DRAFT ENVIRONMENTAL ASSESSMENT

DRAW ONE BRIDGE REPLACEMENT PROJECT

Cambridge & Boston, Massachusetts

Federal Transit Administration
U.S. Department of Transportation

Massachusetts Bay Transportation Authority

December 2024

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Bridge No. B-16-479 Cambridge & Boston, Massachusetts

Federal Transit Administration
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Prepared pursuit to:

42 USC 4321 et seq. and 23 CFR 771
49 USC 303 and 23 CFR 774

PETER SHANNON BUTLER

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Peter S. Butler
Regional Administrator
Federal Transit Administration, Region 1

Date of Approval

December 2024

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Acronyms and Abbreviations

ACM	Asbestos-containing materials
ACS	American Community Survey
APE	Area of Potential Effects
B&MRR	Boston and Maine Railroad
BET	Boston Engine Terminal
BHCC	Bunker Hill Community College
BPDA	Boston Planning & Development Agency
CAA	Clean Air Act
CCTV	Closed-circuit television
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
CO	Carbon monoxide
CSO	Combined sewer overflow
CSX	CSX Railroad
CZM	Massachusetts Office of Coastal Zone Management
CZMA	Coastal Zone Management Act
DCR	Massachusetts Department of Conservation and Recreation
DFE	Design Flood Elevation
EA	Environmental Assessment
EDR	Environmental Database Report
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental justice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse gas
GIS	Geographic Information Systems
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
HAPC	Habitat Areas of Particular Concern
HASP	Health and Safety Plan
LCP	Lead contaminated paint
LFA	Lead Federal Agency
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
DMF	Massachusetts Department of Environmental Protection Division of Marine Fisheries
MassDOT	Massachusetts Department of Transportation

MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGH	Massachusetts General Hospital
MGL	Massachusetts General Law
MHC	Massachusetts Historical Commission
MHD	Massachusetts Highway Department
MIT	Massachusetts Institute of Technology
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MWRA	Massachusetts Water Resources Authority
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NHPA	National Historic Preservation Act
NNEPRA	Northern New England Passenger Rail Authority
NO_2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PIP	Public Involvement Program
PLC	Programmable logic controller
PM_{10}	Particulate matter with a diameter of 10 microns or less
$PM_{2.5}$	Particulate matter with a diameter of 2.5 microns or less
RCNM	Federal Highway Administration Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Concern
ROW	Right of way
SHPO	State Historic Preservation Office
SIH	Signal Instrument House
SIP	State Implementation Plan
SO_2	Sulfur dioxide
TNW	Traditional Navigable Waters
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
VMT	Vehicle miles traveled

WPA	Massachusetts Wetlands Protection Act
WQC	Water Quality Certification

ES. Executive Summary

ES.1. Introduction

The Federal Transit Administration (FTA) and the Massachusetts Bay Transportation Authority (MBTA) have prepared this National Environmental Policy Act (NEPA) Environmental Assessment (EA) to evaluate the Draw One Bridge Replacement Project (the "Proposed Project") in the cities of Cambridge and Boston, Massachusetts.

MBTA proposes to replace the Draw One Bridge,[1] the Boston and Maine Railroad (B&MRR) Signal Tower A, and associated MBTA infrastructure. MBTA owns the rail infrastructure and Right-of-Way (ROW) and contracts with Keolis to operate the commuter rail system; Amtrak also uses the bridge and ROW for its *Downeaster* service between North Station and Brunswick, Maine. Both the Draw One Bridge and the B&MRR Signal Tower A building are eligible for listing in the National Register of Historic Places (NRHP). The Proposed Project also includes modification to the Massachusetts Department of Conservation and Recreation (DCR)-owned North Bank Bridge, which crosses the MBTA ROW north of the Draw One Bridge.

The Draw One Bridge extends across the Charles River northwest of MBTA's North Station, crossing the Charles River approximately 100 feet and 300 feet west of (upriver of) the Leverett Circle Connector Bridge and the Leonard P. Zakim Bunker Hill Memorial Bridge (Zakim Bridge), respectively, each of which carry vehicular traffic. The Leverett Circle Connector Bridge connects to Interstate 93 (I-93) at the north end, and the Zakim Bridge carries traffic along both I-93 and U.S. Route 1. Nearby properties on the north bank of the Charles River include North Point Park to the west of the MBTA ROW, which contains a boat launch ramp used by DCR, the Massachusetts State Police Marine Section, and the Boston Duck Tours Company; and Paul Revere Park and Boston Sand & Gravel to the east of the MBTA ROW. The North Bank Bridge, which serves cyclists and pedestrians on the north side of the Charles River, crosses over the MBTA ROW on the north bank and connects North Point Park to Paul Revere Park. On the south bank of the Charles River, a Massachusetts General Hospital (MGH) administration building and its parking lots and floating dock are west of the MBTA ROW and North Station; TD Garden arena is above North Station. Land to the east of the MBTA ROW on the south bank of the river (i.e., beneath and adjacent to Interstate 93 [I-93] and U.S. Route 1 infrastructure) is partly developed with a parking lot adjacent to the Gridley Locks Footpath, which provides pedestrian and bicycle access across the Charles River, connecting to Paul Revere Park on the north bank; this property is owned by DCR and is planned to be improved with a new South Bank Park.

The Proposed Project would require permanent acquisition of an approximately 0.003-acre (131-square foot [sf]) portion of currently unmaintained, sparsely vegetated land adjacent to the east side of the MGH administrative building for track alignment and clearance and an approximately 0.019-acre (828-sf) area in the proposed South Bank Park for the installation of a new manhole. MBTA would also require five temporary construction easements for staging and access, including one at the MGH administrative

[1] The existing Draw One Bridge comprises two bridge spans crossing the Charles River, though it is referred to in the singular in this EA.

building parking lots (0.25 acre); three at existing DCR parklands (1.08 acre at Paul Revere Park,[2] 0.84 acre at North Point Park, and 0.11 acre at a DCR pier and riverfront walkway); and one at the proposed South Bank Park (0.514 acre). MBTA would temporarily use Boston Sand & Gravel property for construction access pursuant to a license agreement, executed in 2001, granting MBTA the right to enter their property for access to and egress from Signal Tower A and MBTA ROW. Modifications to the North Bank Bridge would require alteration to the existing DCR easement for the relocation of two existing piers and the construction of one additional pier within MBTA ROW. The boat launch ramp in North Point Park may experience multiple temporary closures, and the MGH floating dock and approach ramp would be temporarily removed during construction of the Proposed Project.

Construction is expected to last approximately eight years, beginning in 2026, and be completed in 2034.

ES.1.1. Proposed Actions

As currently contemplated, the Proposed Project would be implemented with federal funding authorized by FTA. In addition, the Proposed Project would require a bridge permit from the United States Coast Guard (USCG) and a Clean Water Act (CWA) Section 404 permit from the U.S. Army Corps of Engineers (USACE).

ES.1.2. Project Sponsor and Lead Agency

MBTA is the Local Lead Project Sponsor. FTA is the Lead Federal Agency under NEPA, USCG and USACE are cooperating agencies, and the Federal Railroad Administration (FRA) is a participating agency. In accordance with NEPA, FTA must evaluate the environmental consequences of the Proposed Project prior to construction activities.

ES.1.3. Class of Action: Environmental Assessment (EA)

An Environmental Assessment (EA) is needed for an action for which the significance of the environmental impact is not clearly established (23 Code of Federal Regulations [CFR] 771.115). An EA is prepared when the action is not categorically excluded and does not appear to require the preparation of an Environmental Impact Statement (EIS) because no significant impacts are anticipated; preparation of an EA may assist in determining the need for an EIS.

This EA has been prepared pursuant to the National Environmental Policy Act (NEPA; 42 United States Code [USC] § 4321 et seq.); the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Parts 1500-1508); and FTA, Federal Highway Administration (FHWA), and FRA joint regulations implementing NEPA contained in the Environmental Impact and Related Procedures (23 CFR Part 771). This EA documents compliance with other applicable federal laws and regulations, including Section 106 of the National Historic Preservation Act (NHPA); the Conformity requirements of the Clean Air Act (CAA); the CWA; the Rivers and Harbors Act of 1899; Section 4(f) of the Department of Transportation Act of 1966 (Section 4(f)); the Endangered Species Act (ESA); Executive Order 11988 and United States Department of Transportation (USDOT) Order 5650.2 on Floodplain Management; Executive Order 11990

[2] The temporary construction easement at Paul Revere Park was previously assumed to be approximately 0.86 acre, which is reflected in the draft Section 4(f) agreement between MBTA and DCR in Appendix J, "Section 4(f)." However, based on DCR review and comment, the easement has been slightly increased to approximately 1.08 acre to accommodate an extension of the access drive.

on Protection of Wetlands; the Magnuson-Stevens Act related to Essential Fish Habitat (EFH); the Coastal Zone Management Act (CZMA); Executive Order 14096 on Environmental Justice (EJ); and the Environmental Justice Policy Guidance for FTA Recipients, FTA C 4703.1.

This EA first provides a discussion of the purpose and need for the Proposed Project; a description of the No Action Alternative (i.e., the "No Build" condition, or the condition in the future were the Proposed Project not implemented); a brief overview of reasonable conceptual "Build" alternatives to the Proposed Project that were previously considered but ultimately dismissed; and a description of the Proposed Project and its construction means, methods, and schedule, which has been advanced to preliminary engineering and environmental review. The affected environment (both existing and future conditions) is then described, followed by technical analyses that determine whether the Proposed Project, as compared against the No Action Alternative, would result in impacts to an array of resources that constitute the human-made and natural environments. The potential effects of the Proposed Project are characterized as direct or indirect, permanent or temporary, and comparison is made between the Proposed Project and the No Action Alternative. Finally, this EA identifies measures to avoid, minimize, and mitigate these impacts and inventories the various permits and approvals necessitating coordination with other federal, state, and local agencies; the mitigation measures are also examined for any potential effects that may result with their implementation.

ES.1.4. Agency Coordination and Public Involvement

NEPA requires that the Lead Federal Agency coordinate with other federal, state, and local agencies in the environmental review process as either cooperating agencies or participating agencies. Under NEPA, a cooperating agency has jurisdiction by law or special expertise with respect to any environmental issue being addressed in the NEPA analysis and, therefore, has more involvement in the NEPA process than other participating agencies. Other federal, state, and local agencies may request or be invited to be participating agencies in the environmental review process because the agency may be affected by the Proposed Project.

FRA is a participating agency and, given that the Proposed Project would require a bridge permit from USCG and a Section 404 permit from USACE, USCG and USACE are cooperating agencies in the environmental review process.

FTA and MBTA developed a Public Involvement Program (PIP) to coordinate engagement with stakeholders and members of communities potentially affected by the Proposed Project (e.g., residents, businesses, commuters, etc.) and their elected representatives, as well as federal, state, and local agencies (see Appendix A, "Public Outreach and Agency Coordination").

MBTA distributed an introductory email on May 13, 2024, to Amtrak, Boston Duck Tours Company, Boston Sand & Gravel, Charles River Boat Company, the Massachusetts Department of Transportation (MassDOT), MGH, and the State Police to describe the Proposed Project and provide an opportunity to arrange individual follow-up meetings if requested. In response, MBTA delivered a presentation to these groups, with the exception of the State Police, to discuss project alternatives, resources that may be potentially affected by construction and operations, measures to minimize or mitigate potential adverse environmental impacts, and other environmental review and agency consultation requirements. MBTA distributed the presentation to the State Police via email as they were unable to attend this initial meeting.

MBTA held meetings with DCR on June 5, 2024, and November 20, 2024, to provide an overview of the Proposed Project and discuss the potential use of Section 4(f) properties and proposed mitigation measures. In addition, a public meeting was held on June 6, 2024, to discuss project progress and provide an update on the status of Section 106 consultation. A public hearing will be held during the 30-day review period for this draft EA.

ES.2. Project Description

MBTA proposes to replace the Draw One Bridge, which carries Amtrak passenger and MBTA commuter rail traffic over the Charles River in the cities of Boston and Cambridge, Massachusetts. The existing two two-track bascule bridge spans still in use, as well as the supporting infrastructure of the two disused spans, would be replaced with three two-track, standalone vertical lift bridge structures within the footprint of the existing bridge (the new bridge structures would carry six tracks, rather than four). The Proposed Project would also replace the Boston and Main Railroad (B&MRR) Signal Tower A and modify the Massachusetts Department of Conservation and Recreation (DCR)-owned North Bank Bridge, which crosses the MBTA Right-of-Way (ROW) north of the Draw One Bridge. The existing signal system and switch heaters associated with the Draw One Bridge would be replaced, and a new drainage system would be provided. The existing Draw One Bridge and Signal Tower A, both of which are eligible for listing in the National Register of Historic Places (NHRP), would be demolished.

As described in Section 2.2.2, "Other Contemplated Projects in the Study Area," DCR's Cross River Pedestrian and Bicycle Crossing project is an entirely separate project from, and not part of, the Proposed Project considered herein.

ES.3. Construction

Construction is expected to begin in 2026 and be complete in 2034. The purpose of the Proposed Project is to keep this portion of the rail system in a state of good repair and improve the reliability and safety of rail service in the Boston metropolitan area and greater Northeast by replacing the current bridge, which is classified as both functionally and operationally obsolete and approaching the end of its useful life, as well as the existing signal tower and temporary control tower with a new Tower A to serve this new bridge. The Proposed Project would not result in any significant change in commuter or passenger rail operations.

Construction would be undertaken in five phases following site preparation and mobilization, which is estimated to take approximately four months. The existing Signal Tower A would be demolished and replaced in the first phase. The new bridge span, to the west/upstream of the existing structures, would be constructed and commissioned first, then each of the existing bridge spans would be replaced in two successive stages so that four tracks across the Charles River would remain in operation at all times. While most construction staging would occur on MBTA-owned property and barges in the Charles River, five temporary construction easements would be required.

ES.4. Planned Future Projects in the Vicinity of the Proposed Project Limits

Two transit projects and two park projects are expected to be completed or in construction in the future independent of the Proposed Project (in the No Action Alternative) in 2034. The MBTA Mainline Tracks Rehabilitation and Ancillary Improvements Project will rehabilitate and improve tracks, switches, signal systems, and drainage along the mainline tracks north of the Draw One Bridge to improve safety, reliability, and operational flexibility. Construction is expected to begin in 2025 and be complete in 2028. The MBTA North Station Platform F Extension and Ancillary Improvements Project will rehabilitate and extend Platform F at North Station, just to the southeast of the project site, and rehabilitate the two station tracks serving the platform. It will also improve platform lighting and egress to improve safety, reliability, and operational flexibility. Construction is expected to begin in 2025 and be complete in 2027.

DCR has planned a new South Bank Park to replace a portion of an existing DCR parking lot and a portion of the Gridley Locks Footpath, generally located below the I-93 and Route 1 elevated highway on the south side of the Charles River to the east of the project site. Construction is expected to begin as early as 2026, so for the purpose of these analyses it is assumed to be complete in 2034. DCR also has plans to develop the South Bank Bridge on the south bank of the Charles River as part of a commitment for the MHD Central Artery Tunnel Project. The bridge would provide pedestrian and bicycle access over the MBTA ROW just west of North Station, connecting Nashua Street Park to the DCR property that will contain the future South Bank Park. While the South Bank Bridge is assumed to be neither under construction nor complete in 2034, it is considered in the assessment of potential cumulative effects that may result with the Proposed Project. Similarly, DCR is independently contemplating a "Cross River Pedestrian and Bicycle Crossing," which would provide a separate Charles River crossing for pedestrians and cyclists. While it is assumed to be neither under construction nor complete in 2034, it is also considered in the assessment of potential cumulative effects.

ES.5. Comparison of No Action Conditions to Existing Conditions

With the No Action Alternative, conditions are generally expected to resemble existing conditions. The four existing Draw One Bridge tracks would remain in service until bridge components reach the end of their finite lives and fail outright despite ongoing maintenance and regular repairs. Bridge controls would continue to be operated from a temporary control tower structure, and the existing Signal Tower A would remain unsafe, and therefore unusable by operations staff, as it continues to deteriorate.

MBTA's planned mainline track and North Station platform transit improvements will represent an improvement in transit services over existing conditions in 2034, but residents, employees, those seeking medical care, students, and tourists visiting rail-accessible National Park Service (NPS) historical and recreational sites in Massachusetts, New Hampshire, and Maine would continue to experience delays, which would likely occur with greater frequency and longer durations. Current marine conditions would not be altered, but as the bridge ages, required maintenance and repairs are likely to increase the number and duration of channel restrictions and closures, affecting commuter and passenger rail service and marine transportation through the navigational channel.

The No Action Alternative would not result in the demolition of the existing Draw One Bridge and Signal Tower A, so while there would be no impacts to archaeological or historic architectural resources, ongoing deterioration of the bridge and building could require remedial measures that might be considered to diminish their integrity of materials and design and thereby cause an adverse impact.

Therefore, while there would be improvements to parklands and visual resources with the implementation of South Bank Park, the No Action Alternative would also result in adverse effects related to community facilities and services, cultural and historic resources, commuter and passenger rail service, and marine transportation.

ES.6. Comparison of With Action Conditions (Proposed Project) to No Action Conditions

The Proposed Project, similar to the No Action Alternative, would introduce no permanent effects to land uses or zoning in or near the project site. It would continue existing transportation land uses and be consistent with existing zoning regulations. It would not introduce new residents or employees to the study area, so as with the No Action Alternative, existing conditions related to its socioeconomic character would remain the same. The Proposed Project would not directly affect existing community facilities or emergency or medical services in the study area. The Area of Potential Effects (APE) contains no known archaeological resources, so there would be no effects with the Proposed Project.

The Proposed Project would require two permanent easements and five temporary (construction) easements and may result in minor and temporary construction-period impacts with respect to land use, socioeconomic conditions, community facilities and services, parks and recreational resources, pedestrian and bicycle facilities, visual and aesthetic conditions, natural resources, rail transportation and transit, marine transportation, noise and vibration, vehicular traffic, parking, and hazardous materials.

In contrast with the No Action Alternative, the Proposed Project, including the new Draw One Bridge and Signal Tower A, would return rail infrastructure over the Charles River to a state of good repair and enhance the reliability and safety of passenger and commuter rail for people living and working in or visiting greater Boston and the New England coast.

Also in contrast with the No Action Alternative, the Proposed Project may result in construction-period impacts with respect to land use, socioeconomic conditions, community facilities and services, parks and recreational resources, pedestrian and bicycle facilities, visual and aesthetic conditions, natural resources, rail transportation and transit, marine transportation, noise and vibration, vehicular traffic, parking, and hazardous materials. Any of these construction-period impacts, however, would be minor and temporary, not significant or permanent.

The Proposed Project would result in minor permanent impacts to parks and recreational resources, though generally conditions would resemble those with the No Action Alternative. While slight modifications to the North Bank Bridge, affecting landings in North Point Park and Paul Revere Park, would be required to accommodate and tie into the new rail infrastructure, the Proposed Project would not impede access to these parks. It would require the acquisition of an extremely small portion of the South Bank Park site for the installation of a new manhole in approximately the same location as an existing manhole, but this would not represent a direct or indirect significant impact to the future South Bank Park.

It would also require the permanent removal of public sidewalks along the east and west sides of the existing Draw One Bridge south trestles, but these sidewalks terminate before the navigable Charles River channel and do not provide access to pedestrian or bicycle facilities north of the river, so this would not represent a significant impact to pedestrian and bicycle resources.

Local soils and topography would be permanently altered by the excavation and grading required to construct the proposed Draw One Bridge and rail approaches, but these resources have been largely altered by the placement of manmade fill material and subject to frequent disturbance over many years.

Construction of the Proposed Project would require the demolition of the NRHP-eligible Draw One Bridge and Signal Tower A, resulting in a permanent adverse effect to historic resources, in contrast with the No Action Alternative. This adverse effect would be unavoidable but mitigated.

There would be no unmitigated adverse impacts with the Proposed Project.

ES.7. Summary of Mitigation and Commitments

Pursuant to the requirements of Section 106 of the NHPA, a Memorandum of Agreement (MOA) will be executed among FTA, MBTA, SHPO/MHC, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and DCR to identify measures to be taken to address adverse effects to the existing Draw One Bridge and Signal Tower A. The draft MOA, which is currently being refined and finalized by FTA in coordination with the Section 106 consulting parties, contains mitigation measures including Historic American Engineering Record (HAER) documentation of the bridge spans; a Historical Architectural Building Survey (HABS) for Signal Tower A; interpretive displays of the bridge and tower in both Cambridge and Boston; a video for public viewing online showing trains crossing the Draw One Bridge and the bridge structures being raised and lowered; a historic context study of bridges across the Charles River; the potential salvage of significant features of the bridge and tower; and provision of design plans to SHPO/MHC, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and DCR for review and comment.

Pursuant to Section 4(f), coordination with DCR is ongoing for their review and comment on the Proposed Project's use of Section 4(f) parks and recreational resources. Measures to minimize harm to parklands and public recreation areas in the vicinity of the Proposed Project will be developed with and agreed upon by MBTA and DCR. Potential measures to minimize harm may include signed detours for pedestrians and bicyclists for each walking/biking path affected during construction activities; regrading, seeding, and planting new trees, shrubs, and other plants; and/or general landscaping for areas disturbed by construction.

MBTA will develop an Unanticipated Discoveries Plan, to be included in construction contract specifications and documentation, that will be followed if any unanticipated archaeological and/or human remains are encountered during construction.

To avoid and minimize construction-period impacts, MBTA will undertake ongoing outreach to affected neighborhoods and coordinate with affected businesses and community service providers. Public access to the Project Limits would be limited with protective measures. MBTA will notify the public of any unavoidable closures and provide alternate routes for rail service on weekends, when such closures would be expected to occur, and notify USCG, DCR, and mariners of any required temporary channel closures. MBTA will collaborate with the owners of property subject to construction easements to minimize disruptions, limit public access, and restore property to existing conditions.

The Proposed Project has been designed, and construction methods have been selected, to minimize impact and disturbance to natural resources. Construction vehicles would be limited to designated routes and staging areas. Air emissions during construction will be minimized and mitigated using strategies such as water suppression for dust control, compliance with Massachusetts Department of Environmental Protection (MassDEP) air quality regulations, and other best management practices. MBTA will prepare a Noise Control Plan, an Excavated Materials Management Plan, a Groundwater Management Plan, and a

Health and Safety Plan (HASP), all of which would be included in contract specifications. Potentially contaminated materials would be characterized and disposed of in accordance with applicable regulations.

1. Introduction

1.1. Summary

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MBTA proposes to replace the Draw One Bridge,[3] the Boston and Maine Railroad (B&MRR) Signal Tower A, and associated MBTA infrastructure. MBTA owns the rail infrastructure and Right-of-Way (ROW) and contracts with Keolis to operate the commuter rail system; Amtrak also uses the bridge and ROW for its *Downeaster* service between North Station and Brunswick, Maine. Both the Draw One Bridge and the B&MRR Signal Tower A building are eligible for listing in the National Register of Historic Places (NRHP). The Proposed Project also includes modification to the Massachusetts Department of Conservation and Recreation (DCR)-owned North Bank Bridge, which crosses the MBTA ROW north of the Draw One Bridge.

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As described in Section 2.2.2, "Other Contemplated Projects in the Study Area," DCR's Cross River Pedestrian and Bicycle Crossing project is an entirely separate project from, and not part of, the Proposed Project considered herein.

[3] The existing Draw One Bridge comprises two bridge spans crossing the Charles River, though it is referred to in the singular in this EA.

Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; STV Incorporated, 2024.

Project Location

Figure 1

Project Location

MBTA Draw One Bridge Replacement Project

As described in Section 2.4.4, "Property Acquisitions," and presented in Table 3, "Permanent and Temporary Easements," the Proposed Project would require permanent acquisition of an approximately 0.003-acre (131-square foot [sf]) portion of currently unmaintained, sparsely vegetated land adjacent to the east side of the MGH administrative building for track alignment and clearance and an approximately 0.019-acre (828-sf) area in the proposed South Bank Park for the installation of a new manhole. MBTA would also require five temporary construction easements for staging and access, including one at the MGH administrative building parking lots (0.25 acre); three at existing DCR parklands (1.08 acre at Paul Revere Park,[4] 0.84 acre at North Point Park, and 0.11 acre at a DCR pier and riverfront walkway); and one at the proposed South Bank Park (0.514 acre). MBTA would temporarily use Boston Sand & Gravel property for construction access pursuant to a license agreement, executed in 2001, granting MBTA the right to enter their property for access to and egress from Signal Tower A and MBTA ROW. Modifications to the North Bank Bridge would require alteration of the existing DCR easement for the relocation of two existing piers and the construction of one additional pier within MBTA ROW. The boat launch ramp in North Point Park may experience multiple temporary closures, and the MGH floating dock and approach ramp would be temporarily removed during construction of the Proposed Project.

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[4] The temporary construction easement at Paul Revere Park was previously assumed to be approximately 0.86 acre, which is reflected in the draft Section 4(f) agreement between MBTA and DCR in Appendix J, "Section 4(f)." However, based on DCR review and comment, the easement has been slightly increased to approximately 1.08 acre to accommodate an extension of the access drive.

implementing NEPA contained in the Environmental Impact and Related Procedures (23 CFR Part 771). This EA documents compliance with other applicable federal laws and regulations, including Section 106 of the National Historic Preservation Act (NHPA); the Conformity requirements of the Clean Air Act (CAA); the CWA; the Rivers and Harbors Act of 1899; Section 4(f) of the Department of Transportation Act of 1966 (Section 4(f)); the Endangered Species Act (ESA); Executive Order 11988 and United States Department of Transportation (USDOT) Order 5650.2 on Floodplain Management; Executive Order 11990 on Protection of Wetlands; the Magnuson-Stevens Act related to Essential Fish Habitat (EFH); the Coastal Zone Management Act (CZMA); Executive Order 12898 on Environmental Justice (EJ); and the Environmental Justice Policy Guidance for FTA Recipients, FTA C 4703.1.

This EA first provides a discussion of the purpose and need for the Proposed Project; a description of the No Action Alternative (i.e., the "No Build" condition, or the condition in the future were the Proposed Project not implemented); a brief overview of reasonable conceptual "Build" alternatives to the Proposed Project that were previously considered but ultimately dismissed; and a description of the Proposed Project and its construction means, methods, and schedule, which has been advanced to preliminary engineering and environmental review. The affected environment (both existing and future conditions) is then described, followed by technical analyses that determine whether the Proposed Project, as compared against the No Action Alternative, would result in impacts to an array of resources that constitute the human-made and natural environments. The potential effects of the Proposed Project are characterized as direct or indirect, permanent or temporary, and comparison is made between the Proposed Project and the No Action Alternative. Finally, this EA identifies measures to avoid, minimize, and mitigate these impacts, as well as inventories the various permits and approvals necessitating coordination with other federal, state, and local agencies; the mitigation measures are also examined for any potential effects that may result with their implementation.

1.1.4. Agency Coordination and Public Involvement

NEPA requires that the Lead Federal Agency coordinate with other federal, state, and local agencies in the environmental review process as either cooperating agencies or participating agencies. Under NEPA, a cooperating agency has jurisdiction by law or special expertise with respect to any environmental issue being addressed in the NEPA analysis and, therefore, has more involvement in the NEPA process than other participating agencies. Other federal, state, and local agencies may request or be invited to be participating agencies in the environmental review process because the agency may be affected by the Proposed Project.

FRA is a participating agency and, given that the Proposed Project would require a bridge permit from USCG and a Section 404 permit from USACE, USCG and USACE are cooperating agencies in the environmental review process.

FTA and MBTA developed a Public Involvement Program (PIP) to coordinate engagement with stakeholders and members of communities potentially affected by the Proposed Project (e.g., residents, businesses, commuters, etc.), as well as federal, state, and local agencies and elected representatives of these communities. (See Appendix A, "Public Outreach and Agency Coordination.")

FTA engaged in Section 106 consultation with the Massachusetts Historical Commission (MHC) in early 2020 and held an initial meeting with MHC and additional Section 106 consulting parties – including the

Boston Office of Historic Preservation and the Cambridge Historical Commission – on February 4, 2020. Most recently, FTA met with the Section 106 consulting parties on May 2, 2024, May 30, 2024, and September 5, 2024, to discuss the proposed mitigation measures in the draft MOA, described in Section 6.2.1.1, "Section 106 Memorandum of Agreement."

MBTA distributed an introductory email on May 13, 2024, to Amtrak, Boston Duck Tours Company, Boston Sand & Gravel, the Charles River Boat Company, MassDOT, MGH, and the State Police to describe the Proposed Project and provide an opportunity to request individual follow-up meetings. In response, MBTA delivered a presentation to these groups, with the exception of the State Police, to discuss project alternatives, resources that may be affected by construction and operations, measures to minimize or mitigate adverse environmental impacts, and other environmental review and agency consultation requirements for the Proposed Project. MBTA distributed the presentation to the State Police via email as they were unable to attend this initial meeting. MBTA met with DCR on June 5, 2024, and on November 20, 2024, to provide an overview of the Proposed Project and discuss potential use of Section 4(f) properties and proposed mitigation measures. In addition, a public meeting was held on June 6, 2024, to discuss project progress and provide an update on the status of Section 106 consultation. A public hearing will be held during the 30-day review period for this draft EA.

1.2. Purpose and Need

1.2.1. Background

The existing Draw One Bridge consists of two adjacent two-track bridge spans crossing the Charles River, with a timber trestle approach structure to the north and a precast concrete approach structure to the south. As originally constructed in 1930-1931, Draw One comprised four steel bascule bridges crossing the Charles River. In 1969, the superstructures of the two westerly bridges, Spans 3 and 4, were dismantled.[5] The concrete caissons supporting Spans 3 and 4 remain in place, along with the rest pier[6] and portions of timber piers.

The remaining usable bridge spans consist of two Scherzer-type rolling lift bascule bridges.[7] Each bridge span has two tracks, for a total of four tracks crossing the Charles River. Each bridge span includes a steel through truss bascule span and a track girder span. The substructure consists of concrete-filled steel caissons. Structural steel beams are embedded in the upper portion of the caissons. The northern approach structure consists of seven spans of timber trestle supported on timber piles. The southern approach structure, which was reconstructed in 1985 after a fire damaged the original timber trestle, consists of 19 spans of precast concrete slabs and girders supported on a combination of timber piles and steel H piles.

Signal Tower A is located just north of the Draw One Bridge, east of the tracks. The structure was built in 1930 and housed the control system for bridge operations as well as the electric room and an overlook room for the bridge operator. The building is severely deteriorated and contains asbestos; to protect

[5] *Rare Old Bridges Replaced in B. & M. Railroad Terminal Improvements at Boston*, Engineering News-Record 107 (5 November 1931):718-722.
[6] A rest pier is a pier designed to carry the load of a bridge's swing span when in the closed position.
[7] The existing bridge spans are double-track structures in the form of single-leaf rolling-lift bascules, a design made famous by the Scherzer Rolling Lift Bridge Company of Chicago.

operations staff, a temporary control tower was built in 2018. This 14-foot-high structure consists of an observation deck supported by a steel frame on a ten-by-ten-foot concrete pad. Conduits below grade connect the temporary control tower to the equipment "left in place" in the adjacent Signal Tower A.

1.2.2. Need for the Proposed Project

Replacement of the Draw One Bridge is critical in order to keep the MBTA system in a state of good repair and improve the reliability and safety of MBTA commuter rail and Amtrak services. The bridge is a crucial rail link between Boston and greater New England. Tens of thousands of people use these services every week, travelling for purposes including work, school, recreation, culture, and medical care, mainstays of the regional economy. Safe and reliable rail options make it easier for commuters and other travelers to keep their cars at home and off congested freeways and city streets, limiting greenhouse gas emissions and contributing to better air quality.

Built approximately 90 years ago, the existing Draw One Bridge and Signal Tower A have reached the end of their useful lives. The existing Draw One Bridge movable spans and its trestles present an ongoing maintenance challenge and are found to be beyond repair. Therefore, the Draw One Bridge, Signal Tower A, and trestles need to be replaced.

1.2.2.1. Bridge Conditions

Through a decade-long series of detailed inspections, MBTA determined that the Draw One Bridge suffers from structural deficiencies that severely reduce the reliability of commuter rail service and negatively affect navigation access along the Charles River (see Figure 2, "Existing Draw One Bridge, Signal Tower A, and Temporary Drawbridge Control Tower"). Service has been regularly disrupted during the past several years by signal-related delays, crossing gate failures, and emergency repairs of steel structural elements, usually undertaken on weekends. Structural, mechanical, and electrical deficiencies also reduce the reliability of the bridge operating system, disrupting marine traffic in the Charles River.

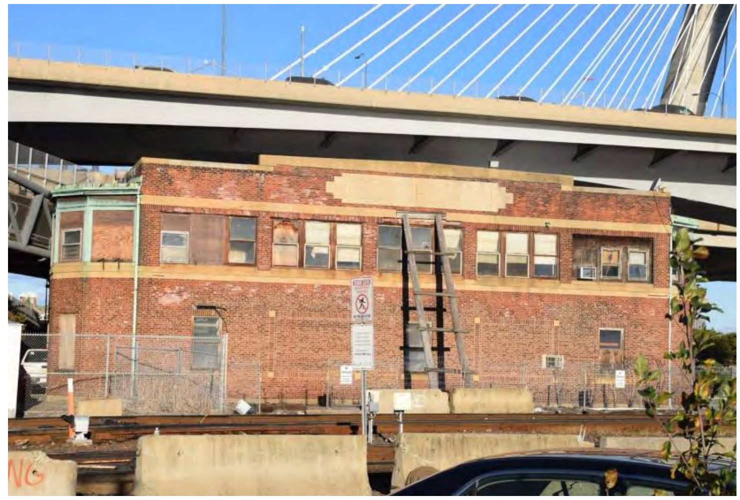
Key structural deficiencies of the Draw One Bridge include:

- Cracked segmental girders and rack framing;
- Deteriorated structural steel stringers and floor beam members;
- Improper seating of movable spans and alignment of rails in closed position;
- Deteriorated, corroded, and cracked top surfaces of the caisson substructures;
- Deterioration and decay of timber piles and beams; and
- Significantly outdated and non-redundant electrical, mechanical, and signaling systems, with the potential to cause extended outages and significant disruptions to rail and river traffic.

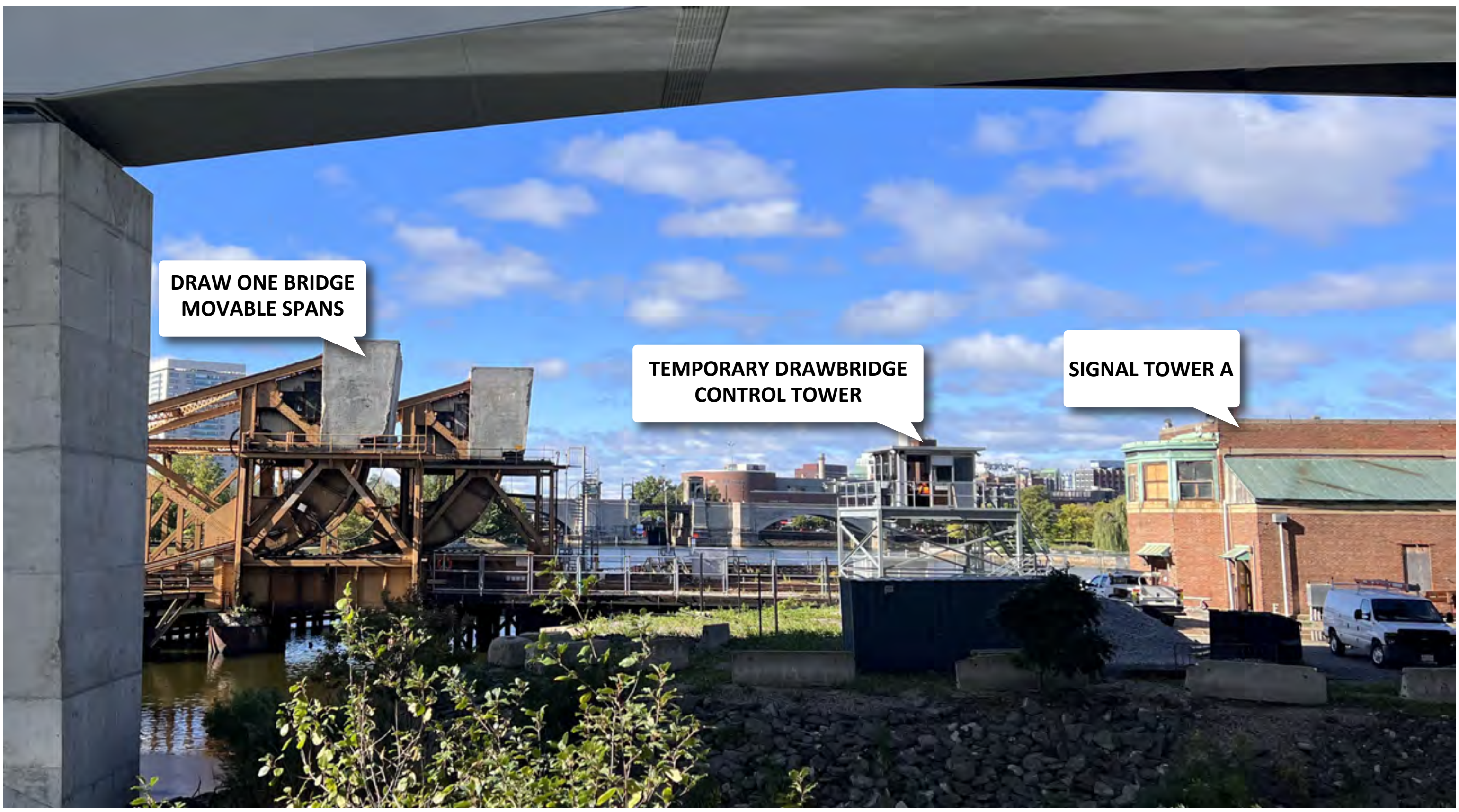
In addition, many of the existing track components on the Draw One Bridge and trestles are more than 25 years old. By the time the Proposed Project is completed – in 2034, as currently contemplated – many of these track components will be nearing the end of their useful lives. Further, directly south of the Draw One Bridge, where most tracks curve between North Station and the Draw One Bridge, some of the fixed rail support system's concrete plinths have deteriorated to the point where they have been demolished and replaced with steel ties, which are not supported by full-depth ballast and thus do not provide the same level of stability. The existing south trestle does not have a drainage system serving this portion of track (i.e., stormwater drains directly into the Charles River), which does not meet stormwater management 'best practice' standards.

The two remaining, usable Draw One Bridge spans, which provide only four tracks over the navigation channel, form a critical physical bottleneck for daily train movements into and out of North Station, which currently has ten station tracks. In the event of service disruptions, operational efficiencies are severely reduced.

1. Facing east from existing Draw One Bridge.



2. Existing Signal Tower A facing east from MBTA ROW.



3. Temporary Drawbridge Control Tower facing west from Paul Revere Park, looking beneath the Leverett Circle Connector Bridge.

Figure 2 - Existing Draw One Bridge, Signal Tower A, and Temporary Drawbridge Control Tower

Each weekday, the four MBTA commuter rail lines that operate from North Station carry a combined total of 178 trains, which includes 23 trains in the AM peak period,[8] 23 trains in the PM peak period,[9] and 132 trains in the off-peak periods. The current average weekday ridership on the four MBTA commuter rail lines is approximately 37,300 riders. Amtrak operates approximately ten trains over the Draw One Bridge each weekday, including one train during the AM peak period and one train during the PM peak period. Approximately 1,760 Amtrak passengers travel over the Draw One Bridge each weekday.

Residents, employees, those seeking medical care, students, and tourists visiting rail-accessible National Park Service (NPS) historical and recreational sites in Massachusetts, New Hampshire, and Maine are routinely subjected to delays. Rehabilitation of the existing Draw One Bridge would not provide adequate rail facilities during construction, as a minimum of four tracks would be required to avoid disruption; reconstruction of the existing bridge spans is required to ensure continued robust commuter and passenger rail service. Replacement of the Draw One Bridge, along with the related replacement of the trestles, track alignment improvements, and signaling system upgrades, is necessary to provide safe and efficient rail operations for this large and diverse array of users.

1.2.2.2. Tower A Conditions

The structural integrity of the existing Signal Tower A building is failing, and the building is at the end of its useful life. Structural problems include several cracks in the brick masonry that prohibit its rehabilitation. The building contains asbestos-containing materials (ACM) and lead-contaminated paint (LCP), which presents a safety concern for workers and prevents its use, requiring them to work from a separate temporary control tower. Signal Tower A must be replaced with a new, safe, permanent facility designed and situated to support the operations of the proposed three-span bridge structure.

1.2.3. Project Purpose

The purpose of the Proposed Project is to keep this portion of the rail system in a state of good repair and improve the reliability and safety of MBTA commuter rail and Amtrak services 1) by replacing the current two-span bridge – which is classified as both functionally and operationally obsolete and approaching the end of its useful life – with a new three-span bridge, which would stand within the same footprint as the historic bridge structures and carry two additional tracks across the Charles River, connecting to North Station; and 2) by replacing the existing signal tower and temporary control tower with a new Tower A to serve this new bridge.

1.2.4. Project Requirements and Goals

It is critical that all scheduled commuter rail services are maintained during Proposed Project construction and that the on-time performance of the trains arriving at and departing from North Station is preserved. A minimum of four active tracks over the Charles River and eight active tracks at North Station are required to be in service throughout the construction period, thereby limiting public transportation disruptions. Marine traffic beneath the bridge must also be maintained throughout the construction period. In

[8] AM Peak is defined as 6:00-10:00 AM
[9] PM Peak is defined as 3:00-7:00 PM

addition, MBTA has designed the Proposed Project to meet resilience standards outlined in the MBTA Flood Resiliency Design Directive and Drainage Design Directive.

2. Alternatives Considered and Description of Proposed Project

2.1. Introduction

The CEQ implementing regulations at 40 C.F.R. 1502.14 state that an agency must rigorously explore and objectively evaluate all reasonable alternatives, including a No Action alternative, and, for alternatives that were eliminated from detailed study, briefly discuss the reasons for their elimination. This section describes the No Action alternative, the Proposed Action (that would meet the purpose and need), and other alternatives that were considered but ultimately eliminated from further consideration.

No alternative site or location for the Proposed Project is considered, as the purpose of the Proposed Project is to address deficiencies associated with the bridge structures crossing the Charles River at this specific location in the established MBTA rail system.

2.2. No Action Alternative

The conditions in the future without the Proposed Project comprise the No Action Alternative. Most notably, the No Action Alternative does not include replacement of the existing Draw One Bridge and trestles. The four existing bridge tracks would remain in service until bridge components reach the end of their finite lives and fail outright despite ongoing maintenance and regular repairs. Bridge controls would continue to be operated from a temporary control tower structure, and the existing Signal Tower A would remain unsafe, and therefore unusable by operations staff, as it continues to deteriorate.

Steel structural elements, such as segmental girders, stringers, and floor beam members, would continue to require regular emergency inspections and repairs. As these system elements become increasingly degraded, they would disrupt rail and marine service more often and for longer periods of time while demanding limited financial and labor resources at an increasing rate. Therefore, the No Action Alternative would not meet the Proposed Project’s purpose and need to upgrade the Draw One Bridge to keep the system in a state of good repair and provide rail service reliability and safety.

2.2.1. Planned Projects in the Study Area

2.2.1.1. Transit Projects

Two planned MBTA projects will be implemented in the future independently of the Proposed Project. The MBTA Mainline Tracks Rehabilitation and Ancillary Improvements Project will rehabilitate and improve tracks, switches, signal systems, and drainage along the mainline tracks north of the Draw One Bridge to improve safety, reliability, and operational flexibility. Construction is expected to begin in 2025 and be complete in 2028. The MBTA North Station Platform F Extension and Ancillary Improvements Project will rehabilitate and extend Platform F at North Station and rehabilitate the two station tracks serving the platform. It will also improve platform lighting and egress to improve safety, reliability, and operational flexibility. Construction is expected to begin in 2025 and be complete in 2027.

2.2.1.2. South Bank Park

DCR proposes to construct a new South Bank Park on the site of a portion of an existing DCR parking lot and a portion of the Gridley Locks Footpath, generally located below the I-93 and Route 1 elevated highway on the south side of the Charles River. For the purposes of this EA, it is conservatively assumed that construction of South Bank Park would require up to five years. Therefore, given DCR's plans to begin construction as early as 2026, South Bank Park is assumed to be fully complete in 2034 with the No Action Alternative.

2.2.1.3. South Bank Bridge

DCR currently has plans to develop the South Bank Bridge on the south bank of the Charles River as part of a commitment pursuant to the Massachusetts General Law (MGL) Chapter 91, 310 CMR 9.00 permitting process for the Massachusetts Highway Department (MHD) Central Artery Tunnel Project. The bridge would provide pedestrian and bicycle access over the MBTA ROW just west of North Station, connecting Nashua Street Park to the DCR property near the southern end of the Gridley Locks Footpath, which provides pedestrian and bicycle access across the dam and locks between the north and south sides of the Charles River. As described above, the DCR property in which the eastern end of the South Bank Bridge will be located is also planned to be redeveloped by DCR as the South Bank Park. With the No Action Alternative, the South Bank Bridge is assumed to be neither under construction nor complete in 2034, but it is considered in the assessment of potential cumulative effects (see Section 4.4, "Indirect and Cumulative Effects").

2.2.2. Other Contemplated Projects in the Study Area

2.2.2.1. Cross River Pedestrian and Bicycle Crossing

A project known as the "Cross River Pedestrian and Bicycle Crossing" was proposed in 1995 by the Metropolitan District Commission, the predecessor agency to DCR, as a separate Charles River crossing for cyclists and pedestrians. It is not yet designed or planned for construction, though as currently contemplated it would cross the Charles River near, and to the west of, Draw One Bridge, connecting North Point Park with Nashua Street Park and/or the proposed new South Bank Park via the proposed South Bank Bridge. With the No Action Alternative, it is assumed to be neither under construction nor complete in 2034, but it is considered in the assessment of potential cumulative effects (see Section 4.4, "Indirect and Cumulative Effects").

2.3. Conceptual Alternatives Previously Considered

Just as there is no alternative site possible for the Proposed Project, there is no alternative to a bridge structure at this location, given the established vertical and horizontal rail geometries it connects. Further, MBTA has determined that the existing Signal Tower A cannot be used safely without nearly wholesale reconstruction, and so a temporary control tower has been constructed and is in use (and would remain in use in the No Action Alternative).

As described previously in Section 1.2, "Purpose and Need," MBTA has studied the bridge in detail to determine the viability of ongoing repair (as would be required with the No Action Alternative) and the feasibility of rehabilitation (i.e., partial reconstruction), rather than replacement. MBTA determined that full replacement would be required and that four tracks would be required to maintain service through construction, so additional temporary or permanent tracks would be required during bridge replacement to avoid service disruptions:

- A Bridge Type Selection Worksheet Report, prepared in July 2010, evaluated repair and replacement options for a four-track crossing of the Charles River that would utilize a footprint similar to the existing bridge alignment. The report recommended that the existing two bridge structures be replaced with two movable through-girder bascule spans in the same footprint.
    - In March 2020, however, before advancing the design of these two replacement bridge structures to completion, MBTA commissioned a Rail Operations Study of service into North Station, which determined that fewer than four tracks over the river would be insufficient to provide reliable service into the station in both the construction period and in the future operational condition given anticipated constraints on train movements during construction and in the event of future repair and maintenance activities.
- A Bridge Structures Evaluation Report, prepared in May 2020, determined that the south trestle piles would not support the full lifespan of the Proposed Project and, therefore, required replacement.

Therefore, MBTA developed conceptual design alternatives for a full replacement that would provide four bridge tracks in service during the construction period and more than four tracks after construction is completed. MBTA also assessed the operations and maintenance requirements, constructability, and expected lifespans of both precast concrete beams and steel stringers as potential replacement approach structure types. Pipe piles and drilled shafts were considered for the pier and abutment foundations.

2.3.1. Screening: Nine "Full Replacement" Alternatives

MBTA considered alternative track and alignment configurations, as well as different bridge types. A movable bridge (rather than fixed bridge) was determined to be the only practical solution to providing reliable MBTA service across the Charles River; a fixed span is not feasible due to allowable track grades, the required channel clearance, and elevation constraints at the adjacent station platforms and overpasses. MBTA considered three different movable span types (Bascule Rolling Lift Bridge, Bascule Heel Trunnion Bridge, and Vertical Lift Bridge), and determined that the vertical lift bridge was preferable because of its efficiency, constructability, and ease of maintenance.

Additionally, nine different track configurations were considered for the bridge (single-, double-, and triple-track bridge spans), as described in Table 1, "Bridge Track Configurations Considered," below.

Table 1: Bridge Track Configurations Considered

#	Configuration	Description	Considerations
1A	Parallel New East Double-Track Bridge Spans	Three two-track bridge spans with a new bridge span to be constructed to the east of the existing spans	• Conflicts with I-93 ramp columns
1B	Skewed New East Double-Track Bridge Spans	Three two-track bridge spans with a new east bridge span skewed to avoid I-93 columns	• Does not provide six parallel track moves • Provides limited connectivity • Provides limited operational flexibility

Table 1: Bridge Track Configurations Considered (cont.)

#	Configuration	Description	Considerations
2A	Parallel New West Double-Track Bridge Spans	Three two-track bridge spans with a new bridge span to be constructed to the west of the existing spans	• Conflicts with I-93 ramp columns
2B	Parallel New West Double-Track Bridge Spans	Three two-track bridge spans with a new bridge span to be constructed to the west of the existing spans	• Avoids conflict with I-93 ramp columns through modified track alignment
2C	Parallel West Bridge Spans	Three two-track bridge spans with a new bridge span to be constructed to the west of the existing spans	• Aligns bridge Track 6 on west side of I-93 ramp columns • Impacts the DCR-owned boat launch ramp • Provides limited connectivity • Provides limited operational flexibility
3	East and West Single-Track Bridge Spans	Two single track bridge spans on east and west sides of two two-track bridge spans	• Provides limited connectivity • Provides limited operational flexibility • Majority of construction is between active tracks
4	Two Triple-Track Bridge Spans	Two replacement three-track bridge spans shifted to the west with bridge Track 1 alignment maintained	• Requires two temporary bridges • Majority of construction is between active tracks • Loss of a single bridge span's operation suspends service to half of North Station
4A	Two Triple-Track Bridge Spans	Two replacement three-track bridge spans shifted to the west with bridge Track 1 alignment maintained	• Requires one temporary bridge to the west of existing spans • Provides three tracks during construction, though does not maintain current levels of service throughout the construction period • Loss of a single bridge span's operation suspends service to half of North Station
4B	Two Triple-Track Bridge Spans	Two replacement three-track bridge spans shifted to the east	• Requires one temporary bridge to the east of existing spans • Provides three tracks during construction, though does not maintain current levels of service throughout the construction period • Loss of a single bridge span's operation suspends service to half of North Station

Source: *Type Study for North Station Draw One Bridge Replacement and Associated Track and Signals Upgrades*, 2019; STV Incorporated, 2024.

2.3.2. Conceptual Design: Three "Full Replacement" Alternatives

The following three options were progressed for further design consideration as they would provide six parallel track moves and maintain current levels of service throughout the construction period and, critically, would not require the relocation of I-93 piers:

- Configuration # 2B: Parallel New West Double-Track Bridge Spans
- Configuration # 3: East and West Single-Track Bridge Spans
- Configuration # 4: Two Triple-Track Bridge Spans

2.4. Preferred Alternative (Proposed Project)

MBTA determined that the Preferred Alternative to be advanced for further project refinement and considered in the environmental review process would be Configuration #2B: Parallel New West Double-Track Bridge Spans, consisting of three standalone vertical lift bridge structures, each supporting two bridge tracks over the Charles River and providing access to at least four North Station tracks. This track alignment would not require relocation of the I-93 on- and off-ramp columns. Further, the three standalone movable bridge spans would provide enhanced operational flexibility for rail operations. During construction, one new bridge can first be constructed and commissioned, then each of the existing bridge spans can be replaced in two successive stages so that four tracks across the Charles River can remain in operation at all times. Once construction is complete, any one bridge can be removed from service for maintenance or repair, which still leaves four bridge tracks in operation and, in turn, allows access to at least eight station tracks at any time.

For the approach trestles, a steel stringer support system was selected in place of the concrete precast beam option due to life cycle cost and maintenance considerations. Given that the pier cap depths are limited by normal water elevations and require piles to be closely spaced, pipe pile foundations were selected in place of drilled shafts.

MBTA, DCR, and USCG have agreed to limit the required vertical clearance over the Charles River navigation channel to 33 feet. A low-level vertical lift structure can achieve this clearance. Additionally, the vertical lift yields a shorter span length and a more compact footprint than the other movable structure types, which provides more flexibility for track layout. The shorter span enables the tower columns to be framed together, which would reduce the size of the tower columns and, critically, allow mechanical equipment to be placed on this framing. With mechanical equipment supported by the framing, a singular drive configuration, which is considered the most maintainable and reliable operational configuration for a vertical lift bridge (compared to tower drive systems that require two sets of equipment), is possible.

In summer 2023, the design for the proposed three new vertical lift bridge structures was shared with Section 106 consulting parties, who requested that it be modified to relate more closely to the aesthetic of the existing Zakim Bridge. In response, MBTA contracted the Boston-based architecture firm Rosales + Partners to modulate the architectural presence of the proposed bridge structure, specifically modifying the apparent bulk and height of the proposed Draw One Bridge. Refer to Appendix B, "National Historic Preservation Act Section 106," for additional information pertaining outreach to Section 106 stakeholders and proposed mitigation measures.

2.4.1. Project Elements

The Preferred Alternative, refined as described above and referred to as the "Proposed Project" in this EA, primarily comprises replacement of the existing two bascule bridges with three vertical lift bridges, replacement of the existing Signal Tower A and temporary control tower with a new Tower A, modifications to raise the North Bank Bridge to accommodate the new Draw One Bridge, and provision of six, rather than four, tracks across the Charles River to maintain service during construction and avoid impacts to operations in the case of potential future service disruptions (see Appendix C, "Engineering

Plans," and Figure 3, "Project Elements"). These and additional Proposed Project elements are described in detail below:

2.4.1.1. Three Vertical Lift Bridges

Three new vertical lift bridge structures would replace the existing two bridge structures. The proposed bridge would have a height of 76 feet above the water level, 45-foot horizontal clearance, 5.17-foot vertical clearance in the closed position, and 32.2-foot vertical clearance when open. The existing bridge has a height of 51.5 feet above the water level, 65-foot horizontal clearance, 5.38-foot vertical clearance in the closed position, and infinite vertical clearance when open. The elevation of both the existing and proposed bridge structures is constrained by adjacent track, which is at an elevation of approximately 11 feet. Although the Design Flood Elevation (DFE) for the Proposed Project is 13.1 feet, track elevations cannot be adjusted to clear this elevation as they are constrained by platform access at North Station and connections north of the Charles River.

The foundations from the two previously demolished bascule bridges would be removed.

The north and south trestles would be replaced, as would the existing fender system, though it would be constructed along a new alignment. The new bridge and trestles would span the same critical distance of approximately 550 feet as the existing bridge infrastructure.

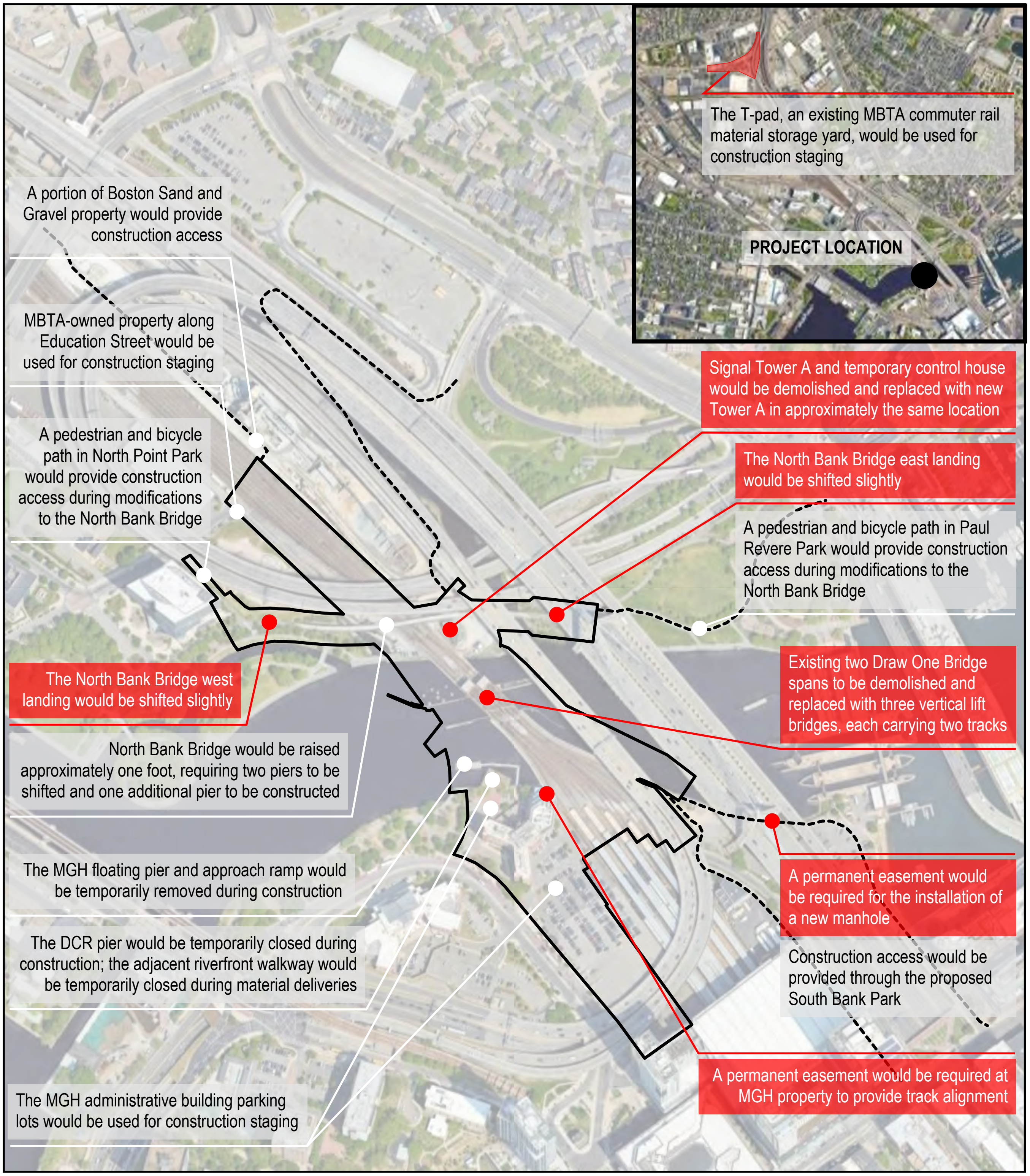
The Proposed Project would be designed to accommodate future electrification of the rail lines by providing sufficient vertical clearance for fixed catenary when the bridge spans are fully open.

2.4.1.2. Signal Tower A Replacement

A new Tower A building would be constructed along the seawall on the north bank of the Charles River, east of the mainline tracks, positioned to best serve operation of the proposed new three-span structure (see Figure 4, "Proposed Draw One Bridge and Tower A"). Existing controls would be relocated from the temporary control tower to the new Tower A building.

2.4.1.3. North Bank Bridge Modification

The North Bank Bridge would be raised approximately one foot to accommodate the new track alignment required with the new bridge structures. This would require the relocation of two bridge supports, the addition of one additional support, modification of the bridge truss structure, and modification and lengthening of the bridge landings in North Point Park and Paul Revere Park. Regrading of adjacent park pathways would require the relocation of an existing staircase in North Point Park. Landscaping at each end of the bridge would be replaced to tie into existing park infrastructure.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits	Permanent Element
Construction Access	Temporary Element

Figure 3

Project Elements

Figure 4 - Proposed Draw One Bridge and Tower A

2.4.1.4. Trackwork

Trackwork and associated signals would also be constructed to connect the new bridge tracks to the mainline tracks north of Tower A, as the new bridge structures would carry six tracks (rather than four, as with the current bridge structures). Trackwork, including reconstruction of direct fixation and platform modifications where required, and associated signals would be constructed to connect the new bridge tracks to station tracks.

2.4.1.5. Signal System

The Proposed Project would replace up to three sets of Signal Instrument Houses (SIHs). The microprocessor controller equipment for each of the new SIHs would support the new track and signal system configuration. All wayside devices, cables, and infrastructure (e.g., cable troughs, signal heads, railroad switches, etc.) currently located within MBTA ROW and serving the existing Draw One Bridge would be upgraded with the Proposed Project.

2.4.1.6. Switch Heaters

Approximately 11 existing switch heaters would be replaced, and an additional six switch heaters would be installed to accommodate the new track alignment across the river, for a total of 17 proposed switch heaters. The types of switch heaters (e.g., gas- or electric-powered) that would be installed as part of the Proposed Project have not yet been determined.

2.4.1.7. Drainage System

A drainage system would be added to the north trestles to collect runoff from the proposed bridge and Tower A infrastructure and provide infiltration and detention before being returned to the Millers River at a new outfall to be installed along the west bank of the river, just south of the North Bank Bridge. Similarly, a drainage system would be added to the south trestles to collect runoff and direct it to a water quality structure that would provide sediment and other stormwater pollutant (e.g., nitrogen, phosphorous) removal before being returned to the Charles River at a new outfall to be installed along the south bank of the river, within the limits of the MBTA ROW.

2.4.1.8. Safety and Security

Safety and security measures would be implemented in accordance with MBTA's policies and procedures and would consist of fencing, a closed-circuit television (CCTV) system, exterior lighting located along the bridge structure, and navigational lighting to meet USCG requirements. Further, MBTA would maintain controlled access locations at the bridge stair towers, Tower A doors, and pedestrian and vehicular fence gates for MBTA's situational awareness of the bridge and Tower A.

2.4.1.9. Resilience

The Proposed Project has been designed in accordance with MBTA's Flood Resiliency Design Directive and Drainage Design Directive.[10] Electrical and mechanical equipment within Tower A (e.g., control desk, programmable logic controller [PLC]) would be located on the second floor, above the DFE of 13.1 feet. Flood walls and a deployable flood barrier would be provided at Tower A, and submersible equipment (e.g., junction boxes, lift span bearings, etc.) would be utilized on the bridge structure.

2.4.2. Operational Considerations

The Proposed Project would not result in any significant change in operations. The Proposed Project would replace the Draw One Bridge to keep the system in a state of good repair, improve the reliability and safety of MBTA commuter rail service and Amtrak passenger rail service, and minimize delays. The increase in the number of usable tracks and upgrades to the track alignment and signal system with the Proposed Project would improve railroad operational flexibility by allowing for universal movement of inbound and outbound trains between all MBTA commuter rail routes and all station tracks and platforms. The incorporation of improved specialty track geometry (e.g., crossovers, turnouts, etc.) would allow for marginally increased speeds (up to approximately five miles per hour [mph]) where new track would be installed, though train speeds would remain constrained by movement into and out of North Station.

2.4.3. Construction

As described in Appendix D, "Construction Methods/Construction Staging Report," construction is expected to begin in 2026 and be complete in 2034.

A minimum of eight active station tracks and four active tracks across the river would be maintained during weekdays and a minimum of five active station tracks and two active tracks across the river would be maintained on weekends. It is anticipated that larger sections of track would be available for required work during weekends, when there is reduced service.

2.4.3.1. Phasing

Construction of the Proposed Project would be phased, with the sequencing of activities expected to be as follows:

[10] The Flood Resiliency Design Directive requires that design for all new construction, repair, or replacement projects shall include a flood resiliency design approach that is consistent with MBTA's priorities to minimize risk to MBTA assets from flooding events; maximize resiliency of the systems; minimize downtime and prevent disruptions to the traveling public; and protect the safety of system users, workers, and the surrounding environment from risks associated with flood hazards.

The Drainage Design Directive requires that design for all new station construction and station renovation projects shall include a drainage design that is consistent with MBTA's priorities in order of importance: 1) Protect MBTA's infrastructure from issues related to stormwater; 2) Protect the environment and downstream resources; 3) Maximize the simplicity of the system and minimize the number of elements that require maintenance; 4) Create a resilient and sustainable design that withstands decades of use and maintenance; and 5) Consider the wider context of resource protection and conservation including utilization of the landscape and other materials for stormwater management.

Table 2: Construction Sequence and Duration

Phase	Key Components	Estimated Duration
Site Preparation & Mobilization	Construction of signal duct banks; relocation of temporary control tower; demolition of existing bridge foundations no longer in service; construction of west temporary trestle; early track and signal work	4 months
Phase 1	Demolition of existing Signal Tower A; construction of proposed Tower A; modification of North Bank Bridge; construction of west trestles and west bridge span; track and signal work; activation of one track on the west bridge span	31 months
Phase 2	Construction of south trestles between west and center bridge spans; track and signal work; activation of second track on west bridge span	5 months
Phase 3	Construction of east temporary trestle; removal of service from center bridge span; demolition of center bridge span; construction of center trestles and center bridge span; track and signal work; activation of one track on the center bridge span	20 months
Phase 4	Construction of south trestles between center and east bridge spans; track and signal work; activation of second track on center bridge span; demolition of west temporary trestle	9 months
Phase 5	Removal of service from east bridge span; demolition of remaining structure; construction of east trestles and eastern bridge span; track and signal work; activation of tracks on east bridge span; demolition of east temporary trestle	27 months

Source: Appendix D: Construction Methods/Staging Report, 2023; STV Incorporated, 2024.

The first major activity would be construction of the first of the three new standalone bridge structures; it would be constructed west (upstream) of the existing bridge structures, within the footprint of the original railroad bridge spans removed in 1969. After this new bridge structure is tied into tracks and operational, then the remaining operational draw spans would be replaced in succession: the existing bridge span directly east of the new bridge span would be demolished and rebuilt, and then the easternmost bridge span (by then the only remaining existing bridge) would be demolished and rebuilt. The first new vertical lift span is expected to be commissioned in 2029.

2.4.3.2. Staging Areas and Access

Work areas and construction activities would be staged in the following locations, as described north to south (see Figure 3, "Project Elements"):

- **Tracks North of Draw One Bridge:** Construction would include installation of new tracks, switches, and signals; installation of new drainage; reconstruction of existing tracks for final conditions and connecting to bridge tracks and tracks north of the bridge; installation of switch heaters; and removal of the original signal house after all signals have been cut over to the new signal house currently on site. Construction would occur between active tracks and would require equipment to operate above active tracks, necessitating close coordination with train operations for the duration of the project. Construction staging areas for this work would include areas where tracks would be inactive as a result of construction phasing (i.e., tracks on the bridge not in service at the time), MBTA-owned property along Education Street, the Tower A site, and the

T-pad, an existing MBTA commuter rail material storage yard north of the bridge, beyond MBTA's Boston Engine Terminal (BET) maintenance facility.

- **North Point Park:** Modification of the North Bank Bridge would include raising the bridge, replacing the bearings and bridge joints at the abutment and piers, increasing the wingwall and approach curb height for regrading and resetting the existing railing, relocating the existing staircase at the end of the bridge, relocating and reconfiguring existing lighting and irrigation systems adjacent to the staircase, and installing replacement landscape elements. Construction staging areas for this work would consist of MBTA-owned property along Education Street, land fenced off below the North Bank Bridge, and areas immediately surrounding the limits of North Point Park pathway reconstruction. During construction, a pedestrian and bicycle path in the park would be closed to public use and modified for use as a construction access driveway to the western portion of the North Bank Bridge.
- **Paul Revere Park:** Modification of the North Bank Bridge would include raising the bridge, replacing the bearings and bridge joints at the abutment, increasing the wingwall and approach curb height for regrading and resetting the existing railing, and reconstructing existing landscape/hardscape elements. The construction staging area for this work would consist of areas immediately surrounding the limits of Paul Revere Park pathway reconstruction. During construction, a pedestrian and bicycle path in the park would be closed to public use and modified for use as a construction access driveway to the eastern portion of the North Bank Bridge.

- **Tower A:** Construction would include relocation of the existing temporary control tower and electrical services from the existing Signal Tower A building; demolition of the existing Signal Tower A; installation of a new water line under the MBTA tracks, using jack and bore methods; construction of a new Tower A building; installation of a drainage system with a detention and infiltration system and outlet to the Millers River; relocation of existing bridge controls into the new Tower A building until both existing bridge spans are taken out of service, at which point existing electrical equipment and controls would be removed; paving of the Tower A parking lot and driveway; installation of security controls; and installation of new pier foundations for the North Bank Bridge modifications. Construction staging areas for this work would consist of the existing Signal Tower A parking lot and the tower's building footprint after demolition.
- **North Seawall and Trestles:** Construction would include construction of temporary work trestles on either side of the existing bridge; demolition of the existing north trestle and cutoff or extraction of existing piles; construction of a new north abutment in front of the existing seawall, consisting of a king pile system comprising pipe piles and sheet piles; construction of a new duct bank behind the abutment; construction of new piers supported by driven pipe piles; construction of new ballasted trestles consisting of steel stringers with a composite concrete deck; and removal of temporary trestles. Construction staging areas for this work would include temporary trestles, barges in the Charles River, areas where tracks would be inactive as a result of construction phasing, and the T-pad to the north of the bridge, beyond BET.
- **Movable Spans and Navigation Channel:** Construction would involve building a new vertical lift bridge to the west of the existing bridge prior to replacing the existing bridge spans one at a time.

The new vertical lift bridge structures would require installation of drilled shafts to support new pier caps; erection of the vertical lift towers; erection of the lift span in the “up” position or float-in of the lift span in a preassembled condition; demolition of the existing fender system, including extraction and cutoff of existing piles; demolition of the existing bridge caisson foundations; installation of the proposed fender system, including driven piles; installation of temporary fender transitions between the new and existing fender systems; demolition of existing bascule spans, including removal of existing counterweights and machinery rooms; selective cutting of truss members and float-out of the existing truss on a barge; removal of the existing submarine cable; and removal of any temporary fender system components. Work in and over the channel would require short-duration partial and full navigational channel closures during demolition and erection activities. Construction staging areas for this work would include temporary trestles, barges in the Charles River, areas where tracks would be inactive as a result of construction phasing, and the T-pad to the north of the bridge, beyond BET. Partial preassembly of the lift spans or tower framing components may be performed off-site, with assemblies brought in by barge for installation on the new bridge structures.

- **South Seawall and Trestles:** Construction would include construction of temporary work trestles on either side of the existing bridge; demolition of the existing south trestle and cutoff or extraction of existing piles; construction of a new south abutment in front of the existing seawall, consisting of a king pile system comprising pipe piles and sheet piles and micropiles where the abutment extends under the Leverett Circle Connector Bridge ramp; construction of a new duct bank behind the abutment; construction of new piers supported by driven pipe piles; construction of new ballasted trestles consisting of steel stringers with a composite concrete deck; and removal of temporary trestles. Construction staging areas for this work would include temporary trestles, barges in the Charles River, areas where tracks would be inactive as a result of construction phasing, and the T-pad to the north of the bridge, beyond BET.
- **North Station/South Seawall:** Construction between North Station and the Draw One Bridge would include reconstruction of ballasted and direct fixation tracks to the final track alignment, partial demolition and modification of existing North Station Platforms D and E, relocation of existing layover power, installation of new drainage system and outfall to the Charles River, reconstruction of portions of existing sub-ballast slab, construction of new bridge approach slabs, and removal of original signal house after all signals have been cut over to the new signal house currently on site. Construction staging areas for this work would include an area within the MGH administrative building parking lots subject to a construction easement, temporary trestles used for bridge construction, barges in the Charles River, and areas where tracks would be inactive as a result of construction phasing.

Construction access and material delivery would generally be provided by barge and rail, though truck routes would also be used, with access to the construction area provided via five access drives. From the north, access would be provided through driveways on either side of the Boston Sand & Gravel facility, one of which connects to the Bunker Hill Community College visitor parking lot access road to the east and the other, which extends to Hood Park Drive. During construction, a pedestrian and bicycle path in Paul Revere Park would be closed to public use and modified for use as a construction access driveway to the eastern portion of the North Bank Bridge. From the south, construction access would be provided via a driveway located immediately west of Lovejoy Wharf, which leads to the Gridley Locks Footpath, the location of the future South Bank Park, and a driveway extending north from North Station.

Construction access would also be provided through the temporary use of a pedestrian and bicycle path in North Point Park extending from Education Drive to the North Bank Bridge, just east of the EF Education First Headquarters building, as well as the temporary use of a DCR-owned pier and riverfront walkway directly west of the MBTA ROW on the south bank of the Charles River.

As described above, in-water construction activities would include caisson removal, timber and steel pile removal, dredging, and installation of drilled shafts, pipe piles, micropiles, pier caps, a new fender system, and a king pile abutment.[11] Existing piles that do not need to be removed below the mudline would be cut at the mudline to limit sediment disturbance.

2.4.4. Property Acquisitions

2.4.4.1. Permanent Easements

The Proposed Project would require two permanent easements: 1) a 0.003-acre (131-sf) portion of currently unmaintained, sparsely vegetated land adjacent to the east side of the MGH administrative building in order to meet the required 12-foot horizontal clearance from track centerline, and 2) a 0.019-acre (828-sf) area in the proposed South Bank Park for the installation of a new manhole in approximately the same location as an existing manhole to provide phosphorus filtration to the existing MBTA drainage system.[12]

2.4.4.2. Temporary (Construction) Easements

A construction easement would also be required for a larger 0.25-acre portion of the MGH administrative building parking lots, resulting in the temporary loss of up to approximately 30 MGH parking spaces during construction of the Proposed Project. This area would be used to provide construction area access and construction equipment storage and/or materials staging; it would be reconstructed by MBTA (as part of the Proposed Project) for continued future use as MGH parking following construction completion.

In total, the Proposed Project would require five temporary construction easements, including one as noted above for the use of MGH administrative building parking lots, three at existing DCR parklands, and one at the future DCR South Bank Park, in order to stage construction equipment and materials and provide construction access, as described previously in Section 2.4.3, “Construction” (see Figure 5, “Property Acquisitions”). The two permanent easements and the five construction easements required for the Proposed Project are described below in Table 3, “Permanent and Temporary Easements.”

In addition, MBTA would temporarily use Boston Sand & Gravel property for construction access pursuant to a license agreement, executed in 2001, granting MBTA the right to enter their property for access to and egress from Signal Tower A and MBTA ROW. Further, as described in Section 2.4.1.3, “North Bank Bridge Modification,” modifications to the DCR-owned North Bank Bridge required as part of the Proposed

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[11] If determined necessary, cofferdams, comprising sheet piling and rock, would be installed to support the removal of caissons that supported the bridge piers no longer in service. Cofferdam installation would be conducted from a barge prior to the construction of the temporary trestles and would be removed following caisson removal.

[12] While the existing manhole is located within property currently owned by MBTA, the new manhole would be located just north, on DCR-owned property.

Project would include the relocation of two existing piers currently located within MBTA ROW as well as the construction of one additional pier. All three new bridge piers would also be located within MBTA ROW. As such, alteration to the existing DCR/MBTA property use agreement for the North Bank Bridge would be required.

Table 3: Permanent and Temporary Easements

ID No.	Location	Property Owner	Property Description	Size of Affected Area	Purpose	Acquisition Mechanism
1	City of Boston	DCR	Paul Revere Park	1.08 acre	Required during construction	Temporary (construction) easement
2	City of Cambridge & City of Boston	DCR	North Point Park	0.84 acre	Required during construction	Temporary (construction) easement
3	City of Boston	DCR	Proposed South Bank Park*	0.514 acre	Construction access	Temporary (construction) easement
4				0.019 acre (828 sf)	Installation of new manhole	Permanent easement
5	City of Boston	DCR	Pier & Riverfront Walkway	0.11 acre	Construction access	Temporary (construction) easement
6	City of Boston	MGH	Parking Lots	0.25 acre	Construction staging and access	Temporary (construction) easement
7			Unmaintained, sparsely vegetated land**	0.003 acre (131 sf)	Track alignment and required clearance	Permanent easement

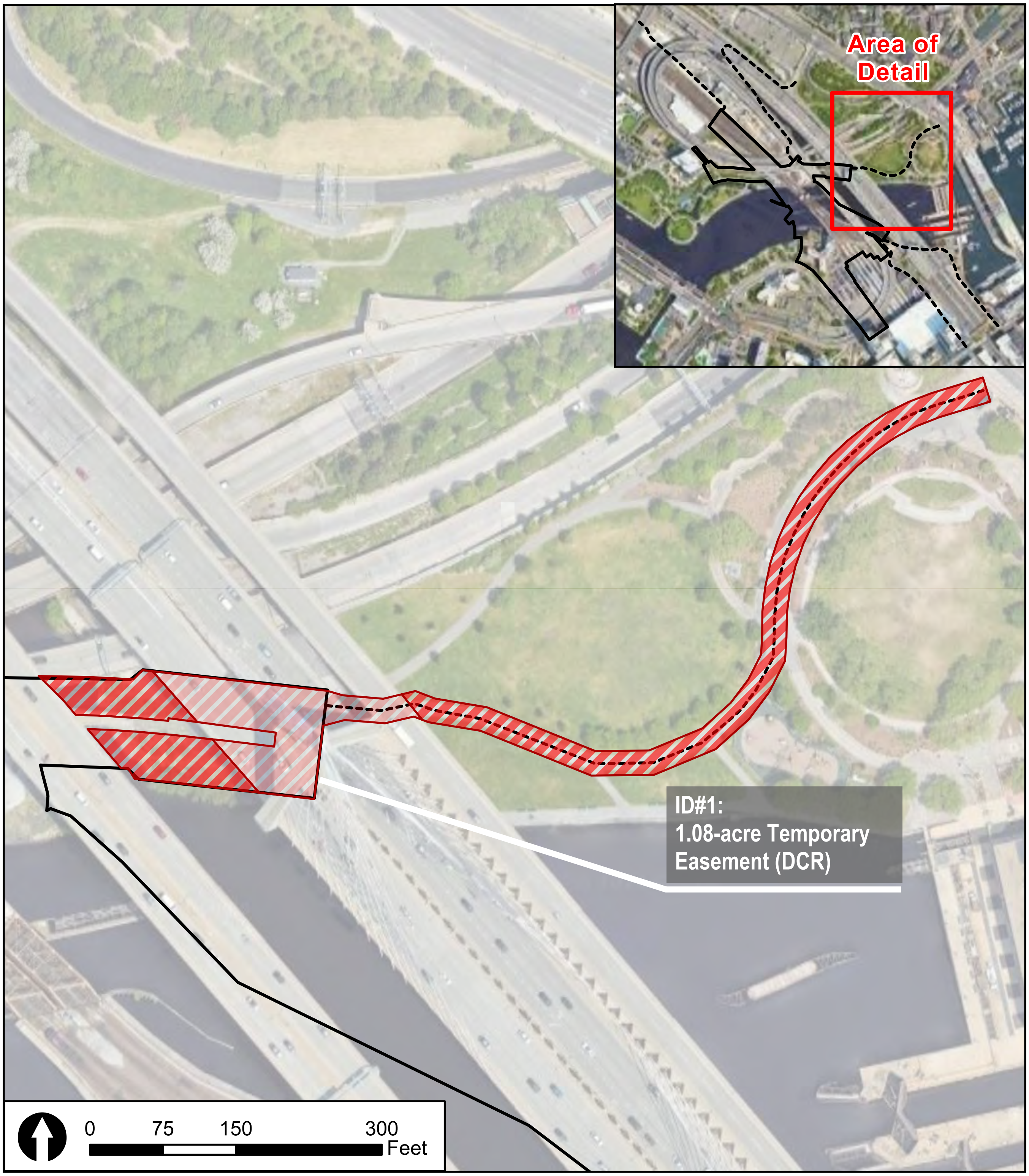
Notes:
** As it is assumed that DCR will have completed all or part of the proposed South Bank Park in advance of the Proposed Project (see Section 2.2, "No Action Alternative"), construction of the Proposed Project would require temporary use of a portion of the newly constructed South Bank Park for access during construction.*
*** Land to be acquired is located between existing MBTA ROW and the MGH administrative building; a chain-link fence is currently in place for safety and security purposes.*

Source: STV Incorporated, 2024; TRC Companies, Inc., 2024.

2.4.4.3. *Temporary Closures*

Temporary Closure of the DCR North Point Park Boat Launch Ramp. Modifications to the North Bank Bridge undertaken as part of the Proposed Project may require multiple temporary closures of the boat launch ramp located in North Point Park, just west of the MBTA ROW, which is used by DCR, the State Police, and the Boston Duck Tours Company. The boat launch ramp is not accessible to the public. If closures of the ramp are determined necessary, MBTA will coordinate these closures with each affected party during construction to avoid impacts to their use of the ramp.

Temporary Closure and Removal of the MGH Floating Dock. The Proposed Project would also remove the MGH floating dock and approach ramp to facilitate construction access throughout the construction duration. The MGH-owned floating dock and approach ramp formerly served the prior owner (Spaulding Rehabilitation). As part of the Proposed Project, MBTA would reinstall the MGH floating dock and approach ramp in coordination with MGH when the area is no longer required for construction access.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
Temporary Easement

Note: Easement would comprise land beneath elevated roadway infrastructure.

Figure 5a

Property Acquisitions

Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
Temporary Easement

Note: Easement would comprise land beneath elevated roadway infrastructure.

Figure 5b

Property Acquisitions

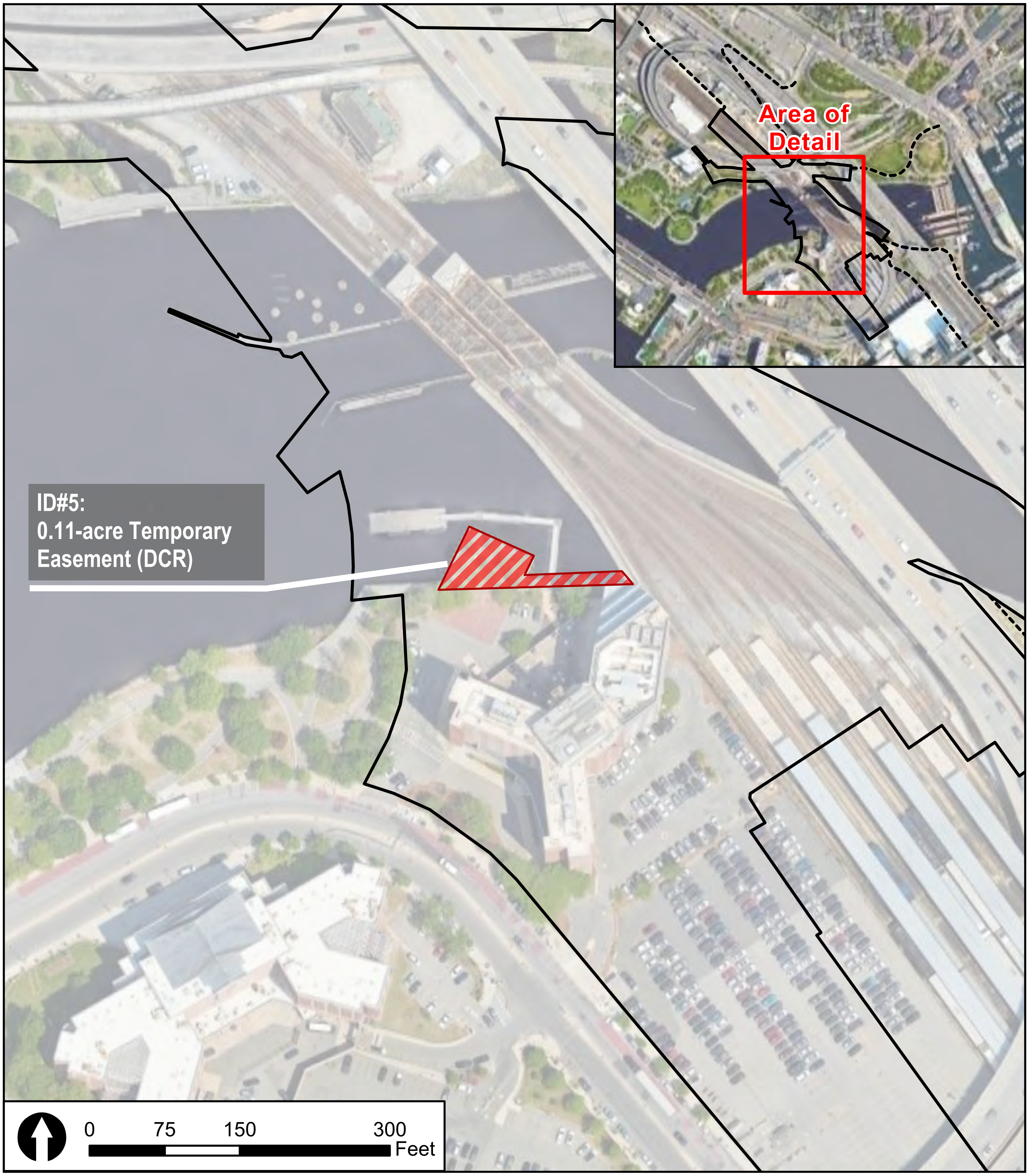
Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
Permanent Easement
Temporary Easement

Note: Easement would comprise land beneath elevated roadway infrastructure.

Figure 5c

Property Acquisitions

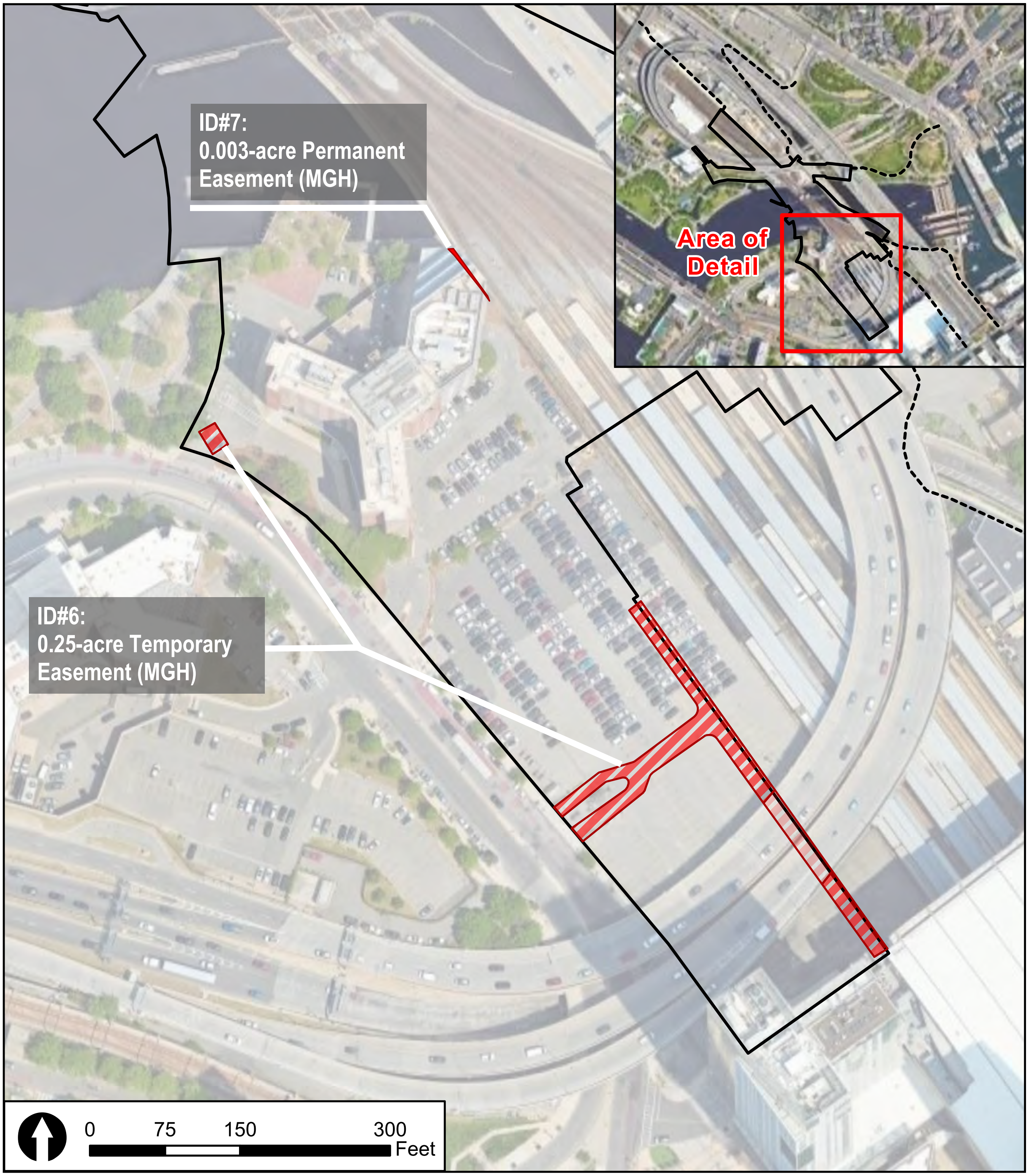


Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
Temporary Easement

Figure 5d

Property Acquisitions



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
Permanent Easement
Temporary Easement

Note: Easement would comprise land beneath elevated roadway infrastructure.

Figure 5e

Property Acquisitions

2.4.5. Project Limits

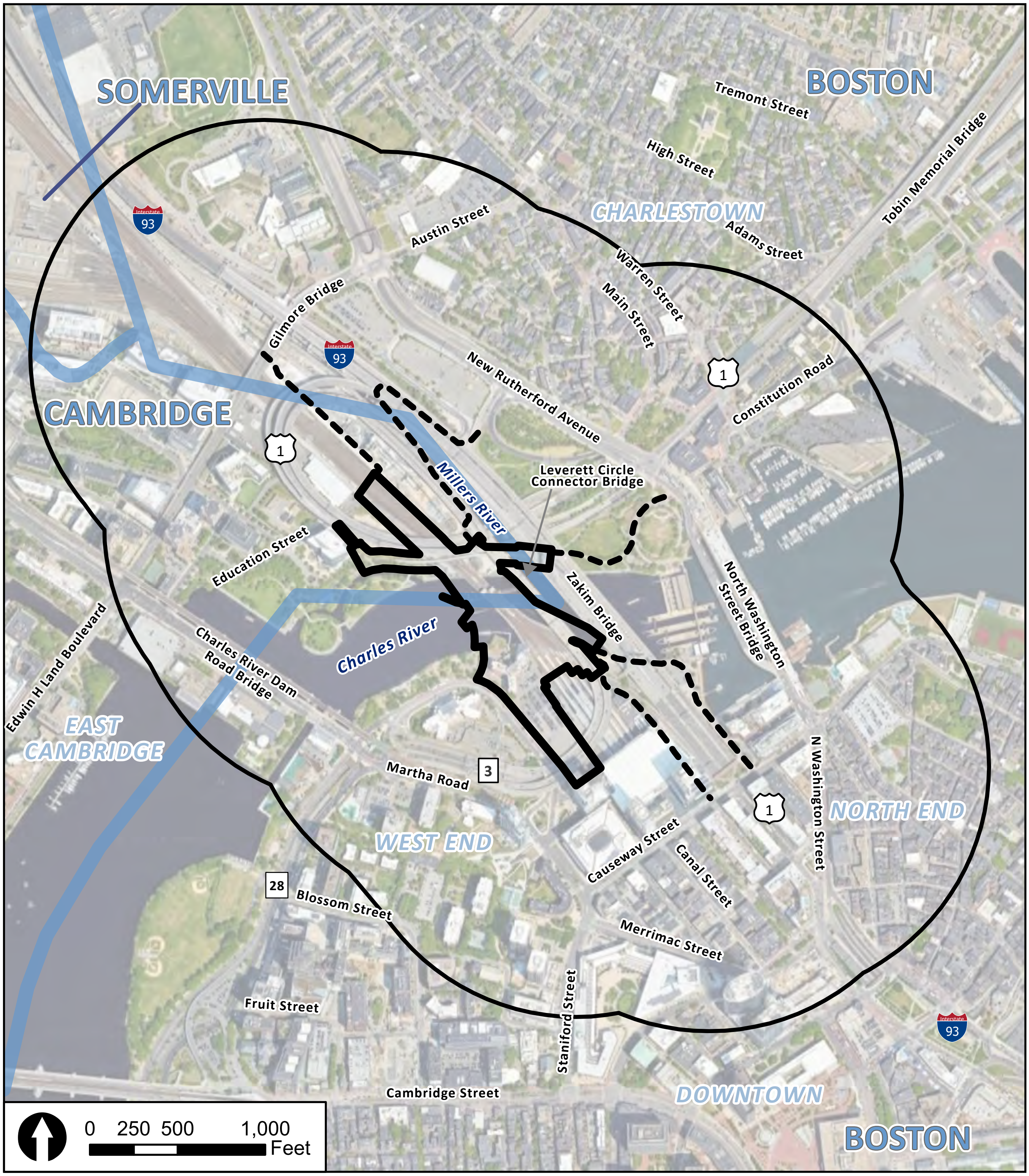
For the purposes of analyses presented in Section 3, "Affected Environment," and Section 4, "Probable Consequences of the Proposed Project," a project site, referred to herein as the "Project Limits," has been defined. It encompasses the areas where the replacement bridge and new Tower A building and any other permanent infrastructure will be located, as well as any existing infrastructure to be removed as part of the Proposed Project. The Project Limits include the entirety of the North Bank Bridge, which will be modified as part of the Proposed Project.

The Project Limits also include the two permanent acquisitions and all five temporary construction easements on property outside MBTA ownership, which were described in Section 2.4.4, "Property Acquisitions." As currently contemplated, the Project design features and construction activities will be managed in accordance with any applicable easements, including agreements in place between MBTA & Boston Sand & Gravel, as appropriate.

The construction access drives are not included as part of the Project Limits, though they were used to inform the quarter-mile study area, and they are considered in the assessment of construction-period effects (see Figure 6, "Project Limits and Study Area").

2.4.6. Build Year (Full Operations)

Construction is expected to last approximately eight years, beginning in 2026, and be completed in 2034. Therefore, analyses of operational conditions (permanent conditions) assume that the Proposed Project has been fully constructed and is operational, and 2034 serves as the analysis year. However, for the assessment of construction-period effects, the entire construction period (2026 – 2034) is considered.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits (Limits of Construction)
Construction Access
1/4 Mile Study Area
Municipal Boundaries

Figure 6

Project Limits and Study Area

3. Affected Environment

3.1. Introduction

Each technical analysis provided in this section considers the Project Limits, as described in Section 2.4.5, "Project Limits," and a quarter-mile study area. The quarter-mile study area has been defined conservatively as the geographic extent within which potential effects may occur or be experienced by nearby populations who may rely on access to and use of the community facilities and resources in the vicinity of the Proposed Project, both during and after its construction. It also allows for reasonable consideration of potential indirect and cumulative effects.

Technical analyses begin with descriptions of existing conditions within the Project Limits and study area, followed by a description of the No Action Alternative, i.e., the conditions in the future if the Proposed Project were not implemented. The No Action Alternative is compared to existing conditions to provide a clearer picture of the future conditions that may be altered with the implementation of the Proposed Project. The technical analyses then describe whether and how the Proposed Project may result in effects during its construction, or once it is fully operational, as of 2034. The anticipated effects of the Proposed Project are compared to the No Action Condition and characterized as permanent or temporary.

3.2. Existing Conditions

3.2.1. Land Use and Zoning

This section describes the existing land uses and zoning districts within the Project Limits and study area, based on a review of land use and zoning data available online and produced by the Massachusetts Bureau of Geographic Information (MassGIS) and the Boston Planning and Development Agency (BPDA), as well as field observation.

3.2.1.1. Land Use

The Project Limits include portions of both the City of Cambridge and the City of Boston. Figure 7, "Land Use," identifies the existing land uses within the study area.

The Project Limits, defined to include both permanent infrastructure and construction limits of disturbance for the Proposed Project (refer to Section 2.4.5, "Project Limits"), comprise MBTA ROW as well as portions of adjacent property owned by DCR and MGH and the Charles River.

The area immediately surrounding the Project Limits is characterized by waterfront parks along both the north and south banks of the Charles River, which provide pedestrian and bicycle paths, playgrounds, and scenic views of the river. Directly adjacent to the Project Limits on the north side of the Charles River are North Point Park to the west (in Cambridge) and Paul Revere Park to the east (in Boston), which are connected to one another by North Bank Bridge (pedestrian and bicycle bridge), which crosses over the MBTA ROW. (North Bank Bridge is included within the Project Limits.) North Point Park also includes a boat launch ramp used by DCR, the State Police, and the Boston Duck Tours Company. The area adjacent to the east side of the Project Limits north of the Charles River is developed with a mix of roadways and highway infrastructure, including the I-93 on- and off-ramps, the Leverett Circle Connector Bridge, which crosses the Charles River approximately 100 feet east of the Draw One Bridge, and the Zakim Bridge, which crosses the Charles River just east of the Leverett Circle Connector Bridge, rising vertically as the most notable visual feature of the surrounding landscape.

The remainder of the study area north of the river includes portions of Cambridge to the west and Boston to the north and east. North of the river, in Cambridge, the study area is characterized by mixed-use development, including the 43-acre Cambridge Crossing, which includes both local and destination retail and restaurants. Large-scale, name-brand regional clothing and coffee retailers are among the occupants. The development also includes high-rise residential and office buildings, with space provided specifically for the life sciences, as well as approximately 11 acres of open space. South of Cambridge Crossing are the Massachusetts Water Resources Authority (MWRA) Prison Point Combined Sewer Overflow (CSO) Facility (water treatment plant) and the Hult International Business School Boston Campus. Directly west of the Project Limits in Cambridge are the EF Education First Headquarters, situated west of the U.S. Route 1 ramp, adjacent to North Point Park. North of the river, in Boston, the Charlestown neighborhood is characterized by residential uses, neighborhood commercial establishments, and neighborhood parks. Institutional uses, including Bunker Hill Community College, northwest of the Project Limits, are scattered throughout the study area. A large industrial use (a Boston Sand & Gravel aggregate facility) is also located north of the river in Boston, abutting the Project Limits.

The southernmost portion of the BET, which is in Somerville and is the only facility for major repairs and replacement of MBTA commuter rail equipment for trains serving the north side of the commuter rail network, extends slightly into the study area from the north. The area just beyond the quarter-mile study area to the north is characterized by transportation and industrial uses, including the BET and the Bunker Hill Industrial Park, which comprises facilities for waste management, wholesalers, electrical supplies, self-storage, etc.

On the south side of the Charles River, west of the MBTA ROW, the Project Limits are adjacent to, and include a portion of, property owned by MGH. This parcel is developed with a building containing MGH administrative offices;[13] a floating dock and approach ramp, extending into the Charles River from the MGH property, is currently owned by MGH and formerly served the prior owner (Spaulding Rehabilitation). West of the MGH property within the study area is another institutional use (Suffolk County Sheriff's Office's Nashua Street Jail). The Leverett Circle Connector Bridge and Zakim Bridge are to the east of the Project Limits; DCR owns currently vacant land beneath them, as well as land directly east that is developed with a parking lot serving the Charles River Dam and Locks, as well as the Gridley Locks Footpath, which provides pedestrian access between the north and south sides of the Charles River. The Project Limits extend south along the MBTA ROW to within approximately 450 feet of North Station, directly above which is TD Garden, a 19,600-seat multi-purpose arena. Adjoining TD Garden and North Station to the south is The Hub on Causeway, a mixed-use development featuring high-rise residential and office buildings, a food hall, a hotel, and destination retail. Commercial uses dominate the portion of the study area directly south of North Station. Multi-family high-rise residences, including the Avalon North Station Apartments, Alcott Apartments, West End Place, and the Amy Lowell Apartments, are located in the southwest portion of the study area in the West End neighborhood of Boston, while the North End

[13] The existing MGH building comprises only administrative offices, not medical uses; this will be confirmed prior to construction.

neighborhood to the southeast is characterized by residential uses, neighborhood commercial establishments, and neighborhood parks.

3.2.1.2. Zoning

The existing land uses throughout the study area are consistent with the applicable zoning.

