vibration limits;
- Developing a vibration monitoring program;
- Conducting post-construction surveys;
- Establishing dedicated truck routes that would keep construction trucks from residential areas;
- Phasing construction activities that create vibration so that multiple sources of vibration do not occur at the same time; and
- Keeping the public informed of proposed construction schedules, especially identifying activities known to be a source of vibration.

CTDOT is participating in ongoing discussions with the Maritime Aquarium so that construction vibration will not adversely affect the aquarium's fish and mammals.

CTDOT will discuss the need for vibration mitigation measures with NMFS and CTDEEP, including addressing potential vibration impacts on fish living/migrating in the Norwalk River, as design progresses and as permit applications are prepared for the Build Alternative.

5.3.17. Cultural Resources

During construction, potential impacts to historic properties that are adjacent to the project generally will not differ from construction-period impacts to other properties. The one area of special concern is vibration from construction-vehicle traffic, compaction to create access facilities, excavation and backfilling, and pile-driving. As indicated in Section 5.3.16, construction-vehicle traffic is not expected to generate vibration levels that would be damage-causing. However, other construction-period vibration impacts could affect buildings that are not in good structural condition. Many of the historic buildings that abut the project area are well over 100 years old, and they may not have the same physical resistance to vibration as modern buildings. These buildings include the Interlocking Tower (SoNo Switch Tower Museum) and other historic buildings on the north side of Washington Street in the South Main and Washington Streets Historic District; the two former factory complexes (Norwalk Lock Company and Norwalk Iron Works) north of the railroad ROW on North Water Street; the circa 1910 commercial building at 68 Water Street; and the buildings that make up the potential Liberty Square Historic District, on the east side of the Norwalk River. All of these historic buildings are adjacent to construction staging/access areas.

As indicated in Section 3.22.3, the temporary access easement at Parcel 2/19/3 will be minimally intrusive, and is not expected to affect the former Norwalk Iron Works Building. The construction easement potentially will require the removal of the modern tensile structure adjoining the historic structure. Provided no physical damage occurs to the historic building due its removal, the removal of the modern structure will not impact the historic building. In fact, its removal may restore the appearance and integrity of the historic building.

Pre-construction inspection of building elements susceptible to damage, documentation of the buildings' pre-existing states, condition assessments by a structural engineer, and real-time monitoring of vibration levels may be required during construction. CTDOT will coordinate with adjacent property owners to establish protocols for conducting pre-construction and construction survey and monitoring activities, as required.

The potential for construction-period impacts to archaeological resources is discussed in detail in Section 3.22.3, since there is no meaningful distinction in terms of temporary versus permanent impacts with regard to disturbance of significant archaeological remains. Stipulations in the MOA regarding historic properties include the implementation of an Archaeological Treatment Plan that will account for project impacts to archaeological resources.

5.3.18. Hazardous and Contaminated Materials

The construction of the Built Alternative will result in potential impacts to environmental risk sites and from hazardous material. Based on the age of Walk Bridge and overhead contact system (including high towers), it is probable that the existing bridge and support facilities contain lead-based paint (LBP), ACM, and polychlorinated biphenyl (PCB)-containing equipment, as well as other contaminants. It is likely that creosote and other contaminants are present in the existing bridge foundations and fender system, and the approximate 5,900 linear feet of existing rail and ties to be demolished and replaced.

To prevent the exposure of workers and the surrounding community to contamination during construction of the Walk Bridge Replacement Project, CTDOT will implement a number of protective measures. During design, CTDOT will conduct its due diligence relative to contaminated material investigations. As a part of this, sampling of soil, sediment, groundwater and other media anticipated to be impacted by project construction will be completed during the design phase of the project. CTDOT will also survey and evaluate structures for ACM, lead-based paint, and potential PCB-containing equipment prior to dismantling/demolishing the existing bridge, control tower, OCS, and high towers.