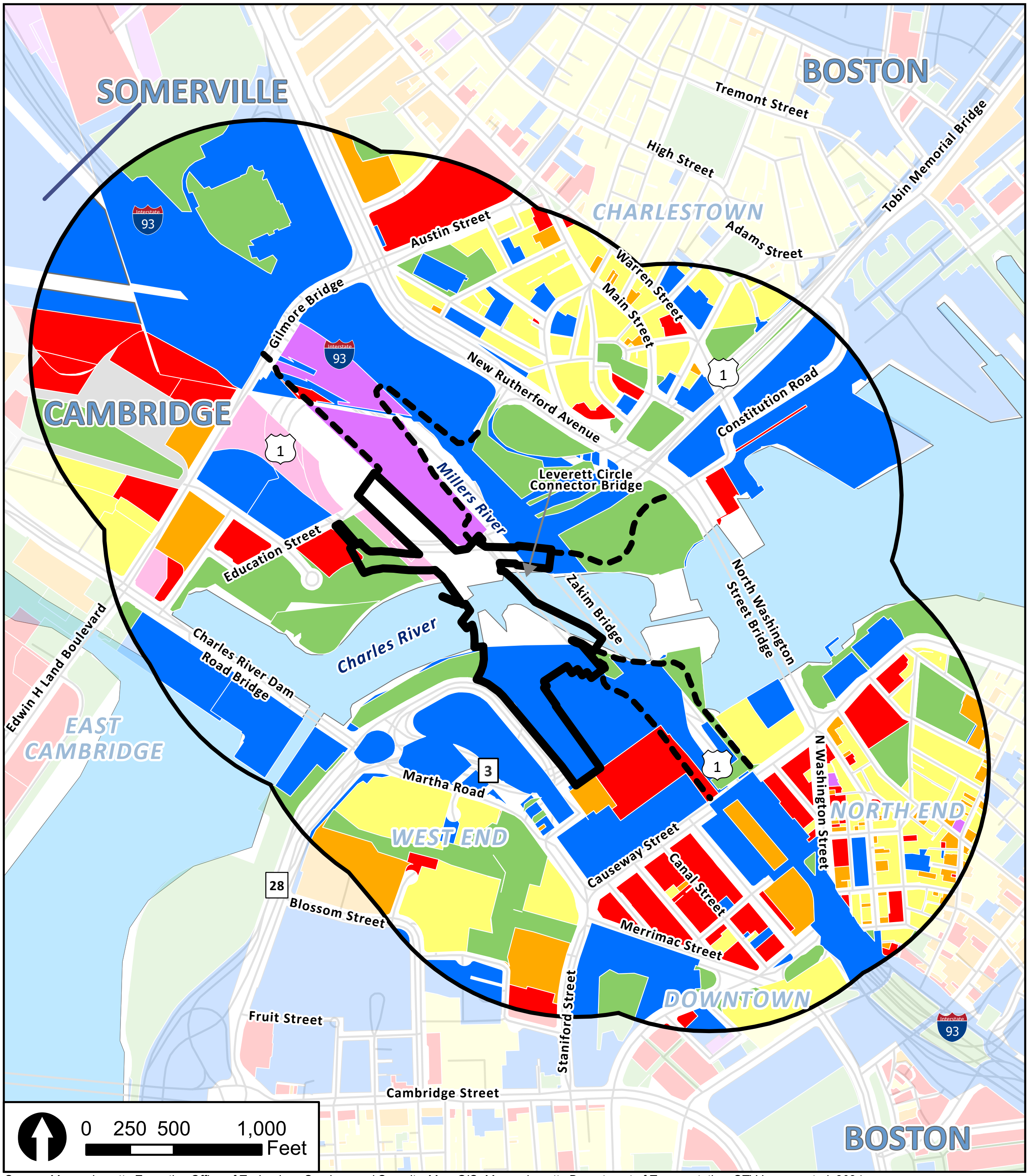
The portion of the Project Limits and the remaining portion of the study area north of the Charles River that is within the City of Cambridge are located in an Industry A (IA) district and the North Point (NP) district. The IA district permits most types of residential uses, most institutional uses, offices and laboratories, some retail uses, most light industrial uses, and some heavy industrial uses. The NP district allows certain residential, office, laboratory, retail, and institutional uses. The portion of the Project Limits north of the Charles River within the City of Boston is located in a Local Industrial (LI) district, which permits rail facilities.

The southern portion of the Project Limits and study area encompasses the New Economy Development Area and the New Boston Garden Development Area, as well as various Open Space, Residential, and Commercial zoning districts and Special District Plans (e.g., Bulfinch Triangle District) (see Figure 8, "Zoning"). Transportation uses such as subway stations or railroad passenger stations are permitted in the New Economy Development Area and the New Boston Garden Development Area as a conditional use, requiring a special permit from the Board of Appeal.

3.2.1.3. Public Policy

Imagine Boston 2030: A Plan for the Future of Boston,[14] adopted in 2017, sets goals around affordable housing development, driving economic opportunities, enhancing open spaces, and investing in transportation infrastructure, among others. *Climate Ready Boston*[15] is the city's initiative to prepare for the effects of climate change and outlines strategies to address extreme heat, stormwater flooding, and coastal flooding from sea-level rise and storms. Similarly, *Resilient Boston Harbor*[16] focuses on improving Boston's resilience to climate change by creating resilient, accessible open spaces and better preparing coastal buildings and infrastructure. The city's most recent long-term transportation plan, *Go Boston 2030 ReVisioned*,[17] builds on the original 2017 plan and includes strategies for improving safety, expanding access to public transit, and reducing emissions.

[14] https://www.boston.gov/civic-engagement/imagine-boston-2030
[15] https://www.boston.gov/environment-and-energy/climate-ready-boston
[16] https://www.boston.gov/environment-and-energy/resilient-boston-harbor
[17] https://www.boston.gov/departments/transportation/go-boston-2030

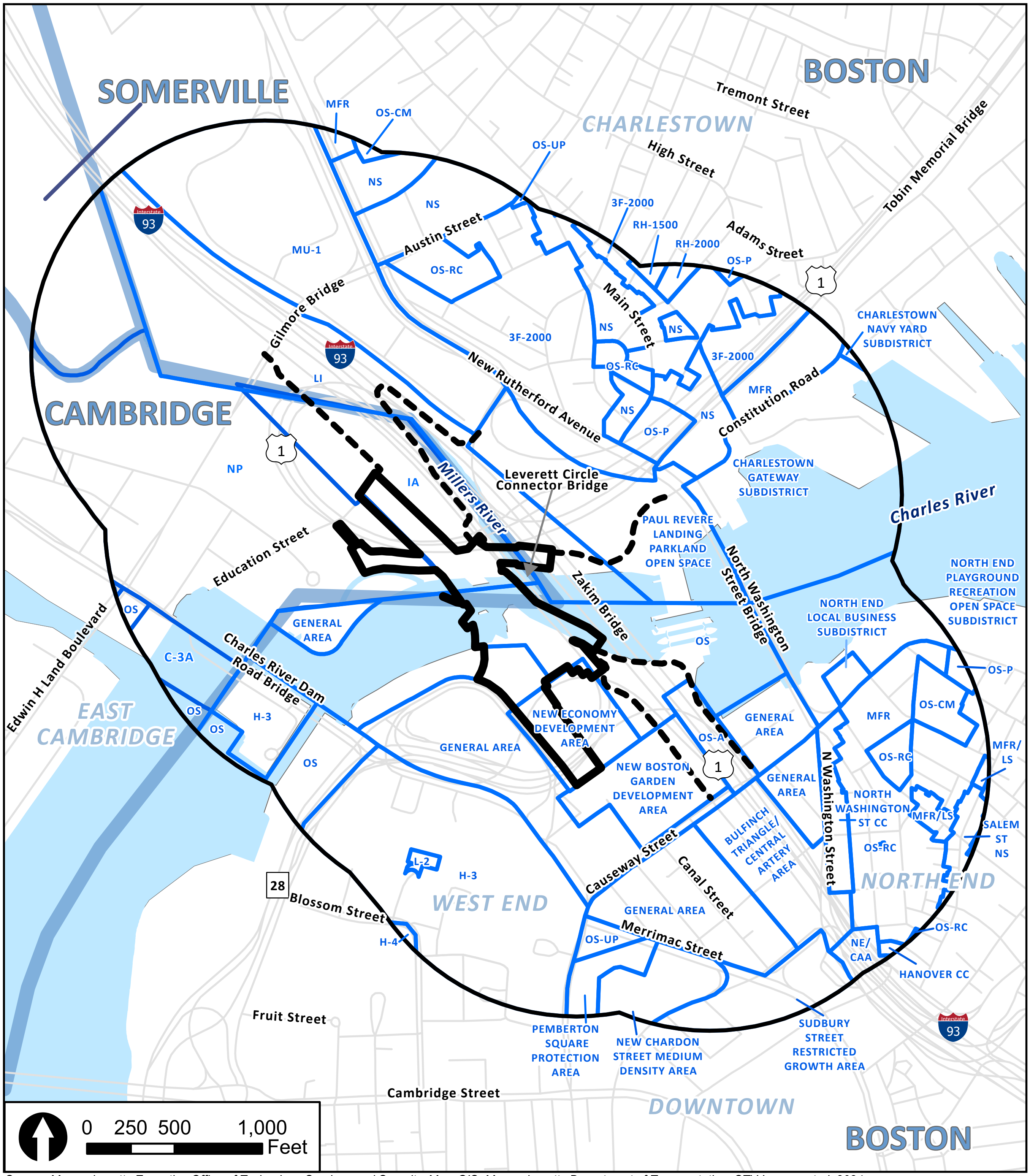


Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

- Project Limits
- Construction Access
- 1/4-Mile Study Area
- Residential
- Mixed Use
- Commercial
- Industrial
- Transportation & Utilities
- Institutional & Public Facility
- Open Space
- Vacant

Figure 7

Land Use



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
1/4-Mile Study Area
Municipal Boundaries
Zoning

Figure 8

Zoning

3.2.2. Socioeconomics

The U.S. Census Bureau provides data on population, housing, and income at the Census block group level to describe socioeconomic conditions. The most current published data are the American Community Survey (ACS) 5-Year Estimates for years 2018-2022, published in 2023. Socioeconomic conditions were characterized by evaluating the Census data available for the Census block groups that fall either fully or partially within the quarter-mile study area.

3.2.2.1. Population

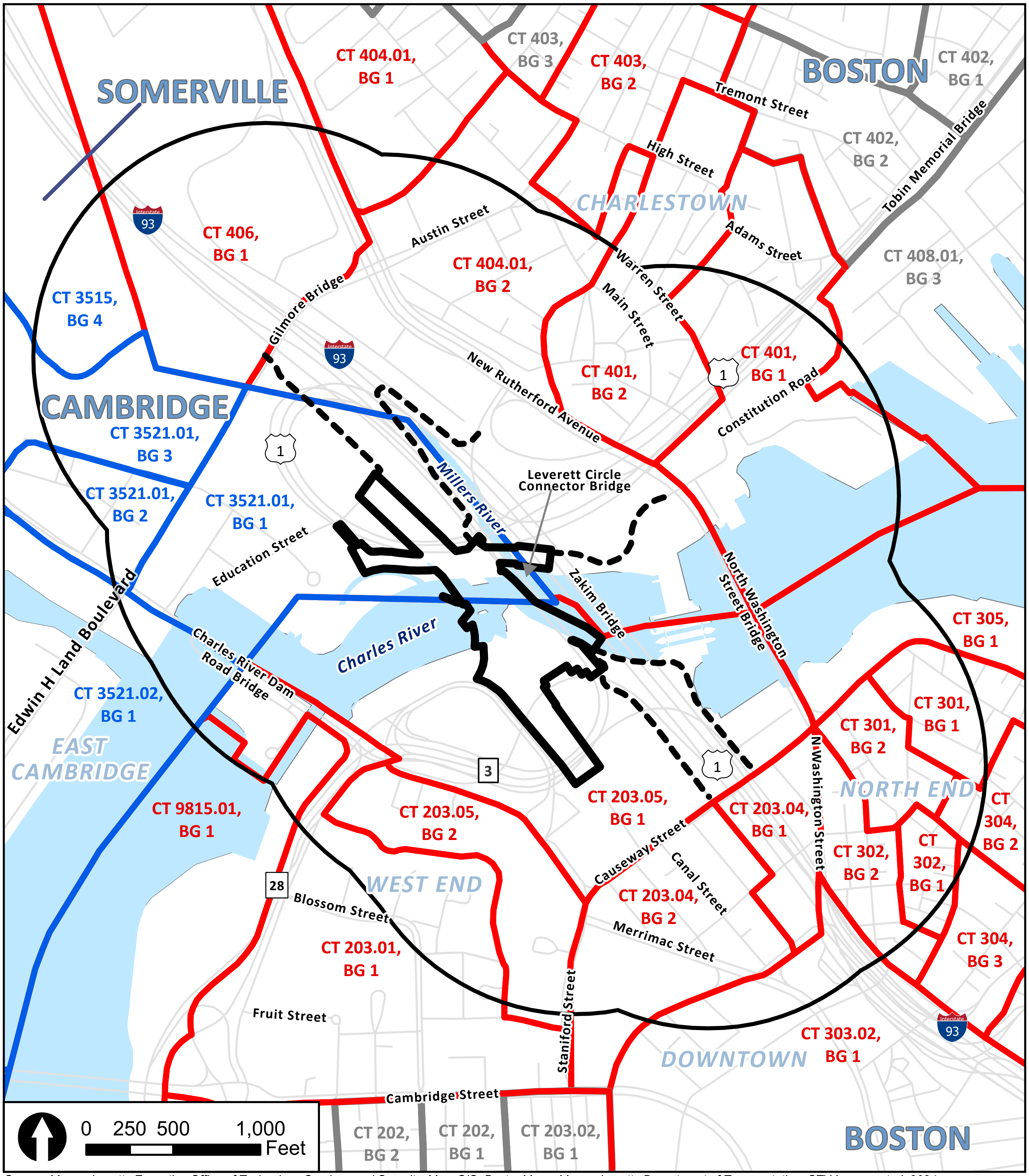
Based on U.S. Census data, the study area contains a total of 28,087 residents, 23,321 of whom live in the Cambridge portion of the study area, north of the Charles River, and 4,766 of whom live in the Boston portions of the study area north and south of the Charles River (see Figure 9, "Census Block Groups"). As shown in Table 4, "Residential Population Trends – 2013 to 2022," this represents an increase of over 100 percent in the Cambridge portion of the study area and 55 percent in the Boston portion of the study area since 2013. The cities of Cambridge and Boston have total populations of 117,962 and 665,945 residents, respectively, representing more modest increases of 12 percent in Cambridge and six percent in Boston since 2013.

Table 4: Residential Population Trends – 2013 to 2022

Geography		Total Population (2013)*	Total Population (2022)	Percent Increase
Study Area	Cambridge	11,585	23,321	101%
	Boston	3,079	4,766	55%
Study Area		14,664	28,087	92%
Cambridge		105,737	117,962	12%
Boston		629,182	665,945	6%

Notes:
** ACS does not provide population data at the block group level for the previous decade (i.e., year 2012); as such, the year 2013 is used for comparison.*

Source: ACS 5-Year Estimates, 2018-2022 & 2009-2013.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; BostonMaps; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits	Boston Census Block Group
Construction Access	Cambridge Census Block Group
1/4-Mile Study Area	Other Census Block Group

Figure 9

Census Block Groups

3.2.2.2. *Households*

Within Cambridge, there are a total of approximately 49,475 households,[18] of which approximately 40.1 percent and approximately 59.9 percent are Family[19,20] and Non-Family[21] households, respectively. Within Boston, there are a total of approximately 276,053 households, of which approximately 46.5 percent and approximately 53.5 percent are Family and Non-Family households, respectively.

The average household size is approximately 2.08 persons per household in Cambridge and approximately 2.26 persons per household in Boston.

3.2.2.3. *Demographics and Income*

Within the Cambridge portion of the study area, 24.1 percent of residents are considered minority populations, 10 percent of households are below the poverty threshold, and 23.6 percent of households are considered low-income households;[22] these percentages are less than those in Cambridge, Suffolk County, and the state as a whole.

Within the Boston portion of the study area, 53.7 percent of residents are considered minority populations, 25 percent of households are below the poverty threshold, and 44.3 percent of households

[18] The U.S. Census Bureau defines a household as consisting of "all the people who occupy a housing unit. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live with any other persons in the structure and there is direct access from the outside or through a common hall. A household includes the related family members and all the unrelated people, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated people sharing a housing unit such as partners or roomers, is also counted as a household. The count of households excludes group quarters. There are two major categories of households, 'family' and 'nonfamily.'" (https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html)

[19] The U.S. Census defines a family as "a group of two people or more (one of whom is the householder) related by birth, marriage, or adoption and residing together; all such people (including related subfamily members) are considered as members of one family. Beginning with the 1980 Current Population Survey, unrelated subfamilies (referred to in the past as secondary families) are no longer included in the count of families, nor are the members of unrelated subfamilies included in the count of family members. The number of families is equal to the number of family households, however, the count of family members differs from the count of family household members because family household members include any non-relatives living in the household." (https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html)

[20] The U.S. Census defines a family household as "a household maintained by a householder who is in a family (as defined above), and includes any unrelated people (unrelated subfamily members and/or secondary individuals) who may be residing there. The number of family households is equal to the number of families. The count of family household members differs from the count of family members, however, in that the family household members include all people living in the household, whereas family members include only the householder and his/her relatives." (https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html)

[21] The U.S. Census defines a non-family household as consisting of "a householder living alone (a one-person household) or where the householder shares the home exclusively with people to whom he/she is not related." (https://www.census.gov/programs-surveys/cps/technicaldocumentation/subject-definitions.html)

[22] In accordance with Massachusetts guidance, low-income households are defined as households with income equal to or less than 65 percent of the statewide annual median household income. The Massachusetts annual median household income is approximately $62,728; as such, the ACS income band for household income below $60,000 was used in this analysis.

are considered low-income households; these percentages are generally comparable to those for Boston, but greater than those in Middlesex County and the state as a whole.

Refer to Section 7, "Environmental Justice," and Appendix K, "Environmental Justice," for more detailed demographic data and identification of environmental justice communities in the study area.

3.2.2.4. Transit-Dependent Populations

Elderly and youth populations, zero-car households, and those with a disability are potential indicators for transit dependency.[23] There are large concentrations of zero-car households in both the Cambridge and Boston portions of the study area: 11 of 19 Census block groups in the Cambridge portion of the study area and four of five Census block groups in the Boston portion of the study area have large concentrations of zero-car households.

3.2.2.5. Commercial Activities

As described in Section 3.2.1, "Land Use and Zoning," large commercial uses in the study area comprise Cambridge Crossing, north of the Project Limits, and the Hub on Causeway, directly south of and adjoining TD Garden and North Station. Additional commercial uses are concentrated in the area just south of North Station. As described further in Section 3.2.8, "Transportation Systems," commercial navigation on the Charles River is generally limited to sightseeing tours by the Charles River Boat Company and the Boston Duck Tours Company.

3.2.3. Community Facilities and Services

Community facilities comprise public or publicly funded facilities, including schools, health care facilities, early childhood programs, libraries, and police and fire protection services. The Proposed Project would not introduce new populations that would use these facilities and services, and so this analysis focuses on the potential for physical alteration or displacement of a community facility or its property and potential changes to service delivery methods or programs that may result with the Proposed Project. MassGIS land use data were supplemented by a review of Google Maps to identify community facilities in the study area.

The study area contains a mix of community facilities, including a jail facility and a State Police facility, as well as educational institutions, medical facilities, and places of worship (see Figure 10, "Community Facilities, Parks and Open Spaces, and Cultural Resources"). The educational institutions and medical facilities in the study area serve regional populations that may depend upon MBTA and Amtrak rail service to provide access to these resources.

[23] Environmental Justice, Title VI, Non-Discrimination, and Equity. U.S. Department of Transportation Federal Highway Administration (https://www.fhwa.dot.gov/environment/environmental_justice/equity/).

Figure Key

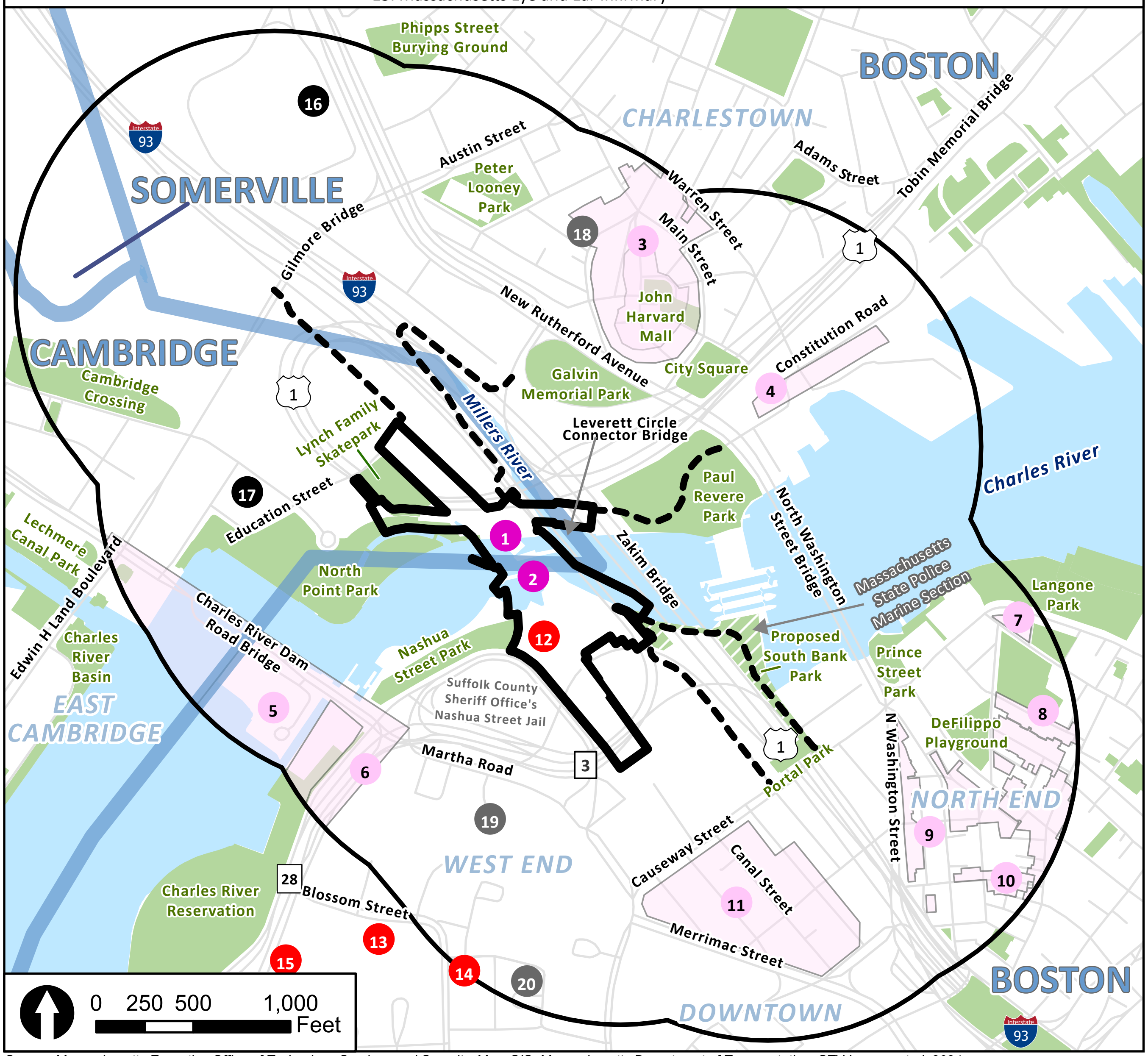
Historic Resources
1. Boston and Maine Railroad Signal Tower A
2. Draw One Bridges

Historic Districts
3. Harvard Street Area
4. Hoosac Stores 1, 2, and 3
5. Charles River Basin Historic District
6. Charles River Esplanade
7. Charter Street - Commercial Street Area
8. Hull Street Area
9. North Washington Street, 45-183
10. Cooper Street Area
11. Bulfinch Triangle Historic District

Hospitals
12. Mass General Hospital: Global Health and Human Rights
13. Massachusetts General Hospital
14. Shriners Hospital for Children - Boston
15. Massachusetts Eye and Ear Infirmary

Schools
16. Bunker Hill Community College
17. Hult International Business School

Places of Worship
18. St. John's Church
19. The Boston Synagogue
20. Saint Joseph



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

- Project Limits
- Construction Access
- 1/4-Mile Study Area
- Municipal Boundaries
- Historic Districts
- Existing Open Space
- Proposed Open Space

Figure 10
Community Facilities, Parks and Open Spaces, and Cultural Resources

MBTA Draw One Bridge Replacement Project

Immediately west of and adjacent to the Project Limits is the Suffolk County Sheriff's Office's Nashua Street Jail, which houses approximately 700 pre-trial detainees in 13 different housing units. The Massachusetts State Police Marine Section is located approximately 500 feet east of the Project Limits, though a construction access driveway would be directly adjacent to the police facility. As described in Section 2.4.4.3, "Temporary Closures," the State Police use a DCR-owned boat launch ramp in North Point Park (located within the Project Limits) and typically have a boat docked beneath the Zakim Bridge along the south bank of the Charles River.

On the south bank of the Charles River, the MGH Global Health and Human Rights building (previously known as the Spaulding Rehabilitation Hospital and currently used as an administrative building) is within the Project Limits, immediately west of the existing tracks. Shriners Children's Boston is approximately one-quarter mile southwest of the Project Limits. MGH's main campus, which includes nearly 30 buildings housing inpatient and ambulatory care services, and Massachusetts Eye and Ear's main campus are southwest of the Project Limits, outside of the quarter-mile study area.

North of the Charles River, the Hult International Business School Boston Campus is approximately 350 feet west of the Project Limits, just beyond the I-93 and U.S. Route 1 on-ramp. The BHCC main campus, located at the Community College Station on the MBTA Orange Line, is approximately 650 feet northeast of the Project Limits. A construction access driveway would be provided connecting to the school's visitor parking lot access road.

St. John's Episcopal Church is approximately 1,300 feet northwest of the Project Limits, though at its closest point, the construction access driveway that would connect to the BHCC campus would extend to within approximately 800 feet of the church. South of the Charles River, the Boston Synagogue and St. Joseph Catholic Church are approximately 700 feet and one-quarter mile southwest of the Project Limits, respectively.

3.2.4. Parks and Recreational Resources, and Pedestrian and Bicycle Facilities

For federally funded transportation projects, federal protection of publicly owned and accessible parklands and recreation areas is provided under Section 4(f) of the U.S. Department of Transportation Act. Section 8, "Section 4(f)," provides a summary of the Section 4(f) evaluation for the Proposed Project. Public parklands and recreation areas in the study area were identified in consultation with DCR and through MassGIS-produced data available online. However, the parks and recreational resources presented on Figure 10, "Community Facilities, Parks and Open Spaces, and Cultural Resources," and listed in Table 5, "Parks and Recreational Resources in the Study Area," comprise all identified parks and recreational resources within the quarter-mile study area, including but not limited to the Section 4(f) resources. Per regulatory authority and guidance, Section 4(f) resources are more narrowly defined as those within the direct footprint of the work area or within the Section 106 Area of Potential Effects (APE).

Email correspondence with DCR on December 19, 2022, confirmed that there are no parks, recreational areas, or open space resources that have been funded with Land and Water Conservation Fund (LWCF) monies in the study area. Therefore there are no Section 6(f) properties within the study area.

3.2.4.1. Parkland

As described in Table 5, "Parks and Recreational Resources in the Study Area," there are several parks and recreational areas along the north and south banks of the Charles River and within the quarter-mile study area.

Table 5: Parks and Recreational Resources in the Study Area

Parks & Open Space Resource	Features
North Bank Bridge	Approximately 690-foot pedestrian and bicycle bridge carrying users under the Zakim Bridge and over the MBTA commuter rail tracks that lead into North Station; it connects North Point Park in Cambridge and Paul Revere Park in Boston
North Point Park	Approximately eight acres featuring a playground, boat docks, green space, walking/biking pathways, and a waterfront promenade
DCR Boat Launch Ramp	DCR-owned ramp within North Point Park extending from an MBTA access roadway into the Charles River Basin; used by DCR, the State Police, and the Boston Duck Tours Company (not available for public use)
Paul Revere Park	Approximately 7.5-acre playground and walking/biking pathways, as well as an oval meadow used as an amphitheater and hosts various exhibits
Nashua Street Park	Approximately 2.5 acres of accessible shoreline, walking/biking pathways connecting the park to other locations, and open lawns with landscaping
DCR Pier and Riverfront Walkway	A small pier with plantings that extends from and appears as part of an adjacent approximately 250-foot bicycle path and pedestrian walkway
MGH Floating Dock and Approach Ramp	Approximately 75-foot by 20-foot floating dock and associated approach ramp adjacent to the MGH administrative building
Gridley Locks Footpath	Approximately 670 feet of walking path on the Charles River through the Gridley Locks system
DCR Parking Lot and Adjacent Vacant Parcel	Approximately 1.67-acre parcel (mostly vacant) featuring a recreational pedestrian and bicycling path along the bank of the Charles River, between and under the Leverett Circle Connector Bridge and the Zakim Bridge
Lynch Family Skatepark	Approximately one-acre park with skateboarding amenities and walking/biking pathways
Galvin Memorial Park	Approximately two acres featuring walking/biking pathways and dense vegetation with a grassy open area
Millers River Littoral Way	Approximately 2,000-foot pedestrian and bicycle walkway along the east bank of the Millers River leading from the north shore of the Charles River under the Zakim Bridge to New Rutherford Avenue
Cambridge Crossing	Approximately 11 acres of open space featuring walking/biking pathways, open space, landscaping, and benches
Peter Looney Park	Sports facility, tennis, playground and play structure for children
John Harvard Mall	Historic brick square featuring stone benches in an open quiet area surrounded by large shady trees
City Square	Historic park on the Freedom Trail consisting of grassy areas, historic markers, sculptures, and a fountain
Prince Street Park	Small park featuring two tennis courts and walking paths
Langone Park/ Puopolo Playground	Waterfront park with bathhouse, playground, sports fields, swimming pool, wading pool, and bocce courts

Table 5: Parks and Recreational Resources in the Study Area (cont.)

Parks & Open Space Resource	Features
DeFilippo Playground	Park featuring a basketball court, street hockey rink, and racquetball court
Steriti Memorial Rink	Public indoor ice rink with harbor views

Source: STV Incorporated, 2024.

3.2.4.2. Pedestrian and Bicycle Facilities

Pedestrian and bicycle facilities within the study area provide regional access to North Station and both sides of the Charles River. Within the study area, pedestrian and bicycle facilities are generally integrated with the extensive parkland that characterizes the portion of the study area along the Charles River.

While the Draw One Bridge does not accommodate pedestrian and bicycle traffic, pedestrian walkways along the east and west sides of the south trestles terminate just before the navigable Charles River channel. These sidewalks, approximately eight feet wide and approximately 255 feet in length on the west side and 420 feet in length on the east side, were constructed as part of a commitment for the MHD Central Artery Tunnel Project. The two sidewalks do not connect to provide cross-river access; the westerly sidewalk connects to the Nashua Street Park on the south bank of the Charles River and the easterly sidewalk connects to DCR property that provides access to the Charles River Dam, Gridley Locks Footpath, and Lovejoy Wharf.

3.2.5. Historic and Cultural Resources (Section 106 Consultation)

Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470f) requires that federally funded or permitted projects consider the effects of their undertakings on historic and archaeological resources listed in or eligible for listing in the National Register of Historic Places (NRHP). Therefore, an analysis of the Proposed Project's potential effects on historic and archaeological resources has been prepared in accordance with both Section 106 and the provisions of MGL Chapter 9, Section 26-27C (codified in 950 CMR 71), under which any projects that require funding, licenses, or permits from any state agency be reviewed by the State Historic Preservation Office (SHPO), which in Massachusetts is MHC. For details related to the Section 106 consultation process, including a copy of the Draft Memorandum of Agreement (MOA) developed in this process, refer to Appendix B, "National Historic Preservation Act Section 106."

3.2.5.1. Archaeology

The APE is limited to areas of proposed ground disturbance, including the site of the existing Draw One Bridge and adjoining areas, as well as the site of the proposed Tower A building. The Proposed Project is located within a heavily developed area of fill land, subjected over many years to extensive construction and dredging in conjunction with continuous railroad and highway building; as such, the APE contains no known archaeological resources.

3.2.5.2. Historic Architectural Resources

FTA conducted a survey to identify historic architectural resources age 50 years or older in the APE for historical architectural resources. Two historic architectural resources were identified within the APE: the Draw One Bridge and Signal Tower A. The Draw One Bridge is eligible for listing in the NRHP under

Criterion C in the areas of Engineering and Transportation, as it comprises two of the last surviving Scherzer-type rolling lift bascule railroad bridges in the state. Signal Tower A is eligible for listing in the NRHP under Criterion C in the areas of Architecture, Engineering, and Transportation as a substantially intact and significant surviving example of railroad architecture dating to the period of the B&MRR's large BET improvement program, carried out between 1928 and 1932.

3.2.5.2.1. Section 106 Consultation

FTA began consultation with the SHPO and other Section 106 stakeholders in February 2020 to provide a project overview and to determine the Proposed Project's APE. (Refer to Appendix B, "National Historic Preservation Act Section 106," for the full list of consulting parties and information shared, as well as comments and information received in return.) See Section 4.2.6, "Historic and Cultural Resources," for a detailed description of the Section 106 consultation process as it relates to the demolition of these historic resources that would be required with implementation of the Proposed Project; mitigation developed through the Section 106 process is described in Section 6, "Summary of Impacts, Commitments, and Required Mitigation Measures."

3.2.6. Visual and Aesthetic Resources

Pursuant to Section 4(f) of the U.S. Department of Transportation Act, the visual effects on publicly owned parks and recreation areas and historically significant cultural resources must be considered when undertaking transportation improvements. Such effects may be considered a Constructive Use of Section 4(f) property when no other physical use of that property occurs. Visual effects on historically significant cultural resources must also be evaluated pursuant to Section 106 of the National Historic Preservation Act.

Given the visual relationship of the Draw One Bridge to the Leverett Circle Connector Bridge and the Zakim Bridge directly to the east of the Project Limits, and to correctly anticipate potential effects associated with the Proposed Project, the general one-quarter-mile study area is suitable for this analysis. Particular attention is given to the relatively unobstructed and direct views from parkland to the south of the Draw One Bridge.

3.2.6.1. Study Area Landscape, View Corridors, and Visual Resources

The aesthetic conditions of the study area may be characterized in accordance with the major land use types in the area, comprising transportation infrastructure (including three bridges over the Charles River), parklands, and commercial uses. The most definitive feature of the landscape in the study area is the Charles River, which together with its surrounding land comprises a relatively flat topography, resulting in view corridors across the river (toward the north and south) in the study area that are unobstructed on either side (to the east or west of) the group of three bridges. Rail passengers and automobile drivers on the bridges are afforded limited views of the riverbanks, but at points more expansive distant views of the cities of Cambridge and Boston to the north and south are available. People walking along the northern or southern banks of the Charles River in the study area have generally unimpeded views to the opposite bank.

Viewers to the west of the bridges have views of all three bridges, with the Draw One Bridge in the foreground being the shortest in overall height. The Leverett Circle Connector Bridge just to the east has limited vertical elements, and the Zakim Bridge behind these two stands the tallest. Viewers to the east of the bridges have clearest views of the Zakim Bridge, though the lower portions of the Leverett Circle Connector Bridge and Draw One Bridge may be visible from some locations, if not entirely discernable from the overall collective massing. Together, the three bridges impede clear views to the east of them from vantage points in the western portion of the study area, and to the west of them from vantage points in the eastern portion of the study area. Notably, while the bridges supporting highway and rail infrastructure limit views along the river, they also define the aesthetic character of the Charles River basin in the study area as they are such prominent features in the landscape.

Rising to approximately 320 feet, its height alone makes the Zakim Bridge one of the most character-defining features of the study area landscape, and its modernist styling, with prominent obelisk tower forms and repetitively placed cables, further characterize the viewshed. Section 106 consultation, as well as Section 4(f) coordination, have confirmed the Zakim Bridge be considered a character-defining feature of the area, and thus a visual resource.

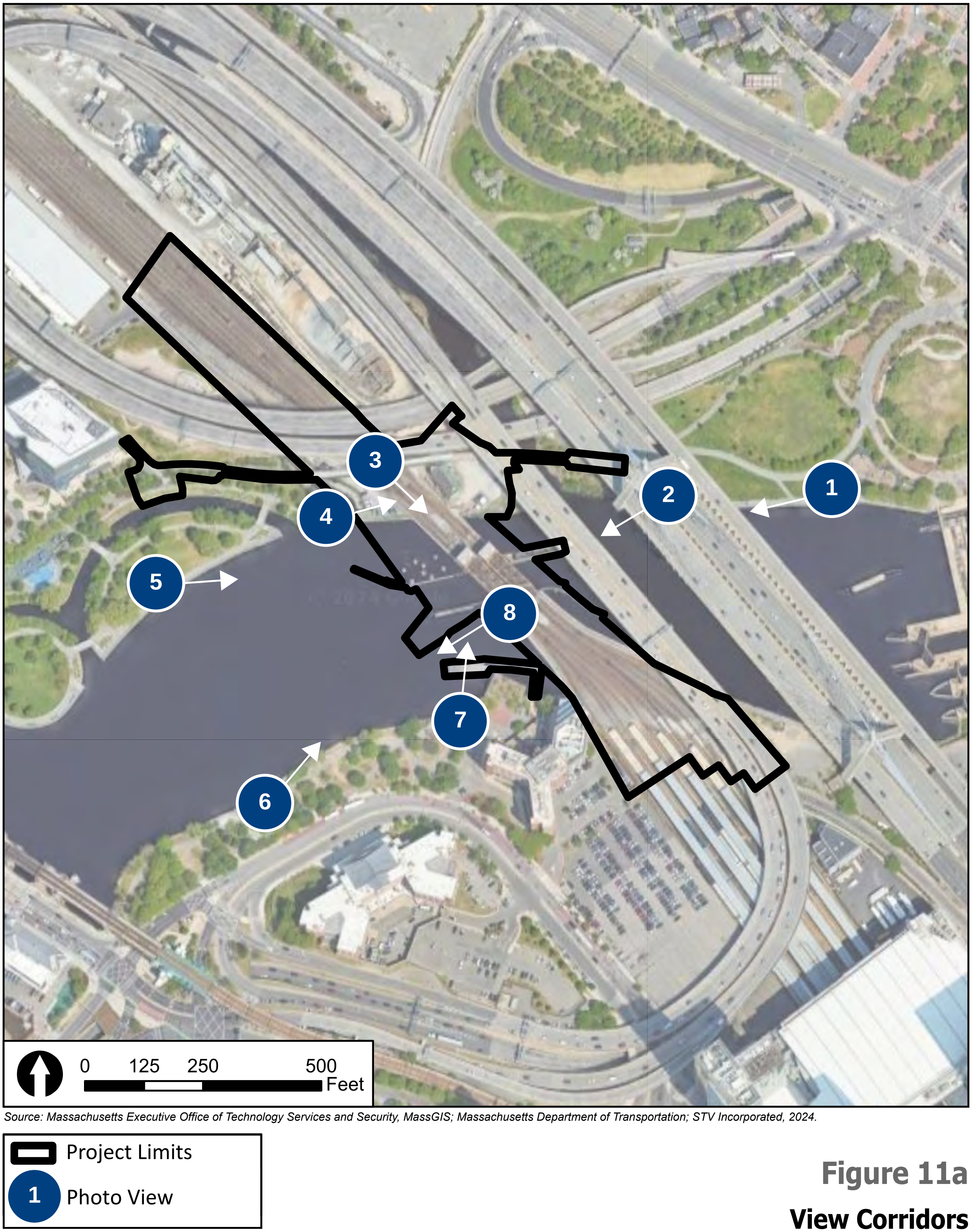
The Leverett Circle Connector Bridge is largely hidden from view given its position between the Draw One Bridge on the west and the Zakim Bridge on the east, particularly as it is a typically streamlined highway bridge that lacks notable vertical elements. As such, the Leverett Circle Connector Bridge does not contribute substantially to the visual character of the group of bridges or otherwise contribute to the aesthetic character of the area.

Though it is both the oldest and the shortest of the three bridges, the Draw One Bridge is visible as the frontmost bridge from vantage points west of it. Given its particular form as a Scherzer-type rolling lift bascule bridge, the Draw One Bridge is distinctive among the group. Likewise, Signal Tower A, which stands east of the Draw One Bridge on the northern side of the river, also represents the history of the rail crossing, though views of it from most vantage points to the west are generally obstructed by the Draw One Bridge. Signal Tower A and the Draw One Bridge are indicative of historic rail infrastructure in the area that facilitated the development on both sides of the river; as listed historic resources, both are considered visual resources in this analysis.

There are several commercial and institutional uses on the north and south sides of the Charles River, including the EF Education First Headquarters and Cambridge Crossing to the north in Cambridge, and the MGH administrative building and The Hub on Causeway to the south in Boston, which provide additional vertical massing to limit or contain views that people would experience in the study area. Otherwise, the banks of the Charles River in the study area are characterized by publicly accessible open space and parkland.

As show on Figure 11, "View Corridors," and in photos 1 through 8, visitors to parklands have varied but generally clear views of the Draw One Bridge and the Zakim Bridge rising behind it when viewing from the west, and limited views of the Draw One Bridge and Project Limits from vantage points east. As shown in Photo 3, pedestrians crossing the North Bank Bridge have direct views of the bridges, as the North Bank Bridge crosses over the tracks directly north of the Draw One Bridge. In addition, limited pedestrian access is available via a walkway installed onto the southern Draw One trestles, which is accessible from Nashua Street Park, affording pedestrians unobstructed views from a point over the water westward along the Charles River (see Photo 8).

The Draw One Bridge is also visible from the Gridley Locks Footpath to the east, though views are interrupted by the Leverett Circle Connector Bridge and the Zakim Bridge. The Craigie Drawbridge and Charles River Dam Road Bridge to the west provide views of both the Draw One Bridge and Signal Tower A.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Figure 11a

View Corridors

Photo 1
View of Draw One Bridge from Paul Revere Park, looking west from Cambridge

Photo 2
View of Draw One Bridge underneath Zakim Bridge, looking west from Cambridge.

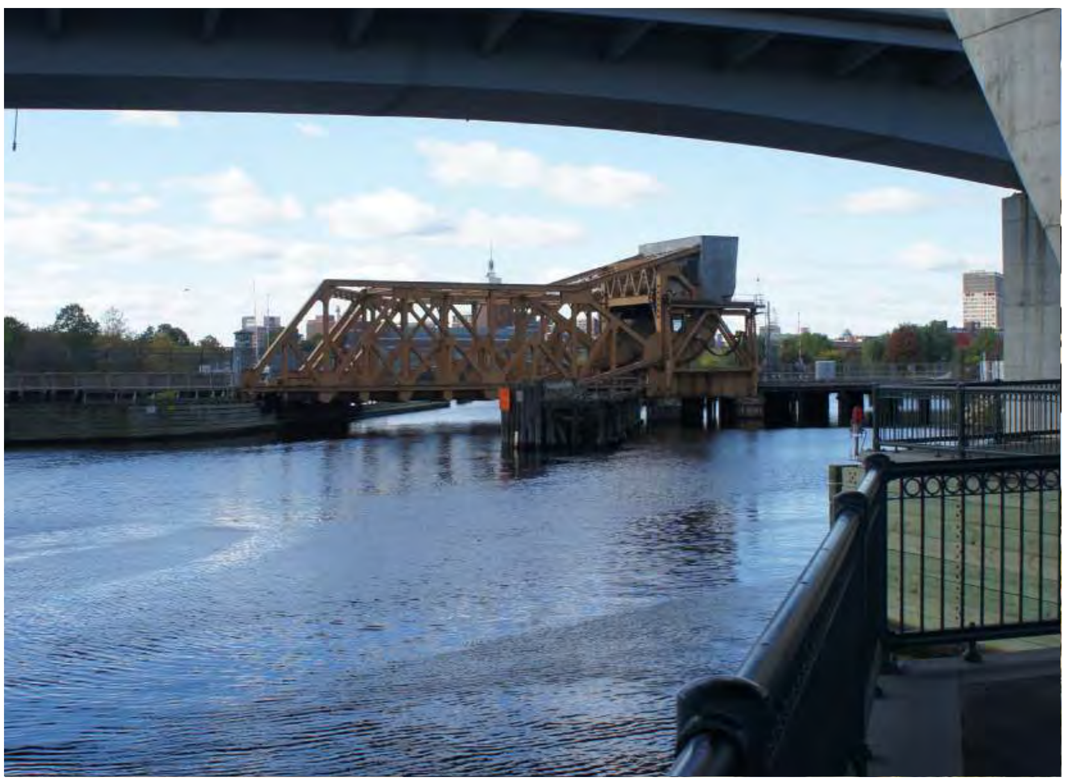


Figure 11b
View Corridors

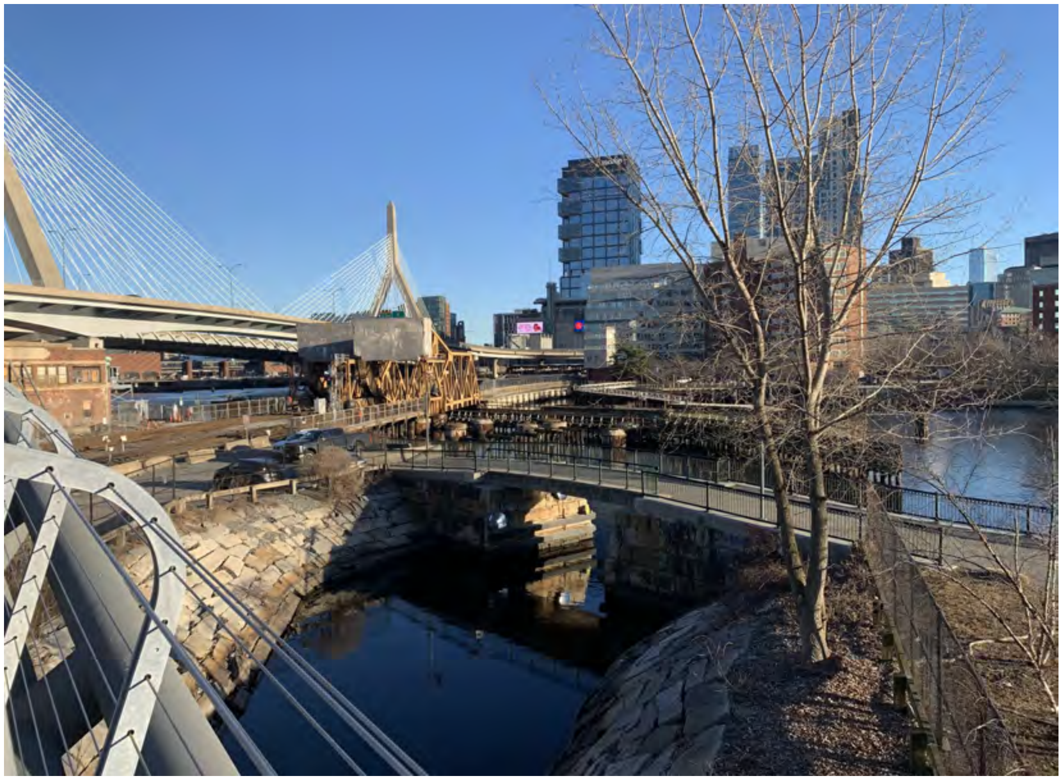


Photo 3
View from MBTA ROW of Draw One Bridge and north timber pile trestle, looking southeast from Cambridge.

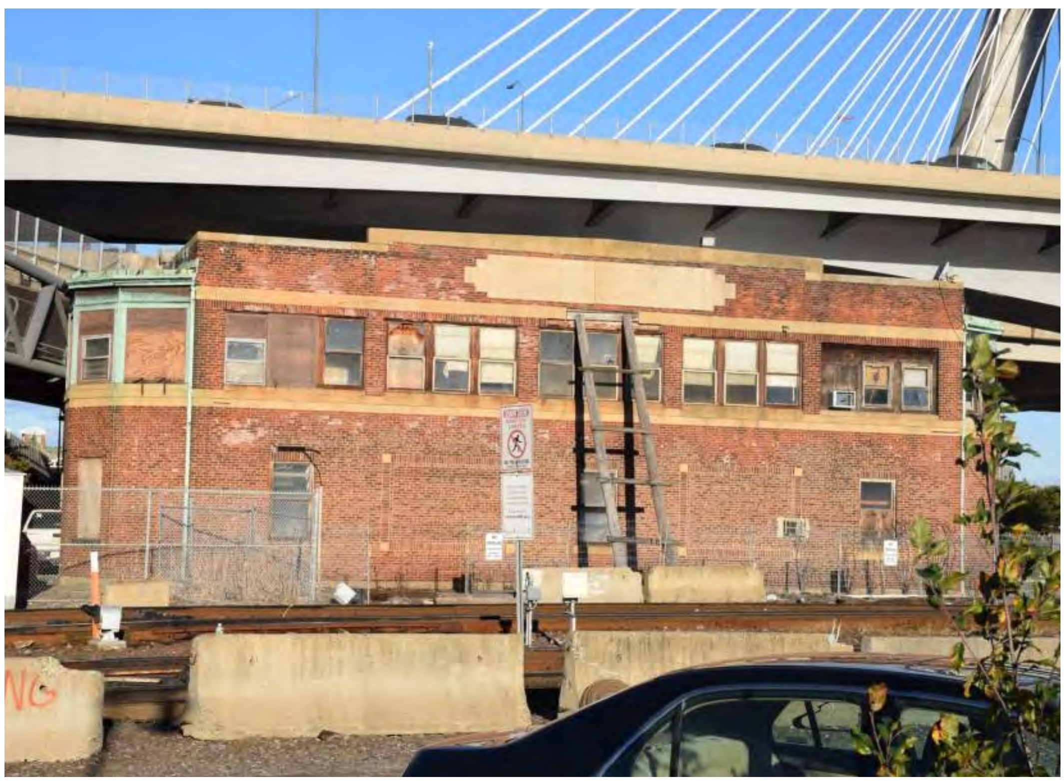


Photo 4
View of Signal Tower A, looking east at the west (trackside) elevation with temporary timber shoring, from Cambridge.

Figure 11c
View Corridors

Photo 5
View of Draw One Bridge from North Point Park, looking east from Cambridge.

Photo 6
View of existing bridge in partially open position from Nashua Street Park from Boston.

Figure 11d
View Corridors

Photo 7
View from Nashua Street Park/ DCR Pier from Boston.

Note: Views of Signal Tower A obscured by passing trains.

Photo 8
View of MGH floating dock and Charles River from Draw One Bridge sidewalk, looking west.

Figure 11e
View Corridors

3.2.7. Natural Resources

Existing conditions in the study area were characterized on the basis of existing information available from federal and state resources.

Section 307 of the 1972 Coastal Zone Management Act requires federal actions within (or outside of, but with the potential to affect) the coastal zone to be consistent with the enforceable policies of a state's federally approved coastal management program. The Massachusetts Office of Coastal Zone Management (CZM) is responsible for managing the state's coastal program.

3.2.7.1. Soils

The Project Limits are within a geologic region known as the Boston Basin. Subsurface conditions may be generally characterized as man-placed fill material overlying organic silt and intermixed fill and silt, which in turn overlie silty sand; marine clays; glaciomarine till; and highly weathered, partially lithified and fractured argillite, and finally, argillite bedrock.

3.2.7.2. Wetlands and Water Resources

Two perennial streams were identified and delineated, including portions of the Charles River and the Millers River, which are assumed to be Traditional Navigable Waters (TNW) (see Figure 12, "Natural Resources"). As described in Section 3.2.8, "Transportation Systems," the Millers River has largely been covered, with just a small segment of estuary remaining. Additional consultation with USACE and MassDEP is necessary to determine the official jurisdictional status of the perennial streams, as well as to coordinate Section 10, 401, and 404 permitting prior to construction.

The Project Limits are situated in the lower portion of the Charles River Basin, which separates Boston and Cambridge. Although historically tidal, the Basin has been cut off from the ocean by a system of locks and dams – the Charles River Dam and Locks. The locks are approximately 900 feet downstream of the Project Limits, near the North Washington Street (Route 99) bridge. There are no tidal flows that reverse the general downstream passage of water from the Charles River upstream of the Charles River Dam and Locks, including within the Project Limits. However, depending on tides, when the locks are opened, there is an upstream incursion of salt water along the bottom of the river, which extends into the lower Basin of the Charles River to varying degrees. Water salinity varies with the tides and seasonally, depending upon the amount of freshwater outflow from the Charles River.

The river bottom sediment in the vicinity of the Project Limits is primarily loose, black organic silt with traces of sand, clay, shells, and other debris to a thickness of approximately five to 10 feet.

3.2.7.3. Floodplains

Portions of the Project Limits are located within the within the 100-year floodplain (1 percent annual-chance flood event), which is at an elevation of 3.5 feet. The Project is also within Special Flood Hazard Area Zone AE and Zone VE.

3.2.7.4. Coastal Zone

A small portion of the Project Limits – the east end of the North Bank Bridge at Paul Revere Park – is located within the Massachusetts Coastal Zone; therefore, the Proposed Project is subject to Federal

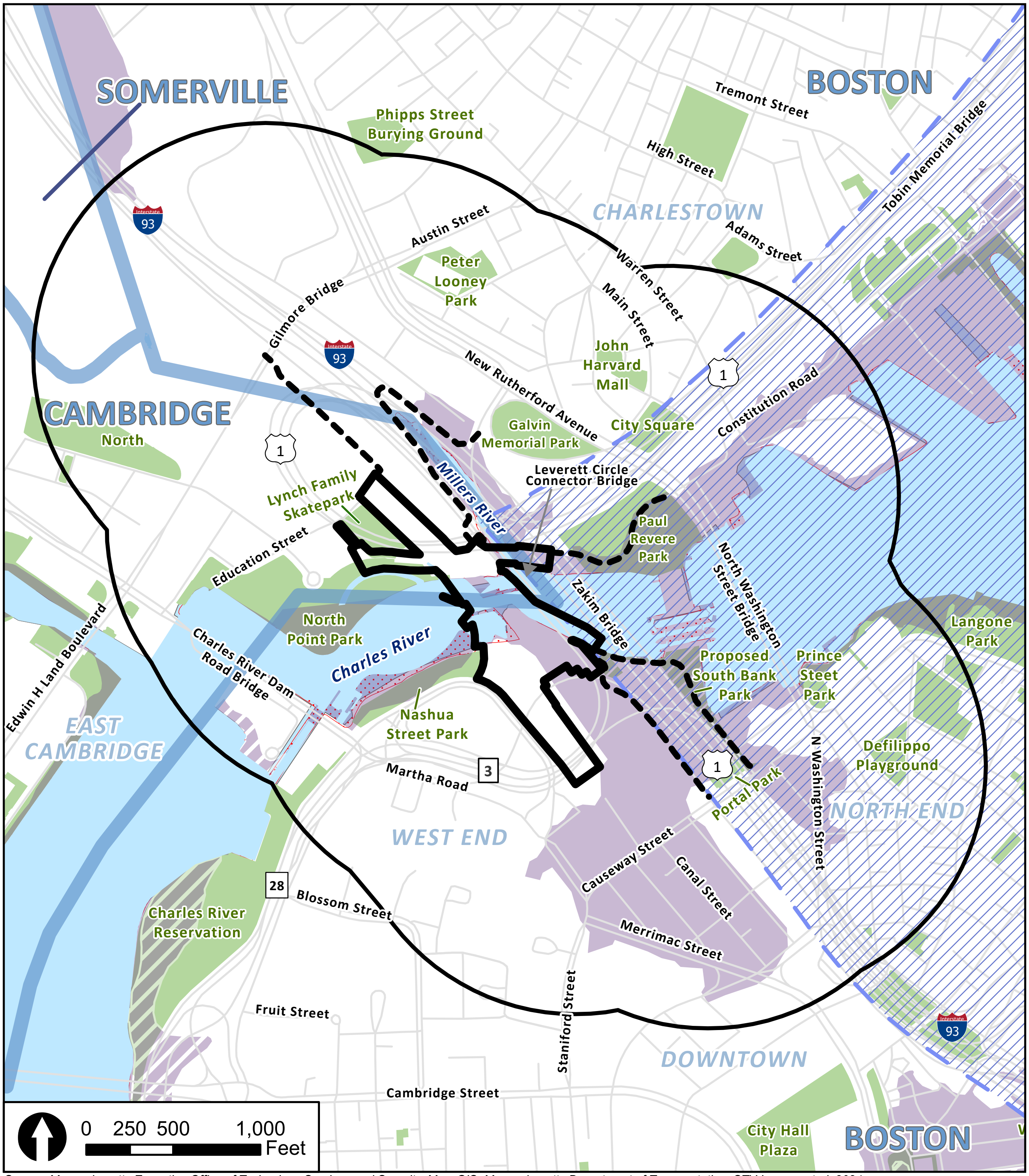
Consistency Review under the Massachusetts Office of Coastal Zone Management's (CZM) coastal program.

3.2.7.5. Ecological Resources

The Project Limits and adjacent terrestrial areas are densely developed urban land. There are vegetated (landscaped) upland areas within North Point Park and Nashua Street Park, though outside of these parks, the study area contains limited vegetation. Upland vegetated habitats within the study area are consistent with highly disturbed urban settings and transportation corridors and contain degraded resources, which have been colonized by numerous invasive species and other species common in such disturbed areas. Field reviews indicated that no bald or golden eagles or their nests are present within the Project Limits. There are no Priority Habitats of Rare Species, Estimated Habitats of Rare Wildlife, or Natural Communities, nor are there Wild or Scenic Rivers, Coastal Barrier Resources, National Marine Sanctuaries, or Marine Protected Areas within the Project Limits.

The Project Limits are, however, located in an area designated as Essential Fish Habitat (EFH) for numerous New England/Mid-Atlantic and Highly Migratory species, though given the coastal river environment and the presence of the Charles River Dam and Locks immediately downstream, the Project Limits do not provide appropriate habitat conditions (i.e., open water) for many fish species. A Habitat Area of Particular Concern (HAPC) for juvenile cod is identified in the Boston Inner Harbor downstream of the Project Limits and the Charles River Dam and Locks.

The USFWS Information for Planning and Consultation (IpaC) System identifies the endangered northern long-eared bat (*Myotis septentrionalis*) and the roseate tern (*Sterna dougallii*), the proposed endangered tricolored bat (*Perimyotis subflavus*), and the monarch butterfly (*Danaus plexippus*), a candidate species for listing as either endangered or threatened, as potentially affected by activities in the vicinity of the Project Limits. However, the IpaC data report did not identify any critical habitats in the vicinity of the Project Limits, nor did it identify birds of conservation concern protected under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act that have the potential to occur within the vicinity of the Project Limits. Several species listed as threatened and endangered under the jurisdiction of NOAA Fisheries may also be present in the vicinity of the Project Limits, including the Atlantic sturgeon (*Acipenser oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*), the North Atlantic right whale (*Eubalaena glacialis*) and fin whale (*Balaenoptera physalus*), and four sea turtle species including leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*) and green sea turtle (*Chelonia mydas*). However, given the presence of the Charles River Dam and Locks between the Boston Harbor and the Project Limits, it is unlikely that marine species are found within the freshwater river.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
1/4-Mile Study Area
Municipal Boundaries
Coastal Zone
100-Year Floodplain
500-Year Floodplain
NWI Wetland
Existing Open Space
Proposed Open Space

Figure 12

Natural Resources

3.2.8. Transportation Systems

3.2.8.1. Rail Transportation

As noted in Section 1.2.2, "Need for the Proposed Project," the Draw One Bridge is a crucial rail link between Boston and greater New England. It is the last crossing before trains terminate at North Station, the fifth-largest transit station in New England and a critical connection point for Amtrak's *Downeaster* rail passenger service as well as MBTA rapid transit and bus lines. Information about the Draw One Bridge and MBTA Commuter Rail and Amtrak services was obtained from current reports prepared by MBTA and Amtrak,[24] as well as through coordination with MBTA.

3.2.8.1.1. Commuter Rail Service

The Draw One Bridge carries four MBTA commuter rail lines – the Fitchburg Line, Haverhill Line, Lowell Line, and Newburyport/Rockport Line (see Figure 13, "Transportation Systems"). Each weekday, these four lines carry a combined total of 178 trains, which includes 23 trains in the AM peak period,[25] 23 trains in the PM peak period,[26] and 132 trains in the off-peak periods. The current average weekday ridership on these four MBTA commuter rail lines is approximately 37,300 riders per day.

In addition, the BET, located in Somerville and partially extending within the northern portion of the study area, is MBTA's primary train maintenance and repair facility for its commuter rail system.

3.2.8.1.2. Intercity Rail Service

North Station is one of three Amtrak stations in the City of Boston. It serves the *Downeaster*, which links Boston, Massachusetts with Brunswick, Maine via New Hampshire. The *Downeaster* is a 145-mile regional passenger train service operated by Amtrak and managed by the Northern New England Passenger Rail Authority (NNEPRA), an agency of the State of Maine. It operates five daily round trips between North Station and Brunswick, Maine, with ten intermediate stops. Amtrak operates approximately ten trains over the Draw One Bridge each weekday, including one train during the AM peak period and one train during the PM peak period. Approximately 1,760 Amtrak passengers travel over the Draw One Bridge each weekday.

3.2.8.1.3. Freight Rail Service

The base of operations for Boston Sand & Gravel is located along the rail line north of the Charles River and immediately east of the Project Limits, with a connection to CSX Corporation (CSX) freight rail service to the north. Boston Sand & Gravel provides ready-mix products to both residential and commercial customers throughout the region. In addition, CSX occasionally utilizes the BET, approximately 1,500 feet north of the Project Limits, for maintenance and repairs.

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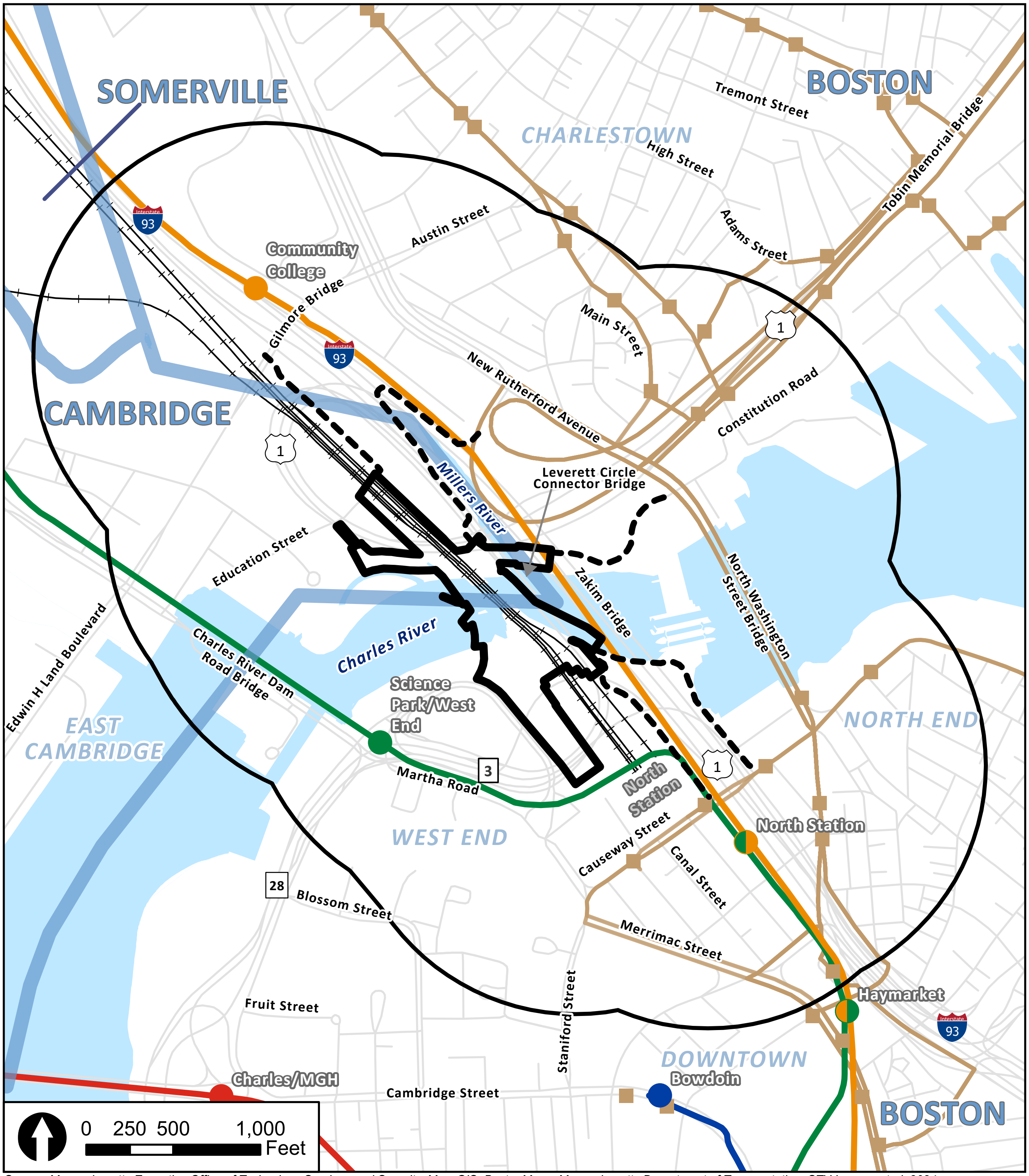
[24] MBTA Rail Vision MPO Presentation, December 2019; Amtrak *Downeaster* Schedule, October 2022; Northern New England Passenger Rail Authority *Downeaster* Monthly Ridership History, 2009-2022; Amtrak *Service & Assets Line Plans*, FY2022-2027.

[25] AM Peak is defined as 6:00 – 10:00 AM

[26] PM Peak Period is defined as 3:00 – 7:00 PM



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; BostonMaps; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits	Bus Stops	MBTA Transit Lines
Construction Access	MBTA Bus Routes	BLUE
1/4-Mile Study Area	MBTA Commuter Rail	GREEN
Municipal Boundaries		ORANGE
		RED

Figure 13
Transportation Systems

3.2.8.2. Marine Transportation

Per the Rivers and Harbors Act of 1894, USCG is responsible for establishing the procedures and practices for vessel movements through the Draw One Bridge, including authorizing vertical and horizontal navigational clearances. A Navigation Impact Report was prepared for the Proposed Project and reviewed by USCG.[27]

The Charles River is the longest river wholly within the State of Massachusetts, flowing more than 80 miles. It is navigable for about 10 miles between Boston Harbor and Watertown and is primarily used for recreation. It is dammed near its mouth, with navigation locks (Gridley Locks) providing access to the harbor.

The Millers River is an approximately 750-foot segment of estuary between the Zakim Bridge and the rail lines that flows into the Charles River from the north. It originally comprised wetlands and open waters but has since been covered, leaving just a small surviving section that stretches along and beneath Interstate 93. The Millers River Littoral Way is a bicycle path and pedestrian walkway along its east bank, featuring graphics, paving designs, and lighting.[28]

The Project Limits are adjacent to the Millers River and span the Charles River, with dense urban development on both sides. Several marine facilities, including public boat ramps, marinas, major docking facilities, and boat repair facilities, are within three miles. Constitution Marina is northeast of the Project Limits, along the north bank of the river. Lovejoy Wharf is on the south bank of the river, just east of the I-93 and U.S. Route 1 highway infrastructure. The Massachusetts State Police Marine Section is in Boston, on the south side of the Charles River Dam adjacent to the southern entrance to the Gridley Locks Footpath, and provides routine marine patrol on the Charles River; the majority of State Police vessels are typically docked east of the dam in the Boston Harbor. State Police operations do not always require opening of the Draw One Bridge, as the bridge's existing 5.38-foot vertical clearance in the closed position is sufficient for their smaller vessels. Vessels from the cities of Boston and Cambridge and the Massachusetts Port Authority conduct search, rescue, and firefighting operations.

Commercial navigation on the Charles River is generally limited to sightseeing tours by the Charles River Boat Company and the Boston Duck Tours Company. Each month between April and October, approximately 15 to 20 of the Charles River tour boats require an opening of the Draw One Bridge. Boston Duck Tours Company sightseeing tours begin on land at several locations; upon entering the water, Boston Duck Tours Company boats typically travel upstream and do not pass under the Draw One Bridge. Other commercial navigation includes occasional barges supporting construction activities along the Charles River. Construction barge passage accounts for approximately 20 to 30 annual bridge openings.

In accordance with federal regulations, the Draw One Bridge movable spans are opened by a signal from the bridge operator when required to allow marine traffic to pass, except from 6:15 AM to 9:10 AM and 4:15 PM to 6:30 PM, Monday through Friday (with the exception of holidays), to minimize service disruptions during rush hour. From January 2012 through January 2019, there were an average of 3,365 bridge openings per year. Approximately 83 percent of bridge openings were for recreational navigation. The majority of recreational navigation occurs from April to October, with the heaviest usage during prime

[27] STV Incorporated *Navigation Impact Report MBTA/Amtrak Bridge, Mile Post 0.8*, November 2020.
[28] https://walkboston.org/sites/default/files/Charles%20river-Nstation8.pdf

summer months. The remaining 17 percent of bridge openings were for work boats, barges, tugs, police, fire, harbor master, commercial tour operators, and maintenance and test operations. Many smaller pleasure craft do not require a bridge opening.

3.2.8.3. Transit, Traffic, and Parking

This section describes the transit routes, roadways, and parking facilities in the study area and the potential effects of the Proposed Project on these routes and facilities. Map data was obtained from online sources, including MassGIS, the City of Boston's BostonMaps database, and Google Maps.

3.2.8.3.1. MBTA Rapid Transit (Subway) Service

North Station serves MBTA's Green and Orange subway lines, two of MBTA's four lines in Boston. The Orange Line extends from Forest Hills in Jamaica Plain, Boston to the south to Oak Grove, Malden to the north. The Orange Line connects with Amtrak service at Back Bay and North Station, and with MBTA commuter rail service at Back Bay, North Station, Forest Hills, Ruggles Station in Roxbury, and Malden Center in Malden. The Green Line runs through downtown Boston between Kenmore Square and Medford. Outside of the central subway, the Green Line has four western surface branches that operate from Kenmore Square to Boston College Station in Newton, Cleveland Circle Station in the Brighton neighborhood of Boston, and Riverside Station in Newton, as well as from Copley Station in the Back Bay neighborhood of Boston to Heath Street Station on the border of Boston's Mission Hill and Jamaica Plain neighborhoods.

3.2.8.3.2. MBTA Bus Service

MBTA operates local bus service connections at North Station, including one local bus route at North Station and three additional routes one block away at North Washington Street: MBTA Route 4 departs from North Station, and MBTA Routes 92, 93, and 111 include stops at North Washington Street. Additionally, the EZRide Shuttle, operated by the Charles River Transportation Management Association, provides service from North Station to the Massachusetts Institute of Technology (MIT), with connectivity to the Lechmere and Kendall/MIT MBTA stations.

3.2.8.3.3. Vehicular Traffic

The Leverett Circle Connector Bridge and the Zakim Bridge carry vehicular traffic over the Charles River just east of the Draw One Bridge. The Leverett Circle Connector Bridge, located between the Draw One Bridge and the Zakim Bridge, is a highway bridge carrying two lanes each of northbound and southbound traffic. It connects to Interstate 93 in Somerville at the north end and splits at the south end, providing direct access to both Storrow Drive and Leverett Circle in Boston.

The main portion of the Zakim Bridge carries four lanes each of northbound and southbound traffic along I-93 and U.S. Route 1 between the Thomas P. "Tip" O'Neill Jr. Tunnel and the elevated highway to the north. Two additional lanes are cantilevered outside the cables and carry northbound traffic from the Sumner Tunnel and North End on-ramp. These lanes merge with the main highway north of the bridge. I-93 extends toward New Hampshire as the "Northern Expressway," and U.S. Route 1 splits from I-93 and extends northeast toward Massachusetts' North Shore communities. U.S. Route 1 ramps cross the Project Limits at two locations, both north of the Charles River.

Local roadways in the study area include the Gilmore Bridge north of the I-93 on- and off-ramps, which carries two lanes each of eastbound and westbound traffic, connecting the Charles River Dam Road Bridge in Cambridge to New Rutherford Avenue in Boston. Just north of the Project Limits, Education Street provides one lane each for eastbound and westbound traffic and extends from Museum Way in Cambridge to a termination point just west of the MBTA ROW; it also provides access to the DCR boat launch ramp in North Point Park. South of the Project Limits, Causeway Street carries two lanes each of eastbound and westbound traffic adjacent to North Station and the TD Garden arena in Boston. Nashua Street – carrying one lane of vehicular traffic and a dedicated bus lane to the west and two lanes of vehicular traffic to the east – connects the North Station parking facility (North Station Garage) to Leverett Circle and Storrow Drive by looping out toward the south bank of the Charles River.

3.2.8.3.4. Parking

There are four parking lots in the immediate vicinity of the Project Limits. Just south of the Project Limits and abutting the MBTA railroad tracks to the west are two MGH administrative building parking lots, one to the south of the building that provides approximately 500 parking spaces and one to the north of the building, adjacent to the river, that provides just 19 parking spaces. Directly west of these lots is a smaller parking lot for the Suffolk County Sheriff's Office's Nashua Street Jail. The North Station Garage, located directly underneath TD Garden, is open daily from 5:00 AM to 1:00 AM and provides 1,275 covered parking spaces. Southeast of the Draw One Bridge is a small DCR-owned parking lot, directly adjacent to the Zakim Bridge, that provides access to the Gridley Locks Footpath and the Charles River Dam and Locks.

3.2.9. Air Quality and GHG Emissions

The Federal Clean Air Act (CAA) regulates air quality in the United States. Among other things, it requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS), identify areas not in attainment of the NAAQS, and review/approve State Implementation Plans (SIPs) for achieving those standards. In addition to the CAA, other major regulations applicable to the Project Limits that pertain to the potential air quality impacts of transportation projects include:

- The General Conformity Rule, 40 CFR Part 93 Subpart B; and
- Air Pollution Control, Code of Massachusetts Regulations (CMR) 310 CMR 7.00.

Given that the Project Limits[29] span both Middlesex and Suffolk counties, and that each falls within a different EPA-designated area,[30] the attainment classifications for both are provided in Table 6, "Middlesex County and Suffolk County Air Quality Attainment Classifications for Project Limits." Background concentrations of pollutants for the Project Limits based on air quality monitoring from 2020 to 2022 are presented in Table 7, "Regional Background Air Quality Concentrations, 2020-2022." The

[29] The state of dispersion science and health effects of GHG emissions have not sufficiently advanced to accurately consider the microscale level of mobile sources. For this reason, this analysis does not determine a local study area for GHG emissions for mobile sources and only considered them on a regional scale. GHG emissions from the Proposed Project would be due to fossil fuel combustion of vehicles, diesel trains, potential change in GHG emissions from implementation of the project is calculated for the same sources and categories as identified for the analysis of local operational emissions.

[30] EPA, Green Book for Middlesex and Suffolk Counties, MA, https://www.epa.gov/green-book.

values describe the air quality status of a given location relative to the NAAQS. These values provide a way to designate and classify nonattainment areas and to assess progress toward meeting the NAAQS. The monitoring locations were selected for the most conservative representation of background levels for each of the NAAQS within the Project Limits.

Table 6: Middlesex County and Suffolk County Air Quality Attainment Classifications for Project Limits

NAAQS	Attainment	Nonattainment	Maintenance
Ozone (1-hour, 1979) – Revoked			X
Ozone (8-hour, 1997) – Revoked			X
Ozone (8-hour, 2008) – Revoked	X		
Ozone (8-hour, 2015)	X		
PM10 (1987)	X		
PM2.5 (2012)	X		
CO (1971)			X
Note: Classifications are identical for Middlesex and Suffolk Counties.			

Source: EPA Greenbook, 2024.

Table 7: Regional Background Air Quality Concentrations, 2020-2022

Pollutant	Units	Averaging Period	2020	2021	2022	Monitoring Location	NAAQS
CO	ppm	8-hour	1.1	1.0	1.0	Boston[1], MA	9
CO	ppm	1-hour	1.6	1.5	1.6	Boston[1], MA	35
Pb	μ/m^3	3-month	0.0072	0.0042	0.0091	Boston[1], MA	0.15
NO_2	ppb	1-hour	42	44	46	Boston[1], MA	100
NO_2	ppb	Annual	9.3	9.6	10.0	Boston[1], MA	53
O_3	ppm	8-hour	0.057	0.060	0.060	Boston[1], MA	0.070
$PM_{2.5}$	μ/m^3	Annual	5.8	7.9	6.5	Boston[1], MA	9
$PM_{2.5}$	μ/m^3	24-hour	14.3	18.2	14.7	Boston[1], MA	35
PM_{10}	μ/m^3	24-hour	25	30	31	Boston[1], MA	150
SO_2	ppb	1-hour	2.0	2.1	3.1	Boston[1], MA	75
[1]Boston, MA Monitor, Harrison Avenue (EPA ID 25-025-0042) *Note: (ppm) – parts per million; (ppb) parts per billion; (μ/m^3) micrograms per meter cubed*							

Source: Massachusetts Air Quality Reports from 2019-2021, Massachusetts Department of Environmental Protection – Air Assessment Branch.

3.2.10. Noise and Vibration

Noise- and vibration-sensitive land uses include, but are not limited to, residences where people normally sleep (e.g., homes, hospitals, and hotels), institutional land uses with primarily daytime and evening use (e.g., schools, libraries, theaters, and churches), certain historic sites and parks, manufacturing facilities, and some research operations.

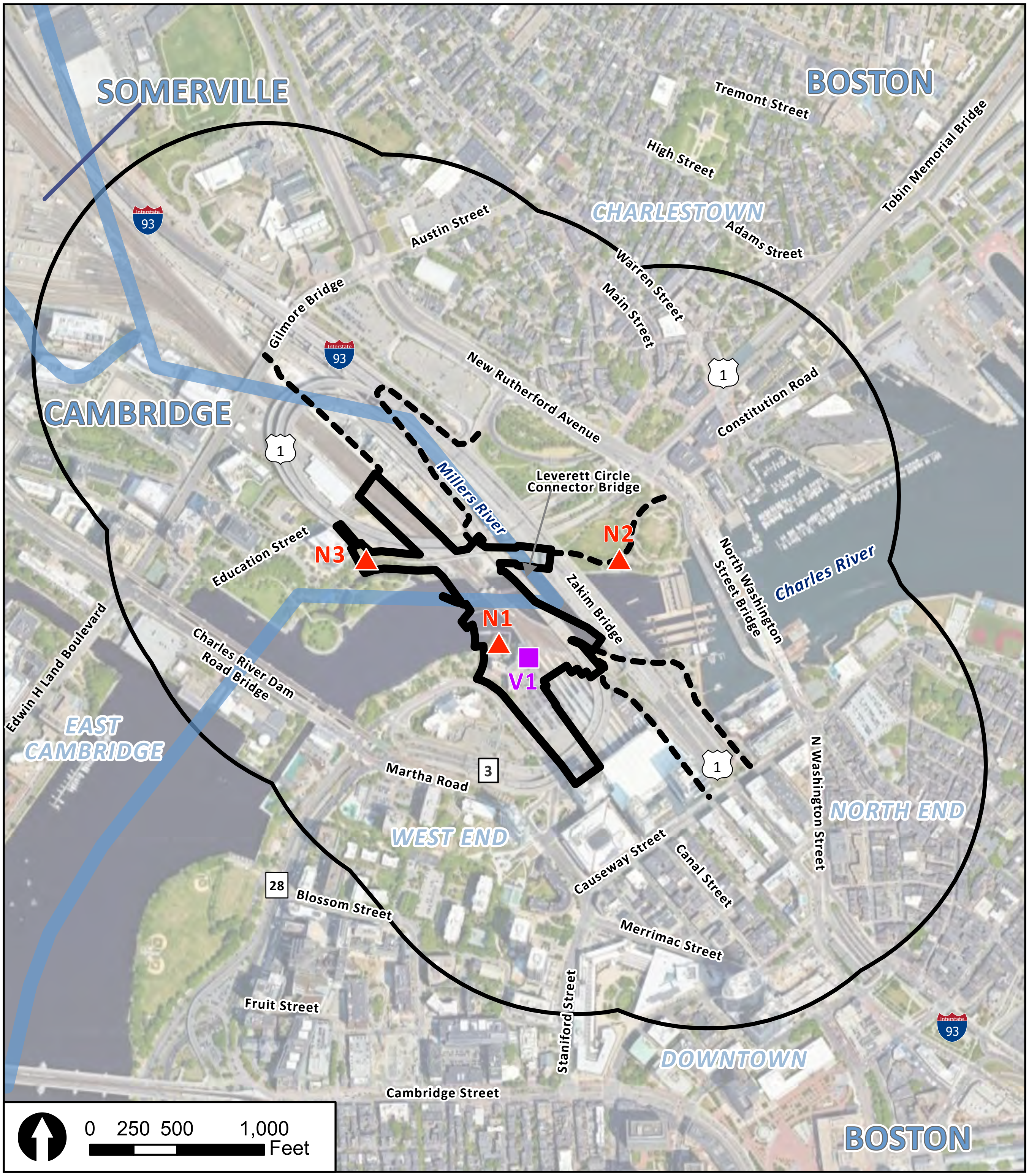
Noise- and vibration-sensitive land uses near the Project Limits include parks (that are used for passive recreation and are therefore considered sensitive to noise) and offices. Five sensitive uses are located near the Project Limits, specifically:

- North Point Park
- Paul Revere Park
- Nashua Street Park
- Cells at the Suffolk County Sheriff's Office's Nashua Street Jail
- MGH administration building

North Point Park, Paul Revere Park, and Nashua Street Park all have passive features such as park benches; therefore, these uses are considered Category 3 FTA uses. The cells at the Suffolk County Sheriff's Office's Nashua Street Jail are considered Category 2 FTA uses because people sleep in the cells. The MGH administration building is not considered noise-sensitive given that it does not function as a hospital or provide medical services, but rather comprises only administrative offices; however, the office building is considered in the vibration assessment because its primary use is office space.

Measurements to characterize the existing noise environment in the study area were conducted at three representative noise-sensitive receptors. Long-term (24-hour) measurements provide a direct measurement of both L_{dn} and peak transit-hour L_{eq}. One-second time histories of sound levels were measured along with audio recordings of events to identify noise from train activity. These measurements allowed the separation of noise generated from trains from other ambient sources.

One vibration measurement of existing commuter and Amtrak trains was conducted to provide detail on vibration generated by these sources (see Figure 14, "Noise and Vibration Monitoring Sites"). This information is used to characterize the levels of vibration experienced at sensitive structures throughout the corridor. The ground vibration measurement was conducted with a high-sensitivity accelerometer mounted in the vertical direction on top of steel stakes driven into soil.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachussetts Department of Transportation; STV Incorporated, 2024.

Project Limits	Municipal Boundaries
Construction Access	Noise Monitoring Location
1/4-Mile Study Area	Vibration Monitoring Location

Figure 14
Noise & Vibration Monitoring Sites

3.2.11. Hazardous and Contaminated Materials

Hazardous and contaminated materials are potentially harmful substances which may be present in soil, groundwater, or building materials and may pose a threat to human health or the environment. The two main statutes that regulate materials of primary concern are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and their respective amendments. RCRA regulates generators, transporters, and the treatment, storage, and disposal facilities of hazardous materials. RCRA defines these materials as having ignitability, corrosivity, reactivity, or toxicity. CERCLA provides a process to correct those sites already contaminated with hazardous substances.

3.2.11.1. Phase I Environmental Site Assessment (ESA)

An American Society for Testing and Materials (ASTM) Phase I Environmental Site Assessment (ESA) was conducted in February 2020 to identify any Recognized Environmental Concerns (RECs) within the Project Limits (see Appendix E, "Hazardous Materials"). An Environmental Database Report (EDR) Radius search did not identify any records/listings in the vicinity of the Project Limits as RECs. The Draw One Bridge and Signal Tower A were not listed in any database within the EDR Report, and no details of noncompliance with CERCLA and/or RCRA were observed within the Project Limits. However, there are potential environmental concerns with the sediment in the Charles River and soil along the riverbanks in North Point Park and Nashua Park. Tests on collected samples indicated the presence of PCBs, PAHs, and lead, among other organic and inorganic contaminants, above MassDEP and USACE reporting limits. Further investigations will be required to understand the type and extent of potential contaminants that may be encountered during construction activities.

3.2.11.2. Lead, Asbestos, and PCB-Containing Materials

Limited hazardous materials inspections and sampling of the existing Signal Tower A building and Draw One Bridge were performed in December 2019, January 2020, and October 2020.[31] The inspections found ACM and LCP at both Signal Tower A and the Draw One Bridge. Based on the age of the existing bridge, polychlorinated biphenyls (PCB)-containing electrical equipment is also likely present.

3.2.12. Public Utilities and Services

The area around the Draw One Bridge is serviced by utilities typical of an urban setting. A Massachusetts Water Resource Authority (MWRA) sewer and a Cambridge Water Department waterline are located below-ground within MBTA ROW in the Project Limits. The Cambridge Water Department waterline services Signal Tower A. In addition, MBTA controls the signal system that supports the movement of MBTA Commuter Rail and Amtrak trains in and out of North Station, and which is located within the MBTA ROW within and in the immediate vicinity of the Project Limits.

3.3. Future Without the Proposed Project (No Action Alternative)

The No Action Alternative, as described in Section 2.2, "No Action Alternative," represents conditions in 2034 assuming that the Proposed Project would not be implemented. It provides a baseline for

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[31] MBTA *Bridge Structures Evaluation Report - Bridge No. B-16-479*, May 2020; MBTA *Hazardous Materials Inspection Report*, December 2020.

understanding how the Proposed Project may affect such conditions in the future (Section 4, “Probable Consequences of the Proposed Project”).

With the No Action Alternative, conditions are generally expected to resemble existing conditions, as described previously in Section 3, “Affected Environment.” There would be improvements to parklands and visual resources with the implementation of South Bank Park, though it would also result in some minor adverse effects related to community facilities and services, cultural and historic resources, commuter and passenger rail service, and marine transportation.

With the No Action Alternative, the deterioration of the Draw One Bridge would not affect land use and zoning in the study area. Existing land use and development patterns and zoning would remain in place. No major developments are expected in the study area, so with the No Action Alternative there would be no effects to socioeconomic conditions, including population and housing characteristics and economic activities. No improvements to traffic or parking infrastructure are planned with the No Action Alternative; a slight reduction in public parking is associated with the planned park project, but this does not represent a substantial change. Noise and vibration levels would resemble existing conditions. Public utilities and services would not change. Contaminated materials within the Project Limits would remain unaffected; while the hazardous and contaminated materials associated with the existing Draw One Bridge and Signal Tower A would not be addressed, there would be no new impacts.

Therefore, there would be no adverse effects to land use and zoning; socioeconomic conditions; traffic and parking; noise and vibration levels; public utilities and services; or hazardous and contaminated materials with the No Action Alternative.

3.3.1. Community Facilities and Services

No changes to existing community facilities and services are planned, so while conditions would resemble existing conditions, continued disruptions to rail service would be likely to impede access to regional community facilities in the study area for those who rely on MBTA service.

3.3.2. Parks and Recreational Resources, and Pedestrian and Bicycle Facilities

In the No Action Alternative, no adverse impacts to existing parks and recreational resources or bicycle and pedestrian facilities in the study area are expected in 2034. The development of South Bank Park would instead expand park and recreational resources in the study area.

3.3.3. Cultural and Historic Resources (Section 106 Consultation)

The No Action Alternative would not result in the demolition of the existing Draw One Bridge and Signal Tower A, so there would be no impacts to archaeological or historic architectural resources. Ongoing deterioration of the bridge and building, however, could require remedial measures that might be considered to diminish their integrity of materials and design and thereby cause an adverse impact.

3.3.4. Visual and Aesthetic Resources

With DCR’s planned development of the new South Bank Park, the No Action Alternative would include improvements to the existing visual and aesthetic character of the area by transforming existing surface parking to parkland and enhance cyclists’ and pedestrians’ experience of the public realm on the south bank of the Charles River. With South Bank Park developed, pedestrian accessibility in the vicinity of

Gridley Locks will have expanded toward the Project Limits, with direct views of the Project Limits from nearer locations.

3.3.5. Natural Resources

As part of the "MBTA North Station Platform F Extension and Ancillary Improvements Project," a drainage system would be implemented to accommodate stormwater at North Station's Platform F and the two station tracks serving the platform. This system will tie into the existing drainage system at the adjacent MGH property.

In addition, current projections for sea level rise suggest that the Boston Harbor elevation will reach the Charles River Dam elevation between 2080 and 2100, which would pose a flood risk to the existing Draw One Bridge and Signal Tower A with the No Action Alternative.[32]

3.3.6. Transportation

Current marine conditions would not be altered, but as the bridge ages, required maintenance and repairs are likely to increase the number and duration of channel restrictions and closures, affecting commuter and passenger rail service and marine transportation through the navigational channel.

Facilitating mode shift away from single-occupancy vehicles and toward transit is identified as a goal in long-term planning documents for both the City of Boston (*Go Boston 2030*[33]) and the City of Cambridge (*Envision Cambridge*[34]), as well as in MassDOT's 2050 Transportation Plan, *Beyond Mobility*.[35] With the No Action Alternative, the deterioration of the Draw One Bridge would likely disrupt rail service with greater frequency and longer durations than in existing conditions and, therefore, would detract from the quality and reliability of the transportation network that would support local and State goals related to mode shift.

MBTA's planned mainline track and North Station Platform transit improvements will, however, represent an improvement in transit services over existing conditions in 2034.

4. Probable Consequences of the Proposed Project

4.1. Introduction

As the Proposed Project is not intended to change operations substantially, consideration of construction-period effects constitutes the bulk of analysis required for this EA; for that reason, and because the construction period precedes the Proposed Project's fully operational or "permanent" condition, which is assessed in Section 4.3, "Operational (Full Build) Effects," discussion of construction-period effects is provided first, followed by a brief description of operational effects.

[32] ResilientMA.org
[33] https://www.boston.gov/sites/default/files/file/document_files/2019/06/go_boston_2030_-_full_report.pdf
[34] https://www.cambridgema.gov/-/media/Files/CDD/compplan/envisioncambridgefinalplan/envisioncambridgefinalreport1.pdf
[35] https://www.mass.gov/doc/massdot-beyond-mobility-full-plan/download

4.2. Construction-Period Effects

4.2.1. Introduction

As described in Section 2.4, "Preferred Alternative (Proposed Project)," Proposed Project construction would begin in 2026 and be complete in 2034. This section presents an assessment of potential effects that may result from construction activities during this approximately eight-year construction period. The various activities that would occur during the construction period are generally distinct, relying on different equipment in different locations; as such, the effects of respective construction activities are also typically temporary, though they may also be permanent when resulting in lasting changes to resources. For example, as described in this section, the construction of the Proposed Project would require the demolition of two historic structures; this demolition activity, though a relatively brief part of construction, may produce temporary impacts associated with the temporary use of demolition equipment (e.g., temporary dust and noise effects), and it also would result in the permanent adverse impacts associated with the removal of two historic resources from the landscape (which would in this case be mitigated, as described below).

As described in Section 2.2.1, "Planned Projects in the Study Area," the early years of Proposed Project construction would overlap with the construction periods for other identified projects adjacent to and partly within the Project Limits for the Proposed Project, including two MBTA improvement projects and the DCR South Bank Park. The potential for combined or cumulative effects associated with this overlap in construction periods is examined in Section 4.4, "Indirect and Cumulative Effects."

4.2.2. Land Use and Zoning

4.2.2.1. Land Use

In contrast with the No Action Alternative, with the Proposed Project construction activities would result in some temporary direct impacts to land use features within and adjacent to the Project Limits. As described in Section 2.4, "Preferred Alternative (Proposed Project)," the construction activities would require use of certain non-MBTA properties adjacent to the Project Limits, as follows:

- Temporary use of a portion of Boston Sand & Gravel property;
- Multiple temporary closures of North Bank Bridge;
- Multiple temporary closures of three walkways (100 feet) within Paul Revere Park;
- Multiple temporary closures of three walkways (140 feet) within North Point Park;
- Multiple potential temporary closures of the DCR boat launch ramp in North Point Park;
- Temporary closure of a DCR riverfront walkway and pier (extending from and appearing as part of the adjacent riverfront walkway);
- Temporary use of a portion of the MGH administrative building parking lots;
- Temporary removal of the MGH floating dock and approach ramp; and
- Temporary use of a portion of the future South Bank Park parking and driveway area.

Further, as described in Section 2.4.3, "Construction," access to the construction area would be provided via five access drives, two of which would extend through Paul Revere Park and the future South Bank Park. The other access drives would be provided through driveways on either side of the Boston Sand & Gravel facility, as well as a driveway extending north from North Station. The construction-period use of these access drives would be temporary and infrequent. The access drives would see up to approximately ten round trips per day, with trips concentrated in the morning and early afternoon during construction worker arrivals and departures. Each access drive would be in use for just a portion of the construction period; most would be used during three construction phases (i.e., up to approximately 56 months in total), though the access drive that extends through Paul Revere Park would only be used during Phase 1 of construction (i.e., up to approximately 31 months).

All of these properties would be restored to their original condition as part of the Proposed Project and the temporary impact would cease. Protective measures would be in place to limit public access to the Project Limits, including properties not owned by MBTA. Proposed Project construction activities would not directly affect parkland property outside the Project Limits, and the use of this parkland, which would remain open to the public, would not be significantly affected by construction activities.

In addition, MBTA would temporarily use Boston Sand & Gravel property for construction access pursuant to a license agreement executed in 2001; MBTA will continue to coordinate with Boston Sand & Gravel prior to construction and throughout the construction period to minimize impacts to its operations.

4.2.2.2. Zoning

The Proposed Project construction would require no changes to zoning.

4.2.2.3. Public Policy

The Proposed Project would be consistent with existing public policy governing the Project Limits and surrounding area.

4.2.3. Socioeconomics

4.2.3.1. Population

Construction of the Proposed Project would not introduce new population to the study area, though it would temporarily bring additional workers to the study area. However, the Proposed Project is intended to facilitate a more reliable and safe rail system serving the existing and future populations in the study area and beyond, as well as the regional population dependent upon MBTA and Amtrak service.

4.2.3.2. Households

While project construction would bring additional workers to the study area, they would not change its household characteristics as this increase in employees would be temporary and limited to work hours during the construction period.

4.2.3.3. Demographics and Income

While project construction would bring additional workers to the study area, they would not change its demographic or income-related characteristics as this increase in employees would be temporary and limited to work hours during the construction period.

4.2.3.4. Transit-Dependent Populations

Construction of the Proposed Project would not result in significant adverse effects to transit-dependent populations. As described in Section 4.2.9, “Transportation Systems,” MBTA is committed to maintaining current levels of MBTA and Amtrak train service at North Station throughout Proposed Project construction, and has specified requirements that enable meeting this objective as fundamental to Proposed Project design and construction. While occasional weekend diversions to MBTA subways and buses may be required, MBTA would notify the public of any unavoidable closures and provide alternate routes for weekend rail service diversions in these instances.

4.2.3.5. Commercial Activities

Construction of the Proposed Project would not result in significant adverse effects to local businesses in the study area. While project construction would bring additional workers to the study area, they would not be so numerous as to significantly increase the local demand for goods or services, nor would they change its demographic characteristics. The Proposed Project would instead provide temporary benefits to the local economy through new construction jobs and construction-related spending.

Access to surrounding businesses would be maintained throughout the duration of project construction. The contractor would also coordinate with USCG to notify mariners as needed, which would minimize disruptions to commercial navigation and sightseeing tours.

4.2.4. Community Facilities and Services

With appropriate coordination and measures in place, construction of the Proposed Project would result in no significant adverse impacts to facilities and services, either within or outside the study area. Pedestrian access to all community facilities would be maintained. Temporary minor construction-period effects on community facilities and services would include the following:

- Construction of the Proposed Project would necessitate the temporary use of a portion of the MGH administrative building parking lots southwest of the Project Limits, though MBTA would coordinate with MGH regarding required easements and temporary access during construction to avoid disruption to hospital operations.
- Modifications to the North Bank Bridge may require multiple temporary closures of the boat launch ramp used by DCR, the State Police, and the Boston Duck Tours Company. If closures of the ramp are determined necessary, MBTA would coordinate these closures with each affected party to avoid impacts to their use of the ramp.
- The floating dock and approach ramp, which are owned by MGH though currently unused, would be temporarily removed for the duration of construction to allow access to the Draw One Bridge, though they would be reinstalled and restored to existing conditions following completion, in coordination with MGH.

Disruption to the Massachusetts State Police Marine Section, the Charles River Boat Company and Boston Duck Tours Company, and other commercial boaters would be minimized through close coordination with USCG to notify mariners as needed throughout the construction period.

4.2.5. Parks and Recreational Resources, and Pedestrian and Bicycle Facilities

4.2.5.1. Parkland

With appropriate coordination and measures in place, Proposed Project construction activities would result in no significant adverse impacts to parkland. (Refer to Section 8, “Section 4(f),” for additional information.)

Three pier foundations for the North Bank Bridge are located on MBTA property, and one (Pier 3) conflicts with the proposed railroad track construction and realignment along the MBTA ROW. To allow for construction of the Proposed Project, the North Bank Bridge would be permanently modified by increasing its height by one foot. This would require the relocation of two bridge supports, the addition of one additional support, modification of the bridge truss structure, and modification and lengthening of the bridge landings in North Point Park and Paul Revere Park. This work would require multiple closures of the pedestrian bridge of up to two weeks, totaling one month over a six-month period.

Temporary disturbance of and access to Paul Revere Park would be required for modifications to the North Bank Bridge east landing. Construction at the North Bank Bridge abutment would require the temporary use of approximately 1.08 acre of pedestrian and bicycle pathways as a construction access drive, while jacking at the abutment and regrading would result in disturbance to just a 0.08-acre area. Temporary disturbance of and access to North Point Park would also be required for modifications to the west landing. Construction would require the temporary use of approximately 0.84 acre of pedestrian and bicycle pathways for construction access, while construction activities would result in disturbance to just a 0.17-acre area. Overall, the North Bank Bridge modification would require multiple temporary closures of three walkways (100 feet) within Paul Revere Park and three walkways (140 feet) within North Point Park for up to two weeks at a time, totaling one month over a six-month period.

Some trees and shrubs within both Paul Revere Park and North Point Park would be temporarily removed during construction. A detour from North Point Park to access Paul Revere Park would be developed in coordination with DCR.

A 0.514-acre temporary easement would be required at the proposed South Bank Park, on the southern bank of the Charles River, for use as a construction access drive for approximately three years. The walkway along the riverfront would be closed during delivery of construction materials.

Further, construction of the Proposed Project would require the temporary closure of the DCR pier (extending from and appearing as part of the adjacent riverfront walkway) southwest of the Draw One Bridge for construction access to the south trestle. Trees on the pier would be removed during construction. The adjacent riverfront walkway would also be temporarily closed during material deliveries.

4.2.5.2. Pedestrian and Bicycle Facilities

Demolition of the existing south trestle would require the permanent removal of the public sidewalks located along both the east and west sides of the Draw One Bridge south trestles. As described in Section 3.2.4.3, “Pedestrian and Bicycle Facilities,” these sidewalks are eight feet wide and approximately 255 feet in length on the west side and 420 feet in length on the east side and terminate just before the navigable Charles River channel.

The required modification of the North Bank Bridge would also require multiple closures of up to two weeks, totaling one month over a six-month period. Given that the North Bank Bridge landings are located within North Point Park to the west and Paul Revere Park to the east, modification of the bridge would also result in multiple temporary closures of three walkways (100 feet) within Paul Revere Park and three walkways (140 feet) within North Point Park for up to two weeks at a time, totaling one month over a six-month period. A detour from North Point Park to access Paul Revere Park would be developed in coordination with DCR.

A 0.11-acre temporary easement would be required at the DCR pier (extending from and appearing as part of the adjacent riverfront walkway) north of the MGH administrative building and Nashua Street Park for access to the existing Draw One Bridge south trestle for approximately five years, resulting in the temporary closure of the pier to pedestrians and cyclists. The riverfront walkway between the DCR pier and the fence on the west side of the MBTA tracks would be briefly and temporarily closed during material deliveries. Multiple deliveries could occur each day through this access point. No detour is proposed during these intermittent closures given that the walkway ends at a fence at the western edge of the MBTA property.

4.2.6. Historic and Cultural Resources

4.2.6.1. Archaeology

While the potential for intact archaeological deposits within the APE is considered to be low, MBTA will develop an Unanticipated Discoveries Plan that will be followed if any unanticipated archaeological and/or human remains are encountered during construction. The Unanticipated Discoveries Plan will be included in construction contract specifications and documentation.

4.2.6.2. Historic Architectural Resources

As described in Section 2.4, "Preferred Alternative (Proposed Project)," construction of the Proposed Project would require the demolition of the NRHP-eligible Draw One Bridge and Signal Tower A, resulting in a permanent adverse effect to historic resources that would continue throughout the operational (full-build) condition of the Proposed Project.

4.2.6.2.1. Section 106 Consultation and Determination of Adverse Effect

Under Section 106 of the NHPA, the proposed full demolition of the bridge and signal tower would constitute an Adverse Effect on a historic property because it would result in the "physical destruction of or damage to all or part of the property." The SHPO concurred with this finding in a letter dated June 12, 2023.

Most recently, FTA met with the Section 106 consulting parties on May 2, 2024, May 30, 2024, and September 5, 2024, to discuss the proposed mitigation measures in the draft MOA, described in Section 6.2.1.1, "Section 106 Memorandum of Agreement."

4.2.7. Visual and Aesthetic Resources

Construction of the Proposed Project would include the use of barges, cranes, and other water surface equipment that would be visible to park users on either side of the Charles River. It would also introduce construction equipment, trucks, fencing, and lighting at the proposed construction staging and laydown areas. Construction activities may result in an adverse visual impact to some users of the nearby waterfront parks and North Bank Bridge looking toward the river, as well as to recreational boaters, but this effect would be momentary, and the construction condition would be temporary. Therefore, the construction-period effects to visual and aesthetic resources would not be significant.

4.2.8. Natural Resources

4.2.8.1. Soils

Construction of the Proposed Project would require excavation and grading that would alter local topography. In-water activities would include removal of existing timber piles, removal of existing steel and concrete caissons and piers, installation of timber and steel piles and drilled shafts, and minor riverbed sediment dredging.

4.2.8.2. Wetlands and Water Resources

Construction would require both dredging and filling within the Charles River, which would result in sediment disturbance and the production of dredge spoil. Filling would consist primarily of installation of drilled shafts and tremie pour[36] behind "king" pile abutments along the riverbanks. The estimated total temporary surface area disturbance of the riverbed associated with demolition and construction is approximately 30,912 square feet (0.71 acre), and the estimated total area of permanent fill in the riverbed would be approximately 11,411 square feet (0.26 acre). If determined necessary, cofferdams would be installed to support the removal of caissons supporting the former bridge piers and minimize disturbance and dispersal of river sediments. Cofferdam installation would be conducted from a barge prior to the construction of the temporary trestles, and any cofferdams would be removed following caisson removal.

Given the slow water flow velocities and the impounding nature of the river's lock and dam system, it is not anticipated that the Boston Inner or Outer harbors would experience elevated total suspended sediment levels. Multiple discrete dredging events would occur over the construction duration, but no single dredging event is expected to generate a significant amount of sediment.

These temporary and permanent construction activities will require a USACE Section 404 permit and a MassDEP Section 401 Water Quality Certification (WQC).

4.2.8.3. Floodplains

Construction of the Proposed Project would not result in temporary or construction-related significant adverse effects related to floodplains. The Draw One Bridge and Signal Tower A are just upstream of the Charles River Gridley Locks, making them vulnerable to coastal storms. As such, construction trestles would be built above the current 500-year flood elevation, and any construction equipment and materials stored temporarily within the floodplain would be removed in the event of a flood warning.

4.2.8.4. Coastal Zone

Construction of the Proposed Project is not anticipated to result in temporary or construction-related significant adverse effects related to the coastal zone, given that it would be consistent with

[36] Tremie pour is a method to pour concrete underwater to lessen concrete washout from the surrounding water.

Massachusetts coastal program policies (e.g., to reduce threats related to coastal hazards). A Federal Consistency Review will be prepared and submitted to CZM during the Proposed Project's final design phase to facilitate CZM's review and concurrence prior to construction.

4.2.8.5. Ecological Resources

No construction-related impacts to or loss of significant upland habitat are anticipated. The removal of some scrub/shrub vegetation along the existing railroad embankment may be necessary to accommodate construction access, but these areas have little value as terrestrial habitat and, as such, any permanent impacts from construction activities to terrestrial natural resources are expected to be minor. Impacts to vegetation at the North Bank Bridge within North Point Park and Paul Revere Park would be temporary, as approach walkway grades are adjusted.

The Proposed Project has been designed and construction methods have been selected to minimize impacts (e.g., drilled shafts that limit sediment disturbance, existing piles below the mudline to remain undisturbed, as possible, etc.). Most existing piles would be cut at the mudline to limit sediment disturbance associated with many small sediment disturbance events if the piles were cut below the mudline. Construction activities would adhere, to the extent practicable, to time-of-year restrictions set by fisheries agencies for certain in-water activities and maintenance of pathways for fish passage. Construction would also require a Sediment and Water Quality Monitoring Plan with turbidity action levels. Therefore, the Proposed Project is anticipated to result in only minor impacts to migratory fish species and would not affect population levels of any species. As described in Appendix F, "Endangered Species Act Section 7 Permitting," and Appendix G, "Essential Fish Habitat (EFH) Assessment," construction of the Proposed Project would not likely result in adverse impacts to water quality, aquatic habitat, or aquatic biota.

FTA is in coordination with federal (USACE, NOAA Fisheries, USFWS) and state (MassDEP, Massachusetts Division of Marine Fisheries [DMF]) agencies to determine potential impacts to federally- and state-listed rare, threatened, and endangered species and critical habitat. However, construction of the Proposed Project is not expected to result in temporary or construction-related significant adverse effects to these species or critical habitat, given that all work would be completed within previously disturbed, highly developed areas with a low likelihood of species or habitat presence.

4.2.9. Transportation Systems

4.2.9.1. Rail Transportation

4.2.9.1.1. Commuter and Intercity Rail Service

As described in Section 1.2.4, "Project Requirements and Goals," and Section 4.2.3.4, "Transit-Dependent Populations," MBTA is committed to maintaining current levels of MBTA and Amtrak train service at North Station throughout Proposed Project construction, and has specified requirements that enable meeting this objective as fundamental to Proposed Project design and construction. MBTA studies in preparation for the design and construction planning confirmed that 1) maintaining weekday service on four active bridge tracks over the Charles River and eight active tracks at North Station, and 2) maintaining weekend service on two active tracks over the Charles River and five active tracks at North Station would accommodate current MBTA and Amtrak rail service throughout the construction period.

The Proposed Project has been expressly designed to facilitate construction staging that 1) maintains weekday service and operations on four bridge tracks over the Charles River and eight active tracks at North Station, and 2) maintains two active tracks over the Charles River and five active tracks at North Station on weekends. Therefore, with current levels of service maintained throughout construction, MBTA and Amtrak rail passengers served by North Station are not expected to experience any substantial disruptions (e.g., schedule changes, delays) as a result of the Proposed Project. As connections are made between the new tracks and existing mainline tracks for signal testing, temporary disruptions to MBTA and Amtrak rail service may occur, which could require occasional weekend diversions to MBTA subways and buses; however, MBTA would notify the public of any unavoidable closures and provide alternate routes for weekend rail service diversions in these instances.

4.2.9.1.2. Freight Rail Service

Freight rail service in the study area is limited to Boston Sand & Gravel and CSX, which may occasionally utilize the BET, though any freight activity would be north of the Project Limits. Track cutovers and signal work would be scheduled to avoid interruptions to freight service.

4.2.9.2. Marine Transportation

Construction activities and sequencing in the Charles River would minimize conflicts with navigational traffic. The navigation channel may be temporarily closed, or its width reduced, to allow for staging of construction barges at least five times throughout construction; these closures would be up to approximately one week at a time, totaling up to approximately two months. However, MBTA would coordinate the timing and length of these temporary channel closures with USCG and DCR, and mariners would be notified as needed. Safety measures (e.g., lighting on barges) would be implemented in coordination with USCG.

4.2.9.3. Transit, Traffic, Parking

4.2.9.3.1. MBTA Rapid Transit (Subway) Service

Construction of the Proposed Project would not result in subway service outages on the Green or Orange lines, nor would it affect weekday service. However, occasional weekend-only interruptions to MBTA and Amtrak commuter rail service would be accommodated, in part, through reliance on these existing subway services. As interruptions would be infrequent and limited in duration, any increase in subway service utilization associated with these weekend diversions is anticipated to be minimal and would not result in significant adverse impacts.

4.2.9.3.2. MBTA Bus Service

Given that construction of the Proposed Project would not require traffic detours or changes to roadway configurations (as described further below), it would not affect weekday service on local bus routes or EZRide Shuttle operations. However, weekend-only interruptions to MBTA and Amtrak commuter rail service with construction of the Proposed Project would be accommodated, in part, through reliance on the existing public bus service (i.e., MBTA Routes 4, 92, 93, and 111). Any increase in public bus service utilization associated with these weekend diversions is anticipated to be minimal and would not result in significant adverse impacts.

4.2.9.3.3. Vehicular Traffic

The Proposed Project would not require traffic detours, nor would it result in modifications to existing roadway configurations. As described in Section 2.4.3, "Construction," construction-period access and material delivery would generally be provided by barge and rail, though truck routes would also be used, with access to the construction area provided via five access drives. Two of these access drives would extend through parks adjacent to the Project Limits, while the others would be provided through driveways on either side of the Boston Sand & Gravel facility as well as a driveway extending north from North Station.

Traffic and transportation operations in the study area may be affected by the daily movement of construction equipment, materials, and construction workers to and from the Project Limits. While there could be limited short-term increased congestion in the study area, the construction-period use of the access drives would be temporary and infrequent. The access drives would see up to approximately ten round trips per day, with trips concentrated in the morning and early afternoon during construction worker arrivals and departures. Further, to avoid unnecessary construction-related traffic, construction vehicles would be limited to designated routes and kept in a designated staging area.

4.2.9.3.4. Parking

Construction of the Proposed Project would not result in impacts to on-street parking. However, a 0.25-acre temporary easement would be required at the MGH administrative building parking lots for construction staging for approximately 2.5 years, which would result in the temporary displacement of up to approximately 30 of 512 parking spaces. A 0.514-acre temporary easement would be required at the proposed South Bank Park for construction access for approximately three years, which would result in the temporary displacement of approximately six of seven boat trailer parking spaces, as well as the displacement of all ten car parking spaces that would be provided at the proposed park.

4.2.10. Air Quality and GHG Emissions

Construction of the Proposed Project would generate emissions from diesel- and gasoline-powered construction equipment, diesel-powered generators, diesel trucks, marine-based diesel equipment and tugboats, and heavy-duty trucks transporting excavated material and delivering construction materials. Building demolition, ground clearing, site preparation, grading, transportation and stockpiling of materials, and on-site equipment movement could result in fugitive dust emissions.

The peak year of construction (defined as the year in which the largest amount of pollutant emissions occurs) would be 2027. An assessment compared the emissions inventory of peak-year construction to *de minimis* thresholds to evaluate whether a General Conformity determination, if required, would indicate potential air quality effects adverse to NAAQS attainment (see Appendix H, "Technical Report: Air Quality"). Based on this analysis, MBTA estimates that fewer than 10,000 tons per year of CO_2 would be generated from construction activities. The EPA major source threshold for CO_2 is 100,000 tons per year.

As such, Proposed Project construction emissions are well below the EPA major source thresholds for GHGs. Given this small contribution, GHG emissions associated with construction of the Proposed Project would have a negligible impact on climate change and would not represent a significant adverse impact to air quality compared to the No Action Alternative.

4.2.11. Noise and Vibration

The broad steps outlined in FTA's Transit Noise and Vibration Impact Assessment Manual (FTA 2018) were followed to evaluate the Proposed Project, and construction noise for each stage was calculated using specific source levels and methods provided in the Federal Highway Administration Roadway Construction Noise Model (RCNM). The screening procedure was used to identify which noise- or vibration-sensitive uses could potentially be affected by the Proposed Project and the detailed noise/vibration impact assessment procedures were used to identify potential noise and vibration impacts. The construction noise criteria applicable to the Proposed Action are based on City of Boston noise limits.[37] The Proposed Project would be constructed in four stages. The analysis conservatively assumes that all construction equipment, except for pile driving, for each stage would operate simultaneously at the closest construction location to each receptor point. Pile driving is allowed as long as it occurs during weekdays between the hours of 7:00 AM. and 6:00 PM. Based on the results of the analysis, the Proposed Project would result in construction noise impacts that would require mitigation.

Temporary construction vibration levels were predicted for the most vibration-intensive equipment used in each project stage, such as pile drivers. The analysis conservatively assumes that all buildings are Category III for the damage assessment.[38] Annoyance thresholds are 80 VdB for places where people sleep, 83 VdB for institutional uses, and 84 VdB for offices. Construction vibration predictions indicate that impacts would occur during all construction stages and would require mitigation.

However, as described in Appendix I, "Technical Report: Noise and Vibration," while the analysis assumptions are conservative, the primary cause of noise and vibration impacts would be the use of heavy equipment and pile driving, which would progress across the Project Limits and would not occur continuously throughout the construction period.

4.2.12. Hazardous Materials

Construction of the Proposed Project would involve demolition of the existing Draw One Bridge and Signal Tower A building, excavation, ground disturbance, and removal and disposal of soil and river sediments. Construction activities would be performed in accordance with an Excavated Materials Management Plan, a Groundwater Management Plan, and a Health and Safety Plan (HASP).

Areas of contaminated soil and/or groundwater may be encountered during construction. Adverse effects would be avoided by ensuring that construction activities are performed in accordance with an Excavated Materials Management Plan, a Groundwater Management Plan, and a HASP. These plans will be included in construction contract specifications and would be prepared by the contractor and reviewed and approved by MBTA prior to the start of construction. Potentially contaminated materials would be characterized and disposed of in accordance with applicable regulations. If any residual contaminated

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[37] While Cambridge regulates construction noise via their noise ordinance, which limits construction noise to certain time periods that vary for weekends, Saturdays and holidays, and Sundays, the City of Boston's criteria are associated with quantitative impact threshold metrics and are therefore more readily applicable to analysis. However, the City of Boston does not regulate pile driving.

[38] Vibration Category 3 comprises institutional uses, including buildings with primarily daytime and evening use. This category includes schools, libraries, and churches.

materials remain on-site following construction, these materials will be managed in accordance with the Massachusetts Contingency Plan (MCP) and/or other applicable federal, state, and/or local regulations.

With the implementation of these plans, the Proposed Project's construction activities would address issues related to hazardous and contaminated materials that may be encountered during construction within the Project Limits, and therefore, like the No Action Alternative, the Proposed Project would not result in adverse effects associated with contaminated materials during construction.

4.2.13. Public Utilities and Services

The Proposed Project is not anticipated to require temporary construction-period relocations of any public or private utilities. Any disruption of utilities, if determined necessary as design advances, will be coordinated with appropriate parties in advance of construction activities to prevent service interruptions.

4.2.14. Summary of Construction-Period Effects and Comparison to No Action Alternative

Therefore, in contrast with the No Action Alternative, the Proposed Project may result in construction-period impacts to land use, socioeconomic conditions, community facilities and services, parks and recreational resources, pedestrian and bicycle facilities, visual and aesthetic conditions, natural resources, rail transportation and transit, marine transportation, noise and vibration, vehicular traffic, parking, and hazardous materials; however, any of these Proposed Project construction-period impacts would be minor and temporary, not significant or permanent. The demolition of the historic Draw One Bridge and Signal Tower A, which would occur as part of and to facilitate construction of the Proposed Project, would be a permanent impact that would not otherwise occur with the No Action Alternative. (See Section 6, "Summary of Impacts, Commitments, and Required Mitigation Measures," for proposed avoidance and minimization measures.)

4.3. Operational (Full Build) Effects

4.3.1. Introduction

The Proposed Project would not result in any permanent direct effects to land uses or zoning within the Project Limits in 2034, similar to the No Action Alternative. It would continue existing transportation land uses and be consistent with existing zoning regulations. It would not introduce new residents or employees to the study area, so as with the No Action Alternative, existing conditions related to its socioeconomic character would remain the same. The Proposed Project would not directly affect existing community facilities or emergency or medical services in the study area, though it would require permanent acquisition of an approximately 0.003-acre (131-sf) portion of currently unmaintained, sparsely vegetated land directly adjacent to the MGH administrative building. The APE contains no known archaeological resources, so there would be no effects with the Proposed Project.

Because the proposed bridge would be designed to exceed current 100-year and 500-year flood elevations in both the closed and open positions, and its design would reflect MBTA's drainage criteria for projected precipitation frequencies and amounts, adverse impacts to the floodplain and displacement of flood waters to areas adjacent to the Project Limits are not anticipated. Where feasible and practicable, all electrical and mechanical equipment would be located above the DFE, submersible equipment would be used, and flood walls would be erected to protect the proposed new Tower A building.

No adverse impacts to marine transportation would occur with the Proposed Project. It would not result in any permanent impacts to the Charles River Boat Company or the Boston Duck Tours sightseeing tours, other commercial navigation, or recreational navigation. Rather, it would allow maritime traffic to proceed along the river unimpeded. The Proposed Project would not result in permanent impacts to the Massachusetts State Police Marine Section operations; their smaller vessels would continue to be able to pass beneath the Draw One Bridge without requiring a bridge opening.

The Proposed Project would result in no permanent direct effects to roadways, transit (subway) routes or parking facilities or on-street parking in the study area. It would introduce no permanent modifications to existing roadway configurations or permanent off-site impacts to traffic and parking. While it would improve safety and reliability, the Proposed Project would make no significant changes to train operations and would therefore not result in any air quality impacts due to operational emissions.

In its operational condition, the Proposed Project would not be expected to result in any adverse impacts related to contaminated materials, as it would not involve any activities such as ground disturbance or demolition that would disturb and expose such materials.

The Proposed Project would replace rail infrastructure and Signal Tower A within the MBTA ROW and would not require permanent relocations of any public or private utilities.

4.3.2. Parks, Recreational Resources, and Pedestrian and Bicycle Facilities

The Proposed Project would result in minor permanent impacts to parks and recreational resources. (Refer to Section 8, “Section 4(f),” and Appendix J, “Section 4(f),” for additional information.)

The existing North Bank Bridge landings in North Point Park and Paul Revere Park would be shifted slightly, though would remain within DCR-owned property and serve the same recreational use. Approximately 0.019 acre (828 sf) of the proposed South Bank Park would be required for the installation of a new manhole in approximately the same location as an existing manhole. However, the Proposed Project would not impede access to North Point Park, Paul Revere Park, or the proposed South Bank Park, nor would it result in any permanent indirect significant adverse impacts to these parks.

The Proposed Project would require the permanent removal of the public sidewalks along both the east and west sides of the existing Draw One Bridge south trestles, though these sidewalks terminate just before the navigable Charles River channel and, therefore, do not provide access to pedestrian or bicycle facilities north of the river. Additionally, three pier foundations for the North Bank Bridge are located on MBTA property, and one (Pier 3) conflicts with the proposed railroad track construction and realignment along the MBTA ROW. To allow for construction of the Proposed Project, the North Bank Bridge would be permanently modified by increasing the bridge height by one foot; however, with the Proposed Project the function of the North Bank Bridge and its general structure, form, and appearance would be fundamentally the same as they would be without the Proposed Project.

4.3.3. Historic and Cultural Resources

As described in Section 4.2, “Construction-Period Effects,” construction of the Proposed Project would include demolition of the NRHP-eligible Draw One Bridge and Signal Tower A, which would constitute an Adverse Effect to historic resources because it would result in the “physical destruction of or damage to all or part of the property.” The SHPO concurred with this finding in a letter dated June 12, 2023. Given the permanent nature of this effect, it would continue throughout the operational (full-build) condition of the Proposed Project.

See Section 6, "Summary of Impacts, Commitments, and Required Mitigation Measures," for a description of proposed mitigation measures.

4.3.4. Visual and Aesthetic Resources

The Proposed Project would require the demolition of both the historic Draw One Bridge and Signal Tower A; as such, these landscape elements would no longer be present in the landscape, nor would they be components of existing views in the study area. The Proposed Project would introduce a new rail bridge where the historic Draw One Bridge currently exists and a new signal tower in approximately the same position as the existing Signal Tower A. Thus, the Proposed Project would introduce similar types of landscape elements in approximately the same locations as they would exist in the No Action Alternative, thereby changing the appearance of the Project Limits but not substantially altering viewsheds.

The viewsheds providing views of the Project Limits from public park areas in the western portion of the study area, as described for existing conditions and the No Action Alternative, would continue to afford views of the newly constructed Draw One Bridge and the Zakim Bridge behind it. Views from the east of and toward the Project Limits would continue be limited by the Zakim Bridge, though new publicly accessible parkland (South Bank Park) will have introduced expanded publicly accessible views toward the Project Limits. All of the viewsheds that would exist in the future without the Proposed Project would remain in the future with the Proposed Project. However, the pedestrian walkways along the southern trestles of the existing Draw One Bridge would no longer be present to afford westward pedestrian views along the river from above the water; the Proposed Project would not include similar pedestrian access at this location.

The opportunity to appreciate the aesthetic environs characterized by the Charles River and the bridges that cross it at this location would not be significantly altered for any park visitor, mariner or boater, or for rail passengers or automobile drivers, whose views would be minimally altered given the brevity of available views while moving.

Finally, FTA and MBTA have worked with the Section 106 consulting parties to develop a bridge design that is intended to complement the Zakim Bridge and to contribute to a shared aesthetic character. Therefore, although the visible form and details of the new bridge and signal tower introduced with the Proposed Project would differ from existing conditions and the No Action Alternative, the Proposed Project will introduce aesthetic unity to the group of bridges that, together with the Charles River, define the aesthetic conditions of the study area landscape. In addition, Section 106 mitigation measures (see Section 6.2.1, "Mitigation for the Loss of Historic Architectural Resources") may offer further opportunities to enrich visitors' understanding of the history of the landscape and its ongoing evolution.

4.3.5. Natural Resources

Local soils and topography would be permanently altered by the excavation and grading required to construct the proposed Draw One Bridge and rail approaches. Removal of existing timber piles (mostly at the mudline), removal of existing steel and concrete caissons and piers (several feet below the mudline), installation of timber and steel piles and drilled shafts, and minor riverbed sediment dredging, all within the footprint of the existing and former Draw One Bridge spans, would permanently alter the bed of the Charles River, but given the history of disturbance and development in this location, no significant adverse impacts are anticipated.

In addition, the drainage system implemented in the No Action Alternative as part of the "MBTA North Station Platform F Extension and Ancillary Improvements Project" would be incorporated into the Proposed Project's drainage system for the south trestles, with a new outfall along the south bank of the Charles River.

As portions of the Project Limits are located within the 100-year floodplain (1 percent annual-chance flood event), the Proposed Project is subject to the provisions of Executive Order 11988 and USDOT Order 5650.2 on Floodplain Management. The Proposed Project would not be considered a significant encroachment onto the floodplain because it comprises the replacement of MBTA infrastructure already located within a floodplain and would not result in adverse impoundment, diversion, higher flood levels, or contamination of floodwaters. Further, given the minor modifications to the floodplain that would result with the Proposed Project, and its location within the already lock-controlled Charles River basin and upstream of the Gridley Locks, adverse impacts to the floodplain or flooding of areas adjacent to the study area are not expected.

Although the Proposed Project has been designed in accordance with MBTA's Flood Resiliency Design Directive and Drainage Design Directive, and with a DFE of 13.1 feet, sea level rise would remain a flood risk to the proposed new Draw One Bridge and Signal Tower A given track profile limitations.

4.3.6. Noise and Vibration

As described in Section 4.2.11, "Noise and Vibration," the steps described in FTA's Transit Noise and Vibration Impact Assessment Manual (FTA 2018) were followed to evaluate the Proposed Project. Changing the railroad alignment would shift commuter and Amtrak trains closer to some noise-and vibration-sensitive receptors (e.g., the MGH administration building, which comprises only administrative offices, not medical uses), though this change in alignment is not expected to result in exceedances of the applicable impact criteria. As described in Appendix I, "Technical Report: Noise and Vibration," predicted operational noise levels at receptors included in this analysis are provided, with a comparison to the moderate and severe impact thresholds identified based on the existing sound level at each receptor. Similarly, predicted operational vibration levels at receptors included in this analysis are provided with a comparison to the impact thresholds based on the use at each receptor. Based on these results, the Proposed Project would not result in operational noise or vibration impacts.

4.3.7. Summary of Operational (Full Build) Effects and Comparison to No Action Alternative

Therefore, in contrast with the No Action Alternative, the Proposed Project would introduce changes to views, small portions of existing parklands, soils and topography within the Project Limits, and the proximity of rail lines to some noise-and vibration-sensitive receptors, though these changes would not constitute significant adverse impacts. As with the No Action Alternative, however, the South Bank Park would expand park and recreational resources in the immediate vicinity of the Proposed Project, thus improving the visual and aesthetic character of the area.

The APE contains no known archaeological resources, so as with the No Action Alternative, there would be no effects with the Proposed Project. However, in contrast to the No Action Alternative that would retain the existing Draw One Bridge and Signal Tower A, the Proposed Project would result in a significant adverse effect to these historic architectural resources through their demolition. This significant adverse effect is mitigated through Section 106 consultation, which concluded with the development of an MOA among FTA, MBTA, SHPO/MHC, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and DCR. The final draft MOA, which is being circulated for signature, is included in Appendix B, "National Historic Preservation Act Section 106." The final executed MOA will be included in the NEPA decision document.

In its operational condition, the Proposed Project would result in no adverse impacts related to land use and zoning; socioeconomic conditions; community facilities and services; stormwater management in the floodplain; traffic and parking; marine transportation; air quality and GHG emissions; hazardous and contaminated materials; or public utilities and services.

The Proposed Project would enhance the reliability of MBTA and Amtrak rail service and provide more reliable access to employment centers, educational institutions, cultural and tourism sites, and commercial centers throughout New England, compared to either existing conditions or the No Action Alternative, thereby supporting the region's economy with greater efficiency. It would better secure permanent, long-term benefits to local communities than can be achieved without the Proposed Project. Further, the Proposed Project would improve reliability for maritime traffic, which would benefit local water-dependent businesses and regional trade. These effects would improve socioeconomic conditions in the study area relative to the No Action Alternative.

Contrary to the No Action Alternative, the Proposed Project would have a positive permanent impact on rail service. It would benefit commuter and intercity rail service by replacing the Draw One Bridge to keep the system in a state of good repair, improving the reliability and safety of rail service and minimizing delays. Therefore, conditions with the Proposed Project would represent an improvement over existing conditions and the No Action Alternative, both of which represent a continuation of infrastructure deterioration, operational deficiencies, and safety concerns.

The Proposed Project would decrease the current unlimited Draw One Bridge clearance to a minimum vertical clearance of 32.2 feet and a 45-foot horizontal clearance, consistent with clearances provided both upstream and downstream of the Draw One Bridge. The United States Coast Guard (USCG) has made a preliminary determination that the replacement bridge with the proposed clearances will meet the current and future navigation needs. Therefore, the proposed replacement spans would provide sufficient vertical and horizontal clearance for marine traffic and improve reliability of navigation beneath the bridge, and thus, the future with the Proposed Project would represent an improvement over existing conditions and the No Action Alternative, both of which represent a continuation of infrastructure deterioration, operational deficiencies, and safety concerns.

The Proposed Project has the potential to reduce future regional vehicle miles traveled (VMT) compared with existing conditions by facilitating a more reliable rail system that could persuade current drivers to use rail. MBTA projects that service improvements facilitated by the Proposed Project could generate more than three million additional annual commuter passenger trips by 2040, thereby reducing regional vehicle trips and associated emissions.

The Proposed Project is intended to replace and improve MBTA infrastructure, including power (e.g., new generator adjacent to Tower A, new power feeder to connect to Tower A) and signal equipment, as well as Signal Tower A itself, allowing for the relocation of existing controls and electrical equipment from the temporary control house to the new building. The signal system, including all wayside devices, cables, and infrastructure, would be updated and/or modified to support the new track and signal system configuration. It would also improve the stormwater drainage system within the MBTA ROW by collecting runoff from the bridge and Tower A and directing it through an infiltration and detention system, tying into new outfall locations at the Charles River and the Millers River. Contrary to the No Action Alternative, the Proposed Project would improve both the MBTA signal system and stormwater drainage system in the MBTA ROW. With these improvements to the stormwater drainage system, the Proposed Project is not expected to result in adverse impacts to water quality. This would be an improvement over existing conditions that allow runoff from the trestles to drain directly into the Charles River.

The Proposed Project would introduce a new bridge structure and Tower A building free of asbestos, lead, PCBs, and other hazardous materials. This is in contrast to the No Action Alternative, with which issues related to hazardous and contaminated materials within the Project Limits continue as in existing conditions. Beyond addressing the existing hazardous and contaminated materials within the Project Limits, however, the Proposed Project, like the No Action Alternative, would result in no new adverse effects related to hazardous and contaminated materials.

Permanent relocations of public or private utilities would not be required with the Proposed Project; the Cambridge Water Department waterline would continue to service the new Tower A. As such, like the No Action Alternative, the Proposed Project would have no significant permanent impact on public utilities and infrastructure.

4.4. Indirect and Cumulative Effects

The CEQ regulations implementing NEPA, set forth in 40 CFR Part 1500-1508, require federal agencies to consider the environmental consequences of their actions, including not only direct effects, but also indirect and cumulative effects.[39]

Indirect effects are those that are "caused by an action and are later in time, or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8). Cumulative effects result from the incremental consequences of an action (the project) when added to other past, present and reasonably foreseeable future actions (40 CFR 1508.7). The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even indirect impacts, but when added to other actions can eventually lead to a measurable environmental change. Cumulative effects are the net result of both the project and the other improvements planned in, near, and around the project.

4.4.1. Indirect Effects

As stated in Section 1.2.3, "Project Purpose," the purpose of the Proposed Project is to replace the current two-span bridge – which is classified as both functionally and operationally obsolete and approaching the end of its useful life – with a new three-span bridge in approximately the same location, thus providing an

[39] The implementing regulations for NEPA use the terms "effect" and "impact" interchangeably; this analysis of indirect and cumulative effects uses the term "effect."

additional two tracks across the Charles River connecting to North Station, as well as to replace the existing signal tower with a new Tower A to serve this new bridge. The Proposed Project is intended to keep this portion of the rail system in a state of good repair and improve the reliability and safety of MBTA Commuter Rail and Amtrak services while maintaining these services during construction.

The Proposed Project would not result in increased train frequency, capacity, or ridership. It would not induce development or result in indirect effects related to population or employment increases, nor would the Proposed Project create new permanent jobs. The presence of temporary workers during the construction period would likely cause a short-term demand for services in the area, including increased demand at nearby restaurants and gas stations. However, the construction period would be temporary and would not contribute to permanent growth-related effects in the area, including neither increased pollutant emissions nor demand for municipal services.

The replacement of the Draw One Bridge, as proposed, would require modification of the North Bank Bridge. However, this modification is being designed and planned, and will be funded, as part of the Proposed Project, as described in Section 2.4, "Preferred Alternative (Proposed Project)." As such, MBTA continues to coordinate with DCR to minimize and avoid adverse impacts to the North Bank Bridge and its users, and the technical analyses presented in Section 3, "Affected Environment," fully assess the potential for impacts related to this aspect of the Proposed Project; likewise the Section 4(f) evaluation summarized in Section 8 and presented in Appendix J, "Section 4(f)," fully considers the modification of the North Bank bridge as part of the Proposed Project. Section 6, "Summary of Impacts, Commitments, and Required Mitigation Measures," describes measures that will avoid or minimize the potential for direct as well as indirect effects to the North Bank Bridge and parklands.

Therefore, the Proposed Project would not result in unmitigated significant adverse indirect effects to the North Bank Bridge or parklands, nor would it result in any other indirect effects.

4.4.2. Cumulative Effects

Potential cumulative effects may result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions (40 CFR §1508.7). The cumulative effects of an action may be undetectable when viewed in the individual context of direct or indirect impacts, but nevertheless can eventually lead to a measurable environmental change when considered collectively.

4.4.2.1. Planned Projects in the Study Area

4.4.2.1.1. Transit Projects

As described in Section 2.2, "No Action Alternative," two planned MBTA projects will be implemented in the future without the Proposed Project: the "Mainline Tracks Rehabilitation and Ancillary Improvements" project, construction of which is expected to begin in 2025 and be complete in 2028, and the "North Station Platform F Extension and Ancillary Improvements" project, construction of which is expected to begin in 2025 and be complete in 2027. Given that construction of the Proposed Project is expected to begin in 2026 and be completed in 2034, the early years of construction for the Proposed Project would overlap with the anticipated construction of these two MBTA projects. The Proposed Project, the "Mainline Tracks Rehabilitation and Ancillary Improvements" project, and the "North Station Platform F Extension and Ancillary Improvements" project have been designed in coordination with each other, and MBTA will coordinate the construction of each project with the specific intent to ensure that there are no interruptions or significant impacts to MBTA commuter rail or Amtrak service. Ultimately, the Proposed Project, in combination with these two planned transit projects, would enhance service reliability and resilience.

4.4.2.1.2. South Bank Park

Similarly, the early years of construction for the Proposed Project would overlap with the anticipated construction of the South Bank Park, which, as described in Section 2.2.1.2, "South Bank Park," will be under construction as early as 2026 through approximately 2031. As such, there is the potential for concurrent construction activities resulting in temporary cumulative effects (the potential for effects on the South Bank Park is assessed in Section 4, "Probable Consequences of the Proposed Project"). To minimize the potential for adverse cumulative impacts of multiple construction projects within close proximity of each other, activities would be coordinated to avoid disruption to either construction program. Code requirements and best management practices would be employed to minimize or avoid any potential adverse effects related to air quality and noise and vibration during construction periods. Concurrent construction activities for the Proposed Project and the South Bank Park may result in the displacement parking spaces adjacent to the Gridley Locks Footpath for a more extended period of time than would otherwise be required, though access to the footpath would be maintained throughout the duration of construction activities.

In its permanent operational condition, as described in Section 4.3, "Operational (Full Build) Effects," the Proposed Project would not directly affect the South Bank Park but would provide improved rail access to the area served by the South Bank Park, thereby contributing to the array of safe and reliable travel options to and within the study area and improving local and regional accessibility to the South Bank Park, as well as other parklands in the study area.

4.4.2.1.3. South Bank Bridge

As described in Section 2.2.1.3, "South Bank Bridge," DCR currently has plans to develop the South Bank Bridge on the south bank of the Charles River, though it is assumed to be neither under construction nor complete in 2034. The Proposed Project would not preclude the implementation of the South Bank Bridge; however, construction activities supporting the latter could not begin until after the substantial completion of the construction for the Proposed Project, assuming that the limits of construction for the two areas overlap. It is anticipated that throughout its design and construction planning, the implementation of the South Bank Bridge would be undertaken in coordination with agencies responsible for the properties it affects to avoid or minimize potential for cumulative effects that its implementation may introduce.

4.4.2.2. Other Contemplated Projects in the Study Area

4.4.2.2.1. Cross River Pedestrian and Bicycle Crossing

As described in Section 2.2.2.1, "Cross River Pedestrian and Bicycle Crossing," a project known as the "Cross River Pedestrian and Bicycle Crossing" is envisioned as a separate Charles River crossing for cyclists and pedestrians. It is not yet designed or planned for construction, and it is assumed to be neither under construction nor complete in 2034. The Proposed Project would not preclude the implementation of the Cross River Pedestrian and Bicycle Crossing; however, construction activities supporting the latter could not begin until after the substantial completion of the construction for the Proposed Project, assuming that the limits of construction for the two areas overlap. It is anticipated that throughout its design and construction planning, the implementation of the Cross River Pedestrian and Bicycle Crossing would be undertaken in coordination with agencies responsible for the properties it affects to avoid or minimize potential for cumulative effects that its implementation may introduce.

4.4.2.3. Other Recently Completed Projects in the Study Area

As described in Section 3.2.1, “Land Use and Zoning,” two large development projects have recently been completed in the study area. Given that both Cambridge Crossing and The Hub on Causeway have been completed (2023 and 2021, respectively), they are considered part of the potentially affected environment, and so the potential for impacts to residents or workers associated with either of these recently completed projects has been assessed in Section 4, “Probable Consequences of the Proposed Project.” The Proposed Project would not directly affect these developments either during its construction or during its permanent operational condition. However, the Proposed Project would support the increased residential population and commercial activity associated with both the Cambridge Crossing and the Hub on Causeway by providing for safe and reliable train service in the future.

4.4.2.4. Summary

The Proposed Project, considered in combination with other recently completed or reasonably foreseeable projects in the area, would not result in any cumulative effects beyond contributing to safe and efficient transportation access in the study area. The Proposed Project would contribute to improvements in regional connectivity to the localized benefits afforded by the other planned and contemplated projects in the study area. The potential for adverse cumulative effects is greatest during the construction of the Proposed Project, particularly during the earlier phases of Proposed Project construction that may overlap with other construction activities in the same area supporting the development of the South Bank Park. MBTA will continue consultation with DCR to coordinate Proposed Project construction and avoid potential construction conflicts. Assuming that construction activities necessary to support the construction of the South Bank Park will also take measures to address temporary construction-period effects, such as controlling noise, fugitive dust, and exposure to hazardous or contaminated materials, any such effects considered cumulatively among the projects would remain minor and temporary, and not amount to a substantial increase in intensity or duration of such effects.

4.5. Safety and Security

The new Draw One Bridge would improve safety and security from both rail and marine transportation perspectives. The operational redundancy provided through the construction of three independent spans would minimize the potential for rail operation disruptions, and the increased reliability of the new bridge would improve marine navigation.

Further, the Proposed Project would incorporate a number of safety and security measures, including fencing, a CCTV system, exterior lighting located along the bridge structure, and navigational lighting to meet USCG requirements. The CCTV system would provide for increased security relative to operations (e.g., bridge, navigation channel, boat traffic) and surveillance (e.g., Tower A, access locations).

Section 2.4.1.9, “Resilience,” identifies resilience measures that would be incorporated into the new bridge and Tower A designs and operation; these measures would provide safety and security in the event of natural hazards.

During construction, safety measures (e.g., installation of lighting on barges) would be implemented in coordination with USCG. The contractor would also coordinate with USCG to provide notification to mariners as needed throughout the duration of construction. These measures will be coordinated with DCR, the State Police, and any other required entities and would protect recreational and other boaters in this area of the Charles River. Additionally, as described in Section 4.2.12, “Hazardous Materials,” construction activities would be performed in accordance with an Excavated Materials Management Plan, a Groundwater Management Plan, and a HASP to minimize the potential for adverse effects to the surrounding communities and construction workers. These plans will be included in construction contract specifications and would be prepared by the contractor and reviewed and approved by MBTA prior to the start of construction.

5. Resource Commitments

5.1. Irreversible and Irretrievable Commitment of Resources

Irreversible resource commitments involve the use or destruction of a specific resource that cannot be replaced. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored due to the action. In both cases, permanent loss of the resource occurs.

The No Action Alternative would not require an immediate increase in irreversible and irretrievable commitment of resources, including natural, human, and monetary resources, beyond those resources currently required for the ongoing operation and maintenance of the Draw One Bridge, Signal Tower A, and the temporary control tower. Due its age and deteriorating conditions, the commitment of human and monetary resources toward the operation of the bridge will likely increase over time, ultimately leading to increased investment in facilities that, despite such investment, will become irreparable and require replacement at a later date.

The Proposed Project would constitute an irreversible and irretrievable destruction of the existing Draw One Bridge and Signal Tower A, both of which are historic resources eligible for listing in the National Register of Historic Places. Mitigation measures will be developed with and agreed upon by FTA, MBTA, the SHPO, and Section 106 consulting parties to ameliorate this loss, as described in Section 4.2.6, “Historic and Cultural Resources.”

As proposed, federal and state funds would be required for the construction of the Proposed Project. State funds would be required for continued operation and maintenance of the Proposed Project for the extent of its useful life. These monetary resources are irretrievable. Construction materials that would be required for the Proposed Project include steel, concrete, wood, and composite plastic. Labor, energy, and natural resources would be required to produce construction materials. These resources are irretrievable; however, they are not in short supply, and their use would not adversely impact their continued availability.

5.2. Relationship between Short-Term uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

For the purposes of this analysis, "short-term" is defined as the construction period, which is the time period during which the majority of environmental impacts will occur. "Long-term" is defined as the lifespan of the Proposed Project. Long-term effects also relate to the sustainability of the Proposed Project and its consistency with local, regional, and statewide planning and policies.

The No Action Alternative would not involve any project-related construction, and therefore would not incur short-term uses of the environment. However, the ongoing maintenance of the existing Draw One Bridge would not extend its useful life; therefore, it would not enhance the long-term productivity of the structure.

The Proposed Project's construction-period use of the environment is presented in Section 4.2, "Construction-Period Effects." The work in the Charles River, including demolition of the existing bridge, minor riverbed sediment dredging, and excavation of sediments would create short-term impacts. Land-based construction activities, including the replacement of Signal Tower A, would also create temporary impacts.

However, the Proposed Project would result in substantial long-term benefits to MBTA and Amtrak rail service, which is important to the region's economy because it provides reliable access to employment centers, educational institutions, cultural destinations, and commercial centers. As it would enhance the reliability of this rail service, the Proposed Project would result in permanent long-term benefits to local and regional communities. The Proposed Project's improvements to marine transportation would also positively affect users of the Charles River, the cities of Boston and Cambridge, and the State of Massachusetts through improved marine-based recreation and commerce.

6. Summary of Impacts, Commitments, and Required Mitigation Measures

6.1. Comparison of the Proposed Project and the No Action Alternative

While the No Action Alternative would not result in the demolition of the historic Draw One Bridge and Signal Tower A, ongoing deterioration of the bridge and building could require remedial measures that might be considered to diminish their integrity of materials and design and thereby cause an adverse impact. Additionally, hazardous and contaminated materials associated with the existing Signal Tower A would not be addressed. Required maintenance and repairs of deteriorating infrastructure with the No Action Alternative are likely to disrupt rail service with greater frequency and longer durations, as well as increase the number and duration of channel restrictions and closures, affecting marine transportation through the navigational channel. These disruptions would be likely to impede access to regional community facilities in the study area for those who rely on MBTA service.

The Proposed Project would require two permanent easements and five temporary (construction) easements. It may result in construction-period impacts to land use, socioeconomic conditions, community facilities and services, parks and recreational resources, pedestrian and bicycle facilities, visual and aesthetic conditions, natural resources, rail transportation and transit, marine transportation, noise and vibration, vehicular traffic, parking, and hazardous materials; however, any of these construction-period impacts would be minor and temporary, not significant or permanent.

Local soils and topography would be permanently altered by the excavation and grading required to construct the proposed Draw One Bridge and rail approaches. The Proposed Project would result in minor permanent impacts to parks and recreational resources and would require the permanent removal of the public sidewalks along both the east and west sides of the existing Draw One Bridge south trestles, though these sidewalks do not provide access to pedestrian or bicycle facilities north of the river. The introduction of new bridge infrastructure would permanently change the views of the Project Limits from the river and surrounding waterfront parks. Further, changing the railroad alignment would shift commuter and Amtrak trains closer to some noise-and vibration-sensitive receptors, though this change in alignment is not expected to result in exceedances of the applicable impact criteria.

Most notably, the Proposed Project would include demolition of the NRHP-eligible Draw One Bridge and Signal Tower A, resulting in permanent adverse effects to two historic architectural resources. As described in Section 6.4, "Unavoidable Significant Adverse Impacts," the adverse effect to historic resources would be unavoidable but mitigated.

There would be no unmitigated adverse impacts with the Proposed Project.

6.2. Required Mitigation Measures

Mitigation measures have been identified and are recorded in agreements with respective entities having jurisdictional oversight, as described below:

6.2.1. Mitigation for the Loss of Historic Architectural Resources

As described in Section 4.2.6, "Historic and Cultural Resources," construction of the Proposed Project would include demolition of the historic Draw One Bridge and Signal Tower A, which was determined to be an Adverse Effect pursuant to Section 106 of the NHPA.

6.2.1.1. Section 106 Memorandum of Agreement

An MOA will be executed among FTA, MBTA, SHPO/MHC, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and DCR that will identify the measures to be taken to address adverse effects to these historic architectural resources. The draft MOA, which is currently being refined and finalized by FTA in coordination with the Section 106 consulting parties, contains the following mitigation measures:

- Historic American Engineering Record (HAER) documentation for Draw One Bridge, including interpretive narratives describing the history of the bridge spans, focusing on construction, and detailed descriptions of engineering and functional elements, historic plans, photographs, and other documents meeting the appropriate HAER archival standards;
- Historical Architectural Building Survey (HABS) documentation for Signal Tower A, including drawings, history, and photographs;
- two Interpretive Displays, one on the Draw One Bridge and one on Signal Tower A, in both Cambridge and Boston; a video, available for public viewing online, showing trains crossing the Draw One Bridge and the bridge structures being raised and lowered. The video of the trains

crossing and the bridges being raised and lowered shall be linked to a QR code that will be linked from the interpretive displays;

- a historic context study of bridges across the Charles River, potentially coordinated with Boston's Museum of Science to host an exhibit;
- the potential salvage of significant architectural and engineering features of the Draw One Bridge and Signal Tower A, and
- provision of design plans to SHPO/MHC, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and DCR for review and comment.

The mitigation measures comprising salvage materials and/or interpretive displays will be designed in consultation with DCR, and though they likely will result in visible changes to the aesthetic and visual environs of the Proposed Project (e.g., salvage, restoration, and display of items within MBTA ROW or DCR parkland), such changes would not be adverse. Rather, such changes to the aesthetic and visual environs would be positive, as any such displays would be designed to reflect the demolished historic resources and their role in the immediate context, thereby providing opportunities for parkland visitors to learn about and appreciate their surroundings in a meaningful way. Any salvaged materials would be carefully restored to address any potential hazardous or contaminated materials associated with them in their original condition, and their use and position within publicly accessible spaces will be undertaken in accordance with applicable public safety standards, and any permits or approvals that may be necessary will be secured.

6.2.2. Mitigation for the Use of Section 4(f) Properties

Per the Section 4(f) regulations, if a feasible and prudent alternative exists that avoids all Section 4(f) resources, it must be selected. If there is no feasible and prudent avoidance alternative, FTA may only approve the alternative that causes the least overall harm in light of Section 4(f)'s preservation purpose. As described in Section 8, "Section 4(f)," there are no feasible and prudent alternatives that would avoid all Section 4(f) resources.

Coordination with DCR is ongoing for their review and comment on the Proposed Project's use of Section 4(f) parks and recreational resources. Measures to minimize harm to parklands and public recreation areas in the vicinity of the Proposed Project will be developed with and agreed upon by MBTA and DCR. Potential measures to minimize harm may include signed detours for pedestrians and bicyclists posted for each walking/biking path affected during construction activities. Regrading; seeding; planting trees, shrubs, and other permanent plantings; and/or general landscaping are other possibilities for areas disturbed by construction.

6.3. Summary of Potential Impacts and Proposed Measures to Avoid, Minimize, or Mitigate

This section summarizes the required mitigation measures described above, together with all other measures MBTA commits to incorporating into the Proposed Project, both in its final design and its construction, with all appropriate measures provided by MBTA as contractor requirements in construction contract documents.

Table 8, "Summary of Potential Project Impacts and Benefits and Proposed Measures to Avoid, Minimize, or Mitigate," summarizes the findings of the environmental analyses, including potential impacts and benefits of the Proposed Project and any associated avoidance, minimization, or mitigation measures that MBTA would implement to address the identified impacts.

6.4. Unavoidable Significant Adverse Impacts

As described in Section 4.2.6, "Historic and Cultural Resources," construction of the Proposed Project would include demolition of the historic Draw One Bridge and Signal Tower A, which was determined to be an Adverse Effect pursuant to Section 106 of the NHPA. This significant adverse impact to these historic architectural resources would be permanent, and it would be unavoidable. As described in Section 6.2.1, "Mitigation for the Loss of Historic Architectural Resources," however, mitigation will be required and implemented as part of the Proposed Project.

Table 8: Summary of Potential Project Impacts and Benefits and Proposed Measures to Avoid, Minimize, or Mitigate

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
Land Use and Zoning					
Land Use	N/A	• The Proposed Project would increase reliability of train service and improve travel for residents, employees, those seeking medical care, students, and tourists traveling to and from Boston.	N/A	• A permanent easement (0.019 acre [828 sf]) would be required at the Proposed South Bank Park for the installation of a manhole. • A permanent easement (0.003 acre [131 sf]) would be required along the east side of the MGH administrative building on currently unmaintained, sparsely vegetated land to accommodate required MBTA track alignment and required clearance. • Construction easements to accommodate construction staging and access would be required at: o Paul Revere Park (1.08 acre); o North Point Park (0.84 acre); o Proposed South Bank Park (0.514 acre); o DCR pier and riverfront walkway (0.11 acre); and o MGH administrative building parking lots (0.25 acre). • MBTA would temporarily use Boston Sand & Gravel property for construction access pursuant to a license agreement, executed in 2001, granting MBTA the right to enter their property for access to and egress from Signal Tower A and MBTA ROW. • The MGH floating dock and approach ramp would be temporarily removed throughout the duration of project construction to facilitate access to the Draw One Bridge. • The boat launch ramp used by DCR, the State Police, and the Boston Duck Tours Company may experience multiple temporary closures. • North Bank Bridge, as well as three walkways (100 feet) within Paul Revere Park and three walkways (140 feet) within North Point Park, would experience multiple temporary closures. • The DCR pier (extending from and appearing as part of the adjacent riverfront walkway) would experience temporary closure for the duration of project construction. The riverfront walkway between the DCR pier and the fence on the west side of the MBTA tracks would be briefly and temporarily closed during material deliveries.	• MBTA will conduct outreach to local neighborhoods, provide a 24-hour hotline and email address (DrawOne@MBTA.com) for emergencies and construction complaints, and notify the public about construction status and upcoming activities. • Protective measures would be in place to limit public access to the Project Limits during the construction period, including properties not owned by MBTA. • All properties not owned by MBTA that would be used during project construction would be restored to their original condition as part of the Proposed Project. • MBTA will coordinate with Boston Sand & Gravel prior to construction and throughout the construction period to minimize impacts to business and other operations. • Following construction completion, the MGH floating dock and approach ramp would be reinstalled and restored to existing conditions. • If closures of the boat launch ramp are determined necessary, MBTA will coordinate with DCR, the State Police, and the Boston Duck Tours Company during construction to avoid impacts to their use of the ramp.
Zoning	N/A	N/A	N/A	N/A	N/A
Public Policy	N/A	N/A	N/A	N/A	N/A
Socioeconomics					
Population	N/A	N/A	N/A	N/A	N/A
Households	N/A	N/A	N/A	N/A	N/A
Demographics and Income	N/A	N/A	N/A	N/A	N/A
Transit-Dependent Populations	N/A	N/A	N/A	• Temporary disruptions to MBTA and Amtrak rail service may occur, which could require occasional weekend diversions to MBTA subways and buses.	• MBTA would notify the public of any unavoidable closures and provide alternate routes for weekend rail service diversions.
Commercial Activities	N/A	• The Proposed Project would enhance the reliability of MBTA and Amtrak rail service, which is important to the region's economy because it provides	N/A	• The Charles River navigation channel may be temporarily closed, or its width reduced, to allow for staging of construction barges at least five times throughout construction; these closures would be up to	• The contractor would coordinate with USCG to provide notification to mariners as needed throughout the duration of construction, which would minimize disruptions to commercial navigation and sightseeing tours.

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
		reliable access to employment centers, educational institutions, and commercial centers, and therefore would result in permanent, long-term benefits to local communities. • The Proposed Project would improve reliability for maritime traffic, which would benefit local businesses that rely on maritime vessels. • The Proposed Project would provide temporary benefits to the local economy through new construction jobs and construction-related spending.		approximately one week at a time, totaling up to approximately two months.	
Community Facilities and Services					
Community Facilities	N/A	• The Proposed Project would improve reliability of train service and allow for safe operations and maintenance. • The Proposed Project would increase reliability of MBTA and Amtrak commuter rail service, as well as improve travel for those seeking medical care and access to other community facilities in Boston.	• Continued disruptions to rail service would be likely to impede access to regional community facilities in the study area for those who rely on MBTA service.	• A permanent easement would be required along the east side of the MGH administrative building on currently unmaintained, sparsely vegetated land. • A portion of the MGH administrative building parking lots would be used during project construction to provide construction staging and access. • The MGH floating dock and approach ramp would be temporarily removed throughout the duration of project construction to facilitate access to the Draw One Bridge. • The DCR-owned boat launch ramp used by the State Police (and the Boston Duck Tours Company) may experience multiple temporary closures.	• MBTA would coordinate with MGH regarding required easements and temporary access during construction to avoid disruption to hospital operations. • Following construction completion, the MGH floating dock and approach ramp would be reinstalled and restored to existing conditions. • If closure of the boat launch ramp is determined necessary, MBTA will coordinate with DCR, the State Police, and any other required entities during construction to avoid impacts to their use of the ramp.
Parks and Recreational Resources, and Pedestrian and Bicycle Facilities					
Parkland	• The development of South Bank Park would expand park and recreational resources in the immediate vicinity of the Proposed Project.	• Same as No Action Alternative	N/A	• The existing North Bank Bridge landings in North Point Park and Paul Revere Park would be shifted slightly, though would remain within DCR-owned property and provide the same recreational use. • A new manhole would be installed permanently at the Proposed South Bank Park in approximately the same location as an existing manhole. • Trees and shrubs in the vicinity of construction activities within both Paul Revere Park and North Point Park would be temporarily removed during construction. • A portion of the proposed South Bank Park would be used during project construction to provide construction access. • (See also "Pedestrian and Bicycle Facilities" located within parkland, described below.)	• Mitigation measures for permanent impacts to parks resources will be developed between MBTA and DCR. Examples of mitigation could include regrading, seeding, and planting of trees and/or landscaping for areas disturbed by construction within the DCR park areas. • The temporary closure of the DCR riverfront walkway and pier (extending from and appearing as part of the adjacent riverfront walkway) would be coordinated with DCR and the local community.
Pedestrian and Bicycle Facilities	N/A	N/A	N/A	• Public sidewalks along both the east and west sides of the existing Draw One Bridge south trestles would be permanently removed. • North Bank Bridge would be permanently modified by increasing the bridge height by one foot, requiring the relocation of two bridge supports, the addition of one additional support, the modification of the bridge truss structure, and the modification and lengthening of the bridge landings in North Point Park and Paul Revere Park. North	• A detour from North Point Park to access Paul Revere Park would be developed in coordination with DCR. • Temporary closures of pedestrian walkways and bicycle paths, as well as detours, would be coordinated with DCR and the local community.

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
				Bank Bridge would experience multiple closures of the pedestrian bridge of up to two weeks, totaling one month; these closures would take place over a six-month period. Temporary disturbance and access to Paul Revere Park would be required for modifications to the North Bank Bridge east landing. Construction at the North Bank Bridge abutment would require the temporary use of approximately 1.08 acre of pedestrian and bicycle pathways for construction access, while jacking at the abutment and regrading would result in disturbance to just a 0.08-acre area. • Temporary disturbance and access to North Point Park would be required for modifications to the North Bank Bridge west landing. Construction would require the temporary use of approximately 0.84 acre of pedestrian and bicycle pathways for construction access, while construction activities would result in disturbance to just a 0.17-acre area. • North Bank Bridge modification would require multiple temporary closures of three walkways (100 feet) within Paul Revere Park and three walkways (140 feet) within North Point Park for up to two weeks at a time, totaling one month. These closures would take place over a six-month period. • The DCR pier (extending from and appearing as part of the adjacent riverfront walkway) would experience temporary closure for the duration of project construction; trees on the pier would be removed during construction. The adjacent riverfront walkway would also be temporarily closed during material deliveries.	
Historic and Cultural Resources					
Archaeology	N/A	N/A	N/A	• The potential for intact archaeological deposits within the APE is considered to be low.	• MBTA will develop an Unanticipated Discoveries Plan that will be followed if any unanticipated archaeological and/or human remains are encountered during construction. The Unanticipated Discoveries Plan will be included in construction contract specifications and documentation.
Historic Architectural Resources	• The historic Draw One Bridge and Signal Tower A would be retained.	N/A	• Ongoing deterioration of the bridge and building could require remedial measures that might be considered to diminish their integrity of materials and design and thereby cause an adverse impact.	• The Proposed Project would include demolition of the NRHP-eligible Draw One Bridge and Signal Tower A, resulting in permanent adverse effects to two historic architectural resources.	• An MOA will be executed among FTA, MBTA, SHPO/MHC, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and DCR that will identify the measures to be taken to address adverse effects to these historic architectural resources (e.g., salvage materials, interpretive displays, video documentation, etc.).
Visual and Aesthetic Resources					
Visual and Aesthetic Resources	• Existing surface parking would be transformed to	• Same as No Action Alternative	N/A	• Construction activities would introduce construction equipment (e.g., barges, cranes, fencing, etc.) to the Charles River and other staging areas, which may result in an adverse visual impact to some users of	• FTA and MBTA have worked with the Section 106 consulting parties to develop a bridge design that is intended to complement the Zakim Bridge and to contribute to a shared aesthetic character.

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
	parkland as part of the proposed South Bank Park and, therefore, would enhance cyclists' and pedestrians' experience of the public realm on the south bank of the Charles River.			the nearby waterfront parks and North Bank Bridge looking toward the river, as well as to recreational boaters, but this effect would be momentary, and the construction condition would be temporary. • The Proposed Project would require the demolition of both the historic Draw One Bridge and Signal Tower A; as such, these landscape elements would no longer be present in the landscape, nor would they be components of existing views in the study area. • The pedestrian walkways along the southern trestles of the existing Draw One Bridge would no longer be present to afford westward pedestrian views along the river from above the water; the Proposed Project would not include similar pedestrian access at this location.	• As part of the MOA to address adverse effects to the historic Draw One Bridge and Signal Tower A, salvage materials and/or interpretive displays would likely be introduced within MBTA ROW or DCR parkland, the design of which would reflect the demolished historic resources and their role in the immediate context, thereby providing opportunities for parkland visitors to learn about and appreciate their surroundings in a meaningful way.
Natural Resources					
Soils	N/A	N/A	N/A	• Construction of the Proposed Project would require excavation and grading that would alter local soils and topography.	N/A
Wetlands and Water Resources	• A drainage system would be implemented to accommodate stormwater at North Station's Platform F and the two station tracks serving the platform.	• The Proposed Project would further improve the stormwater drainage system within the MBTA ROW, adding features to collect runoff from the bridge and Tower A and direct it through an infiltration and detention system, tying into new outfall locations at the Charles River and the Millers River	N/A	• The estimated total temporary surface area disturbance of the riverbed associated with demolition and construction is approximately 30,912 square feet (0.71 acre), and the estimated total area of permanent fill in the riverbed is approximately 11,411 square feet (0.26 acre).	• Temporary and permanent construction activities will require a USACE Section 404 permit and a MassDEP Section 401 WQC. • Mitigation measures to address the required fill within the riverbed will be completed prior to construction as part of the USACE permitting process.
Floodplains	N/A	• The proposed bridge would be designed to exceed current 100-year and 500-year flood elevations in both the closed and open positions, and its design would respond to MBTA's drainage criteria for projected precipitation frequencies and amounts.	• Sea level rise would pose a flood risk to the existing Draw One Bridge and Signal Tower A.	• Sea level rise would pose a flood risk to the proposed new Draw One Bridge and Tower A.	• Construction trestles would be built above the current 500-year flood elevation, and any construction equipment and materials stored temporarily within the floodplain would be removed in the event of a flood warning. • Where feasible and practicable, all electrical and mechanical equipment would be located above the DFE, submersible equipment would be used, and flood walls would be erected to protect the proposed new Tower A building.
Coastal Zone	N/A	N/A	N/A	N/A	N/A
Ecological Resources	N/A	N/A	N/A	• Trees and shrubs in the vicinity of construction activities within both Paul Revere Park and North Point Park would be temporarily removed during construction.	• The Proposed Project has been designed and construction methods have been selected to minimize impacts to e (e.g., drilled shafts that limit sediment disturbance, existing piles below the mudline to remain undisturbed, as possible, etc.). • Construction activities would adhere, to the extent practicable, to time-of-year restrictions set by fisheries agencies for certain in-water activities and maintenance of pathways for fish passage. • A Sediment and Water Quality Monitoring Plan would be implemented during project construction. • Invasive species would not be included in plantings or seed mixes in an effort to reduce the spread of invasive species.
Transportation Systems					
Rail Transportation	N/A	• The Proposed Project would improve reliability and safety of rail service and minimize delays. • The Proposed Project would improve railroad operational flexibility.	• Required maintenance and repairs of deteriorating infrastructure are	• As connections are made between the new tracks and existing mainline tracks for signal testing, temporary disruptions to MBTA and Amtrak rail service may occur that could result in weekend diversions to MBTA subways and buses.	• MBTA would notify the public of any closures and provide alternate routes for weekend rail service diversions during construction. • Track cutovers and signal work would be scheduled to avoid interruptions to Boston Sand & Gravel freight service.

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
			likely to disrupt service with greater frequency and longer durations.		
Marine Transportation	N/A	• The Proposed Project would improve reliability of operations for maritime traffic.	• Required maintenance and repairs are likely to increase the number and duration of channel restrictions and closures, affecting marine transportation through the navigational channel.	• The Charles River Navigation Channel would be permanently altered to match the clearances of the controlling bridges upstream and downstream of the Draw One Bridge. • The Charles River navigation channel may be temporarily closed, or its width reduced, to allow for staging of construction barges at least five times throughout construction; these closures would be up to approximately one week at a time, totaling up to approximately two months.	• Construction activities and sequencing in the Charles River would be designed to minimize conflicts with navigational traffic. • MBTA would coordinate temporary channel closures with USCG and DCR, and notifications to mariners will be provided, as needed. • Construction-period safety measures (e.g., installation of lighting on barges) would be implemented in coordination with USCG.
Traffic, Transit, and Parking	• MBTA's planned mainline track and North Station Platform transit improvements will represent an improvement in transit services.	• The Proposed Project, in combination with MBTA's planned transit projects, would represent an improvement in transit services. • Increased reliability of rail service would result in improved connection to subway and bus service at North Station.	• The development of South Bank Park would result in a slight reduction in public parking adjacent to the Gridley Locks Footpath.	• As with the No Action Alternative, the development of South Bank Park would result in a slight reduction in public parking adjacent to the Gridley Locks Footpath. • Project construction may result in limited short-term increased congestion in the study area. • Weekend-only interruptions to MBTA and Amtrak commuter rail service may occur during the construction period. • Temporary use of a portion of the MGH administrative building parking lots would result in the temporary displacement of up to approximately 30 of 512 parking spaces. • Temporary use of a portion of the proposed South Bank Park would result in the temporary displacement of approximately six of seven boat trailer parking spaces, as well as the displacement of all ten car parking spaces that would be provided at the proposed park.	• To avoid unnecessary construction-related traffic within the study area, construction vehicles would be limited to designated routes and kept in the designated staging areas. • Weekend-only interruptions to MBTA and Amtrak commuter rail service during construction of the Proposed Project would be accommodated through reliance on the existing subway and public bus services for passengers that may be affected during these limited periods.
Air Quality and GHG Emissions					
Air Quality and GHG	N/A	• The Proposed Project has the potential to reduce future regional VMT compared with existing conditions by facilitating a more reliable rail system that could persuade current drivers to use rail; MBTA projects that service improvements facilitated by the Proposed Project could generate more than three million additional annual commuter passenger trips by 2040, thereby reducing regional vehicle trips and associated emissions.	N/A	• MBTA estimates that fewer than 10,000 tons per year of CO_2 would be generated from project construction activities.	• Strategies to minimize and mitigate air emissions during construction could include: ○ Applying water suppression at least twice a day to all active construction areas to minimize dust; ○ Tarping all trucks hauling soil, sand, and other loose materials or require that all trucks maintain at least two feet of freeboard; ○ Paving, applying water daily, or applying (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites; ○ Using water sweepers to sweep all paved access roads, parking areas, and staging areas at construction sites daily; using water sweepers to sweep all streets daily if visible soil material is carried onto adjacent public streets; ○ Hydroseeding or applying (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more);

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
					○ Enclosing, covering, watering twice daily or applying (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.); ○ Limiting traffic speeds on unpaved roads to 15 mph; ○ Complying with MassDEP's idling regulations [310 CMR 7.11(1)(b)], requiring that engines idle for no more than five minutes. Posting idling restriction signage on project construction sites; ○ Complying with MassDEP's Diesel Retrofit Program (DRP), which promotes the use of such engine emission controls as oxidation catalysts or particulate filters for diesel engines to the maximum extent practicable; ○ Complying with the State's Low Sulfur Diesel standards (301 Code of Massachusetts Regulations [CMR] 7.05) and EPA's Clean Air Non-road Diesel Rule; and ○ Replanting vegetation as quickly as possible to minimize erosion in disturbed areas.
Noise and Vibration					
Noise	N/A	N/A	N/A	• The Proposed Project would result in construction noise impacts that would require mitigation.	• An acoustical engineer will prepare a Noise Control Plan in conjunction with the contractor's specific equipment, schedule and methods of construction, maximum noise limits for each piece of equipment, prohibition on certain types of equipment during the nighttime hours and engineering noise control measures. • Noise control measures will be used to reduce noise emissions and potential impact to sensitive receptors where feasible. These measures could include: ○ Shields, shrouds or intake and exhaust mufflers; ○ Noise deadening materials adhered to chutes or storage bins; ○ Temporary noise barriers; ○ Acoustic enclosures; ○ Specialized back-up alarms; ○ Limiting the size of generators and the duration of their use; and ○ Truck routes that minimize exposure to sensitive receptors.
Vibration	N/A	N/A	N/A	• Construction vibration predictions indicate that impacts would occur during all construction stages and would require mitigation.	The following measures will be applied where feasible: ○ Using alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile drivers and compactors) ○ Truck routes that minimize exposure to sensitive receptors and maintaining smooth roadway surfaces ○ Avoiding nighttime construction in residential neighborhoods (i.e., use of construction access drives in vicinity of residences)
Hazardous Materials					
Hazardous Materials	N/A	• The Proposed Project would introduce a new bridge structure and Tower A building free of asbestos, lead, PCBs, and other hazardous materials.	• Hazardous and contaminated materials associated with the existing Signal Tower A would not be addressed.	• Construction of the Proposed Project would involve demolition of the existing Draw One Bridge and Signal Tower A building, excavation, ground disturbance, and removal and disposal of soil and river sediments. • Areas of contaminated soil and/or groundwater may be encountered during construction of the Proposed Project.	• MBTA will conduct additional soil and groundwater sampling, as well as additional hazardous and contaminated materials investigations, as appropriate, including survey and testing of the Signal Tower A building and bridge structures, prior to construction. • Construction activities would be performed in accordance with an Excavated Materials Management Plan, a Groundwater

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
					Management Plan, and a HASP. These plans will be included in construction contract specifications. • Potentially contaminated materials would be characterized and disposed of in accordance with applicable regulations. • If any residual contaminated materials remain on-site following construction, these materials will be managed in accordance with the MCP and/or other applicable federal, state, and/or local regulations.
Public Utilities and Services					
Public Utilities and Services	N/A	• The signal system, including all wayside devices, cables, and infrastructure, would be updated and/or modified to support the new track and signal system configuration. • The Proposed Project would add a drainage system to both the north and south trestles of the Draw One Bridge to collect runoff from the bridge and Tower A and direct it through an infiltration and detention system, tying into new outfall locations at the Charles River and the Millers River.	N/A	• The Proposed Project is not anticipated to require temporary construction-period relocations of any public or private utilities.	• Any disruption of utilities, if determined necessary as design advances, will be coordinated with appropriate parties to ensure no interruptions or significant impacts to service.
Safety and Security					
Safety and Security	N/A	• The Proposed Project would improve safety and security from both rail and marine transportation perspectives. The operational redundancy provided through the construction of three independent spans would minimize the potential for rail operation disruptions, and increased reliability of the new bridge would improve marine navigation. • The Proposed Project would include the provision of fencing, a CCTV system, exterior lighting located along the bridge structure, navigational lighting to meet USCG requirements, and controlled access locations at Tower A and the Draw One Bridge. • The Proposed Project has been designed in accordance with MBTA's Flood Resiliency Design Directive and Drainage Design Directive, which would provide safety and security in the event of natural hazards.	N/A	• The Charles River navigation channel may be temporarily closed, or its width reduced, to allow for staging of construction barges at least five times throughout construction; these closures would be up to approximately one week at a time, totaling up to approximately two months. • Areas of contaminated soil and/or groundwater may be encountered during construction of the Proposed Project.	• During construction, safety measures (e.g., installation of lighting on barges) would be implemented in coordination with USCG. • The contractor would coordinate with USCG to provide notification to mariners as needed throughout the duration of construction. • Construction activities would be performed in accordance with an Excavated Materials Management Plan, a Groundwater Management Plan, and a HASP to minimize the potential for adverse effects to the surrounding communities and construction workers. These plans will be included in construction contract specifications.

Environmental Resource	Potential Benefits		Potential Impacts		Proposed Project Avoidance and Minimization Measures
	No Action Alternative	Proposed Project	No Action Alternative	Proposed Project	
Indirect and Cumulative Effects					
Indirect Effects	N/A	N/A	N/A	• The presence of temporary workers during the construction period would likely cause a short-term demand for services in the area, including increased demand at nearby restaurants and gas stations. • The replacement of the Draw One Bridge would require the modification to the North Bank Bridge.	• MBTA continues to coordinate with DCR to minimize and avoid adverse impacts to the North Bank Bridge and its users.
Cumulative Effects	N/A	• The Proposed Project, in combination with MBTA's two additional planned transit projects, would enhance service reliability and resilience. • The Proposed Project would provide improved rail access to the area served by the South Bank Park, thereby contributing to the array of safe and reliable travel options to and within the study area and improving local and regional accessibility to the South Bank Park, as well as other parklands in the study area. • The Proposed Project would support the increased residential population and commercial activity associated with both the Cambridge Crossing and the Hub on Causeway by providing for safe and reliable train service in the future.	N/A	• The early years of construction for the Proposed Project would overlap with the anticipated construction of two planned MBTA projects: the "Mainline Tracks Rehabilitation and Ancillary Improvements" project and the "North Station Platform F Extension and Ancillary Improvements" project. • The early years of construction for the Proposed Project would overlap with the anticipated construction of the South Bank Park. Concurrent construction activities for the Proposed Project and the South Bank Park may result in the displacement parking spaces adjacent to the Gridley Locks Footpath for an extended period of time longer than would otherwise be required, though access to the footpath would be maintained throughout the duration of construction activities. • The Proposed Project would not preclude the implementation of the South Bank Bridge or the Cross River Pedestrian and Bicycle Crossing; however, construction activities for these two projects could not begin until after the substantial completion of the construction for the Proposed Project, assuming that the limits of construction for the two areas overlap.	• MBTA will coordinate the construction of the Proposed Project and other planned projects in the vicinity to ensure that there are no interruptions or significant impact to MBTA commuter rail or Amtrak service and to avoid disruption to each construction program. • Construction of the Proposed Project would be coordinated with DCR to minimize effects to construction or safe operations of the South Bank Park. • Measures required by code and best management practices would be employed to minimize or avoid any potential adverse effects related to air quality and noise and vibration during construction periods.

Source: STV Incorporated, 2024.

7. Environmental Justice

7.1. Methodology and Study Area

The most recent federal guidance on environmental justice, Executive Order 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023),[40] defines "environmental justice" as:

> *the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people:*
>
> > *(i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and*
> >
> > *(ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.*

Both Executive Order 14096 and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), require specific and meaningful engagement with members of environmental justice communities as part of the environmental review process. CEQ has developed guidance to assist federal agencies with NEPA procedures so that environmental justice concerns are effectively identified and addressed (*Environmental Justice Guidance under the National Environmental Policy Act* [December 1997]). Federal agencies are permitted to supplement this guidance with more specific procedures tailored to their particular programs or activities, as USDOT has done.[41]

MBTA has also considered the defined environmental justice principles and populations outlined in the Massachusetts Environmental Policy Act's (MEPA) Public Involvement Protocol for Environmental Justice Populations,[42] which was developed pursuant to the requirements in former Massachusetts Governor Charlie Baker's *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*[43] and the resulting *Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs*.[44] As described further in Appendix K, "Environmental Justice," the Massachusetts guidance for defining

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[40] https://www.whitehouse.gov/briefing-room/presidential-actions/2023/04/21/executive-order-on-revitalizing-our-nations-commitment-to-environmental-justice-for-all/

[41] FTA guidance includes FTA Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients* (August 15, 2012), and FTA Circular 4702.1B, *Title VI Requirements and Guidelines for Federal Transit Administration Recipients* (October 1, 2012).

[42] https://www.mass.gov/doc/final-mepa-public-involvement-protocol-for-environmental-justice-populations-effective-date-of-january-1-2022/download

[43] https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8

[44] https://www.mass.gov/doc/environmental-justice-policy6242021-update/download

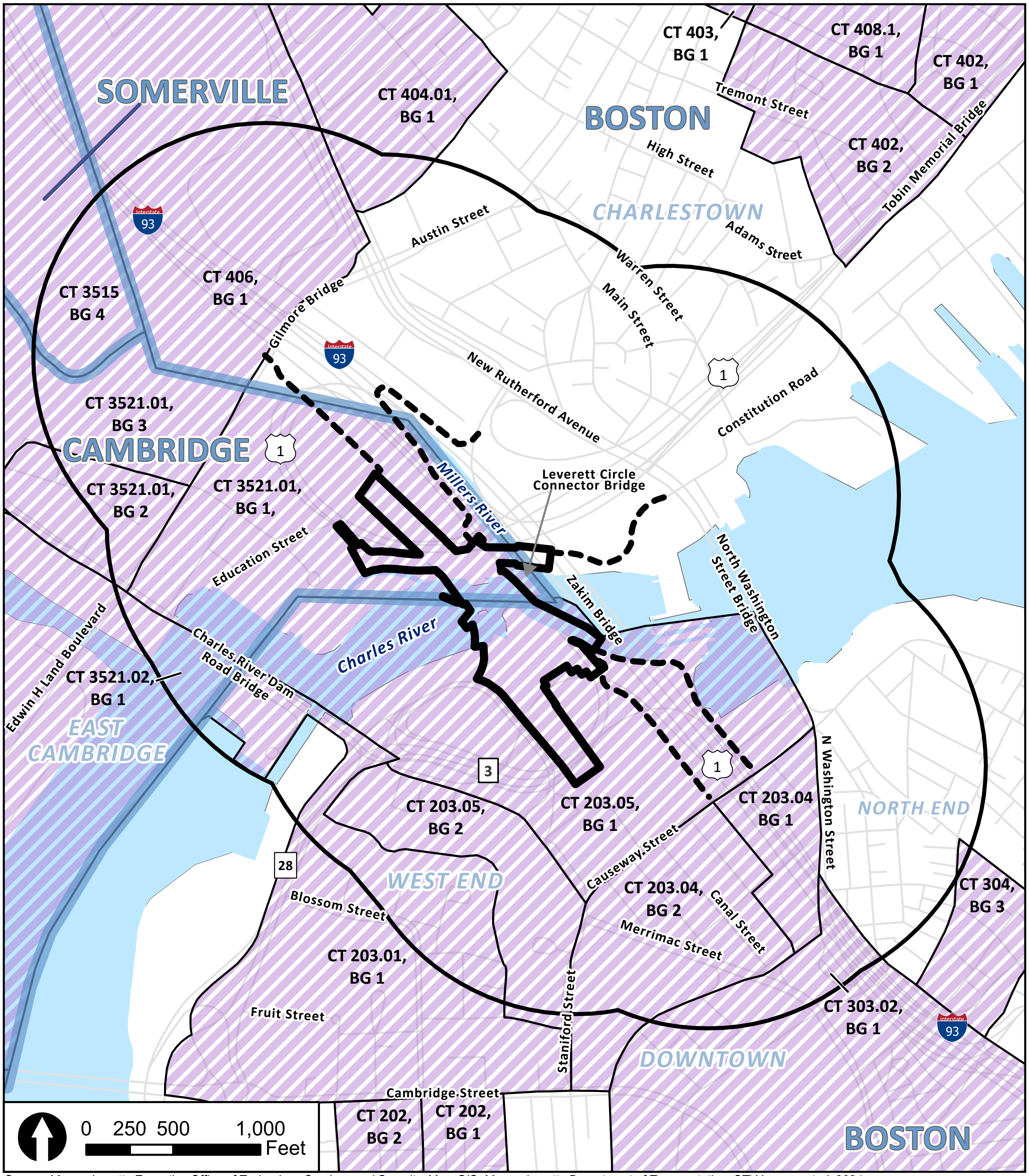
environmental justice communities differs slightly from the Federal definition; because the State guidance is both more stringent and provides a broader definition, it requires consideration of potential impacts to a larger segment of the population.

Consistent with both Federal and State guidance documents, this analysis involved four basic steps:

1. Identify the area where the Proposed Project may cause adverse impacts (i.e., the study area);
2. Compile race and ethnicity and income data for the Census block groups in the study area and identify minority and low-income populations;
3. Identify the Proposed Project's potential adverse impacts on minority and low-income populations; and
4. Evaluate the Proposed Project's potential adverse effects on minority and low-income populations relative to its effects on non-minority and non-low-income populations to determine whether it would result in any disproportionately high and adverse effects on minority or low-income populations.[45]

The study area for environmental justice encompasses the area that could be affected by the Proposed Project and considers the area where potential impacts resulting from construction and operation of the Proposed Project could occur (see Appendix K, "Environmental Justice"). The study area for environmental justice follows the quarter-mile study area used for the analyses of land use and socioeconomic conditions (see Figure 15, "Environmental Justice Populations").

[45] Figure 15, "Environmental Justice Populations," was developed using the Massachusetts Bureau of Geographic Information (MassGIS) EJ Maps Viewer.



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

- Project Limits
- Construction Access
- 1/4-Mile Study Area
- Municipal Boundaries
- Environmental Justice Population

Figure 15

Environmental Justice Populations

7.2. Environmental Justice Communities

In accordance with Massachusetts guidance, an environmental justice population is defined as a Census block group that includes one or more of the following demographic characteristics:

- **Income:** The annual median household income is not more than 65 percent of the statewide annual median household income;
- **Minority:** Minorities (i.e., individuals who identify themselves as Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white) comprise 40 percent or more of the population;
- **Minority and Income:** Minorities comprise 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income; or
- **English Language Isolation:** 25 percent or more of households lack English language proficiency.

Additionally, the Massachusetts Executive Office of Energy and Environmental Affairs can designate a geographic portion of a neighborhood as an EJ population.

The Project Limits touch both the City of Cambridge and the City of Boston and are located entirely in an area that can be considered an environmental justice community based on State guidance. All block groups in the portion of the study area within the City of Cambridge are considered environmental justice communities, as well as a number of those within the City of Boston, specifically those extending southeast of the Project Limits into Downtown Boston. EPA's environmental justice mapping and screening tool, EJScreen, also identifies potential environmental justice communities along the eastern edge of the study area. Therefore, any adverse effects from the construction or operation of the Proposed Project would occur in an environmental justice community.

7.3. Identification of Disproportionate Adverse Effects

As defined in FTA's guidance, based on the USDOT Order, a disproportionate adverse effect on an environmental justice population is an adverse effect that is predominantly borne by a minority and/or low-income population, or will be appreciably greater for the minority and/or low-income population than for the non-minority and/or non-low-income population. Effects that may occur as a result of a proposed action may be considered in the context of associated mitigation measures and offsetting benefits when determining whether disproportionate adverse effects may be likely to occur.

The Proposed Project would not disproportionately impact EJ communities. The Proposed Project would replace an existing bridge on an existing rail corridor and would represent an overall benefit to the entire community. It is important to the region's continued economic prosperity. The improved safety and reliability of the Draw One Bridge would benefit environmental justice communities, which comprise a substantial portion of the local community. The long-term benefits of the Proposed Project would accrue not only to the local environmental justice communities working, living near, or commuting to/from North Station, but also to environmental justice communities throughout the region that depend on the regional rail accessibility provided by the Draw One Bridge and the regional economic benefits accruing from its continued usage.

7.4. Public Participation

The importance and value of early and meaningful public participation are clearly recognized in CEQ regulations.[46] MBTA is committed to fostering equitable engagement with EJ populations – communities often underrepresented in decision-making processes – including low-income residents, communities of color, and individuals with LEP. This aligns with both Federal and MEPA requirements, the Title VI Civil Rights Act, and MBTA's broader goals for accessibility, transparency, and inclusion through MBTA's 2023 Public Engagement Plan.[47]

The most common types of public engagement that MBTA uses are in-person and virtual public meetings, including public hearings as well as community meetings, open houses and breakout sessions, stakeholder meetings, station pop-ups, virtual community drop-in sessions, and one-on-one interactions. MBTA also deploys street outreach teams, intercept and periodic surveys, and interviews or question-and-answer sessions at stations or bus stops. While MBTA is committed to in-person public engagement, virtual public engagement methods have been proven to make participation more accessible and convenient for the public and continue to be a key public engagement strategy at MBTA. Refer to Appendix A, "Public Outreach and Agency Coordination," and Appendix K, "Environmental Justice," for additional information.

8. Section 4(f)

8.1. Section 4(f) Protections and Definitions

Pursuant to Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 (23 USC §138 and 49 USC §303), USDOT agencies may not approve transportation projects that require use of: 1) publicly owned parks and recreational areas of national, state, or local significance; 2) publicly owned wildlife and waterfowl refuges of national, state, or local significance; or 3) historic sites of national, state, or local significance regardless of ownership such resources unless a determination is made that there is no feasible and prudent alternative and that all possible planning has been done to minimize harm to Section 4(f) land(s) resulting from such use, or that the use of the property, taking into account avoidance, minimization and mitigation measures, will have a *de minimis* impact.

8.2. Section 4(f) Resources

This section summarizes the Section 4(f) impact assessment and identifies potential impacts of the Proposed Project on parklands and public recreation areas and historic resources within the direct footprint of the work area, as presented in Appendix J, "Section 4(f)."

8.2.1. Parklands and Public Recreation Areas

There are nine publicly owned parks and recreational areas – each of which is considered a Section 4(f) resource – in the immediate vicinity of the Project Limits, including Galvin Memorial Park, the Lynch Family Skatepark, Paul Revere Park, North Point Park, and the North Bank Bridge to the north of the Charles River, as well as Nashua Street Park, the Gridley Locks Footpath, the proposed-but-not-yet-constructed South Bank Park, and a pier and riverfront walkway on the southern bank of the Charles River. The

[46] https://www.energy.gov/nepa/articles/environmental-justice-guidance-under-nepa-ceq-1997
[47] https://cdn.mbta.com/sites/default/files/2023-06/2023-06-Public-Engagement-Plan-English.pdf

Proposed Project would not affect Galvin Memorial Park, the Lynch Family Skatepark, Nashua Street Park, or the Gridley Locks Footpath.

Consistent with the requirements of 23 CFR 774.5(b)(2)(i), FTA is using the public comment period associated with the review of this EA to seek comments from the public on its intent to make a *de minimis* determination for the minor Section 4(f) use of the following publicly-owned public parks under the jurisdiction of DCR: Gridley Locks Footpath and Parcel (Proposed South Bank Park), Vacant Parcel (Proposed South Bank Park), North Bank Bridge, Pier and Riverfront Walkway, Paul Revere Park, and North Point Park. The details of the proposed minor Section 4(f) use of these properties are discussed in Appendix J, "Section 4(f)."

After considering any comments received from the public, FTA will request concurrence from DCR to concur in writing that the Proposed Project will not adversely affect the recreational activities, features, or attributes that qualified the properties for Section 4(f) protection.

8.2.2. Historic and Archaeological Resources

The Proposed Project comprises the replacement of the existing NRHP-eligible Draw One Bridge spans and Signal Tower A and would result in the demolition of both of these historic resources. As such, the Proposed Project would result in an adverse effect to historic properties under Section 106. However, consistent with 23 CFR 774.13(a)(2), both of these properties are excepted from Section 4(f) consideration as 4(f) resources because the Proposed Project comprises the replacement of line elements for existing railroad and commuter rail system operations.

8.3. Ongoing Coordination

Coordination with DCR is ongoing for their review and comment on the Proposed Project's use of Section 4(f) parks and recreational resources. Measures to minimize harm and mitigation measures for potential impacts will be set forth in an agreement between DCR and MBTA. These measures may include signed detours for pedestrians and bicyclists posted for each walking/biking path affected during construction activities. Regrading; seeding; planting trees, shrubs, and other permanent plantings; and/or general landscaping are also possibilities for areas disturbed by construction.

9. Federal, State, and Local Permits and Approvals

The Proposed Project is subject to federal and state permits and approvals, as identified in Table 9, "Permits and Approvals Required for the Proposed Project." Though exempt from local permitting and approvals, MBTA would comply with local noise regulations to the extent practicable. The Proposed Project qualifies for the Massachusetts Footprint Bridge Exemption (Chapter 79, Section 24 of the Acts of 2014) given that the project comprises the replacement of existing bridge spans that are substantially the functional equivalent of the original rail bridge structures.[48] Further, the Proposed Project would maintain a similar track alignment to existing conditions. As such, the Proposed Project would be exempt from

[48] https://malegislature.gov/Laws/SessionLaws/Acts/2014/Chapter79

Chapter 91 authorization. The Proposed Project would also be exempt from the Massachusetts Wetlands Protection Act (WPA) and the Massachusetts Environmental Policy Act (MEPA).

Table 9: Permits and Approvals Required for the Proposed Project

Law/Regulation	Agency	Activity
Federal		
Section 4(f) of the United States Department of Transportation Act (49 USC §303) and implementing regulations (23 CFR Part 774)	Federal Transit Administration (FTA)	Evaluation of Section 4(f) property use
33 CFR Part 114 and 115	U.S. Coast Guard (USCG)	Bridge permit
National Historic Preservation Act (54 USC §306101 et seq.) and implementing regulations (36 CFR Part 800)	Advisory Council on Historic Preservation; Massachusetts Historical Commission; Consulting Parties	Section 106 consultation regarding effects on historic resources
Endangered Species Act (ESA) of 1973 (16 USC §1531-1544) and implementing regulations (50 CFR Part 402)	U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA)	Section 7 coordination/ consultation regarding presence of federally threatened and endangered species
Migratory Bird Treaty Act (16 USC §703-712)	U.S. Fish and Wildlife Service (USFWS)	Review and consultation regarding migratory birds
Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 USC §1801 et seq) and implementing regulations (50 CFR 600)	National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NOAA Fisheries)	Review and consultation regarding Essential Fish Habitat (EFH)
Marine Mammal Protection Act (MMPA) (16 USC §1361 et seq) and implementing regulations 50 CFR Part 18	National Marine Fisheries Service (NOAA Fisheries)	Review and consultation regarding marine mammals
Section 404 of the Clean Water Act (CWA) (33 USC 1344); Section 10 of the Rivers and Harbors Act (33 USC 403)	U.S. Army Corps of Engineers (USACE)	Section 404 permit for placement of dredged or fill material into waters of the United States; Section 10 permit for construction of any structure in or over any navigable waters of the United States
Section 402 of the Clean Water Act (CWA) (33 USC 1342)	U.S. Environmental Protection Agency (EPA)	National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities and Point Source Discharge Individual Outfall Permit

Table 9: Permits and Approvals Required for the Proposed Project (cont.)

Law/Regulation	Agency	Activity
State		
302 CMR 11.08	Massachusetts Department of Conservation and Recreation (DCR)	Construction Access Permit
Section 8(m) of Chapter 372 of the Acts of 1984	Massachusetts Water Resources Authority (MWRA)	Section 8(m) Permit
Section 401 of the Clean Water Act (CWA) (33 USC 1341)	Massachusetts Department of Environmental Protection (MassDEP)	Water Quality Certification
Massachusetts Endangered Species Act (MESA) 321 CMR 10.00	Massachusetts Division of Fisheries & Wildlife; Natural Heritage and Endangered Species Program (NHESP)	Consultation regarding presence of state rare, threatened, and endangered species
Coastal Zone Management Act (CZMA) (16 USC 1451 et seq) and implementing regulations (15 Part 923)	Massachusetts Office of Coastal Zone Management (CZM)	Determination of consistency with the State CZM coastal program

Source: TRC Companies, Inc, 2024; STV Incorporated, 2024.

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10.2. MBTA

Karl Eckstrom, PE, Senior Director – Bridge/Structures Program

Tess Paganelli, Director of Environmental Review and Permitting

Jeremy Fontaine, MA, ENV SP, Environmental Compliance Officer

10.3. Consultants

10.3.1. STV

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Linda McIntyre, AICP, Environmental Analyses and Quality Control – Master of Urban Planning (M.U.P), Land Use and Environmental Planning, and Juris Doctorate (J.D.). More than 15 years of experience in transportation and infrastructure, as well as technical writing.

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Stacy Schimmoeller, NEPA Coordination and Review – Bachelor of Science (B.S.), Biology, Restoration Ecology. More than 18 years of technical and project management experience in environmental impact analyses, NEPA project development, management, and construction inspection, biology, and waterway permitting.

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Adair Gregory, Communications Lead – Bachelor of Science, Bachelor of Arts (B.S.B.A), Business. Two years of experience on public sector transportation projects, specifically in building grassroots support for public infrastructure projects.

10.3.4. MHHM

Scott Noel, AICP, INCE, Noise and Vibration Lead – Bachelor of Arts, Environmental Planning and Geography. Over 24 years of technical, project management, and task management experience on noise and vibration studies for major infrastructure projects in support of NEPA permitting efforts.

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Appendix A
Public Outreach and Agency Coordination

Contents:

Stakeholder Engagement Plan

Draw One Bridge Replacement Project
MBTA Contract No. H32PS01

STAKEHOLDER ENGAGEMENT PLAN
November 2024

Prepared by:

City Point Partners
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TABLE OF CONTENTS

1. INTRODUCTION

The term "stakeholder" refers to potentially impacted entities, including members of the public who may participate in some part of the NEPA process.[1] The Advisory Council on Historic Preservation (ACHP) advises Federal agencies to coordinate compliance with Section 106 of the National Historic Preservation Act (NHPA) and the procedures in the regulations implementing Section 106, "Protection of Historic Properties" (36 C.F.R. Part 800), with steps taken to meet the requirements of the NEPA. Under NHPA stakeholders are identified parties that have consultative roles in the Section 106 process, including SHPOs, THPOs; Indian tribes[2]; Native Hawaiian organizations; representatives of local governments; applicants for Federal assistance, permits, licenses, and other approvals; the ACHP; and other individuals and organizations with a demonstrated interest in the undertaking or affected historic properties. During each phase of the project, outreach activities will be scheduled and structured to reflect its demographic and commercial diversity, and to facilitate open communication, problem resolution, and consensus building.[3]

This Stakeholder Plan is designed to engage stakeholders and address the concerns of:

Date	Group	Style of Meeting
2025	Group A: Potential partners most impacted by the Draw One Bridge Project	Working Group
2025	Group 4F/106: Organizations identified for Section 4F/Section 106	Working Group
Ongoing	Group B: City departments of Boston, Cambridge, Somerville	Working Group
Ongoing	Group C: Elected officials of Boston, Cambridge, and Somerville, as well as identified Community Groups	Leg Brief/Town Hall
2025 / 2026	Public Meetings	Focus on Section 106 & 4(f)

[1] https://ceq.doe.gov/docs/ceq-publications/NEPA_NHPA_Section_106_Handbook_Mar2013.pdf#xml=https://ceq.doe.gov/dtSearch/dtisapi6.dll?cmd=getpdfhits&u=425d9c&DocId=20&Index=%2a%7baa6ef58232bb83cd704a3f43820d33a0%7d%20CEQ&HitCount=8&hits=15ca+1937+1ec3+2dfe+3701+4a1f+4cab+5327+&SearchForm=%2fCEQSearch%5fform%2ehtml&.pdf
[2] FTA consultation status TBD; see Public Outreach Plan
[3] 36 CFR § 800.2 Participants in the Section 106 process - Code of Federal Regulations (ecfr.io)

2. GROUP A - DIRECTLY IMPACTED

The following partners could be directly impacted by the Draw One Bridge Replacement Project. The project began outreach to Group A partners in May 2024. An introduction email was sent in the beginning of May introducing the project and the project team and a follow-up series of meetings were established so that the project could form working partnerships with the organizations. City Point Partners, on behalf of, and at the direction of MBTA and Draw One project Team, coordinated individual stakeholder meetings with the Group A partners. City Point included project team members from necessary organizations and MBTA, including MBTA Real Estate. FTA were invited to individual meetings as a partner of the project.

Amtrak
Northern New England Passenger Rail Authority (NNEPRA)
75 West Commercial Street, Suite 104
Portland, ME 04101
207-780-1000 x106

The Downeaster stops in Boston at North Station, home of MBTA Commuter Rail and TD Garden. The train concourse and boarding area is open daily from 5:00 am to 12:00 am with access to an Amtrak self-service ticketing kiosk, public restroom, and various retail businesses. Ticket Agents are available approximately 1 hour before departures.

Boston Duck Tours
4 Copley Place, Suite 4155
Boston, Massachusetts 02116
617.267.DUCK (3825)

The Boston Duck Tours mission is to operate a safe and unique sightseeing tour that is perceived by the leaders, citizens, and guests of Boston to be of historical and educational value, a positive asset to the community, and fun.

Boston Duck Tours depart in front of the Museum of Science next to the life-size T.Rex, located in front of the Museum of Science at 1 Science Park, Boston MA 02114, and enter the Charles River adjacent to the project site.

Boston Sand & Gravel
PO Box 9187
100 N. Washington Street
Boston, MA 02114
617.227.9000

David Kelley, Director of Operations
dkelley@bostonsand.com
617-721-6072

Boston Sand & Gravel provides ready-mix products to both residential and commercial customers throughout the city of Boston.

Charles River Boat Company
617-621-3001
Since its creation in 1990, the Charles River Boat Company has offered guests the chance to experience the sights of Boston from the best vantage point in the city, while highlighting Boston's rich maritime history. We are the only company offering cruises on the historic Charles River with views of both Boston and Cambridge.

A family-run business, the Charles River Boat Company was founded with the ideals of providing a comfortable environment, genuine guides, and an alternative approach to exploring the great city of Boston – for locals and visitors alike. Starting with just one boat, the Charles River Boat Company has grown to a fleet of 5 vessels carrying over 60,000 passengers per year!

Department of Conservation and Recreation – see also Group 4F/106
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District 6 of the Highway Division covers the following cities and towns:

Boston	Braintree	Brookline	Cambridge	Canton
Chelsea	Dedham	Dover	Milton	Needham
Newton	Quincy	Randolph	Watertown	Wellesley
Weston	Westwood	Weymouth	Winthrop	

Mass General Hospital-Center for Global Health

Executive Director: Louise C. Ivers, MD, MPH, DTM&H
125 Nashua Street, Suite 722
Boston, MA 02114
617-726-2000

Driven by the belief that everyone, everywhere has a right to good health, we partner with diverse communities to exchange life-saving ideas, catalyze scientific discoveries, deliver compassionate care, and train the next generation of leaders in global health.

Mass State Police Marine
200 Beverly St, Boston, MA 02114
(617) 740-7820

The State Police Marine Unit's mission includes enforcement of state laws and marine regulations in ports, waterways, and coastal areas. Additionally, they provide safety and security zone enforcement, security for critical infrastructure and key resource sites, search and rescue services, ancillary support of other units, and vessel escort security.

The Marine Unit enforces laws on all inland bodies of water and upon coastal waters out to 3 nautical miles from shore. The unit also assists with the State Police's Underwater Recovery Unit as well as State Police Detective Units in death investigations and evidence recovery.

With regard to coastal security, the Marine Unit provides first responder services and is the primary law enforcement agency for all Department of Conservation (DCR) waterways, including both the Charles and Mystic Rivers. The Marine Unit has jurisdiction over 29 of the 31 Boston Harbor Islands and has primary responsibility to enforce the Logan Airport Seaward Security Zone.

3. GROUP 4F/106

The following partners have been identified as needing to be engaged with to satisfy 4F and Section 106 requirements. FTA will coordinate 4F and Section 106 meetings and the project team will support, as necessary. These meetings are currently ongoing.

Boston City Cruises (formerly Boston Harbor Tours)

Boston Harbor Cruises, (BHC) is the nation's oldest and largest private operator of passenger vessels. BHC's current service offerings include Whale Watches in partnership with the New England Aquarium, the Cape Cod Fast Ferry, a variety of sightseeing tours, the Salem Ferry, private charters, Codzilla - a high speed thrill ride, two pier side patio bars -The Landing at Long Wharf and The Landing at the Salem Ferry, commuter ferry service for MBTA and more.

Boston Esplanade Association
Jen Mergel –Executive Director
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The Esplanade Association is a 22-year-old non-profit dedicated to revitalizing, enhancing, programming, and maintaining the historic Charles River Esplanade in downtown Boston. The Esplanade is a 64-acre park revered for its natural & cultivated beauty, riverfront access, miles of populated running trails, and thoughtful programming. In the last few years, the Esplanade Association completed planning studies in pathway safety, tree succession, invasives management, and interpretive services while partnering to launch a new beer garden, producing dozens of high-quality events, and much more.

The Esplanade Association was formed in 2001 because the park had fallen into a state of decline, and local community members recognized the need for a park friends group that could help to restore and enhance the Esplanade.

Since our founding EA has been the catalyst for over $28 million in park improvements. This work has been accomplished in collaboration with the Department of Conservation and Recreation.

Boston Landmarks Commission
Joseph Cornish – Director of Design Review
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Within the Office of Historic Preservation, the Landmarks Commission (BLC) and historic district commissions recognize, preserve, and protect Boston culture and history. Local volunteers serve as commissioners. All commissioners are nominated by neighborhood groups and professional organizations. They are appointed by the Mayor and confirmed by City Council. BLC staff support each commissions' work. Find specifics about commissioner appointments in the Landmarks Commission's enabling legislation, and in each study report.

The Office of Historic Preservation (OHP) also includes the City Archaeology Program and the Commemoration Commission. OHP is part of the Environment, Energy, and Open Space Cabinet. Learn about how Landmarks works to protect Boston's historic resources while promoting the environmental benefits of our existing historic buildings and open spaces.

Boston Preservation Alliance
Alison Frazee – Executive Director
afrazee@bostonpreservation.org

The Boston Preservation Alliance is an independent, nonprofit organization that brings people and organizations together to influence the future of Boston's historic buildings, landscapes, and communities. We envision Boston as a continually vibrant, world-class city that respects, protects, and celebrates its historic resources. Through advocacy and education, we guide thoughtful change that simultaneously stewards the historic character that defines our city.

Cambridge Historical Commission
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The Cambridge Historical Commission (CHC) is the city's historic preservation agency. Established in 1963, the CHC seeks to preserve the integrity and diversity of Cambridge's built environment and to disseminate information about its history. The CHC protects designated properties throughout the city; preserves the integrity of Cambridge's many significant buildings through the administration of CPA-funded preservation grants; and honors local projects with Preservation Awards. The CHC advises private and commercial owners, institutions, and public agencies on historic preservation issues, and participates in reviews of state and federal projects that impact historic resources.

Charles River Boat Company- See Also Group A

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ljasinski@thecharles.org
crc@thecharles.org

Established in 2000, the Charles River Conservancy (CRC) is a 501(c)(3) nonprofit organization. The CRC works in partnership with the Massachusetts Department of Conservation and Recreation (MassDCR), the managing agency of the parks and parkways, as well as the Massachusetts Department of Transportation (MassDOT), the managing agency of the historic bridges that traverse the Charles. The group strives to make the Charles River and its parks a well-maintained network of natural urban places that invite and engage all in their use and stewardship.

East Coast Greenway
Emily Paskewicz-Northern New England Manager
978-414-5433
Emily@greenway.org

David Read-Massachusetts Committee Chair
617-257-7323
Dave@Readfamilyhome.com

The East Coast Greenway connects 15 states and 450 cities and towns for 3,000 miles from Maine to Florida. We are fostering a safe walking and biking route through the country's most populated corridor. The East Coast Greenway in Massachusetts passes through a mix of landscapes, from downtown Boston to coastal communities, rural farmland, and mill villages. Many trails are being constructed in the North Shore region, including the Border to Boston Trail and the Northern Strand Community Trail.

Massachusetts Department of Conservation & Recreation – See also Group A
Office of Cultural Resources
Mr. Andy Backman – Director of Regional Planning
Andy.backman@state.ma.us

Mashpee Wampanoag Tribe
Mr. David Weeden – Tribal Council Chairman
David.weeden@mwtribe-nsn.gov

The Mashpee Wampanoag Tribe, also known as the People of the First Light, has inhabited present day Massachusetts and Eastern Rhode Island for more than 12,000 years. After an arduous process lasting more than three decades, the Mashpee Wampanoag were re-acknowledged as a federally recognized tribe in 2007. In 2015, the federal government declared 150 acres of land in Mashpee and 170 acres of land in Taunton as the Tribe's initial reservation, on which the Tribe can exercise its full tribal sovereignty rights. The Mashpee tribe currently has approximately 3,200 enrolled citizens.

Massachusetts Board of Underwater Archaeological Resources (BUAR)
Charles M. Sullivan – Executive Director
David.s.robinson@mass.gov

The Massachusetts Board of Underwater Archaeological Resources (BUAR) is the sole trustee of the Commonwealth's underwater cultural heritage and is charged with encouraging the discovery, reporting, interpretation, and protection of these resources. While underwater archaeological resources are commonly shipwrecks (there are more than 3,500 shipwrecks within Massachusetts waters), they also include submerged Native American sites, wharves, and aircraft.

Massachusetts Historical Commission
Ms. Brona Simon – SHPO and Executive Director
Brona.Simon@state.ma.us
mhc@sec.state.ma.us

The continuing presence of historic properties in Massachusetts immeasurably enhances the quality of our lives; they help to establish our sense of place and to define the very character of our communities. To meet the challenge of preserving this important heritage, the Massachusetts Historical Commission (MHC) was established by the legislature in 1963* to identify, evaluate, and protect important historical and archaeological assets of the Commonwealth.

The Commission consists of 17 members appointed from various disciplines who serve as the State Review Board for state and federal preservation programs. The Commission is Chaired by Secretary of the Commonwealth William Francis Galvin.

The professional staff of the Commission includes historians, architects, archaeologists, geographers, and preservation planners. The state's preservation programs are administered through MHC's Preservation Planning, Grants, and Technical Services Divisions. The MHC is the office of the State Historic Preservation Officer, as well as the office of the State Archaeologist.

Narragansett Indian Tribe
John Brown – Tribal Historic Preservation Officer
tashtesook@aol.com
ssmith@nitribe.org

The Narragansett Indians are descendants of the aboriginal people of the State of Rhode Island. Archaeological evidence and oral history of the Narragansett People establish their existence in the region more than 30,000 years ago.

Stockbridge-Munsee Tribe
Jeff Bendremer – Tribal Historical Preservation Officer
thpo@mohican-nsn.gov
preservation@mohican-nsn.gov

This office has the honor of protecting Mohican and Munsee cultural sites and burial places from disturbance. It also works to repatriate cultural items to the community and to return ancestors held by museums or other institutions for respectful reburial.

It carries this out primarily through participating in Government-to-Government consultation under two federal laws pertaining to cultural resources: Section 106 of the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act.