CTDOT will develop specifications for the removal of ACM impacted by construction and/or demolition operations in accordance with all applicable federal and state regulations. Obsolete equipment containing PCBs will be removed and properly disposed per federal and state regulations. Appropriate engineering controls required by the regulations, such as containment, dust control measures and the use of personal protection equipment, will be used to minimize exposure. Demolition activities will be conducted in accordance with OSHA and state regulations. CTDOT will direct the contractor to provide Connecticut Department of Public Health (CTDPH) with advance notification prior to abatement and removal activities.

Construction of new bridge piers, fenders, ancillary structures, and contractor work trestles, as well as the channel dredging, will require the management and disposal of approximately 15,100 cy of dredged sediments for the Bascule Bridge option and approximately 16,700 cy of dredged sediments for the two Vertical Lift Bridge options. On-site management and off-site disposal of excavated soils, resulting from the construction of new land-based bridge piers, also may be required. CTDOT is completing testing of the river sediments, soils, and groundwater to be impacted. During final design, CTDOT will prepare

specifications for the management, dewatering, and off-site disposal of excavated soil and dredged sediment. Temporary waste stockpile area(s) will be constructed, managed and dismantled in accordance with CTDEEP regulatory and permit requirements. CTDOT has identified approved upland facility sites for the disposal of excess soil and sediments. In cooperation with CTDEEP and USACE, and depending upon the results of sediment testing, CTDOT will investigate disposal options for the dredged material, including land-based, offshore, or in-water (CAD) disposal methods.

5.3.19. Safety and Security

CTDOT's construction specifications require development of a Safety and Health Plan specific to the Walk Bridge Replacement Project. This plan will conform to the Occupational Safety and Health Administration (OSHA) regulations and reflect site-specific conditions and protocols to be followed during project construction based on contamination detected during subsurface investigations conducted during the design phase of the project.

Prior to construction start, CTDOT will require the contractor to develop an overall site safety plan. The safety plan will address construction worker and site safety, site security, and public safety, including safety of adjacent properties.

The site-specific public safety plan will be designed to prevent public exposures, including protection of the public from nuisance conditions (such as construction noise and dust), avoid disrupting public routes and services, and maintain a continuous separation between the construction areas and public spaces. The plan also will include an emergency action plan to identify procedures to be followed in the event of an emergency.

CTDOT's construction specifications include supplemental specifications for addressing public health and safety issues, including rodent and pest control.[6]

5.3.20. Public Utilities and Service

There will generally be no effect on, or disruption to, local public utilities during construction. Most of the construction activities will not take place where public utilities exist. However, there are several areas where construction is near public utilities or on or over public streets, such as North Water Street, Fort Point Street, and Goldstein Place. In areas where construction may affect public utilities or take place on public streets, the owning utility will be contacted to locate the utility, and care will be taken to avoid disruption to the utility and interruption of service in accordance with CTDOT construction specifications.

5.3.21. Title VI and Environmental Justice

Construction may incur short-term impacts on adjoining neighborhoods, including environmental justice (EJ) and Limited English Proficiency (LEP) populations. Section 3.26 presents an overview of the demographic characteristics for the EJ communities of concern (defined by the Census Tracts) identified by the SWRPA regional planning agency. Table 5-7 presents the minority, low-income, and LEP characteristics of the four block groups immediately adjoining the project site potentially affected by project construction.

[6] CTDOT. Supplemental Specifications to the Standard Specifications for Roads, Bridges, Facilities and Incidental Construction. Form 816, 2004. January 2016

Table 5-7—Minority, Low-Income, and LEP Characteristics for Study Area Census Blocks

EJ Category	Tract 441 Block Group 1	Tract 441 Block Group 2	Tract 442 Block Group 2	Tract 442 Block Group 3
% Minorities	69.2%	69.3%	71.7%	60.4%
% Below Poverty	21.9%	25.7%	12.7%	5.7%
Per Capita Income	$39,012	$49,312	$19,330	$41,932
% LEP (individuals over age 5)	23.3%	18.2%	30.2%	14.8%
% LEP (households)	13.32%	12.9%	18.41	9.0%