The Historic Preservation program fields an average of 800 such federal, state and local project reviews annually across its service area spanning six states where the Tribe has ancestral territories.

Wampanoag Tribe of Gay Head (Aquinnah)
Bettina Washington – Tribal Historic Officer
thpo@wampanoagtribe-nsn.gov

Maintaining and protecting tribal cultural resources is a top priority of the Wampanoag Tribe of Gay Head (Aquinnah). Sadly, the desecration of Native American burial and other sacred or historic sites has been a common occurrence across the nation, not to mention on Wampanoag ancestral lands. State and Federal laws exist to ensure the return/reburial of funerary objects and human remains and in the identification and protection of undisturbed Native American burial, sacred and historical sites.

The Tribe is currently in the process of developing a Cultural Resource Protection Program that will incorporate the Tribe's responsibilities under the National Historic Preservation Act (NHPA), the Archaeological Resource Protection Act (ARPA) and the Native American Graves Protection and Repatriation Act (NAGPRA).

4. GROUP B –MUNICIPAL DEPARTMENTS

In addition to engagement with Groups A and 4F/106, the project will continue to build on its relationships with the impacted departments of the Cities of Boston, Cambridge, and Somerville.[4] This engagement should not necessarily involve elected officials, other than a courtesy notification. An initial introduction email should be sent followed by necessary partnership meetings to discuss the concerns that the Cities may have with the project. These City meetings should be held independently of one other.

City Point Partners, on behalf of, and at the direction of MBTA and Draw One Project Team, will coordinate individual stakeholder meetings with the Group B potential partners. City Point will include project team members from necessary organizations and MBTA. FTA should be invited to attend meetings as a partner to the project.

City of Boston

Community Engagement
Brianna Millor-Director
617-635-3485
community.engagement@Boston.gov

Our cabinet leads the City of Boston's work towards eliminating silos between Boston residents and City Hall. Our goal is to better connect neighborhood services, community engagement, and policy making. We want to improve how Boston includes community voices in its work. We plan to create a new model for prioritizing constituents and neighborhood services in government affairs.

Planning & Development Agency
617-722-4300
BPDAmarketing@boston.gov

The Boston Planning & Development Agency plans and guides inclusive growth in our City — creating opportunities for everyone to live, work and connect.

Public Works
617-635-4900
311@Boston.gov

Our department provides core basic services essential to neighborhood quality of life. We direct the general construction, maintenance, and cleaning of approximately 802 miles of roadways throughout the City.

[4] The project team will comply with all necessary Conservation Commission regulations.

Tourism, Sports, and Entertainment
John Borders IV
617-635-3911
Tourrism@Boston.gov

Our mission is to advance tourism in Boston and promote participation in public celebrations from Boston residents and visitors to our City.

City of Cambridge

Community Development
344 Broadway Street, Cambridge
617-349-4600

The Community Development Department (CDD) guides planning and future growth in a manner that best supports the overall health, sustainability, and diversity of the city.

Public Works
147 Hampshire Street, Cambridge
617-349-4800

The Cambridge Department of Public Works (DPW), provides dependable, high quality service maintaining, improving and expanding a safe, healthy, attractive, and inviting physical environment.

City of Somerville

Communications and Community Engagement
Denise Taylor, Director of Communications and Community Engagement
617-625-6600
media@somervillema.gov

Communications & Community Engagement encompasses City Cable operations, community and immigrant outreach, constituent services, and media relations. We strive to use a broad and innovative range of channels and initiatives to provide the greatest possible number of community members with information on emergencies, services, programs, public meetings, initiatives and events.

Public Works
Jill Lathan-DPW Commissioner
617-666-3311
dpw@somervillema.gov

The Department of Public Works (DPW) maintains the City's infrastructure and guarantees a clean and safe environment for all. DPW administers and oversees the City's lights and electrical lines, streets and public ways, city-wide vehicle fleet including Police, DPW and all City departments, refuse removal, environmental improvement programs, public buildings and grounds, parks and playgrounds, snow removal, open spaces, and school custodial services. The DPW Administration team oversees all personnel and financial matters related to the department.

Office of Strategic Planning and Community Development (OSPCD) -Planning, Preservation, and Zoning Division
Sarah Lewis-Director of Planning, Preservation, and Zoning
617-625-6600
planning@somervillema.gov

The Planning, Preservation, and Zoning (PPZ) Division develops recommendations that allow us to best utilize our available land resources in meeting the needs of our residents and businesses. We seek to develop more and better community-focused spaces while preserving the character of Somerville and incorporating the vision residents have for their neighborhoods. PPZ pursues these goals by administering and implementing the SomerVision comprehensive plan; which addresses the City's goals, policies, and actions for the years of 2010 to 2040. SomerVision and our neighborhood planning projects help us understand the needs of residents, while our zoning code aims to keep development aligned with our long-term planning goals.

5. GROUP C – COMMUNITY GROUPS

In addition to meetings with Groups A, 4F, and Group B, Public Outreach will continue at various milestones. The first public meeting took place June 6, 2024. A public hearing is anticipated in January of 2025. The project will continue to engage with the elected officials of Boston, Cambridge, and Somerville, as well as identified Community Groups. The project team may hold a legislative brief to prepare elected officials for any possible constituent questions/concerns.

The project team, on behalf of, and at the direction of MBTA and Draw One project team, will coordinate additional meetings at the direction of MBTA. FTA will be invited to attend all public and stakeholder group meetings as a partner to the project.

Mass Rivers Alliance

Julia Blatt, Executive Director
617-714-4272
juliablatt@massriversalliance.org

Mass Rivers' mission is to protect and restore the Commonwealth's rivers and streams. To be successful in this mission, we prioritize climate resilience and ensure that our river solutions also promote economic and racial justice locally. We believe every community in the state has the right to a clean healthy river, and every river in the state should be free of pollution. We work collaboratively with a mix of partners and strive to build a movement that is inclusive of all backgrounds and demographics and values the diverse perspectives they bring.

Environment Massachusetts

Ben Hellerstein, Mass State Director
617-747-4368
ben@environmentmassachusetts.org

Environment Massachusetts works for clean air, clean water, clean energy, wildlife and open spaces, and a livable climate. Our members across the state put grassroots support behind our research and advocacy.

We envision a greener Massachusetts: one that protects more places where nature can thrive and offers us and our children a greater opportunity to live healthier, more enriching lives. Through our research, public education, advocacy, litigation and action, we advance policies and practices that put our state and our country on a better path.

Charles River Conservancy

Laura Jasinski, Executive Director
617-300-8175
ljasinski@thecharles.org

The Charles River Conservancy lies at the center of the Charles River, its parks, and the park's users. We similarly envision a future in which the Charles River and its parks are celebrated, well-utilized, and connected centers of public life. We strive to make the Charles River and its parks a well-maintained network of natural urban places that invite and engage all in their use and stewardship.

East Coast Greenway (See also Group 4F/106)

Emily Paskewicz-Northern New England Manager
978-414-5433
Emily@greenway.org

The Trustees of Reservations

Kerry Bowie

The centerpiece of the Trustees mission is protecting places of ecological, scenic, and historic importance. We search far and wide to find Massachusetts' most potentially endangered iconic landscapes and precious cultural relics, navigate the complex and long path to bring them under our protection, and allocate land stewardship resources and expertise to maintain their integrity long into the future.

Environmental League of Massachusetts

Linda Orel
617-360-1857
lorel@thetrustees.org

The Environmental League of Massachusetts (ELM) is committed to combating climate change and protecting the commonwealth's land, water, and public health. By creating diverse alliances and building the power of the environmental community, ELM uses its collective influence to ensure Massachusetts is a leader in environmental and economic sustainability.

Boston Harbor Now

Alice Brown, Chief of Planning and Policy
617-223-8104
kabbott@bostonharbornow.org

Our mission is to ensure that Boston Harbor, its waterfront and islands are accessible and inclusive and that these special places are properly adapted to the risks of climate change.
Boston Harbor Now is working to re-establish Boston as one of the world's truly great coastal cities. Everything we do is in partnership with public agencies, communities, and private and non-profit partners.

Charles River Watershed Association

Heather Miller
781-788-0007
hmiller@crwa.org

Environment Massachusetts works for clean air, clean water, clean energy, wildlife and open spaces, and a livable climate. Our members across the state put grassroots support behind our research and advocacy. We envision a greener Massachusetts: one that protects more places where nature can thrive, and offers us and our children a greater opportunity to live healthier, more enriching lives. Through our research, public education, advocacy, litigation, and action, we advance policies and practices that put our state and our country on a better path

6. ENGAGEMENT WITH ENVIRONMENTAL JUSTICE (EJ) POPULATIONS

Public involvement is key to informing MBTA projects and decisions. MBTA's 2023 Public Engagement Plan[13] outlines the following public engagement principles that agency representatives and those working in concert with MBTA on transportation projects and initiatives will strive to achieve:

- **Strong Community Partnerships:** MBTA shall develop collaborative working partnerships with community members, community and advocacy organizations, and municipalities to build trust, avenues for regular communication, and ongoing engagement.
- **Strategic and Continuous Outreach:** Concerted effort must be given to encouraging participation through early, accessible, and ongoing strategic outreach to the public that MBTA serves. This includes using a variety of tools and mechanisms to reach the riders who are most likely to be impacted by proposed changes.
- **Accessibility, Equity, and Inclusion:** All public participation and engagement activities should promote inclusion and equity with specific strategies that encourage participation from diverse members of the community. Every effort should be made to ensure that participation opportunities are physically, geographically, temporally, linguistically, and culturally accessible. Public engagement processes should include, as appropriate to a project or those impacted, a range of socioeconomic, ethnic, environmental, and cultural perspectives and include people with low-incomes, people of color, people with disabilities, people with limited English proficiency, young people and older adults, and other traditionally underserved communities.
- **Respectful and Solution-Oriented Dialogue:** MBTA welcomes the constructive contributions by members of the public and encourages the respect and inclusion of all points of view. When there are conflicting opinions, conversations should be structured to allow for compromise, when possible, while staying solution-focused to respond to community concerns.
- **Transparent Process:** The decision-making processes and level of input for any event or community process should be clear, open, and understandable. Plans and projects must be clearly described, including the potential effect of public input, so that the public understands what is being proposed and how to get involved.

MBTA seeks to engage the public about its policies, planning, and projects. The level of complexity for each project and the impact on the community guide the structure and process of public engagement. Simple projects may require a less extensive engagement process, while some projects may require more outreach over the life of the project. Further, MBTA recognizes that its riders have different time constraints and strives to provide multiple ways to ensure rider voices are heard.

The most common types of public engagement that MBTA uses are in-person and virtual public meetings, including public hearings, as well as community meetings, open houses and breakout sessions, stakeholder meetings, station pop-ups, virtual community drop-in sessions, and one-on-one interactions. MBTA also deploys street outreach teams, intercept and periodic surveys, and interviews or asking questions at stations or bus stops. While MBTA is committed to in-person public engagement, virtual public engagement methods have proven to make participation more accessible and convenient for the public and are a key public engagement strategy at MBTA.

Public Involvement Plan

Draw One Bridge Replacement Project
MBTA Contract No. H32PS01

PUBLIC INVOLVEMENT PLAN
November 2024

Prepared by:

City Point Partners
11 Elkins St.
Suite 470
Boston, MA 02127

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1. INTRODUCTION

The Massachusetts Bay Transportation Authority (MBTA), in cooperation with the Federal Transit Administration (FTA), proposes to replace the Draw One Bridge, the Boston and Maine Railroad (B&MRR) Signal Tower A, and associated MBTA infrastructure as part of the Draw One Bridge Replacement Project (the "Proposed Project"), located in the cities of Cambridge and Boston, Massachusetts. MBTA owns the rail infrastructure and Right-of-Way (ROW) and contracts with Keolis to operate the commuter rail system; Amtrak also uses the bridge and ROW for its *Downeaster* service between North Station and Brunswick, Maine.

Consistent with the requirements of the Massachusetts Environmental Policy Act (MEPA), Title VI of the Civil Rights Act,[1] and both FTA's and MBTA's public outreach guidelines,[2,3] this Public Involvement Plan (PIP) is intended to ensure meaningful public engagement in the decision-making process for this transportation infrastructure project. This PIP outlines the opportunities for community member involvement and input on the Proposed Project, incorporating both general and targeted outreach approaches to diverse stakeholders. Particular emphasis is given to strategies for inclusive public participation, specifically intended to engage people of color, people with disabilities, and low-income populations.

Goals and Objectives

The objectives of this PIP will be to encourage an exchange of ideas and information and address any concerns related to the plan from the potentially affected communities (including environmental justice (EJ) populations). This exchange will include, but will not be limited to, providing an overview of the project benefits to the community and addressing any construction-related concerns such as noise, air quality, etc. MBTA will involve stakeholders in the environmental process through early and open communication.[4] The intent is that this exchange of ideas and information will help to identify and address focused community issues and concerns that arise from Project construction.

In alignment with the requirements of the National Environmental Policy Act (NEPA), MBTA has developed this PIP, which outlines:

- why engaging the public is important;
- the principles for how MBTA will reach out to the public;
- MBTA's goals for responsible and thoughtful outreach;
- the methods and types of community events for the public;

[1] https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Title_VI_FINAL.pdf
[2] https://www.transportation.gov/sites/dot.gov/files/2023-11/Promising%20Practices%20for%20Meaningful%20Public%20Involvement_2023Update_FINAL.pdf
[3] https://cdn.mbta.com/sites/default/files/2023-06/2023-06-Public-Engagement-Plan-English.pdf
[4] https://www7.transportation.gov/transportation-policy/environmental-justice/environmental-justice-strategy

- and MBTA's responsibility to ensure access and accommodation so all may participate.

MBTA will use this PIP to ensure all communities are involved, including communities that have been historically under-represented, including, but not limited to, low-income individuals, people of color, the elderly, people with disabilities, those with limited English proficiency (LEP), Veterans, non-US citizens, and the lesbian, gay, bisexual, transgender, queer and intersex (LGBTQI+) community. The proposed process for engaging these stakeholders, along with host and impacted communities, provides venues for them to express interests and concerns, allowing MBTA to identify and address any new or unexpected local priorities and issues.

Project Overview

The Proposed Project primarily comprises replacement of the existing two bascule bridges with three vertical lift bridges, replacement of the existing Signal Tower A and temporary control tower with a new Tower A, modifications to raise the North Bank Bridge to accommodate the new Draw One Bridge, and provision of six, rather than four, tracks across the Charles River to maintain service during construction and avoid impacts to operations in the case of potential future service disruptions. The purpose of the Proposed Project is to keep this portion of the rail system in a state of good repair and improve the reliability and safety of MBTA commuter rail and Amtrak services.

2. INTERNAL COMMUNICATIONS AND COLLABORATION

The Draw One Bridge is a crucial rail link between Boston and greater New England. Tens of thousands of people use these services every week, travelling for purposes including work, school, recreation, culture, and medical care, mainstays of the regional economy. Safe and reliable rail options make it easier for commuters and other travelers to keep their cars at home and off congested freeways and city streets, limiting greenhouse gas emissions and contributing to better air quality. Working closely with stakeholders will be important to the Proposed Project's success, especially during construction activities.

The goal of this PIP is to identify and address stakeholder interests and concerns, facilitate the promotion of all necessary information in a timely, accurate manner to groups involved in or potentially affected by the Proposed Project, and solicit meaningful stakeholder feedback to be considered in decision-making for the Proposed Project.

Interface with Government Officials and Agencies

All contact with Federal, State, and local elected officials will be coordinated through the MBTA Program Management Team, in association with the Massachusetts Department of Transportation (MassDOT) Government and Public Affairs office. The primary point of contact will be:

Eddie Palladino
MassDOT Deputy Director of Government Affairs
edward.palladino@sao.state.ma

Capital Delivery Stakeholder Engagement

Coordination of communications about public outreach matters will be coordinated through the MBTA Program Management Team, in association with the MBTA Stakeholder Engagement Manager. The primary point of contact will be:

Ashley Armand
MBTA Deputy Director of Capital Coordination
AArmand@MBTA.com

MBTA Customer Service Communications

Coordination of communications about any disruption of Commuter Rail or bus service to commuters will be coordinated through the MBTA Project Management Team in association with the MBTA Customer Communication & Marketing Team. The primary point of contact will be:

Rose Yates
MBTA Assistant General Manager of Customer Communications & Marketing
ryates@MBTA.com

Media Interface

MBTA Public Affairs will handle all media requests during the environmental review for the Proposed Project, as well as throughout the construction period and continuing into the operational phase. The project team will work closely with and support the MBTA Public Affairs and MBTA Press Office by providing information, materials, and other support required to assist with media briefings, announcements, and milestone events, including groundbreaking and press releases. The primary point of contact will be:

Joe Pesaturo
MBTA Director of Communications
jpesaturo@mbta.com

3. FEDERAL AND STATE REQUIREMENTS

NEPA

A focused PIP, including outreach to EJ populations, guided towards communities potentially affected by the Proposed Project, in accordance with the FTA's National Environmental Policy Act NEPA requirements and consideration of MEPA Public Involvement Protocol for Environmental Justice Populations,[5] is a critical component to the Proposed Project's success. NEPA requires that agencies make diligent efforts

[5] https://www.mass.gov/doc/final-mepa-public-involvement-protocol-for-environmental-justice-populations-effective-date-of-january-1-2022/download

to involve the public in preparing and implementing their NEPA procedures and provide public notice of NEPA-related hearings, public meetings, and other opportunities for public involvement.[6]

The Proposed Project is also subject to Section 106 of the National Historic Preservation Act (NHPA) and Section 4(f) of the U.S. Department of Transportation Act, which have requirements related to public involvement. The project team has complied with Section 106 of the National Historic Preservation Act[7] as provided for in 36 CFR § 800.2(d)(3)[8] concurrently with the NEPA process, including the public involvement requirements. Native American tribal consultations have been conducted following U.S. Department of the Interior (DOI) policy, and tribal concerns have been given due consideration, including impacts on Indian trust assets. Scoping has also been conducted in compliance with the U.S. Army Corps of Engineers (USACE) Section 404 requirements.[9] The public involvement requirements of the proposed Section 4(f) *de minimis* impact determination are assumed to be fulfilled through the publication of the NEPA Environmental Assessment (EA) for the Proposed Project.

EJ and LEP Outreach

As described in Appendix K, "Environmental Justice," of the NEPA EA, both Federal and State criteria are considered for EJ populations. FTA's 2012 Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients*, specifies that an EJ analysis begins with determining whether minority and/or low-income populations will experience potential environmental or heath impacts from a proposed project.[10] Additionally, in accordance with guidance developed by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), an environmental justice population is defined as a Census block group that includes one or more of the following demographic characteristics, an EJ population is defined as a Census block group that includes one or more of the following demographic characteristics:[11]

- **Income:** The annual median household income is not more than 65 percent of the statewide annual median household income,
- **Minority:** Minorities (i.e., individuals who identify themselves as Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white) comprise 40 percent or more of the population,
- **English Language Isolation:** 25 percent or more of households lack English language proficiency, or

[6] https://www.energy.gov/nepa/articles/effective-public-participation-doe-1998
[7] http://www.gpo.gov/fdsys/pkg/USCODE-2011-title16/html/USCODE-2011-title16-chap1A-subchapII.htm
[8] https://www.ecfr.gov/current/title-36/chapter-VIII/part-800/subpart-B/section-800.3
[9] https://www.epa.gov/cwa-404/overview-clean-water-act-section-404
[10] https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_EJ_Circular_7.14-12_FINAL.pdf
[11] The Massachusetts Executive Office of Energy and Environmental Affairs can also designate a geographic portion of a Neighborhood as an EJ population.

- **Minority and Income:** Minorities comprise 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income.

This PIP identifies how the project team will document information and create a database of EJ stakeholder interests and concerns to properly advise the project team on decision-making and prioritization processes throughout the design process.

4. STAKEHOLDERS

The term "stakeholder" is used throughout this PIP to refer to potentially affected entities, including members of the public who may participate in some part of the NEPA process.[12] The Advisory Council on Historic Preservation (ACHP) advises Federal agencies to coordinate compliance with Section 106 of the NHPA and the procedures in the regulations implementing Section 106, "Protection of Historic Properties" (36 C.F.R. Part 800), with steps taken to meet the requirements of the NEPA. Under NHPA, stakeholders are identified parties that have consultative roles in the Section 106 process, including State Historic Preservation Officers (SHPOs), Tribal Historic Preservation Officers (THPOs); Indian tribes; Native Hawaiian organizations; representatives of local governments; applicants for Federal assistance, permits, licenses, and other approvals; the ACHP; and other individuals and organizations with a demonstrated interest in the undertaking or affected historic properties. During each phase of the Proposed Project, outreach activities will be scheduled and structured to reflect its demographic and commercial diversity, and to facilitate open communication, problem resolution, and consensus building.[13]

This PIP is designed to engage stakeholders and address the concerns of:

- Elected officials and staff of the affected municipality (Tables 3, 4, 5);
- Indigenous Organizations (Table 6);
- Federal Tribes (Table 7); and
- Other organizations within proximity (Table 8).

5. PUBLIC INVOLVEMENT

Public involvement is key to informing MBTA projects and decisions. MBTA's 2023 Public Engagement Plan[14] outlines the following public engagement principles that agency representatives and those working in concert with MBTA on transportation projects and initiatives will strive to achieve:

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[12] https://ceq.doe.gov/docs/ceq-publications/NEPA_NHPA_Section_106_Handbook_Mar2013.pdf#xml=https://ceq.doe.gov/dtSearch/dtisapi6.dll?cmd=getpdfhits&u=425d9c&DocId=20&Index=%2a%7baa6ef58232bb83cd704a3f43820d33a0%7d%20CEQ&HitCount=8&hits=15ca+1937+1ec3+2dfe+3701+4a1f+4cab+5327+&SearchForm=%2fCEQSearch%5fform%2ehtml&.pdf
[13] 36 CFR § 800.2 Participants in the Section 106 process - Code of Federal Regulations (ecfr.io)
[14] https://cdn.mbta.com/sites/default/files/2023-06/2023-06-Public-Engagement-Plan-English.pdf

- **Strong Community Partnerships:** MBTA shall develop collaborative working partnerships with community members, community and advocacy organizations, and municipalities to build trust, avenues for regular communication, and ongoing engagement.
- **Strategic and Continuous Outreach:** Concerted effort must be given to encouraging participation through early, accessible, and ongoing strategic outreach to the public that MBTA serves. This includes using a variety of tools and mechanisms to reach the riders who are most likely to be impacted by proposed changes.
- **Accessibility, Equity, and Inclusion:** All public participation and engagement activities should promote inclusion and equity with specific strategies that encourage participation from diverse members of the community. Every effort should be made to ensure that participation opportunities are physically, geographically, temporally, linguistically, and culturally accessible. Public engagement processes should include, as appropriate to a project or those impacted, a range of socioeconomic, ethnic, environmental, and cultural perspectives and include people with low-incomes, people of color, people with disabilities, people with limited English proficiency, young people and older adults, and other traditionally underserved communities.
- **Respectful and Solution-Oriented Dialogue:** MBTA welcomes the constructive contributions by members of the public and encourages the respect and inclusion of all points of view. When there are conflicting opinions, conversations should be structured to allow for compromise, when possible, while staying solution-focused to respond to community concerns.
- **Transparent Process:** The decision-making processes and level of input for any event or community process should be clear, open, and understandable. Plans and projects must be clearly described, including the potential effect of public input, so that the public understands what is being proposed and how to get involved.

MBTA seeks to engage the public about its policies, planning, and projects. The level of complexity for each project and the impact on the community guide the structure and process of public engagement. Simple projects may require a less extensive engagement process, while some projects may require more outreach over the life of the project. Further, MBTA recognizes that its riders have different time constraints and strives to provide multiple ways to ensure rider voices are heard.

The most common types of public engagement that MBTA uses are in-person and virtual public meetings, including public hearings, as well as community meetings, open houses and breakout sessions, stakeholder meetings, station pop-ups, virtual community drop-in sessions, and one-on-one interactions. MBTA also deploys street outreach teams, intercept and periodic surveys, and interviews or asking questions at stations or bus stops. While MBTA is committed to in-person public engagement, virtual public engagement methods have proven to make participation more accessible and convenient for the public and are a key public engagement strategy at MBTA.

Inclusive Engagement Strategies

MBTA is committed to fostering equitable engagement with Environmental Justice (EJ) populations—communities often underrepresented in decision-making processes, including low-income residents, communities of color, and individuals with Limited English Proficiency (LEP). This aligns with MEPA requirements, the Title VI Civil Rights Act, and MBTA's broader goals for accessibility, transparency, and inclusion through the Public Engagement Plan.

Guiding Principles for Engagement

MBTA maintains the following guiding principles to facilitate meaningful public engagement:

- **Proactive Communication:** Engage EJ populations early and maintain consistent outreach throughout the project lifecycle.
- **Accessibility:** Ensure all outreach is linguistically, culturally, and geographically accessible, adhering to Title VI and ADA guidelines.
- **Transparency:** Provide clear, timely, and accurate updates about the project and its impacts.
- **Stakeholder-Centered Design:** Collaborate with community organizations, municipalities, and advocacy groups to ensure equitable participation.

Tools and Techniques for Engagement

<u>Consistent Communication</u>
To ensure open and effective lines of communication, MBTA will:

- Disseminate a written summary of basic Project details and regular **design update bulletins** with information about construction schedules, disruptions, and mitigation plans.
- Use an electronic stakeholder database to distribute updates and project alerts. This database will include community organizations, officials, community advocates and individuals from EJ and LEP populations.
- Leverage outreach channels such as email, social media, press releases, and printed materials (e.g., publications in local newspapers like The Boston Globe, The Cambridge Chronicle, The Somerville Journal, and el Planeta) to ensure information reaches diverse audiences.
- Provide press releases and legislative advisories, as warranted, and disseminated through MBTA/MassDOT Press and Legislative departments.

<u>Stakeholder Meetings</u>
MBTA will coordinate meetings with relevant stakeholders as needed. These sessions may include, and aren't limited to:

- Elected officials, community boards, and neighborhood associations.
- Advocacy groups for EJ populations, LEP communities, and ADA representatives.
- Business owners, residents, and civic organizations near the project area.

These meetings will include targeted discussions to identify and address EJ community concerns. To maximize attendance, notifications will be distributed using culturally relevant methods, including multicultural media and flyers posted in high-traffic areas in EJ communities.

Multilingual Outreach

MBTA recognizes language barriers as a significant factor in engagement. To address this:

- All project materials, including flyers, emails, and meeting notices, will be translated into relevant languages such as Spanish, Chinese, Portuguese, Haitian Creole, Amharic, Bangla, and Vietnamese, with additional languages available upon request.
- Public meetings will provide real-time interpretation and translated materials.
- Ethnic media platforms will be utilized to increase awareness within linguistically diverse communities.

Digital and Traditional Outreach

- **Digital Tools:** Utilize project websites, social media platforms (Facebook, Instagram, X), and email newsletters to share updates. Targeted ads will engage specific demographics.
- **Traditional Methods:** Flyers, posters, and printed materials will be distributed in community hubs, libraries, and transit stations to reach residents without internet access. Mailers may be sent to households within a 1000-foot radius of the Proposed Project to improve outreach and encourage engagement.
- **Project Email and Hotline:** Establish a dedicated email address and hotline for inquiries, ensuring public access to timely responses.
- **Other:** Make use of pre-existing groups (e.g., grassroots organizations and community groups) and natural areas of congregation (e.g., places of worship, libraries, and farmer’s markets) to disseminate Project information.

Accessible Public Meetings

Public meetings will be designed to accommodate EJ populations and underserved communities:

- Held in ADA-compliant venues accessible by public transit.
- Scheduled flexibly, including evenings and weekends, to suit diverse schedules.
- Conducted with virtual options featuring closed captioning, sign language interpretation, and real-time language services.

Ongoing Communication and Feedback Mechanisms

- **Community Partnerships:** Collaborate with local groups, such as La Colaborativa, GreenRoots, and Charles River Conservancy, to co-design outreach strategies.
- **Information Sharing:** All public materials will be made available online and in accessible formats, and will be supplied in alternative formats if requested. Meeting minutes, presentations, and feedback summaries will be shared promptly.

- **Feedback Loops:** MBTA will respond to community input through newsletters and regular updates, demonstrating how feedback shapes project decisions.

The importance and value of early and meaningful public participation are clearly recognized in CEQ regulations[15]. Early and meaningful public participation communication with stakeholders, including MBTA and the City of Boston, among others, will consider the needs, concerns, and interests of MBTA's constituency of riders, host communities, and EJ communities within a quarter-mile radius of the Proposed Project that may be impacted (Figure 1).

Direct Engagement

As questions specific to individual neighborhoods arise, meetings can be organized with community boards, elected officials, and neighborhood groups (see Section 11, "Tables") to provide information that may directly affect the public and solicit their input. Interactions with these local groups will provide insights into local history, community-specific concerns, and needs while continuing the involvement with the community. Stakeholders can provide specific comments or concerns to the project through the project website, email, and hotline (if necessary). These comments will be logged into a communications log, which will help track when the communication came in, who the interested and/or responsible parties may be, and the project team's next steps, such as a response email or a stakeholder visit.

The project team will be involved in hosting community events to help foster community engagement. The project team, with direction from MBTA can utilize the types of public engagement, available in English, Chinese, Portuguese, and Spanish, that are most commonly used by MBTA, primarily:

- Public Meetings and/or Recorded Project Overviews,
- Open Houses (as needed),
- Stakeholder meetings,
- One-on-one interactions.

Virtual Engagement

In response to the COVID-19 pandemic, the use of alternative means of communication have proven vital and successful during times of social distancing and public gathering restrictions – this will include the use of Virtual Public Involvement (VPI) when necessary.

The Proposed Project will continue to host virtual and hybrid public involvement opportunities, including working with the community to host viewing and participation opportunities.

The MBTA Zoom platform has been used in previous Virtual Public Meetings. The Zoom platform is a useful tool for organizing and facilitating a virtual public meeting. This platform has many benefits, such as a Question-and-Answer capability that allows attendees to submit questions via text or phone,

[15] https://www.energy.gov/nepa/articles/environmental-justice-guidance-under-nepa-ceq-1997

translation capabilities, closed captions, the ability to record the presentation, which can be later uploaded to the Project webpage, as well as the ability to collect valuable data like the list of attendee contacts which can be added to the Proposed Project's stakeholder database.

VPI allows for additional public engagement through webinars, websites, live streams, mobile applications, online surveys, and social media. The goal of VPI for the Proposed Project is that through virtual avenues public engagement can be more convenient and accessible.

The project team may utilize the following groups to announce and promote Project involvement on their websites and/or social media platforms:

- State and City officials (pre-briefings sharing Project updates)
- City of Boston Main Streets Neighborhood Commercial Districts
- Neighborhood Associations
- Minority Development Centers
- Non-profit organizations
- Places of worship, libraries, education
- Disability Commission
- Elderly Commission

Engagement Timeline

As the Proposed Project design plans take shape (Table 1), the project team recommends certain PIP milestones and tasks over the duration of the Proposed Project (Table 2) following NEPA requirements.

The project team will actively disseminate design update bulletins that will alert impacted communities about the Proposed Project and highlight future construction activities and potential disruptions and inconveniences, which can supplement website updates. Mailing and email lists will be updated to verify that the appropriate organizations, agencies, officials, and concerned individuals are receiving Project materials and participating in ongoing meetings.

The project team will meet to brief the various impacted stakeholders of the scope and scheduled Project work. The lines of communication must be open and maintained until the Proposed Project is completed; this builds trust with the community and supports the planned improvements.

All public materials (e.g., meeting minutes, copies of correspondence, emails, handouts and flyers, attendance lists) will be preserved according to MBTA guidelines and in an accessible format that is

Section 508[16] and Title VI compliant.[17] MBTA has implemented a Title VI Program consistent with the Federal interpretation and administration and provides meaningful access to its programs, services, and activities to individuals with limited English proficiency.[18]

Engagement Documentation

The project team will maintain full documentation of activities in the form of meeting minutes, copies of correspondence, emails, handouts and flyers, attendance lists, and similar materials associated with this PIP. The project team uses and will continue to use a Microsoft Outlook calendar to track and record outreach events, notification deadlines, review periods, and deliverable due dates. The calendar will be maintained throughout the duration of the Proposed Project and will include all stakeholder and public meetings. In addition to the Microsoft Outlook calendar, detailed spreadsheets are used to track meeting attendees, locations, discussions, question and answer, follow-up items, and other general meeting notes. This information is organized by meeting type (e.g., individual stakeholder or public meeting) and date. All information collected in the spreadsheet can be easily exported into an accessible PDF file, in compliance with Title VI, to demonstrate that comprehensive and accessible outreach occurred throughout the project. The project team will host the tracking spreadsheets in a centralized location such as DropBox or Microsoft Teams to ensure all members can update the files with the most up-to-date and accurate outreach information.

[16] Section 508 of the Rehabilitation Act (29 U.S.C. § 794d), as amended by the Workforce Investment Act of 1998 (P.L. 105-220) requires Federal agencies to develop, procure, maintain, and use information and communications technology (ICT) that is accessible to people with disabilities - regardless of whether or not they work for the Federal government. The U.S. Access Board established the Section 508 standards that implement the law and provides the requirements for accessibility. Section 508 requires Federal agencies to make their ICT such as technology, online training, and websites accessible for everyone. https://www.epa.gov/accessibility/what-section-508

[17] Title VI is a law that prohibits discrimination by recipients of Federal money, such as MBTA, on the basis of race, color, or national origin, which includes the denial of language access to limited English proficient (LEP) persons. https://www.mbta.com/policies/frequently-asked-questions-title-vi

[18] In compliance with US Department of Transportation policy and guidance on federal Executive Order 13166 https://www.transportation.gov/civil-rights/civil-rights-awareness-enforcement/dots-lep-guidance.

6. TABLES

Table 1: Anticipated Project Schedule (Subject to change)

Date	Task
2023	75% Design
2026	Procurement
2023	NEPA/EA initiated
2025	File permit applications
2026	Final Design Complete
2025	NEPA/EA approved FONSI issued Permits approved
2026 – 2034	Construction

Table 2: Anticipated Outreach Activities

Date	Task	Subtask
Ongoing	Meet with City of Boston and Commonwealth officials	MBTA to review the Project including proposed timeline for the project and engagement
2025	Engage with identified Environmental Justice Community stakeholders	-stakeholder working groups -neighborhood flyering -updates to project website -conduct events
Fall 2022	Recorded Project Overview and posted it to MBTA's website and YouTube page	
2024/2025 and future key milestones	Meetings with project partners and key stakeholders	Small working group meetings to provide project updates and collect feedback as needed
January 2025 and future key milestones	Conduct Public Meetings and post recording to the project website and MBTA's YouTube page	*at the discretion of the project team and the Director of Stakeholder Engagement

Table 3: City of Boston Elected Officials and Staff

Elected Official Name	Title	Phone	Email
Michelle Wu	Mayor of Boston	617-635-3115	michelle.wu@boston.gov
Lydia Edwards	Senator, Third Suffolk	617-722-1634	lydia.edwards@masenate.gov
Aaron Michlewitz	State Rep, 3rd Suffolk	617-722-2990	aaron.m.michlewitz@mahouse.gov
Ed Flynn	City Councilor-District 2	617-635-3203	ed.flynn@boston.gov
Ciara D'Amico	Neighborhood Liaison-West End	617-635-4987	ciara.damico@boston.gov
Erin Murphy	City Councilor, At-Large	617-635-3115	erin.murphy@boston.gov
Julia Mejia	City Councilor, At-Large	617-635-4217	julia.meja@boston.gov
Michael Flaherty	City Councilor, At-Large	617-635-4205	michael.flaherty@boston.gov
Ruthzee Louijeune	City Councilor, At-Large	617-635-4376	Ruthzee.louijuene@boston.gov
Gladys Oliveros	Latinx Community Liaison	617-636-1979	Gladys.oliverdos@boston.gov

Table 4: City of Cambridge Elected Officials and Staff

Elected Official Name	Title	Phone	Email
Sumbul Siddiqui	Mayor of Cambridge	617-349-4280	mayor@cambridgema.gov
Alanna Mallon	Vice Mayor	617-349-4280	amallon@cambridgema.gov
Sal DiDomenico	State Senator, Middlesex and Suffolk	617-722-1650	sal.didomenico@masenate.gov
Marjorie Decker	State Representative, 25th Middlesex	617-722-2130	Majorie.decker@mahouse.gov
Burhan Azeem	City Councilor	617-349-4280	bazeem@cambridgema.gov
Dennis Carlone	City Councilor	617-349-4280	dcarlone@cambridgema.gov
Alanna M. Mallon	City Councilor	617-349-4263	amallon@cambridgema.gov
Patricia Nolan	City Councilor	617-349-4280	pnolan@cambridgema.gov
E. Denise Simmons	City Councilor	617-349-4280	dsimmons@cambridgema.gov
Paul Toner	City Councilor	617-349-4280	ptoner@cambridgema.gov
Quinton Zondervan	City Councilor	617-349-4280	qzondervan@cambridgema.gov
Marc McGovern	City Councilor	617 349-4280	mmcgovern@cambridgema.gov
Naomie Stephen	Executive Assistant to the City Council	617-349-4280	council@cambridgema.gov

Table 5: City of Somerville Elected Officials and Staff

Elected Official Name	Title	Phone	Email
Katjana Ballantyne	Mayor of Somerville	617-625-6600x2100	mayor@somervillema.gov
Patricia Jehlen	State Senator, Second Middlesex	617-722-1578	Patricia.jehlen@masenate.gov
Erika Uyterhoeven	State Representative, 27th Middlesex	857-264-1096	erika.uyterhoevan@mahouse.gov
Kristen Strezo	Councilor at Large	617-209-9915	strezoatlarge@gmail.com
Willie Burnley, Jr.	Councilor at Large	617-475-0203	wburnley@somervillema.gov
Charlotte Kelly	Councilor at Large	617-902-0539	ckelly@somervillema.gov
Jake Wilson	Councilor at Large	617-468-8969	jwilson@somervillema.gov
Matthew McLaughlin	Councilor Ward 1	617-999-0924	mattforward1@gmail.com
Jefferson Thomas “JT” Scott	Councilor Ward 2	857-615-1531	jtscott@somervillema.gov
Ben Ewen-Campen	Councilor Ward 3	617-702-2613	Benforward3@gmail.com
Jesse Clingan	Councilor Ward 4	617-290-1904	aldermanclingan@gmail.com
Beatriz Gomez Mouakad	Councilor Ward 5	617-216-0199	Gomezmouakad.ward5@gmail.com
Lance Davis	Councilor Ward 6	857-261-1909	Lancedavisward6@gmail.com
Judy Pineda Neufeld	Councilor Ward 7	617-684-5112	Judyforward7@gmail.com

Table 6: Indigenous Organizations

First Name	Last Name	Title	Phone	Email	Affiliation
Alma	Gordon	President	Not Provided	tribalcouncil@chappaquiddick-wampanoag.org	Chappaquiddick Tribe of the Wampanoag Nation
Cheryll	Toney Holley	Chair	774-317-9138	crwritings@aol.com	Nipmuc Nation (Hassanamisco Nipmucs)
John	Peters, Jr.	Executive Director	617-573-1292	john.peters@mass.gov	Massachusetts Commission on Indian Affairs (MCIA)

First Name	Last Name	Title	Phone	Email	Affiliation
Kenneth	White	Council Chairman	508-347-7829	acw1213@verizon.net	Chaubunagungamaug Nipmuck Indian Council
Melissa	Ferretti	Chair	508-304-5023	melissa@herringpondtribe.org	Herring Pond Wampanoag Tribe
Patricia	D. Rocker	Council Chair	Not Provided	rockerpatriciad@verizon.net	Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan
Raquel	Halsey	Executive Director	617-232-0343	rhalsey@naicob.org	North American Indian Center of Boston
Cora	Pierce	Not Provided	Not Provided	Coradot@yahooe.com	Pocassett Wampanoag Tribe
Elizabeth	Soloman	Not Provided	Not Provided	Solomon.Elizabeth.e@gmail.com	Massachusetts Tribe at Ponkapoag

Table 7: Federal Tribes

First	Last	Title	Phone	Email	Affiliation
Bettina	Washington	Tribal Historic Preservation Officer	508-560-9014	thpo@wampanoagtribe-nsn.gov	Wampanoag Tribe of Gay Head (Aquinnah)
Bonney	Hartley	Historic Preservation Manager	413-884-6048	bonney.hartley@mohican-nsn.gov	Stockbridge-Munsee Tribe
Brian	Weeden	Chair	774-413-0520	Brian.Weeden@mwtribe-nsn.gov	Mashpee Wampanoag Tribe

Table 8: Other organizations within project proximity

First Name	Last Name	Title	Service Area	Phone Number	Email	Affiliation
David	Kelley	Director of Operations	Cambridge	617-721-6072	dkelley@bostonsand.com	Boston Sand and Gravel
Edward	Hult	CEO / North America	Cambridge	617-746-1700	bostonilc@ef.com	EF Education First Headquarters
Stefan	Skalinski	Deputy Director of Government Affairs	Boston	617-626-1250	mass.parks@mass.gov	Charles River Reservation North Point Maintenance Facility / DCR
Steven	Tompkins	Sheriff	Boston	617-635-1000 x2100	info@scsdma.org	Suffolk County Sheriff's Department
Michael	Morrison	Sr. Director of External Communications	Boston	617-724-6425	mdmorrison@partners.org	Massachusetts General Hospital
Douglas	Cameron	Director and Chief Engineer	Boston	617-828-3532	doug.cameron@mass.gov	Office of Fishing and Boating Access
Joy	Gary	Executive Director	Boston	617-825-3846	joy@bostonfarms.org	Boston Farms Community Land Trust
Alice	Brown	Chief of Planning and Policy	Boston	Not provided	abrown@bostonharbornow.org	Boston Harbor Now
Kathy	Abbott	President and CEO	Boston	617-223-8104	kabbott@bostonharbornow.org	Boston Harbor Now

First Name	Last Name	Title	Service Area	Phone Number	Email	Affiliation
Karen	Chen	Executive Director	Boston	617-357-4499	karen@cpaboston.org	Portuguese Progressive Association
Lee	Matsueda	Executive Director	Boston	617-723-2639	lee@massclu.org	Mass Community Labor United
Bruce	Berman	Not Provided	Boston	(617) 293-6243	Bruce@bostonharbor.com	Save the Harbor/Save the Bay
Hin Sang	Yu	Co-Chair	Boston	603-905-9915	chinatownresidents@gmail.com	Chinatown Resident Association
Maria Belen	Power	Associate Executive Director	Boston	617-466-3076 Ext 2	mariabelenp@greenrootschelsea.org	GreenRoots, Inc.
Deb	Fastino	Executive Director	Boston	617-316-0456	dfastino@aol.com	Coalition for Social Justice
Laura	Jasinski	Executive Director	Boston	Not provided	ljasinski@thecharles.org	Charles River Conservancy
Anabel	Santiago	Grassroots Organizer	Boston	978-880-0016	anabel@coalitionforsocialjustice.org	Coalition for Social Justice
Andres	Ripley	Natural Resource Specialist	Boston	Not provided	ripley@neponset.org	Neponset River Watershed Association
Patricia	Alvarez	Not Provided	Boston	Not provided	palvarez@swbcdc.org	Southwest Boston Community Development Corporation

First Name	Last Name	Title	Service Area	Phone Number	Email	Affiliation
Heather	Miller	Not Provided	Boston Cambridge	781-788-007	hmiller@crwa.org	Charles River Watershed Assoc.
May	Lui	Community Outreach Coordinator	Boston Cambridge Somerville	617-482-2380	may.lui@asiancdc.org	Asian Community Development Corporation
Melanie	Gárate	Climate Resiliency Project Manager	Boston Cambridge Somerville	(781) 316-3438	melanie.garate@mysticriver.org	Mystic River Watershed Association
Josefine	Wendel	Not Provided	Cambridge	617-665-3765	jwendel@challiance.org	Cambridge Food and Fitness Policy Council
Chris	Marchi	Vice President	East Boston	Not Provided	cbmarchi@gmail.com	Air, Inc.
Eugene	Benson	Former City Planning & Urban Affairs Professor	East Boston	Not provided	eugene.b.benson@gmail.com	GreenRoots, Inc.
David	Queeley	Director of Projects	East Boston Cambridge Somerville	Not Provided	david.queeley@mysticriver.org	Mystic River Watershed Association
Julie	Wormser	Deputy Director	East Boston Cambridge Somerville	Not Provided	julie.wormser@mysticriver.org	Mystic River Watershed Association
Alexandra	Lennon-Simon	Executive Director	Somerville	617-628-9988	alexandra@groundworksomerville.org	Groundwork Somerville

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Appendix B
National Historic Preservation Act Section 106

Contents:

1. Draft Memorandum of Agreement
2. Massachusetts Historical Commission Concurrence with Adverse Effect Finding
3. Advisory Council on Historic Preservation Notification of Non-Participation
4. Historic Architectural Survey and Assessment of Effects

Draft Memorandum of Agreement

MEMORANDUM OF AGREEMENT AMONG

THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS

WHEREAS, the Massachusetts Bay Transportation Authority (MBTA) proposes the full replacement of Bridge No. B-16-479 (BIN No.A5A and 85B) (the North Station Draw One Bridges) carrying all four (4) of the MBTA's North Commuter Rail lines (Fitchburg Line, Haverhill Line, Lowell Line and Newbury/Rockport Line) across the Charles River, and the demolition and replacement of the associated building known as Signal Tower A in Boston and Cambridge, Massachusetts (the Undertaking); and

WHEREAS, the U.S. Department of Transportation, Federal Transit Administration (FTA) is providing federal funding for the Undertaking, making it subject to the provisions of Section 106 of the National Historic Preservation Act of 1966 (54 U.S.C. § 306108) (NHPA) and its implementing regulations 36 CFR Part 800, *et. seq*.; and

WHEREAS, the Undertaking's area of potential effects (APE) was defined to include areas of proposed ground disturbance, including the site of the existing Draw One bridges and immediately adjoining areas, as well as the proposed site of the new Signal Tower A building. The proposed Undertaking is in a heavily developed area of filled land, subjected over the years to extensive construction and dredging in conjunction with continuous railroad and highway building. The potential for intact archaeological deposits within the APE is considered low; and

WHEREAS, the FTA has determined that the Undertaking would have an adverse effect via demolition (36 CFR 800.5[a][2][i]) on two historic resources, the North Station Draw One Bridge and Signal Tower A, which have been determined by consensus to meet the criteria of eligibility for listing in the National Register of Historic Places (NRHP); and

WHEREAS, the FTA has determined that the Undertaking has the potential to have an adverse visual effect on the adjacent Zakim Bridge and the NRHP-listed Charles River Basin Historic District (36 CFR 800.5[a][2][v]); and

WHEREAS, the FTA has consulted with the Massachusetts State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. § 306108); and

WHEREAS, FTA has consulted with MBTA, the Boston Office of Historic Preservation, Massachusetts Department of Conservation and Recreation (DCR), and the Cambridge Historical Commission regarding the effects of the undertaking on historic properties and has invited them to sign this MOA as invited signatories;

WHEREAS, in accordance with 36 CFR Part 800.6(a)(1), FTA notified the Advisory Council on Historic Preservation (ACHP) of its adverse effect determination with specified documentation on March 5, 2024. The ACHP replied on March 20, 2024, finding that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, does not apply to this Undertaking. The ACHP, therefore, declined to participate in the consultation pursuant to 36 CFR Part 800.6(a)(l)(iii); and

NOW, THEREFORE, the FTA and the SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to resolve the adverse effect of the undertaking on historic properties.

STIPULATIONS

FTA shall ensure that the following measures are carried out:

I. HISTORICAL DOCUMENTATION

A. Prepare Historic American Engineering Record (HAER) documentation for North Station Draw One Bridge and Historic American Buildings Survey (HABS) documentation for Signal Tower A.

B. Pursuant to Section 110(b) of the National Historic Preservation Act, FTA shall ensure that the following recordation measures are carried out in consultation with SHPO, MBTA, Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR before North Station Draw One Bridge and Signal Tower A are demolished.

1. The North Station Draw One Bridge shall be documented according to the Level II requirements of HAER;
2. Signal Tower A shall be documented according to the Level II requirements of HABS;

C. HABS/HAER Level II documentation requires:

1. Drawings: select existing architectural/engineering drawings, where available, which may be photographed with large-format 4 x 5-inch negatives.
2. Photographs: photographs with large-format 4 x 5-inch negatives of exterior and interior views, and historic views where available. An estimated 8-10 views are required to document the Draw One Bridge, and an estimated 15 views to document Tower A exterior and interior spaces.
3. Written data: separate reports containing the narrative histories and descriptions of the historic resources according to the HABS/HAER outline format.
4. Review of HABS/HAER Level II documentation:
    a. Electronic copies of the draft HABS/HAER documentation shall be

submitted to the SHPO and to the National Parks Service (NPS) regional office in Philadelphia for review and comment.

b. SHPO and NPS will review and comment on the draft documentation within 30 days of receipt.

c. Once any required edits have been made the final documentation will be submitted to the NPS regional office. The final documentation materials shall be formatted, labeled, and organized in conformance with the NPS Heritage Documentation Programs (HPD) Transmittal Guidelines (*Preparing HABS/HAER/HALS Documentation for Transmittal (Updated November 2021)*.

d. The FTA shall notify the MOA consulting parties when the final HABS/HAER documentation has been accepted by the NPS within 30 days of the acceptance date.

e. The FTA shall ensure that electronic copies of the final documentation packages are made available to the SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, the DCR and other appropriate archives designated by the SHPO.

II. HISTORICAL INTERPRETATION

A. Develop Interpretive Displays Discussing North Station Draw One Bridge and Signal Tower A.

1. MBTA shall develop one interpretive display for each historic property. Two sets of the displays will be produced (four displays total) with two installed in Cambridge and two installed in Boston. The interpretive displays will be developed in consultation with the MBTA Graphics & Wayfinding Department following MBTA Historical Murals design requirements. The contents of the interpretive displays will be presented on weather and vandal-resistant panels, and the panels specifications will be in accordance with the MBTA enamel panel specifications, which meet and exceed National Park Service standards for permanent outdoor interpretive signage (www.nps.gov/hfc/products/waysides/way-product-panels.htm).

2. MBTA shall prepare draft plans, renderings, and specifications, including the proposed text and illustrations of the interpretive displays for review prior to preparation of the final design.

3. The MBTA shall seek and consider comments from SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR on the draft interpretive displays, renderings, and specifications prior to final design. The MBTA requests that comments are one of the following: "approved," "approved as noted" (with comments), or "resubmittal requested" (with comments). The SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR will have 14 calendar days to respond, no response within 14 days will be deemed an approval.

4. The panels will be installed at locations to be determined through consultation among MBTA, SHPO, the Boston Office of Historic

Preservation, the Cambridge Historical Commission, and the DCR.

B. Develop Interpretive Video of North Station Draw One Bridges in Operation

1. MBTA shall develop a video showing trains crossing the bridges and showing the bridges being and raised and lowered. The video shall be available for public viewing online. The video shall show the bridge gears and mechanical components in operation. The video of the trains crossing and the bridges being raised and lowered shall be linked to a QR code that will be linked from the interpretive displays. The SHPO, Boston Office of Historic Preservation, Cambridge Historical Commission, and the DCR will review and comment on the draft video within 30 calendar days of receipt.

C. Historic Bridge Context Study

2. MBTA shall develop a historic context study of bridges across the Charles River. The study will potentially be coordinated with Boston's Museum of Science to host an exhibit. The study shall be available online in electronic format and will be available in hard copy format at the discretion of each Consulting Party. The SHPO, Boston Office of Historic Preservation, Cambridge Historical Commission, and the DCR will review and comment on the draft study within 30 calendar days of receipt.

III. ARCHITECTURAL SALVAGE

A. Salvage of Significant Architectural and Engineering Features

1. FTA shall ensure that MBTA salvages the stone panel from the exterior cornice of Signal Tower A reading "BOSTON AND MAINE RAILROAD, SIGNAL TOWER A." The stone panel shall be installed on the Cambridge side of the river in a suitable location to be determined in consultation among MBTA, SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR.
2. Portions of the original Draw One Bridge structure shall be displayed at North Station at a suitable location to be determined by MBTA in consultation among MBTA, SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR.
3. The MBTA shall seek and consider comments from SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR in identifying potentially salvageable elements of the Draw One Bridge structure.
4. SHPO, Boston Office of Historic Preservation, and the Cambridge Historical Commission, and the DCR will review and comment on the draft documentation within 30 days of receipt.
5. Salvage operations shall be completed by qualified construction professionals, with documented experience in architectural salvage of historic properties.
6. All salvaged materials shall be stored in a secure location out of the elements until they are reinstalled in their new locations.

IV. DESIGN PLAN REVIEW

A. Review of Design Plans

1. MBTA shall provide draft design plans to SHPO, the Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR and seek and consider comments. The Consulting Parties will have the opportunity to review the first interim submission and each subsequent plan submission prior to the final design of the facilities, including the Draw One Bridges and Signal Tower A. The draft design plans will be submitted at approximately the following stages: 50 percent, 75 percent, 90 percent, and 100 percent. The MBTA requests that comments are one of the following: "approved," "approved as noted" (with comments), or "resubmittal requested" (with comments). The SHPO, Boston Office of Historic Preservation, the Cambridge Historical Commission, and the DCR will have 14 calendar days from the date they are received to respond, no response within 14 days will be deemed an approval.
2. The draft facility design plans at each review stage shall include, but is not limited to, information on the proposed bridge design, color, materials, and lighting for review and comment by the Consulting Parties.

V. CHANGES TO PROJECT SCOPE

Neither the FTA nor MBTA shall alter any plan, scope of services, or other document that has been reviewed and commented on pursuant to this MOA (except to finalize documents commented on in draft form), without first affording the parties to this MOA the opportunity to review the proposed change and determine whether it shall require this MOA be amended. If one or more signatory determines that an amendment is needed, the parties to this MOA shall consult in accordance with Stipulation XIV.

VI. PROFESSIONAL QUALIFICATIONS STANDARDS

The Project Sponsor will ensure that all actions prescribed by this MOA are carried out by, or under the direct supervision of, qualified professional(s) who meet the appropriate standards in the applicable disciplines as outlined in the *Secretary of the Interior's Professional Qualifications Standards* (48 Fed. Reg. 44716, 44738 (Sept. 29, 1983).

VII. DOCUMENTATION STANDARDS

All studies, reports, plans, and other documentation prepared pursuant to this MOA will be consistent with pertinent standards and guidelines outlined in *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (48 Fed. Reg. 44716, Sept. 29, 1983). In addition, documentation will also follow applicable guidance issued by the ACHP and the Massachusetts Historical Commission's *Guidelines for the Identification of Historic and Archaeological Resources in Massachusetts* (July 1992, Revised September 1993 and September 1995) or subsequent revisions or replacements to these documents.

VIII. DURATION

This MOA will expire if its terms are not carried out within seven (7) years from the date of its execution. Prior to such time, FTA may consult with the other signatories to reconsider the terms of the MOA and amend it in accordance with Stipulation XIV below.

IX. POST-REVIEW DISCOVERIES

If properties are discovered that may be historically significant or unanticipated effects on historic properties found, the FTA shall implement the discovery plan included as **Attachment 1** of this MOA.

X. TREATMENT OF HUMAN REMAINS

A. FTA and MBTA recognize the importance of providing respectful consideration for burial sites, human remains, and funerary objects.

1. In the event that human remains are encountered, work within 100 feet of the general area of the discovery will cease immediately. MBTA will notify the FTA within 24 hours of the discovery and contact the SHPO. The location will be secured and protected from damage and disturbance. No human remains or materials associated with the remains will be collected or removed until appropriate consultation in accordance with 36 CFR § 800.13 has been conducted. No further work in the area of discovery will proceed until the FTA has determined that the requirements of 36 CFR § 800.13 have been satisfied.
2. MBTA will develop a treatment plan in consultation with the FTA and SHPO within 48 hours of the discovery or a timeline agreed upon during consultation. If, in the course of consultation, it is determined that the human remains are associated with a historic property of religious or cultural significance to Tribes, MBTA and the FTA will consult with the Tribes prior to the development or execution of a treatment plan.
3. For additional details on plans for the unanticipated discovery and treatment of human remains see **Attachment 1** of this MOA.
4. Tribes expressing an interest in participating in Section 106 consultation in Massachusetts are listed in **Attachment 2** of this MOA.

XI. MONITORING AND REPORTING

Each year following the execution of this MOA until it expires or is terminated, MBTA shall provide all signatories to this MOA a summary report detailing work undertaking pursuant to its terms. Such report shall include any scheduling changes proposed, challenges encountered, and any disputes and objections received in the course of implementing the terms of this MOA.

XII. CONFIDENTIALITY

All parties to this MOA acknowledge that information about historic properties, potential historic properties, or properties considered historic for purposes of this Agreement are or may be subject to the provisions of Section 304 of NHPA. Section 304 allows FTA to withhold from disclosure to the public, information about the location, character, or ownership of a historic property if the FTA, in consultation with MBTA, determines that disclosure may: 1) cause a significant invasion of privacy; 2) risk harm to the historic property; or 3) impede the use of a traditional religious site by practitioners. Having so acknowledged, all parties to this MOA will ensure that all actions and documentation prescribed by this MOA are, where necessary, consistent with the requirements of Section

304 of the NHPA.

XIII. DISPUTE RESOLUTION

A. Resolving Objections to Implementation of this Agreement:

1. Should any signatory to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, they shall immediately notify the FTA in writing. FTA shall notify all other signatories of the objection and proceed to consult with the objecting party to resolve the objection. FTA will honor the request of any signatory to participate in consultation and will take any comments provided into account.

2. If the objection is resolved through consultation, FTA may authorize the disputed action to proceed in accordance with the terms of such resolution.

3. If FTA determines that such objection cannot be resolved, FTA will:

   a. Forward all documentation relevant to the dispute, including FTA's proposed resolution, to the ACHP. The ACHP shall provide FTA with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, FTA shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP and signatories, and provide them with a copy of this written response. FTA will then proceed according to its final decision.

   b. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, FTA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, FTA shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories to the MOA, and provide them and the ACHP with a copy of such written response.

   c. FTA's responsibility to carry out all other actions subject to the terms of this MOA that are not subject of the dispute remain unchanged.

B. Resolving Objections from Members of the Public

1. At any time during implementation of the terms of this MOA, should any member of the public raise an objection in writing pertaining to such implementation to any signatory, that signatory shall immediately notify FTA. FTA shall immediately notify the other signatory parties in writing of the objection. FTA shall consider the objection and any comments provided by the signatories prior to reaching its decision. Within fifteen (15) days, FTA shall render a decision regarding the objection and respond to the objecting party. FTA shall promptly notify the other parties to its decision in writing, including a copy of the response to the objecting party FTA's decision regarding resolution of the objection will be final. Following the issuance of its final decision, FTA may authorize the action subject to dispute

to proceed in accordance with the terms of that decision.

C. Objections to Determination of Eligibility

1. Should any signatory object to a determination of eligibility, FTA will submit the determination to the Keeper of the National Register of Historic Places for resolution.

XIV. AMENDMENTS

This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all signatories is filed with the ACHP.

XV. ADOPTABILITY

In the event that a Federal agency, not initially a party to or subject to this MOA, receives an application for financial assistance, permits, licenses, or approvals for the Project as described in this MOA, such Federal agency may become a signatory to this MOA as a means of complying with its Section 106 responsibilities for its undertaking. To become a signatory to this MOA, the agency official must provide written notice to the Signatories that the agency agrees to the terms of the MOA, specifying the extent of the agency's intent to participate in the MOA, and identifying the lead Federal agency for the undertaking. The participation of the agency is subject to approval by the Signatories. Upon approval, the agency must execute a signature page to this MOA, file the signature with the ACHP, and implement the terms of this MOA, as applicable. Any necessary amendments to the MOA will be considered in accordance with Stipulation XIV.

XVI. TERMINATION

If an MOA is not amended following the consultation set out in this stipulation, it may be terminated by any signatory. Within 30 days following termination, FTA shall notify the signatories if it will initiate consultation to execute an MOA with the signatories under 36CFR §800.6(c)(1) or request the comments of the Council under 36 CFR §800.7(a) and proceed accordingly.

If any signatory to this MOA determines that its terms will not or cannot be carried out, that party shall immediately consult with the other signatories to attempt to develop an amendment per Stipulation XIV, above. If within thirty (30) days an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.

Once the MOA is terminated, and prior to work continuing on the undertaking, FTA must either (a) execute an MOA pursuant to 36 CFR § 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR § 800.7. FTA shall notify the signatories as to the course of action it will pursue.

Execution of this MOA by the FTA and the SHPO and implementation of its terms evidence that the FTA has afforded the ACHP an opportunity to comment on the proposed North Station Draw One Bridge Replacement Project and its effects on historic properties and that the FTA has taken into account the effects of the undertaking on historic properties.

XVII. TIMEFRAMES AND COMMUNICATIONS

The timeframes and communication protocols described in this Stipulation apply to all Stipulations in this MOA unless otherwise specified.

A. All time designations are in calendar days unless otherwise stipulated. If a review period ends on a Saturday, Sunday, or Federal holiday, the review period will be extended until the next business day.

B. All review periods are thirty (30) days, starting on the day hard copies of the draft documents are received by the consulting parties for review, except as noted elsewhere in this document.

C. The Project Sponsor, in coordination with FTA, will ensure that all comments received within the review period are considered, and will consult with responding parties as appropriate. If the Project Sponsor does not receive comments within the review period, the Project Sponsor may proceed to the next step of the process.

D. In exigent circumstances (e.g., in Post-review discovery situations, or concerns over construction suspensions or delays), all Signatories, consulting Tribes, and Consulting Parties agree to expedite their respective document review within seven (7) days.

E. All official notices, comments, requests for further information, documentation, and other communications will be sent in writing by e-mail or other electronic means.

   1. See **Attachment 3 f**or a list of contacts and email addresses. Contact information in **Attachment 3** may be updated as needed without an amendment to this MOA. It is the responsibility of each signatory to immediately inform the FTA of any change in name, address, email address, or phone number of any point-of-contact. The FTA will forward this information to all signatories and concurring parties by email.

F. FTA is responsible for all government-to-government consultation with Tribes.

SIGNATORY

MEMORANDUM OF AGREEMENT AMONG

**THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS
DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT
PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS**

FEDERAL TRANSIT ADMINISTRATION

By: ____ Date:____________
Peter Butler Regional Administrator

Concur: ____ Date:____________
Charles J. Dyer Regional Counsel

SIGNATORY

MEMORANDUM OF AGREEMENT AMONG

**THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS
DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT
PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS**

MASSACHUSETTS HISTORICAL COMMISSION

By:____ Date:______________

Brona Simon, Executive Director
Massachusetts State Historic Preservation Officer

INVITED SIGNATORY

MEMORANDUM OF AGREEMENT AMONG

THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

By: ____ Date:_______________

Approved as to Form:

By:____ Date:_______________

INVITED SIGNATORY

MEMORANDUM OF AGREEMENT AMONG

**THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS
DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT
PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS**

BOSTON OFFICE OF HISTORIC PRESERVATION

By:____ Date:______________

INVITED SIGNATORY

MEMORANDUM OF AGREEMENT AMONG

**THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS**

CAMBRIDGE HISTORICAL COMMISSION

By:____ Date:____________

INVITED SIGNATORY

MEMORANDUM OF AGREEMENT AMONG

THE FEDERAL TRANSIT ADMINISTRATION,
MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICER,
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY,
BOSTON OFFICE OF HISTORIC PRESERVATION, MASSACHUSETTS
DEPARTMENT OF CONSERVATION AND RECREATION,
AND THE
CAMBRIDGE HISTORICAL COMMISSION,
REGARDING THE NORTH STATION DRAW ONE BRIDGE REPLACEMENT
PROJECT
BOSTON AND CAMBRIDGE, MASSACHUSETTS

MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION

By:____ Date:______________

Attachment 1

Post Review Discovery Plan

A. Unanticipated Discoveries or Unexpected Effects:

In accordance with 36 CFR § 800.13, if a previously undiscovered archeological or cultural resource that could reasonably be a historic property is encountered, or if a previously known historic property will be affected in an unanticipated manner during construction, the MBTA will implement the following procedures. This may include discovery of cultural features (e.g., foundations, water wells, trash pits, etc.) and/or artifacts/ecofacts (e.g., pottery, stone tools and flakes, animal bones, etc.) or damage to a historic property that was not anticipated. The MBTA will direct the construction contractor to cease project activities and the MBTA will consult with FTA to address post-review concerns. Each step within these procedures will be completed within 24 hours unless otherwise specified:

1. Work shall immediately stop in the area of the discovery and the personnel responsible for the discovery shall notify the MBTA, who will contact FTA and the Section 106 point of contact (POC) (contact information listed below), within 24 hours unless extenuating circumstances are present.

2. Upon notification of a discovery, FTA shall notify the State Historic Preservation Office (SHPO), participating Tribe(s)/Nation(s), and other consulting parties that may have an interest in the discovery, previously unidentified property or unexpected effects, and consult to evaluate the discovery for eligibility for listing in the National Register of Historic Places (National Register) and/or the effects of the undertaking on historic properties. This shall be done as soon as is feasible, and in accordance with federal and state law; usually within a period of no more than 48 hours.

3. The MBTA will take all reasonable measures to avoid or minimize harm to the property until FTA has completed consultation with the SHPO, participating Tribe(s)/Nation(s), and any other consulting parties. They will require the construction contractor to immediately cease all ground disturbing and/or construction activities within a 100-foot radius buffer zone of the discovery, which FTA may reduce or expand based on SHPO standards. Any associated spoil piles or soils must also be retained and cordoned off. For any discovered archeological resources, the MBTA will also halt work in surrounding areas where additional subsurface remains are reasonably expected to be present. Additionally, the recipient shall take necessary steps to protect the find from loss, the elements, and public view – for example, by using flagging tape to mark any small elements that may be easily lost, and then covering the find with a tarp.

4. The MBTA will ensure that no excavation, operation of heavy machinery, or stockpiling occurs within the buffer zone. The MBTA will secure the buffer zone through the installation of protective fencing. The MBTA will not resume ground disturbing and/or construction activities within the buffer zone until the specified Section 106 process is complete. Work in all other Project areas may continue.

5. Following notification of an unanticipated discovery or effect, the MBTA, in coordination with FTA, the Section 106 POC, and consultants as appropriate, will investigate the discovery site and evaluate the resource(s). The MBTA or consultant will prepare and submit a written document containing a proposed determination of National Register eligibility for the resource and/or, if relevant, an assessment of the Undertaking's effects on historic properties. FTA may elect to assume eligibility and/or adverse effects for expediency.

6. If the unanticipated discovery is determined to be eligible for listing in the National Register and/or adverse effects cannot be avoided, the MBTA, in coordination with FTA, will propose in writing to SHPO and participating Tribe(s)/Nation(s) and consulting parties, treatment measures to resolve adverse effects.

7. If it is necessary to develop treatment measures, the MBTA, in coordination with FTA, will implement the approved treatment measures. The MBTA will ensure construction or maintenance-related activities within the buffer zone do not proceed until consultation with SHPO, Tribe(s)/Nation(s) and other consulting parties concludes with:
    a. a determination that the resource is not National Register-eligible or there are no new adverse effects;
    b. the agreed upon treatment measures have been implemented; or
    c. it has been agreed that the treatment measures can be completed within a specified time period after construction-related activities have resumed.

B. Unanticipated Discovery of Human Remains

If the unanticipated discovery includes human remains or possible human remains, the MBTA will implement the procedures included in Stipulation X of this MOA, with additional plan details provided below. At all times suspected human remains must be treated with the utmost dignity and respect. Human remains or associated artifacts will be left in place and not disturbed without the informed consent of the FTA. No skeletal remains or materials associated with the remains will be photographed or removed except as specified in the procedures below. The MBTA will advise construction personnel to cease construction and will consult with FTA to address post-review concerns. Each step within these procedures will be completed within 48 hours unless otherwise specified:

1. If marked or unmarked graves, human remains, or remains believed to be human are encountered during development, all potential disturbance to the graves, remains, or associated items (e.g., artifacts, headstones, etc.) must cease immediately in the general area of the discovery. The MBTA will immediately take the following protective measures:
    a. Secure and protect the remains and any associated artifacts in place in such a way that minimizes further exposure or damage from the public view, the elements, looting, and/or vandalism – for example, by using flagging tape to

mark any small elements that may be easily lost, and then covering the find with a tarp.

b. Ensure a perimeter with a 100-foot radius buffer zone around the discovery is established where there will be no excavation, operation of heavy machinery, or stockpiling. FTA may reduce or expand this buffer zone based on SHPO standards.

c. Retain any associated spoil piles or soils and cordon them off. The MBTA will secure the buffer zone through the installation of protective mesh fencing at minimum.

2. The MBTA will not resume ground disturbing and/or construction activities within the buffer zone until the specified Section 106 process is complete. Work in all other Project areas may continue.

3. Remains are not to be photographed, except as determined necessary by appropriate officials (e.g., law enforcement, agency officials). Their discovery is to be treated as confidential information and kept within appropriate internal channels.

4. The MBTA will notify FTA and the Section 106 POC within twenty-four (24) hours of the initial discovery.

5. If human remains are discovered law enforcement will be notified as soon as possible in accordance with applicable State statute(s), to determine if the discovery is subject to a forensic investigation. Unless otherwise specified by state or local laws, law enforcement need not be notified in the case of marked graves (i.e., historic cemetery); or ambiguous bones which may be faunal (e.g., small fragments) unless they are later determined to be human by a qualified expert.

6. If expert opinion is needed to assist in determining whether indeterminate osteological remains are human, or to assist in determining the age and affiliation of a discovery of human remains, then a qualified physical anthropologist will be consulted.

7. If remains are determined to be human but a forensic investigation is not deemed appropriate, the MBTA will ensure compliance with any applicable State and local laws pertaining to human remains, funerary objects, and cemeteries. Discoveries of human remains on Federal or Tribal lands shall be subject to the Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC §3001-3013, 18 USC § 1170); and the Archaeological Resources Protection Act (ARPA) (14 USC § 470), as applicable. FTA, in coordination with the MBTA, will consult with the appropriate Tribe(s)/Nation(s) and consulting parties.

8. In the event the human remains encountered are of Native American origin, FTA, in coordination with the MBTA, will consult with the appropriate Tribe(s)/Nation(s) and

SHPO to determine treatment measures for the avoidance, recovery or reburial of the remains and any associated artifacts. When applicable, FTA and the MBTA will follow the principles within the ACHP's Policy Statement on Burial Sites, Human Remains, and Funerary Objects, dated March 1, 2023.

9. If the remains are not of Native American origin, the MBTA, in coordination with FTA, will consult with the SHPO and participating consulting parties to determine if the discovery is part of a historic property or is subject to other burial mitigation treatment per state historic preservation law and SHPO policy. They will then consider the effects, provide opportunity for appropriate descendant groups to comment, and resolve adverse effects, as appropriate.

10. If it is necessary to develop treatment measures, the MBTA, in coordination with FTA, will implement the approved treatment measures. The MBTA will ensure ground disturbing and construction-related activities within the buffer zone do not proceed until consultation with the SHPO, consulting Tribe(s)/Nation(s) and participating consulting parties concludes with:
    a. a finding that the resource is not National Register-eligible or there are no new adverse effects;
    b. the agreed upon treatment measures have been implemented; or
    c. it has been agreed that the treatment measures can be completed within a specified time period after construction-related activities have resumed.

11. In extremely rare cases, emergency circumstance posing an imminent risk to the find (e.g. approaching natural disaster, landscape instability, immediate risk of theft) may necessitate the removal and temporary storage of individual elements, remains, or possible remains at any stage before the consultation process is completed. In general, it is expected that emergency circumstances are more likely to apply to individual elements or isolated sets of remains: they are not intended for large-scale removal, as a substitution for consultation and treatment, or to expedite any project. Wherever emergency circumstances may apply, the following guidelines must be followed:
    a. Approval must be requested from FTA, accompanied by an explanation of exigent circumstances. Upon approval, FTA shall inform SHPO and other consulting parties of the decision within 24 hours. Removal will not be allowed where it is not warranted or where it conflicts with any legal directive.
    b. Remains shall be treated with utmost care and respect at all times.
    c. The extent of removal shall be restricted to only what is necessary to prevent immediate loss or damage.
    d. Prior to removal, the following recording shall be done:
        i. The find shall be photographed in situ, using a photo scale. Photographs are to include both close-up photos of the find, and context photos showing where the find is located on the landscape. The cardinal direction in which any overview photos were taken should be indicated,

either using a north arrow, or in a photo record. In the unlikely event that photos deal with many elements or multiple sources of bone, the relevant photos must be associated with relevant bags/boxes throughout the storage process. Photographs are to be treated as confidential, and will be considered the property of the FTA, regardless of the ownership of the device on which they were taken. No copies of the photos are to be publicly shared; or to be retained by individual personnel after the project's completion.

   ii. Location information – ideally GIS data – shall be recorded for the find.
   iii. Depth of the find below ground surface shall be recorded to the extent possible.
   iv. Any other relevant observation about the find or circumstances leading to discovery should be written down for posterity.

e. Bones should be handled carefully with latex or nitrile gloves wherever feasible. Remains should be removed as carefully as possible, and never pulled out of the ground when a portion is still buried. Following removal, loose soil may be gently removed with a soft brush if desired, but more intensive cleaning should not occur. Care should be taken not to damage fragile bone.

f. To the extent possible following removal, and in consideration of any remains or resources that may still be in the ground, the location should be marked with a medium that will not be lost in whatever exigent circumstances necessitated the initial removal of the remains (e.g., flagged rebar, cinder block).

g. Remains must be protected from view, damage, and loss. In the case of multiple bones/fragments, they should not be overcrowded or jumbled together in a single container. The following storage guidelines will be followed to the extent possible:

   i. Fragile, dry individual elements may be lightly wrapped in tissue-paper, linen cloth, or bubble wrap.
   ii. Especially fragile or dirty elements may benefit from storage in tin-foil packets.
   iii. Bone(s) should be placed in bags (e.g., zip lock or brown paper bag), and/or stored in a box with a secured bottom (e.g., filing box).
   iv. If plastic bags are used, they should be left unsealed and upright in a box to prevent mold growth.
   v. If non-plastic bags/containers are used, care should be taken to ensure that moisture from the remains does not cause the container(s) to rip over time.
   vi. If bones are especially wet, they may be bagged or rebagged after they have had an opportunity to vent and dry, provided extreme care is taken to protect the bone itself and preserve associated labeling information.
   vii. Bones should not be handled unnecessarily once dry and packed.

h. Bearing in mind that some bones may deteriorate and become unidentifiable outside of burial contexts, remains must be stored in such a way that they can be identified and traced back to their specific origin, especially in case of multiple elements collected. Individual bags and/or external boxes should be labeled with pertinent information such as:
   i. Project;
   ii. Collection date;
   iii. Collector/Discoverer;
   iv. Unique GIS information;
   v. Associated photos;
   vi. Any identifying information about the burial/find (e.g., which burial, which trench or construction footprint);
   vii. Any useful observations (e.g., which bone it is believed to be, or which side of the body the bone comes from).
   viii. Should multiple bags/boxes exist, the use of packing lists and/or numbering systems are highly encouraged.

i. Interim storage should be in a secure (ideally limited access and locking) location and protected from unnecessary disturbance or view. The FTA shall work with the MBTA, as well as any law enforcement or consulting parties, to determine any additional stabilization and long-term custody arrangements until appropriate consultation and treatment can be organized.

12. The MBTA, in coordination with FTA, will also ensure ground disturbing and construction or maintenance-related activities within the buffer zone do not proceed until the MBTA has complied with all applicable State or local cemetery or burials laws. Points of contact are as follows:

o MBTA, Tess Paganelli, 617-549-4357, tpagenelli@mbta.com

o FTA, Jon Schmidt, 617-494-4742, Jonathan.schmidt@dot.gov

Attachment 2

Federally Recognized Tribes Participating in Consultation in Eastern Massachusetts

Delaware Tribe of Indians

125 Dorry Lane Grants Pass
Ogden, OR 95727
www.delawaretribe.org

Jeremy Johnson, THPO
jeremyjohnson@delawaretribe.org
262-825-7586

Susan Bachor, Preservation Representative (East Coast)
Sbachor@delawaretribe.org
539-529-1671
c. 610-761-7452

Mohegan Tribe of Indians of Connecticut

13 Crow Hill Road
Uncasville, CT 06382
www.mohegan.nsn.us

R. James Gessner Jr., Chairman
communications@moheganmail.com
860-862-6100

Elaine Thomas, Deputy THPO
ethomas@moheganmail.com
860-862-6395

Narragansett Indian Tribe

4425 South County Trail
Charlestown, RI 02813
www.narragansettindiannation.org

Gene Cam, THPO
office@nithpo.net
410-364-1100

John Brown III THPO
tashtesook@aol.com
401-585-0142
401-286-3817

Mashpee Wampanoag Tribe
482 Great Neck Road South
Mashpee, MA 02649
www.mashpeewampanoagtribe.com

Brian Weeden, Chairman
brian.weeden@mwtribe-nsn.gov
508-477-0208

David Weeden, THPO
106review@mwtribe-nsn.gov
508-477-0208

Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, MA 02535
www.wampanoagtribe-nsn.gov

Cheryl Andrews-Maltais, Chairwoman
chairwoman@wampanoagtribe-nsn.gov
508-645-9265

Bettina Washington, THPO
thpo@wampanoagtribe-nsn.gov
508-645-9265 x.175

Attachment 3
Consulting Parties Contact Information

FTA
Peter S. Butler
Reginal Administrator
Federal Transit Administration
220 Binney Street
Floor 9-940
Cambridge, MA 02142-1026
Peter.Butler@dot.gov

Jon Schmidt
Environmental Protection Specialist Team Leader
Federal Transit Administration
220 Binney Street
Floor 9-940
Cambridge, MA 02142-1026
Jonathan.Schmidt@dot.gov

MHC
Brona Simon
State Historic Preservation Officer and Executive Director
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125
Brona.Simon@sec.state.ma.us

Elizabeth Sherva
Deputy State Historic Preservation Officer/ Director of Architectural Review
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125
Elizabeth.Sherva@sec.state.ma.us

MBTA
Phillip Eng
General Manager and CEO
Massachusetts Bay Transit Authority
10 Park Plaza
Boston, MA 02116
PEng@mbta.com

Boston Office of Historic Preservation

Joseph Cornish
Director of Design Review
Boston Landmarks Commission
20 City Hall Avenue, 3rd Floor
Boston, MA 02108
Joseph.Cornish@Boston.gov

Cambridge Historical Commission
Charles M. Sullivan
Executive Director
Cambridge Historical Commission
831 Massachusetts Avenue, 2nd Floor
Cambridge, MA 02139
CSullivan@CambridgeMA.gov

DCR
Brian Arrigo
Commissioner
Department of Conservation and Recreation
251 Causeway Street, 9th Floor
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Massachusetts Historical Commission Concurrence with Adverse Effect Finding

RECEIVED

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U.S. Department of Transportation

Federal Transit Administration

REGION 1
Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Volpe Center
55 Broadway, Suite 920
Cambridge, MA 02142-1093
617-494-2055
617-494-2865 (fax)

RC.62589

May 9, 2023

CONCURRENCE. Brona Simon
6/12/23
BRONA SIMON
STATE HISTORIC PRESERVATION OFFICER
MASSACHUSETTS HISTORICAL COMMISSION

Ms. Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

RE: MBTA North Station Draw 1 Bridge Replacement Project, Boston and Cambridge, MA Adverse Effect

Dear Ms. Simon:

The Massachusetts Bay Transportation Authority (MBTA) is proposing to utilize Federal Transit Administration (FTA) financial assistance for the North Station Draw 1 Bridge Replacement Project located in Boston and Cambridge, MA (the project). The proposed project will replace the existing Draw 1 Bridges over the Charles River at North Station, remove the adjoining Control Tower A, replace the Draw 1 bridge approach trestles, add new tracks (11 and 12) and a platform F at North Station, and make repairs and adjustments to bridge substructures, track alignments, signaling systems, and passenger platforms at North Station.

AREA OF POTENTIAL EFFECTS

Based on input received during virtual meetings on May 24, 2022, and June 27, 2022, the Area of Potential Effects (APE) has been refined to include a new passenger platform at North Station. The APE is now defined as the site of the existing Draw 1 structures and adjoining areas, the proposed site of the new Signal Tower A building, and a new passenger platform at North Station, including areas of proposed ground disturbance. A drawing of the APE is shown in Figure 2 on page 12 of the attached report. The APE excludes the north end of the Project corridor where improvements are confined to track alignments and signaling systems within the existing rail right-of-way, and FTA therefore expects to apply the Advisory Council on Historic Preservation's (ACHP) *Program Comment to Exempt Consideration of Effects to Rail Properties within Rail Rights-of-Way*, published August 24, 2018 *(83 Fed. Reg. 42920)* to those project components.

The proposed undertaking is in a heavily developed area of filled land, subjected over the years to extensive construction and dredging in conjunction with continuous railroad and highway building. The potential for intact archaeological deposits within the APE is considered low. The potential for effects to historic properties beyond the proposed APE are considered negligible because the project involves the replacement of existing buildings and structures on or near their current footprints and related track work within an active railroad corridor surrounded on two sides by extensive highway infrastructure. Accordingly, the APE has been delineated along existing railroad right-of-way and at places where existing elevated highway infrastructure creates distinct visual boundaries.

In accordance with 36 CFR Part §800.4(a), FTA requests your concurrence with the APE.

IDENTIFICATION OF HISTORIC PROPERTIES

Following background research and a field survey of the APE, the FTA has determined that the Draw 1 Bridges (MHC Nos. BOS.927/CAM.911) and the Boston and Maine Railroad Signal Tower A (B&MRR Signal Tower A) (MHC No. CAM.99) are eligible for listing in the National Register of Historic Places (NHRP). The Draw 1 Bridges are eligible for listing in the NHRP under Criterion C in the areas of Engineering and Transportation. The bridges, built in 1930-1931 by the Phoenix Bridge Company, are two of the last surviving Scherzer-type rolling lift bascule railroad bridges in Massachusetts. B&MRR Signal Tower A is eligible for listing in the NHRP under Criterion C in the areas of Architecture, Engineering, and Transportation as a substantially intact and significant surviving example of railroad architecture dating to the period of the B&MRR's large Boston Engine Terminal improvement program carried out between 1928 and 1932. There are no other historic resources located within the APE.

In accordance with 36 CFR Part 800.4(b), FTA requests your concurrence with the identification of historic properties.

ASSESSMENT OF EFFECTS

In accordance with 36 CFR Part 800.5(a) Protection of Historic Properties, the FTA has determined that the replacement of the Draw 1 bridges and removal of B&MRR Signal Tower A will have an adverse effect on historic resources. Prior alternatives analyses conducted by the FTA have demonstrated that neither avoidance nor minimization of the adverse effect is possible.

The FTA requests your concurrence with the adverse effect determination. Attached is a Historic Architectural Survey and Assessment of Effects dated March 2023 in support of this determination.

In addition to your concurrence with the APE, identification of historic properties, and adverse effect finding, we have developed the following potential mitigations for further consideration among all consulting parties. We welcome your input regarding potential mitigations at any time, and we plan to engage in additional consultation related to the development of a Memorandum of Agreement (MOA) soon.

- Recordation of the existing structures to the standards of the Historic American Buildings Survey/Historic American Engineering Record

- Salvage
- Development of interpretive displays for the public
- Context-sensitive design treatments for replacement structures and buildings

Please note that the above is not an exhaustive list of potential mitigations. The FTA welcomes your insight, expertise, and ideas and looks forward to discussing this important transit project with you and other consulting parties.

The following resources are provided for your consideration:

- Historic Architectural Survey and Assessment of Effects, March 2023
- List of Consulting Parties

Please respond to this office within 30 days of receipt of this request. In accordance with 36 CFR Part 800.3(c)(4), if a response is not received within 30 days, FTA will proceed with the Section 106 process. Please also be aware that the MBTA will be reaching out to you soon to convene a meeting with all consulting parties to discuss further.

If you have any questions regarding this matter, please contact Eric Papetti at (617) 494-3494. We look forward to your response.

Sincerely,

Peter Butler
Regional Administrator

Attachment

cc: Tess Paganelli, MBTA

<u>Advisory Council on Historic Preservation Notification of Non-Participation</u>

Schimmoeller, Stacy

From:	Price, David
Sent:	Wednesday, September 11, 2024 4:50 PM
To:	Schimmoeller, Stacy
Subject:	FW: [EXTERNAL] FW: North Station Draw One Bridge Demolition and Replacement Project Boston, Suffolk County, MA ACHP Project Number: 020641

David L. Price
Senior Architectural Historian

TRC
712 Melrose Ave, Nashville, TN 37211
T: 615.326.5153 | C: 615.428.4484

LinkedIn | Twitter | Blog | www.TRCcompanies.com

From: Fontaine, Jeremy <JFontaine@MBTA.com>
Sent: Thursday, August 1, 2024 2:38 PM
To: Price, David <DPrice@trccompanies.com>
Subject: [EXTERNAL] FW: North Station Draw One Bridge Demolition and Replacement Project Boston, Suffolk County, MA ACHP Project Number: 020641

FYI

From: Schmidt, Jonathan (FTA) <Jonathan.Schmidt@dot.gov>
Sent: Thursday, March 21, 2024 1:57 PM
To: Fontaine, Jeremy <JFontaine@MBTA.com>
Cc: Paganelli, Tess <tpaganelli@MBTA.com>
Subject: FW: North Station Draw One Bridge Demolition and Replacement Project Boston, Suffolk County, MA ACHP Project Number: 020641

FYI. ACHP will not be involved at this time.
Jon

From: Maxwell Sickler <msickler@achp.gov>
Sent: Wednesday, March 20, 2024 3:49 PM
To: Schmidt, Jonathan (FTA) <Jonathan.Schmidt@dot.gov>
Cc: Jeffery C. Bendremer <thpo@mohican-nsn.gov>; John Brown <tashtesook@aol.com>; elizabeth.sherva@sec.state.ma.us; brona.simon@sec.state.ma.us; Bettina Washington <THPO@wampanoagtribe-nsn.gov>; David Weeden <David.Weeden@mwtribe-nsn.gov>
Subject: North Station Draw One Bridge Demolition and Replacement Project Boston, Suffolk County, MA ACHP Project Number: 020641

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Dear Mr. Schmidt:

On March 5, 2024, the Advisory Council on Historic Preservation (ACHP) received your notification and supporting documentation regarding the potential adverse effects of the referenced undertaking on a property or properties listed or eligible for listing in the National Register of Historic Places. Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act, does not apply to this undertaking. Accordingly, we do not believe our participation in the consultation to resolve adverse effects is needed.

However, if we receive a request for participation from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer, affected Indian tribe, a consulting party, or other party, we may reconsider this decision. Should the undertaking's circumstances change, consulting parties cannot come to consensus, or you need further advisory assistance to conclude the consultation process, please contact us.

Pursuant to Section 800.6(b)(1)(iv), you will need to file the final Section 106 agreement document (Agreement), developed in consultation with the Massachusetts SHPO and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the Agreement and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions or require our further assistance, please contact Maxwell Sickler at (202) 517-0220 or by e-mail at msickler@achp.gov and reference the ACHP Project Number above.

Sincerely,

Maxwell Sickler

Maxwell Sickler (he/him)
Assistant Historic Preservation Specialist
Advisory Council on Historic Preservation
401 F Street NW, Suite 308, Washington D.C. 20001
(202) 517 0220

www.achp.gov

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<u>Historic Architectural Survey and Assessment of Effects</u>

MBTA Capital Delivery
North Station Draw 1 Bridge Replacement
and Associated Track and Signal Upgrades

North Station Draw 1 Bridge Replacement and Associated Track and Signals Upgrades, Boston, Suffolk County, and Cambridge, Middlesex County, Massachusetts

Historic Architectural Survey and Assessment of Effects

March 2023

Prepared by:
TRC Environmental Corporation
650 Suffolk St., Suite 200
Lowell, MA 01854

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Revision Index

Revision Index

Revision #:	Date:	Description:
0	Date of completion	March 9, 2023
	Prepared by: Signature: David Price	Date: 3-9-23
	Reviewed by: Signature: Stacy Schultz	Date: 3-9-23

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MANAGEMENT SUMMARY

Under contract to STV, TRC completed a Historic Architectural Survey and Assessment of Effects for the proposed North Station Draw 1 Bridge Replacement and Associated Track and Signal Upgrades Project (the Project). Using funds provided through the Federal Transit Administration (FTA), the Massachusetts Bay Transit Authority (MBTA) proposes to replace the two North Station Draw 1 Bridges and add a third bridge over the Charles River, as well as the adjoining Signal Tower A, and to make related repairs and adjustments to the bridge substructures, approach trestles, track alignments, and signaling systems.

This survey was completed in accordance with Section 106 of National Historic Preservation Act, as amended and re-codified (54 USC § 306108), and its implementing regulations at 36 CFR § 800, and the National Environmental Policy Act (NEPA). The project is also subject to the provisions of Massachusetts General Laws Chapter 9, Section 26-27C (codified in 950 CMR 71) and the Massachusetts Environmental Policy Act (MEPA).

The purpose of the survey was to identify architectural resources of age 50 years or older in the Project's Area of Potential Effects (APE); evaluate the surveyed resources eligible for listing in the National Register of Historic Places (NRHP); and assess the effects of the Project on NRHP listed or eligible properties. As a result of background research and field survey, TRC identified two properties in the APE that are eligible for listing in the NRHP, including the North Station Draw 1 Bridges and Signal Tower A. No other properties aged 50 years or older were identified in the APE. Because the proposed project will demolish both the Draw 1 Bridges and Signal Tower A, TRC recommends that the proposed undertaking will have an **adverse effect** on these NRHP-eligible historic properties. TRC recommends that the FTA, in coordination with the MBTA and in consultation with the Massachusetts Historical Commission (MHC), adopt an adverse effect finding and begin discussions among all consulting parties on ways to minimize and/or mitigate the adverse effect.

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1.0 INTRODUCTION

Under contract to STV, TRC completed a Historic Architectural Survey and Assessment of Effects for the proposed North Station Draw 1 Bridge Replacement and Associated Track and Signal Upgrades Project (the Project) (Figure 1). Using funds provided through the Federal Transit Administration (FTA), the Massachusetts Bay Transit Authority (MBTA) proposes to replace the two North Station Draw 1 Bridges and add a third bridge over the Charles River, as well as the adjoining Signal Tower A, and to make related repairs and adjustments to the bridge approach trestles, track alignments, and signaling systems. An overview of the Project was presented by the FTA and TRC to the staff of the Massachusetts Historical Commission (MHC) and other consulting parties on May 24, 2022. A PDF copy of the PowerPoint presentation used during that meeting is attached to this report as Appendix A.

This survey was completed in accordance with Section 106 of National Historic Preservation Act, as amended and re-codified (54 USC § 306108), and its implementing regulations at 36 CFR § 800, the National Environmental Policy Act (NEPA), and Section 4(f) of the Department of Transportation Act (49 USC § 303). The project is also subject to the provisions of Massachusetts General Laws Chapter 9, Section 26-27C (codified in 950 CMR 71) and the Massachusetts Environmental Policy Act (MEPA). The purpose of the survey was to identify architectural resources of age 50 years or older in the Project's Area of Potential Effects (APE); evaluate the surveyed resources eligible for listing in the National Register of Historic Places (NRHP); and assess the effects of the Project on NRHP listed or eligible properties.

The APE was defined to include areas of proposed ground disturbance, including the site of the existing Draw 1 structures and adjoining areas, as well as the proposed site of the new Signal Tower A building and a new passenger platform at North Station (Figure 2). The APE excludes the north end of the Project corridor where improvements are confined to track alignments and signaling systems within the existing railway ROW. The proposed undertaking is in a heavily developed area of filled land, subjected over the years to extensive construction and dredging in conjunction with continuous railroad and highway building. The potential for intact archaeological deposits within the APE is considered low. Because the project involves the replacement of existing buildings and structures on or near their current footprints and related track work within an active railroad corridor surrounded on two sides by extensive highway infrastructure, the potential for visual, atmospheric, and audible impacts to historic properties beyond the current railroad right-of-way are considered negligible.

2.0 PROJECT PURPOSE AND NEED

Built 90 years ago, the Draw 1 Bridges and Signal Tower A have reached the end of their useful life span. This conclusion was established in two previous reports submitted by STV to MBTA in 2020: *Tower A and North Station Tracks 11 and 12 Assessment* (STV 2020a) and *Bridge Structures Evaluation Report* (STV 2020b).Through a decade-long series of detailed inspections, the MBTA determined that the bridges suffer from structural deficiencies that severely reduce the reliability of commuter rail service and prohibit the future expansion of service at North Station. The MBTA finds the project requires the replacement of the two Draw 1 Bridges, as well as the north and south approach trestles, and Signal Tower A. Key structural deficiencies of the bridges include:

- Deteriorated structural steel stringers and floorbeam members;
- Improper seating of spans and alignment of rails in closed position;
- Inadequate vertical opening angles of spans;
- Corroded and cracked top surface of the caissons substructures; and
- Significantly outdated and non-redundant electrical, mechanical, and signaling systems, with the potential to create extended outages and significant disruptions to rail and river traffic.

With respect to Signal Tower A, the building suffers serious structural problems that prohibit its rehabilitation with several through-shear cracks, failing structural integrity, and obsolete utility.

The existing Draw 1 Bridges are subject to malfunction, while the four tracks they carry limit capacity and constrain operational resiliency in the wake of service disruptions. With the expected future expansion of MBTA commuter service and Amtrak Downeaster passenger service, both MBTA and Amtrak recognize the need to increase the number of tracks currently available to cross the Charles River.

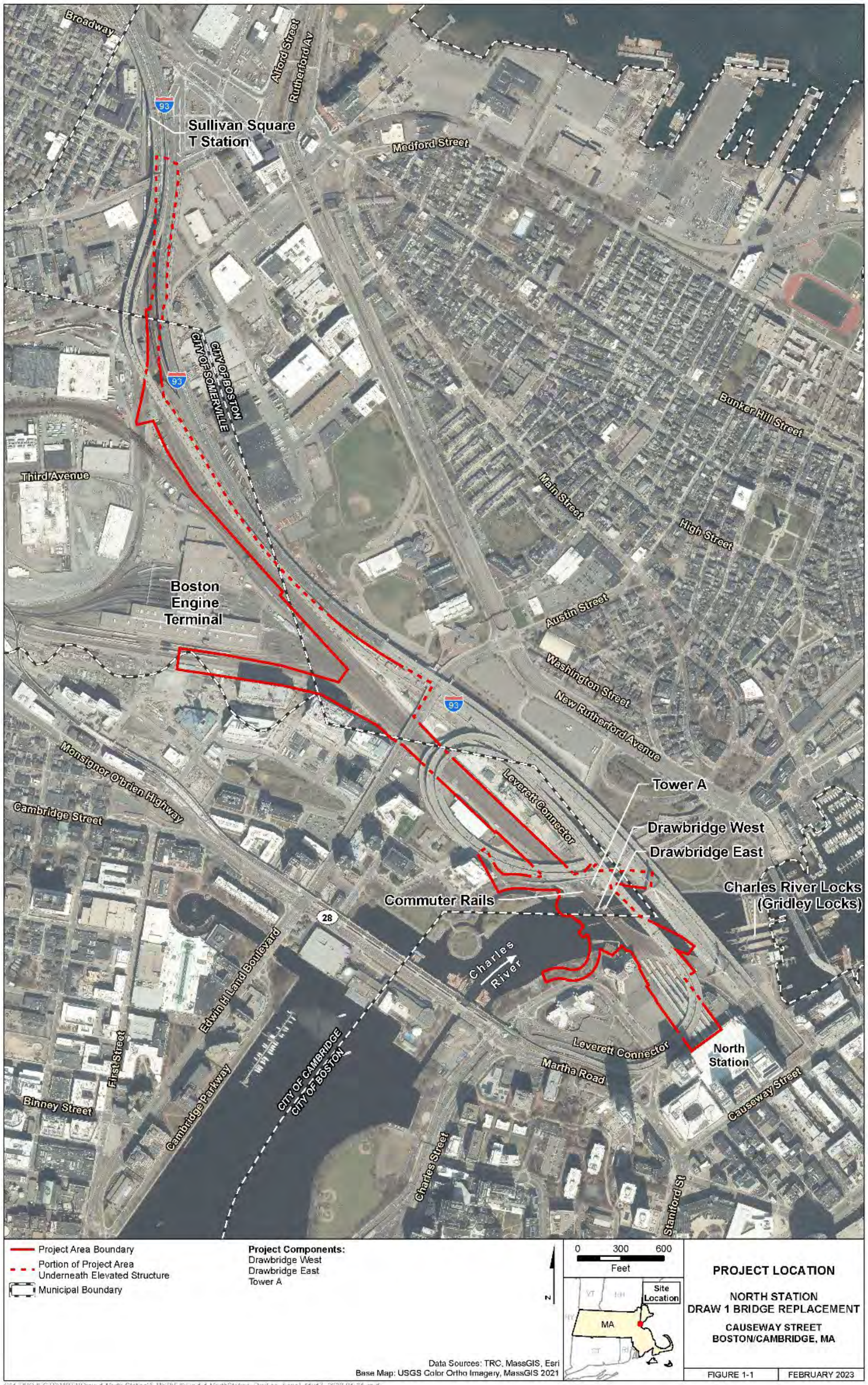


Figure 1. Project location map.

Figure 2. Project APE

3.0 SURVEY METHODS

3.1 Background Research

Background research was conducted using the Massachusetts Cultural Resources Information (MACRIS) database and files at the Massachusetts Historical Commission (MHC), as well as the Library of Congress; the National Register archives; the Boston Public Library; the Massachusetts Historical Society; and on-line at the Boston & Main Railroad (B&MRR) Historical Society. Research sources included historic maps and atlases; historic photographs; and published histories of the B&MRR and the MBTA and its stations, bridges, and track structures.

3.2 Previous Studies

The MBTA completed previous structural studies and replacement plans for the North Station Draw 1 Bridge in 2010 and again in 2017. In 2010, an early version of the proposed undertaking was included as part of the MBTA's Repair and Rehabilitation of 12 Bridges System-wide Project. At that time, the MBTA commissioned a *Bridge Type Selection Worksheet* study to record existing conditions and evaluate options for the rehabilitation or replacement of North Station Draw 1 (Fay, Spofford & Thorndike, Inc. 2010). Related activities included completion of an initial cultural resources review, assessment of effects, consultation with interested parties, and preparation of a draft Memorandum of Agreement (MOA) designed to resolve adverse effects to historic properties (TRC 2011a, 2011b). After this initial work, however, the MBTA commissioned additional conceptual studies, performed an alternatives analysis, and redesigned the project for increased capacity, leading to the identification of a new Preferred Alternative in 2017 (Fay, Spofford & Thorndike 2016; HDR 2017).

In January 2020, the engineering firm STV Incorporated (STV), in partnership with preservation planning firm McGinley Kalsow & Associates and TRC, completed a historic structure report focusing on Signal Tower A and Tracks 11 and 12 at North Station. With respect to Signal Tower A, the report found that the building's structural issues – including significant masonry cracking and spalling – were too extensive to enable rehabilitation and reuse. The report concluded that given the extent of work that would be required to rehabilitate Signal Tower A the preferred alternative was demolition and replacement with a new building (STV 2020a). In June 2020, STV completed an updated *Type Study: North Station Draw 1 Bridge Replacement and Associated Track and Signals Upgrade* providing an overview of the current project along with alternatives analysis, preferred alternative, existing conditions, site history, cost estimate, and schedule (STV 2020b).

3.3 Architectural Survey

Fieldwork for the project took place on April 11, 2017, to record existing conditions, locate all previously identified historic properties, and identify, record, and evaluate all other resources over 50 years of age inside the APE. Bisected by the Charles River, the APE is characterized by man-made fills, the active railroad corridor, associated infrastructure, and equipment, service roads, vehicle parking areas, and elevated pedestrian and highway bridges. The recently created North Point Park adjoins the APE to the west. A trackside sand and gravel yard abuts the northern end of the APE to the east. North Station terminal and modern office buildings occupy adjacent lands at the south end of the APE.

3.4 NRHP Eligibility Criteria

Sufficient data were compiled during background research and survey to make recommendations regarding eligibility for listing in the NRHP for all architectural resources addressed during this study. According to 36 CFR 60.4, cultural resources eligible for listing on the NRHP are defined as buildings, structures, objects, sites, and districts that have "integrity," and that meet one or more of the criteria outlined below.

- Criterion A (Event). Association with one or more events that have made a significant contribution to the broad patterns of national, state, or local history.
- Criterion B (Person). Association with the lives of persons significant in the past.
- Criterion C (Design/Construction). Embodiment of distinctive characteristics of a type, period, or method of construction; or representation of the work of a master; or possession of high artistic values; or representation of a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D (Information Potential). Properties that yield, or are likely to yield, information important in prehistory or history. Criterion D is most often (but not exclusively) associated with archaeological resources. To be considered eligible under Criterion D, sites must be associated with specific or general patterns in the development of the region. Therefore, sites become significant when they are seen within the larger framework of local or regional development.

For a property to be eligible for listing in the NRHP it must exhibit qualities of physical integrity. This rule also applies to historic districts. The seven NRHP aspects of integrity are as follows:

- Location: the place where the historic property (or properties) was/were constructed or where the historic event(s) occurred;
- Design: the combination of elements that create the form, plan, space, structure, and style of a property (or properties);
- Setting: the physical environment of the historic property (or properties);
- Materials: the physical elements that were combined to create the property (or properties) during the associated period of significance;
- Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory;
- Feeling: the property's (or properties') expression of the aesthetic or historic sense of the period of significance; and
- Association: the direct link between the important historic event(s) or person(s) and the historic property (or properties).

3.5 Section 106 Assessment of Effects

Sufficient data were compiled during background research and survey to make recommendations regarding Section 106 Assessments of Effect for this Project. Pursuant to the Section 106 Regulations at 36 CFR § 800.5 (Assessment of Adverse Effects), TRC applied the criteria of adverse effect to the proposed Project and the resources located in the APE that are listed or eligible for listing in the NRHP. The Assessments of Effect is provided for NRHP-listed or eligible properties in Chapter 4.

§ 800.5 Assessment of adverse effects.

(a) *Apply criteria of adverse effect*. In consultation with the SHPO/THPO and any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to identified historic properties, the agency official shall apply the criteria of adverse effect to historic properties within the area of potential effects. The agency official shall consider any views concerning such effects which have been provided by consulting parties and the public.

(1) *Criteria of adverse effect*.

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

(2) *Examples of adverse effects*.

Adverse effects on historic properties include, but are not limited to:

(i) Physical destruction of or damage to all or part of the property;

(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines;

(iii) Removal of the property from its historic location;

(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;

(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and

(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

4.0 SURVEY RESULTS

As a result of background research and field survey, TRC located two previously identified historic properties eligible for listing in the NRHP, including the Draw 1 Bridges at North Station and Signal Tower A.

Draw 1 Bridges at North Station

MHC Nos. BOS.927/CAM.911

The Draw 1 Bridges at North Station are eligible for listing in the NRHP under Criterion C in the areas of Engineering and Transportation as two of the last surviving Scherzer-type rolling lift bascule railroad bridges in the state. Built in 1930-1931 by the Phoenix Bridge Company according to plans prepared by Keller & Harrington, the two bridges feature steel through trusses with cast concrete counterweights resting on concrete pier caissons. The north approach features a timber pile trestle; the south approach has a concrete pile trestle installed in 1986 to replace one destroyed by fire in 1984. Survey photographs of the bridges are shown below in Figures 3-8.

Figure 3. Overview of the project area from Nashua Street Park, Boston, looking northeast.

Figure 4. Overview of the project area from North Point Park, Cambridge, looking southeast.

Figure 5. Draw 1 Bridges, looking southeast.

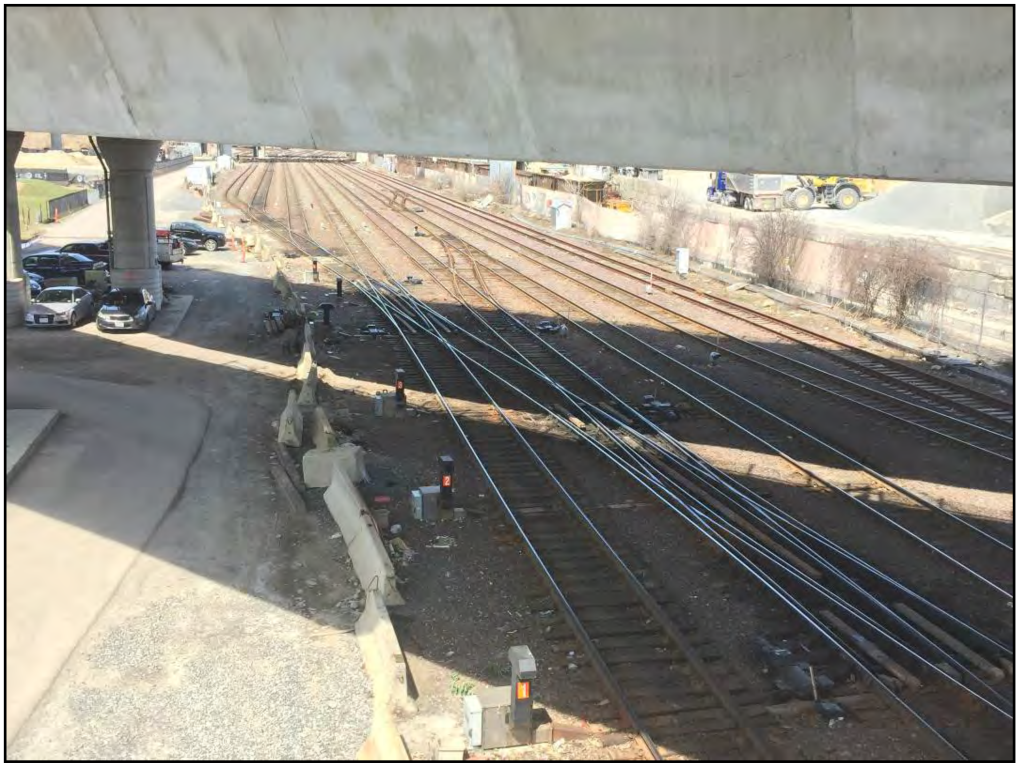


Figure 6. Tracks located north of Draw 1 Bridges, looking north.

Figure 7. Draw 1 Bridges and north timber pile approach span, looking southeast.

Figure 8. Draw 1 Bridges and south concrete pier approach span, looking northeast.

Figure 9. Draw 1 Bridges, looking southwest.

Figure 10. Draw 1 Bridges, looking west.

B&MRR Signal Tower A

MHC No. CAM.99

B&MRR Signal Tower A is eligible for listing in the NRHP under Criterion C in the areas of Architecture, Engineering, and Transportation as a substantially intact and significant surviving example of railroad architecture dating to the period of the B&MRR's large Boston Engine Terminal improvement program carried out between 1928 and 1932. The two-story, three-bay wide signal tower was built between 1930 and 1931 and features steel frame construction with a brick veneer and poured concrete foundation. It includes a pair of two-story, five-sided bays on both the north and south ends. The parapet wall along the west façade features a central panel inscribed with "BOSTON AND MAINE RAILROAD / SIGNAL TOWER A." Survey photographs of Signal Tower A are shown below in Figure 11 and 12.

Both the Charles River Drawbridges at North Station and the B&MRR Signal Tower A were surveyed as part of the MBTA's *Historical Property Survey—Phase II*, which recommended the structures eligible for listing in the NRHP (McGinley Hart & Associates 1990). Although a formal written determination of eligibility was not located in the MHC files, consultation with MHC staff member Peter Scott confirmed that the MHC considers the structures eligible. The MBTA's *Historical Property Survey* did not identify a period of significance or delineate boundaries for either historic property. For the purposes of the present investigation, TRC assumes a period of significance of 1930-1932 for both the bridges and Tower A, covering the time of construction, successful initiation of service, and completion of the B&MRR's major Boston Terminal improvement project. The historic property boundaries for the Charles River Drawbridges at North Station include the footprints of each steel structure, excluding the altered approach trestles. The historic property boundary for B&MRR Signal Tower A includes the building's footprint.

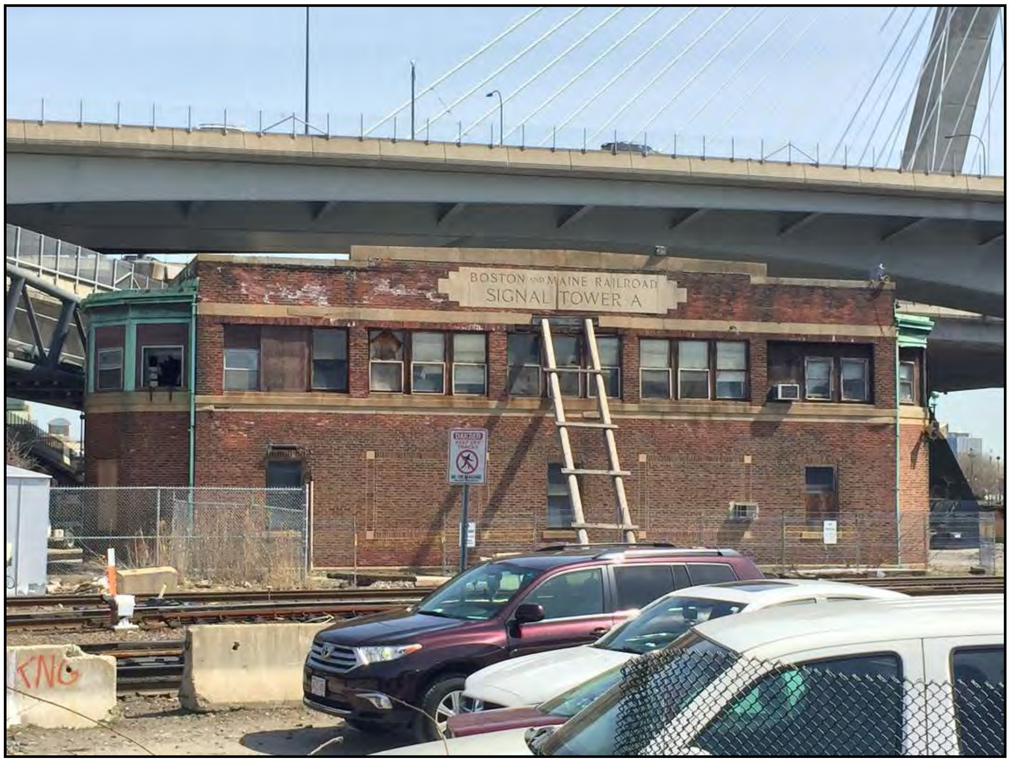


Figure 11. Signal Tower A, looking east at the west (trackside) elevation with temporary timber shoring.

Figure 12. Signal Tower A, looking west at the east (rear) elevation.

5.0 SECTION 106 ASSESSMENT OF EFFECTS

5.1 Alternatives Analysis

The MBTA has studied several options since 2010 to best address the overall project purpose and need, concluding with the most recent alternatives analysis completed by STV in June 2020 (Fay, Spofford & Thorndike, Inc. 2010, 2016; HDR 2017; STV 2020a and 2020b). Factors and constraints considered in this process included: diminishing utility of the existing structures, current and future rail service demands, rail traffic disruptions, resiliency, existing station and track geometry, vertical and horizontal clearance limitations posed by nearby elevated roadways, navigable water requirements, private property restrictions, existing land uses, and capital investment. Environmental constraints included federal and state-jurisdictional waters and fish habitat, cultural/historical resources, hazardous building materials, and the potential for contaminated sediments, soils, and groundwater.

Building on the previous studies conducted in 2010 and 2017, STV's *Type Study* in June 2020 investigated alternative options associated with the project's major elements, including different track layouts from North Station, movable bridge structure types, and north and south approach trestle structure types. Viable options were identified for each of these major project elements and described in detail and evaluated. For each major project element, a cost estimate and recommended alternative was identified based on cost and other appropriate evaluation criteria (STV 2020b).

5.2 Preferred Alternative

The *Type Study* identified Option 2B as the preferred alternative, which includes the replacement of the two existing Draw 1 Bridges as well as the north and south approach trestle structures and Signal Tower A. The analysis found the existing bridges are an on-going maintenance challenge and are beyond repair. Similarly, the existing approach trestles and Signal Tower A are at the end of their useful life and require replacement. The study identified Option 2B as the preferred track alignment alternative that incorporates three, stand-alone, vertical lift bridge structures, each supporting two bridge tracks over the Charles River. This will upgrade capacity at North Station from 10 station tracks to 12, upgrade service across the Charles River from four bridge tracks to six and upgrade the number of usable tracks north of the river from seven tracks to eight. In other words, the trackwork through the project site will be upgraded from 10-4-7 to 12-6-8.

Most importantly, Option 2B provides enhanced operation flexibility for rail operations with its three standalone movable bridges. During construction, one new bridge can first be constructed and commissioned, then in two successive stages each of the existing draw spans can be replaced so that four tracks can remain in operation across the river during each stage. Once construction is complete, any one bridge can be removed from service for reasons of maintenance or repair, which still leaves four bridge tracks in operation, and which in turn allows access to at least eight station tracks at any time. The ability to stage the work in a manner that maintains uninterrupted service into and out of North Station was a critical consideration for all track alignment options evaluated. Option 2B offers the most flexibility in terms of staging.

5.3 Assessment of Effects

To assess the effects of Project Option 2B on identified historic resources, TRC applied the Advisory Council on Historic Preservation's Criteria of Adverse Effect (36 CFR 800.5). Because the proposed Project will demolish both the Draw 1 Bridges and Signal Tower A, TRC recommends that the proposed undertaking will have an **adverse effect** on these NRHP-eligible historic properties. Prior alternatives analyses conducted as part of the selection of the Preferred Alternative have demonstrated that avoidance of the adverse effect is not possible.

6.0 CONCLUSION AND RECOMMENDATION

TRC recommends that the FTA, in coordination with the MBTA and in consultation with the MHC, adopt an adverse effect finding and begin discussions among all consulting parties, including any federally recognized tribes, on ways to minimize and/or mitigate the adverse effect. In addition to the participating agencies, other identified consulting parties include the Boston Landmarks Commission, the Cambridge Historical Commission, the Charles River Conservancy, the Esplanade Association, and the Massachusetts Department of Conservation & Recreation. Previously considered mitigation options include recordation of the existing structures to the standards of the Historic American Buildings Survey/Historic American Engineering Record, salvage, interpretive displays, and context-sensitive design treatments for the replacement structures and buildings. Agreed-upon stipulations should be specified in a new Memorandum of Agreement (MOA) among the signatories, invited signatories, and concurring parties to resolve the adverse effects and conclude the Section 106 process.

7.0 REFERENCES

Fay, Spofford & Thorndike, Inc.

2010 [Draft] *Draw 1 over Charles River Carrying East Route Commuter Rail Rehabilitation of Bridge No. B-16-479, Boston, Massachusetts, Project File No. B92PS07, Bridge Type Selection Worksheet*. Prepared for Massachusetts Bay Transportation Authority, July 21, 2010. On file, Massachusetts Bay Transportation Authority, Boston, Massachusetts.

2016 *North Station Draw over Charles River Bridge No. B-16-479, Six Tracks Crossing Conceptual Design Report*, January 22, 2016. On file, Massachusetts Bay Transportation Authority, Boston, Massachusetts.

HDR

2017 *Part 3 Final Report: Charles River Bridge Replacement Analysis, Boston, MA*, March 14, 2017. On file, Massachusetts Bay Transportation Authority, Boston, Massachusetts.

McGinley Hart & Assoc.

1990 *Final Report: Historical Property Survey Phase II Commuter Rail System MBTA* Contract # X2PS26, October 1990. On file, Massachusetts Historical Commission, Boston, Massachusetts.

STV

2020a *Tower A and North Station Tracks 11 and 12 Assessment*.

2020b *Type Study: North Station Draw 1 Bridge Replacement and Associated Track and Signals Upgrade*. MTBA Contract No. H32PS01.

TRC Environmental Corporation

2011a Draft Memorandum of Agreement by and Between the Federal Transit Administration, Massachusetts State Historic Preservation Officer, and the Massachusetts Bay Transportation Authority Regarding the Boston & Maine Railroad Signal Tower A and Charles River Drawbridges at North Station Replacement Projects. Boston and Cambridge, Massachusetts, June 14, 2011. On file, Massachusetts Bay Transportation Authority, Boston, Massachusetts.

2011b Technical Memorandum, Architectural Survey of Boston & Maine Railroad Signal Tower A and Charles River Drawbridges at North Station, Summary of Findings and Assessment of Effects, June 27, 2011. On file, Massachusetts Bay Transportation Authority, Boston, Massachusetts.

APPENDIX A: PROJECT POWERPOINT PRESENTATION

PRESENTATION
MBTA CONTRACT NO. H32PS01

ENGINEERING SERVICES FOR

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

AND ASSOCIATED TRACK AND SIGNALS UPGRADES

FTA/SHPO Section 106 Consultation Meeting

May 24, 2022

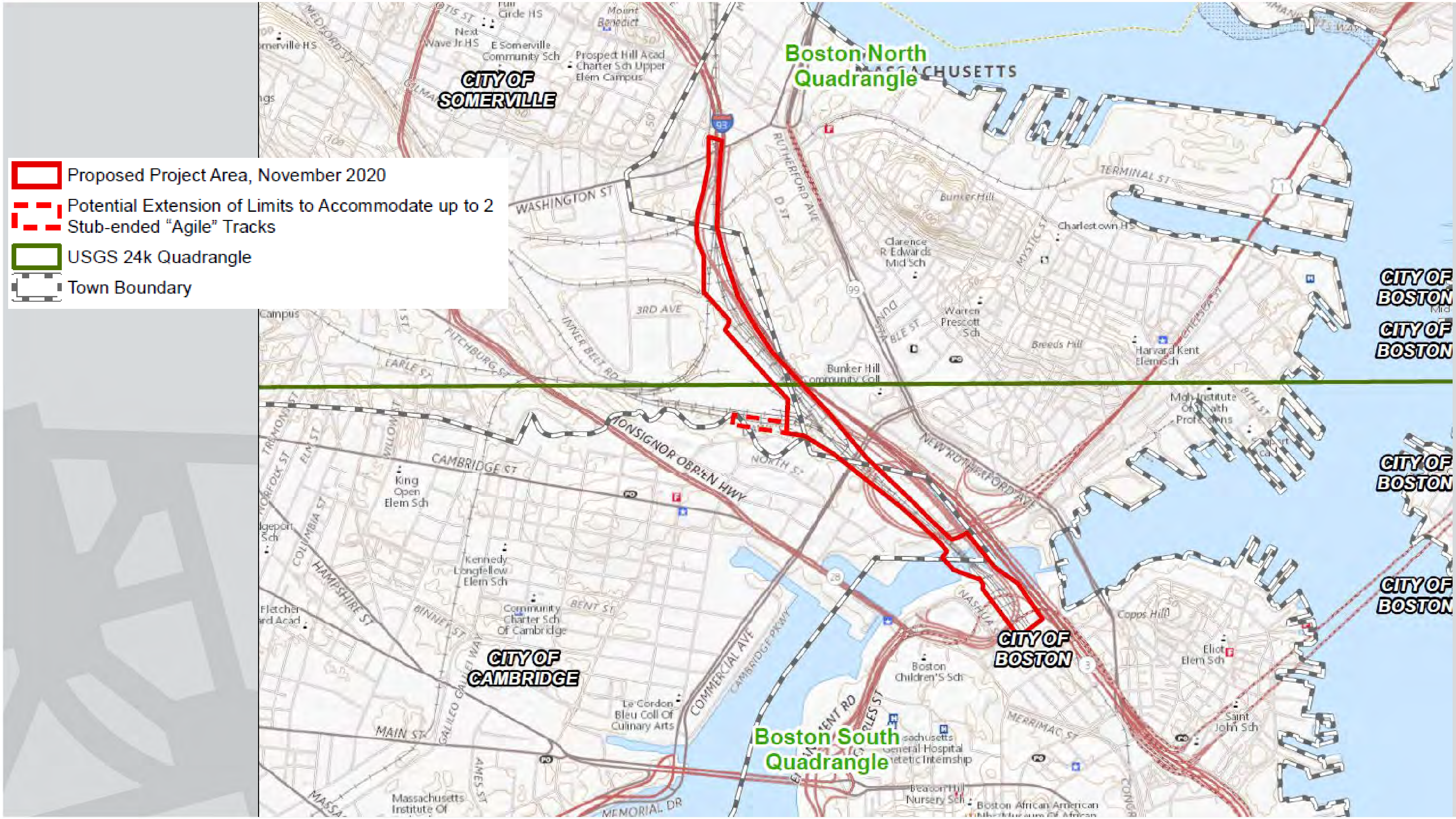
STV 100 Years

AGENDA

- INTRODUCTIONS
- FTA INTRODUCTION
- FTA/NEPA ROLE, REVIEW PROCESS
- PROJECT OVERVIEW/VIRTUAL TOUR (SLIDES)
- HISTORICAL RESOURCES AND APE (SLIDES)
- SECTION 106 REVIEW PROCESS
- OPEN DISCUSSION

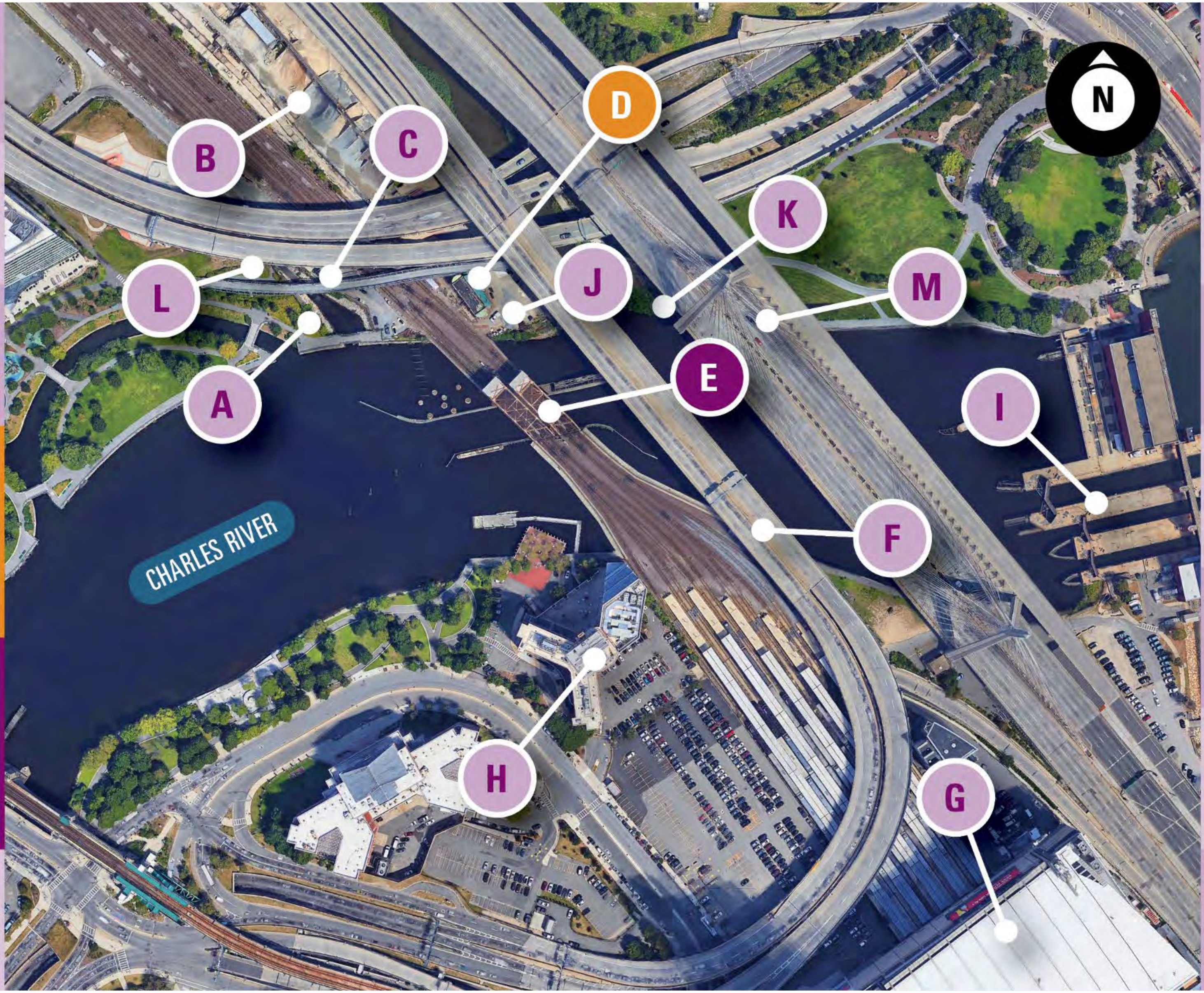
PROJECT OVERVIEW

PROJECT AREA



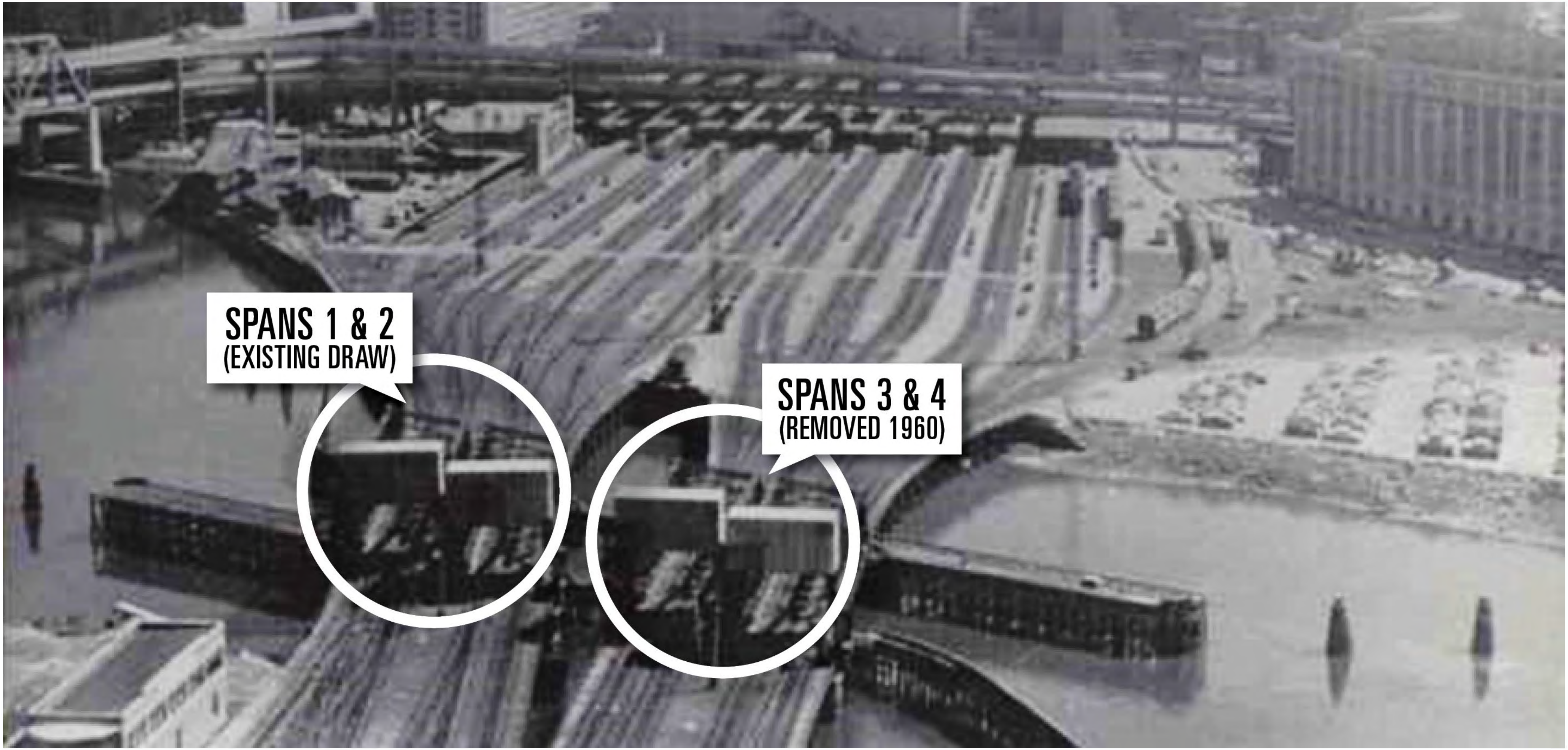
Existing Site Overview

- DCR PARK **A**
- BOSTON SAND & GRAVEL **B**
- NORTH BANK BRIDGE **C**
- TOWER A **D**
- DRAW 1 BRIDGES **E**
- LEVERETT CIRCLE CONNECTOR BRIDGE **F**



- **G** NORTH STATION
- **H** MGH BUILDING (FORMERLY SPAULDING REHAB)
- **I** CHARLES RIVER DAM
- **J** TEMPORARY STEEL FRAME CONTROL TOWER
- **K** MILLERS RIVER
- **L** DUCK BOAT RAMP
- **M** ZAKIM BRIDGE

Draw 1 1930s Final Conditions, Looking South



Historical Modifications

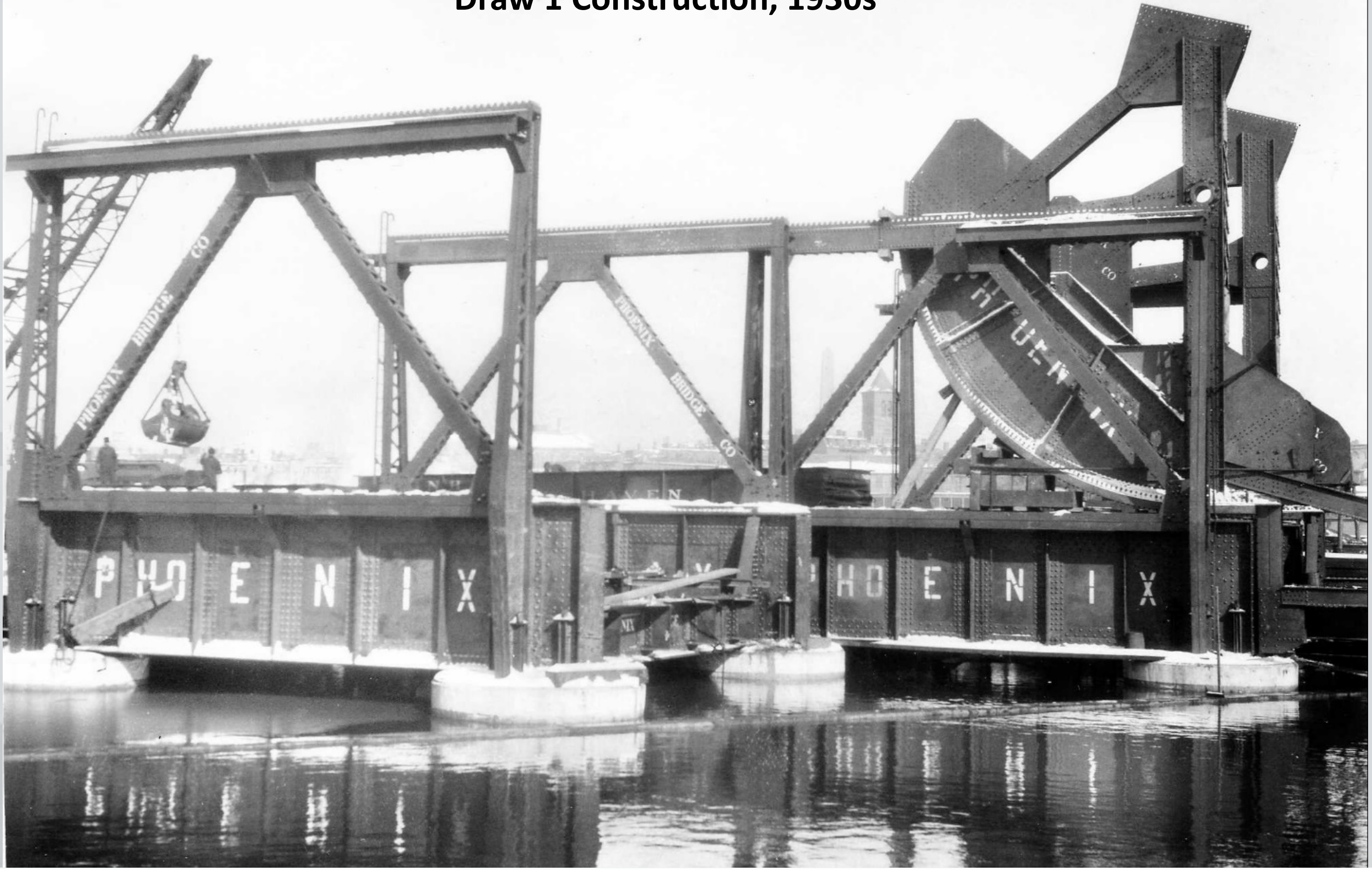
AREA OF POTENTIAL EFFECT

Draw 1 – MHC Historical Inventory Form F Summary

- **Town(s):** Boston/Cambridge
- **Place:** North Station
- **Historic/Common Name:** Draw 1
- **Ownership:** MBTA
- **Bridge Type:** Sherzer Rolling Lift Bascule
- **Date of Construction:** 1930
- **Source:** Date Plaque
- **Engineer/Designer:** Keller & Harrington, Chicago, IL
- **Bridge Company/Contractor:** Phoenix Bridge Company, Phoenixville, PA
- **Material(s):** Steel with case concrete counterweights
- **Alterations:** 1960: 2nd Set of draw trestles demolished. 1984: original south approach trestle replaced with cast concrete trestle and flanking sidewalks

Historical Modifications

Draw 1 Construction, 1930s



Draw 1 – Representative Photos

Draw 1, Spans 1 and 2, Boston Terminal. September 29, 1946

South ends of West Span (l) and East Span (r), looking northwest. 2010

Draw 1 – Representative Photos

- North approach and north ends of east span (l) and west span (r), looking southwest. 2010

Detail of Date Plaque on southeast corner of east span. 2010

Tower A – MHC Historical Inventory Form B Information

- **Town(s):** Boston/Cambridge
- **Place:** North Station
- **Historic/Common Name:** Boston and Maine Railroad Signal Tower A
- **Uses:** Railroad Signal Tower
- **Style/Form:** No Style
- **Date of Construction:** 1931
- **Source:** MBTA Archives; Barret (1996:75)
- **Architect/Builder:** Boston and Maine Railroad
- **Exterior Material(s):**
  - *Foundation: Concrete*
  - *Wall-Trim: Brick/Concrete*
  - *Roof: Metal*
- **Alterations:** Numerous window openings have been resized and window sash replaced. Most signaling equipment has been removed from interior

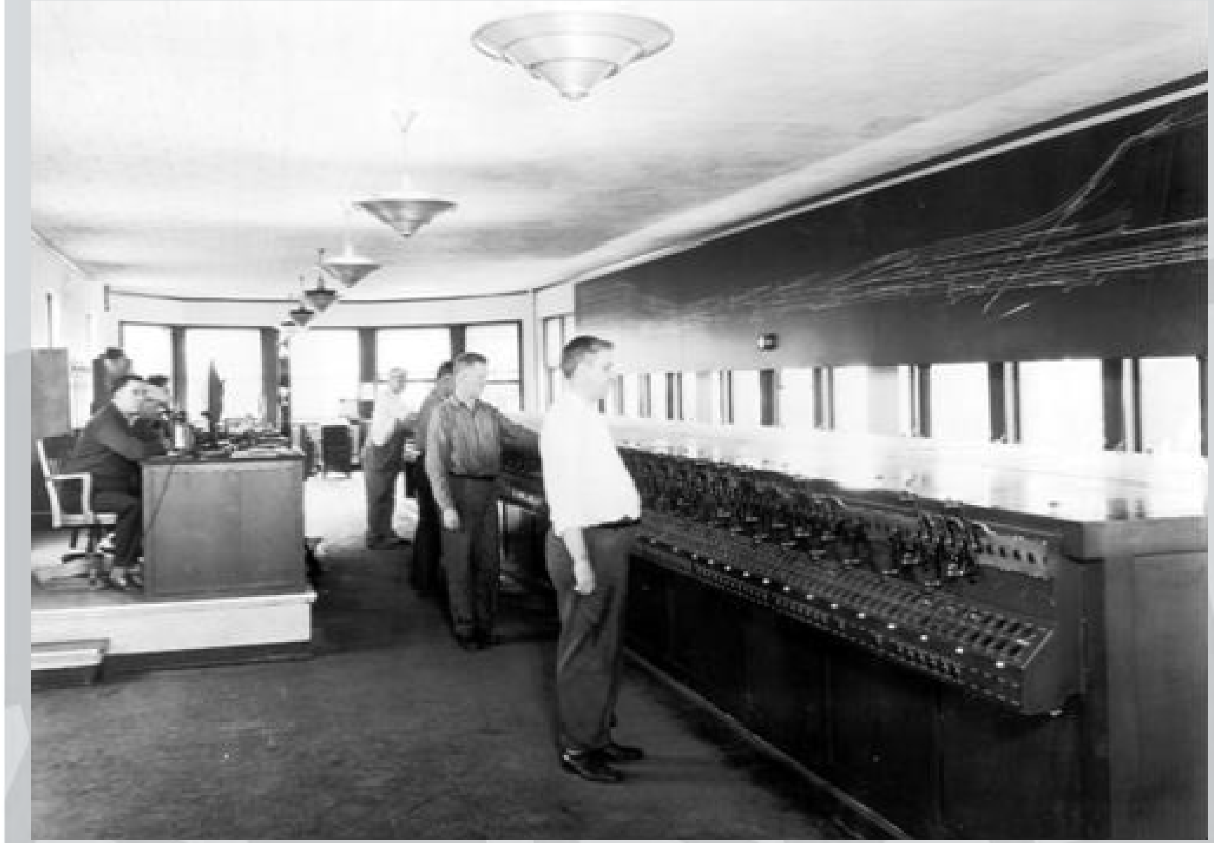
Tower A – Representative Photos

“”Tower A” courtesy of B&M RR Historical Soc. Archives.
Date unknown

South bay and east elevation, looking northwest. 2010

Tower A – Representative Photos

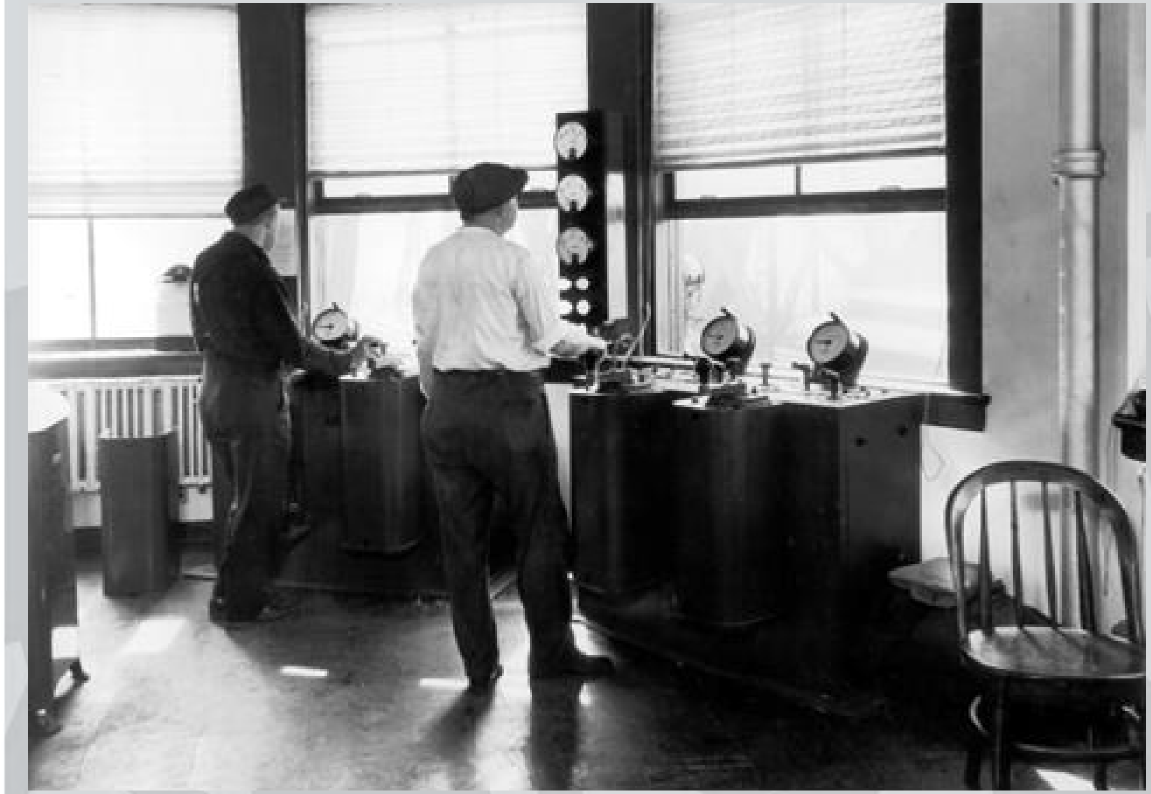
Interior of Signal Tower A control room. Date unknown



Director's Room (asbestos containment to the left). 2020

Tower A – Representative Photos

Interior of Signal Tower A control room. Date unknown



Current control room without bridge control consoles. 2020

Tower A – Representative Photos

Switching machinery, second floor control room, since moved to current control tower. 2010

Detail of frieze panel on west elevation, 2010

Historical Modifications

Old Tower A Control Room, 1884

Old Tower A Fire, 1914

Historical Modifications

Causeway Street, 1884

North Station Train Shed, 1902

Existing Conditions

Rendered Model – Design Team Update

[North Station Draw 1 Virtual tour (123bim.com)]

PRESENTATION

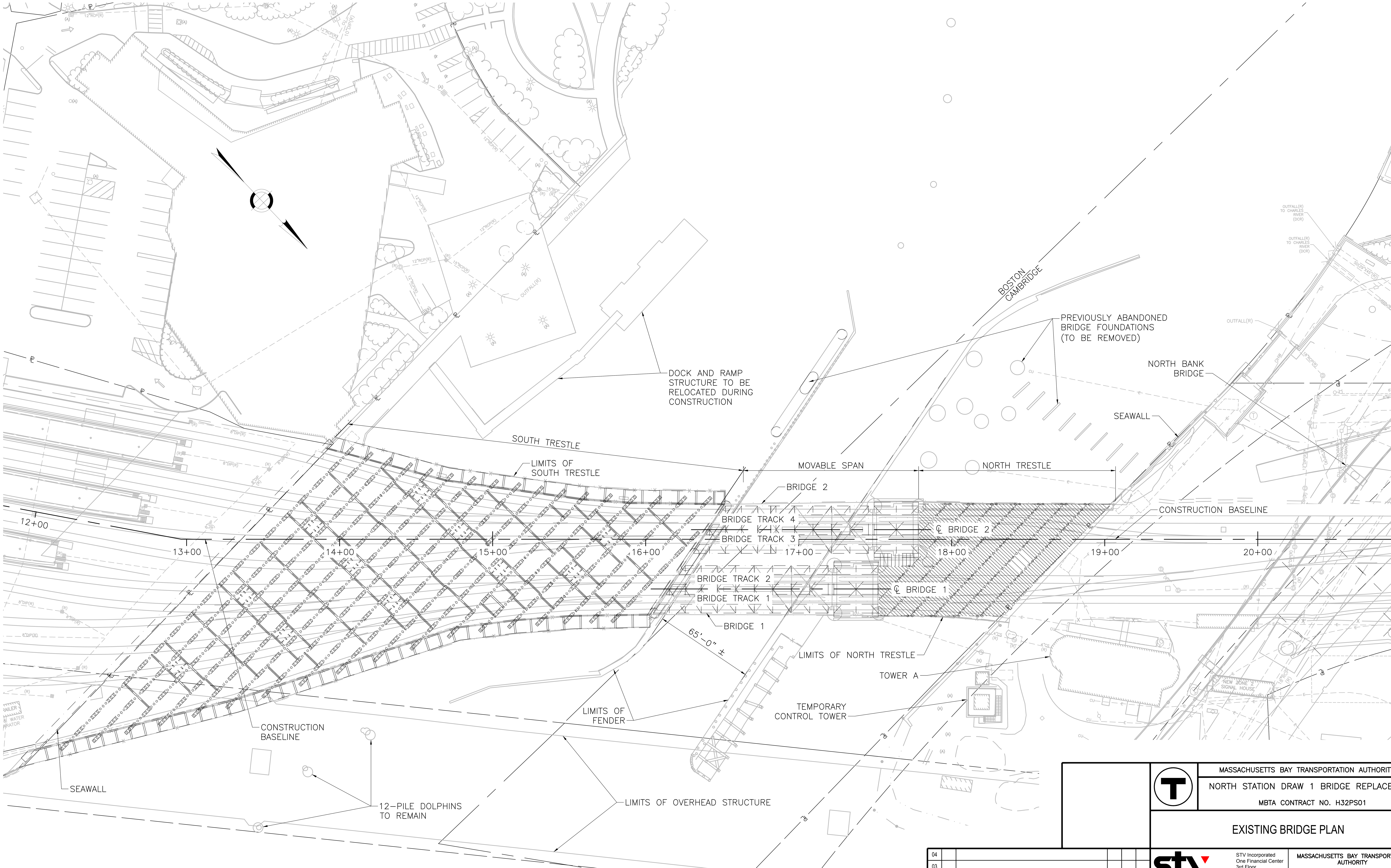
MBTA CONTRACT NO. H32PS01

QUESTIONS & ANSWERS

THANK YOU

STV 100 Years

Appendix C
Engineering Plans



EXISTING BRIDGE PLAN

SCALE: 1" = 30'

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

EXISTING BRIDGE PLAN

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE: 1" = 30'
Vert. SCALE: 1" = 30'
DATE: NOV. 20, 2024

DES. BY WRG | DR. BY WRG | CHK. BY JM

PLAN NO.
SHEET BR-G-37
ISSUE

I:\Projects\40204150\40204150_0001\90_CAD Models and Sheets\06_S_Structural\H32PS01_BR_G-37_(Existing Bridge Plan).dwg, 11/20/2024 6:25 AM, Goulet, William R.

EXISTING LONGITUDINAL SECTION

SCALE: $\frac{1}{16}$" = 1'-0"

NOTES:

1. TIMBER PILES AT SOUTH TRESTLE ARE FROM ORIGINAL CONSTRUCTION AND WERE RETROFITTED DURING TRESTLE RECONSTRUCTION.
2. NORTH AND SOUTH TRESTLE SPAN LENGTHS SHOWN ARE MEASURED PERPENDICULAR TO THE PIER CENTERLINES.
3. MOVABLE SPAN EAST TRUSS SHOWN.
4. SEE SHEETS G-39 THROUGH G-41 FOR TYPICAL SECTIONS.

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

EXISTING LONGITUDINAL SECTION

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

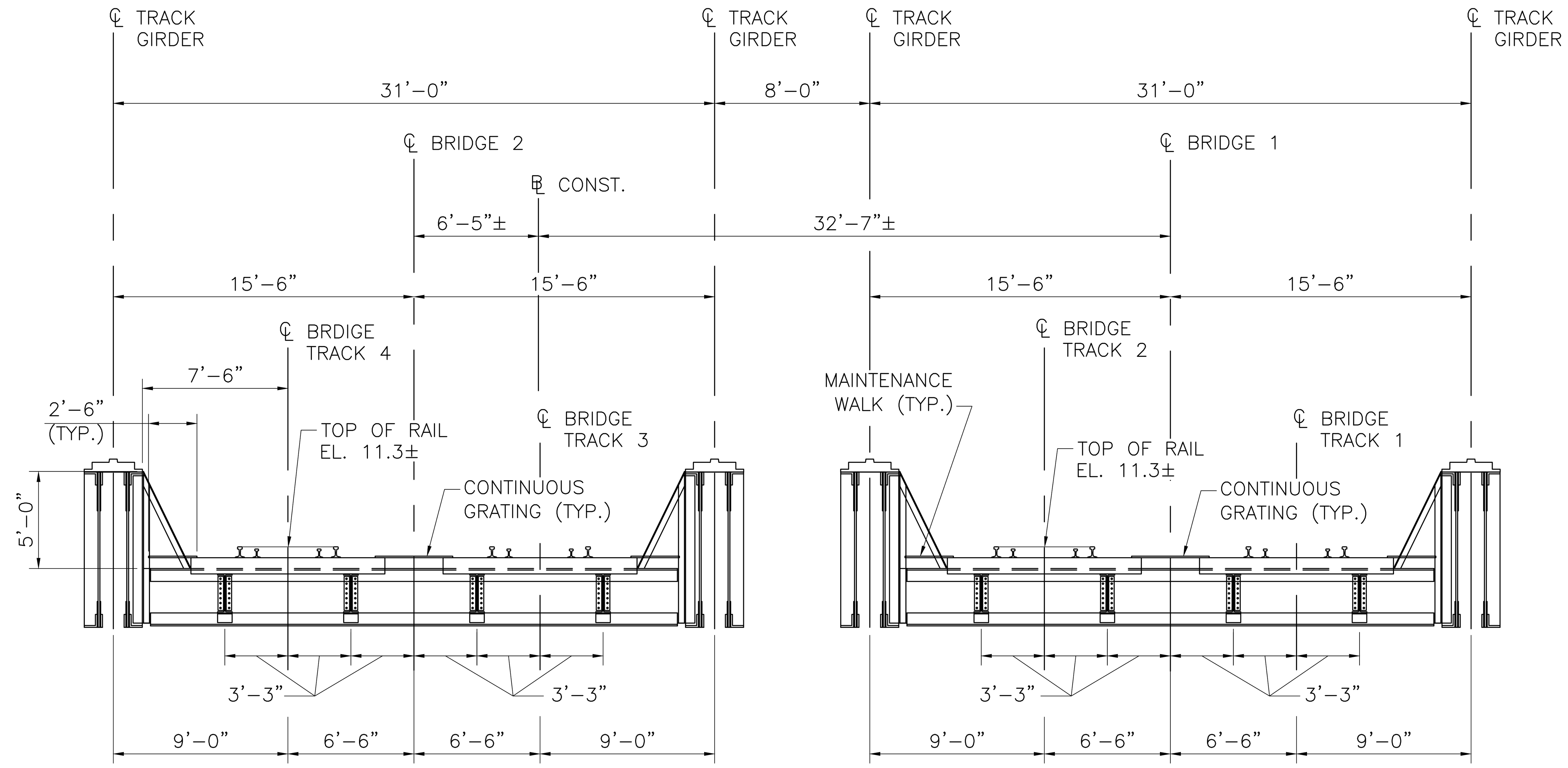
Horiz. SCALE: 1/16" = 1'-0"
Vert. SCALE: 1/16" = 1'-0"
DATE: NOV. 20, 2024

DES. BY WRG | DR. BY WRG | CHK. BY JM

PLAN NO.

SHEET BR-G-38

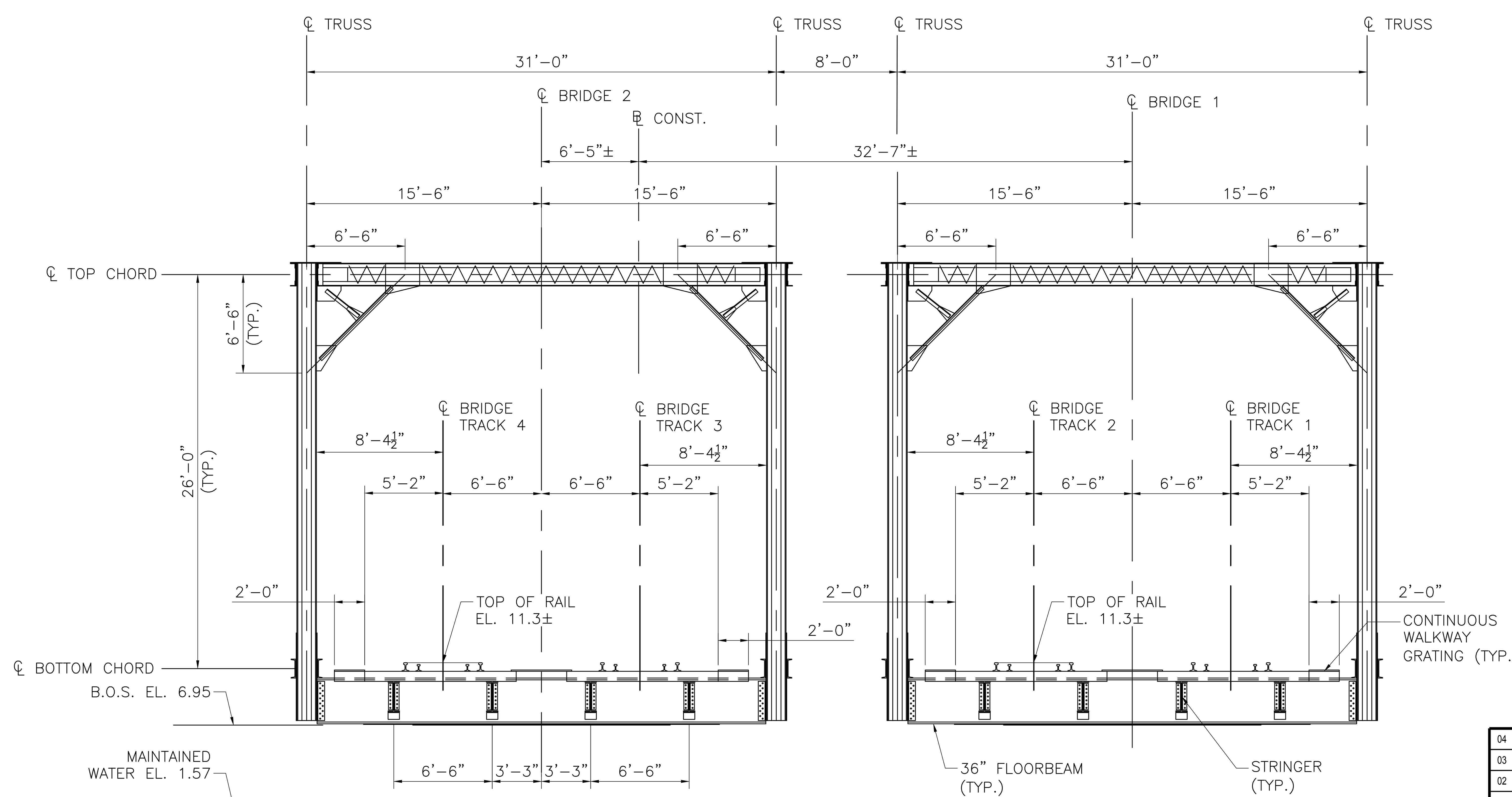
ISSUE



NOTE: MINIMUM HORIZONTAL CLEARANCE AT TRACK GIRDER = 7'–6".

EXISTING TRACK GIRDER SECTION

SCALE: $\frac{3}{16}$" = 1'–0"



NOTE: MINIMUM HORIZONTAL CLEARANCE AT PORTAL FRAME = 7'–11".

EXISTING BASCULE SECTION

SCALE: $\frac{3}{16}$" = 1'–0"

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

EXISTING TYPICAL SECTIONS 1 OF 3

stv

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE: 3/16" = 1'=0"

Vert. SCALE: 3/16" = 1'=0"

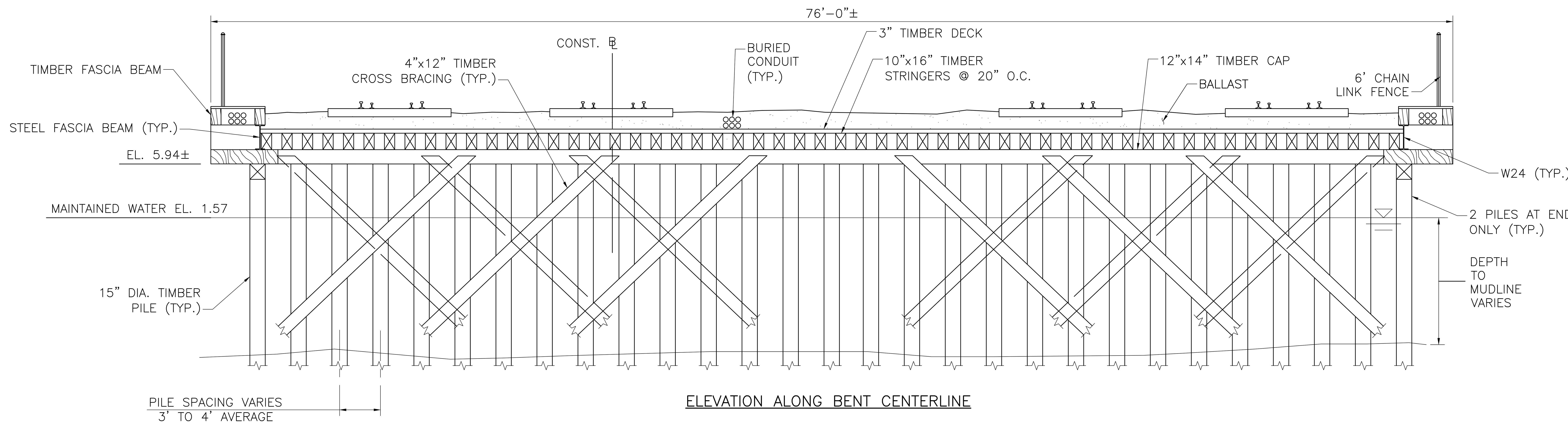
DATE: NOV. 20, 2024

DES. BY WRG | DR. BY WRG | CHK. BY JM

PLAN NO.

SHEET BR-G-39

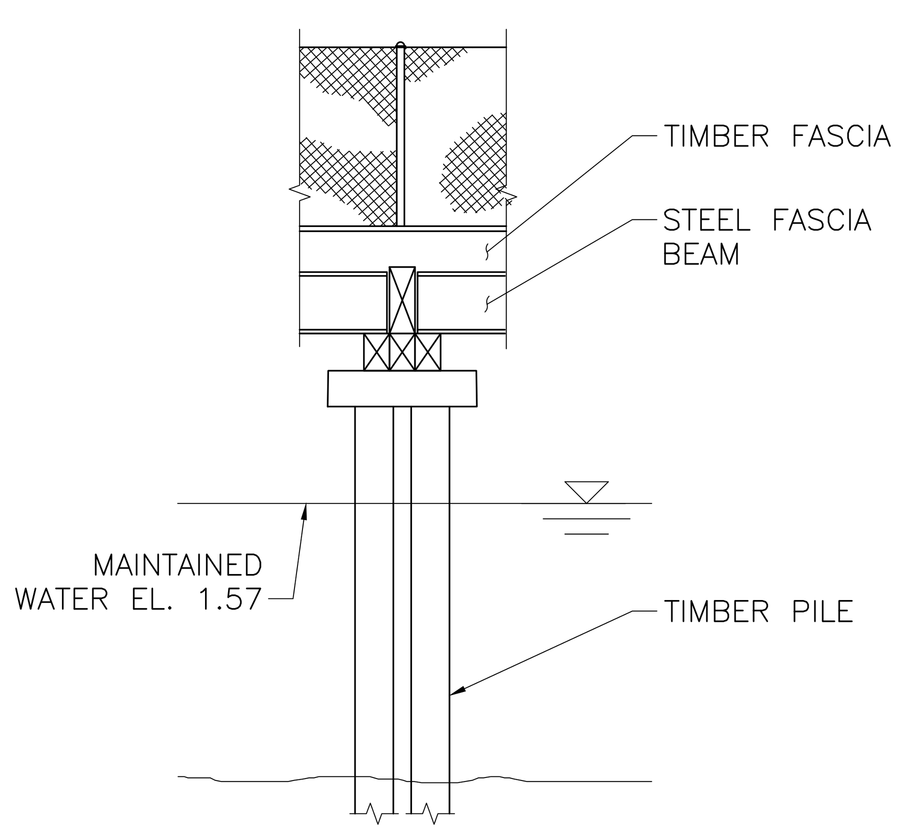
ISSUE



ELEVATION ALONG BENT CENTERLINE

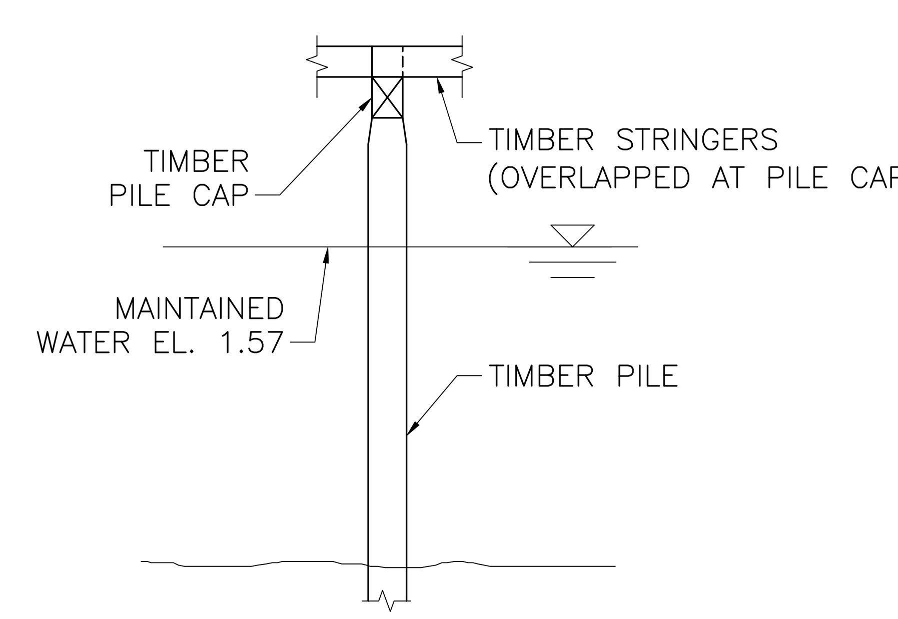
EXISTING NORTH TRESTLE CROSS SECTION

SCALE: 3/16" = 1'–0"



ELEVATION AT END CAP

SCALE: 3/16" = 1'–0"



ELEVATION AT TYPICAL PILE

SCALE: 3/16" = 1'–0"

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

EXISTING TYPICAL SECTIONS 2 OF 3

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

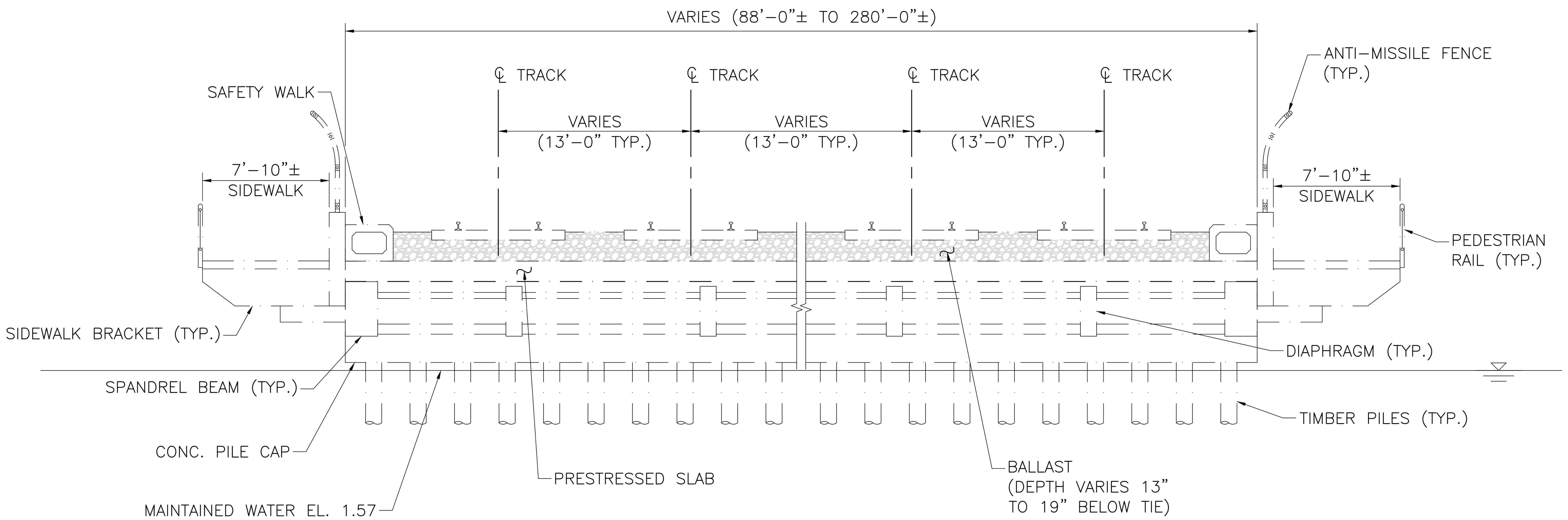
Horiz. SCALE: 3/16" = 1'=0"
Vert. SCALE: 3/16" = 1'=0"
DATE: NOV. 20, 2024

DES. BY: WRG | DR. BY: WRG | CHK. BY: JM

PLAN NO.

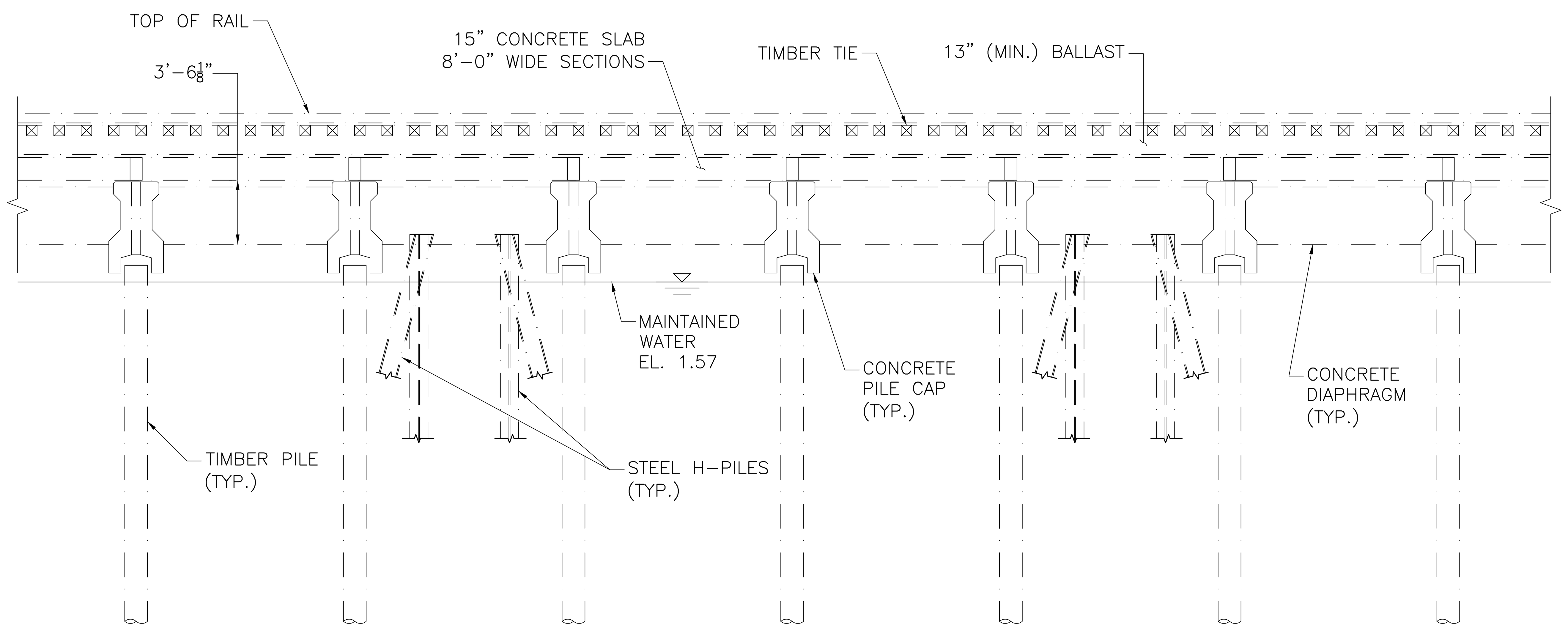
SHEET BR-G-40

ISSUE



EXISTING SOUTH TRESTLE SECTION

SCALE: $\frac{3}{16}$" = 1'–0"



EXISTING SOUTH TRESTLE ELEVATION

SCALE: $\frac{3}{16}$" = 1'–0"

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

EXISTING TYPICAL SECTIONS 3 OF 3

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE: 3/16" = 1'-0"
Vert. SCALE: 3/16" = 1'-0"
DATE: NOV. 20, 2024

DES. BY	DR. BY	CHK. BY
WRG	WRG	JM

PLAN NO.

SHEET BR-G-41

ISSUE

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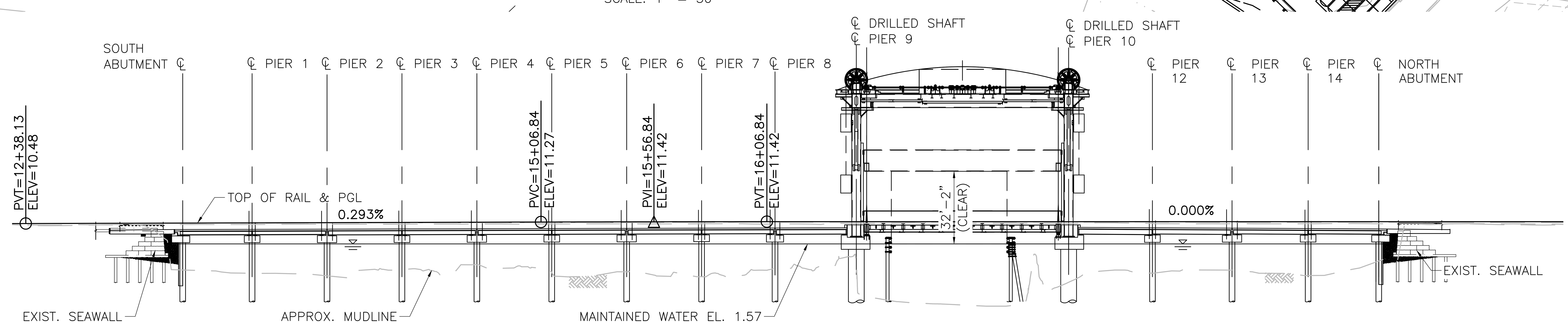
OVERALL PLAN

SCALE: 1" = 30'



PROFILE OVER CHARLES RIVER

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 30'

NOTES:

1. PROFILE SHOWN AT TRACK 4. TRACK PROFILES VARY, SEE TRACK SHEETS T-301 THROUGH T-310 AND T-401 THROUGH T-426 FOR PROFILE INFORMATION.
2. FOR BORING LOCATIONS SEE SHEET G-4 AND G-5.
3. STATIONING PROVIDED IS AT THE CONSTRUCTION BASELINE.
4. WORK AT NORTH BANK BRIDGE LOCATION NOT SHOWN FOR CLARITY.
5. SEE NORTH STATION DRAWINGS FOR WORK TO BE PERFORMED AT EXISTING PLATFORMS AND PROPOSED PLATFORM F.
6. SEE CIVIL DRAWINGS C-201 AND C-202 FOR LIMITS OF DREDGING.
7. MICROPILES UNDER OVERHEAD STRUCTURE NOT SHOWN IN PROFILE VIEW FOR CLARITY.
8. MAINTAINED WATER ELEVATION IS 1.57'. THE LOW MAINTAINED WATER ELEVATION IS 0.07' AND THE HIGH MAINTAINED WATER ELEVATION IS 2.07'. 100 YEAR FLOOD ELEVATION IS 3.5' AND 500 YEAR FLOOD ELEVATION IS 5.17'.

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01

PLAN AND ELEVATION

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE: 1" = 30'
Vert. SCALE: 1" = 30'
DATE: NOV. 20, 2024

DES. BY	DR. BY	CHK. BY
KS	SK	WRG

PLAN NO.
SHEET BR-S-1
ISSUE

LONGITUDINAL SECTION

SCALE: $\frac{3}{32}$" = 1'-0"

NOTES:

1. LONGITUDINAL SECTION SHOWN AT BASELINE OF CONSTRUCTION.
2. MAINTAINED WATER ELEVATION IS 1.57'. THE LOW MAINTAINED WATER ELEVATION IS 0.07' AND HIGH MAINTAINED WATER ELEVATION IS 2.07'.
3. ROCK PROFILE SHOWN IS BASED ON BORINGS AB-21, AB-19, AB-17, AB-15, BB-13, BB-11, AB-09, AB-06 AND AB-03(W). SEE BORING LOGS FOR TOP OF PARTIALLY LITHIFIED ROCK AND CORING ELEVATIONS FOR ALL OTHER LOCATIONS.

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

LONGITUDINAL SECTION 1 OF 2

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE AS NOTED
Vert. SCALE AS NOTED
DATE: NOV. 20, 2024

DES. BY KS | DR. BY SJK | CHK. BY WRG

PLAN NO.

SHEET BR-S-2

ISSUE

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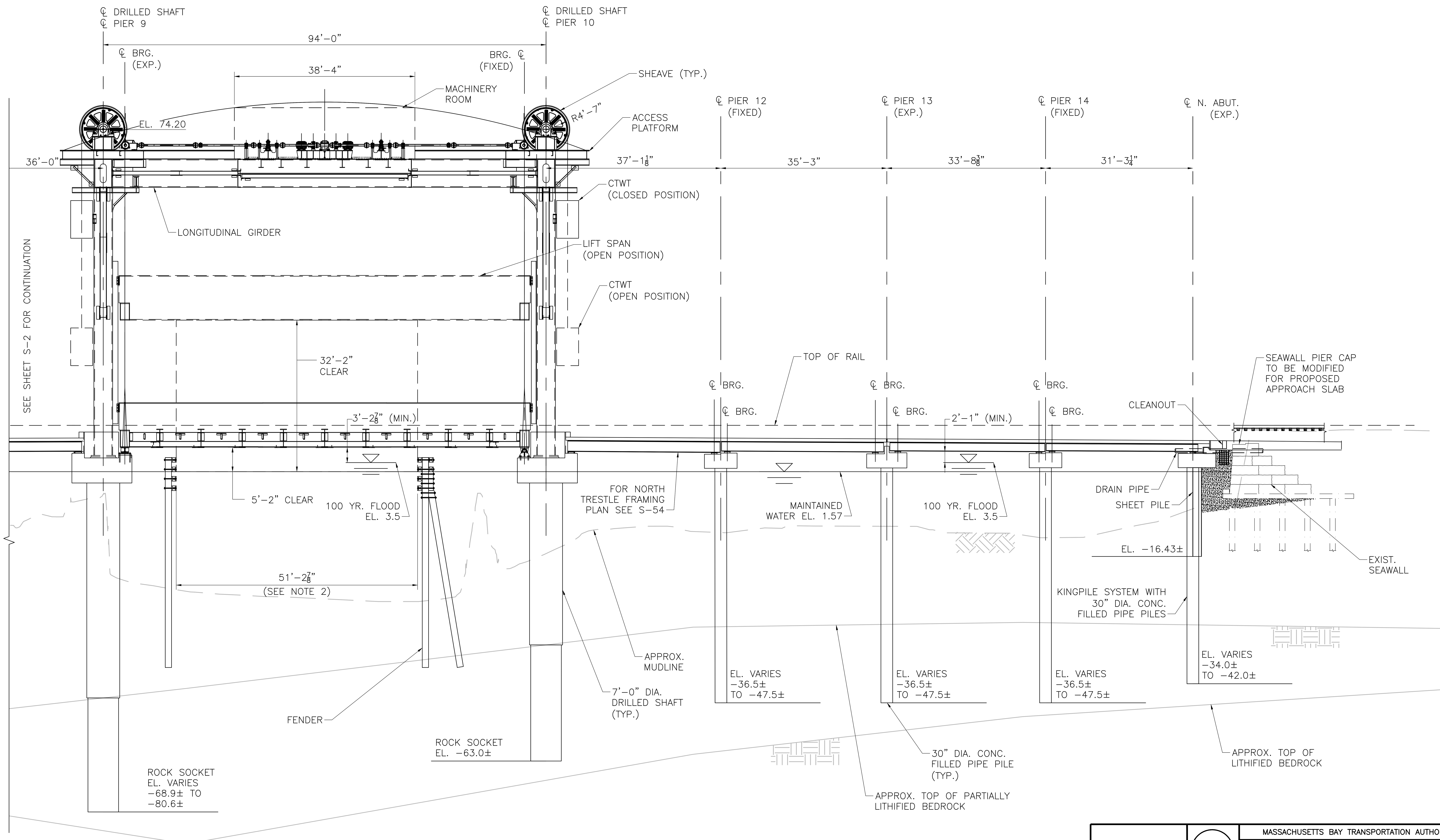


LONGITUDINAL SECTION

SCALE: 3/32" = 1'–0"

NOTES:

1. LONGITUDINAL SECTION SHOWN AT BASELINE OF CONSTRUCTION.
2. CHANNEL WIDTH IS 45'–0" MEASURED PERPENDICULAR TO THE FENDER SYSTEM.
3. PIER 11 NOT SHOWN. LIMITS OF PIER 11 SUPPORT BRIDGE TRACKS 5 AND 6 ONLY AND IS BEYOND THE CONSTRUCTION BASELINE SECTION AS SHOWN.
4. MAINTAINED WATER ELEVATION IS 1.57'. THE LOW MAINTAINED WATER ELEVATION IS 0.07' AND HIGH MAINTAINED WATER ELEVATION IS 2.07'.
5. ROCK PROFILE SHOWN IS BASED ON BORINGS AB–21, AB–19, AB–17, AB–15, BB–13, BB–11, AB–09, AB–06 AND AB–03(W). SEE BORING LOGS FOR TOP OF LITHIFIED BEDROCK AND CORING ELEVATIONS FOR ALL OTHER LOCATIONS.
6. CLADDING SYSTEM AND SUPPORTING FRAMING AT MACHINERY LEVEL NOT SHOWN FOR CLARITY.

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

LONGITUDINAL SECTION 2 OF 2

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE AS NOTED

Vert. SCALE AS NOTED

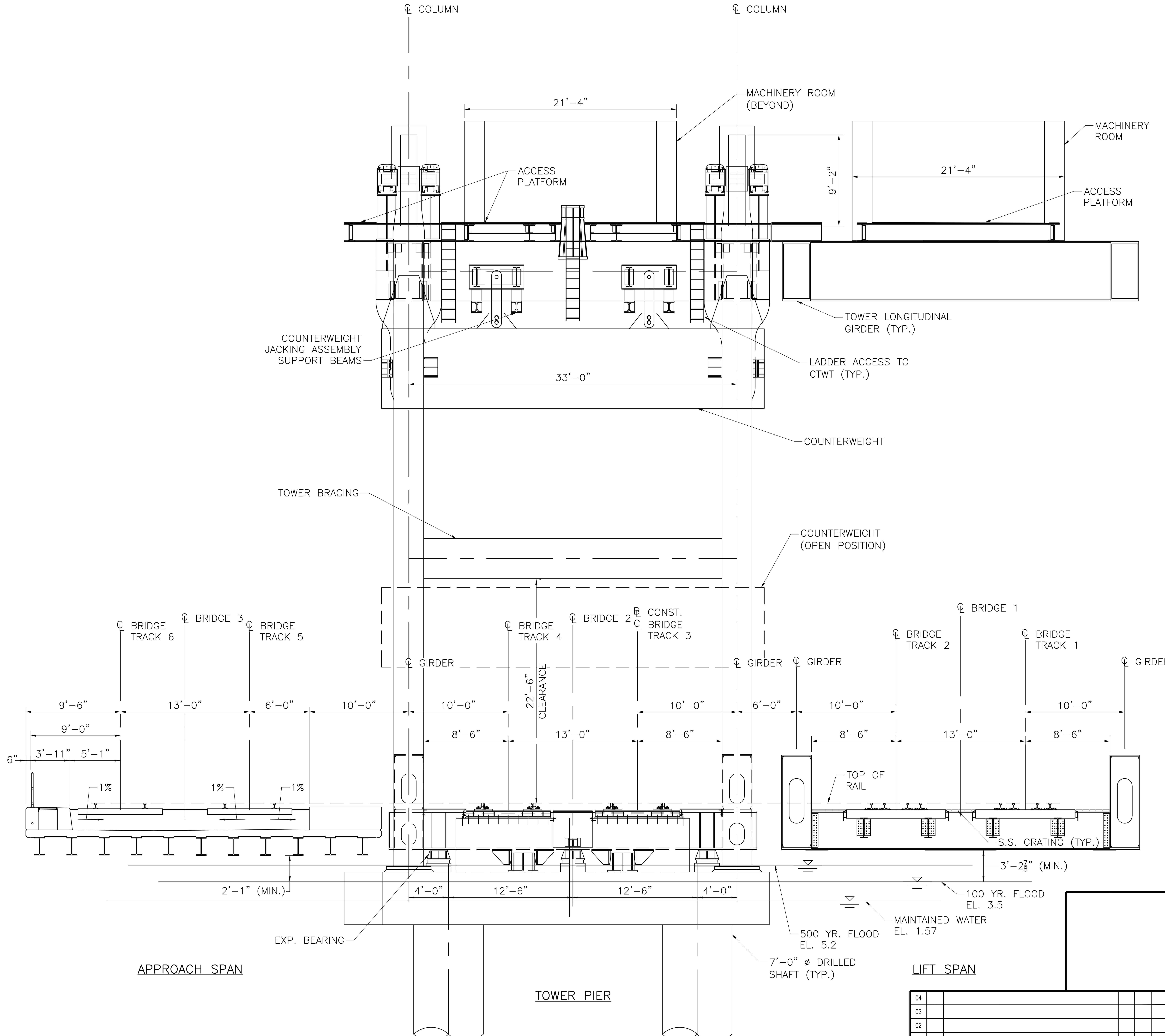
DATE: NOV. 20, 2024

DES. BY KS | DR. BY SJK | CHK. BY WRG

PLAN NO.

SHEET BR-S-3

ISSUE



TRANSVERSE SECTION (STA. 16+42.12)

SCALE: 3/16" = 1'-0"

NOTES:

1. COUNTERWEIGHT ROPE CONNECTIONS NOT SHOWN.
2. MACHINERY ROOM CLADDING SUPPORTS NOT SHOWN.
3. COUNTERWEIGHT RAILING NOT SHOWN.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

TRANSVERSE SECTION

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

stv

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE: 3/16" = 1'-0"

Vert. SCALE: 3/16" = 1'-0"

DATE: NOV. 20, 2024

DES. BY KS | DR. BY SJK | CHK. BY WRG

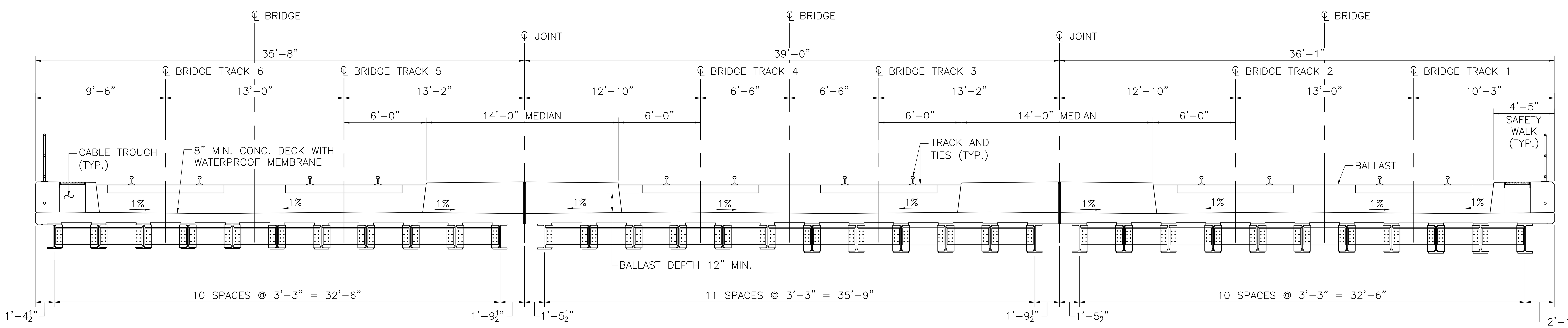
PLAN NO.

SHEET BR-S-4

ISSUE

SOUTH TRESTLE TYPICAL SECTION

SCALE: ¼" = 1'–0"



SOUTH TRESTLE SECTION (AT LIFT SPAN)

SCALE: ¼" = 1'–0"

NOTES:

1. TYPICAL SECTION SHOWN AT STA. 14+90±.
2. SOUTH TRESTLE SECTION AT LIFT SPAN SHOWN AT LIFT SPAN PIER BEARING CENTERLINE.
3. FOR ADDITIONAL DECK DETAILS SEE SHEET S–58 AND S–59.
4. TURNOUTS NOT SHOWN FOR CLARITY.

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

SOUTH TRESTLE TYPICAL SECTIONS

stv

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

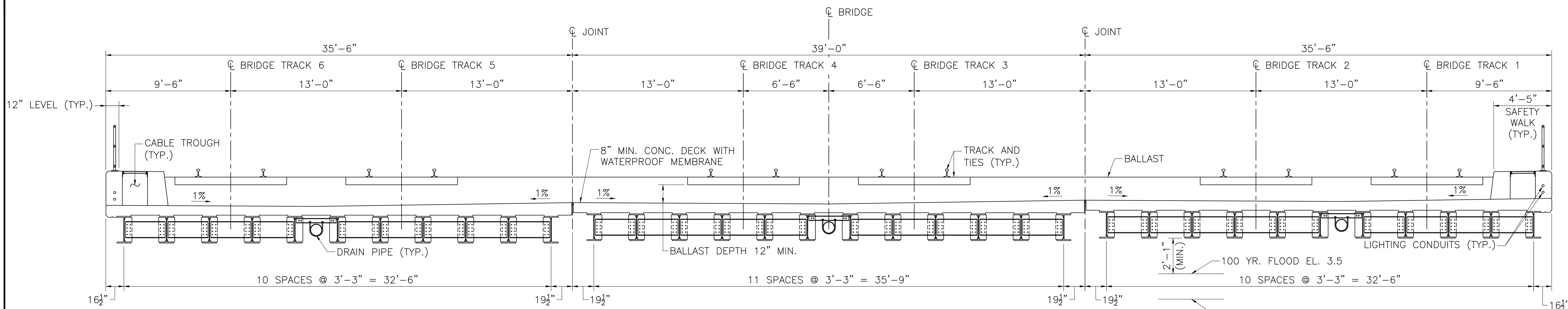
Horiz. SCALE AS NOTED
Vert. SCALE AS NOTED
DATE: NOV. 20, 2024

DES. BY KS | DR. BY KS | CHK. BY WRG

PLAN NO.

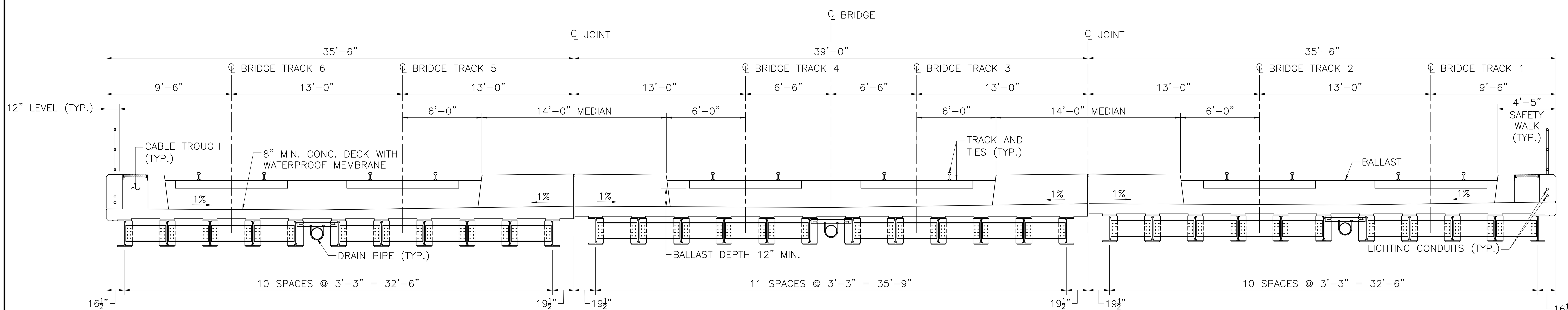
SHEET BR-S-45

ISSUE



NORTH TRESTLE TYPICAL SECTION

SCALE: ¼" = 1'-0"



NORTH TRESTLE SECTION (AT LIFT SPAN)

SCALE: ¼" = 1'-0"

NOTES:

1. TYPICAL SECTION SHOWN AT STA. 18+25±.
2. TYPICAL SECTIONS MAINTAIN 1% CROSS SLOPE FOR TOP OF DECK PERPENDICULAR TO THE BEAMS. SEE SHEET S-61 AND S-62 FOR TOP OF DECK ELEVATIONS FOR EACH SPAN.
3. FOR ADDITIONAL DECK DETAILS SEE SHEET S-58 AND S-59.
4. TURNOUTS NOT SHOWN FOR CLARITY.

ISSUE	DATE	DESCRIPTION	BY	CHKD.	APP.
04					
03					
02					
01					

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

MBTA CONTRACT NO. H32PS01

NORTH TRESTLE TYPICAL SECTION

STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Manager of Design: "Name" Date:

Horiz. SCALE AS NOTED | Vert. SCALE AS NOTED | DATE: NOV. 20, 2024

DES. BY WHM | DR. BY WHM | CHK. BY COD

PLAN NO. | SHEET BR-S-52 | ISSUE

Appendix D
Construction Methods / Construction Staging Report

Construction Staging Report available upon request

Draw One Bridge Replacement

Draft Environmental Assessment

Construction Methods

May 22, 2023

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TABLE OF CONTENTS

FIGURES

TABLES

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1.0 INTRODUCTION

The Massachusetts Bay Transportation Authority (MBTA) is seeking funds to be provided through the Federal Transit Administration ("FTA") and the Federal Railroad Administration ("FRA") to demolish and replace the superstructure and substructures of the North Station Draw One Bridge spans and approach spans over the Charles River, as well as the adjoining Signal Tower A, and upgrading the track network, communications and signaling systems. The two remaining operational bridges are rolling lift bridges and each carry two tracks. Portions of two additional bridges that were partially demolished are located to the west of the operational bridges. The Proposed Project includes the replacement of the original four bridges with three vertical lift bridge structures. Each vertical lift bridge will support two tracks (for a total of six tracks) over the Charles River.

This document describes the anticipated construction methods and activities for the Proposed Project; assesses the potential for temporary environmental impacts and identifies recommended mitigation measures. It is not intended to describe the precise construction methods that may ultimately be used, nor is it intended to dictate or confine the construction process. Actual construction methods and materials may vary, depending in part on how the construction contractors choose to implement their work to be most cost effective, within the requirements set forth in bid, contract, and construction documents, as well as to comply with mitigation requirements.

Where a variety of alternative construction methods or techniques could be utilized for the Proposed Project, the EA analysis evaluates the methods that are considered to have the greatest potential for adverse environmental impact.

2.0 CONSTRUCTION SCHEDULE, ACCESS, AND SEQUENCE

2.1 CONSTRUCTION SCHEDULE

MBTA anticipates construction of the Proposed Project to take approximately eight years, with construction beginning in 2026 and being completed in 2034. Construction activities may occur up to 7 days a week. Work shifts would be primarily during the daytime from 7am-3pm. At certain times in the construction, nighttime work may be performed between 3pm-11pm and 11pm-7am. Based on consultation with Federal and state regulatory permitting agencies, time of year (TOY) restrictions for Essential Fish Habitat (EFH) would be implemented for certain in-water construction work. TOY restrictions for in-water work associated with major silt-producing activities (e.g., channel dredging, removing existing caissons, removing existing and temporary piles) would generally be February 15 to July 15, with a requirement to maintain downstream passage September 1 to November 15. The proposed construction schedule accounts for these TOY restrictions, and all in-water work subject to these restrictions would be completed outside of the designated time periods.

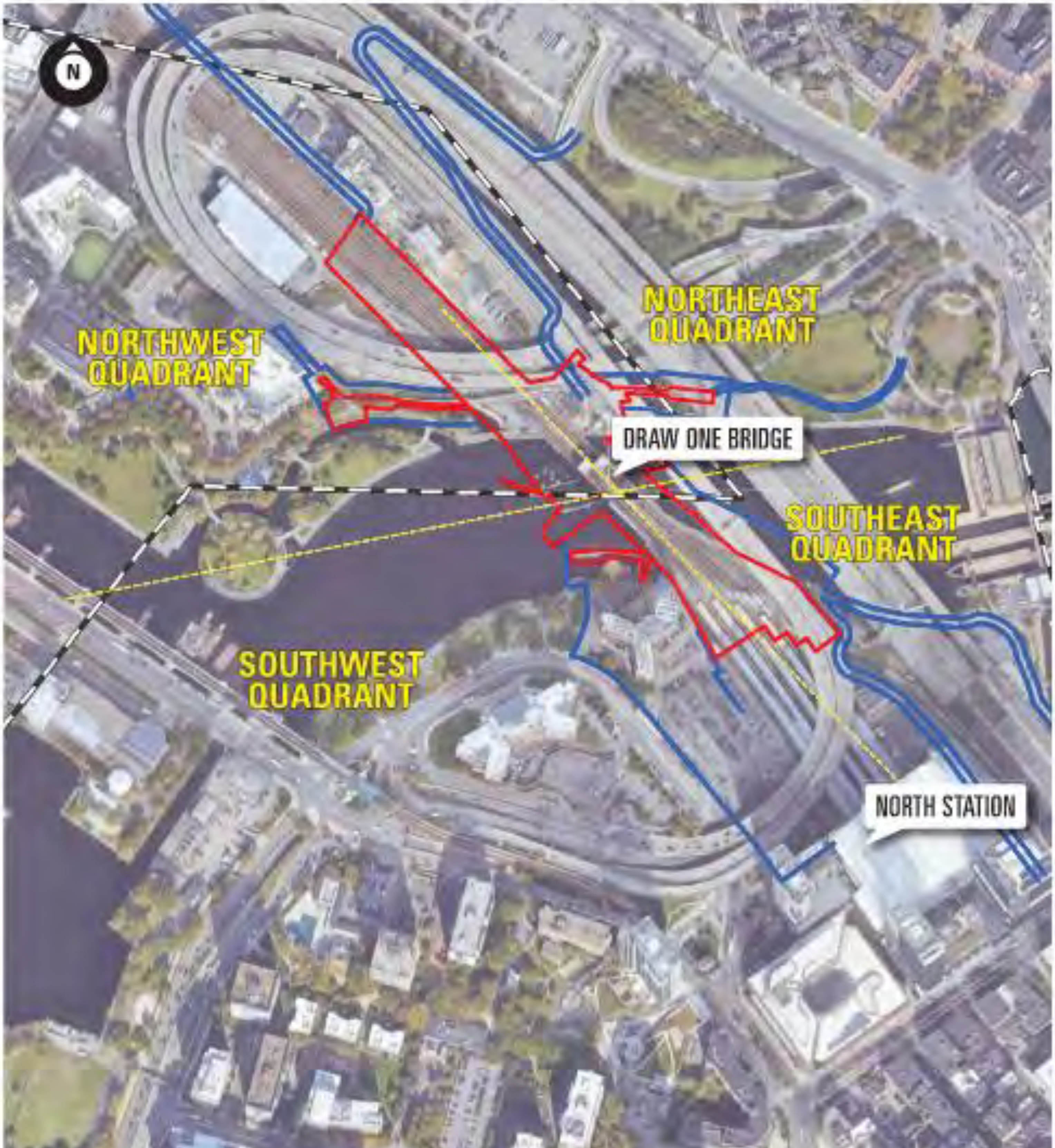
2.2 CONSTRUCTION ACCESS

The primary areas of construction within the Project Site are the Draw One Bridges, Tower A, and track and signal upgrades to tie into North Station and the mainline tracks to the north. Access to these primary areas is through the following quadrants (**Figure 2.2-1**):

- The Southwest Quadrant - access near MGH allows access for construction between the North Station Platforms and the bridge and provides access to construct the Draw One Bridges Phases 1 through 3.
- The Northwest Quadrant - access to construct the Draw One Bridges Phases 1 through 3, the west end of the North Bank Bridge, and access to the mainline tracks up through the limits of work.
- The Southeast Quadrant - access to construct the Draw One Bridges Phases 3 through 5.
- The Northeast Quadrant - access to construct the Draw One Bridges Phases 3 through 5, the new Tower A, the east end of the North Bank Bridge, and access to the mainline tracks up through the project limits.

Additional access to the T-Pad laydown site in Somerville, MA is expected to occur throughout the project and can be used for material deliveries that will utilize the tracks to make deliveries to the Project Site.

Truck access to these quadrants is described in **Section 4.2, “Construction Access Routes.”**



Permanent Limit of Work (LOW)

Municipal Boundary

Temporary Limit of Work (LOW)

Figure 2.2-1: Project Construction Access - Quadrants

2.3 CONSTRUCTION SEQUENCE

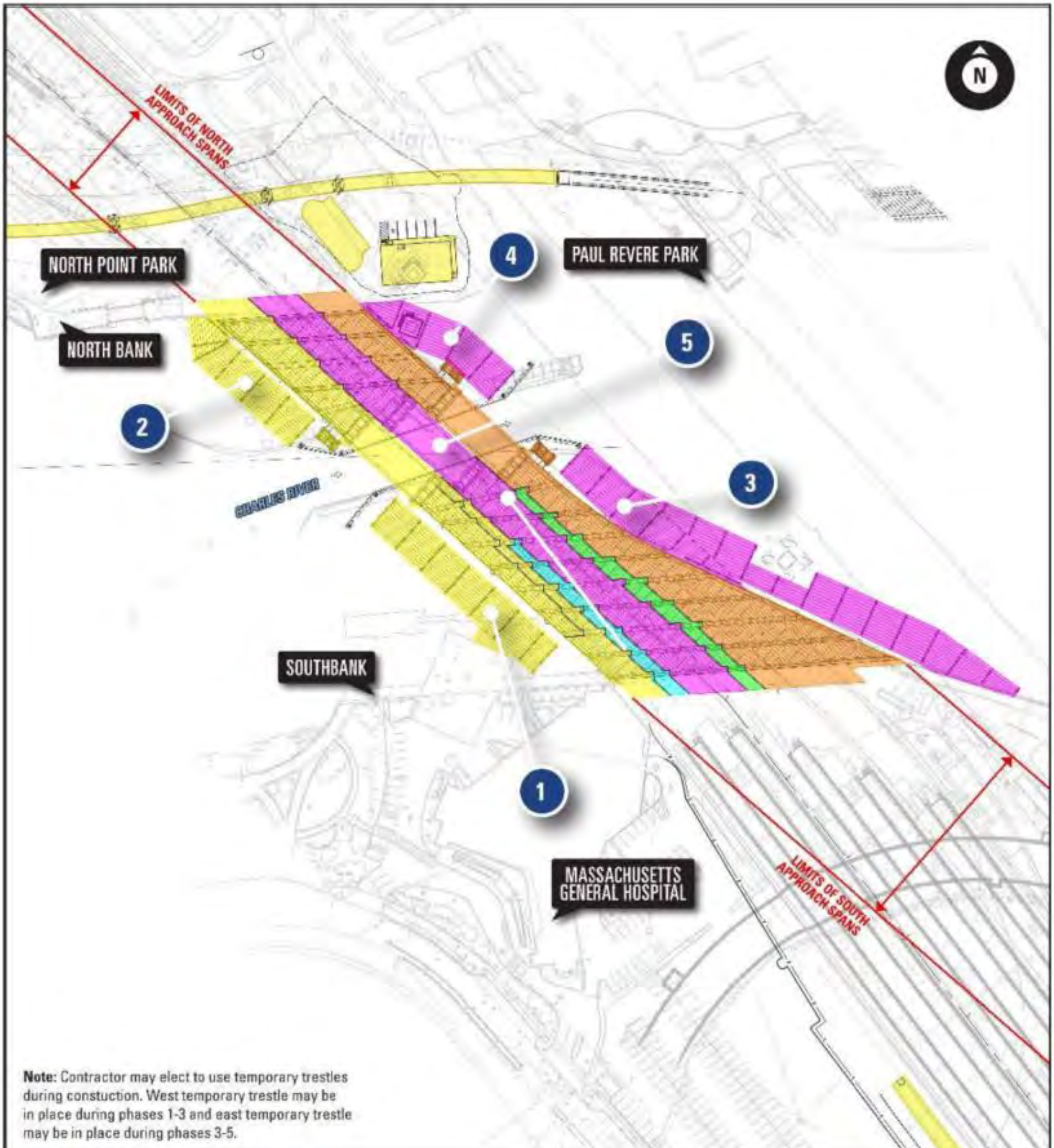
The contractor will be required to follow the sequencing identified within the track construction staging plans which will be provided in the contract documents. The contractor will determine the details of the sequencing activities. Bridge construction will be carried out in five phases as shown in **Table 2.3-1** and on **Figure 2.3-1**. These bridge construction phases would be coordinated with the track construction staging plans. It is anticipated that each vertical lift bridge will take up to two years to construct. Multiple track phases would also be required to access each work zone in between bridge phases. Therefore, the overall duration of construction could be up to eight years due to the complexity of the construction staging required to maintain levels of service at North Station.

Table 2.3-1: Construction Sequence and Duration[1]

Phase	Key Components	Estimated Duration (months)
Site Preparation & Mobilization	Signal duct banks, temporary control tower relocation,[2] demolition of existing bridge foundations, west temporary trestle construction, early Track and Signal work.	4 Months
Bridge Phase 1	Demolition of Existing Tower A, Construction of Proposed Tower A, North Bank Bridge Modification,[3] West approaches and western vertical lift span, Track and Signal work	31 Months
Bridge Phase 2	South approach spans, Track and Signal work	5 Months
Bridge Phase 3	East temporary trestle construction, Center approach spans and center vertical lift span, Track and Signal work	20 Months
Bridge Phase 4	South approach spans, Track and Signal work	9 Months
Bridge Phase 5	East approach spans and eastern vertical lift span, Track and Signal work	27 Months
	Total	**96 Months**

Notes:
[1] *This is the same table as referenced in Figure 2.3-1.*
[2] *The current design assumes that the temporary control tower would be relocated onto the temporary work trestle, though the contractor may consider alternate locations as part of their evaluation of additional construction means and methods.*

Source: STV (Jan 2023)



Note: Contractor may elect to use temporary trestles during constuction. West temporary trestle may be in place during phases 1-3 and east temporary trestle may be in place during phases 3-5.