Notes: Poverty thresholds are updated annually for changes in inflation and the cost of living, and dollar value thresholds vary by family size and composition. The 2014 poverty thresholds used by the U.S. Census Bureau included $12,316 for an individual under the age of 65 without children and was $11,354 for an individual 65 years or older.
Source: U.S. Census Bureau 2010 Decennial Census, Table P2, Hispanic or Latino, and Not Hispanic or Latino by Race; 2014 American Community Survey 5-year Estimate, B17021: Poverty Status of Individuals in the Past 12 Months by Living Arrangement; B19301: Per Capita Income in the Past 12 Months (in 2014 Inflation-Adjusted Dollars); B16002: Household Language by Household Limited English Speaking Status; and B16004: Age by Language Spoken at Home by Ability to Speak English for the Population 5 Years and Over.

The census block groups encompassing the project site have minority populations of 60.4 percent to 71.7 percent, and three of the four block groups have higher percentages of low-income populations (12.7 percent to 25.7 percent) than the city, county, and state as a whole. Block Group 3 in Tract 442 to the southeast (encompassing the Goldstein Place and Liberty Square neighborhoods) has a relatively low percentage (6 percent) of low-income residents. Per capita income for the southwestern Block Group 2 in Tract 441 (including the Ironworks residential development and other recent or pending developments in SONO) was higher than per capita income for the state and city (but slightly lower than that for the county).

The surrounding block groups had 22 percent LEP for the population over 5 years of age in 2014, which was higher than the percentages for the state, county, and city as a whole. These block groups had a combined percentage of LEP households of 13.4 percent in 2014, higher than that for the city, county, and state. For LEP households in these block groups, the majority (61 percent to 84 percent) are Spanish speaking, and the percentages of Spanish speaking LEP individuals over age 5 ranged from 54 percent to 96 percent of the total block group LEP population.

Potential impacts to EJ populations during construction will include temporary visual effects, temporary traffic detours in the immediate area of the bridge construction, and temporary increases in noise and vibration, and air quality emissions. These impacts are short-term and will not be disproportionately adverse. These impacts will occur to all adjoining properties, including newly constructed, high-end developments built adjacent to the railroad (e.g., Ironworks Building). The majority of the adjoining parcels and land uses fronting on the railroad and Walk Bridge in the SONO District are either commercial uses (accommodating mixed uses and residential use) or institutional in nature.

All three Build options will have similar impacts on EJ communities, although the long span Vertical Lift Bridge will lessen the duration of construction impacts. The environmental justice impacts resulting from permanent property displacements are addressed in Section 3.26.

Mitigation measures, including potential noise/vibration mitigation (such as pre-construction surveys and vibration monitoring) and measures to reduce dust emissions or air quality impacts, are described in the preceding sections.

CTDOT will implement a Public Involvement Program during construction to provide information on construction activities that will include outreach to EJ communities, as described in Section 3.26. Public involvement will include use of the project website, project newsletters, public meetings, and press releases to provide updates on project construction. Outreach performed to date has included contacting city officials, community and neighborhood organizations to identify EJ contacts and groups and to develop means of communicating and coordinating with these entities. A Spanish-language project fact sheet has been developed, posted in appropriate locations, and distributed, and public meeting notices have been posted and sent to these grassroots organizations.

Construction updates posted on the project website will include language translation features. Outreach to LEP populations will include language translation in newspapers in general circulation to EJ populations and translation of public notices and key project updates, including Spanish and Haitian Creole translations of the project factsheet for the project's public hearing on the EA/EIE. A Local Presence Plan will include community outreach, in train stations, pop-up kiosks, and attendance at local events, as well as outreach beyond the project limits to include commuters, to provide construction updates and information on project construction activities, including the coordination of the project with other CTDOT construction projects.