- Phase 1 (31 months)
- Phase 2 (5 months)
- Phase 3 (20 months)
- Phase 4 (9 months)
- Phase 5 (27 months)

1. Southwest Temporary Trestle
2. Northwest Temporary Trestle
3. Southeast Temporary Trestle
4. Northeast Temporary Trestle
5. Draw One Moveable Spans

BRIDGE CONSTRUCTION PHASES

DRAW ONE BRIDGE PROJECT

BOSTON/CAMBRIDGE, MA

FIGURE 2.3-1 | AUGUST 2024

3.0 CONSTRUCTION OF KEY ELEMENTS

3.1 SUBSTRUCTURE

Construction of the substructures would consist of the installation of a combination of foundation types. The Draw One Bridge would be supported by 12 drilled shafts, 321 concrete filled pipe piles and 39 micropiles, the fender system would consist of 207 composite fiberglass reinforced piles, Tower A will be supported by 65 H-piles, and the North Bank Bridge would require 18 micropiles. The work would also include the demolition of the existing foundations for the Draw One Bridge, Tower A, and two piers of the North Bank Bridge. The work would also include the demolition of the existing foundations for the Draw One Bridge, including 25 piers, 21 caissons, the fender system, and Tower A.

3.1.1 IN-RIVER STRUCTURES

To support the removal of eleven (11) caissons that supported the former Draw One Bridge piers, two cofferdams may be installed. One cofferdam, approximately 98 feet x 58 feet, would encapsulate the set of eight (8) caissons on the north side of channel, and a second cofferdam approximately 104 feet x 27 feet would encapsulate the "rest pier cap" and the three (3) caissons that support it on the south side of channel (**Figure 3.1-1**). Installation of the cofferdams would be conducted from a barge prior to the construction of the temporary trestle and would take approximately one (1) week for installation. Installation of the cofferdam sheets would be performed by vibratory hammer or impact hammer. The cofferdams would not be dewatered but would be closed to contain debris and disturbed sediment. Cofferdam sheet piles would be removed via vibratory or impact hammer. Silt curtains or other methods of minimizing sediment dispersal would be installed around the cofferdams during their removal as needed. It is anticipated that each cofferdam would be in place for approximately three months during the Site Preparation and Mobilization phase of construction.

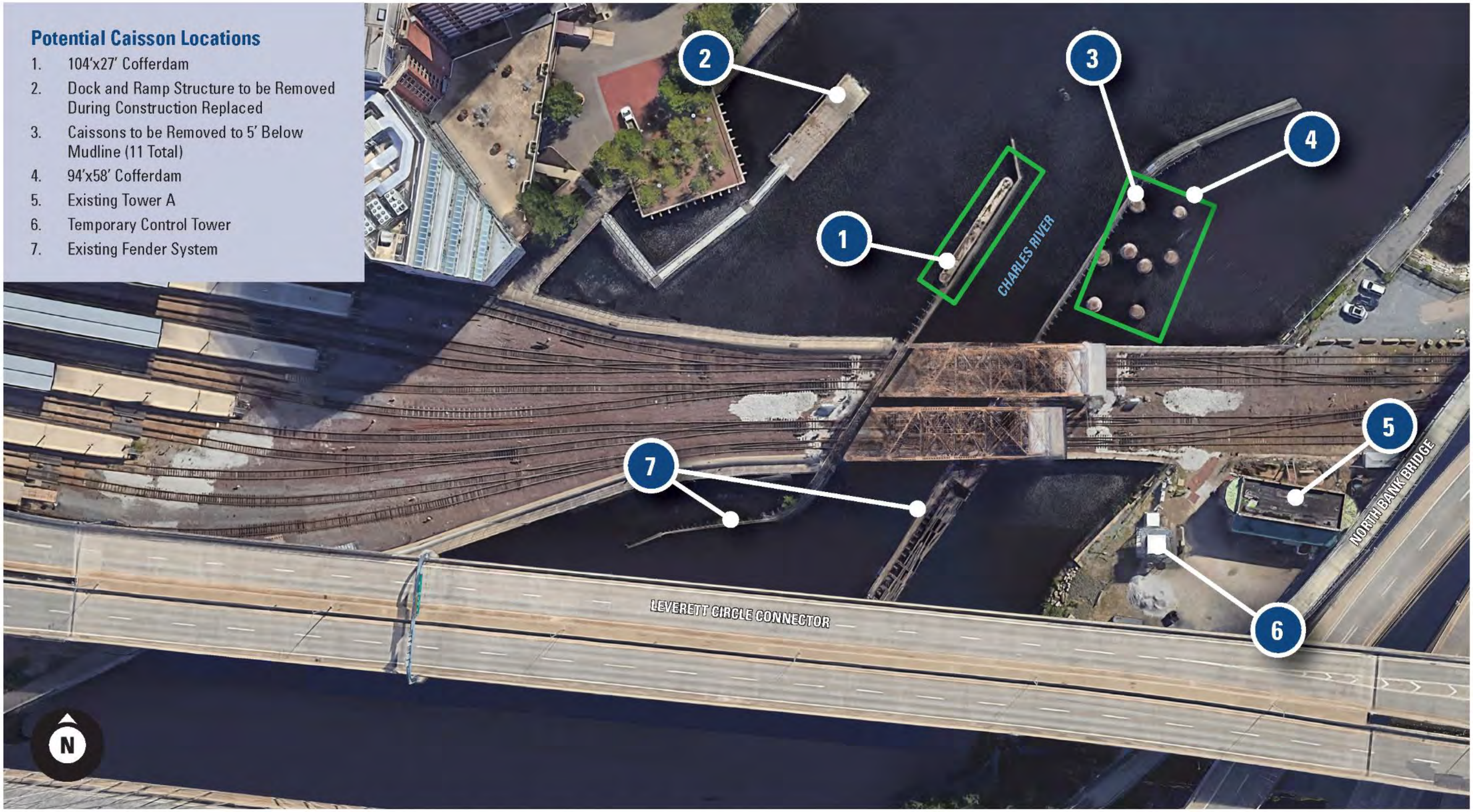
Four temporary work trestles could then be constructed, two on the east side and two on the west side of the proposed bridge alignment (**Figure 3.1-2**).[1] Each trestle could be in place for approximately six years. The trestles enable delivery of materials and access of construction equipment in the Charles River. The temporary work trestles are expected to have an overwater length of up to 1,000 feet with individual lengths ranging from 150 feet to 465 feet and a width of 40 feet as shown on **Figure 3.1-2**.

Construction work activities would begin simultaneously at multiple locations, starting with the construction of work trestles to drive piles using barge-mounted equipment. Drilled shaft construction for lift span piers could begin concurrently and be performed using barge-mounted equipment or trestle

[1] In coordination with Massachusetts General Hospital (MGH), an MGH-owned floating dock and approach ramp on the south bank of the Charles River would be temporarily removed during construction of the Proposed Project to facilitate access to the Draw One Bridge from the proposed southwest temporary work trestle. The floating dock and approach ramp formerly served the prior owner (Spaulding Rehabilitation). As part of the Proposed Project, MBTA would reinstall the MGH floating dock and approach ramp in coordination with MGH when the area is no longer required for construction access.

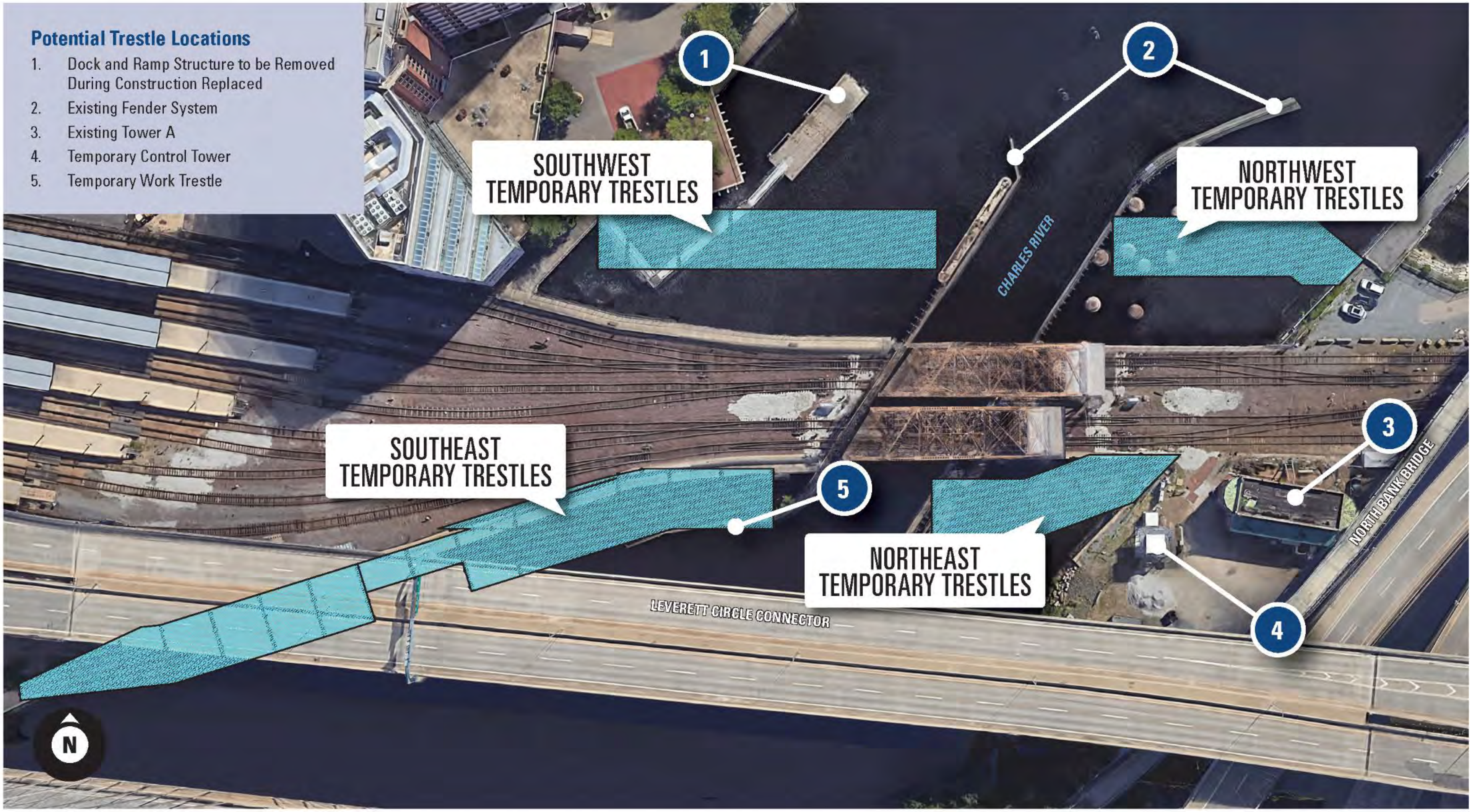
supported equipment. The abutments and approach pier piles would be constructed using equipment mounted on the work trestles or located on constructed portions of the proposed Draw One Bridge structure.

The use of several barges is anticipated for the construction of the temporary trestles, drilled shafts, caps and piers (**Figure 3.1-3**).



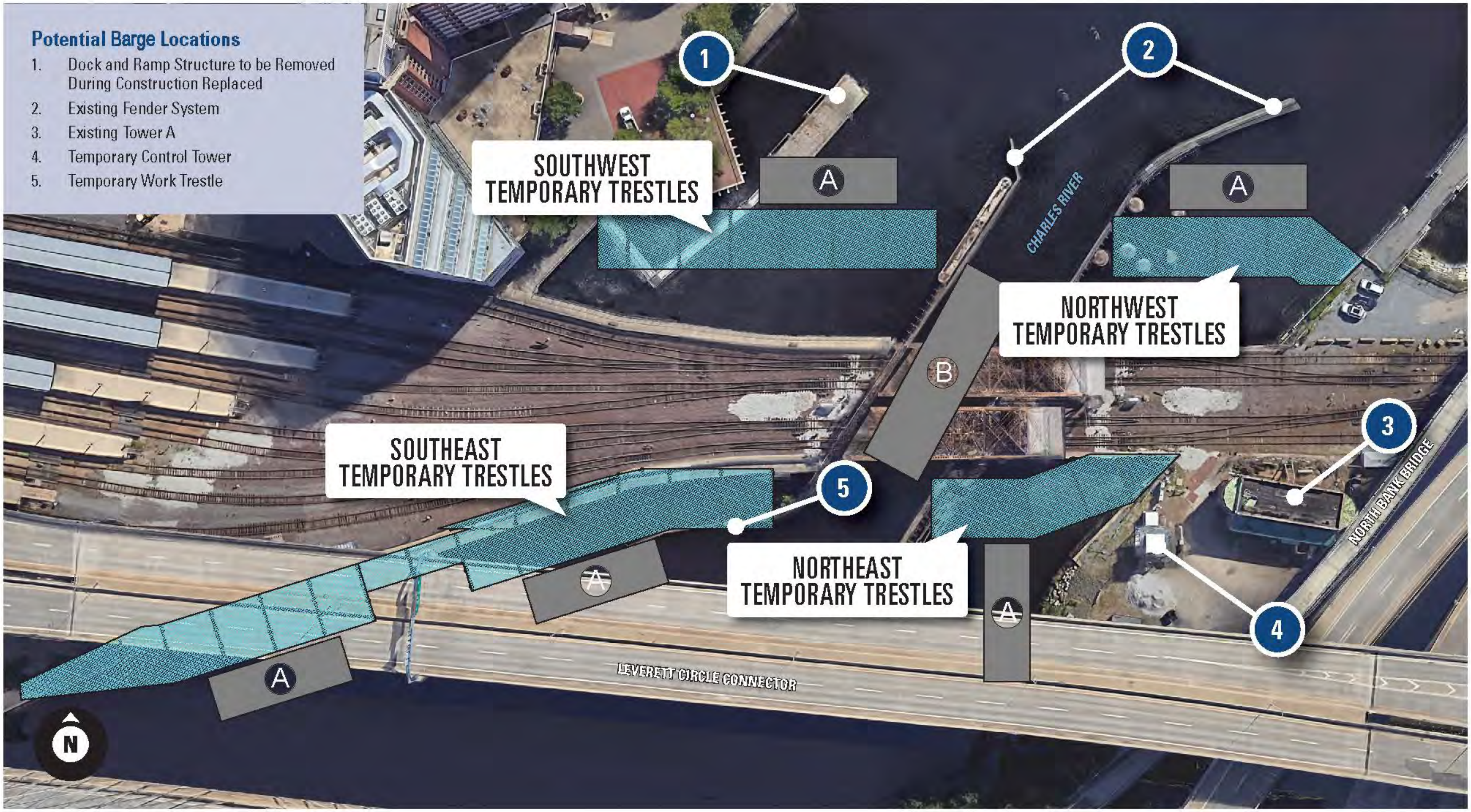
Note: Contractor may elect to use Cofferdams as shown to assist in the demolition of remaining caissons and pier.

Figure 3.1-1: Potential Cofferdam



Note: Contractor may elect to use temporary trestles and barges during construction. All of the barges and temporary trestles shown are underneath the elevated overhead structures.

Figure 3.1-2: Temporary Trestles without Barges



A Barge for Material Delivery and Storage

B Barge for Float-out of Existing Spans (Temporary Channel Closure)

Note: Contractor may elect to use temporary trestles and barges during construction. All of the barges and temporary trestles shown are underneath the elevated overhead structures.

Figure 3.1-3: Temporary Trestles with Barges

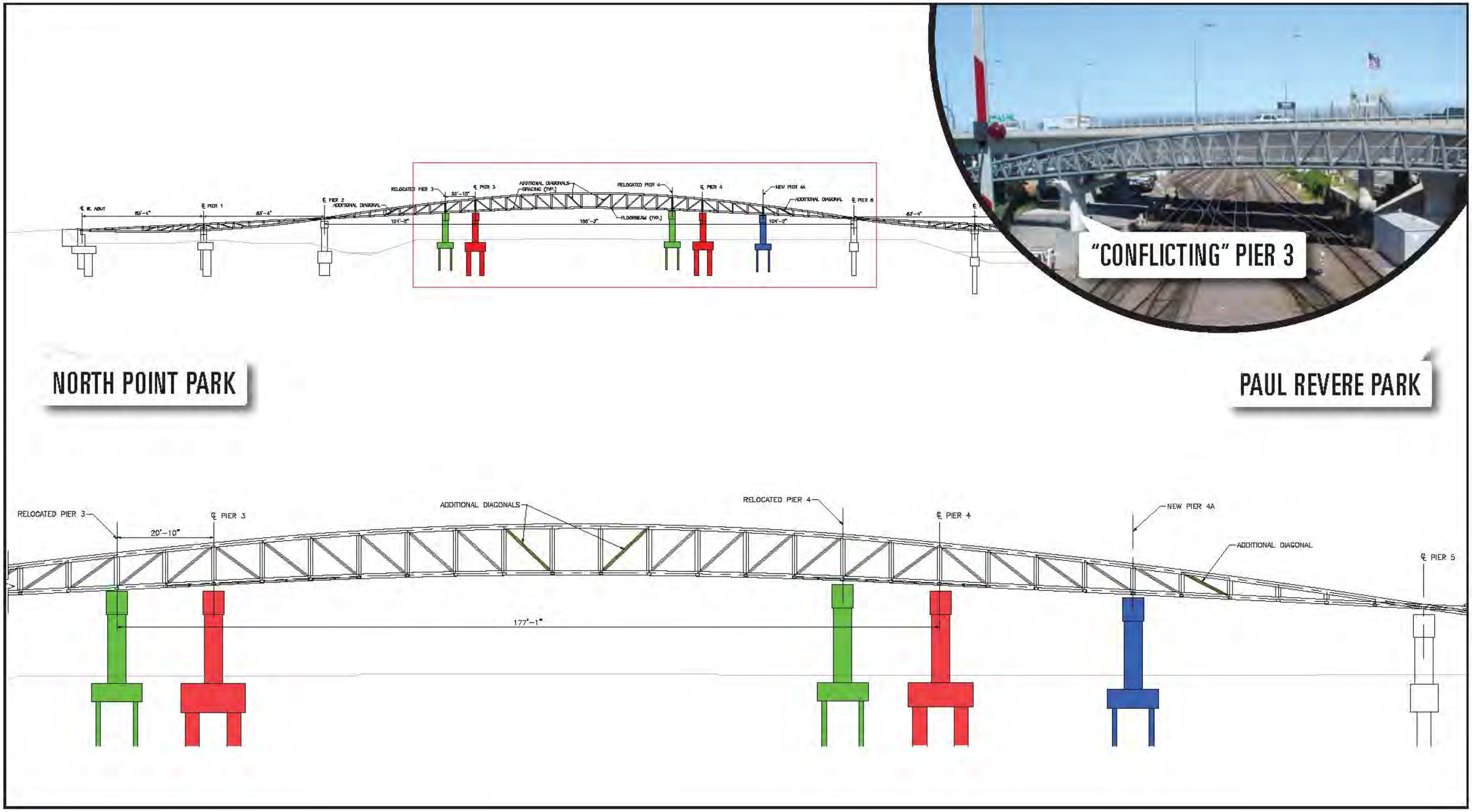
Barges may also be used for mounted cranes, material storage, and material delivery. Precast concrete, steel reinforcement bars, structural steel members, and machinery components may be transported to the Project Site by barge.

The work trestles, supported on piles, may be used for access, material storage, and construction. Dredging is proposed for areas outside of the proposed fender system that now may be in the assumed travel path for vessels traversing the channel and are no longer protected by the existing fender. For pile caps that are partially submerged in the final condition, float-in forms may be utilized to minimize on-site construction and to function as formwork for the caps.

3.1.2 LAND-SIDE STRUCTURES

Construction of Tower A is assumed to start as part of the Bridge Phase 1 work activities (**Table 2.3-1**). Work would consist of relocating the existing temporary control tower onto a temporary trestle structure which will be installed in the river adjacent to the existing north bank seawall. Foundation work would consist of the construction of test pits to determine the extent of the existing seawall and the installation of driven piles from equipment located on the land. Additional work would include the installation of a water detention system below the proposed parking lot at the new Tower A site and installation of a new waterline utility using jack and bore methods beneath the MBTA tracks adjacent to the Tower A site.

Modification of the North Bank Bridge is assumed to be completed during Bridge Phase 1 of construction. New foundations for Piers 3, 4, and 4A would consist of the installation of micropiles from ground supported equipment. The North Bank Bridge superstructure would be permanently raised approximately 1 foot in height to allow for the reconfigured track to be constructed under this bridge. Additional work would consist of regrading the approach pathways at each end of the North Bank Bridge after it is raised and adjusting the drainage structures (**Figure 3.1-4**). This work would require multiple closures of the pedestrian bridge of up to two weeks, totaling one month over a six-month period. Further, modification of the bridge would require multiple temporary closures of three walkways (100 feet) within Paul Revere Park and three walkways (140 feet) within North Point Park for up to two weeks at a time, totaling one month; these closures would take place over a six-month period. A detour from North Point Park to access Paul Revere Park would be developed in coordination with DCR.



Existing Pier Location to be Demolished

Proposed Pier Location and New Diagonals

Newly Constructed Additional Pier

Figure 3.1-4: North Bank Bridge – Modifications

3.2 SUPERSTRUCTURE

The bridge superstructure would be erected from the temporary work trestles for Phases 1, 2, 4, and 5. Phase 3 would be constructed from a combination of the constructed structure and the temporary work trestles. Material delivery would primarily be by barge or by rail and material storage would be on barges or on the trestle system.

3.2.1 DEMOLITION OF REMAINING MOVABLE SPAN STRUCTURES AND TOWER A

Demolition of the remaining operational Draw One Bridge movable span structures would likely consist of removing the counterweight and machinery room and transporting it to the existing Tower A site for demolition using SPMTs (self-propelled modular transporters), which are multi-axle trailers designed for the transportation of large and heavy cargoes. The existing trusses would be cut apart and portions removed by crane and remaining portions floated out on a barge.[2]

Existing caissons outside of the navigable channel would be demolished down to the mudline. Caissons that would lie within the proposed channel would be demolished down to 5’ below the proposed channel elevation. Caisson demolition is anticipated to be performed by wire-saw cutting and removing sections of each caisson. Alternate methods could include the use of silt curtains and demolition hammers.

South trestle demolition would consist of cutting the existing deck precast panels at the original construction joints and removing sections of the deck. Pier caps would have areas of local demolition so sections of the caps could be removed. Where original timber piles were grouted into the pier caps, the tops of piles would be cut to facilitate pile cap removal. Timber piles would be cut off at the mudline except at locations where they will conflict with the proposed foundations, in which case they would be extracted. Approximately 1,380 timber piles would be cutoff at the mudline and 20 piles would be extracted at the south trestle.

North trestle and fender demolition would consist of removal of deck timber and timber pile caps prior to cutting off timber piles at the mudline. Where timber piles conflict with the proposed foundations, the piles would be extracted. Where piles would be located in the proposed channel, the piles would be cut off 3 feet below the mudline. Approximately 580 piles would be cutoff at or below the mudline and 50 piles would be extracted at the north trestle and existing fender system.

Tower A demolition will consist of abatement of existing hazardous materials and relocation of all electrical and bridge operation related services out of Tower A so existing equipment can be decommissioned. Selective demolition will be used to remove the existing Boston and Maine cast stone sign from the façade of the building, along with any other elements that may be required as part of agreed upon mitigations. Shielding will be erected to provide protection to the tracks, existing signal equipment, and the North Bank Bridge. Traditional demolition methods would then be used to demolish the building

[2] Crane boom heights (approximately 300 feet) would not exceed the heights of nearby high-rise buildings or the Leonard P. Zakim Bunker Hill Memorial Bridge towers. The contractor would follow the requirements outlined in the Federal Aviation Administration (FAA) guidelines, as applicable.

and foundation, which may include excavators, demolition hammers, and steel shears. A description of hazardous materials within the existing Tower A building is provided in EA **Section 3.2.11, "Hazardous and Contaminated Materials**."

3.2.2 TRACK AND SIGNAL

Track and Signal work will extend throughout the entire limits of the project. New signal duct banks and troughs will be installed to facilitate construction phasing and final construction. In areas of existing tracks, tracks will be realigned to provide consistent spacing and new special track work and signals will be installed to facilitate the track phasing required to allow the three lift bridges to be constructed while maintaining connectivity between the station tracks and all of the commuter rail lines. Existing track will have new ballast, ties, and rails installed as part of the project. Where new portions of track are being added or where track is constructed along a new alignment, new subgrade, drainage, ballast and track work and signals will be constructed.

4.0 CONSTRUCTION STAGING AREAS AND ACCESS ROUTES

4.1 CONSTRUCTION STAGING AREAS

Construction staging areas, also referred to as "laydown areas," are sites that are used for storage of materials or equipment, assembly, or other temporary construction-related activities. Staging areas are typically fenced for security and to protect the public, have gates to allow vehicle access, deliveries, and are often lighted for security. Staging areas of adequate size and proximity to the work activities are essential to support construction activities.

A potential construction staging area is located at an existing MBTA commuter rail material storage yard and construction staging area, referred to as the T-Pad. The T-Pad is located at 28 Inner Belt Road, Somerville, MA, which is approximately 5,000 feet on rail to the center of the Charles River (**Figure 4.1-1**).

The T-Pad site currently houses a bridge and buildings shop as well as track material storage and laydown areas to support maintenance activities throughout the MBTA Commuter Rail network. The yard has a direct connection into the existing track network throughout the Project Site. The site's rail proximity would allow for hi-rail equipment to get on and off rail on uncontrolled track, thereby not delaying MBTA Commuter Rail operations. This proximity also enables ballast cars and flat cars to be loaded to move track materials from the laydown area to the project construction sites.

Additional laydown areas would be located in construction zones based on the track phasing. During the construction of the movable spans, the two tracks that connect to the bridge under construction, immediately north of the bridges would be out of service and can be used for laydown areas during each phase. There are similar situations along the length of the project where extended lengths of adjacent tracks would be inactive during a specific construction phase and will provide temporary laydown areas for storage or other construction activities.

If the construction contractors choose to use staging areas that differ from those identified and analyzed in this EA, they will be required to obtain all the necessary permits and approvals from federal, state and local regulatory agencies. This would include any remote staging areas for loading barges with material and equipment, or for partial preassembly.

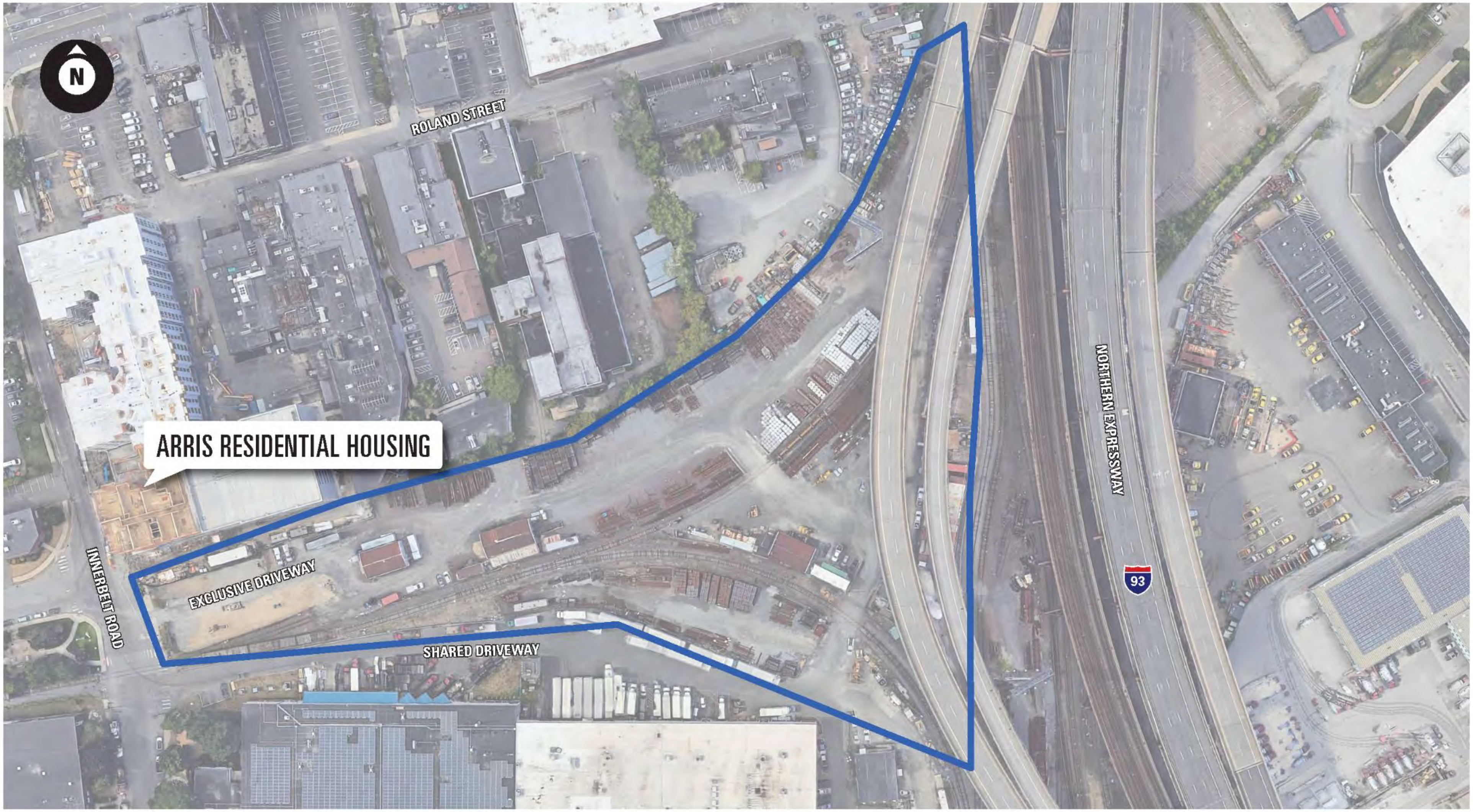


Figure 4.1-1: Construction Laydown Area – T-Pad

4.2 CONSTRUCTION ACCESS ROUTES

Construction access and material delivery would be provided by barge and rail throughout the approximately eight (8) year project construction duration. The Contractor would remove most of the construction and demolition debris by barge. The contractor would dismantle and remove the existing Draw One Bridge structures by barge. Some debris would be removed by truck.

Truck routes to access the project construction areas falls into two categories. Typical truck traffic that can travel without restrictions and hazardous cargo truck traffic that is restricted from using tunnels (e.g., O'Neill Tunnel, Sumner Tunnel, Ted Williams Tunnel, Callahan Tunnel). Trucks that may be required to access the construction site that fall into this hazardous cargo category include fuel deliveries for equipment such as gasoline or diesel, and flammable gas and compressed gas that may be used for welding or torches.

It is anticipated that access to the Project Site would be via I-93 and the Leverett Circle Connector and local roads in the Cities of Boston and Cambridge. Additional access on the North side of the project may be via Sullivan Square and New Rutherford Avenue. Access to the T-Pad is expected to be via I-93 and Cambridge Street to Inner Belt Road. Trucks carrying hazardous cargo would follow standard hazardous routes through the various cities (Boston, Cambridge, Somerville) to access the project.

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Appendix E
Hazardous Materials

PHASE I ENVIRONMENTAL SITE ASSESSMENT

MBTA Draw 1 Bridge
Causeway Street
Boston, MA 02114
February 2020

Project Number:
342282.0000

Prepared For:
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Annie Cornell

Reviewed and Approved by:
Ryan Niles

This Phase I ESA (February 2020) has been assumed valid for the purposes of the National Environmental Protection Act Environmental Assessment (December 2024) prepared to evaluate the Draw One Bridge Replacement Project. MBTA will conduct additional soil and groundwater sampling, as well as additional hazardous and contaminated materials investigations, as appropriate, including survey and testing of the Signal Tower A building and Draw One Bridge structures, prior to construction.

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EXECUTIVE SUMMARY

TRC Environmental Corporation, Inc. (TRC) was retained by Massachusetts Bay Transit Authority (also known as “Client” or “User”) to perform a Phase I Environmental Site Assessment (ESA) of the MBTA Draw 1 Bridge Property which includes the two spans of the railroad bridge over the Charles River, and portions of land in Cambridge and Boston at Causeway Street, Boston, MA 02114 (herein referred to as the “Site”). TRC conducted the ESA in connection with the Client’s planned replacement of the Bridge. The Phase I ESA described in this report was performed in accordance with the scope and limitations of the American Society for Testing and Materials Practice E 1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E 1527-13). Limiting conditions and/or deviations from the ASTM E 1527-13 standard are described in Sections 1.3 and 7.6 of this report.

The approximately 4-acre Site includes the two spans of the railroad bridge over the Charles River and portions of land in Cambridge and Boston and is located at Causeway Street in Boston, MA 02114, in an urban area. The Site is described as MBTA North Station and MBTA Tower A, and is located in industrially zoned area. A Site location map is included as **Figure 1**. The Site is currently owned by the MBTA and operated by Keolis Commuter Services (Keolis) for commuter train service.

TRC has performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527 of Causeway Street, Boston, MA 02114, the Site. Any exceptions to or deletions from this practice are described in Sections 1.3 and 7.6 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the Site.

This Executive Summary is part of this complete report; any findings, opinions, or conclusions in this Executive Summary are made in context with the complete report. TRC recommends that the User read the entire report for supporting information related to findings, opinions, and conclusions.

Legal Notice

TRC has prepared this Phase I ESA for Massachusetts Bay Transit Authority (hereinafter “Client” or “User”). This document was prepared by TRC solely for the benefit of the Client and the User. With regard to third-party recipients of this document, neither TRC, nor the Client, nor the User, nor any of their respective parents, affiliates, or subsidiaries, nor any person acting on their behalf: (a) makes any warranty, expressed or implied, with respect to the use of any information or methods disclosed in this document; or (b) assumes any liability with respect to the use of any information or methods disclosed in this document. Any third-party recipient of this document, by its acceptance or use of this document, releases TRC, the Client, the User, and their parents, affiliates, and subsidiaries from any liability for direct, indirect, economic, incidental, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort, or otherwise, and irrespective of fault, negligence, and strict liability.

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) has prepared this Phase I Environmental Site Assessment (ESA) for STV Incorporated (hereinafter "Client") and Massachusetts Bay Transit Authority (hereinafter "User").

This report was prepared for and may be relied upon by Client and User for the purposes set forth herein; it may not be relied on by any party other than the Client and User. TRC will consider authorization for third-party reliance on this report if requested by the Client. TRC reserves the right to deny reliance on this report by third parties.

1.1 Purpose and Scope of Services

The following Phase I ESA was performed for the MBTA Draw 1 Bridge Property which includes the two spans of the railroad bridge over the Charles River and portions of land in Cambridge and Boston: Causeway Street, Boston, MA 02114 (hereinafter "Site"). A Site location map is included as **Figure 1**. This Phase I ESA has been prepared by TRC in accordance with the American Society for Testing and Materials E 1527-13 *Standard Practice for Environmental Site Assessments: Phase I ESA Process* (ASTM E 1527-13) and is intended for the sole use of STV Incorporated and Massachusetts Bay Transit Authority (MTBA) per MBTA Contract Number H32PS01 dated November 12, 2019.

The purpose of this assessment is to identify *Recognized Environmental Conditions* (RECs) at the Site, as defined by the ASTM E 1527-13 standard. The completion of this Phase I ESA report may be used to satisfy one of the requirements for the User to qualify for the *innocent landowner*, *contiguous property owner*, or *bona fide prospective purchaser* liability protections pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), thereby constituting *all appropriate inquiries into the previous ownership and uses of the property consistent with good commercial or customary practice* as defined by 42 U.S.C. §9601(35)(B) of CERCLA.

The Scope of Services for this Phase I ESA included the following tasks:

- Site and vicinity reconnaissance;
- Site and vicinity description and physical setting;
- Historical source review and description of historic Site conditions;
- Interviews with owners, operators, and/or occupants of the Site, and/or local officials;
- Review of environmental databases and regulatory agency records;
- Review of previous environmental reports/documentation, as applicable;
- Review of environmental liens, if provided or authorized to obtain by the User; and
- Preparation of a report summarizing findings, opinions, and conclusions.

1.2 Additional Services

Items outside the scope of the ASTM E 1527-13 standard include but are not limited to the following:

- Asbestos-containing building materials
- Radon
- Lead-based paint
- Lead in drinking water
- Wetlands
- Regulatory compliance
- Cultural and historic resources
- Industrial hygiene
- Emerging contaminants
- Health and safety
- Ecological resources
- Endangered species
- Indoor air quality unrelated to *releases* of *hazardous substances* or *petroleum products* into the environment
- Biological agents
- Mold

Non-scope services including potential locations for staging and storage of contaminated soil and groundwater and a hazardous materials evaluation are further described in Section 9.0.

1.3 Deviations to ASTM E 1527-13 Standard

The following significant deviations or deletions to the ASTM standard were made during this Phase I ESA:

- No access to two rooms within Tower A were granted due to health hazards.
- No access to the east bridge machine room was granted.

2.0 SITE DESCRIPTION

2.1 Site Location and Legal Description

The approximately 4-acre Site includes the two spans of the railroad bridge over the Charles River and portions of land in Cambridge and Boston, is located at Causeway Street in Boston, MA 02114 in an urban area. The Site is described by the Essex and Middlesex tax assessor as MBTA North Station and MBTA Tower A, is zoned as industrial and is currently owned by the Client. A Site location map is included as **Figure 1**.

2.2 Site Improvements

Current on-Site improvements are listed in the following table. A Site layout plan is included as **Figure 2**.

Table 2.1 – Site Improvements

Site Feature	Description
Buildings (stories)	One two-story historic control tower.
Construction date(s)	1931
Exterior areas	Paved
On-Site roads/rail lines	Active Commuter Rail Lines
Other large equipment	Electrical Equipment
Potable water supply	Unknown
Sewage disposal system(s)	Unknown
Heating/cooling system fuel source(s)	Heating oil
Back-up fuel source(s)	N/A
Electricity supplier(s)	Unknown
Stormwater system	Unknown

2.3 Current and Historic Site Use

2.3.1 Current Site Use(s)

The Site is currently owned by the MBTA and operated by Keolis Commuter Services (Keolis) as a commuter rail line.

2.3.2 Previous Owner and Operator Information

Based on information provided by the User (Section 3.0), the historical record review (Section 4.0), and/or interviews conducted during this Phase I ESA (Section 6.0), the Sites have been owned and operated as a railroad since before the 1890s.

2.4 Physical Setting

According to the United States Geological Survey, 2012, *7.5-Minute Topographic Map for Boston South and Boston North* (refer to **Figure 1**), the Site is located adjacent to and spanning the Charles River, the Site topographic elevation is approximately 8 feet above mean sea level at the track level, and local topography slopes to the river, though the Site is generally flat. Based on local topography, the assumed direction of shallow groundwater flow is toward the Charles River. However, a subsurface investigation would be required to determine actual groundwater flow direction.

Please refer to the Geocheck Physical Setting Source Summary of the EDR report presented in **Appendix A** for further information regarding the soil composition in the Site vicinity. According to EDR, the Site is located in a Federal Emergency Management Agency flood zone. According to EDR and Priority Resource Map (**Figure 3**), the Site is located in a Federal Emergency Management Agency (FEMA) 100-year flood zone. The Site is located within 500 feet of protected open space areas located to the east-northeast and to the southwest.

3.0 USER PROVIDED INFORMATION

According to the ASTM E 1527-13 standard, certain tasks that may help identify the presence of RECs associated with the Site are generally conducted by the Phase I ESA User. These tasks include providing or authorizing the *environmental professional* to obtain recorded land title records for environmental liens or activity and use limitations (AULs); providing specialized knowledge related to RECs at the Site (e.g., information about previous ownership or environmental litigation); providing commonly known or *reasonably ascertainable* information within the local community about the *property* that is material to RECs in connection with the *property*; and informing the *environmental professional* if, as believed by the User, the purchase price of the *property* is lower than the fair market value due to contamination. A list of requested information was included in TRC's signed proposal (see Section 1.1). Information provided by the User pursuant to that request is listed in Section 3.0. A copy of the User questionnaire is included in **Appendix B**.

3.1 Title and Judicial Records for Environmental Liens or AULs

In addition to reviewing the EDR report (discussed in Section 4.2), local municipal records (Section 4.4), and the Massachusetts Land Records online database (Section 4.4), TRC obtained supplemental information regarding AUL-listed properties within Boston and Cambridge from the Mass Land Records. No evidence of AULs associated with the Site was identified.

3.2 Specialized Knowledge

The User was not aware of specialized knowledge related to RECs at the Site.

3.3 Property Value Reduction Issues

The User was not aware of property valuation reduction issues regarding the Site.

3.4 Commonly Known or Reasonably Ascertainable Information

No commonly known or reasonably ascertainable information was provided to TRC by the User.

3.5 Reason for Conducting Phase I ESA

TRC understands the User requires a Phase I for their planned redevelopment of the Site.

4.0 RECORDS REVIEW

4.1 Historic Use Information

Information regarding Site and vicinity historic uses was obtained from various publicly available and practically reviewable sources including:

- Aerial photographs (scale: 1” = 500’) dated 1938, 1946, 1952, 1955, 1960, 1969, 1970, 1978, 1980, 1985, 1995, 2008, 2012, and 2016;
- Historical Sanborn® Fire Insurance Maps (Sanborn Maps) dated 1867, 1885, 1888, 1895, 1900, 1909, 1922,1927, 1929, 1934, 1950, 1951, 1964, 1986, 1988, 1989, 1990, 1992, 1993, 1994, 1995, 1996, 1998, 2002, 2003, 2004, 2005, and 2006;
- Topographic maps dated 1893, 1903, 1943, 1944, 1946, 1947, 1949, 1950, 1954, 1956, 1970, 1971, 1979, 1985, 1987, and 2012;
- City Directories dated 1930, 1935, 1945, 1950, 1960, 1965, 1969, 1975, 1984, 1989, 1992, 1995, 2000, 2005, 2010, and 2014;
- Local municipal records;
- An environmental database report; and
- Interviews with Debra Darby and Clary Coutu.*

Historical research documentation is included in **Appendix C**.

4.1.1 Site History

Operational History

Table 4.1 - Site History

Year	Site History
1890 to 1938	The Site property appears to be used as Boston and Maine railroad tracks. There are no existing buildings present on the site.
1938-1952	On the Cambridge side of the Site, a signal tower (Tower A) was constructed in 1938 for the Boston and Maine railroad tracks. This structure is the only structure on the site.
1952 to 1969	An elevated road was constructed over the southernmost portion of the Boston site of the Site. The highway runs above the tracks. In 1965, the last Boston and Maine railroad intercity service ended and MBTA began operating the tracks.
1969-1985	A road was constructed behind Signal Tower A, connecting two pieces of land on either side of the Millers River. The existing structure does not appear to change throughout this time. In 1980 limited MBTA Commuter Rail service to Concord was run as part of a federally funded experiment.
1985 to 2008	Canopies have been added over tracks extending out from North Station. Many elevated highways were constructed above the railroad track. Route 1 was built running horizontally across the site. In 2001, Amtrak began service at North Station.

*Note (as of November 22, 2024): Debra Darby is the Site Remediation Specialist at MBTA – Key Site Manager (as defined by the ASTM standard and identified by the property owner); Clary Coutu is the Director of Environmental Services, Compliance, and Sustainability with Keolis Commuter Services, LLC, current property User.

Table 4.1 - Site History

Year	Site History
2008 to 2012	The elevated road above the site has been reconstructed, being pushed further away from North Station. An additional elevated highway was constructed behind Signal Tower A running parallel to the railroad tracks.
2012 to Present	A pedestrian bridge named "N Bank Bridge" was constructed above the railroad tracks and behind Signal Tower A.

It does not appear that topographic contours in the Site area have significantly changed during the time period reviewed. If significant changes had been noted, it could indicate significant filling or excavation activity.

4.1.2 Adjoining Property History

Table 4.2 – Site Adjoining Property History

Year	Adjoining Property History
North	This area has been used at railroad tracks since the early 1900s. Prior to 1965 Boston and Maine railroad occupied the area. Since 1965 MBTA has owned and operated the tracks. In the 1990s elevated highways were constructed over the tracks.
East	Southeast: Prior to the 1950s, the area contains multiple structures and parking areas. In the 1950s, an overhead road was constructed. In the late 1970s it appears that the structures in the area were demolished and the area was used as a parking lot. In the early 2000s the road was relocated and one building was constructed in the area and Interstate 93 was constructed running parallel to the railroad tracks. Northeast: Prior to the late 19th century, the Millers River occupied the area. Since the late 1970s the Millers River has mostly been turned into a landfill and there is only a small part of the river still existing. In the 1990s, highways were constructed over the area.
South	North Station and the Boston Garden have been present since the late 1920s. The Boston Garden arena is located directly above North Station. In 1984, the MBTA was awarded a contract to rebuild North Station and its tracks. In 1998 the Boston Garden building was demolished, and the TD Garden took its place.
West	Southwest: Prior to the 1960s, this area was used as additional tracks coming from North Station. In the late 1960s it appears these tracks were removed, and this area became a parking lot. The area is still currently being used as a parking lot. Northwest: Prior to 1955, this area was undeveloped. In the late 1950s, the area became more developed and occupied by large buildings. In the early 1990s, elevated highways were constructed over the area. In the early 2000s, the buildings were demolished, and the land was made into North Point Park.

4.1.3 Surrounding Property History

Table 4.3 - Surrounding Property History

Year	Surrounding Property History
North	Between the early 1900s to present this area has been developed for industrial use and as railroad tracks,
East	From at least 1900 to the present, the Charles River has occupied this area.
South	North Station and the Boston/TD Garden have been present in this area since before the 1930s.
West	From at least 1900 to the present, the Charles River has occupied this area.

4.2 Database Report and Environmental Record Review

A database search report that identifies properties listed on state and federal databases within the ASTM-required radii of the Site was obtained from EDR and is included in **Appendix A**.

The environmental database report identified 536 records/listings surrounding the Site and 167 other records/listings within the search radii of the Site. These properties included those that could be mapped and those that could not (i.e., orphan properties).

4.2.1 Adjoining and Surrounding Property Record Review

TRC evaluated the following factors to determine whether additional environmental records should be reviewed with respect to the potential for contaminant migration from the adjoining and surrounding properties:

(1) Whether the property is upgradient or downgradient of the Site related to potential groundwater migration based on the local topography, and the assumed (or known) groundwater depth and east south east shallow groundwater flow direction;
(2) Whether the property is upgradient or downgradient of the Site related to potential vapor migration based on readily available information pursuant to the ASTM E 1527-13 standard including soil and geological characteristics; contaminant characteristics; contaminated plume migration data; and significant conduits that might provide preferential pathways for vapor migration such as major utility corridors, sanitary sewers, storm sewers, and significant natural conduits such as Karst terrain (vapor migration may also be influenced by the age and design of infrastructure features associated with these conduits);
(3) Property case status (i.e., whether the Massachusetts Department of Environmental Protection has issued a No Further Action letter);
(4) Type of database and whether the presence of contamination is known; and
(5) The distance between the listed property and the Site.

Based on this evaluation, TRC limited the review of additional environmental records to the properties listed below because the potential for contamination to be migrating to the Site from the other properties identified by the database search is considered low.

4.2.1.1 Adjoining Properties

Information regarding adjoining properties (those which share a common property boundary with the Site) included in the database search report is summarized in the following table(s):

Facility Name(s) and/or Listed Address(es)	ADJ TO BOSTON GARDEN & MBTA STATION; NORTH STA TRACK 7 MOTOR OIL RELEASE; BOSTON & MAINE CORP DEBTOR 150 CAUSEWAY ST, BOSTON, MA 02114
EDR Map No(s).	A1, A2, & A3
Database(s)	MA SHWS, MA RELEASE, & RCRA NonGen/NRL
Description/ID No(s)	RTNs: 3-10179 & 3-26308; EPA ID: MAD006951610
Database Review Summary	According to the EDR, on October 12, 1993, there was a report of a two-hour release of oil from a pipe reported to Massachusetts Department of Environmental Protection (MassDEP) and release tracking number (RTN) 3-10179 was assigned to the release. On June 30, 2000 an A2 Release Action Outcome (RAO) was filed for the release meaning a permanent solution has been achieved but the contamination was not reduced to background. According to the EDR, on October 18, 2006, there was a report of a two-hour release of motor oil submitted to MassDEP and RTN 3-26308 was assigned to the release. On February 16, 2017 an A2 RAO was filed for the release meaning a permanent solution has been achieved but the contamination was not reduced to background. According to the EDR, this facility is listed as a Non-Generator of Hazardous Waste but does use D007 – Chromium on site with no violations to date. Based on proximity to the Site, these releases may impact subsurface conditions at the Site and should be considered during subsequent subsurface investigations.

Facility Name(s) and/or Listed Address(es)	NO LOCATION AID MILLERS RIV, CAMBRIDGE, MA
EDR Map No(s).	10
Database(s)	MA SHWS & MA RELEASE
Description/ID No(s)	RTN: 3-16014

Database Review Summary	According to the EDR, on November 16, 1999 there was a release of oil to the surface water at Millers River and RTN 3-16014 was assigned to the release. An Immediate Release Action (IRA) was implemented and release was contained. A Memorandum of Understanding was submitted to MassDEP and no further action was taken. Based on regulatory status, this release is not anticipated to impact conditions at the Site.

Facility Name(s) and/or Listed Address(es)	ACROSS FROM MUSEUM OF SCIENCE 61 INDUSTRIAL PARK RD, BOSTON, MA 02114
EDR Map No(s).	24
Database(s)	MA SHWS & MA RELEASE
Description/ID No(s)	RTNs: 3-15995 & 3-14856
Database Review Summary	According to the EDR, on February 10, 1998, there was a 120-day release notification filed for the presence of total petroleum hydrocarbons (TPH), benz(e)acephenanthrylene, and lead and RTN 3-15995 was assigned to the release. A RAO Not Required was submitted on February 22, 2000 and the release was linked to RTN 3-14856. According to the EDR, on October 26, 1996, there was a 120-day release notification filed for the presence of polynuclear aromatic hydrocarbons (PAHs) and heavy metals in soil and the RTN 3-14856 was assigned to the release. This release is the primary RTN which includes RTNs 3-15995 and 3-17455. The Site is currently classified as Tier II. Based on proximity to the Site and regulatory status, these releases may impact subsurface conditions at the Site and should be considered during subsequent subsurface investigations.

4.2.1.2 Surrounding Properties

Information regarding surrounding properties (those within the general vicinity of the Site) included in the database search report is summarized in the following table(s):

Facility Name(s) and/or Address(es)	@ TD BANK NORTH GARDEN CAUSEWAY ST, BOSTON, MA
Approximate Location Relative to Site	302 ft
EDR Map No(s).	B11
Database(s)	MA SHWS & MA RELEASE

Description/ID No(s).	RTN: 3-26309
Presumed Hydrogeologic Setting	Upgradient
Database Review Summary	According to the EDR, on October 18, 2006, there was a two-hour release of 20 gallons of hydraulic oil from a vehicle on Causeway Street was reported to MassDEP and the RTN 3-26309 was assigned to the release. After an IRA was conducted, an A1 RAO was submitted on December 22, 2019 meaning that a permanent solution has been achieved and contamination has been reduced to background or a threat of release has been eliminated. Based on regulatory status, this release is not anticipated to impact conditions at the Site.

Facility Name(s) and/or Address(es)	BOSTON DPW 50 NASHUA ST, BOSTON, MA 02100
Approximate Location Relative to Site	320 ft
EDR Map No(s).	D12
Database(s)	MA SHWS & MA RELEASE
Description/ID No(s).	RTN: 3-4359
	Upgradient
Database Review Summary	According to the EDR, on July 15, 1993, there was a release of oil discovered during the removal of a 5,000-gallon underground storage tank (UST) reported to MassDEP and the RTN 3-4359 was assigned to the release. An A2 RAO was submitted on December 19, 2001 meaning a permanent solution has been achieved but the contamination was not reduced to background. Based on regulatory status, this release is not anticipated to impact conditions at the Site.

Facility Name(s) and/or Address(es)	TRIGEN-BOSTON ENGERY CORP S-1 MINOT STREET STEAM STATION BOSTON THERMAL ENERGY CORP 80 NASHUA ST, BOSTON, MA 02111
Approximate Location Relative to Site	332 feet
EDR Map No(s).	D13, D14, D15
Database(s)	MA LUST, MA SPILLS, MA RELEASE, MA UST, RCRA NonGen/NLR

Description/ID No(s).	RTNs 3-16005 & 3-11824
Presumed Hydrogeologic Setting	Upgradient
Database Review Summary	According to the EDR, on March 6, 1998, there was a two-hour release of 20 gallons of #6 fuel oil from a UST. The release was reported to MassDEP and the RTN 3-16005 was assigned to the release. After an IRA was conducted, a RAO Not Required was submitted on May 26, 2005 meaning that a permanent solution has been achieved and contamination has been reduced to background or a threat of release has been eliminated. Based on regulatory status, this release is not anticipated to impact conditions at the Site. According to the EDR, on November 7, 1994, there was a two-hour release of an unknown amount of #6 and #2 fuel oil from a UST. The release was reported to MassDEP and the RTN 3-11824 was assigned to the release. After an IRA was conducted, an A1 RAO was submitted on July 12, 1995 meaning that a permanent solution has been achieved and contamination has been reduced to background or a threat of release has been eliminated. Based on regulatory status, this release is not anticipated to impact conditions at the Site.

Facility Name(s) and/or Address(es)	PARK BTWN NASHUA ST AND CHARLES RIVER NASHUA ST BOSTON, MA 02115
Approximate Location Relative to Site	466 ft
EDR Map No(s).	G21
Database(s)	MA SHWS, MA INST CONTROL, MA SPILLS, MA RELEASE, MA ENF
Description/ID No(s).	RTN 3-19466
Presumed Hydrogeologic Setting	Upgradient

Database Review Summary	According to the EDR, on April 18, 2000, there was a 120-day release of lead and polynuclear aromatic hydrocarbons (PAHs) in soil reported to MassDEP and the RTN 3-19466 was assigned to the release. After completion of Phase II remediation, contamination still remains at a depth of >15 feet and an evaluation has determined that it is not feasible to reduce the concentrations any more. Therefore, an A4 RAO was submitted on January 30, 2001 meaning that a permanent solution has been achieved. Contamination has not been reduced to background and an Activity and Use Limitation (AUL) has been implemented. Based on distance from the site, this release is not anticipated to impact conditions at the Site.

Facility Name(s) and/or Address(es)	GARAGE NORTH STA BOSTON, MA 02109
Approximate Location Relative to Site	466 ft
EDR Map No(s).	G22
Database(s)	3-2660
Description/ID No(s).	MA SHWS & MA RELEASE
Presumed Hydrogeologic Setting	Upgradient
Database Review Summary	According to the EDR, there was a two-hour release of petroleum hydrocarbons into a trench during excavations on June 21, 1990. The release was reported to MassDEP and the RTN 3-2660 was assigned to the Site. An A2 RAO was submitted on April 2, 1996 meaning a permanent solution has been achieved but the contamination was not reduced to background. Based on regulatory status, this release is not anticipated to impact conditions at the Site.

Facility Name(s) and/or Address(es)	NO LOCATION AID 100 NASHUA ST, BOSTON, MA 02110
Approximate Location Relative to Site	476 ft
EDR Map No(s).	23
Database(s)	MA SHWS, MA RELEASE, & MA ASBESTOS
Description/ID No(s).	3-20003
Presumed Hydrogeologic Setting	Upgradient

Database Review Summary	According to the EDR, on October 2, 2000, there was a two-hour release of 20 gallons of hydraulic oil from an excavator and was reported to MassDEP and the RTN 3-20003 was assigned to the release. After an IRA was conducted, an A1 RAO was submitted on December 12, 2000 meaning that a permanent solution has been achieved and contamination has been reduced to background or a threat of release has been eliminated. Based on regulatory status, this release is not anticipated to impact conditions at the Site.

4.3 Previous Reports

The following environmental reports regarding the Site were reviewed:

- August 2010, *Limited Environmental Site Assessment: Drawbridge 1 East, Drawbridge 1 West, and Signal Tower A*, Prepared by TRC Environmental Corporation.

Information provided in these reports is summarized throughout this report.

4.4 Other Environmental Record Sources

Per the ASTM standard, local or additional state records were reviewed to enhance and supplement the ASTM-required federal and state records reviewed and discussed earlier in this report. These additional records include state agency lists of waste disposal facilities; Brownfield properties; hazardous waste/contaminated facilities; registered storage tanks; records of emergency release reports; and records of contaminated public wells. Local sources that were contacted to obtain this information include Department of Health/Environmental Division; Fire Department; Planning Department; Building Permit/Inspection Department; and land records (for AULs). Information from these sources is discussed below:

Table 4.4 - Other Environmental Record Sources

Regulatory Agency/ Department	Available Information
Department of Health/ Environmental Division	TRC contacted the City of Boston and City of Cambridge Health Departments on December 9, 2019 and did not find any relevant information.
Fire Department	TRC contacted the City of Boston and City of Cambridge Fire Departments on December 9, 2019 and did not find any relevant information.
Planning Department	TRC visited the City of Boston and City of Cambridge Planning Departments on December 11, 2019 and did not find any relevant information.

Table 4.4 - Other Environmental Record Sources

Regulatory Agency/ Department	Available Information
Building Permit/Inspection/ Construction/Engineering Department	TRC visited the City of Boston and City of Cambridge Building Departments on December 11, 2019 and did not find any relevant information.
Land Records	TRC visited Massachusetts Land Records online database and found no deeds or land records associated with the Site.

5.0 SITE RECONNAISSANCE

5.1 Methodology and Limiting Conditions

Ms. Annie Cornell, Engineer, conducted a Site reconnaissance of accessible areas on and around the Site on December 12, 2020 for the purpose of identifying potential RECs, and was accompanied by a Keolis Engineer In Charge (EIC) who provided access to the property and answered questions during the reconnaissance. Photographs taken during the Site reconnaissance are provided in **Appendix D**. A Site layout plan is included as **Figure 2**.

During the Site reconnaissance, light snowfall covered the tracks and some of the surround areas. This limiting condition is not expected to impact the results of this Phase I ESA because access to the Site is restricted and Site conditions were still visible.

5.2 Interior and Exterior Site Observations

Unless otherwise noted, the items listed in the table below appeared in good condition with no visual evidence of staining, deterioration, or a discharge of hazardous materials; and there are no records of a release in these areas. Items where further description is warranted are discussed in the section(s) following the table.

Table 5.1 - Interior and Exterior Site Observations

Item	Present (Current/ Historic/ Not Observed)	Description
Hazardous material storage or handling areas	Not Observed	(see Section 5.2.1)
Solid and liquid wastes including municipal wastes	Not Observed	(see Section 5.2.2)
USTs and associated piping	Not Observed	
ASTs and associated piping	Not Observed	
Drums and containers (≥5 gallons)	Not Observed	
Odors	Not Observed	
Pools of liquid, including surface water bodies and sumps (handling hazardous substances or substances likely to be hazardous only)	Not Observed	
PCBs/transformers	Not Observed	
Stains or corrosion	Not Observed	
Drains and sumps	Not Observed	
Pits, ponds, and lagoons	Not Observed	
Stressed vegetation	Not Observed	
Historic fill or other fill material	Not Observed	
Wastewater (including stormwater or discharge into a drain, ditch, underground injection system, or stream on or adjacent to the Site)	Not Observed	

Table 5.1 - Interior and Exterior Site Observations

Item	Present (Current/ Historic/ Not Observed)	Description
Wells (including dry wells, irrigation wells, injection wells, abandoned wells, or other wells)	Not Observed	
Septic systems or cesspools	Not Observed	

5.2.1 Hazardous Substances

Hazardous substances including raw materials; finished products and formulations; hazardous wastes; hazardous constituents and pollutants including intermediates and byproducts that are currently present at the Site; and unidentified substance containers (when open or damaged, and containing unidentified substances suspected of being hazardous or petroleum products) were not discovered at the site.

5.2.2 Solid and Liquid Wastes

Solid and liquid wastes are not generated and stored on the Site.

5.2.3 USTs

No USTs were identified by the Key Site Manager or observed during the Site visit.

5.2.4 ASTs

No ASTs were identified by the Key Site Manager or observed during the Site visit.

5.3 Adjoining and Surrounding Properties Reconnaissance

5.3.1 Adjoining Properties

During the Site reconnaissance, TRC viewed the adjoining properties from the Site and publicly accessible areas (e.g., public roadways, etc.).

Table 5.6 - Adjoining Properties Reconnaissance

Direction from Site	Current Land Use Description
North	Boston Sand and Gravel
East	Highway Bridges and the Millers River
South	North Station
West	Mass General Hospital and North Point Park

5.3.2 Surrounding Properties

Surrounding properties generally include the industrial to the north, commercial and residential to the south, and the Charles River to the east and west.

6.0 INTERVIEWS

The following persons were interviewed to obtain historically and/or environmentally pertinent information regarding RECs associated with the Site. Interview documentation is included in **Appendix B.**

- Debra Darby, Site Remediation Specialist at MBTA – *Key Site Manager* (as defined by the ASTM standard and identified by the property owner);
- Clary Coutu, Director of Environmental Services, Compliance, and Sustainability with Keolis Commuter Services, LLC, current property User.

The information provided by each is discussed and referenced in the text or provided below. Other references and sources of information are included in **Appendix E**.

7.0 FINDINGS, OPINIONS, AND CONCLUSIONS

Potential findings can include RECs, including CREC), HRECs, and *de minimis* conditions, pursuant to the ASTM E 1527-13 standard.

RECs are defined as the presence or likely presence of any *hazardous substances* or *petroleum products* in, on, or at a *property*: (1) due to any *release* to the environment; (2) under conditions indicative of a *release* to the *environment*; or (3) under conditions that pose a *material threat* of a future *release* to the *environment*.

CRECs are defined as RECs resulting from past *releases* of *hazardous substances* or *petroleum products* that have been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with *hazardous substances* or *petroleum products* allowed to remain in place subject to the implementation of required controls (e.g., *property* use restrictions, *AULs, institutional controls*, or *engineering controls*).

HRECs are defined as past *releases* of any *hazardous substances* or *petroleum products* that have occurred in connection with the *property* and have been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the *property* to any required controls (for example, *property* use restrictions, *AULs, institutional controls*, or *engineering controls*).

De minimis conditions are defined as conditions that generally do not present a threat to human health or the *environment* and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis conditions* are not RECs nor CRECs.

TRC has performed a Phase I ESA in conformance with the scope and limitations of ASTM E 1527-13 at the property located at Causeway Street, Boston, MA (Site), see **Appendices F** and **G**. Deviations from this standard are described in Sections 1.3 and 7.6 of this report.

7.1 RECs and CRECs

This assessment has revealed no evidence of RECs (including CRECs) in connection with the Site.

7.2 HRECs

This assessment has revealed no evidence of HRECs in connection with the Site.

7.3 *De Minimis* Conditions

This assessment has revealed no evidence of *de minimis* conditions in connection with the Site except for light snow cover during the Site visit.

7.4 Data Gaps

TRC has made an appropriate inquiry into the commonly known and reasonably ascertainable resources concerning the historic ownership and use of the Site back to the first development per 40 CFR Part 312.24 (*Reviews of Historical Sources of Information*). Data gaps identified during this assessment include the following:

1. The Site is located in a complex, urban setting that has a complex history of adjacent and surrounding properties that have listed potentially environmentally impactful uses. Given the complex setting, number of potentially impactful uses, the presence of potential preferential pathways including utility corridors, and unknown groundwater flow, TRC cannot rule out the possibility of potential subsurface impacts to the Site from its presence in a complex, urban setting. Additional information provided to TRC regarding the complex, urban setting may affect the conclusions of this assessment.

Based on other historical sources reviewed, the Data Gap is not considered *significant*.

7.5 Other Noteworthy Issues

This assessment has revealed no evidence of other noteworthy issues that warrant further discussion in this section.

7.6 Limiting Conditions and Deviations

7.6.1 Accuracy and Completeness

The ASTM E 1527-13 standard recognizes inherent limitations for Phase I ESAs that apply to this report, including:

- Uncertainty Not Eliminated – No Phase I ESA can wholly eliminate uncertainty regarding the potential for RECs in connection with a property. Data gaps identified during this Phase I ESA are listed in Section 7.4.
- Not Exhaustive – A Phase I ESA is not an exhaustive investigation.
- Past Uses of the Property – A review of standard historical sources at intervals less than 5 years is not required.

The Client is advised that the Phase I ESA conducted at the Site is a limited inquiry into a property's environmental status, cannot wholly eliminate uncertainty, and is not an exhaustive assessment to discover every potential source of environmental liability at the Site. Therefore, TRC does not make a statement i) of warranty or guarantee, express or implied for any specific use; ii) that the Site is free of RECs or environmental impairment; iii) that the Site is "clean;" or iv) that impairments, if any, are limited to those that were discovered while TRC was performing the Phase I ESA. This limiting statement is not meant to compromise the findings of this report; rather, it is meant as a statement of limitations within the ASTM standard and intended scope of this assessment. Specific limiting conditions identified during the Site reconnaissance are described in Section 5.1. Subsurface conditions may differ from the conditions implied by surface observations and can be evaluated more thoroughly through intrusive techniques that are beyond the scope of this assessment. Information in this report is not intended to be used as a construction document and should not be used for demolition, renovation, or other construction purposes.

This report presents TRC's Site reconnaissance observations, findings, and conclusions as they existed at the time of the Site reconnaissance. TRC makes no representation or warranty that the past or current operations at the property are or have been in compliance with applicable federal, state, and local laws, regulations, and codes. TRC makes no guarantees as to the accuracy or completeness of information obtained from others during the course of this Phase I ESA report. It is possible that information exists beyond the scope of this assessment, or that information was not provided to TRC. Additional information subsequently provided, discovered, or produced may alter findings or conclusions made in this Phase I ESA report. TRC is under no obligation to update this report to reflect such subsequent information. The findings presented in this report are based upon reasonably ascertainable information and observed Site conditions at the time of the assessment.

This report does not warrant against future operations or conditions, nor does it warrant against operations or conditions present of a type or at a location not assessed. Regardless of the findings stated in this report, TRC is not responsible for consequences or conditions arising from facts that were not fully disclosed to TRC during the assessment.

An independent data research company provided the government agency database referenced in this report. Information regarding surrounding area properties was requested for approximate minimum search distances and was assumed to be correct and complete unless obviously contradicted by TRC's observations or other credible referenced sources reviewed during the assessment.

TRC is not a professional title insurance or land surveyor firm and makes no guarantee, explicit or implied, that any land title records acquired or reviewed, or any physical descriptions or depictions of the property in this report, represent a comprehensive definition or precise delineation of property ownership or boundaries.

7.6.2 Warranties and Representations

This report does not warrant against: (1) operations or conditions which were not evident from visual observations or historical information provided; (2) conditions which could only be determined by physical sampling or other intrusive investigation techniques; (3) locations other than the client-provided addresses and/or legal parcel description; or (4) information regarding off-Site location(s) (with possible impact to the Site) not published in publicly available records.

7.6.3 Continued Validity/User Reliance

This report is presumed to be valid, in accordance with, and subject to, the limitations specified in the ASTM E 1527-13 standard, for a period of 180 days from completion, or until the Client obtains specific information that may materially alter a finding, opinion, or conclusion in this report, or until the Client is notified by TRC that it has obtained specific information that may materially alter a finding, opinion, or conclusion in this report. Additionally, pursuant to the ASTM E 1527-13 standard, this report is presumed valid if completed less than 180 days prior to the date of acquisition of the property or (for transactions not involving an acquisition) the date of the intended transaction.

7.6.4 Significant Assumptions

During this Phase I ESA, TRC relied on database information; interviews with Site representatives, regulatory officials, and other individuals having knowledge of Site operations; and information provided by the User as requested in our authorized Scope of Work. TRC has assumed that the information provided is true and accurate. Reliance on electronic database search reports is subject to the limitations set forth in those reports. TRC did not independently verify the information provided. TRC found no reason to question the validity of the information received unless explicitly noted elsewhere in this report. If other information is discovered and/or if previous reports exist that were not provided to TRC, our conclusions may not be valid.

8.0 REFERENCES

Table 8.1 - Reference Information

Description/Title of Document(s) Received or Agency Contacted	Date Information Request Filled/Date of Agency Contact	Information Updated	Reference Source
Regulatory database search and historical sources discussed herein	December 4, 2019	N/A	EDR Inquiry Number: 5893380.2s
Provided prior environmental reports as discussed in Section 4.4	December 4, 2019	N/A	TRC Environmental Corporation

9.0 NON-SCOPE ITEMS

As part of this Phase I ESA, TRC identified potential locations for the staging and storage of contaminated soil and groundwater during construction which include:

- The Keolis Parking Lot – on the west side of the tracks on the Cambridge side of the Site.
- Boston Sand and Gravel – located north of Tower A.
- Bunker Hill Community College Parking Lot – located northeast of the Cambridge side of the Site.
- DIVCO – a northern portion of the DIVCO parcel currently being used for soil stockpiling for the MBTA Green Line Extension Project.

See the attached **Figure 4** to see these locations.

As part of this Phase I ESA, TRC also conducted a Hazardous Materials Inspection of the Site.

Hazardous Materials Summary:

TRC Environmental Corporation (TRC) conducted a site visit at Tower A and the drawbridge structure on December 12, 2019 and a site visit at North Station (Platforms 11 and 12) on January 7, 2020. The purpose of the site visits was to conduct visual observations of potential hazardous materials that may be impacted in the proposed project.

The information outlined below includes recommendations based on information collected during the site visits as well as historical information included in a report titled Pre-Demolition/Renovation Investigative Survey for Hazardous Materials for Tower A and Draw 2 issued by TRC in February 2010.

Asbestos-Containing Materials (ACM):

Tower A: ACM has been previously identified as various types of floor, glue daubs, window caulking/glazing, and flashing material associated with the electrical room roof system. TRC also previously assumed ACM to be present in the form of pipe insulation, electrical/boards and clips within the 1st floor electrical room. TRC recommends that assessment/sampling be conducted on the main roof system as well as exterior sealant associated with the façade observed during the site visit. TRC also recommends additional investigation of the exterior foundation and the below the rail system stone ballast for waterproofing materials as well as any materials not previously assessed for ACM.

Drawbridge: ACM has been previously identified as transite was material and mechanical brake pads. TRC recommends additional assessment/sampling for any materials not previously investigated for ACM.

North Station (Platforms): TRC recommends assessment/sampling of caulking associated with the platforms and rail system as well as the membrane associated with the rail system near the entrance of the main building observed during the site visit. TRC also recommends assessment/sampling for materials located within the proposed project constraints.

Lead-Containing Paint (LCP):

Tower A: LCP has been previously identified associated with plaster walls, metal handrails, I-beams and metal window frames.

Drawbridge: LCP has been previously identified associated structural I-beams.

North Station (Platforms): TRC observed various components with potential LCP (i.e. platform panels and structural I-beams) during the site visit. TRC recommends assessment for LCP within the proposed project constraints.

Polychlorinated Biphenyls (PCBs):

Tower A: Low concentrations of PCB-1254 (9.7 ppm) was previously identified associated with window glazing. TRC recommends additional assessment/sampling of the exterior sealant associated with the façade observed during the site visit as well as any materials not previously investigated for PCBs.

Drawbridge: TRC recommends assessment/sampling of any materials not previously investigated for PCBs.

North Station (Platforms): TRC recommends assessment for PCBs within the proposed project constraints.

Other Hazardous/Regulated Materials (OHM):

Tower A and Drawbridge: Various types of universal waste (i.e. batteries, thermostat ampoules, fluorescent lamps/ballasts, used electronics etc.) and chemicals/storage containers were previously inventoried. TRC recommends updating the previous OHM inventory.

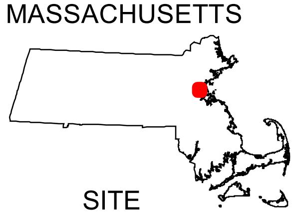
North Station (Platforms): TRC observed various types of OHM (i.e. fluorescent lamps/ballasts) during the site visit. TRC recommends assessment/compiling an inventory for OHM within the proposed project constraints.

N

0 1,000 2,000 Feet

Base map: USGS 7.5 Minute Quadrangle Boston South (1983)

MASSACHUSETTS



SITE LOCATION

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

SITE LOCATION MAP

MBTA DRAW 1 BRIDGE
CAUSEWAY STREET
BOSTON, MA 02114

FIGURE 1	FEBRUARY 2020

★ Project Location

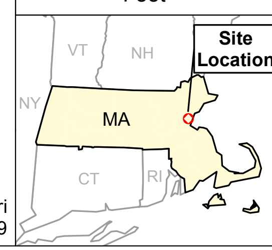
Town Boundary

Assumed Groundwater Flow Direction

Project Components:
Drawbridge West
Drawbridge East
Tower A

N

0 150 300
Feet



TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

SITE PLAN

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

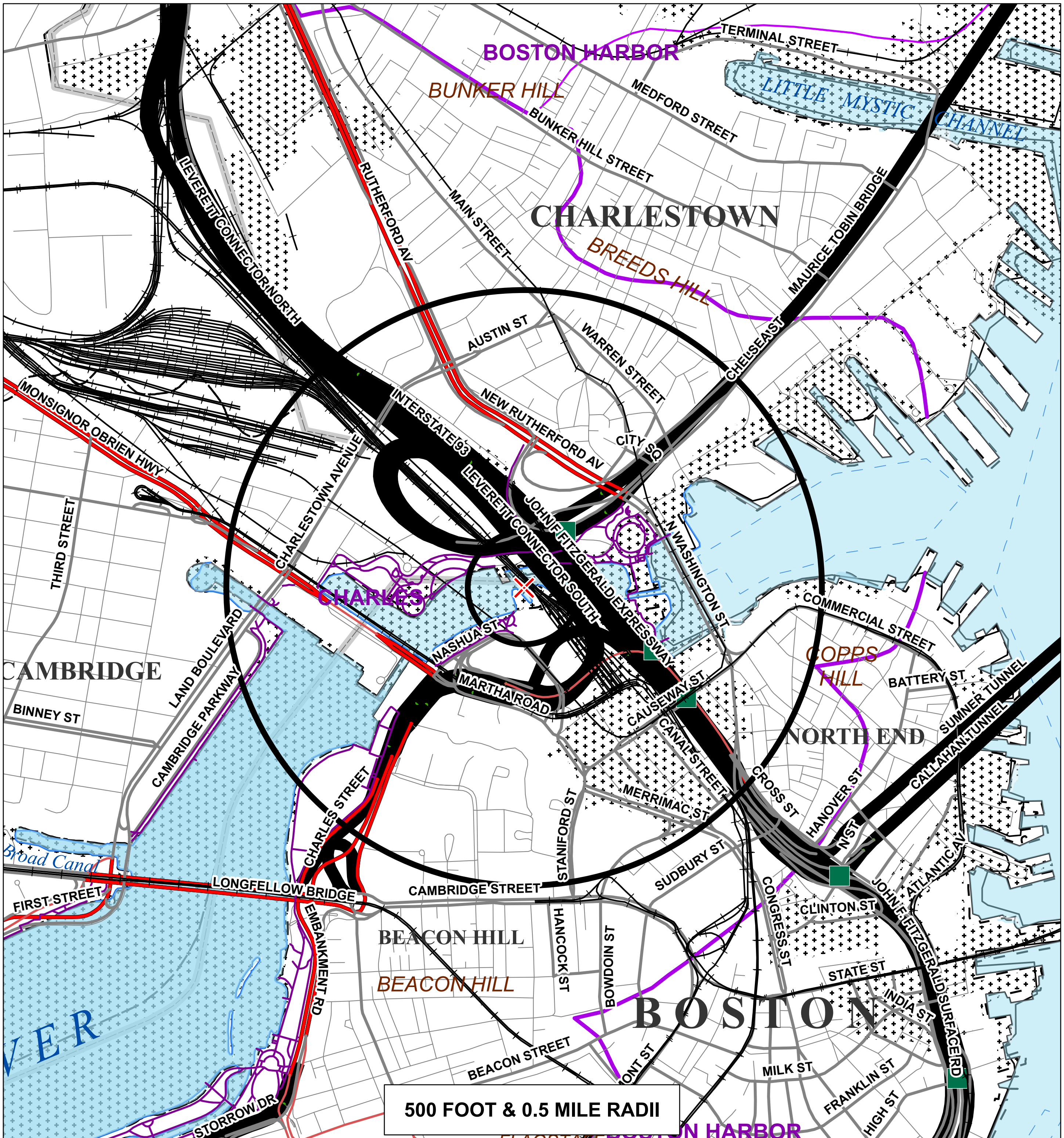
CAUSEWAY STREET
BOSTON, MA

FIGURE 2 | FEBRUARY 2020

Notes:
Project Area to be defined by STV Design Team as design advances.
Please refer to Appendix B for MassDEP disposal site details.

Data Sources: TRC, MassGIS, Esri
Bae Map: USGS Color Ortho Imagery, MassGIS 2019

S:\1-PROJECTS\MBTA\Draw 1 North Station\5-MXD\Figures20200228\Fig 2 NorthStation_SitePlan_ASTM_8x11_20200228.mxd



Roads: Limited Access, Multi-Lane, Major/Minor, Track, Trail
Railroad, Pipline, Powerline

Major Basin, Sub Basin, Perennial Stream, Intermittent Stream,
Shoreline, Man made Shore, Dam, Aqueduct

Wetland, Salt Wetland, Submerged Wetland, Open Water, Reservoir, Tidal Flat/Shoal

Potentially Productive Aquifers: Medium, High Yield

Non-Potential Drinking Water Source Area: Medium, High Yield

EPA Sole Source Aquifer, FEMA 100 Yr. Floodplain, DEP Solid Waste Facility

Approved Zone II, IWPA, Surface Water Supply Zone A

Protected Open Space, ACEC

Priority Habitat, Certified Vernal Pool

Boundaries: County and Town

Public Water Supplies: Ground, Surface, Non-Community (NTNC, TNC)

Source: MassGIS/EOEA

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

FIGURE 3

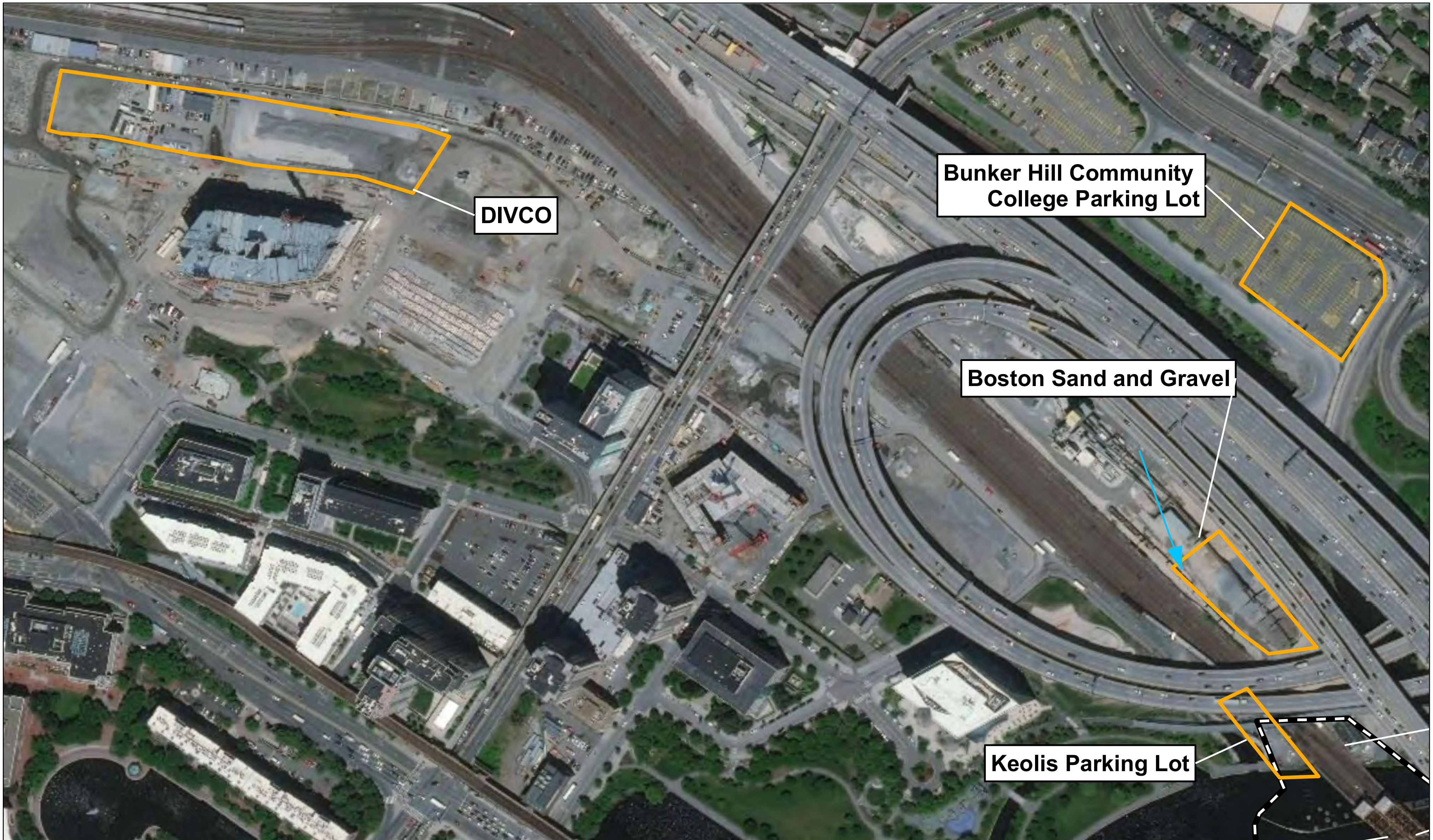
MASSDEP PRIORITY RESOURCE MAP
MBTA DRAW 1 BRIDGE
CAUSEWAY STREET
CAMBRIDGE, MA

N

0 1,500
Feet

FEB.
2020

S:\1-PROJECTS\Mass_DEP\cambridge\aprx\DRAW1BRIDGE_2020_01_09.aprx

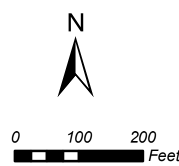


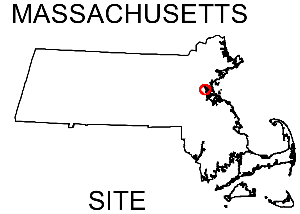
North Station Train Bridge

Assumed Groundwater Flow Direction

Note: Please refer to Appendix B for MassDEP disposal site details.

Base map: 2008 Aerial





TRC

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650 Suffolk Street
Lowell, MA 01854
978-970-5600

POTENTIAL STAGING AREAS

MBTA DRAW 1 BRIDGE
CAUSEWAY STREET
BOSTON, MA 02114

FIGURE 4	**FEBRUARY 2020**

Document Path: R:\Projects\GIS_2010\156318_MA_Bridges\MXD\Drawbridge_East\staging_Areas_Fig2_2020_01_10.mxd

North Station Draw 1 Bridge Replacement and Associated Track & Signal Upgrades
MBTA Contract No. H32PS01

Hazardous Materials Inspection Report

December 2020

Prepared by:
TRC
650 Suffolk St
Suite 200
Lowell, MA 01854

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Revision Index

<table>
<tr><th>Revision #:</th><th>Date:</th><th>Description:</th></tr>
<tr><td rowspan="2">0</td><td>12/14/20</td><td>Initial Submission</td></tr>
<tr><td colspan="2">Prepared by: Annie Cornell

Signature: ______________________ Date: 12/14/20________

Reviewed by: Diane Stallings Mrozek

Signature: ______________________ Date: 12/14/20________</td></tr>
</table>

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TABLE OF CONTENTS

APPENDICES

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EXECUTIVE SUMMARY

As directed by the MBTA, the STV Design Team conducted a limited hazardous materials inspection of Tower A and Draw 1 (Bridge Spans 1 & 2). The inspection activities were conducted on August 2, 2020, August 19th, 2020 and between October 12, 2020 and October 16, 2020, by Certified Massachusetts Asbestos Inspector(s) Cameron Cooke, Roland Holacsek, Jorge DaSilva and David J. Gavin of STV Design Team member TRC Environmental. The scope of work included a verification inspection of Tower A, Mechanical Rooms associated with Spans 1 & 2, beneath the stone track ballast as well as an initial inspection of the new control tower. The STV Design Team was unable to access the underside of Spans 1 & 2 due to the lack of boat rentals and/or alternatives at the time of the inspection.

Asbestos Containing Materials

Results of the bulk sampling identified the presence of asbestos-containing materials (ACM). The US EPA and MassDEP require all ACM be removed from a facility prior to the start of renovation or demolition activities if the materials may be disturbed by these activities. A licensed Asbestos Removal Contractor should remove identified ACM prior to the start of renovation or demolition activities in accordance with federal, state and local regulations.

Inaccessible Suspect Asbestos Containing Materials / Areas

Suspect ACM were identified during the survey which were not sampled. These materials must be sampled by an accredited asbestos inspector prior to any disturbance, or they must be treated as ACM. Suspect ACM were identified in the Tower A Electrical Room, the mechanical rooms associated with Spans 1 & 2

Lead Containing Paint Sampling Results

Results of the laboratory analysis indicated lead was detected in the samples that were collected as listed in the following sections. For any paint in which lead was detected, the STV Design Team recommends that any demolition or renovation activities that may disturb painted surfaces be conducted according to the OSHA requirements regarding lead in construction (29 CFR 1926.62).

Other Regulated and Hazardous Materials Inventory

Suspect PCB containing fluorescent light ballasts etc. were identified in the areas surveyed. Fluorescent ballasts manufactured prior to January 1, 1978 or ballasts that are not labeled "No PCBs" must be considered PCB containing unless testing proves otherwise.

Mercury containing light bulbs (high intensity discharge, fluorescent tubes, etc.) were identified in the areas surveyed. Mercury containing light bulbs, that are scheduled for disposal should be managed according to applicable local, state and federal waste disposal regulations and requirements.

Polychlorinated Biphenyl (PCB) Containing Caulks

Results of laboratory analysis of representative building materials did not detect PCB concentrations above the Toxic Substances Control Act (TSCA) limits.

1. INTRODUCTION

As directed by the MBTA, the STV Design Team conducted a limited hazardous materials inspection at Tower A and Draw 1 (Bridge Spans 1 & 2). The inspection activities were initiated on October 12, 2020, by Certified Massachusetts Asbestos Inspector(s) Roland Holacsek, Jorge DaSilva and David J. Gavin of STV Design Team member TRC Environmental.

The scope of work included a verification inspection of Tower A, Mechanical Rooms associated with Bridge Spans 1 & 2, beneath the stone track ballast as well as an initial inspection of the new control tower.

The scope of services was conducted for the proposed demolition project.

2. BACKGROUND

2.1. Asbestos Containing Materials

Occupational Safety and Health Administration (OSHA), MassDEP and MADLS defines asbestos-containing material (ACM), as any material containing one percent asbestos or greater.

The Environmental Protection Agency (EPA) defines ACM as follows:

1. Friable asbestos-containing material (ACM), is defined by the Asbestos NESHAP, as any material containing more than one percent (1%) asbestos as determined using the method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy (PLM), that, when dry, can be crumbled, pulverized or reduced to powder by hand pressure.
2. Nonfriable ACM is any material containing more than one percent (1%) asbestos as determined using the PLM method that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. The EPA further defines two categories of nonfriable ACM:
   a. Category I (Cat I) - Category I nonfriable ACM is any asbestos-containing packing, gasket, resilient floor covering or asphalt roofing product which contains more than one percent (1%) asbestos as determined using PLM according to the method specified in Appendix A, Subpart F, 40 CFR Part 763, and
   b. Category II (Cat II) - Category II nonfriable ACM is any material, excluding Category I nonfriable ACM, containing more than one percent (1%) asbestos as determined using PLM according to the methods specified in Appendix A, Subpart F, 40 CFR Part 763 that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.
3. Regulated Asbestos-Containing Material (RACM) is (a) friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

2.2. Asbestos Containing Waste Material (ACWM)

ACWM means any ACM removed during a demolition or renovation project and anything contaminated with asbestos in the course of a demolition or renovation project including, but not limited to, asbestos waste from control devices, bags or containers that previously contained asbestos, contaminated clothing, materials used to enclose the work area during the demolition or renovation operation, and demolition or renovation debris. ASBESTOS-CONTAINING WASTE MATERIAL (ACWM) shall also include ACM on and/or in facility components that are inoperable or have been taken out of service and any ACM that is damaged or deteriorated to the point where it is no longer attached as originally applied or is no longer serving the intended purpose for which it was originally installed.

2.3. Asbestos Sampling Procedures

The survey was conducted in accordance with the sample collection protocols established in 40 CFR 763 (AHERA), 40 CFR 61 Subpart M (NESHAP). A summary of survey activities is provided below.

Survey activities began with visual observation of the project area to identify homogeneous areas of suspect ACM. A homogeneous area consists of building materials that appear similar throughout in terms of color and texture that does not extend to other buildings. Visual assessments were conducted in accessible areas of the building. Building materials identified as glass, wood or metal were not considered suspect ACM.

A physical assessment of each homogeneous area of suspect ACM was conducted to assess the friability and condition of the materials. Friability was assessed by physically touching suspect materials.

Based on results of the visual observation, bulk samples of suspect ACM were collected in accordance with EPA AHERA sampling protocols. Samples of suspect materials were collected in each homogeneous area. Bulk samples were collected using wet methods as applicable to reduce the potential for fiber release. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker.

Bulk samples were submitted under proper COC documentation to the laboratory. Bulk samples were analyzed by PLM utilizing the EPA's, Method for the Determination of Asbestos in Bulk Building Materials, EPA 600/M4-82-020. Analysis by PLM was performed by visual observation of the bulk sample and slides prepared of the bulk sample for microscopic examination and identification. The samples were analyzed for asbestos (Chrysotile, Amosite, Crocidolite, Anthophyllite, and Actinolite/Tremolite), fibrous non-asbestos constituents (mineral wool, cellulose, etc.) and non-fibrous constituents. Using a stereoscope, the microscopist visually estimated the relative amounts of each constituent by determining the estimated area of the asbestos compared with the area estimate of the total sample.

2.4. Paint Chip Sampling

The STV Design Team conducted an inspection to identify lead-containing paint (LCP) at the Site. The inspection/sampling was performed to identify representative testing of suspect LCP on paint coated surfaces that made up most of the coatings in each area assessed.

The general purpose of this investigation was to confirm the general presence and locations of painted coatings and components that will be disturbed in association with the renovation or demolition of the Site.

According to the OSHA Program Directive, Lead: Exposure in Construction, "For all occupational exposure to lead occurring in the course of construction work, the standard (1926.62) does not specify a minimum amount or concentration of lead that triggers a determination that lead is present and the potential for occupational exposure exists."

Paint chip samples were collected from painted surfaces to determine total lead content and assist in determining Occupational Safety and Health Administration (OSHA) requirements with respect to construction activities which may disturb lead-containing paints. Contractors involved with demolition and debris handling should comply with the requirements cited in OSHA's Lead in Construction Standard 29 CFR 1926.62. In addition, contractors should comply with applicable federal and state requirements for demolition and disposal of lead containing paint coated building materials.

All paint chip samples were submitted under proper COC documentation to the laboratory. Samples were analyzed by Flame AAS utilizing the Environmental Protection Agency's (EPA) Test Method for Evaluating Solid Waste, Physical / Chemical Methods, EPA SW-846 Method 7420.

2.5. Other Regulated and Hazardous Materials Inventory

The STV Design Team conducted a survey for other regulated materials, hazardous materials, and hazardous materials contained in equipment. The hazardous materials survey was directed at collecting information on the type, location, and quantities of hazardous materials contained in building equipment or hazardous materials stored at the site that would have to be disposed of according to applicable federal and state regulations prior to the demolition of the site buildings and structures.

These materials fall into various categories such as Hazardous Waste, Universal Waste, Toxic Substances Control Act (TSCA) Wastes and other Regulated Wastes, depending on the component and concentration of contaminants of concern.

Any material classified as unknown will require sample collection and analysis for hazardous waste characteristics (e.g., Ignitability, Corrosivity, Reactivity, Toxicity, PCBs, and Metals analyses) in accordance with federal regulations. Based on the results of analyses, if the material is classified as a hazardous waste, it will be managed and disposed in accordance applicable regulations. Additional profile sampling and analysis may be necessary to meet the specific waste acceptance requirements of the selected disposal facility.

2.6. PCB Sampling Procedures

Select interior and exterior water proofing sealants including interior window caulk, exterior skylight caulk and exterior building caulk were sampled to determine if they contained PCBs. The material samples were shipped to the laboratory for analysis under the chain of custody protocol and submitted to be analyzed by EPA Method 8082.

2.7. Laboratory Analysis

Laboratory services were provided by EMSL Analytical, Inc., a National Voluntary Laboratory Accreditation Program (NVLAP) certified laboratory.

3. FINDINGS

3.1. Asbestos Containing Materials

The table below provides a summary of suspect ACM that were observed within the survey area(s) and approximate quantities.

Tower A, Bridge Spans 1 & 2		
ACM	**Location**	**Approximate Quantity**
Black Tar Flooring Under 12x12 Pink Floor Tile (Carpeted Area)	Tower A, 2nd Floor, Storage Area (Half of Carpeted Area)	150 SF
Electrical Conduit Sealant	Tower A, 1st Floor Electrical Closet, Near Electrical Room	5 SF
Roof Parapet Flashing	Tower A Roof Parapet	210 SF
Gray Patching Material	Tower A Exterior Brick Facade	60 SF
9"x9" Floor Tile	Tower A, 2nd Floor Locker Room	155 SF
Glue Daub	Tower A Throughout 2nd Floor	1980 SF

Tower A, Bridge Spans 1 & 2		
ACM	**Location**	**Approximate Quantity**
Perimeter Flashing	Tower A – Electrical Room Roof	600 SF
Parapet Flashing	Tower A – Electrical Room Roof	120 SF
Interior Window Glazing	Tower A – 1st Floor Utility Room, Bathroom 1, Shops 2, 3 & 4	7 EA
Exterior Window Caulking	Tower A – Throughout 1st and 2nd	33 EA
Exterior Window Caulking	Tower A Exterior	8 EA
Transite	Span 1 & 2 – Exterior	1400 SF
Mechanical Brake Pad	Span 1 & 2 – Interior	416 EA
Pipe Insulation	Tower A – 1st Floor Electrical Room	20 LF
Electrical Board with 80 Electrical Clips	Tower A – 1st Floor Electrical Room	80 Clips

Notes:
NAD = No Asbestos Detected
LF = Linear Feet
SF = Square Feet

Asbestos Suspect Materials (Inaccessible)

The following materials must be sampled by an accredited asbestos inspector prior to any disturbance, or they must be treated as asbestos containing material (ACM):

Tower A, Bridge Spans 1 & 2 and New Control Tower		
Suspect ACM	**Material Location**	**Reason Inaccessible**
Asbestos Cement Switch Panels	Tower A Electrical Room (300 SF)	No Access

Tower A, Bridge Spans 1 & 2 and New Control Tower		
Suspect ACM	**Material Location**	**Reason Inaccessible**
Asbestos Cement Break Pads	Mechanical Rooms, Span 1 And 2 (16 Each)	No Access
Glue Behind Wooden Panels	New Control Tower (150 SP)	No Access

Any additional materials uncovered during renovation or demolition activities that are not addressed in this inspection report, or presumed asbestos containing materials (PACM), must be sampled by an accredited asbestos inspector prior to any disturbance, or they must be treated as ACM.

Laboratory results and a photographic log of suspect asbestos-containing materials is provided as Appendix A.

3.2. Paint Chip Sampling Results

Results of laboratory analysis identified lead to be present in some of the paint chip samples that were collected and analyzed.

Tower A, Bridge Spans 1 & 2		
Sample Number	**Sample Description**	**Lead Concentration % wt.**
1	Gray Paint on Concrete Floor	0.25
2	Gray Paint on Plaster Wall	3.2
3	White Paint on Plaster Wall	7.2
4	Blue Paint on Metal Handrail	14
5	White Paint on Drywall	11
6	Off-White Paint on Drywall	<0.0080
7	Black Paint on Metal Handrail	17

8	Brown Paint on Window Sill	7.9
9	White Paint on Window Sill	7.0
10	Green Paint on Plaster Wall	0.021
11	Beige Paint on Mechanical Room Steel Structures	1.1
12	Beige Paint on Mechanical Room Concrete Wall	0.26
13	Gray Paint on Exterior of Mechanical Room Concrete Wall (Span 2)	0.018

<RL = Less Than the Analytical Reporting Limit

Laboratory results and a photographic log of suspect lead containing paint is provided as Appendix B.

3.3. Other Regulated and Hazardous Materials Inventory

An inventory of other regulated and hazardous materials and/or universal wastes as well a photographic log of is provided as Appendix D.

Materials contained in the inventory fall into various categories such as Hazardous Waste, Universal Waste, Toxic Substances Control Act (TSCA) Wastes and other Regulated Wastes, depending on the component and concentration of contaminants of concern.

3.4. PCB Sample Source Results

Sample Number	Location	Description	Quantity	Result (mg/kg)
01	Interior	Interior Window Glaze compound	NA	ND
02	Interior	Interior Window Glaze compound	NA	ND
03	Exterior	Exterior Window Caulk	NA	ND
04	Exterior	Exterior Window Caulk	NA	ND

Sample Number	Location	Description	Quantity	Result (mg/kg)
05	Exterior (Roof)	Parapet Flashing Material	NA	ND
06	Exterior (Roof)	Parapet Flashing Material	NA	ND

No PCB concentrations above the Toxic Substances Control Act (TSCA) regulated limits were found in the samples analyzed.

Laboratory results and a photographic log of PCB samples collected for this project are provided as Appendix C.

4. RECOMMENDATIONS

The STV Design Team recommends that any materials uncovered during renovation/demolition activities that are not addressed in this inspection report suspected to be ACM must be sampled by an accredited asbestos inspector prior to any disturbance, or they must be treated as asbestos containing.

The STV Design Team conducted an inspection in conjunction with the drilling operation to verify the presence of waterproofing/damp proofing material associated with the stone track ballast located on the railway and bridge. No material was encountered.

The STV Design Team recommends that a boat be secured in order to investigate the potential hazardous materials present under the drawbridge (i.e. waterproofing associated with the wooden pilings and lead containing paint associated with the steel structure, etc.)

5. DISCLAIMER

The content presented in this report is based on data collected during the site inspection and survey, review of pertinent regulations, requirements, guidelines and commonly followed industry standards, and information provided by Client, their clients, agents, and representatives.

The work has been conducted in an objective and unbiased manner and in accordance with generally accepted professional practice for this type of work. STV Design Team member TRC believes the data and analysis to be accurate and relevant but cannot accept responsibility for the accuracy or completeness of available documentation or possible withholding of information of other parties.

This limited hazardous materials inspection report is designed to aid the property owner, architect, construction manager, general contractor, and asbestos abatement contractor in locating ACM, lead containing paints, suspect PCB containing equipment and suspect mercury containing equipment. This report is not intended for, and may not be utilized as, a bidding document or as an abatement project specification document.

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Appendix A
ACM LABORATORY DATA/REPRESENTATIVE PHOTO LOG

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 132007292
Customer ID: COVI50
Customer PO: 342282
Project ID:

Attention: David Gavin
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 933-2555
Fax:
Received Date: 10/14/2020 11:00 AM
Analysis Date: 10/15/2020
Collected Date: 10/12/2020

Project: 342282/Tower A Verification Survey; US-1 N; Cambridge, MA 02141

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
01A *132007292-0001*	2nd Floor, Storage Area - Black Tar Flooring Under 12x12 Pink Floor Tile (Carpeted Area)	Black Non-Fibrous Homogeneous	35% Cellulose	63% Non-fibrous (Other)	2% Chrysotile
01B *132007292-0002*	2nd Floor, Storage Area - Black Tar Flooring Under 12x12 Pink Floor Tile (Carpeted Area)	Black Non-Fibrous Homogeneous	35% Cellulose	63% Non-fibrous (Other)	2% Chrysotile
02A *132007292-0003*	2nd Floor, Office 2 - Brown Floor Tile Under 12x12 Pink Floor Tile (Carpeted Area)	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
02B *132007292-0004*	2nd Floor, Office 2 - Brown Floor Tile Under 12x12 Pink Floor Tile (Carpeted Area)	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
03A *132007292-0005*	2nd Floor, Office 1 - Black Mastic Assoc. w/ Brown Floor Tile	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
03B *132007292-0006*	2nd Floor, Office 2 - Black Mastic Assoc. w/ Brown Floor Tile	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
04A *132007292-0007*	1st Floor, Electrical Closet - Electrical Conduit Sealant	Black Non-Fibrous Homogeneous	25% Cellulose	45% Non-fibrous (Other)	30% Chrysotile
04B *132007292-0008*	1st Floor, Electrical Closet - Electrical Conduit Sealant	Black Non-Fibrous Homogeneous	20% Cellulose	45% Non-fibrous (Other)	35% Chrysotile
05A *132007292-0009*	1st Floor, Boiler Room - Pipe Thread Sealant	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
05B *132007292-0010*	1st Floor, Boiler Room - Pipe Thread Sealant	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
06A *132007292-0011*	2nd Floor, Electrical Room Roof - Roll-on Asphalt Roofing Material	Black Non-Fibrous Homogeneous	15% Synthetic	85% Non-fibrous (Other)	None Detected
06B *132007292-0012*	2nd Floor, Electrical Room Roof - Roll-on Asphalt Roofing Material	Black Non-Fibrous Homogeneous	15% Synthetic	85% Non-fibrous (Other)	None Detected
07A *132007292-0013*	Tower A, Exterior, North Side - Exterior Hose Valve Putty	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 10/15/2020 17:38:24

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order: 132007292
Customer ID: COVI50
Customer PO: 342282
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
07B 132007292-0014	Tower A, Exterior, North Side - Exterior Hose Valve Putty	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
08A 132007292-0015	2nd Floor, 1 Pane Windows - Exterior White Window Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
08B 132007292-0016	2nd Floor, 1 Pane Windows - Exterior White Window Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
09A 132007292-0017	Exterior Brick Wall - Exterior Red Fire Stop	Red Non-Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected
09B 132007292-0018	Exterior Brick Wall - Exterior Red Fire Stop	Red Non-Fibrous Homogeneous	5% Glass	95% Non-fibrous (Other)	None Detected
10A 132007292-0019	Tower A Roof Parapet - Roof Parapet Flashing	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
10B 132007292-0020	Tower A Roof Parapet - Roof Parapet Flashing	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
10C 132007292-0021	Roof Parapet - Roof Parapet Flashing	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
11A 132007292-0022	Exterior Brick Wall - Gray Patching Material	Black Non-Fibrous Homogeneous		92% Non-fibrous (Other)	8% Chrysotile
11B 132007292-0023	Exterior Brick Wall - Gray Patching Material	Black Non-Fibrous Homogeneous		92% Non-fibrous (Other)	8% Chrysotile
12A 132007292-0024	SW Side of Roof - Asphalt Roofing Material	Black Non-Fibrous Homogeneous	10% Cellulose 5% Glass	85% Non-fibrous (Other)	None Detected
12B 132007292-0025	SW Side of Roof - Asphalt Roofing Material	Black Non-Fibrous Homogeneous	10% Cellulose 5% Glass	85% Non-fibrous (Other)	None Detected
12C 132007292-0026	SE Side of Roof - Asphalt Roofing Material	Black Non-Fibrous Homogeneous	10% Cellulose 5% Glass	85% Non-fibrous (Other)	None Detected
12D 132007292-0027	SE Side of Roof - Asphalt Roofing Material	Black Non-Fibrous Homogeneous	10% Cellulose 5% Glass	85% Non-fibrous (Other)	None Detected
13A 132007292-0028	1st Floor Stair Landing - Cloth Wire Cover	Black Fibrous Homogeneous	70% Cellulose	30% Non-fibrous (Other)	None Detected
13B 132007292-0029	1st Floor Closet Next to Electrical Room - Cloth Wire Cover	Black Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
14A 132007292-0030	Electrical Room - White Cable Wrap	White Non-Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (Other)	None Detected
14B 132007292-0031	Electrical Room - White Cable Wrap	White Fibrous Homogeneous	70% Cellulose	30% Non-fibrous (Other)	None Detected

Initial report from: 10/15/2020 17:38:24

EMSL Analytical, Inc.
5 Constitution Way, Unit A Woburn, MA 01801
Tel/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com / bostonlab@emsl.com

EMSL Order:	132007292
Customer ID:	COVI50
Customer PO:	342282
Project ID:	

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
15A 132007292-0032	Span 1 Mech Room Window - Interior Window Glaze Mechanical Rooms Spans 1 and 2	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
15B 132007292-0033	Span 1 Mech Room Window - Interior Window Glaze Mechanical Rooms Spans 1 and 2	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16A 132007292-0034	Span 1 Mech Room - Soft Glaze Assoc. w/ Door	Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16B 132007292-0035	Span 1 Mech Room - Soft Glaze Assoc. w/ Door	Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
17A 132007292-0036	Base of No Access Restroom (Next to New Control Tower) - Gray Building Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
17B 132007292-0037	No Access Restroom - Gray Building Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
18A 132007292-0038	Inaccessible Restroom Roof - White Rubber Roof Sealant	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
18B 132007292-0039	Inaccessible Restroom Roof - White Rubber Roof Sealant	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19A 132007292-0040	New Control Tower Roof - White Rubber Roof Sealant	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19B 132007292-0041	New Control Tower Roof - White Rubber Roof Sealant	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)

Valerica Stanca (41)

Steve Grise, Laboratory Manager
or Other Approved Signatory

Initial report from: 10/15/2020 17:38:24

TRC

300 Wildwood Avenue, Suite 230, Woburn, MA 01801

132007292

ASBESTOS BULK SAMPLE CHAIN OF CUSTODY FORM

Client: STV	Project Number: 342282	Inspector(s): David Gavin, Jorge DaSilva, Roland Holacsek
Project Name: Tower A verification survey US-1 N Cambridge, MA 02141	Tracking Number:	Requested TAT: 24 HR
Email Results to: dgavin@trccompanies.com	Analytical Method: PLM EPA 600/R-93/116	Lab Comments:

ASBESTOS BULK SAMPLE INFORMATION

Date Collected	Sample Identification	Material Description	Homogeneous Area	Sample Location	Lab Identification (Lab Use Only)
2020-10-12	01A	Black tar flooring under 12z12 pink floor tile (carpeted area)	Tower A, 2nd floor, storage area	2nd floor, storage area	
2020-10-12	01B	Black tar flooring under 12z12 pink floor tile (carpeted area)	Tower A, 2nd floor, storage area	2nd floor storage area	
2020-10-12	02A	Brown floor tile under 12x12 pink floor tile (carpeted area)	Tower A, 2nd floor, carpeted area (offices 1 and 2)	2nd floor, office 2	
2020-10-12	02B	Brown floor tile under 12x12 pink floor tile (carpeted area)	Tower A, 2nd floor, carpeted area (offices 1 and 2)	2nd floor office 2	
2020-10-12	03A	Black mastic assoc. with brown floor tile	Tower A, 2nd floor, offices 1 and 2	2nd floor, office 1	
2020-10-12	03B	Black mastic assoc. with brown floor tile	Tower A, 2nd floor, offices 1 and 2	2nd floor office 2	
2020-10-12	04A	Electrical conduit sealant	Tower A, 1st floor electrical closet , near electrical room	1st floor, electrical closet	

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SM 1100
Wainin

132007292

Date Collected	Sample Identification	Material Description	Homogeneous Area	Sample Location	Lab Identification (Lab Use Only)
2020-10-12	04B	Electrical conduit sealant	Tower A, 1st floor electrical closet , near electrical room	1st floor electrical closet	
2020-10-12	05A	Pipe thread sealant	Tower A, 1st floor, boiler room	1st floor, boiler room	
2020-10-12	05B	Pipe thread sealant	Tower A, 1st floor, boiler room	1st floor, boiler room	
2020-10-12	06A	Roll on asphalt roofing material	Tower A, electrical room roof	2nd floor, electrical room roof	
2020-10-12	06B	Roll on asphalt roofing material	Tower A, electrical room roof	2nd floor, electrical room roof	
2020-10-12	07A	Exterior hose valve putty	Tower A, hose valve	Tower A, exterior, north side	
2020-10-12	07B	Exterior hose valve putty	Tower A, hose valve	Tower A, exterior, north side	
2020-10-12	08A	Exterior white window caulk	Tower A, second floor 1 pane windows	2nd floor, 1 pane windows	
2020-10-12	08B	Exterior white window caulk	Tower A, second floor 1 pane windows	2nd floor 1 pane windows	
2020-10-12	09A	Exterior red fire stop	Tower A, exterior brick wall	Exterior brick wall	
2020-10-12	09B	Exterior red fire stop	Tower A, exterior brick wall	Exterior brick wall	
2020-10-13	10A	Roof parapet flashing	Tower A roof parapet	Tower A roof parapet	
2020-10-13	10B	Roof parapet flashing	Tower A roof parapet	Tower A roof parapet	
2020-10-13	10C	Roof parapet flashing	Tower A roof parapet	Roof parapet	
2020-10-13	11A	Gray patching material	Tower A exterior brick wall	Exterior brick wall	
2020-10-13	11B	Gray patching material	Tower A exterior brick wall	Exterior brick wall	
2020-10-13	12A	Asphalt roofing material	Tower A, main roof	SW side of the roof	
2020-10-13	12B	Asphalt roofing material	Tower A, main roof	SW side of the roof	
2020-10-13	12C	Asphalt roofing material	Tower A, main roof	SE side of the roof	
2020-10-13	12D	Asphalt roofing material	Tower A, main roof	SE side of the roof	
2020-10-13	13A	Cloth wire cover	Tower A 1st floor	1st floor stair landing	

EMSL-BOSTON OCT 14 2020

132007292

Date Collected	Sample Identification	Material Description	Homogeneous Area	Sample Location	Lab Identification (Lab Use Only)
2020-10-13	13B	Cloth wire cover	Tower A 1st floor	1st floor closet next to electrical room	
2020-10-14	14A	White cable wrap	Tower A electrical room	Electrical room	
2020-10-14	14B	White cable wrap	Tower A electrical room	Electrical room	
2020-10-14	15A	Interior window glaze mechanical rooms spans 1 and 2	Mechanical rooms, spans 1 and 2	Span 1 mech room window	
2020-10-14	15B	Interior window glaze mechanical rooms spans 1 and 2	Mechanical rooms, spans 1 and 2	Span 1, mech room window	
2020-10-14	16A	Soft glaze assoc. with door	Mechanical rooms, spans 1 and 2 doors	Span 1, mech room	
2020-10-14	16B	Soft glaze assoc. with door	Mechanical rooms, spans 1 and 2 doors	Span 1, mech room	
2020-10-14	17A	Gray building caulk	Between concrete base and aluminum structure for f no access restroom	Base of no access restroom (next to new control tower)	
2020-10-14	17B	Gray building caulk	Between concrete base and aluminum structure for f no access restroom	No access restroom	
2020-10-14	18A	White rubber roof sealant	Inaccessible restroom roof	Inaccessible restroom roof	
2020-10-14	18B	White rubber roof sealant	Inaccessible restroom roof	Inaccessible restroom roof	
2020-10-14	19A	White rubber roof sealant	New control tower roof	New control tower roof	
2020-10-14	19B	White rubber roof sealant	New control tower roof	New control tower roof	

Special Instruction to Laboratory:

N/A

RECD EMSL-BOSTON OCT 14 2020

1320072922

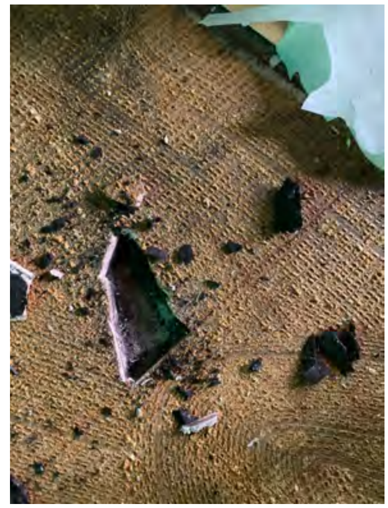
CHAIN OF CUSTODY INFORMATION					
Relinquished By:	Date	Time	Received By:	Date	Time
I. (Print): Roland Holacsek	2020-10-14	10:12:29 EDT	I. (Print):		
(Sign): Holocsek			(Sign):		
II. (Print):			II. (Print):		
(Sign):			(Sign):		

OCT 14 2020

OrderID: 1320072922

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	01A, 01B	
Material Description	Black Tar Flooring Under 12z12 Pink Floor Tile (Carpeted Area)	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Positive	
Asbestos Type	Chrysotile	
Homogeneous Area	Tower A, 2nd Floor, Storage Area (Half Of Carpeted Area)	
Total Approximate Quantity	150 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	RACM	
Notes	Not Applicable	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	02A, 02B	
Material Description	Brown Floor Tile Under 12x12 Pink Floor Tile (Carpeted Area)	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Negative	
Asbestos Type	No Asbestos Detected	
Homogeneous Area	Tower A, 2nd Floor, Carpeted Area (Offices 1 And 2)	
Total Approximate Quantity	200 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	Not Applicable	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	03A, 03B	
Material Description	Black Mastic Assoc. With Brown Floor Tile	
Accessible Material	Accessible	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Reason Inaccessible	N/A	
Asbestos Detected	Negative	
Asbestos Type	No Asbestos Detected	
Homogeneous Area	Tower A, 2nd Floor, Offices 1 And 2	
Total Approximate Quantity	200 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	Not Applicable	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	04A, 04B	
Material Description	Electrical Conduit Sealant	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Positive	
Asbestos Type	Chrysotile	
Homogeneous Area	Tower A, 1st Floor Electrical Closet , Near Electrical Room	
Total Approximate Quantity	5 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	RACM	
Notes	Not Applicable	

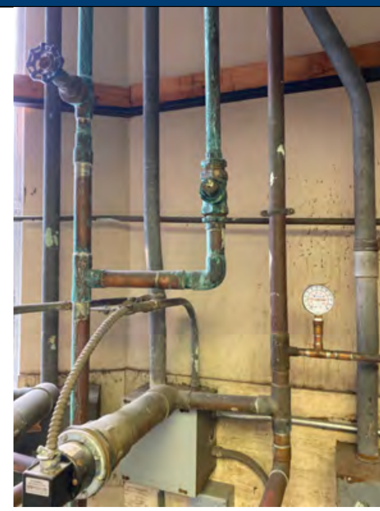
SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	05A, 05B	
Material Description	Pipe Thread Sealant	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Negative	

October 30, 2020

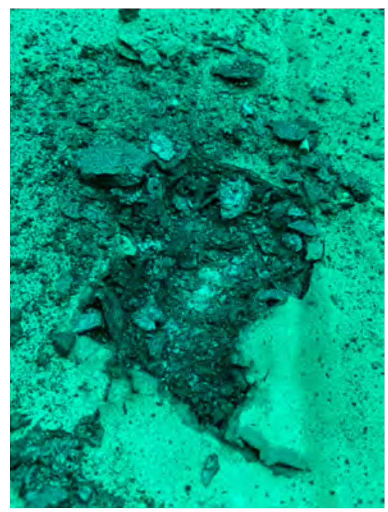
DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected
Homogeneous Area	Tower A, 1st Floor, Boiler Room
Total Approximate Quantity	TBD
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	Not Applicable



SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	06A, 06B
Material Description	Roll On Asphalt Roofing Material
Accessible Material	Accessible
Reason Inaccessible	N/A
Asbestos Detected	Negative
Asbestos Type	No Asbestos Detected
Homogeneous Area	Tower A, Electrical Room Roof
Total Approximate Quantity	1000 SF
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	Not Applicable



SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	07A, 07B
Material Description	Exterior Hose Valve Putty
Accessible Material	Accessible
Reason Inaccessible	N/A
Asbestos Detected	Negative

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected
Homogeneous Area	Tower A, Hose Valve
Total Approximate Quantity	2 SF
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	Not Applicable

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	08A, 08B
Material Description	Exterior White Window Caulk
Accessible Material	Accessible
Reason Inaccessible	N/A
Asbestos Detected	Negative
Asbestos Type	No Asbestos Detected
Homogeneous Area	Tower A, Second Floor 1 Pane Windows
Total Approximate Quantity	20 Each
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	Not Applicable

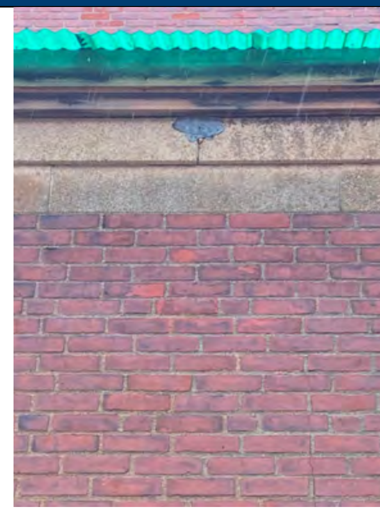
SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	09A, 09B
Material Description	Exterior Red Fire Stop
Accessible Material	Accessible
Reason Inaccessible	N/A
Asbestos Detected	Negative

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected	
Homogeneous Area	Tower A, Exterior Brick Wall	
Total Approximate Quantity	20 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	Not Applicable	
SUSPECT ASBESTOS CONTAINING MATERIAL		
Sample Numbers	10A, 10B, 10C	
Material Description	Roof Parapet Flashing	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Positive	
Asbestos Type	Chrysotile	
Homogeneous Area	Tower A Roof Parapet	
Total Approximate Quantity	210 SF	
Condition	Damaged	
Material Type	Misc.	
NESHAP Category	RACM	
Notes	Not Applicable	
SUSPECT ASBESTOS CONTAINING MATERIAL		
Sample Numbers	11A, 11B	
Material Description	Gray Patching Material	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Positive	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	Chrysotile	
Homogeneous Area	Tower A Exterior Brick Facade	
Total Approximate Quantity	60 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	RACM	
Notes	Not Applicable	

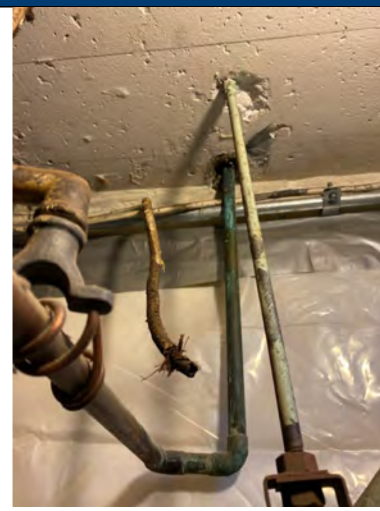
SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	12A, 12B, 12C, 12D	
Material Description	Asphalt Roofing Material	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Negative	
Asbestos Type	No Asbestos Detected	
Homogeneous Area	Tower A, Main Roof	
Total Approximate Quantity	2000 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	Not Applicable	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	13A, 13B	
Material Description	Cloth Wire Cover	
Accessible Material	Accessible	
Reason Inaccessible	No Access	
Asbestos Detected	Negative	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected	
Homogeneous Area	Tower A 1st Floor	
Total Approximate Quantity	10 LF	
Condition	Good	
Material Type	Surfacing	
NESHAP Category	N/A	
Notes	Not Applicable	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	14A, 14B	
Material Description	White Cable Wrap	
Accessible Material	Accessible	
Reason Inaccessible	No Access	
Asbestos Detected	Negative	
Asbestos Type	No Asbestos Detected	
Homogeneous Area	Tower A Electrical Room	
Total Approximate Quantity	300 LF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	Not Applicable	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	15A, 15B	
Material Description	Interior Window Glaze Mechanical Rooms Spans 1 And 2	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Negative	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected	
Homogeneous Area	Mechanical Rooms, Spans 1 And 2	
Total Approximate Quantity	8 Each	
Condition	Damaged	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	4 windows in each mech room	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	16A, 16B	
Material Description	Soft Glaze Assoc. With Door	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Negative	
Asbestos Type	No Asbestos Detected	
Homogeneous Area	Mechanical Rooms, Spans 1 And 2 Doors	
Total Approximate Quantity	4 Each	
Condition	Damaged	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	2 door in each room	

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	17A, 17B	
Material Description	Gray Building Caulk	
Accessible Material	Accessible	
Reason Inaccessible	N/A	
Asbestos Detected	Negative	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected
Homogeneous Area	Between Concrete Base And Aluminum Structure For F No Access Restroom
Total Approximate Quantity	40 LF
Condition	Damaged
Material Type	Misc.
NESHAP Category	N/A
Notes	Not Applicable

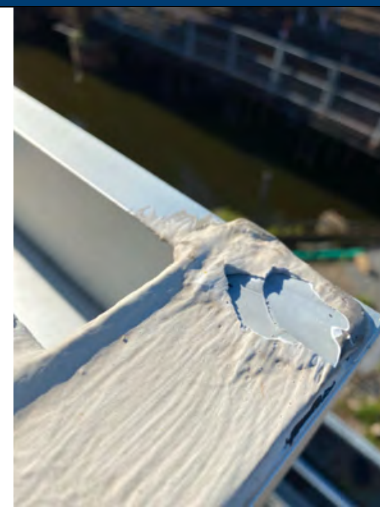
SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	18A, 18B
Material Description	White Rubber Roof Sealant
Accessible Material	Accessible
Reason Inaccessible	N/A
Asbestos Detected	Negative
Asbestos Type	No Asbestos Detected
Homogeneous Area	Inaccessible Restroom Roof
Total Approximate Quantity	65 SF
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	Not Applicable

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	19A, 19B
Material Description	White Rubber Roof Sealant
Accessible Material	Accessible
Reason Inaccessible	N/A
Asbestos Detected	Negative

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	No Asbestos Detected	
Homogeneous Area	New Control Tower Roof	
Total Approximate Quantity	250 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	The new control tower roof has not been sampled	
SUSPECT ASBESTOS CONTAINING MATERIAL		
Sample Numbers	N/A	
Material Description	Asbestos Cement Switch Panels	
Accessible Material	Inaccessible	
Reason Inaccessible	No Access	
Asbestos Detected	N/A	
Asbestos Type	N/A	
Homogeneous Area	Tower A Electrical Room	
Total Approximate Quantity	300 SF	
Condition	Good	
Material Type	Misc.	
NESHAP Category	N/A	
Notes	Not Applicable	
SUSPECT ASBESTOS CONTAINING MATERIAL		
Sample Numbers	N/A	
Material Description	Asbestos Cement Break Pads	
Accessible Material	Inaccessible	
Reason Inaccessible	N/A	
Asbestos Detected	N/A	

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October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PHOTOGRAPHIC LOG

Asbestos Type	N/A
Homogeneous Area	Mechanical Rooms, Span 1 And 2
Total Approximate Quantity	16 Each
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	8 pads in each mech room

SUSPECT ASBESTOS CONTAINING MATERIAL

Sample Numbers	N/A
Material Description	Glue Behind Wooden Panels
Accessible Material	Inaccessible
Reason Inaccessible	No Access
Asbestos Detected	N/A
Asbestos Type	N/A
Homogeneous Area	New Control Tower
Total Approximate Quantity	120 SF
Condition	Good
Material Type	Misc.
NESHAP Category	N/A
Notes	Assumed glue behind wooden panels in new control tower

MBTA Draw 1

Created	2020-08-20 03:29:24 UTC by Cameron Cooke
Updated	2020-12-03 15:57:02 UTC by David Gavin
Location	42.3679912090696, -71.0631763749486
Status	Survey Pending

PROJECT INFORMATION

Project Name	MBTA Draw 1
TRC Project Number	342282.2.18
TRC Project Manager	Gavin, David
Inspection Start Date	2020-08-19
Inspection End Date	2020-08-19
Inspector(s)	Cooke, Cameron
Client	Keolis
Background	Survey of potential ACM material under ballast at location AB-08. No suspect materials were found, 2ft of ballast on top of solid wood planks.

SURVEY INFORMATION

Surveys Performed	Asbestos
Asbestos Survey Type	NESHAP
NESHAP Survey Type	Full Demolition
Results Audited	No

ASBESTOS SECTION

Asbestos Present	No
Suspect Inaccessible Materials Present	No

GENERAL INFORMATION

Sample Location Diagrams

Samples Submitted	No
timezone	America/New_York
Generate COC	No

COC SECTION

1) Fill in information in this section and sign in the signature field; 2) Use the built-in generate report icon bottom left corner (iOS) in order to generate a COC.

REPORTING SECTION

Report generation is always under development. If you have questions please contact Heath Howard at hhoward@trcsolutions.com.

Survey Complete	No
Proposal Reviewed	No
Report Written	No
Report Reviewed	No
Email for Report Delivery	dgavin@trccompanies.com
Compile Generic Report	N/A
Compile Asbestos Report	N/A
Compile Boston Environmental Report	N/A

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Appendix B
LCP LABORATORY DATA/REPRESENTATIVE PHOTO LOG

EMSL Analytical, Inc.
5 Constitution Way, Unit A, Woburn, MA 01801
Phone/Fax: (781) 933-8411 / (781) 933-8412
http://www.EMSL.com bostonlab@emsl.com

EMSL Order:	132007269
CustomerID:	COVI50
CustomerPO:	342282
ProjectID:	

Attn: **David Gavin**
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 933-2555
Fax:
Received: 10/14/2020 11:00 AM
Collected: 10/12/2020

Project: **342282/Tower A Verification Survey**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Weight*	*Lead Concentration*
01	*132007269-0001*	10/12/2020	10/15/2020	0.251 g	0.25 % wt
	Site: Gray Paint on Concrete Floor				
02	*132007269-0002*	10/12/2020	10/15/2020	0.2497 g	3.2 % wt
	Site: Gray Paint on Wall (Plaster)				
03	*132007269-0003*	10/12/2020	10/15/2020	0.2485 g	7.2 % wt
	Site: White Paint on Wall (Plaster)				
04	*132007269-0004*	10/12/2020	10/15/2020	0.2525 g	14 % wt
	Site: Blue Paint on Handrail (Metal)				
05	*132007269-0005*	10/12/2020	10/15/2020	0.2513 g	11 % wt
	Site: White Paint on Wall (Plaster)				
06	*132007269-0006*	10/12/2020	10/15/2020	0.2485 g	<0.0080 % wt
	Site: Off-White Paint on Drywall				
07	*132007269-0007*	10/12/2020	10/15/2020	0.2497 g	17 % wt
	Site: Black Paint on Handrail (Metal)				
08	*132007269-0008*	10/12/2020	10/15/2020	0.2493 g	7.9 % wt
	Site: Brown Paint on Window Sill (Wood)				
09	*132007269-0009*	10/12/2020	10/15/2020	0.2511 g	7.0 % wt
	Site: White Paint on Window Sill (Wood)				
10	*132007269-0010*	10/12/2020	10/15/2020	0.2498 g	0.021 % wt
	Site: Green Paint on Plaster Wall				
11	*132007269-0011*	10/12/2020	10/15/2020	0.2485 g	1.1 % wt
	Site: Beige Paint on Mechanical Room Steel Structures				
12	*132007269-0012*	10/12/2020	10/15/2020	0.2508 g	0.26 % wt
	Site: Beige Paint on Mechanical Room Wall (Concrete)				
13	*132007269-0013*	10/12/2020	10/15/2020	0.25 g	0.018 % wt
	Site: Gray Paint on Span 2 Mechanical Room Exterior Wall (Concrete)				

Eric Steele, Laboratory Manager
or other approved signatory

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Analytical, Inc. Woburn, MA AIHA-LAP, LLC - ELLAP Accredited #180179

Initial report from 10/15/2020 16:02:02

132007269

TRC

300 Wildwood Avenue, Suite 230, Woburn, MA 01801

LEAD CONTAINING PAINT BULK SAMPLE CHAIN OF CUSTODY FORM

Client: STV	Project Number: 342282	Inspector(s): David Gavin, Jorge DaSilva, Roland Holacsek
Project Name: Tower A verification survey	Tracking Number:	Requested TAT: 24 HR
Email Results to: dgavin@trccompanies.com	Analytical Method: Lead Chips SW846-7000B	Lab Comments:

LCP BULK SAMPLE INFORMATION

Date Collected	Sample Identification	Sample Description	Substrate	Lab Identification (Lab Use Only)
2020-10-12	01	Gray paint on concrete floor	Concrete	
2020-10-12	02	Gray paint on wall	Plaster	
2020-10-12	03	White paint on wall	Plaster	
2020-10-12	04	Blue paint on handrail	Metal	
2020-10-12	05	White paint on wall	Plaster	
2020-10-12	06	Off white paint on dry wall	Drywall	
2020-10-12	07	Black paint on handrail	Metal	
2020-10-12	08	Brown paint on window sill	Wood	
2020-10-13	09	White paint on window sill	Wood	
2020-10-12	10	Green paint on plaster wall	Plaster	
2020-10-14	11	Beige paint on mechanical room steel structures	Metal	
2020-10-14	12	Beige paint on mechanical room wall	Concrete	
2020-10-14	13	Gray paint on span 2 mechanical room exterior wall	Concrete	

Special Instruction to Laboratory:

N/A

REC'D EMSL-BOSTON OCT 14 2020

SM 1100 walkin

CHAIN OF CUSTODY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time
I. (Print): Roland Holacsek	2020-10-14	10:12:29 EDT	I. (Print):		
(Sign): Holocsek			(Sign):		
II. (Print):			II. (Print):		
(Sign):			(Sign):		

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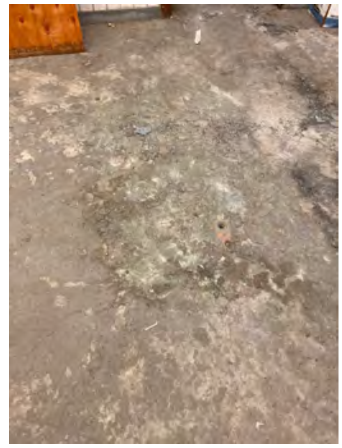
October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – LEAD CONTAINING PAINT PHOTOGRAPHIC LOG

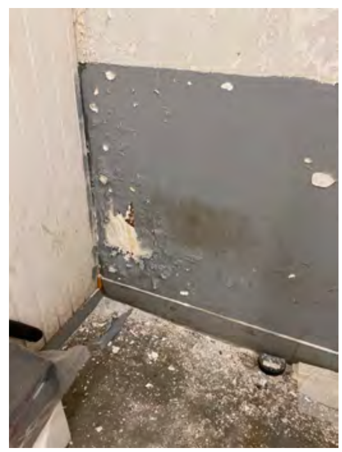
SUSPECT PAINT

Sample Numbers	01
Sample Location	1st Floor
Description	Gray Paint On Concrete Floor
Laboratory Result (%)	0.25
Substrate	Concrete
Paint Locations	
Quantity of Deteriorated Paint (SF)	1000



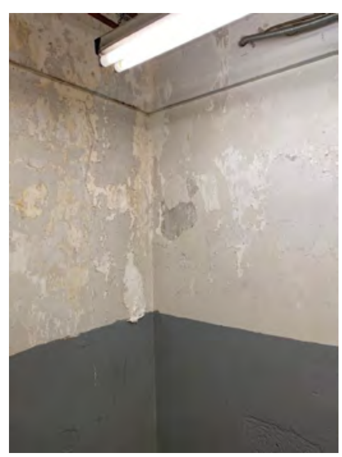
SUSPECT PAINT

Sample Numbers	02
Sample Location	1st Floor Wall
Description	Gray Paint On Wall
Laboratory Result (%)	3.2
Substrate	Plaster
Paint Locations	1st Floor
Quantity of Deteriorated Paint (SF)	TBD



SUSPECT PAINT

Sample Numbers	03
Sample Location	1st Floor Wall
Description	White Paint On Wall
Laboratory Result (%)	7.2
Substrate	Plaster
Paint Locations	1st Floor
Quantity of Deteriorated Paint (SF)	TBD

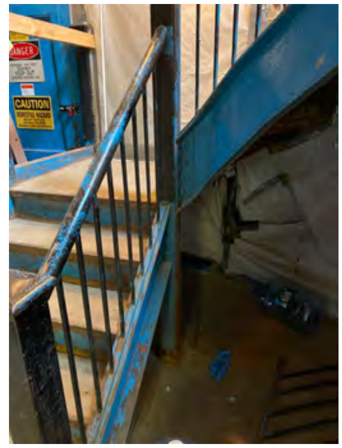


SUSPECT PAINT

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – LEAD CONTAINING PAINT PHOTOGRAPHIC LOG

Sample Numbers	04
Sample Location	1st And 2nd Floor Stair Case
Description	Blue Paint On Handrail
Laboratory Result (%)	14
Substrate	Metal
Paint Locations	1st And 2nd Floor Staircase
Quantity of Deteriorated Paint (SF)	TBD

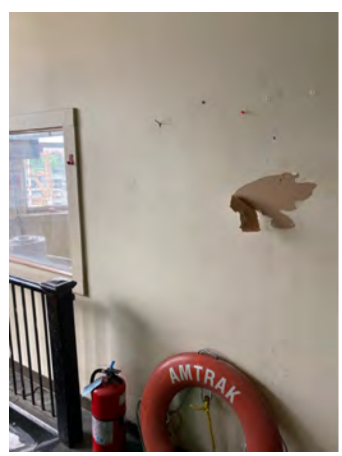


SUSPECT PAINT

Sample Numbers	05
Sample Location	2nd Floor Top Of The Stairs
Description	White Paint On Wall
Laboratory Result (%)	11
Substrate	Plaster
Paint Locations	2nd Floor Top Of The Stairs
Quantity of Deteriorated Paint (SF)	TBD

SUSPECT PAINT

Sample Numbers	06
Sample Location	2nd Floor, Control Room Wall
Description	Off White Paint On Dry Wall
Laboratory Result (%)	<0.0080
Substrate	Drywall
Paint Locations	2nd Floor, Control Room Wall
Quantity of Deteriorated Paint (SF)	TBD

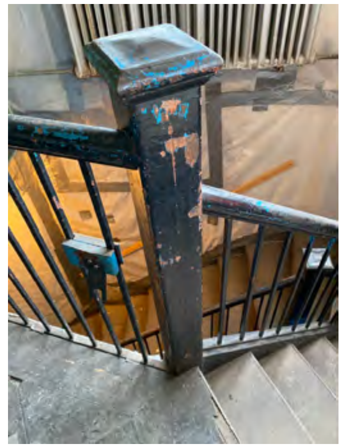


SUSPECT PAINT

October 30, 2020

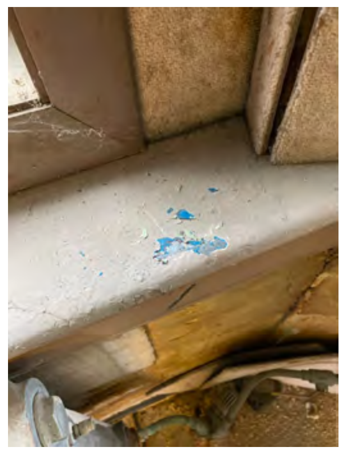
DRAW 1 - HAZARDOUS MATERIALS INSPECTION – LEAD CONTAINING PAINT PHOTOGRAPHIC LOG

Sample Numbers	07
Sample Location	2nd Floor Staircase Handrail
Description	Black Paint On Handrail
Laboratory Result (%)	17
Substrate	Metal
Paint Locations	2nd Floor Hand Rail
Quantity of Deteriorated Paint (SF)	TBD



SUSPECT PAINT

Sample Numbers	08
Sample Location	2nd Floor Window Sill
Description	Brown Paint On Window Sill
Laboratory Result (%)	7.9
Substrate	Wood
Paint Locations	2nd Floor Window Sill
Quantity of Deteriorated Paint (SF)	TBD



SUSPECT PAINT

Sample Numbers	09
Sample Location	2nd Floor, Locker Room Area
Description	White Paint On Window Sill
Laboratory Result (%)	7.0
Substrate	Wood
Paint Locations	2nd Floor, Locker Room Area
Quantity of Deteriorated Paint (SF)	TBD

SUSPECT PAINT

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – LEAD CONTAINING PAINT PHOTOGRAPHIC LOG

Sample Numbers	10
Sample Location	2nd Floor, Office 2
Description	Green Paint On Plaster Wall
Laboratory Result (%)	0.021
Substrate	Plaster
Paint Locations	2nd Floor Office 2
Quantity of Deteriorated Paint (SF)	TBD

SUSPECT PAINT

Sample Numbers	11
Sample Location	Mechanical Room, Span 2
Description	Beige Paint On Mechanical Room Steel Structures
Laboratory Result (%)	1.1
Substrate	Metal
Paint Locations	Span 2, Mechanical Room
Quantity of Deteriorated Paint (SF)	TBD

SUSPECT PAINT

Sample Numbers	12
Sample Location	Span 2, Mechanical Room
Description	Beige Paint On Mechanical Room Wall
Laboratory Result (%)	0.26
Substrate	Concrete
Paint Locations	Span 2, Mechanical Room
Quantity of Deteriorated Paint (SF)	TBD

SUSPECT PAINT

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October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – LEAD CONTAINING PAINT PHOTOGRAPHIC LOG

Sample Numbers	13	
Sample Location	Mechanical Room Exterior Wall	
Description	Gray Paint On Span 2 Mechanical Room Exterior Wall	
Laboratory Result (%)	0.018	
Substrate	Concrete	
Paint Locations	Span 2, Mechanical Room Exterior Wall	
Quantity of Deteriorated Paint (SF)	TBD	

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Appendix C
PCB LABORATORY DATA/REPRESENTATIVE PHOTO LOG

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn: **David Gavin**
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 933-2555
Fax:

10/19/2020

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 10/15/2020. The results are tabulated on the attached data pages for the following client designated project:

342282 Tower A verification survey

The reference number for these samples is EMSL Order #012011418. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Approved By:

Phillip Worby, Environmental Chemistry
Laboratory Director

The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, CA ELAP 1877

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order: 012011418
CustomerID: COVI50
CustomerPO:
ProjectID:

Attn: **David Gavin**
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 933-2555
Fax:
Received: 10/15/20 9:30 AM

Project: **342282 Tower A verification survey**

Analytical Results

Client Sample Description 01
2nd floor control room window
Collected: 10/13/2020 ***Lab ID:*** *012011418-0001*

Method	*Parameter*	*Result*	*RL Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA							
3540C/8082A	Aroclor-1016	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1254	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

Client Sample Description 02
2nd floor locker room
Collected: 10/13/2020 ***Lab ID:*** *012011418-0002*

Method	*Parameter*	*Result*	*RL Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA							
3540C/8082A	Aroclor-1016	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1254	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.93 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

Client Sample Description 03
2nd floor window
Collected: 10/13/2020 ***Lab ID:*** *012011418-0003*

Method	*Parameter*	*Result*	*RL Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA							
3540C/8082A	Aroclor-1016	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order: 012011418
CustomerID: COVI50
CustomerPO:
ProjectID:

Attn: **David Gavin**
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 933-2555
Fax:
Received: 10/15/20 9:30 AM

Project: **342282 Tower A verification survey**

Analytical Results

Client Sample Description 03 2nd floor window — ***Collected:*** 10/13/2020 — ***Lab ID:*** *012011418-0003*

Method	Parameter	Result	RL Units	Prep Date & Analyst		Analysis Date & Analyst	
GC-SVOA							
3540C/8082A	Aroclor-1254	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.81 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

Client Sample Description 04 1st floor window — ***Collected:*** 10/13/2020 — ***Lab ID:*** *012011418-0004*

Method	Parameter	Result	RL Units	Prep Date & Analyst		Analysis Date & Analyst	
GC-SVOA							
3540C/8082A	Aroclor-1016	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1254	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

Client Sample Description 05 Roof above the electrical room — ***Collected:*** 10/13/2020 — ***Lab ID:*** *012011418-0005*

Method	Parameter	Result	RL Units	Prep Date & Analyst		Analysis Date & Analyst	
GC-SVOA							
3540C/8082A	Aroclor-1016	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1254	1.4 D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.95 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order: 012011418
CustomerID: COVI50
CustomerPO:
ProjectID:

Attn: **David Gavin**
TRC
300 Wildwood Avenue
Woburn, MA 01801

Phone: (781) 933-2555
Fax:
Received: 10/15/20 9:30 AM

Project: **342282 Tower A verification survey**

Analytical Results

Client Sample Description 06
Roof above the electrical room

Collected: 10/13/2020 ***Lab ID:*** *012011418-0006*

Method	*Parameter*	*Result*	*RL Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA							
3540C/8082A	Aroclor-1016	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1254	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.99 mg/Kg	10/15/2020	RS	10/16/20 0:00	EH

Definitions:

MDL - method detection limit
J - Result was below the reporting limit, but at or above the MDL
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)
D - Dilution Sample required a dilution which was used to calculate final results

012011418

TRC

300 Wildwood Avenue, Suite 230, Woburn, MA 01801

PCB BULK SAMPLE CHAIN OF CUSTODY FORM

Client: STV	Project Number: 342282	Inspector(s): David Gavin, Jorge DaSilva, Roland Holacsek
Project Name: Tower A verification survey	Tracking Number:	Requested TAT: Rush
Email Results to: dgavin@trccompanies.com	Analytical Method: PCB	Lab Comments:

PCB BULK SAMPLE INFORMATION

	Date Collected	Sample Identification	Material Description	Sample Location	Lab Identification (Lab Use Only)
1	2020-10-13	01	Interior window glaze	2nd floor control room window	
2	2020-10-13	02	Interior window glaze	2nd floor locker room	
3	2020-10-13	03	Exterior window caulk	2nd floor window	
4	2020-10-13	04	Exterior window caulk	1st floor window	
5	2020-10-13	05	Parapet flashing material	Roof above the electrical room	
6	2020-10-13	06	Parapet flashing material	Roof above the electrical room	

Special Instruction to Laboratory:

N/A

email for TAT 10/15 Bi

SM 1100

REC'D OCT 14 2020 EMSL BOSTON

walkin

OrderID: 012011418

012011418

CHAIN OF CUSTODY INFORMATION

Relinquished By:	Date	Time	Received By:	Date	Time
I. (Print): Roland Holacsek	2020-10-14	10:12:29 EDT	I. (Print): Colleen Palladino	10/15/20	9:30AM
(Sign): Holacsek			(Sign): Colleen Palladino		
II. (Print):			II. (Print):		
(Sign):			(Sign):		

15.7°C

REC'D EMSL-BOSTON OCT 14 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PCB PHOTOGRAPHIC LOG

PCB Samples

Sample Number	01	No Image Available
Accessible Material	Yes	
Material Interior or Interior	Interior	
Material Description	Interior Window Glaze	
Substrate Adjacent to Material	Wood	
Ground Cover Below Material		

PCB Samples

Sample Number	02	
Accessible Material	Yes	
Material Interior or Interior	Interior	
Material Description	Interior Window Glaze	
Substrate Adjacent to Material	Metal	
Ground Cover Below Material		

PCB Samples

Sample Number	03	
Accessible Material	Yes	
Material Interior or Interior	N/A	
Material Description	Exterior Window Caulk	
Substrate Adjacent to Material	Brick	
Ground Cover Below Material		

PCB Samples

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – PCB PHOTOGRAPHIC LOG

Sample Number	04	
Accessible Material	Yes	
Material Interior or Interior	Exterior	
Material Description	Exterior Window Caulk	
Substrate Adjacent to Material	Brick	
Ground Cover Below Material	Soil	

PCB Samples

Sample Number	05	
Accessible Material	Yes	
Material Interior or Interior	Exterior	
Material Description	Parapet Flashing Material	
Substrate Adjacent to Material	Brick	
Ground Cover Below Material		

PCB Samples

Sample Number	06	
Accessible Material	Yes	
Material Interior or Interior	Exterior	
Material Description	Parapet Flashing Material	
Substrate Adjacent to Material	Brick	
Ground Cover Below Material		

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Appendix D
OTHER REGULATED AND HAZARDOUS MATERIALS INVENTORY/REPRESENTATIVE PHOTO LOG

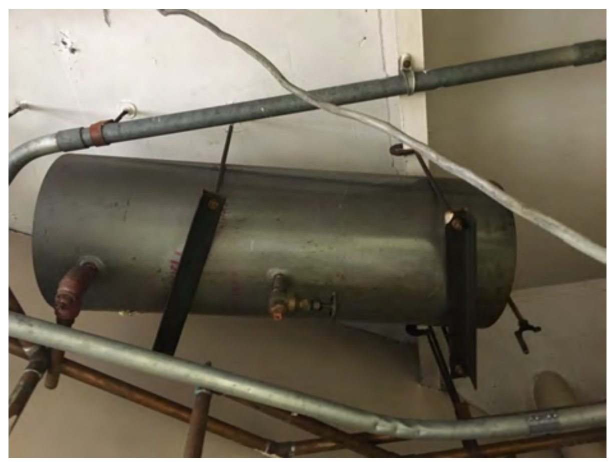
DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Fluorescent (Green Tip)
Quantity	4
Notes	4' (Stockpiled)

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Tank
Quantity	1
Notes	18 Gallon Pressurization Tank (Abandonded)



ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Unknown Contents
Quantity	2
Notes	1 Gallon Metal Container

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG		
ITEM		
Area	Tower A - 1st Floor	
Description	Heavy Metal Containing Devices Smoke Detector Batteries	
Quantity	1	
Notes	N/A	
ITEM		
Area	Tower A - 1st Floor	
Description	Heavy Metal Containing Devices Emergency Lighting System Batteries	
Quantity	2	
Notes	N/A	
ITEM		
Area	Tower A - 1st Floor	
Description	Heavy Metal Containing Devices CFL	
Quantity	2	
Notes	N/A	

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM		
Area	Tower A - 1st Floor	
Description	Miscellaneous Small Motor	
Quantity	2	
Notes	N/A	

ITEM		
Area	Tower A - 1st Floor	
Description	Miscellaneous Overhead Heating Unit	
Quantity	2	
Notes	N/A	

ITEM		
Area	Tower A - 1st Floor	
Description	Heavy Metal Containing Devices Emergency Lighting System Batteries	
Quantity	1	
Notes	N/A	

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Solvents
Quantity	3
Notes	2 Aerosol Solvent/2 Quart Plastic Containers (1 Degreaser/1 Lubricant)

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)
Quantity	30
Notes	8' (Stockpiled)

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Thermostats
Quantity	1
Notes	N/A

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Fluorescent (Green Tip)
Quantity	5
Notes	4'

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)
Quantity	32
Notes	4'

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Paints
Quantity	2
Notes	Aerosol

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Tank
Quantity	2
Notes	Small Pressurized Expansion Tank Associated With Heating System

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Solvents
Quantity	1
Notes	Aerosol

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Other Electronic Recyclables
Quantity	2
Notes	1 Television/1 Stereo

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor	
Description	Miscellaneous Oils	
Quantity	1	
Notes	15 LB Plastic Container	

ITEM

Area	Tower A - 1st Floor	
Description	Miscellaneous Oils	
Quantity	1	
Notes	5 Liter Plastic Container	

ITEM

Area	Tower A - 1st Floor	
Description	Miscellaneous Electrical Components	
Quantity	20	
Notes	Miscellaneous Panels	

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Small Motor
Quantity	2
Notes	Associated with Heating System

ITEM

Area	Tower A - 1st Floor
Description	Heating/Water System Components
Quantity	2
Notes	Appear to be Newer Components

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Fluorescent (Green Tip)
Quantity	15
Notes	8' - 5 Bulbs Stockpiled (1 Bulb Broken)

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)
Quantity	12
Notes	8'

ITEM

Area	Tower A - 1st Floor
Description	PCB Containing Devices PCB Ballast
Quantity	32
Notes	N/A

ITEM

Area	Tower A - 1st Floor
Description	Battery Charger
Quantity	1
Notes	N/A

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Desiccant
Quantity	2
Notes	1 Metal Container (160 Grams) / 1 Metal Container (650 Grams)

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Unknown Contents
Quantity	1
Notes	Metal Container ~ 1 Quart

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Battery
Quantity	7
Notes	N/A

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor
Description	Heavy Metal Containing Devices Incandescent Bulb
Quantity	5
Notes	N/A

ITEM

Area	Tower A - 1st Floor
Description	Refrigerants Air Conditioner
Quantity	2
Notes	N/A

ITEM

Area	Tower A - 1st Floor
Description	Miscellaneous Electrical Components
Quantity	2
Notes	N/A

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 1st Floor	
Description	Miscellaneous Electrical Components	
Quantity	80	
Notes	N/A	

ITEM

Area	Tower A - 1st Floor	
Description	Heavy Metal Containing Devices HID Lamp	
Quantity	1	
Notes	N/A	

ITEM

Area	Tower A - 1st Floor	
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)	
Quantity	33	
Notes	4' (Stockpiled)	

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 2nd Floor	
Description	Miscellaneous Cleaning Supplies	
Quantity	1	
Notes	5 Lb Cardboard Container	

ITEM

Area	Tower A - 2nd Floor	
Description	Heavy Metal Containing Devices Thermostats	
Quantity	1	
Notes	N/A	

ITEM

Area	Tower A - 2nd Floor	
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)	
Quantity	16	
Notes	4'	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 2nd Floor	
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)	
Quantity	1	
Notes	2'	

ITEM

Area	Tower A - 2nd Floor	
Description	Refrigerants Fire Extinguisher	
Quantity	1	
Notes	N/A	

ITEM

Area	Tower A - 2nd Floor	
Description	Miscellaneous Electrical Components	
Quantity	6	
Notes	Miscellaneous Components/Panels	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 2nd Floor	
Description	Heavy Metal Containing Devices Fluorescent Bulb (U-Bulb)	
Quantity	16	
Notes	N/A	

ITEM

Area	Tower A - 2nd Floor	
Description	PCB Containing Devices PCB Ballast	
Quantity	31	
Notes	N/A	

ITEM

Area	Tower A - 2nd Floor	
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)	
Quantity	25	
Notes	4'	

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 2nd Floor
Description	Heavy Metal Containing Devices HID Lamp
Quantity	6 (5 Stockpiled)
Notes	N/A

ITEM

Area	Tower A - 2nd Floor
Description	Heavy Metal Containing Devices Incandescent Bulb
Quantity	2
Notes	N/A

ITEM

Area	Tower A - 2nd Floor
Description	Heavy Metal Containing Devices CFL
Quantity	1
Notes	N/A

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM		
Area	Tower A - 2nd Floor	
Description	Refrigerants Water Cooler	
Quantity	1	
Notes	N/A	

ITEM		
Area	Tower A - 2nd Floor	
Description	Miscellaneous Other Electronic Recyclables	
Quantity	11	
Notes	3 Space Heaters/2 Toaster Oven/2 Coffee Maker/1 Keyboard/1 Phone/1 Monitor/1 Air Filtration Device1 Television	

ITEM		
Area	Tower A - 2nd Floor	
Description	Refrigerants Air Conditioner	
Quantity	1	
Notes	N/A	

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Tower A - 2nd Floor
Description	Refrigerants Refrigerator
Quantity	2
Notes	N/A

ITEM

Area	Exterior-Tower A
Description	Miscellaneous Electrical Components
Quantity	4
Notes	Miscellaneous Panels/Cabinets

ITEM

Area	Exterior-Tower A
Description	PCB Containing Devices Transformer
Quantity	1
Notes	N/A

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Exterior-Tower A
Description	Heavy Metal Containing Devices HID Lamp
Quantity	6
Notes	N/A

ITEM

Area	Exterior-Tower A
Description	Generator
Quantity	2
Notes	No Access.

ITEM

Area	New Control Tower
Description	Heavy Metal Containing Devices Fluorescent (Green Tip)
Quantity	4
Notes	N/A

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DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	New Control Tower
Description	Heavy Metal Containing Devices Smoke Detector Batteries
Quantity	TBD
Notes	1

ITEM

Area	New Control Tower
Description	Refrigerants Refrigerator
Quantity	2
Notes	N/A

ITEM

Area	New Control Tower
Description	Miscellaneous Electrical Components
Quantity	3
Notes	Control Panel/Cabinets

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	New Control Tower
Description	Miscellaneous Other Electronic Recyclables
Quantity	6
Notes	1 Monitor/1 Printer/1 Computer/2 Space Heaters/1 Television

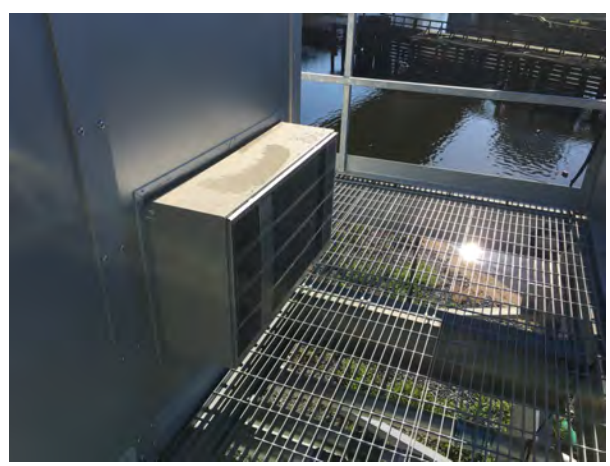
ITEM

Area	New Control Tower
Description	Refrigerants Water Cooler
Quantity	1
Notes	N/A

ITEM

Area	New Control Tower
Description	Refrigerants Fire Extinguisher
Quantity	2
Notes	N/A

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG		
ITEM		
Area	New Control Tower	
Description	Miscellaneous Electrical Components	
Quantity	5	
Notes	Miscellaneous Panels/Cabinets	
ITEM		
Area	New Control Tower	
Description	Heavy Metal Containing Devices HID Lamp	
Quantity	9	
Notes	N/A	
ITEM		
Area	New Control Tower	
Description	Refrigerants Air Conditioner	
Quantity	1	
Notes	N/A	

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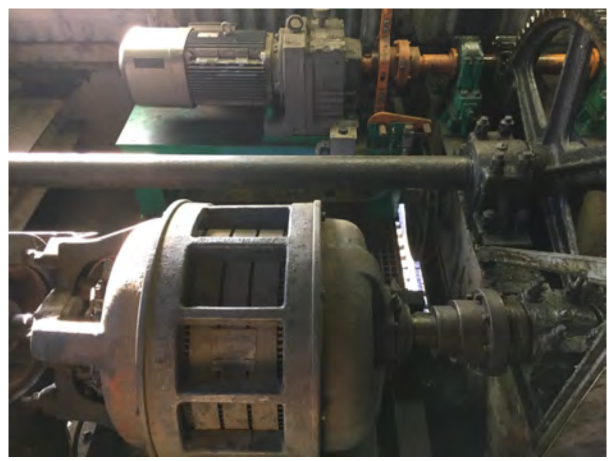
DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Span 1 & 2
Description	Heavy Metal Containing Devices HID Lamp
Quantity	6
Notes	N/A

ITEM

Area	Span 1 & 2
Description	Miscellaneous Large Motor
Quantity	6
Notes	3 Per Span



ITEM

Area	Span 1 & 2
Description	Miscellaneous Oils
Quantity	3 (Grease/Lubricant)
Notes	2-5 Gallon Plastic Container /1-5Gallon Metal Container

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Span 1 & 2
Description	Miscellaneous Oils
Quantity	17
Notes	16 Aerosol Lubricant/1 Aersosol Pesticide

ITEM

Area	Span 1 & 2
Description	Refrigerants Fire Extinguisher
Quantity	1
Notes	N/A

ITEM

Area	Span 1 & 2
Description	Miscellaneous Electrical Components
Quantity	2
Notes	1 Panel Per Span/1 Exterior Panel/1 Cabinet

October 30, 2020

DRAW 1 - HAZARDOUS MATERIALS INSPECTION – HAZARDOUS MATERIALS INVENTORY PHOTOGRAPHIC LOG

ITEM

Area	Span 1 & 2
Description	Heavy Metal Containing Devices Flourescent (Silver Tip)
Quantity	12
Notes	8'

ITEM

Area	Span 1 & 2
Description	PCB Containing Devices PCB Ballast
Quantity	6
Notes	N/A

ITEM

Area	Span 1 & 2
Description	Heavy Metal Containing Devices HID Lamp
Quantity	8
Notes	N/A

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Appendix F
Endangered Species Act Section 7 Permitting

Section 7 Consultation, Determination of Effects

Draw One Bridge Replacement Project

November 2024

Prepared For:

Massachusetts Bay Transportation Authority (MBTA)
10 Park Plaza
Boston, MA 02116

Federal Transportation Authority (FTA)

220 Binney Street Suite 940
Cambridge, MA 02142-1093

Prepared By:

TRC Environmental Corporation
650 Suffolk Street
Lowell, MA 01854

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

LIST OF ACRONYMS

Notation	Definition
BMP	Best Management Practice
°C	Degrees Celsius
CCTV	Closed-circuit television
CZM	Coastal Zone Management
dB	decibels
DCR	Massachusetts Division of Conservation and Recreation
DFE	Design Flood Elevations
DMF	Massachusetts Division of Marine Fisheries
DPS	Distinct Population Segment
Draw One Bridge	Commuter rail draw bridges over the Charles River just north of North Station
EFH	Essential Fish Habitat
°F	Degrees Fahrenheit
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
GARFO	Greater Atlantic Region Fisheries Office
GOM	Gulf of Maine
km	kilometers
LAA	Likely to Adversely Affect
LNG	Liquid Natural Gas
MassDEP	Massachusetts Department of Environmental Protection
MassGIS	Massachusetts Bureau of Geographic Information
MBTA	Massachusetts Bay Transit Authority
MEPA	Massachusetts Environmental Policy Act
mg/L	Milligrams per liter
MGH	Massachusetts General Hospital
MHW	Mean high water
mph	miles per hour

Notation	Definition
mS/cm	Millisiemens per centimeter
MWRA	Massachusetts Water Resources Authority
NARW	North Atlantic Right Whale
NLAA	Not Likely to Adversely Affect
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOAA Fisheries Tool	NOAA Fisheries Multi-Species Pile Driving Calculator
North Bank Bridge	North Bank Pedestrian and Bicycle Bridge north of the Draw One Bridge (Figures 1 and A4)
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
OHWM	Ordinary High Water Mark
PAHs	Polyaromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PLC	Programmable logic controller
Proposed Project	Draw One Bridge Replacement Project
Project Site	The physical location of the Draw One Bridge Replacement Project as identified in Figure 1.
PSU	practical salinity units
RMS	root mean square
ROW	Right of way; land owned by the MBTA
SAV	Submerged Aquatic Vegetation
SEL	Peak Sound Exposure Level
SEL_{cum}	Cumulative Sound Exposure Levels
SEL_{ss}	Single Strike Sound Exposure Level
SIH	Signal Instrument House
SPCC	Spill Prevention, Control and Countermeasures
SPMTs	Self-propelled modular transporters
SWPPP	Stormwater Pollution Prevention Plan
SWQS	Massachusetts Surface Water Quality Standards
T-Pad	Area owned by MTBA north of the Draw One Bridge to be used by the contractor for construction storage and staging shown on Figure A3.

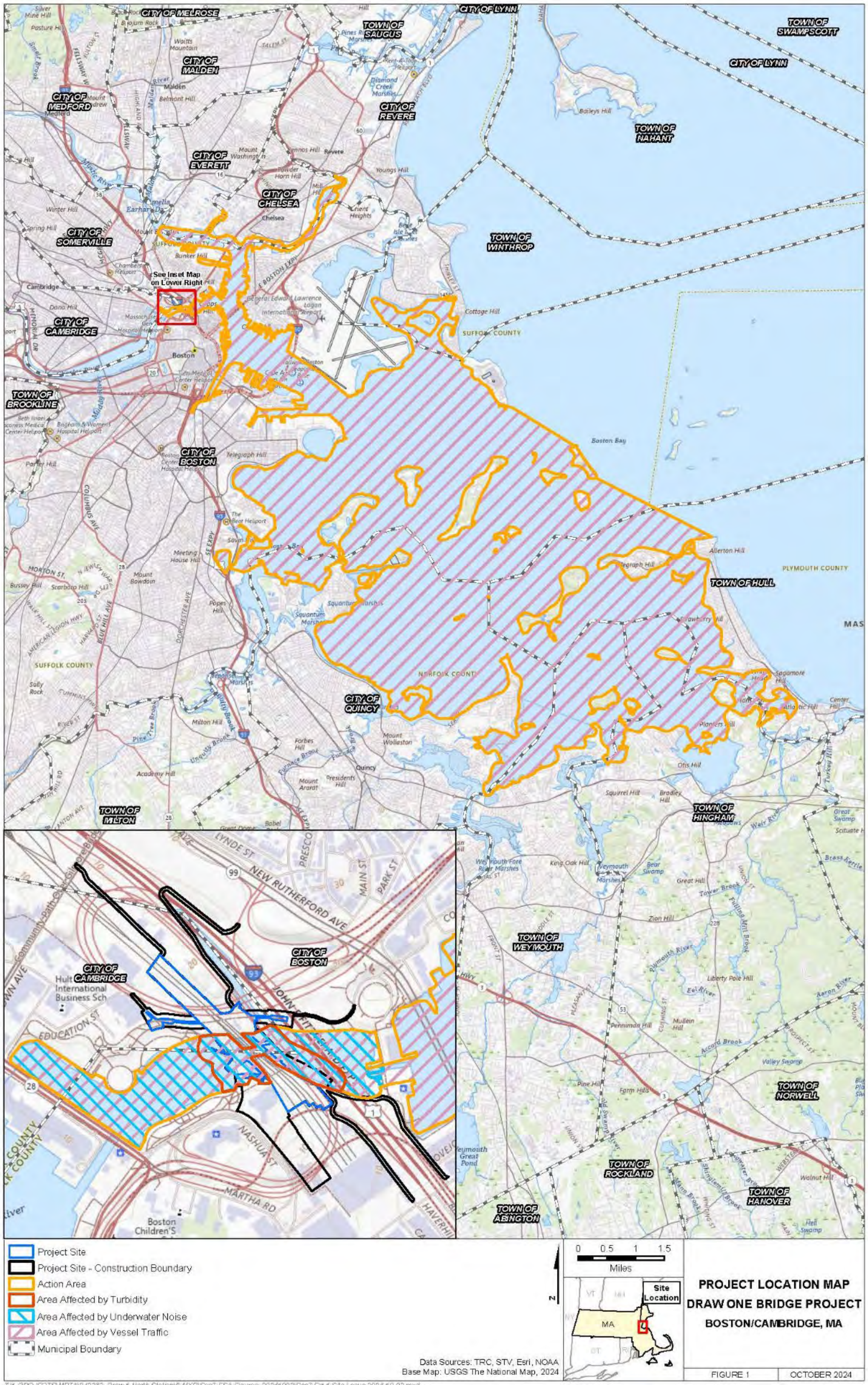
Notation	Definition
TOY	Time of Year
TRC	TRC Environmental Corporation
TSS	Total Suspended Solids
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WOTUS	Waters of the United States
WQC	Water Quality Certificate

1.0 PROJECT PURPOSE AND OVERVIEW

The Massachusetts Bay Transit Authority (MBTA) is seeking funds to be provided through the Federal Transit Administration (FTA), as the lead federal agency for the Draw One Bridge Replacement Project (the Proposed Project). The Proposed Project would replace the existing two structures comprising the Draw One Bridge over the Charles River with three new vertical lift bridge structures. Associated activities include replacement of the adjacent Signal Tower A, replacement of the approach trestles, and related adjustments and upgrades to track alignments, and communications and signaling systems. **Figure 1** highlights the direct footprint of the work area including the temporary impacts (shown on figures as “Project Site – Construction Boundary”) and permanent impact areas (shown on figures as “Project Site”) for the Proposed Project. Project Site is used throughout the document to refer to the “Project Site – Construction Boundary” and “Project Site”. The Project Site, comprising approximately 8 acres, is roughly located within the bounds of the Charles River (in the same area as the previous Draw One Bridge) but extends 200 feet upstream and 300 feet downstream of the existing Draw One Bridge. The purpose of the Proposed Project is to bring the Draw One Bridge into a state of good repair, improving the reliability and safety of MBTA Commuter Rail and Amtrak service. This is further detailed in Section 2 while conditions within the Action Area are described in Section 5.

Section 7(a)(2) of the Endangered Species Act (ESA) requires each federal agency to consult with National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) and United States Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The Fish and Wildlife Coordination Act (FWCA) (16 USC 742, et seq.) requires federal agencies that construct, license, or permit water resource development projects to first consult with the USFWS (and NOAA in some instances) and the state fish and wildlife agency regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. This document is intended to initiate consultation with NOAA under Section 7 of the ESA and coordinate under FWCA.

This consultation is used to represent all the discussions each agency has with NOAA Fisheries about the effects of a project on listed species and critical habitat. Section 7 of the ESA requires the federal agency to make a determination on the effects of the proposed project will have on listed species and critical habitat in order for NOAA Fisheries to issue their determination on the effects of the proposed action (which are explained in Section 7 of this document). If it is determined that the proposed project may affect but is Not Likely to Adversely Affect (NLAA) listed species and critical habitat, then only an informal consultation is necessary. An informal consultation must be requested by sending NOAA Fisheries a letter describing the proposed action, including any measures intended to avoid, minimize, or offset effects of the action; stating determinations that the effects on ESA listed species and/or critical habitat are extremely unlikely to occur, insignificant, or wholly beneficial; and an agency determination that the proposed project may affect but is unlikely to adversely affect any listed species and/or critical habitat.


See Inset Map on Lower Right
CITY OF CAMBRIDGE
CITY OF BOSTON
CITY OF QUINCY
TOWN OF WINTHROP
TOWN OF HULL
Project Site
Project Site - Construction Boundary
Action Area
Area Affected by Turbidity
Area Affected by Underwater Noise
Area Affected by Vessel Traffic
Municipal Boundary
0 0.5 1 1.5
Miles
Site Location
PROJECT LOCATION MAP
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
Data Sources: TRC, STV, Esri, NOAA
Base Map: USGS The National Map, 2024
FIGURE 1
OCTOBER 2024

If it is determined that the proposed project is Likely to Adversely Affect (LAA) listed species or NOAA Fisheries disagrees with the NLAA determination, then a formal consultation will be required. A formal consultation concludes with NOAA Fisheries issuing a biological opinion as to whether the proposed action is likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat.

Consultation should be initiated before the applicant or applicable entities authorize, fund, or carry out the activity, but after they have determined that the proposed action may affect listed species and/or critical habitat. The information needed to initiate consultation is outlined in the implementation regulations 50 CFR Section 402.14.

1.1 Agency Correspondence

Three interagency consultation meetings have occurred between MBTA and NOAA (May 7, 2020, April 15, 2021, and February 25, 2022) to discuss the Proposed Project, likely permitting/review programs, the schedule, data needs and the permitting timeline **(Appendix A).** These interagency consultation meetings included members from MBTA, FTA, FRA, NOAA, the United States Coast Guard (USCG), Coastal Zone Management (CZM), United States Army Corps of Engineers (USACE) the Massachusetts Division of Marine Fisheries (DMF), the Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Department of Conservation and Recreation (DCR), Cambridge and Boston Conservation Commission, Office and the Massachusetts Environmental Policy Act (MEPA) Office.

In response to questions asked during the interagency consultation meetings, email correspondence from Kaitlyn Shaw (NOAA) dated May 4, 2021, provided guidance on time of year (TOY) restrictions for Essential Fish Habitat (EFH) and NOAA Trust Resource Species (Section 4.1) and Best Management Practices (BMPs) (Section 4.1) to apply to the Proposed Project. Additionally, discussions during the interagency consultation meetings further guided the design and permitting process and helped confirm some of the BMPs and TOY restrictions that will be followed during the Proposed Project construction. FTA and MBTA met with the Greater Atlantic Regional Fisheries Office (GARFO) Protected Resources Division on November 26, 2024, to discuss the Proposed Project and consultation approach.

2.0 PROPOSED PROJECT

The Proposed Project would replace the existing Draw One Bridge over the Charles River, which currently comprises two bascule bridge structures, with three new vertical lift bridge structures. It would provide six, rather than the current four, tracks across the Charles River to maintain service during construction and operations. It would also replace the adjoining Signal Tower A and the approach spans and upgrade track alignments and communications and signaling systems. The purpose of the Proposed Project is to bring the Draw One Bridge into a state of good repair, improving the reliability and safety of MBTA Commuter Rail and Amtrak.

2.1 Project Components

2.1.1 Vertical Lift Bridges

The two operational bridge structures (of the original four) each carry two rail tracks over the Charles River. The Proposed Project includes the replacement of the original four bridges with three vertical lift bridge structures. Each new vertical lift bridge would support two tracks, for a total of six tracks over the Charles River.

Throughout the construction period, four tracks would remain in service. One new vertical lift bridge would be constructed to the west of the existing bridges and commissioned, then each of the existing draw spans would be replaced in succession. Once construction is complete, any one bridge could be removed from service for maintenance or repair while leaving four bridge tracks in operation.

The proposed bridges would rise 76 feet above the water level and have a 45-foot horizontal clearance, a 5.17-foot vertical clearance in the closed position, and a 32.2-foot vertical clearance when open. The existing bridges rise 51.5 feet above the water level and have a 65-foot horizontal clearance, a 5.38-foot vertical clearance in the closed position, and infinite vertical clearance when open. The new bridge structures accommodate future electrification of the rail lines by providing sufficient vertical clearance for fixed catenary when the bridge spans are fully open. The elevation of both the existing and proposed bridge structures is constrained by the elevation of adjacent track, which is at an elevation of approximately 11 feet. Although the Design Flood Elevation (DFE) for the Proposed Project is 13.1 feet, track elevations cannot be adjusted to clear this elevation as they are constrained by platform access at North Station and connections north of the Charles River.

Foundations from the two previously demolished bascule bridges would be removed. The north and south trestles of the existing structures would be replaced, as would the existing fender system. The new bridge and trestles would span the same distance of approximately 550 feet as the existing bridge infrastructure.

2.1.2 Signal Tower A Replacement

Existing operational controls would be relocated from a temporary control tower to a new Tower A building. The new building would be constructed along the seawall on the north bank of the Charles River, east of the mainline tracks, positioned to best serve operation of the proposed new three-span structure.

2.1.3 North Bank Bridge Modification

The North Bank Bridge would be raised approximately one foot to accommodate the new track alignment required with the new bridge structures. This would require the relocation of two bridge supports, the addition of one additional support, modification of the bridge truss structure, and modification and lengthening of the bridge landings in North Point Park and Paul Revere Park. Regrading of adjacent park pathways would require the relocation of an existing staircase in North Point Park. Landscaping at each end of the bridge would be replaced to tie into existing park infrastructure.

2.1.4 Track Work

Trackwork and associated signals would extend throughout the Project Site to connect the new bridge tracks to the mainline tracks north of Tower A. Trackwork, including reconstruction of direct fixation and platform modifications where required, and associated signals would be constructed to connect the new bridge tracks to station tracks.

Existing tracks would be realigned to provide consistent spacing and new special track work and signals will be installed to facilitate the track phasing required to allow the three proposed lift bridges to be constructed while maintaining connectivity of four tracks between the station and the rail lines north of the bridges. Existing track will have new ballast, ties, and rails installed as part of the project. Where new portions of track are being added to align with the third bridge or where track is constructed along a new alignment to realign to new bridges, new subgrade, drainage, ballast and track work and signals will be constructed.

2.1.5 Signal System

The Proposed Project would replace up to three sets of Signal Instrument Houses (SIHs). The microprocessor controller equipment for each of the new SIHs would support the new track and signal system configuration. All wayside devices, cables, and infrastructure (e.g., cable troughs, signal heads, railroad switches, etc.) currently located within MBTA right of way (ROW) and serving the existing Draw One Bridge would be upgraded with the Proposed Project.

2.1.6 Switch Heaters

Approximately 11 existing switch heaters would be replaced, and an additional six switch heaters would be installed to accommodate the new track alignment across the river, for a total of 17 proposed switch heaters. The types of switch heaters (e.g., gas- or electric-powered) that would be installed as part of the Proposed Project have not yet been determined.

2.1.7 Drainage System

A drainage system would be added to the north trestles to collect runoff from the proposed bridge and Tower A infrastructure and provide infiltration and detention before being returned to the Millers River at a new outfall to be installed along the west bank of the river, just south of the North Bank Bridge. Similarly, a drainage system would be added to the south trestles to collect runoff and direct it to a water quality structure that would remove sediment and other stormwater pollutants (e.g., nitrogen, phosphorous) before returning runoff to the Charles River at a new outfall to be installed along the south bank of the river within the limits of the MBTA ROW.

2.1.8 Safety and Security

Safety and security measures would be implemented in accordance with MBTA's policies and procedures and would consist of fencing, a closed-circuit television (CCTV) system, exterior lighting located along the bridge structure, and navigational lighting to meet USCG requirements. Further, MBTA would maintain controlled access locations at the bridge stair towers, Tower A doors, and pedestrian and vehicular fence gates for MBTA's situational awareness of the bridge and Tower A.

2.1.9 Resilience

The Proposed Project has been designed in accordance with MBTA's Flood Resiliency Design Directive and Drainage Design Directive. Electrical and mechanical equipment within Tower A (e.g., control desk, programmable logic controller [PLC]) would be located on the second floor, above the DFE of 13.1 feet. Flood walls and a deployable flood barrier would be provided at Tower A, and submersible equipment (e.g., junction boxes, lift span bearings, etc.) would be utilized on the bridge structure.

2.2 Construction Schedule, Sequence and Access

Based on permit/mitigation requirements that have been set forth, MBTA will include in the contract specifications parameters and requirements for the contractor, which are aligned with what is presented in the document below and will include all identified BMP's, commitments, and other measures presented. The construction methods described within the document will be followed to the extent practicable; however, actual construction methods and materials may vary slightly, depending in part on how the construction contractors choose to implement their work to be most cost effective, within the requirements set forth in this document and, in turn, the bid, contract, and construction documents, as well as to comply with mitigation requirements. It is understood that substantial deviations from these methods would require reinitiation of consultation; such deviations are not anticipated and will be avoided.

2.2.1 Construction Schedule and Sequence

Construction is expected to begin in 2026 and be complete in 2034. Construction would be undertaken in five phases. The existing Signal Tower A would be demolished and replaced in the first phase. The new bridge span, to the west/upstream of the existing structures, would be constructed and commissioned first, then each of the existing bridge spans would be replaced in two successive stages so that four tracks across the Charles River would remain in operation at all times. In-water work would be undertaken approximately eight hours per day and five days per week; primarily during the daytime from 7am to 3pm. At certain times during the construction period, nighttime work may be performed between 3pm to 11pm and 11pm to 7am based on weather conditions and Project and contractor schedules. Work will be completed outside of the TOY restrictions, which are discussed in Table 6 below. Because barges will likely be used for material delivery and storage, work is expected to continue throughout the winter.

The contractor will determine sequencing and associated staging activities, which will be written into the contract documents. Construction will be carried out in five phases following site preparation and mobilization, which is estimated to require approximately four months, as shown in **Table 1**, below, and on **Figure A1**.

Table 1. Construction Sequence and Duration

Phase	Key Components	Estimated Duration (months)
Site Preparation & Mobilization	Signal duct banks, temporary control tower relocation, demolition of existing bridge foundations west of the bridges in use, western temporary trestle construction, early track and signal work	4
Bridge Phase 1	Demolition of Existing Tower A, Construction of Proposed Tower A, North Bank Bridge Modification, West Bridge north and south approach trestles and West Bridge vertical lift span, track and signal work in order to maintain service, one track on West Bridge brought into service	31

Table 1. Construction Sequence and Duration

Phase	Key Components	Estimated Duration (months)
Bridge Phase 2	Construction of new south approach trestles between west and center bridges, track and signal work, second track on West Bridge brought into service	5
Bridge Phase 3	Eastern temporary trestle construction, Center Bridge demolition, Center Bridge new north approach trestle and vertical lift span, track and signal work, one track on Center Bridge brought into service	20
Bridge Phase 4	Construction of new south approach trestle between center and east bridges, track and signal work, second track on Center Bridge brought into service, demolition of west temporary trestle	9
Bridge Phase 5	East Bridge demolition, construction of East Bridge north approach trestles and East Bridge vertical lift span, track and signal work, East Bridge brought into service, demolition of east temporary trestle	27
	Total	**96**
Source: STV (Jan 2023)		

Three pier foundations of the North Bank Pedestrian and Bicycle Bridge (North Bank Bridge) on MBTA right-of-way conflict with the Proposed Project construction. Existing piers 3, 4, and 5 of the North Bank Bridge are located on MBTA property, and one (Pier 3) conflicts with the Proposed Project. To allow for construction of the Proposed Project, the North Bank Bridge would be required to be raised 1 foot. This would entail relocating two bridge supports (existing Piers 3 and 4) and adding one additional support (Pier 4A), modifying the bridge truss structure, and modifying and lengthening the landings of the bridge within North Point Park and Paul Revere Park (Figure A2 on page 13 below).

North Station Draw One Bridge Replacement

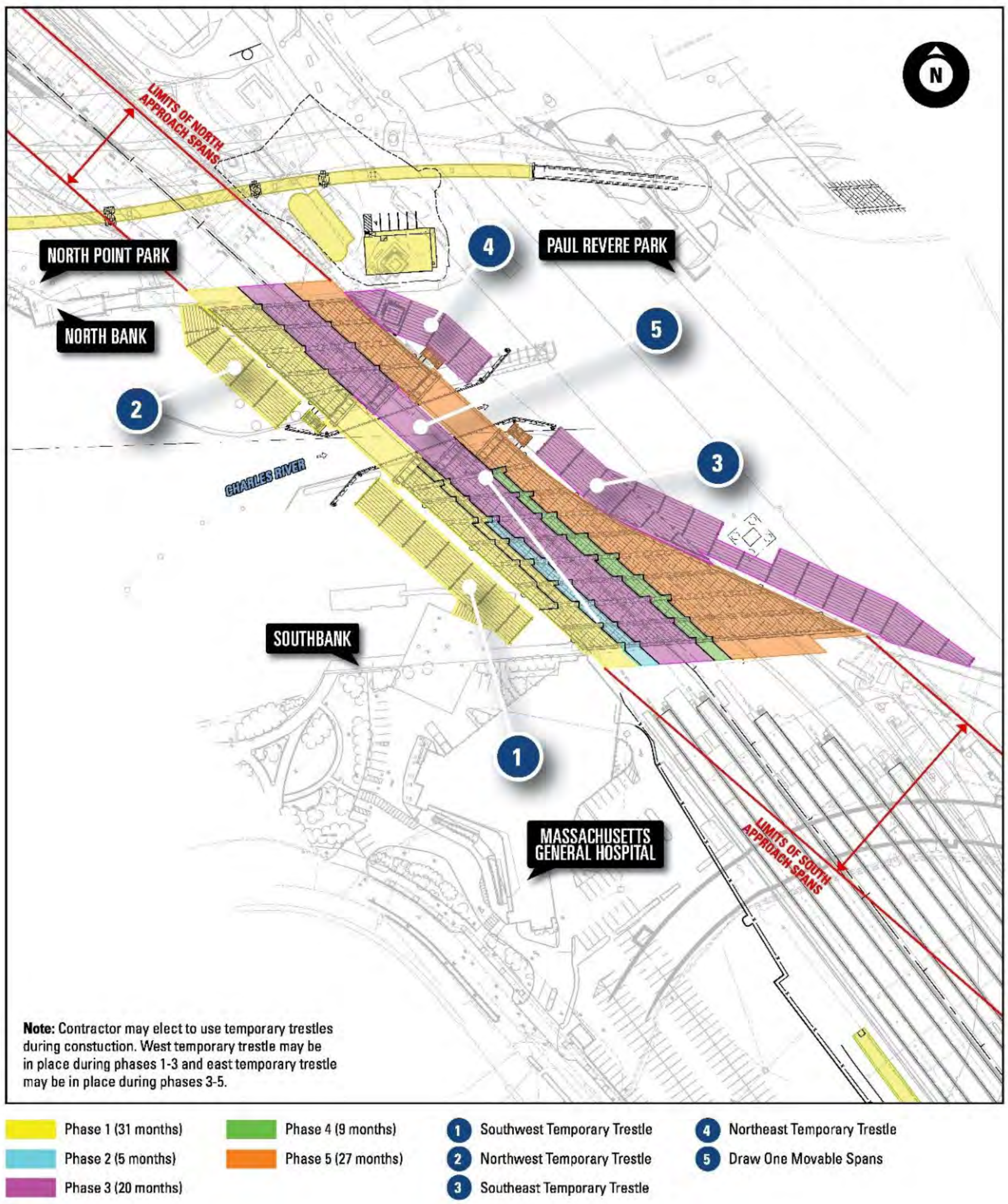
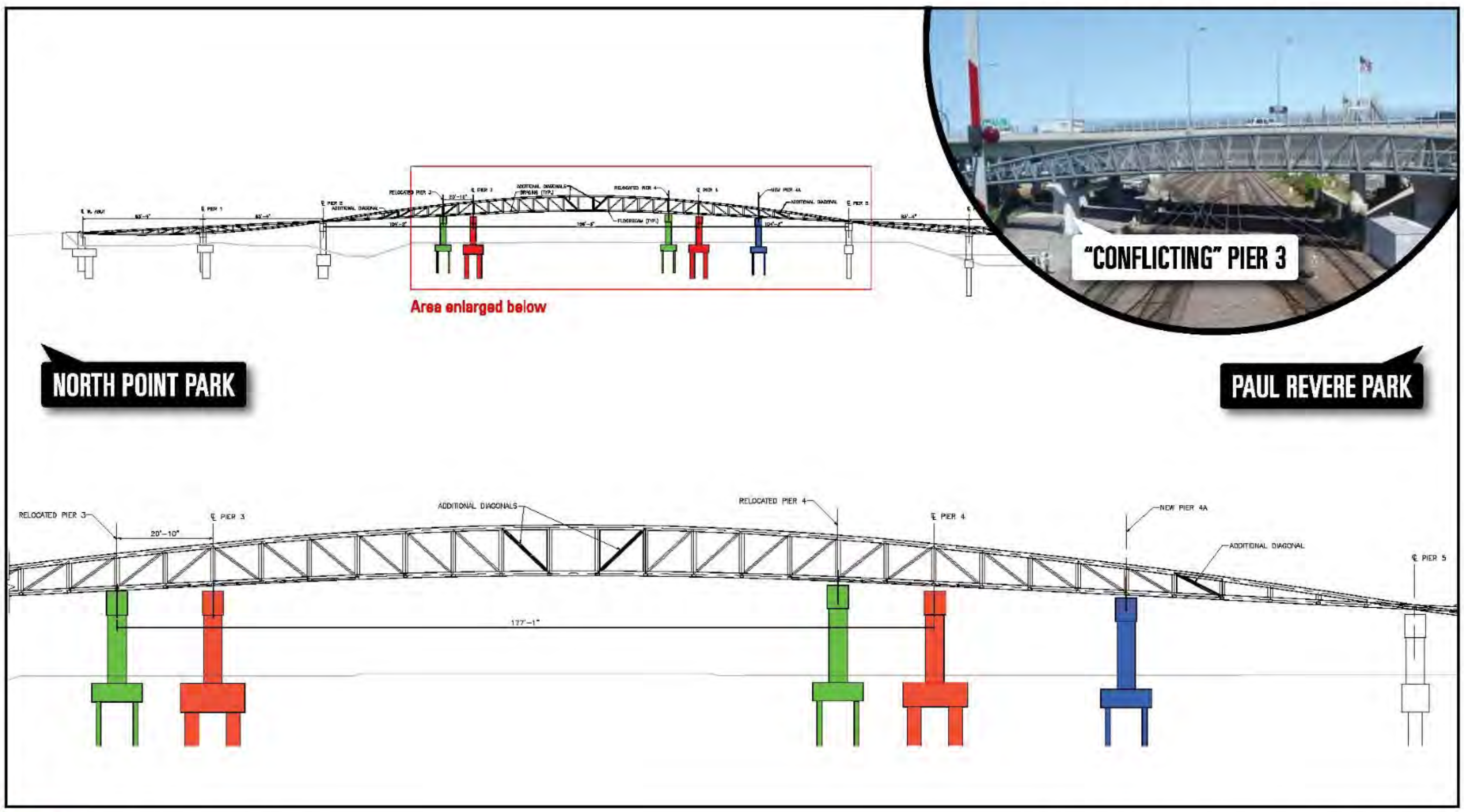


Figure A1: Bridge Construction Phases

TRC

North Station Draw One Bridge Replacement Project



Existing Pier Location to be Demolished

Proposed Pier Location and Additional Diagonals

Newly Constructed Additional Pier

Note: the picture shows the North Bank Bridge facing north from the north side of the existing Draw One Bridges.

Figure A2: North Bank Bridge – Modifications

Construction activities may occur up to seven days a week. Work shifts would be primarily during the daytime from 7am to 3pm. At certain times in the construction as defined by weather and the Project and contractor's schedule, nighttime work may be performed between 3pm to 11pm and 11pm to 7am.

Various construction activities, when performed in a waterbody, disturb the sediment on the bottom of the waterbody, which mixes with the water, increasing the amount of sediment. These are referred to as "silt producing" activities. Construction activities that disturb a relatively small amount of sediment are referred to as minor silt producing activities and those that disturb a relatively large amount of sediment are referred to as major silt producing activities.

For the Proposed Project, all major silt producing activities, such as pile (timber, steel, and sheet piles) removal, dredging of the channel/riverbed to realign the navigational channel with the new bridge structures, riverbed disturbance by cutting below the mudline to remove existing piles or caissons, and removal of a bottom-laid cable used for the existing bridge would be conducted outside of the prime TOY fisheries windows (February 15 to July 15 and September 1 to November 15) or with silt curtains. Specific construction methodologies will be developed by the contractor, and until that is known, a more specific schedule is not available.

2.2.2 Construction Access

The primary areas of construction within the Project Site are the Draw One Bridge, existing Signal Tower A, and the MBTA-owned construction materials staging area and laydown site (T-Pad) in Somerville, Massachusetts **Figure A3** below.

Access to the T-Pad is expected to occur throughout the Proposed Project and can be used for material deliveries that will utilize the existing tracks to make deliveries to the Project Site. Access to these primary construction areas will be accomplished through developed and/or disturbed areas via the following quadrants shown on **Figure 1 and Figure A1** above:

- The Southwest Quadrant – access near Massachusetts General Hospital (MGH) allows access for construction of the Draw One Bridge Phases 1 through 3, west of the bridges currently in service. This area, proposed for use as construction access, is disturbed and currently comprises of the MGH, associated parking lots, and portions of North Station. The existing MGH ramp and dock into the river are proposed to be removed and reinstalled after construction is complete.

North Station Draw One Bridge Replacement Project

Figure A3: Construction Laydown Area – T-Pad

- The Northwest Quadrant – access to construct the Draw One Bridge Phases 1 through 3, the west end of the North Bank Bridge, and access to the mainline tracks up through the T-Pad. This area, proposed for use as construction access, is currently comprised of walking paths, as well as mowed and landscaped areas of the North Point Park; however, it has been historically disturbed by the construction and use of the previous rail bridges and tracks.
- The Southeast Quadrant – access to construct the Draw One Bridge Phases 3 through 5 (eastern bridge). This area, proposed for use as construction access, is disturbed and currently comprises of existing roadways and parking lots associated with the Charles River Dam and Locks and North Station.
- The Northeast Quadrant – access to construct the Draw One Bridge Phases 3 through 5 (eastern bridge), the replacement Tower A, the east end of the North Bank Bridge, and access to the T-Pad. This area, proposed for use as construction access, is currently comprised of walking paths and mowed and landscaped areas of the Paul Revere Park, as well as existing roadways which has been historically disturbed by the construction and use of the previous rail bridges and tracks.

2.3 Construction Overview

2.3.1 Substructures

Construction of the bridge substructures would comprise the installation of a combination of foundation types, including spread footings along the riverbanks and the following within the river: concrete-filled pipe piles, micropiles, composite fiberglass-reinforced piles, drilled shafts, and driven H-piles. In-river foundations would include a total of 12 drilled shafts, 321 concrete-filled pipe piles, and 39 micropiles. The navigational channel fender system associated with the bridge and the navigational channel would require 207 composite piles within the river. The North Bank Bridge modifications would require 16 micropiles on land. Tower A would require 65 driven H-piles on land.

2.3.2 Cofferdams

To support the removal of eleven caissons from the demolished bridge structures to the west of the existing Draw One Bridge, two cofferdams may be installed. One cofferdam, approximately 98 feet (29 meters) long by 58 feet (18 meters) wide, would encapsulate the set of eight caissons on the north side of channel (Location 4 on **Figure A4**). A second cofferdam, approximately 104 feet (32 meters) long by 27 feet (8 meters) wide, would encapsulate the three caissons on the south side of channel, and a concrete cap would connect all three of the caissons (Location 1 on **Figure A4**). If used, it is expected that the cofferdams be in the water for approximately four months while the caissons within the cofferdams are removed. Please see Section 3.3.1.1 below for more information on caisson removal and **Table 4** below for more information on sheet piles.

North Station Draw One Bridge Replacement

Note: Contractor may elect to use Cofferdams as shown to assist in the demolition of remaining caissons and piers.

Figure A4: Potential Cofferdam Locations

2.3.3 Temporary Trestles and Barges

Construction work activities for each bridge structure would begin simultaneously at multiple locations, starting with the construction of temporary work trestles to drive piles using barge-mounted equipment. Four temporary work trestles for materials and equipment would then be constructed, two on the east side and two on the west side of the Project Site (**Figures A5 and A6**). Each trestle would be in place for approximately six years. The temporary work trestles are expected to have an overwater length of up to 1,000 feet (305 meters) in total, with individual lengths ranging from 150 feet (45 meters) to 465 feet (142 meters) and a width of 40 feet (12 meters); they would be placed as shown on **Figures A5 and A6**. Several barges would be used for the construction of the temporary trestles, drilled shafts, caps, and piers (**Figure A5 and A6**). Barges may also be used for mounted cranes, storage barges, and material delivery. Precast concrete, steel reinforcement bars, structural steel members, and machinery components may be transported to the Project Site by barge.

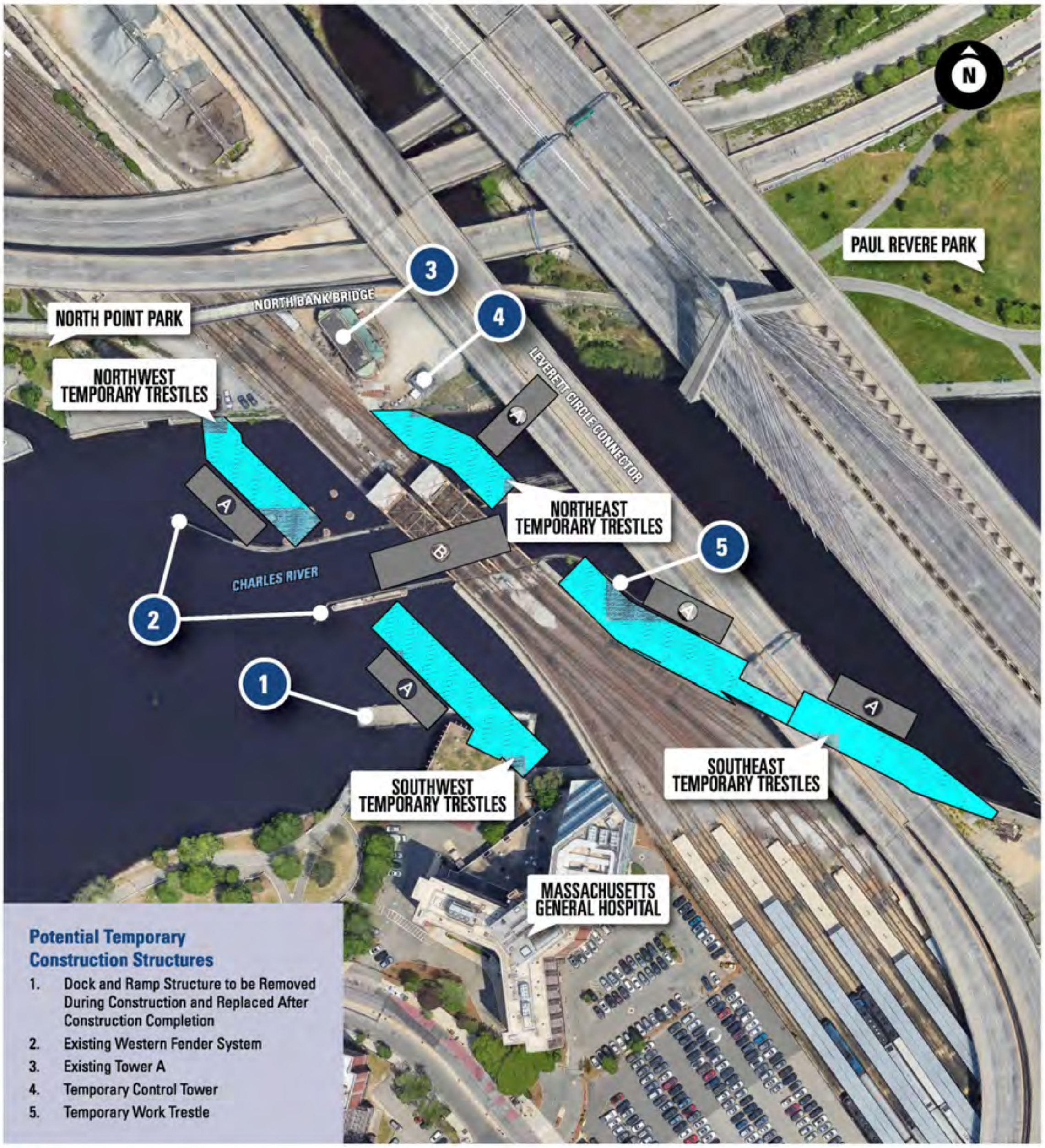
Drilled shaft construction for lift span piers could begin concurrently and be performed using barge-mounted equipment or trestle-supported equipment. The abutments and approach trestle piles would be constructed using equipment mounted on the work trestles or located on constructed portions of each proposed bridge structure.

2.3.4 Land-Side Structures

As currently contemplated, Phase 1 work activities would include demolition of the original unused Tower A, relocating the existing temporary Tower A onto the Northeast Temporary Trestle structure which will be installed in the river adjacent to the existing north bank seawall, and construction of a new Tower A (**Table 1**). Foundation work would comprise the installation of test pits to determine the extent of the existing seawall landward and the installation of driven piles with land-side equipment. Phase 1 would include the installation of a water detention system below the proposed parking lot at the new Tower A site and a new waterline utility using jack and bore methods beneath the MBTA tracks adjacent to the Tower A site.

Modification of the North Bank Bridge is assumed to start during Phase 1. New foundations for the relocated Pier 3, relocated Pier 4, and new Pier 4A would consist of micropiles from ground supported equipment. The North Bank Bridge superstructure would be raised approximately one foot in height to allow for the additional track to be constructed under this bridge. Additional work would consist of regrading the approach pathways at each end of the North Bank Bridge after it is raised and adjusting the drainage structures (**Figure A2**).

North Station Draw One Bridge Replacement

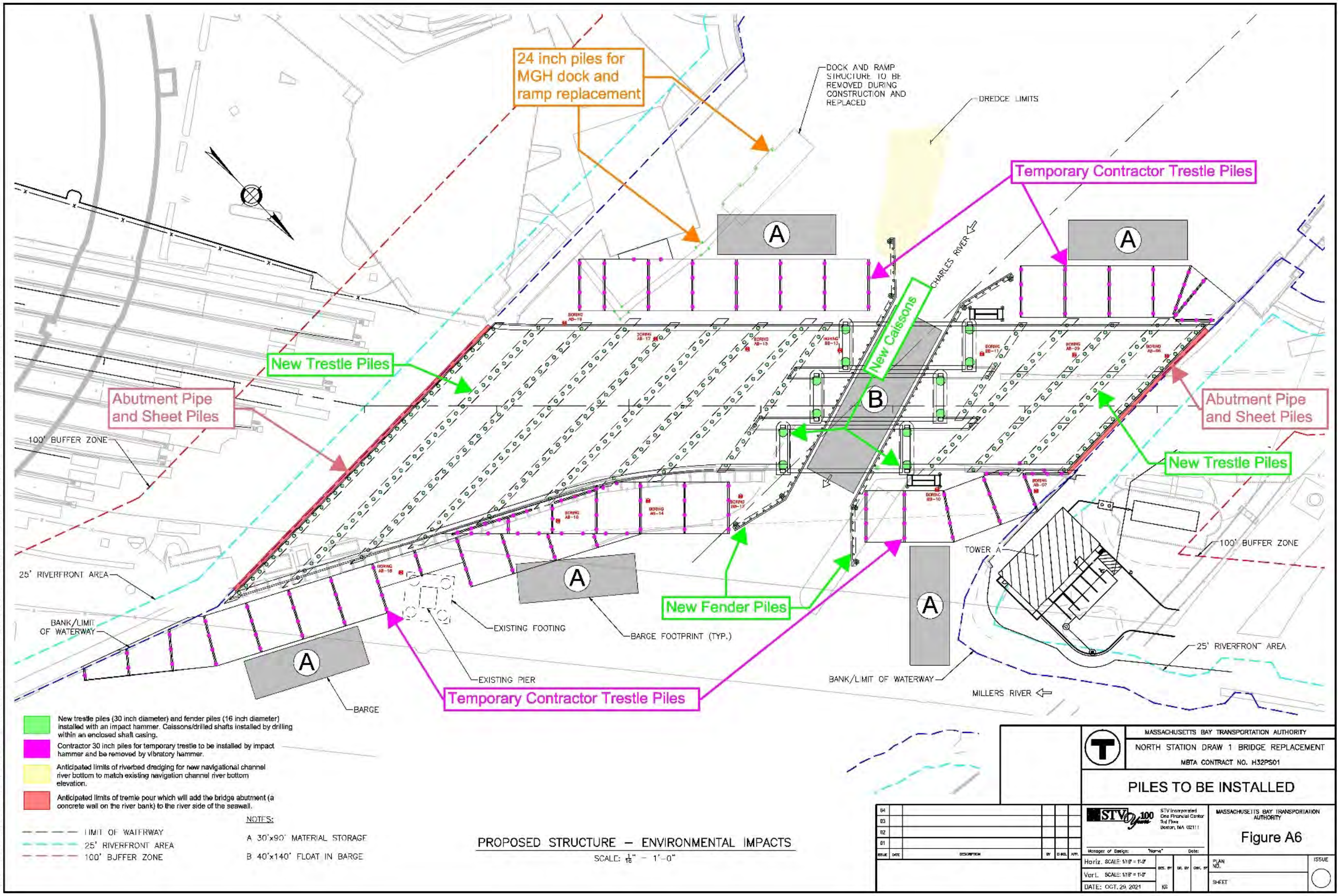


A Barge for Material Delivery and Storage

B Barge for Float-out of Existing Spans (Temporary Channel Closure)

Note: Contractor may elect to use temporary trestles and barges during construction. All of the barges and temporary trestles shown are underneath the elevated overhead structures.

Figure A5: Temporary Trestles with Barges


24 inch piles for MGH dock and ramp replacement
DOCK AND RAMP STRUCTURE TO BE REMOVED DURING CONSTRUCTION AND REPLACED
DREDGE LIMITS
Temporary Contractor Trestle Piles
A
CHARLES RIVER
New Caissons
New Trestle Piles
Abutment Pipe and Sheet Piles
B
100' BUFFER ZONE
25' RIVERFRONT AREA
BANK/LIMIT OF WATERWAY
New Fender Piles
TOWER A
EXISTING FOOTING
BARGE FOOTPRINT (TYP.)
EXISTING PIER
BARGE
Temporary Contractor Trestle Piles
25' RIVERFRONT AREA
BANK/LIMIT OF WATERWAY
MILLERS RIVER
New trestle piles (30 inch diameter) and fender piles (16 inch diameter) installed with an impact hammer. Caissons/drilled shafts installed by drilling within an enclosed shaft casing.
Contractor 30 inch piles for temporary trestle to be installed by impact hammer and be removed by vibratory hammer.
Anticipated limits of riverbed dredging for new navigational channel river bottom to match existing navigation channel river bottom elevation.
Anticipated limits of tremie pour which will add the bridge abutment (a concrete wall on the river bank) to the river side of the seawall.
LIMIT OF WATERWAY
25' RIVERFRONT AREA
100' BUFFER ZONE
NOTES:
A 30'x90' MATERIAL STORAGE
B 40'x140' FLOAT IN BARGE
PROPOSED STRUCTURE – ENVIRONMENTAL IMPACTS
SCALE: 1/16" = 1'-0"
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
PILES TO BE INSTALLED
Figure A6
DATE: OCT. 29, 2021

2.3.5 Superstructure

Superstructures of the new bridge structures would be erected from the temporary work trestles in Phases 1, 2, 4, and 5. Phase 3, the new eastern bridge, would be constructed from a combination of the already-constructed bridge and the temporary work trestles. Materials delivery would primarily be by barge or rail; materials would be stored at the T-Pad, on barges, or on the temporary trestle system.

2.3.6 Demolition of Remaining Movable Span Structures and Tower A

Demolition of the original Tower A would include abatement of existing hazardous materials and relocation of any remaining electrical and bridge operation related services out of Tower A so existing equipment can be decommissioned. Selective demolition will be used to remove the existing Boston and Maine cast stone sign from the façade along with any other elements that may be used in the mitigation measures undertaken pursuant to Section 106 of the National Historic Preservation Act of 1966 Memorandum of Agreement. Shielding will be erected to protect the tracks, existing signal equipment, and the North Bank Bridge. Traditional demolition methods would then be used to demolish the building and foundation, which may include excavators, demolition hammers, and steel shears.

Foundations for the existing Draw One Bridge that would be demolished with the Proposed Project include 25 piers and 21 caissons, as well as the navigational channel fender system and Tower A.

Demolition of the remaining operational Draw One Bridge movable span structures would likely entail removing the counterweight and machinery room and transporting them to the existing Tower A site for demolition using self-propelled modular transporters (SPMTs), which are multi-axle trailers designed for large and heavy cargoes. The existing trusses would be cut apart and portions removed by crane, and remaining portions floated out on a barge. Existing caissons outside of the navigable channel would be demolished down to the mudline by wire saw cutting, cutting torches, or other mechanical means chosen by the contractor. Caissons within the proposed navigational channel would be demolished down to five feet below the proposed channel elevation. Caisson demolition is anticipated to be performed by wire-saw cutting and removing sections of each caisson. Alternate methods could include the use of silt curtains and demolition hammers.

Demolition of the south approach trestle would entail cutting the existing deck precast panels at the original construction joints and removing sections of the deck. Pier caps would have areas of local demolition so sections could be removed. Where original timber piles were grouted into the pier caps, the tops of piles would be cut to facilitate pile cap removal. Timber piles would be cut off at the mudline, except at locations where they would conflict with the proposed foundations, in which case they would be extracted. Approximately 1,380 timber piles would be cut off at the mudline and 20 piles would be extracted at the existing south approach trestles (**Figure A7**).

Demolition of the operational north approach trestle and navigational channel fender would consist of removal of deck timber and timber pile caps prior to cutting timber piles off at the mudline. Where timber piles conflict with the proposed foundations, the piles would be extracted. Where piles would be located in the proposed channel, the piles would be cut off five feet below the mudline. Approximately 560 piles would be cut off at or below the mudline and 50 piles would be extracted at the operational north approach trestles and existing navigational channel fender system (**Figure A7 and A8**).

2.3.7 Construction Staging Areas

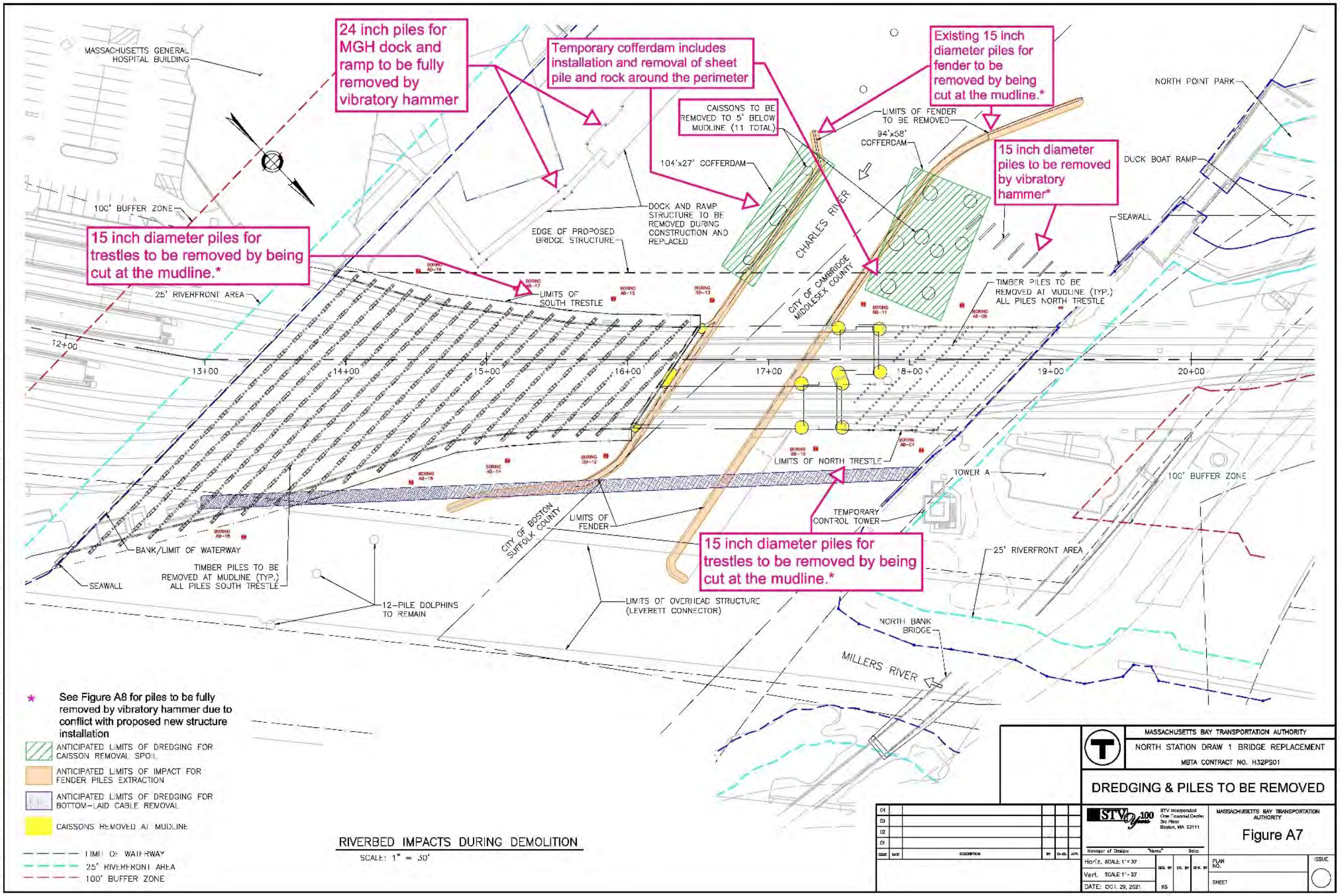
Construction staging areas, also referred to as "laydown areas," are sites used for storage of materials or equipment, assembly, or other temporary construction-related activities. Staging areas are typically fenced for security and to protect the public, have gates to allow vehicle access, take deliveries, and are often lighted for security. Staging areas of adequate size and proximity to the work activities are essential to support construction activities.

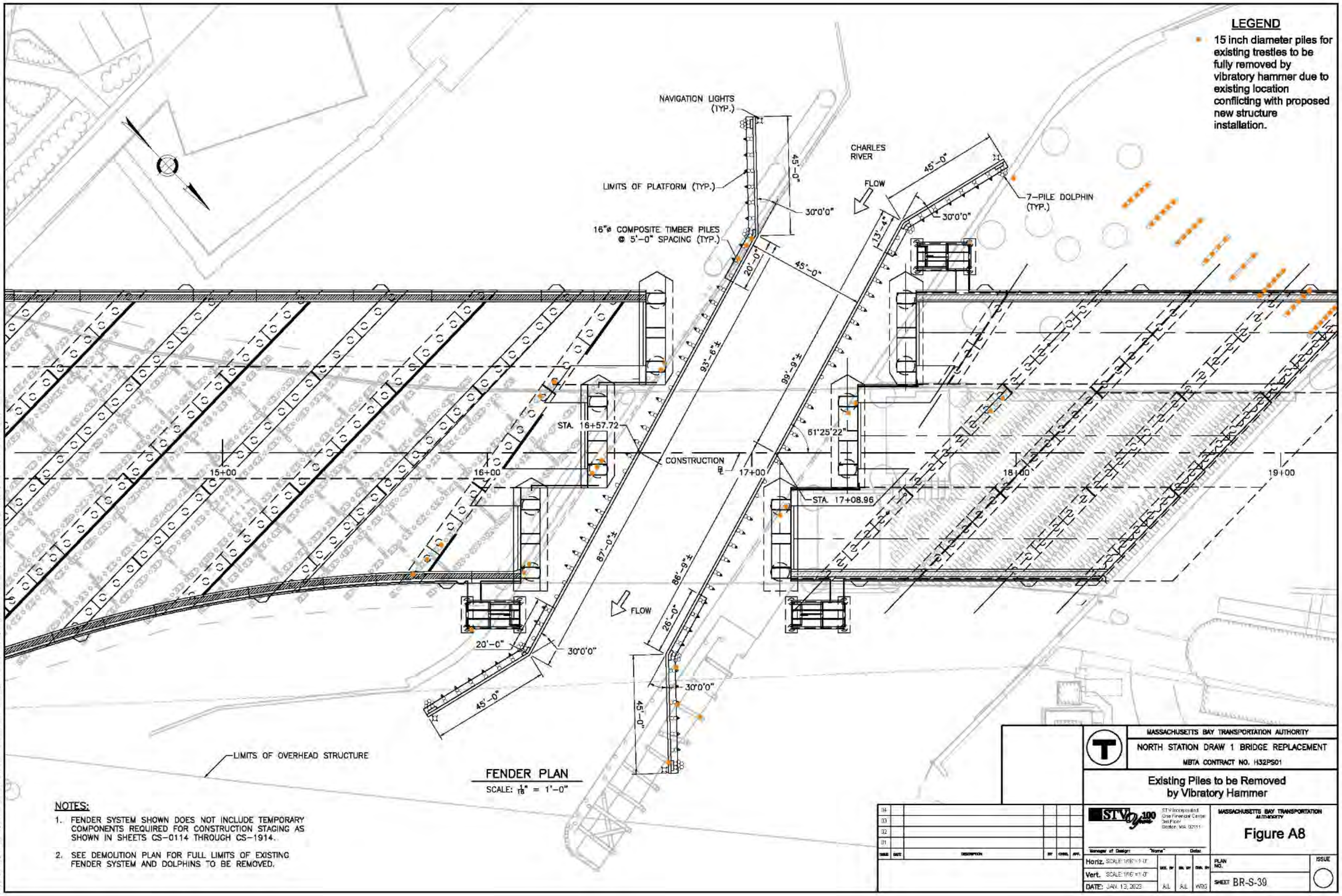
One construction staging area is an existing MBTA commuter rail material storage yard and maintenance staging area known as the "T-Pad." The T-Pad is located at 28 Inner Belt Road, in Somerville, Massachusetts, which is north approximately 5,000 feet on rail from the center of the Charles River (**Figure A3** above).

The T-Pad site currently contains a bridge and building shop as well as track material storage and MBTA Operations staging area to support MBTA Commuter Rail maintenance, but these uses would be temporarily relocated during Proposed Project construction. The T-Pad yard has a direct connection into the existing track network throughout the Project Site. The site's rail proximity would allow for equipment to get on and off rail on uncontrolled track, thereby not delaying MBTA Commuter Rail operations. This close proximity also enables ballast cars and flat cars to be loaded to move track materials from the laydown area to the project construction sites.

Additional laydown areas would be located in construction zones based on the track phasing. During the construction of the movable spans, the two tracks that connect to the bridge under construction, immediately north of the bridges, would be out of service and can be used for onsite laydown areas during each phase.

If the construction contractors choose to use staging areas that differ from those identified herein, they will be required to obtain all necessary permits and approvals from federal, state and local regulatory agencies. This would also be required for any remote staging areas for loading barges with material and equipment, or for partial preassembly.


24 inch piles for MGH dock and ramp to be fully removed by vibratory hammer
Temporary cofferdam includes installation and removal of sheet pile and rock around the perimeter
Existing 15 inch diameter piles for fender to be removed by being cut at the mudline.*
15 inch diameter piles to be removed by vibratory hammer*
15 inch diameter piles for trestles to be removed by being cut at the mudline.*
15 inch diameter piles for trestles to be removed by being cut at the mudline.*
MASSACHUSETTS GENERAL HOSPITAL BUILDING
CAISSONS TO BE REMOVED TO 5' BELOW MUDLINE (11 TOTAL)
LIMITS OF FENDER TO BE REMOVED
94'x58' COFFERDAM
104'x27' COFFERDAM
NORTH POINT PARK
DUCK BOAT RAMP
SEAWALL
100' BUFFER ZONE
EDGE OF PROPOSED BRIDGE STRUCTURE
DOCK AND RAMP STRUCTURE TO BE REMOVED DURING CONSTRUCTION AND REPLACED
CHARLES RIVER
CITY OF CAMBRIDGE MIDDLESEX COUNTY
TIMBER PILES TO BE REMOVED AT MUDLINE (TYP.) ALL PILES NORTH TRESTLE
25' RIVERFRONT AREA
LIMITS OF SOUTH TRESTLE
LIMITS OF NORTH TRESTLE
TOWER A
TEMPORARY CONTROL TOWER
CITY OF BOSTON SUFFOLK COUNTY
LIMITS OF FENDER
BANK/LIMIT OF WATERWAY
TIMBER PILES TO BE REMOVED AT MUDLINE (TYP.) ALL PILES SOUTH TRESTLE
SEAWALL
12-PILE DOLPHINS TO REMAIN
LIMITS OF OVERHEAD STRUCTURE (LEVERETT CONNECTOR)
NORTH BANK BRIDGE
MILLERS RIVER
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
* See Figure A8 for piles to be fully removed by vibratory hammer due to conflict with proposed new structure installation
ANTICIPATED LIMITS OF DREDGING FOR CAISSON REMOVAL SPOIL
ANTICIPATED LIMITS OF IMPACT FOR FENDER PILES EXTRACTION
ANTICIPATED LIMITS OF DREDGING FOR BOTTOM-LAID CABLE REMOVAL
CAISSONS REMOVED AT MUDLINE
LIMIT OF WATERWAY
25' RIVERFRONT AREA
100' BUFFER ZONE
RIVERBED IMPACTS DURING DEMOLITION
SCALE: 1" = 30'
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
DREDGING & PILES TO BE REMOVED
Figure A7
DATE: OCT. 29, 2021


LEGEND
15 inch diameter piles for existing trestles to be fully removed by vibratory hammer due to existing location conflicting with proposed new structure installation.
NAVIGATION LIGHTS (TYP.)
LIMITS OF PLATFORM (TYP.)
16"ø COMPOSITE TIMBER PILES @ 5'-0" SPACING (TYP.)
CHARLES RIVER
FLOW
7-PILE DOLPHIN (TYP.)
STA. 16+57.72
STA. 17+08.96
CONSTRUCTION ℄
15+00
16+00
17+00
18+00
19+00
LIMITS OF OVERHEAD STRUCTURE
FENDER PLAN
SCALE: 1/16" = 1'-0"
NOTES:
1. FENDER SYSTEM SHOWN DOES NOT INCLUDE TEMPORARY COMPONENTS REQUIRED FOR CONSTRUCTION STAGING AS SHOWN IN SHEETS CS-0114 THROUGH CS-1914.
2. SEE DEMOLITION PLAN FOR FULL LIMITS OF EXISTING FENDER SYSTEM AND DOLPHINS TO BE REMOVED.
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
Existing Piles to be Removed by Vibratory Hammer
Figure A8
SHEET BR-S-39

2.4 In-water Construction Details

The overall footprint within which bottom disturbance could occur is shown in **Figure 2** below.

2.4.1 Demolition

The existing bridge superstructure would be sequentially demolished using cranes mounted on the temporary trestle and/or barges. This section of the bridge currently above the water will be kept above the water throughout demolition. In-water demolition activities are described below.

2.4.1.1 Caisson Removal

To remove the foundations/caissons of the currently unused bridge structures within the navigational channel, sediment would be excavated to a depth of five feet below mudline, while caissons at the bridge would be cut at the mudline to minimize sediment disturbance. Wire saw cutting, cutting torches, or other mechanical means would be used to cut metal and pneumatic hammers or other tools chosen by the contractor would be used to break up and remove the concrete.

Two cofferdams may be installed to support caisson removal. One approximately 98-foot by 58-foot cofferdam would surround the set of eight caissons on north side of channel, and a second approximately 104-foot by 27-foot cofferdam would encapsulate the three caissons that supported the “rest piers” on south side of channel. Cofferdam installation using a vibratory hammer or impact hammer would be conducted from a barge prior to the construction of the temporary trestle and would take approximately one week. The cofferdams would not be dewatered, but would be closed to contain debris and disturbed sediment. Cofferdam sheet piles would also be removed via vibratory or impact hammer. As needed, silt curtains or other methods of minimizing sediment dispersal would be installed around the cofferdams during their removal. It is anticipated that each cofferdam would be in place for approximately four months during the Site Preparation and Mobilization construction phase.

2.4.1.2 Timber and Steel Pile Removal

Timber piles would be removed by cutting the piles three feet below the mudline or defined bottom channel. Full removal would be undertaken where piles conflict with the proposed structure and the remaining piles would be cut at the mudline and placed on a barge for upland disposal (**Figure A7**). A pneumatic shear would cut the pile, while an excavator or other device with a grapple would connect to the pile and lift it out of the water and onto a barge. If positioning pneumatic shear equipment for cutting steel is determined to be difficult, piles may be cut using a thermal or arc process or mechanical methods. Piles would be properly disposed of or considered for reuse (e.g., dried, chipped and used for biofuel). See **Table 2** for details on the timber and steel pile removal.

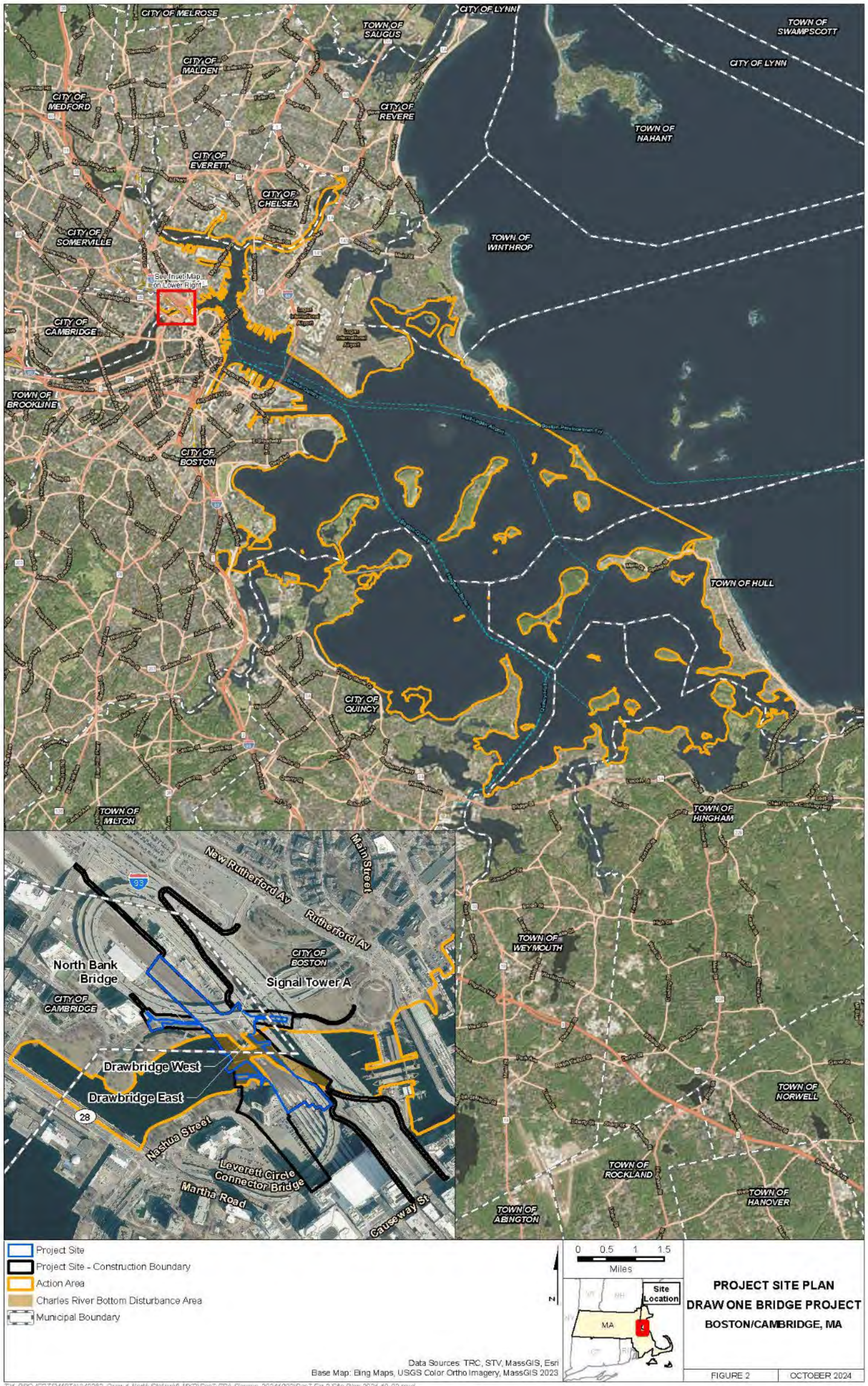

CITY OF MELROSE
CITY OF LYNN
TOWN OF SAUGUS
TOWN OF SWAMPSCOTT
CITY OF MALDEN
CITY OF MEDFORD
CITY OF REVERE
TOWN OF NAHANT
CITY OF EVERETT
CITY OF CHELSEA
CITY OF SOMERVILLE
TOWN OF WINTHROP
See Inset Map on Lower Right
CITY OF CAMBRIDGE
TOWN OF BROOKLINE
CITY OF BOSTON
TOWN OF HULL
CITY OF QUINCY
TOWN OF MILTON
TOWN OF HINGHAM
TOWN OF WEYMOUTH
TOWN OF NORWELL
TOWN OF ROCKLAND
TOWN OF HANOVER
TOWN OF ABINGTON
New Rutherford Av
Main Street
Rutherford Av
North Bank Bridge
Signal Tower A
Drawbridge West
Drawbridge East
Nashua Street
Leverett Circle Connector Bridge
Martha Road
Causeway St
Project Site
Project Site - Construction Boundary
Action Area
Charles River Bottom Disturbance Area
Municipal Boundary
0 0.5 1 1.5
Miles
Site Location
MA
PROJECT SITE PLAN
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 2
OCTOBER 2024
Data Sources: TRC, STV, MassGIS, Esri
Base Map: Bing Maps, USGS Color Ortho Imagery, MassGIS 2023

Table 2. Removals by Vibratory Hammer

Figure No.	Structure (action)	Size & Diameter	Duration of Work	Technique
A7	48 Existing Bridge Trestle piles removed	• 15" diameter • timber	• 15 days to remove all ~86 piles in this table	• 3 to 6 piles per day • 30 minutes of vibratory hammer per pile
A6	22 Existing Navigational Fender piles removed	• 15" diameter • timber		
A6	16 MGH dock and ramp piles removed	• 24" diameter (conservative est.) • Steel or fiberglass		

2.4.1.3 Bottom-laid Cable Removal

While the cable comprises a bottom-laid system on the riverbed, portions of the cable may have settled into the underlying sediments. Therefore, cable removal may require excavation of any overlaying sediments to a sufficient depth to either expose the cable or allow it to be pulled out of a partially excavated trench. The removed cable would be placed on a barge for proper upland disposal or recycling.

2.4.2 Dredging

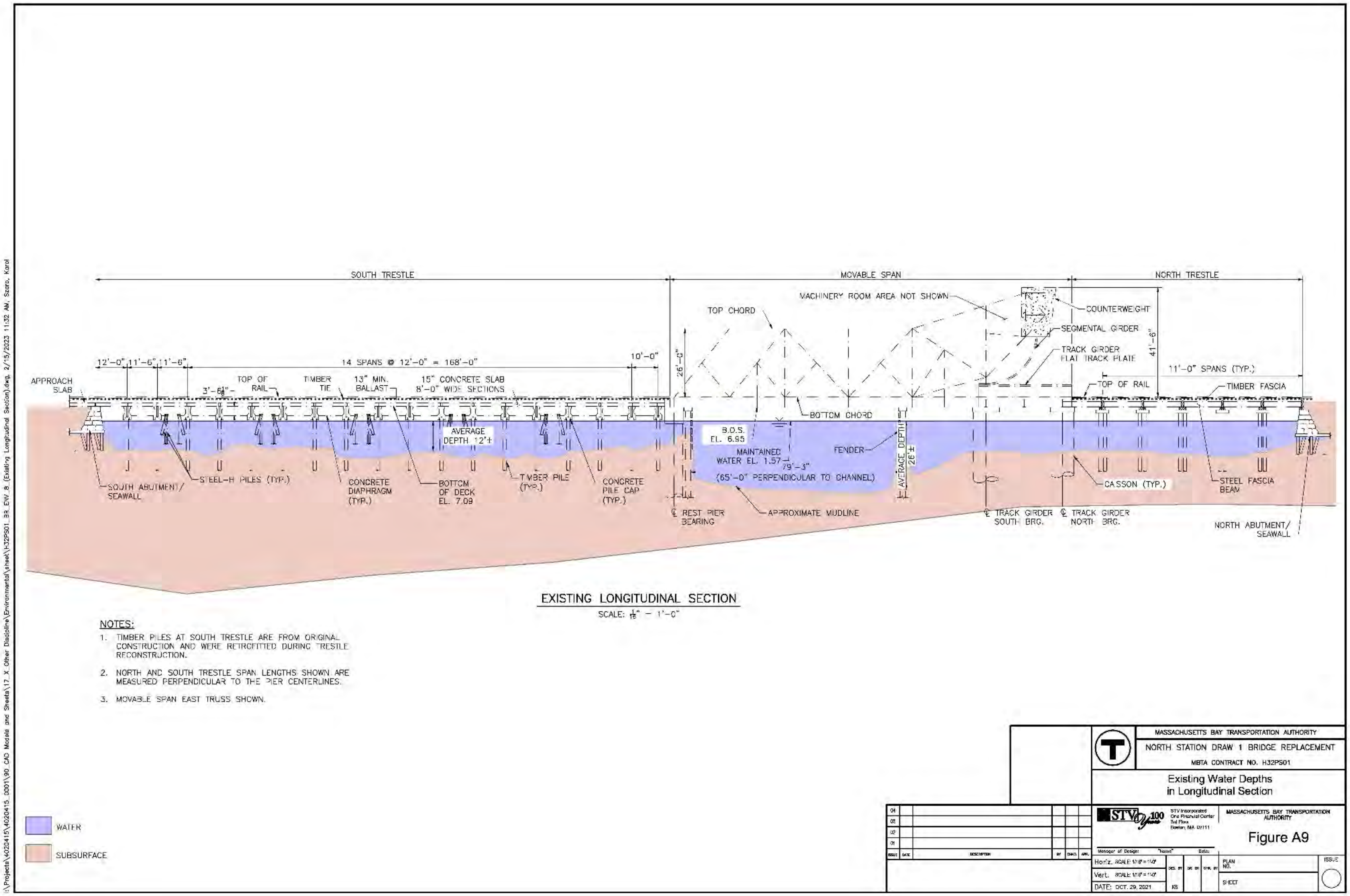
This section describes all activities that remove structures or soil from the riverbed.

Dredge volume includes the volume of existing piles and structures removed in addition to the volume of removed sediments. The estimated dredge volume associated with bridge and approach trestle demolition and construction totals 2,689 cubic yards of riverbed material (**Figures A7 and A8**). Volumes of sediment to be dredged by project stage is presented in **Table 3**. The estimated fill volume for drilled shafts is 1,487 cubic yards (**Figure A6**). The estimated total temporary surface area disturbance of the riverbed associated with Proposed Project demolition and construction is 30,912 square feet (0.71 acres), and the estimated total area of permanent fill to be placed in the riverbed from all construction activity is 11,411 square feet (0.26 acres).

Dredging would involve removing underwater sediment via barge-mounted bucket excavator or clamshell dredge. Excavated sediment would be loaded onto containment barges for proper disposal, most likely at a contained landfill suitable for receipt of contaminated soils.

Sediment-disturbing activities during Proposed Project demolition and construction would include:

1. Existing structure demolition
    a. Demolition of existing caissons (21 total: 11 for previous bridges not in service, 10 for current bridges in service), including the optional installation of temporary cofferdams around previous bridge caissons as determined by the contractor
    b. Pile extraction and/or cutting of existing MGH dock and ramp, bridge trestles, and navigational channel fender system piles (**Figures A4, A6, A7 above and A9 below**)
    c. Bottom-laid cable removal
2. Proposed structure construction
    a. Installation of temporary work trestle system
    b. Construction of proposed bridge drilled shafts and trestle piles, MGH dock and ramp replacement piles, and navigational channel fender piles
    c. Existing riverbed dredging - Dredging is proposed for areas outside of the proposed fender system that now may be in the assumed travel path for vessels traversing the channel and are no longer protected by the existing fender to ensure the required depth of the navigational channel.
    d. Construction of the king (sheet) pile abutments along the north and south seawalls
3. Proposed temporary structure demolition impacts
    a. Temporary work trestle piles extraction


SOUTH TRESTLE
MOVABLE SPAN
NORTH TRESTLE
MACHINERY ROOM AREA NOT SHOWN
TOP CHORD
COUNTERWEIGHT
SEGMENTAL GIRDER
TRACK GIRDER FLAT TRACK PLATE
41'-6"
26'-0"
12'-0" 11'-6" 11'-6"
14 SPANS @ 12'-0" = 168'-0"
10'-0"
11'-0" SPANS (TYP.)
APPROACH SLAB
3'-6$\frac{1}{8}$"
TOP OF RAIL
TIMBER TIE
13" MIN. BALLAST
15" CONCRETE SLAB 8'-0" WIDE SECTIONS
TOP OF RAIL
TIMBER FASCIA
BOTTOM CHORD
AVERAGE DEPTH 12'±
B.O.S. EL. 6.95
MAINTAINED WATER EL. 1.57
79'-3"
(65'-0" PERPENDICULAR TO CHANNEL)
FENDER
AVERAGE DEPTH 26'±
SOUTH ABUTMENT/ SEAWALL
STEEL-H PILES (TYP.)
CONCRETE DIAPHRAGM (TYP.)
BOTTOM OF DECK EL. 7.09
TIMBER PILE (TYP.)
CONCRETE PILE CAP (TYP.)
℄ REST PIER BEARING
APPROXIMATE MUDLINE
℄ TRACK GIRDER SOUTH BRG.
℄ TRACK GIRDER NORTH BRG.
CASSON (TYP.)
STEEL FASCIA BEAM
NORTH ABUTMENT/ SEAWALL
EXISTING LONGITUDINAL SECTION
SCALE: $\frac{1}{16}$" = 1'-0"
NOTES:
1. TIMBER PILES AT SOUTH TRESTLE ARE FROM ORIGINAL CONSTRUCTION AND WERE RETROFITTED DURING TRESTLE RECONSTRUCTION.
2. NORTH AND SOUTH TRESTLE SPAN LENGTHS SHOWN ARE MEASURED PERPENDICULAR TO THE PIER CENTERLINES.
3. MOVABLE SPAN EAST TRUSS SHOWN.
WATER
SUBSURFACE
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
Existing Water Depths in Longitudinal Section
STV Incorporated One Financial Center 3rd Floor Boston, MA 02111
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
Figure A9
Horiz. SCALE: 1/16" = 1'-0"
Vert. SCALE: 1/16" = 1'-0"
DATE: OCT. 29, 2021
KS
PLAN NO.
SHEET
ISSUE

A summary of the dredging and fill estimates for various Project elements is provided in **Table 3** below.

Table 3. Dredge/Excavation Volumes and Surface Area Permanent Impacts Associated with the Draw One Bridge Replacement

Figure No.	In Water Activity (Below MHW/OHW)*	Demolition (D) and Construction (C) Impacts			
		Dredge Volume (CY)	Fill Volume (CY)	Temporary Riverbed Disturbance (SF)	Perm Fill in Riverbed (SF)
Demolition					
A4 & A7	Removal of Caissons from Bridge Not In Service[1]	386	0	694	0
A7	Removal of Bridge Trestle and Fender Timber Piles (16-inch) & Trestle Steel H-piles (piles cut off)	1567	0	11,122	0
A7 & A8	Removal of Timber Trestle Piles (piles extracted)[3,5]	143	0	86	0
A4 & A7	Removal of Caissons from Bridge Not In Service with Optional Cofferdams and Bridges In Use[2]	500	0	8,260	0
A7	Bottom-Laid Cable Removal	10	0	3,800	0
A7	MGH Dock and Ramp 24-inch Pile Removal	84	0	50	0
	Total for Demolition (6 lines above)	2,689	0	24,012	0
Construction					
A6	Drilled Shafts[4]	941	1,487	0	462
A6	Micropiles for King Pile Abutment	77	96	0	35
A6	New Bridge 30-inch Trestle Piles and 16-inch Navigational Channel Fender Piles	0	1,149	0	1,865
A6	Temporary Work Trestle 30-inch Pile Installation[6]	0	900	1,600	0
A6	Riverbed Dredging to get Navigational Channel to Correct Depth	220	0	3,700	0
A6	Tremie Pour Behind King Pile Abutment North and South Seawalls[7]	0	1,200	0	9,000
A6	MGH Dock and Ramp 24-inch Pile Replacement	0	84	0	50
	Construction (7 lines above)	1,238	4,915	5,300	11,411

Table 3. Dredge/Excavation Volumes and Surface Area Permanent Impacts Associated with the Draw One Bridge Replacement

Figure No.	In Water Activity (Below MHW/OHW)*	Demolition (D) and Construction (C) Impacts			
		Dredge Volume (CY)	Fill Volume (CY)	Temporary Riverbed Disturbance (SF)	Perm Fill in Riverbed (SF)
Additional Demolition					
A6	Temporary Work Trestle 30-inch Pile Extraction[8]	900	0	1,600	0
Total Loss or Alteration of Resource Area		**4,827**	**4,915**	**30,912**	**11,411**
Combined Total		**9,742**		**42,323**	
Total with added 10% Dredge Volume and Fill Area Factor of Safety for Permitting Purposes		**10,716**		**46,555**	

[1] Cut at mudline. Existing piles and caissons not located where new construction is proposed are to be removed at the mudline (dredging impact = 0).
[2] Existing caissons within the proposed navigational channel are to be removed 5 feet below mudline at 1:3 slope.
[3] Existing piles located where new construction is proposed are to be removed using vibratory hammer extraction method.
[4] Drilled shafts assumed to extend 60 feet below mudline.
[5] Includes North & South Approach Trestles. Piles assumed to extend 25 feet below mudline.
[6] Layout of temporary work trestle may change based on contractor approach to Project construction, to be determined. Impacts are multiplied by 2 due to uncertainty in the final layout.
[7] Assumes no fill below mudline for tremie pour.
[8] Volume of temporary trestle piles removed; surface area included in Figure A7. Removal assumed to use vibratory hammer extraction method. Impacts are multiplied by 2 due to uncertainty in the final layout.

*These activities are not changing the nature of the land. The final conditions would be essentially the same as existing conditions.

2.4.2.1 Drilled Shaft Installation

The movable span would be supported on piers, which in turn would be supported on concrete drilled shafts installed through the sediment directly into bedrock. Each of the 12 drilled shafts would be 7 feet in diameter. Other than a momentary disturbance when each casing is first lowered onto the channel bottom, sediment disturbance during installation would only occur within the enclosed shaft casing. The casing is essentially the formwork for the concrete drilled shaft, and both the casing and drilled shaft would be permanent.

During drilling activity within the shaft, sediments would be moved within and up the casing to the drilling equipment and would not enter the water. As the drilling continues, the casing would continue to advance downward into the sediment until the casing is seated on bedrock. A rock socket would then be drilled into the bedrock in a similar manner. Concrete would be pumped into the casing to finish construction of the drilled shaft. Concrete placement for the proposed drilled shafts would be undertaken using a pump truck on a temporary trestle. See **Figure A10** below for the Proposed Water Depths in Longitudinal Sections.

2.4.2.2 King Pile Abutment

King pile abutment installation would comprise installing pipe piles with sheet piles between them, both driven beyond the mudline to form a wall structure. A concrete abutment cap would be cast on top of the wall created by the pipe and sheet piles and concrete would be placed between the sheet pile and pipe pile wall and abutment cap and the existing seawall using the tremie pour technique to reduce concrete washout from the surrounding water. The tremie pour will also allow concrete to fill underneath the existing seawall, extending the seawall. The extended seawall and sheet pile and pipe pile wall formed together with the concrete would comprise the abutment portion of the bridge on the riverbank. Pipe piles and sheet piles would be driven by pneumatic hammer or vibratory hammer, or a combination of both, depending on subsurface conditions. Additional information on the pipe and sheet piles for the king pile abutment is in **Table 4** and **Figure A10** below.

2.4.2.3 Fender, Trestle Piles, and Temporary Piles Installation

The proposed fender system would line both sides of the navigational channel under the bridge, acting as a “guard rail” for boats, barges, and other vessels to help avoid collisions into, or allisions with, the new bridge that would compromise its structural integrity and damage vessels. Twelve seven-foot-diameter drilled shafts are proposed for the new bridge structures. The proposed fenders would comprise 207 sixteen-inch diameter composite piles. 321 30-inch-diameter piles and 39 13-inch-diameter micropiles for the approach trestles would be driven to an adequate depth to provide the required lateral capacity for the new bridge structures. 16 24-inch steel piles would be installed to support the replacement MGH ramp and dock (**Figure A6**). A quantity of 167, thirty-inch diameter piles would be driven to provide temporary trestles for the required load capacity to support the contractor’s equipment. As identified below in **Table 4**, piles will be driven either by a crane mounted pneumatic hammer or vibratory hammer. See **Table 4** for details on the installation of navigational channel fender piles, approach trestle piles, and temporary contractor trestle piles.

The temporary work trestles will be removed towards the end of construction once they are no longer required to support construction (**Figures A5** and **A6**). See **Table 5** for details on the removal of the temporary trestle piles post construction.

2.4.2.4 Pier Caps

Prefabricated steel/concrete formwork frames would be installed on the drilled shafts and act as the form for the pier caps. Concrete placement for the pier caps above mean high water (MHW) would likely be performed using a concrete pump truck.

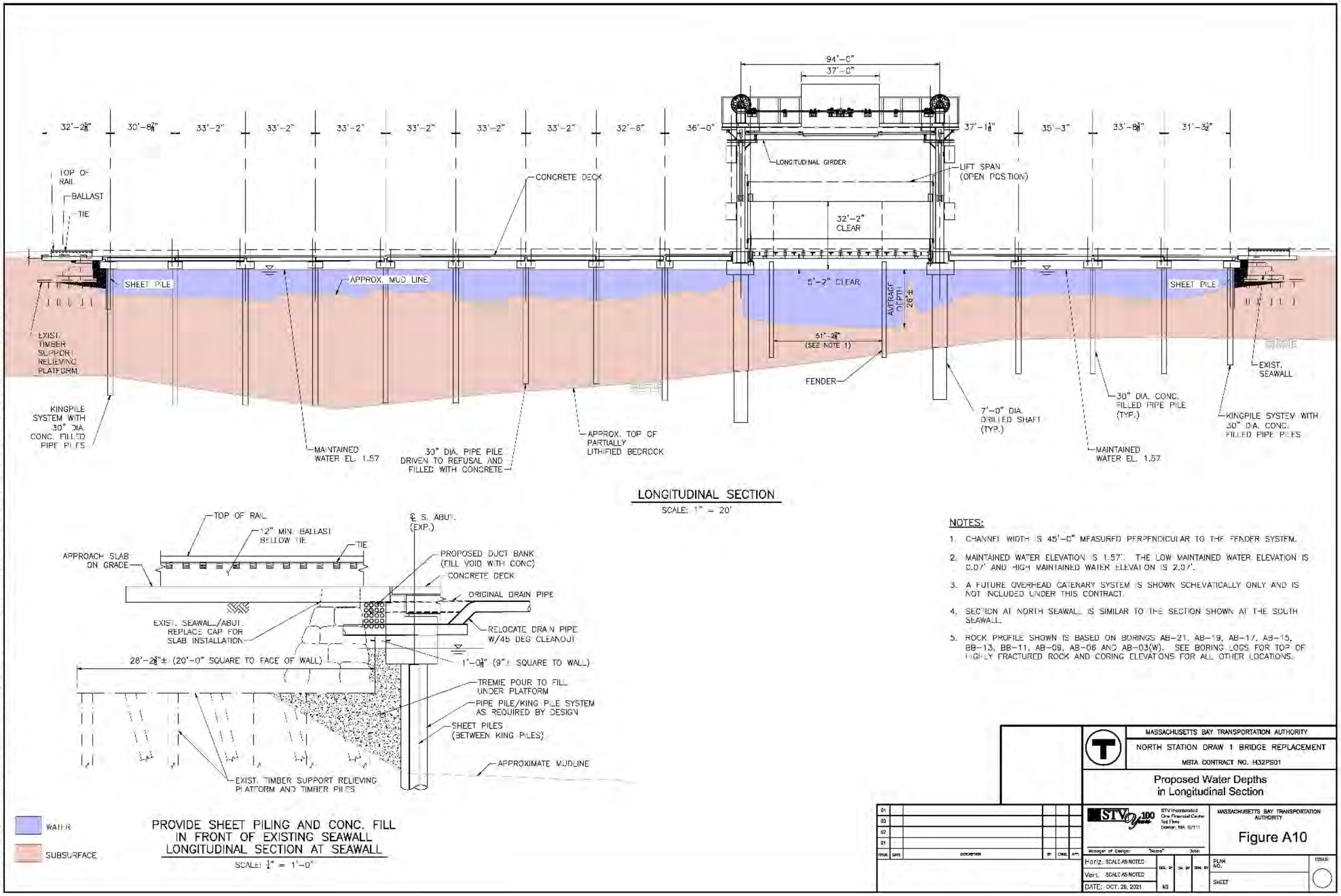

94'-0"
37'-0"
32'-2⅝"
30'-8⅝"
33'-2"
32'-8"
36'-0"
37'-1⅛"
35'-3"
33'-8⅝"
31'-3½"
LONGITUDINAL GIRDER
LIFT SPAN (OPEN POSITION)
CONCRETE DECK
TOP OF RAIL
BALLAST
TIE
32'-2" CLEAR
SHEET PILE
APPROX. MUD LINE
5'-2" CLEAR
AVERAGE DEPTH 28'±
51'-2⅞" (SEE NOTE 1)
EXIST. TIMBER SUPPORT RELIEVING PLATFORM
KINGPILE SYSTEM WITH 30" DIA. CONC. FILLED PIPE PILES
MAINTAINED WATER EL. 1.57
30" DIA. PIPE PILE DRIVEN TO REFUSAL AND FILLED WITH CONCRETE
APPROX. TOP OF PARTIALLY LITHIFIED BEDROCK
FENDER
7'-0" DIA. DRILLED SHAFT (TYP.)
30" DIA. CONC. FILLED PIPE PILE (TYP.)
EXIST. SEAWALL
LONGITUDINAL SECTION
SCALE: 1" = 20'
TOP OF RAIL
12" MIN. BALLAST BELLOW TIE
TIE
APPROACH SLAB ON GRADE
℄ S. ABUT. (EXP.)
PROPOSED DUCT BANK (FILL VOID WITH CONC)
CONCRETE DECK
ORIGINAL DRAIN PIPE
EXIST. SEAWALL/ABUT. REPLACE CAP FOR SLAB INSTALLATION
RELOCATE DRAIN PIPE W/45 DEG CLEANOUT
28'-2⅞"± (20'-0" SQUARE TO FACE OF WALL)
1'-0⅞" (9"± SQUARE TO WALL)
TREMIE POUR TO FILL UNDER PLATFORM
PIPE PILE/KING PILE SYSTEM AS REQUIRED BY DESIGN
SHEET PILES (BETWEEN KING PILES)
APPROXIMATE MUDLINE
EXIST. TIMBER SUPPORT RELIEVING PLATFORM AND TIMBER PILES
WATER
SUBSURFACE
PROVIDE SHEET PILING AND CONC. FILL IN FRONT OF EXISTING SEAWALL
LONGITUDINAL SECTION AT SEAWALL
SCALE: ¼" = 1'-0"
NOTES:
1. CHANNEL WIDTH IS 45'-0" MEASURED PERPENDICULAR TO THE FENDER SYSTEM.
2. MAINTAINED WATER ELEVATION IS 1.57'. THE LOW MAINTAINED WATER ELEVATION IS 0.07' AND HIGH MAINTAINED WATER ELEVATION IS 2.07'.
3. A FUTURE OVERHEAD CATENARY SYSTEM IS SHOWN SCHEMATICALLY ONLY AND IS NOT INCLUDED UNDER THIS CONTRACT.
4. SECTION AT NORTH SEAWALL IS SIMILAR TO THE SECTION SHOWN AT THE SOUTH SEAWALL.
5. ROCK PROFILE SHOWN IS BASED ON BORINGS AB-21, AB-19, AB-17, AB-15, BB-13, BB-11, AB-09, AB-06 AND AB-03(W). SEE BORING LOGS FOR TOP OF HIGHLY FRACTURED ROCK AND CORING ELEVATIONS FOR ALL OTHER LOCATIONS.
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
Proposed Water Depths in Longitudinal Section
STV
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
Figure A10
DATE: OCT. 28, 2021

Table 4. Installation of Piles by Impact Hammer

Structure (action)	Size & Diameter	Duration of Work	Technique
New Bridge Trestle piles (installation)	• 30" diameter • Steel	• Phase 1: 49 days • Phase 3: 19 days • Phase 4: 11 days • Phase 6: 60 days • Phase 8: 16 days • Phase 10: 121 days	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day
Contractor Temporary Trestle piles (installation) [1, 2]	• 30" diameter • Steel	• Southwest temp trestle: 22 days[1] • Northwest temp trestle: 14 days[1] • Southeast temp trestle: 25 days[2] • Northeast temp trestle: 16 days[2]	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day
New Navigational Channel Fender piles (installation)	• 16" diameter • Solid fiberglass plastic	• 35 days	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week/8 hours per day
Replacement MGH dock and ramp (replacement)	• 24" diameter (conservative) • Steel	• 16 piles, 4 days	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day

Table 4. Installation of Piles by Impact Hammer

Structure (action)	Size & Diameter	Duration of Work	Technique
Sheet Pile for King Pile Abutment	• 24” diameter (conservative) • Steel	• 132 piles, 16 days	• 6 piles per day; • 20 strikes per pile • 5 days a week and 8 hours per day • Installed alternating between pipe piles (below)
Pipe pile for King Pile Abutment	• 30” diameter (conservative) • Steel	• 49 piles, 17 days	• 3 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day • Installed alternating between sheet piles (above)
Temporary sheet piles for cofferdams[3]	• 24” diameter (conservative) • Steel • No pipe piles in the cofferdam	• 250 piles, 15 days	• 15 to 20 piles per day • 200 strikes per pile • 5 days a week and 8 hours per day

Notes:
[1] Temporary work trestles on the west side of the bridges will be in place for approximately 6 years before being removed.
[2] Temporary work trestles on the east side of the bridges will be in place for approximately 4 years before being removed.
[3] Temporary sheet piles for the cofferdams will be in place for approximately 4 months before being removed.

Table 5. Vibratory Removal of Temporary Trestle Piles

Structure (action)	Size & Diameter	Duration	Technique
Contractor Temporary trestle piles (removal)	• 30” diameter • Steel	• Southwest temp trestle: 22 days • Northwest temp trestle: 14 days • Southeast temp trestle: 25 days • Northeast temp trestle: 16 days	• 3 to 6 piles per day • 30 minutes of vibratory hammer per pile
Temporary sheet piles for cofferdams	• 24” diameter • Steel	• 250 piles, 15 days	• 15 to 20 piles per day • 20 minutes of vibratory hammer per pile

2.5 Vessel Activity

While not definitive since a construction contractor has not been selected, construction is likely to primarily involve barges and tugboats, small work boats (25 feet in length), and occasional shallow draft material supply vessels operating between staging areas and the Project Site. In most instances, construction support vessels coming from Boston Harbor are likely to move at slow speeds, less than ten knots. Transit routes are unknown at this time but are likely to be either from staging areas in East Boston or Quincy/Weymouth based on the limited number of contractors qualified to undertake work specific to a movable bridge.

In addition, Boston hosts a commercial fishing fleet and has port facilities for oil tankers, liquid natural gas (LNG) tankers, container ships, and cruise ships. While exact numbers cannot be known since vessel tracking is not performed across all vessel types, it is likely that the baseline vessel activity between potential home ports and/or staging areas in Weymouth/Quincy and Boston/East Boston and the Charles River is well in excess of several thousand transits per year. It is estimated that Project-related construction vessel transits would number in the hundreds during Proposed Project construction.

2.6 Operation

Once construction is finished, bridge operations would be similar to current operations except that there would be six tracks crossing the river on three bridge structures instead of four tracks crossing the river on two bridge structures today. The Proposed Project is intended to bring the Draw One Bridge to a state of good repair, reducing the need for in-water repair and unscheduled maintenance activities.

3.0 CONSERVATION MEASURES

3.1 Best Management Practices and Time of Year Restrictions

MBTA's construction contractor will be required to implement standard construction practices and follow TOY restrictions for certain in-water activities. Restrictions on the proposed construction activity are expected to include the following, which will be incorporated into the Project plans and specifications as contract requirements:

- Piles in the area where new portions of the bridge structures will be installed must be fully removed from the riverbed. Piles within the navigational channel are to be cut off three feet below the defined bottom of channel. However, the majority of the existing piles will be cut at the mudline rather below the mudline to minimize sediment disturbance. This activity will not be subject to TOY restrictions because it is not considered a silt-producing activity.
- NOAA Fisheries Trust Resource Species TOY restrictions for in-water construction activities would be used to protect diadromous species, enabling upstream passage for spawning and migratory fish during the Spring from February 15 to July 15 and downstream passage during the Fall out migration from September 1 to November 15, as per the Massachusetts DMF, Technical Report TR-47, *Recommended TOYs for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts* (Evans et al. 2015). The activities listed in **Table 6** will be subject to TOY restrictions. Major silt-producing activities will not be allowed during the restriction periods, and minor silt-producing activities would only be allowed during those periods with the use of silt curtains or cofferdams. During the TOY restriction, allowed construction activities and associated in-water measures would be conducted to maintain fish passage through the work site, with any in-water devices not encroaching on more than 25 percent of the river corridor, pursuant to an email recommendation from NOAA Fisheries dated May 4, 2021 (**Appendix A**).

Table 6. TOY by Construction Activity

Activity	Construction method	TOY Restriction[1,2]
Major Silt-Producing Activities		
Channel dredging	Dredge	February 15 to July 15 September 1 to November 15
Remove existing caissons	Dredge around caissons and cut off/demolish as required.	February 15 to July 15 September 1 to November 15
Remove existing piles where required	Extract existing piles	February 15 to July 15 September 1 to November 15

Table 6. TOY by Construction Activity

Activity	Construction method	TOY Restriction[1,2]
Remove temporary piles for construction trestle or any sheet pile cofferdams if used.	Extract temporary piles and sheet piles	February 15 to July 15 September 1 to November 15
Minor Silt-Producing Activities		
Remove surface laid submarine cables	Lift surface laid cable	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install temporary piles for temporary construction trestle or sheet pile cofferdams if used.	Drive piles or sheet piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install pipe piles for approach trestles	Drive piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install sheeting and piles at abutments	Drive piles and sheet piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install Drilled Shafts for lift spans	Install drilled shaft	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install navigational channel fender system	Drive piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain is required.
Anchoring of barges	Spud, jack-up or anchor moored barges (temporary)	None

[1]NOAA Trust Resource Species TOY restrictions for upstream passage for spawning and migratory fish known to be within the Area Affected by Turbidity (**Table 6**).
[2] TOYs were decided based on recommendation from NOAA **(Appendix A**).

- Major silt-producing activities conducted during the rest of the year (when allowed outside the TOY restrictions) will be implemented using silt curtains to minimize turbidity and siltation in the river. Minor silt-producing activities described in **Table 6** above would be undertaken using siltation control methods such as silt curtains or potential cofferdams (at the discretion of the contractor) and water quality monitoring requirements if performed during TOY restriction dates to reduce siltation. Other methods may also be used.

- MBTA will develop a Project-specific National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP) to describe BMPs that will be implemented during construction to control erosion and contain and treat stormwater runoff generated during construction. If necessary, construction dewatering will be undertaken in compliance with the NPDES requirements for these types of activities.
- To reduce and mitigate the risk of spills, boats, barges, and construction equipment will have spill kits readily available to address small accidental spills. Reporting of accidental spills will be done in accordance with state and federal regulations and a Project-specific Spill Prevention, Control, and Countermeasures (SPCC) Plan will be developed and incorporated into contract specifications.
- As currently contemplated, construction methods entail the use of an impact hammer, which may produce underwater noise levels (peak and SEL_{cum} [cumulative sound exposure levels]) that exceed the behavioral disturbance threshold for aquatic species. Therefore, ramp-up procedures for impact hammers, also known as a “soft start,” shall be used before continuing with the activity. The contractor will be required to employ a ramp-up period of at least 60 seconds to gradually increase sound intensity of pile driving activities to allow sturgeon and other species to leave the work zone.

3.2 Environmental Compliance and Monitoring

MBTA is consulting with USACE and MassDEP and will continue to coordinate closely with these natural resource agencies during the permitting process. MBTA would also require the construction contractor to implement an environmental monitoring program overseen by a Construction Supervisor and an Environmental Monitor, both of whom would be responsible for daily inspections of work areas that would note any potential effects and recommend measures to address them. The Construction Supervisor, working with the Environmental Monitor, will be on site daily to perform inspections and will have “stop work” authority to address observed or reported infractions of required standards and procedures that pose a threat to aquatic habitat and potential inhabitants. The Environmental Monitor would confirm compliance with permit and other regulatory requirements and inspect the work area for sediment and erosion to minimize the potential for sediment-laden water to drain into the river and increase turbidity for fish.

Construction crews will be trained prior to the start of work to recognize and respond to changing field conditions, particularly as they relate to fisheries, and prevent sedimentation, unauthorized stormwater runoff, accidental spills, and releases of fuel, lubricant, grease, or oil.

4.0 DESCRIPTION OF THE ACTION AREA

The Action Area is defined in 50 Code of Federal Regulation 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action". For this Project, the Action Area has been defined to consider three primary potential effects: turbidity resulting from increased suspended sediments; hydroacoustic noise from pile driving; and construction vessel transit activity. The area affected by each of the three components was determined and all three were overlaid. This overlay, including the furthest extent of each component area, was used to determine Action Area for the Proposed Project.

In general, the underwater area approximately 200 feet upstream and 200 feet downstream of the bridge components has the highest potential for increased turbidity resulting from construction-related suspended sediments. The underwater area with potential to experience elevated hydroacoustic noise from pile driving extends further from the bridge location, from approximately 1,200 feet upstream at the Charles River Dam to approximately 800 feet downstream at the Charles River Dam and Locks. The area with the furthest extent is associated with vessel transit activity; it includes all of Boston Harbor, approximately 7.5 miles from the Project Site. The three component areas and the overall Action Area are shown on **Figure 1** and discussed in more detail below.

<u>Area Affected by Turbidity</u>

Within the Area Affected by Turbidity, the distance that construction-related suspended sediment concentrations are expected to travel is estimated to be 100 feet upstream/west of the Draw One Bridge, based on best professional judgement and assuming minimal currents in the area owing to the Charles River Dam and Locks. The eastern end of the Area Affected by Turbidity is defined by the Charles River Dam and Locks, which would isolate the effects of project-related construction work on the Boston Inner Harbor. The locks are approximately 700 feet (213 meters) downstream of the Project Site, and Charles River currents are relatively slow, which provides ample time for sediment suspended during dredging activities to settle. The north and south limits of the Area Affected by Turbidity are the banks of the Charles River (**Figure 1**). Silt will likely be the major component of sediment disturbed and suspended during the limited dredging activity required for construction and removal of an underwater cable.

<u>Area Affected by Underwater Noise</u>

The Area Affected by Underwater Noise accounts for the elevated hydroacoustic noise from construction-related pile driving activities, using both vibratory and impact hammers. It was defined for the Proposed Project using the NOAA Fisheries Multi-Species Pile Driving Calculator (NOAA Fisheries Tool) (NOAA Fisheries, 2022b) which predicted the distance from the Proposed Project in which aquatic organisms may be affected by construction noise. The NOAA Fisheries Tool predicted that a large area (4.5 miles in all directions underwater) would be affected. The NOAA Fisheries Tool model, however, assumes that construction is undertaken in an area surrounded by open water. It is assumed that for the Proposed Project, the riverbanks, the Charles River Dam and Locks, the bends in the Charles River, the Charles River Dam Road, and the

surrounding landforms would attenuate the hydroacoustic noise from pile driving activities. This assumption is explained in more detail in the hydroacoustic analysis in Section 7.2.
For this reason, the elevated Area Affected by Underwater Noise for the Proposed Project has been defined as limited to the bounds of the Charles River from Charles River Dam Road to the Charles River Dam and Locks, totaling approximately 27 acres (**Figure 1**).

<u>Area Affected by Vessel Traffic</u>

The Area Affected by Vessel Traffic includes the area required for project-related vessel transit and extends approximately 7.5 miles from the Project Site to the inner and outer regions of Boston Harbor. This calculation is based on potential distances that construction vessels moored in the Project Site during construction may need to travel between the Project Site, potential staging areas, and their home ports to transport equipment, supplies, or other items (**Figure 1**). Additional information on vessel transits is provided in Section 7.3.

4.1 Physical Characteristics

Figure 1 shows a map of the Action Area, the Area Affected by Underwater Noise, the Area Affected by Vessel Traffic, and Area Affected by Turbidity. The Action Area consists of a highly altered segment of the Charles River, where both riverbanks consist of man-made structures. It has been subject to many anthropogenic changes, such as dredging and filling of estuaries in the Inner Boston Harbor, while the Outer Boston Harbor has been less altered by humans. Water depths in the Action Area are an average of 10 feet (3 meters), except for the navigation channel which is 20 feet (6 meters) deep, and the river is approximately 380 feet (116 meters) wide. Current velocities near the Project Site are low, given the proximity of the locks and dam and water level management in the basin by DCR. The river bottom sediment in the Action Area is primarily loose, black organic silt with traces of sand, clay, shells and other debris to a thickness of approximately 5 to 10 feet (1.5 to 3 meters).

The Project Site is located near the mouth of the Charles River, within the Charles River Basin. The Charles River is approximately 79.5 miles long and the Project Site is approximately 0.75 miles from its confluence with Boston's Inner Harbor. The Project Site is surrounded by a densely developed urban environment characterized by limited access highways, commercial businesses, a sand and gravel facility, a rail station, a hospital, and protected open spaces, such as mowed parkland, along the Charles River. The Charles River channel is situated in an east-west orientation under the Draw One Bridge and hardened with sea walls on each bank. Charles River Dam Road, marinas, and moorings are located upstream of the Draw One Bridge, and the Charles River Dam and Locks are located downstream (**Figure 1**). Most project work would be undertaken upstream of the Charles River Dam and Locks, near the mouth of the Charles River. The only activity downstream of the dam and within Boston Harbor would be construction vessel transit to and from the home port and/or staging area to the Project Site.

The Millers River flows into the Charles River immediately north and east of the Project Site. The exposed, or daylighted, portion of the river emanates from a culvert approximately 1,200 feet (366 meters) upstream of the Draw One Bridge to the north. The modern-day Millers River is a remnant of what used to be a much longer river; owing to development most of the river now flows through culverts. The exposed portion of the river is located under the Leverett Circle Connector Bridge. Though there is some riparian corridor along the current extent of the Miller River, a majority of its extent has been hardened with riprap under overpasses and highway infrastructure. Therefore, the Action Area includes highly disturbed habitat.

The Project Site is located within the lower portion of the Charles River Basin, which separates Boston and Cambridge. Although historically tidal, this portion of the river was cut off from the ocean by the Charles River Dam and Locks, the construction of which turned the river into a basin. The water level of the portion of the Charles River Basin that contains the Project Site is controlled by DCR via the Charles River Dam and Locks and is associated with seasonal flows within the Charles River as well as stormwater flows.
The Charles River Dam and Locks were constructed in 1978 and are operated by DCR. The locks are located 700 feet (213 meters) downstream of the Project Site, just west of the North Washington Street (Route 99) Bridge. One of the three locks is wider than the other two to accommodate the occasional passing of larger vessels. These concrete and steel structures create a physical barrier largely preventing the upstream flow of water from the Boston Inner Harbor into the Charles River.

The Charles River Dam and Locks operate 24 hours a day. The locks remain closed, however, for the vast majority of any given 24-hour period. Openings occur much less frequently during winter months than during summer months, reflecting the seasonal nature of the recreational boat traffic that generates most openings.

Fish can pass through the lock system when it is opened, but the variability of opening frequency throughout the year affects fish passage, which is therefore also highly variable. A vertical slot fishway/ladder alongside the locks enables passage of migratory finfish (Brady et al., 2005). The fish ladder was installed in 1978 and modified in the early 1990s to improve its functioning. It is 170 feet (52 meters) long, with 29 slots (Brady et al., 2005). The condition of the fish ladder was considered to be “fair” and its function was deemed “not passable” in the January 2005 Technical Report TR-18 released by the DMF.

4.2 Description of the Aquatic Habitat

4.2.1 Currents and Tides

In general, Boston Harbor is well-flushed throughout by strong tidal currents; therefore, the harbor has a short average residence time. Past studies indicate that the waters of Massachusetts Bay and the rivers that discharge into the harbor replace all the harbor water every five to seven days (Taylor, 2014). In most cases, tidal currents are dominant in Boston Harbor, while wind driven currents play a larger role in water circulation patterns during storms.

The primary sources of freshwater inputs into Boston Harbor are the three major rivers that discharge into the harbor: the Charles River, Mystic River and Chelsea River. The Neponset River provides freshwater into the Dorchester Bay area and the Fore River provides freshwater into Hingham Bay. The average tidal range in Boston Harbor is 8.9 feet (2.7 meters). This tidal range results in four mid-tide, relatively high-velocity current events daily, on average, in the Action Area.

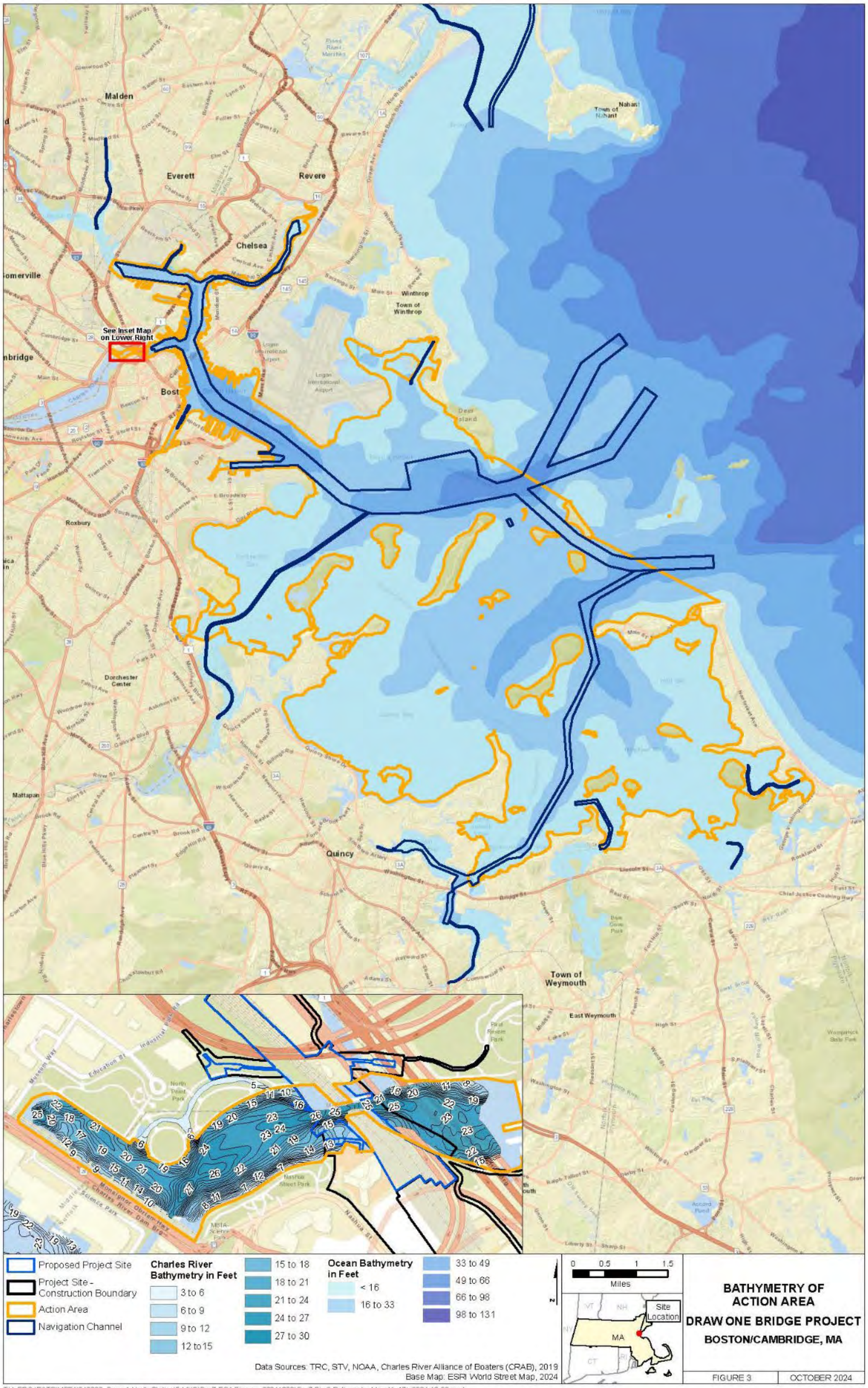
At the location where the Draw One Bridge crosses the Charles River, the River has a relatively slow-moving current. Although historically tidal, the Project Site has been cut off from the ocean by a system of locks and dams, the Charles River Dam and Locks. Currents under the bridge vary based on seasonal flow levels in the Charles River, as well as pre- and post-storm conditions, such as tides, wind, etc. Lock openings and some leakage creates a bottom-oriented salt wedge that migrates upstream into the lower Basin, but there are no reversing tidal flows upstream of the lock and dam system.

Bridge structures on the north and south banks of the Charles River are within the Federal Emergency Management Agency (FEMA) 100-year floodplain.

4.2.2 Depth and Bathymetry

The water depth zones within the larger geographic area that encompasses Boston Inner and Outer Harbor range from 0 to 16 feet (5 meters), 16 to 33 feet (10 meters), 33 to 49 feet (15 meters), and 49 to 66 feet (20 meters) (**Figure 3, Bathymetry of Action Area**). The average depth of Boston Harbor is approximately 15 feet. Depths in the Action Area range from 1 to 27 feet (8.2 meters) (MWRA, 2004 as cited in USACE 2013). However, dredged depths of United States Army Corps of Engineers (USACE) Civil Works Navigation Channels within Boston Harbor range between approximately 40 to approximately 51 feet (USACE, 2013). The USACE completed maintenance dredging in navigational channels within the Charles River and Boston Harbor and widening in selected areas were in August 2022 (USACE, 2022).

The depth of the Charles River Basin (the pool created by the Charles River Dam and Locks) is generally shallow, with an average water depth of approximately 1 to 30 feet (9 meters). Water depths at the Project Site range from 7 to 27 feet (2 to 8 meters). The deepest areas within the Project Site are in the center of the river and portions closer to the northern bank, whereas shallower water areas dominate the portions closer to the southern bank. The depth of the Charles River at the Project Site is approximately ten feet (3 meters), and the existing 65-foot-wide (20 meter) navigation channel is 25 feet (8 meters) deep. The Charles River Basin has an average width of approximately 380 feet (116 meters).


Malden
Everett
Revere
Chelsea
Somerville
Cambridge
See Inset Map on Lower Right
Town of Winthrop
Town of Nahant
Roxbury
Dorchester Center
Mattapan
Quincy
Town of Weymouth
East Weymouth
Proposed Project Site
Project Site - Construction Boundary
Action Area
Navigation Channel
Charles River Bathymetry in Feet
3 to 6
6 to 9
9 to 12
12 to 15
15 to 18
18 to 21
21 to 24
24 to 27
27 to 30
Ocean Bathymetry in Feet
< 16
16 to 33
33 to 49
49 to 66
66 to 98
98 to 131
Data Sources: TRC, STV, NOAA, Charles River Alliance of Boaters (CRAB), 2019
Base Map: ESRI World Street Map, 2024
0 0.5 1 1.5
Miles
Site Location
VT
NH
MA
CT
BATHYMETRY OF ACTION AREA
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 3
OCTOBER 2024

4.2.3 Substrates and Sediments

The Boston Basin, which underlies part of Boston Harbor, is underlain with predominant bedrock, Cambridge argillite, and mafic igneous rock, which are high in silicates. The Cambridge argillite is a layer sedimentary rock dating back to the Paleozoic age, and igneous rock are intrusive sills, creating parallel layers of cooled magma along the bedrock. The sculpted-out shape of Boston Harbor is due to the soft sedimentary bedrock layers having been eroded by the movement of glaciers, which also formed the Boston Harbor inner islands. These islands, known as drumlins, consist of glacial debris deposited during multiple rounds of retreating glacial meltwater.

The inner harbor has undergone many anthropogenic changes, such as the dredging and filling of estuaries, while the outer harbor has been less disturbed. Above the bedrock, the floor includes glacial deposits such as till, outwash, and younger glaciomarine clays such as the Boston Blue clay also found on the Charles riverbed. The harbor's topography is constantly changing due to natural and manmade actions including shoreline erosion, dredging of the shipping channel, and intense weather events such as Nor'easter storms. According to Bell et. al 2002, as cited in Thornberry-Ehrlich, T. L., 2017, the intertidal zone of the Boston Harbor islands consists of the following top three substrate groups: mixed coarse (heterogeneous continuum of rocks, boulders, cobbles, gravel, shell, and sand); mixed coarse and fine (mixed coarse and fine: heterogeneous assemblage of rocks, boulders, and coarse and fine particles); and reef, which are carbonate mound-like features (for example, oyster or mussel bars) (Thornberry-Ehrlich, T. L., 2017).

According to the Draw One Bridge Geotechnical Engineering Memorandum, subsurface conditions at the Project Site consist of historically placed fill overlying organic silt tidal estuary deposits often intermixed with fill material, overlying silty sand, marine clay (Boston Blue Clay), discontinuous strata of glaciomarine deposits and/or glacial till, weathered argillite, and argillite bedrock. The substrates on site consist of approximately 70 percent silt/mud, 20 percent sand, and ten percent pebble/gravel/cobble. The organic silt stratum primarily comprises very soft-to-hard, dark gray-to-black organic silt with up to ten percent shells. Because of the fill dumped atop this layer within the historic mud flats adjacent to the Charles River, the stratum is intermixed with up to 20 percent fine to coarse sand and debris including brick, wood, and cinders, and up to ten percent gravel (Pizzi, 2020).

Historic studies indicate that the benthic habitat of the lower Charles River is contaminated by a suite of inorganic and organic constituents, such as lead, polychlorinated biphenyls (PCBs), organochlorine pesticides, and polyaromatic hydrocarbons (PAHs) (Breault et al., 2000). During 2020, TRC Environmental Corporation (TRC) collected preliminary sediment samples from the Project Site. Data collected indicates the presence of PCBs, PAHs, and lead, among other organic and inorganic contaminants, above MassDEP and USACE reporting limits.

4.2.4 Water Quality

Since 1989, the Massachusetts Water Resources Authority (MWRA) has monitored water quality in the Boston Harbor. The most recent water quality data was reviewed to provide a general characterization of water quality in the Action Area. Results indicate that, in general, water quality has improved greatly in Boston Harbor since the mid-1990's (MWRA, 2024).

There are no tidal flows that reverse the general downstream passage of water from the Charles River upstream of the Charles River Dam and Locks, including the Project Site. However, when the locks are opened there is an upstream incursion of salt water along the bottom of the river that extends into the lower Charles River Basin to varying degrees. Water salinity varies with the tides and seasonally, depending upon the amount of freshwater outflow from the Charles River.

Under the Massachusetts Surface Water Quality Standards (SWQS) (Massachusetts Administrative Code 314 CMR 4.00), coastal and marine water is characterized as Class SA, Class SB, and SC. The state defines Boston Harbor as Class SB water, which is designated as suitable for habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary recreation. Class A, Class B, and Class C are inland water classes. The state classifies the waters past the Charles River Dam and Locks, including at the Project Site, as Class B warm water, which is designated as suitable for habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary recreation.

The closest MWRA monitoring station, Station 11, is located approximately 600 feet (183 meters) downstream of the Project Site, upstream of the Charles River Dam and Locks. Currently, phosphorus is the primary cause of impairment throughout the Charles, although the river is also impaired by bacterial pollutants, algal growth, excessive nutrients, and stormwater (EPA 2024a).

According to the SWQS, the following conditions are associated with Class B waters: Dissolved oxygen is not less than 5.0 milligrams per liter (mg/l) in warm-water fisheries. Temperature shall not exceed 85 degrees Fahrenheit (°F) (29 degrees Celsius [°C]). The pH shall be in the range of 6.5 to 8.3 standard units, and not more than 0.5 units outside of the natural background range. The water shall be free from floating, suspended, and settleable solids; color and turbidity; oil, grease; and taste and odor in concentration or combinations that would impair any use assigned to Class B.

Table 7 above provides water quality data recorded at MWRA's Station 11 from 2013 to 2023 (note: no data was recorded in 2020) during April to October of each year. Due to the proximity of the Project Site to the marine waters of the Boston Inner Harbor, and reflecting the operation of the locks, Charles River waters experience saltwater intrusion visible in the data collected at Station 11. Data indicates that average surface salinity is 0.82 practical salinity units (PSU), while bottom salinity averages are close to 15.14 PSU, indicating an estuarine environment exists at the Project Site (MWRA, 2024).

Table 7. Charles River Water Quality Monitoring Data, MWRA Station 11[1]

Parameter	Surface			Bottom		
	Min	Max	Average	Min	Max	Average
Temperature (°C)[2]	3.23	28.73	19.14	3.35	25.17	16.7290
Dissolved Oxygen (mg/L)[3]	4.60	13.86	8.59	0.77	12.	5.68
Turbidity (NTU)[4]	0.00	40.90	4.35	0.00	39.54	5.75
Salinity (PSU)[5]	0.22	3.18	0.82	0.27	28.34	15.14
Specific Conductance (mS/cm)[6]	0.46	5.83	1.61	0.55	43.86	24.40
pH	6.15	8.69	7.30	5.89	7.96	7.05

[1]Source: MWRA, 2024, Boston Harbor and River Monitoring Data: Charles River
[2] °C = degrees Celsius
[3]mg/L = milligrams per liter
[4]NTU = nephelometric turbidity units
[5]PSU = Practical Salinity Units
[6]mS/cm = millisiemens per centimeter

Generally, specific conductance measurements are affected by the presence of dissolved solids such as salts (EPA 2024b). At Station 11, bottom specific conductance is high, averaging at 24.40 (mS/cm) [6], likely due to the close proximity of marine waters. At Station 11, surface pH levels range from 6.15 to 8.69 and bottom pH levels range from 5.89 to 7.96. The bottom dissolved oxygen measurements average at 5.68 (mg/L) [3], lower than the surface dissolved oxygen measurements which average at 8.59 (mg/L) [3].

Surface turbidity at Station 11 ranges from 0.00 to 40.90 (NTU), with an average of 4.35 NTU, while bottom turbidity ranges from 0.00 to 39.54 NTU, with an average of 5.75 NTU. The Charles River has hundreds of stormwater outfalls and therefore the maximum measurements are likely due to very large rain events that discharge stormwater into these outfalls (EPA 2024b).

4.2.5 Benthic Community

The substrate type, such as soft sediments, well-sorted sands, rocky outcrops, gravel, cobble, and boulders or manmade structures (i.e., pilings or jetties, bridge foundations), is the habitat component that is generally most influential on species composition and distribution. The community of aquatic invertebrates attached to, resting on, or living in the bottom sediments is called the benthos.

Intertidal

Rocky intertidal areas can support a diverse and productive habitat that includes algae and macroinvertebrates (Lubchenco 1980, Mathieson et al., 1991, Menge 1976, 1978a, 1978b, 1991, as cited in Duke, 2000). The high intertidal community is composed mainly of barnacles (*Semibalanus balanoides*), with periwinkles (*Littorina* spp.), predatory gastropod (*Nucella lapillus*), green and rock crabs (*Carcinus maenas* and *Cancer irroratus*), limpets, and chitons. The high intertidal community can support shorebirds, herring gulls, and fish such as cunner (*Tautogolabrus adspersus*) at high tide. A canopy of algae appears in the mid-intertidal zone, including brown algae such as *Fucus distichus* and *Ascophyllum nodosum*, then blue mussels, join the barnacles and periwinkles found in the high intertidal zone. In the low intertidal and shallow subtidal zones, fucoids are replaced by red algae (*Chondrus crispus and Mastocarpus stellatus*), which provides a substrate for a variety of epiphytes and epifauna. The algae support herbivorous crustaceans such as *Hyale nilssoni*, snails including periwinkles and *Lacuna vincta*, limpets *(Acmaea testudinalis*), and sea urchins (*Strongylocentrotus droebachiensis*). Invertebrate predators include green, rock, and Jonah (*Cancer borealis*) crabs, starfish (*Asterias* spp.), and the gastropod *Nucella lapillus*.

At the Project Site, the benthic habitat consists of estuarine/riverine conditions, with both banks of the river consisting of granite block bulkhead walls. Substrate consists of soft bottom sediments with an absence of macroalgae or submerged aquatic vegetation (SAV). Based on the substrate characteristics, soft bottom, estuarine benthic infauna and epifauna are likely to occur to some extent, but given the extreme range of salinities, ranging at times from essentially freshwater, to a nearly marine saltwater wedge, the benthic community is likely stressed and depauperate.

Subtidal

Predominant taxa benthic infauna within the Action Area in the lower Boston Harbor includes several polychaete species, such as *Aricidea catherinae*, *Prionospio steenstrupi*, *Scoletoma fragilis*, and *Tharyx acutus*. The tube-dwelling amphipod *Ampelisca abdita* is numerically important in the region and other amphipods, such as *Orchomenella pinguis* and *Leptocheirus pinguis*, are also relatively common (USACE, 2013). Between 1993 through 2003, a dense aggregation of amphipod tubes, also called tube mats, occurred in all regions of Boston Harbor and although plentiful during 2003, *Ampelisca* tube mat densities were virtually eliminated from the Harbor in 2004 and 2005, possibly as a consequence of several severe storms that affected benthic habitats (USACE, 2013). *Ampelisca* tubemat densities have been recovering in number since 2005 (USACE, 2013). Based on USACE 2013 data, infaunal abundances described in the Boston Harbor Federal Deep Draft Navigation Improvement Project (USACE, 2013) range from medium (5,000 to 25,000/m^2) to large (25,000 to 80,000/m^2) and species numbers range from medium (15 to 25/sample) to large (25 to 40/sample).

Shellfish resources in the Action Area are include the blue mussel (*Mytilus edulis*), soft shell clam (*Mya arenaria*), European oysters (*Ostrea edulis*), razor clams (*Ensis directus*), Atlantic surf clams (*Spisula solidissima*), and ocean quahogs (*Arctica islandica*). According to the Massachusetts Bureau of Geographic Information (MassGIS), the closest portion of the Action Area suitable for shellfish is more than 2,755 feet (840 meters) away from the Project Site and occurs within waters classified as prohibited for growing shellfish (MassGIS, 2024).

Anadromous fin-fish species also present in the Action Area during in- and out- spawning migrations, including alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), rainbow smelt (*Osmerus mordax*), American eel (*Anguilla rostrata*), white perch (*Morone americana*), and Atlantic tomcod (*Microgadus tomcod*). The Project site is also habitat for the spawning and juvenile development of winter flounder (*Pseudopleuronectes americanus*). In addition to shellfish and fin-fish species, lobster (*Homarus americanus*) are commonly found burrowing in the side slopes of channels and are commercially fished in Boston Harbor.

5.0 ESA LISTED SPECIES AND CRITICAL HABITAT EVALUATED IN THE ACTION AREA

To assist in the assessment of marine resources and analysis of any potential effects with the Proposed Project, TRC utilized the NOAA Fisheries Section 7 mapper to identify the potential for the presence of listed species in the Action Area and the NOAA Fisheries Critical Habitat mapper to identify critical habitat that overlaps the Action Area (NOAA Fisheries, 2022b and NOAA Fisheries, 2023a; see **Appendix B**). NOAA Fisheries' Section 7 mapper results are shown on **Figure 4.**

Within the Action Area, up to eight species protected under the ESA may potentially occur, including two fish species, two whale species, and four sea turtle species. The eight ESA-listed species evaluated were the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*) fish species; two whale species, including the North Atlantic right whale (NARW) (*Eubalaena glacialis*) and fin whale (*Balaenoptera physalus*); and four sea turtle species, including leatherback (*Dermochelys coriacea),* loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), and green (*Chelonia mydas*). Critical Habitat for the NARW is adjacent to the Action Area; however, it does not overlap the Action Area and was therefore not discussed or considered further as the Project will have no effect on it.

The distribution, life history, and behaviors of these species, as well as the extent and physical and biological features of designated critical habitat, are summarized in NOAA Fisheries' Greater Atlantic Regional Fisheries Office (GARFO) Maps and Species Tables, which were used in the analysis incorporated herein.

Table 8 provides a review of listed species with potential presence in the Action Area, including their status under the ESA, life history data, final listing rules, and recovery plan references.

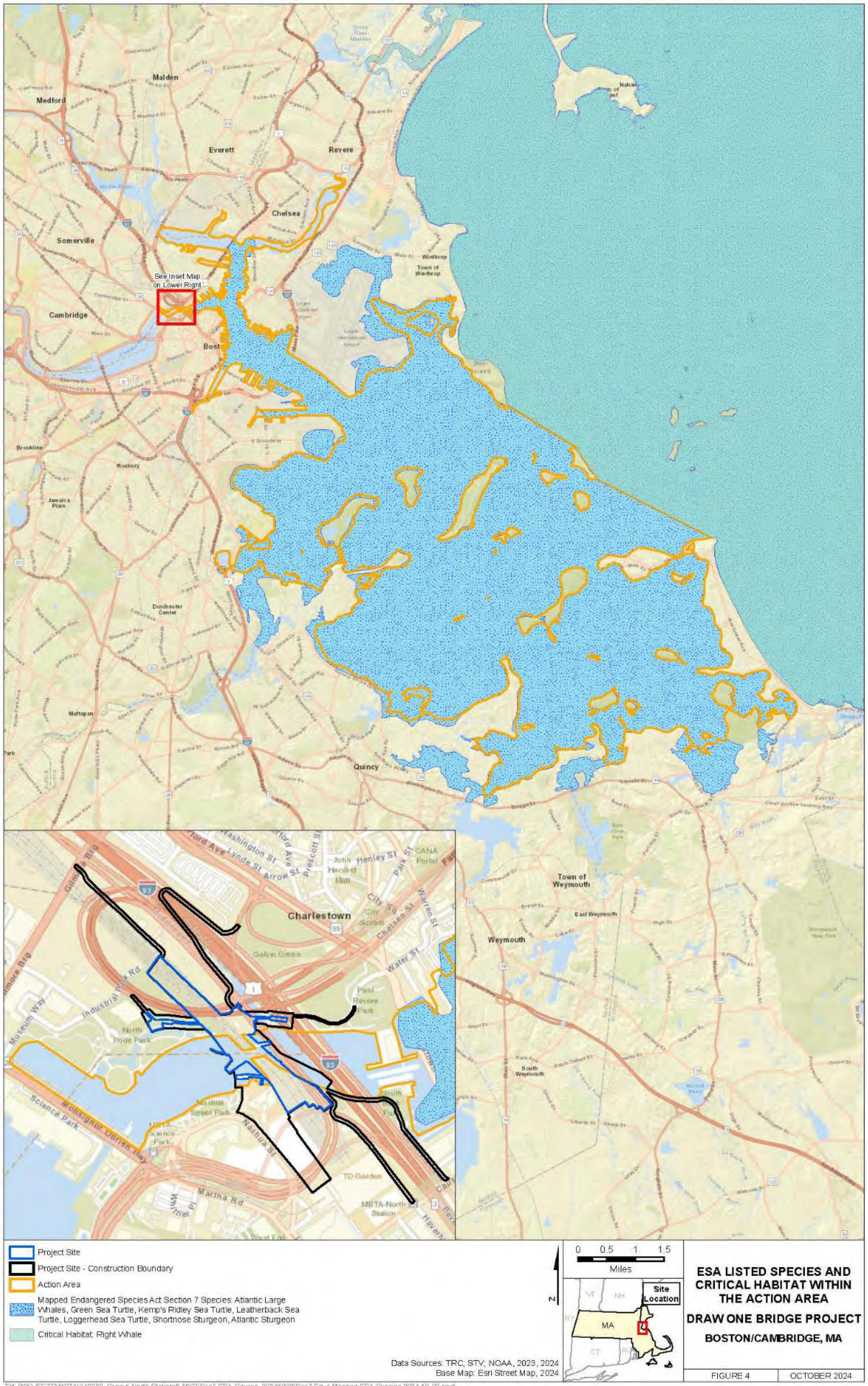

Malden
Medford
Everett
Revere
Chelsea
Somerville
Cambridge
See Inset Map on Lower Right
Quincy
Town of Weymouth
Weymouth
Charlestown
Project Site
Project Site - Construction Boundary
Action Area
Mapped Endangered Species Act Section 7 Species: Atlantic Large Whales, Green Sea Turtle, Kemp's Ridley Sea Turtle, Leatherback Sea Turtle, Loggerhead Sea Turtle, Shortnose Sturgeon, Atlantic Sturgeon
Critical Habitat: Right Whale
0 0.5 1 1.5
Miles
Site Location
Data Sources: TRC; STV; NOAA, 2023, 2024
Base Map: Esri Street Map, 2024
ESA LISTED SPECIES AND CRITICAL HABITAT WITHIN THE ACTION AREA
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 4
OCTOBER 2024

Table 8. ESA Listed Species, Status, Life History, Final Listing Rules, and Recovery Plan Information

Species	ESA Status [1]	Species Life Stages That May Be Present in the Action Area	Expected Behaviors	Expected Time of Year Species May Be Present Within the Action Area	ESA Listing Rule	Name and Date of New Recovery Plan	Notes/ References
Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)* (all 5 DPSs[2])	E[3] (Gulf of Maine [4]) T (4 others)	Subadults; Adults	Migrating; Foraging	Year round	77 FR[5] 5880 and 77 FR 5914	Recovery Plan Outline: NOAA Fisheries 2020	Expect to remain in the 50 meter depth contour (Hilton, Ericson, and Stein as cited in NOAA Fisheries, 2023c)
Shortnose sturgeon *(Acipenser brevirostrum)*	E	Adult	Migrating; Foraging	April through November	32 FR 4001	Shortnose sturgeon recovery team 1998	Coastal migrations may occur within the 50-meter depth contour (Zydlewski as cited in NOAA Fisheries, 2023c)
North Atlantic Right Whale (*Eubalaena glacialis)*	E	Juveniles; Adults	Overwintering	December through May	73 FR 12024	NOAA Fisheries 2005	(NHESP, 2019a)
Fin Whale (*Balaenoptera physalus*	E	None	None	None	35 FR 18319	NOAA Fisheries 2010	(CETAP as cited in NOAA Fisheries, 2023c)
Leatherback Sea Turtle *(Dermochelys coriacea)*	E	Juveniles; Adults	Migrating; foraging	June through September	35 FR 849	Leatherback/ Hawksbill Turtle Recovery Team 1992	(NHESP, 2019b)

Table 8. ESA Listed Species, Status, Life History, Final Listing Rules, and Recovery Plan Information

Species	ESA Status [1]	Species Life Stages That May Be Present in the Action Area	Expected Behaviors	Expected Time of Year Species May Be Present Within the Action Area	ESA Listing Rule	Name and Date of New Recovery Plan	Notes/ References
Loggerhead Sea Turtle; Northwest Atlantic DPS (*Caretta caretta)*	T	Juveniles; Adults	Migrating; foraging	June through November	76 FR 58868	NOAA Fisheries 2008	(CETAP as cited in NOAA Fisheries 2023c)
Kemp's Ridley Sea Turtle (*Lepidochelys kempii)*	E	Juveniles; Adults	Migrating; foraging	November and December	35 FR 18319	USFWS 2011	Juvenile turtles show up on southeastern coast of Cape Cod Bay cold-stunned during this time. (NHESP, 2019d)
Green Sea Turtle; North Atlantic DPS (*Chelonia mydas)*	T	Juveniles; Adults	Migrating; foraging	June through November	81 FR 20057	Loggerhead/ Green Turtle Recovery Team 1991	Juvenile turtles show up on southeastern coast of Cape Cod Bay cold-stunned during this time. They prefer water temperatures between 68 and 73 °Fahrenheit. (NHESP, 2019e)

[1] ESA Status = Endangered Species Act Status
[2] DPS = Distinct Population Segment
[3] E= Endangered
[4] GOM = Gulf of Maine
[5] FR = Federal Register
[6] T = Threatened

5.1 Fish

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*)

In 2012, Atlantic Sturgeon were listed as five distinct population segments (DPSs) under the ESA, of which the Gulf of Maine (GOM) DPS is listed as threatened (NOAA Fisheries, 2024a). It is unlikely, but possible, that Atlantic sturgeon from other DPSs (endangered New York Bight, Chesapeake Bay, Carolina, and South Atlantic) may be present given the proximity of the Project Site to the coast. Atlantic sturgeon are demersal, anadromous species found in rivers, estuaries, and coastal waters along the Atlantic coast of North America, between Florida and northern Maine. Atlantic sturgeon migrate from the marine environment to freshwater to spawn, typically in May and June in Massachusetts (NHESP, 2015a). Atlantic sturgeon are a slow-growing and late-maturing species that has been recorded to reach up to 16 feet in length, with a life span of up to 60 years in Canada but only 25 to 30 years in the southeastern United States (NOAA Fisheries, 2024a).

Both adult and subadult Atlantic sturgeon originating from any of the aforementioned DPSs could potentially migrate throughout the Action Area year-round. This species' subadults and adults could potentially be foraging up to the seaward side of the Charles River Dam and Locks in the Area Affected by Vessel Traffic (NOAA Fisheries, 2023b). During early life stages, this species usually remains in its natal rivers until age two, as the eggs, larvae, and juvenile Atlantic sturgeon are intolerant of saline waters. A three-foot-long juvenile Atlantic sturgeon was, however, observed in the Charles River in February 2012 (Boston Globe, February 20, 2012). Since spawning from the Charles River is not known to occur, no eggs, larvae, or juveniles are anticipated in the Action Area (NOAA Fisheries, 2024a).

Shortnose sturgeon (*Acipenser brevirostrum*)

On March 11, 1967, the Federal Register listed the shortnose sturgeon as threatened with extinction (32 FR 4001) (NOAA Fisheries, 2024b). Shortnose sturgeon, now listed as endangered under the ESA, are a slow-growing and late-maturing species that grow up to 4.5 feet in length and have typical life spans of up to 30 years. Shortnose sturgeon spend most of their lifespan in fresh water, but they do make brief trips into salt water for migratory or feeding purposes.

Shortnose sturgeon have been recorded in Provincetown as well as Ipswich Bay (Bigelow and Schroeder, 1953, and Jerome et al. 1968, as cited in Collette and Klein-MacPhee, 2002). Adult shortnose sturgeon will overwinter in rivers, so coastal migrations will happen roughly from April 1 to November 30. These migrations could occur along the 50-meter contour (Zydlewski et al. as cited in NOAA Fisheries 2022a).

Shortnose sturgeon migrate from marine waters to freshwater rivers to spawn (NOAA Fisheries, 2024b). The Charles River has an average salinity level of 0.82 PSU at the surface and 15.14 PSU at the bottom, indicating that an estuarine environment exists at the Project Site (MWRA, 2024). Shortnose sturgeon prefer to spawn in low-salinity waters (0.0 to 0.5 PSU), and the dam and locks would likely deter any fish from going further upriver.

Documented movement of shortnose sturgeon between the Connecticut River and the Merrimack, River and the capture of an individual in the Housatonic River, suggest that shortnose sturgeon may be present in nearshore coastal waters and rivers of southern New England. Although data indicate movement of the shortnose sturgeon between the Merrimack and Connecticut rivers, approximately 450 miles south of the Project Site, no occurrences of this species have recorded in the Charles River (NOAA Fisheries, 2024b) (NHESP, 2015b). Therefore, it is possible but unlikely that adult shortnose sturgeon would be found throughout the Action Area between April and November.

5.2 Whales

North Atlantic Right Whale (*Eubalaena glacialis*)

On March 6, 2008, NOAA Fisheries published a final rule to list the endangered Right whale (*Eubalaena* spp.) as two separate endangered species - the North Pacific right whale (*Eubalaena japonica*) and the North Atlantic right whale (*E. glacialis*) (NARW) (73 FR 12024).

NARW are large baleen whales with a large head (typically about 1/4 of the body length), large stocky bodies, primarily black coloration (although some have white patches on their bellies), and no dorsal fin. (NOAA Fisheries, 2024c). From December to March, there is a small concentration of NARW in Cape Cod Bay and the Great South Channel east of Nantucket Island, all south of the Project Site. During April and May, the concentration increases to feed on the large number of zooplankton present in the area. The majority of NARW in Massachusetts waters will move further offshore in the summer and fall (NHESP, 2019a), but NARW could be present year-round.

Based on data on the NOAA Fisheries Right Whale sighting “WhaleMap”, if a line is drawn between Nahant and Hull for the period between January 2010 and June 2024, there have been six NARW sightings shoreward of this line. It is in this shoreward area that project-related vessel transits would occur between the Charles River and home ports and/or staging areas in the Weymouth/Quincy or Boston/East Boston areas (Johnson et al, 2021).

NARW are not expected to be found in the Charles River due to the presence of the Charles River Dam and Locks, the small size of the river, the confined nature of the channel at the bridge location, and other factors. While unlikely, it is possible that transient individuals may enter the Boston Harbor portion of the Area Affected by Vessel Traffic during seasonal migrations, typically December through May. Generally, however, NARW are not considered resident within Boston Harbor since their planktonic feeding behavior is not suited to the ecosystem in these waters.

Fin Whale (*Balaenoptera physalus*)

On December 2, 1970, the fin whale was listed as endangered throughout its range (35 FR 18319). Currently there is no critical designated habitat specific to the fin whale. Fin whales can be found in social groups of two to seven whales. In the north Atlantic, they are often seen feeding in large groups that include humpback whales, minke whales, and Atlantic white-sided dolphins (NOAA Fisheries, 2024d). Fin whales are the second-largest species of whale and killer whales are their only non-human predator. The species can live 80 to 90 years (NOAA Fisheries, 2024d).

Fin whales are found in deep (650 to 820 feet) offshore waters in all major oceans, primarily in temperate to polar latitudes, and less commonly in the tropics. They occur year-round in a wide range of latitudes and longitudes, but the density of individuals in any one area changes seasonally. During the summer, fin whales feed on krill, small schooling fish (e.g., herring, capelin, and sand lance), and squid by lunging into schools of prey with their mouths open, using their 50 to 100 accordion-like throat pleats to gulp large amounts of food and water. They then filter the food particles from the water using the 260 to 480 "baleen" plates on each side of the mouth. During the winter, this species will fast as they travel to warmer waters (NOAA Fisheries, 2024d). Massachusetts waters are an important feeding ground for fin whales (NHESP, 2015c); however, they are not considered a resident species within the Boston Harbor since their planktonic feeding behavior is not suited to the harbor's waters, so any species found are likely transient due to their seasonal migration pattern.

In waters deeper than 12 miles (20 km) east of Cape Cod in the Great South Channel, and in deeper waters of Boston and Cape Ann, this species is most commonly observed from April to November, but fin whales have been found throughout the year in Massachusetts waters (NHESP, 2015c). Since this species favors deeper offshore waters, its presence is not expected in the Area Affected by Vessel Traffic, which will generally remain within several miles of the Massachusetts coast (NOAA Fisheries, 2024d). Water depths in the vessel transit region, between possible home ports and/or staging areas in Weymouth/Quincy or Boston/East Boston and the mouth of the Charles River, do not exceed 60 feet (18 meters) and would generally be avoided by fin whales, which prefer deeper waters typically found more than 12 miles of the coastline. In addition, the presence of the Charles River Dam and Locks, the small size of the river, the confined nature of the channel at the bridge location, the lack of planktonic feeding foraging habitat, and other factors essentially eliminate the likelihood that fin whales would be present in other portions of the Action Area. Therefore, fin whales would not be present in the Action Area and are not evaluated further in this document.

5.3 Sea Turtles

Leatherback Turtle (*Dermochelys coriacea*)

On June 2, 1970, the leatherback turtle was listed under the Endangered Species Conservation Act, the predecessor to the ESA (35 FR 8491). When the ESA was passed in 1973, leatherbacks were listed as endangered throughout their range.

Leatherback turtles are the largest turtles, reaching up to 750 to 1,000 pounds (340 to 454 kilograms) and five to six feet (1.5 to 1.8 meters) in length. Average life expectancy ranges between 45 to 50 years and potentially longer. Leatherbacks mate in tropical waters adjacent to nesting beaches. In United States waters, leatherbacks tend to nest in Florida, Puerto Rico, and the Virgin Islands. The nesting season in the United States is from March to July (NOAA Fisheries, 2024e). Nesting does not occur along the northern United States Atlantic coastline; therefore, egg-laying females, eggs, and hatchlings will not be present in the Action Area.

During the winter, females will travel south to nest and then migrate north to temperate waters throughout the summer. From June through September, male and female leatherback turtles will move into shallow coastal waters to feed on jellyfish. Each year, approximately 20 turtles are spotted along the Massachusetts coast, especially in southern Cape Cod Bay near the Cape Cod canal (NHESP, 2019b). The leatherback turtle can tolerate a range of temperatures, including the colder temperatures of the Action Area during the fall and winter (NHESP, 2019b).

The presence of the Charles River Dam and Locks, the small size of the river, the confined nature of the channel at the bridge location, the lack of pelagic habitats, and other factors essentially eliminate the likelihood that the leatherback turtle would be present upstream of the dam and locks. However, adults and possibly juveniles may occur in the Boston Harbor portion of the Area Affected by Vessel Traffic between June and September, although the potential is considered low.

Loggerhead Turtle (*Caretta caretta*)

In September 2011, NOAA Fisheries and USFWS listed nine DPSs of loggerhead sea turtles under the ESA (76 FR 58868). The Northeast Atlantic Ocean DPS is listed as endangered throughout its range.

This species is known for their large, heart-shaped heads, which support powerful jaws and enable them to feed on hard-shelled prey such as whelk and conch, as well as a reddish-brown carapace in adults and sub-adults. In the Atlantic, their range extends from Newfoundland to as far south as Argentina. Migration routes from foraging habitats to nesting beaches (and vice versa) are restricted to the continental shelf for some of the population, while some of the population use other routes involving crossing oceanic waters to and from the Bahamas, Cuba, and the Yucatán Peninsula. The predominant foraging areas for western North Atlantic adult loggerheads are found throughout the relatively shallow continental shelf waters of the United States, Bahamas, Cuba, and the Yucatán Peninsula, Mexico (NOAA Fisheries, 2024f).

Loggerhead turtle juveniles and adults tend to reside in the open ocean, with most of the population staying south of Cape Cod and only small numbers seasonally moving north of Cape Cod to waters between 68° and 73° Fahrenheit (NHESP, 2019c). If loggerhead turtles were to occur in the Action Area, such occurrences would be most likely during the June through November period (CETAP as cited in NOAA Fisheries, 2023b). Adults move to coastal waters and feed on benthic prey, commonly crabs. Nesting is not expected along the northern United States Atlantic coastline; therefore, egg-laying females, eggs, and hatchlings will not be present in the Action Area.

While the presence of the loggerhead turtle is not expected within the Charles River due to the lack of suitable habitat upstream of the dam and locks, adults and juveniles may occur in the Boston Harbor portion of the Area Affected by Vessel Traffic between June and November.

Kemp's Ridley Turtle (*Lepidochelys kempii*)

On December 2, 1970, NOAA Fisheries published a final rule listing the Kemp's ridley turtle (*Lepidochelys kempii*) as endangered (35 FR 18319) (NOAA Fisheries, 2024g). In addition, on February 17, 2010, NOAA Fisheries and USFWS were jointly petitioned to designate critical habitat for Kemp's ridley sea turtles on nesting beaches along the Texas coast and in marine habitats in the Gulf of Mexico and Atlantic Ocean (NOAA Fisheries, 2024g; Wild Earth Guardians, 2010). As of June 29, 2021, NOAA Fisheries issued a Notice of Initiation for the next five-year review of the plan published in July of 2015 (86 FR 34228, 2021).

Kemp's ridley turtles are considered the smallest marine turtle in the world, with adults reaching weights of approximately 70 to 100 pounds (32 to 45 kilograms) and lengths of approximately 24 inches (0.6 meter), with a grayish-green, nearly circular, carapace with a pale yellowish plastron (NOAA Fisheries, 2024g). Juveniles tend to reside in the open ocean, often in areas of floating sargassum seaweed, utilizing the sargassum as an area of refuge, rest, and/or food. This developmental drifting period is assumed to last about two years, or until the turtle reaches a carapace length of about eight inches (0.2 meter) (NWF, 2022). Adults move to coastal waters, primarily occupying nearshore coastal areas that typically contain muddy or sandy bottoms where prey can be found. Such areas are often found in estuaries, particularly in or near shallow seagrass habitats. Kemp's ridley turtles rarely venture into waters deeper than 160 feet (18 meters) (NWF, 2022). They feed on benthic prey and occasionally jellyfish and sea plants (NHESP, 2019d). They prefer crabs but will also feed on discarded by-catch (NOAA Fisheries, 2024g). The Action Area contains the turtle's preferred habitat of a muddy and sandy bottom.

Kemp's ridleys are distributed throughout the Gulf of Mexico and United States Atlantic seaboard from Florida to New England, with rare occurrences north of Cape Cod (NOAA Fisheries, 2024g). As the smallest sea turtle, they do not tolerate cold well and therefore are rarely found in colder waters. Cold-stunned juveniles have been recorded washed ashore during November and December. Adults are very rarely spotted Cape Cod Bay (NHESP, 2019d) during the summer.

Nesting does not occur along the northern United States Atlantic coastline and therefore egg-laying females, eggs, and hatchlings will not occur in the Action Area. While the presence of the Kemp's ridley turtle is not expected in the Charles River due to the lack of suitable habitat upstream of the dam and locks, adults and juveniles may occur in the Boston Harbor portion of the Area Affected by Vessel Traffic in November and December.

Green Sea Turtle (*Chelonia mydas*)

On July 28, 1978, NOAA Fisheries and USFWS listed the green sea turtle (*Chelonia mydas*) as threatened under the ESA (81 FR 20057). On April 6, 2016, NOAA Fisheries and USFWS determined that three DPSs of green sea turtle are endangered species and eight DPSs of green sea turtle are threatened species, which superseded the 1978 ruling (81 FR 20058). The north Atlantic DPS remains listed as threatened under the ESA (NOAA Fisheries, 2024h).

Green sea turtles are the largest of all the hard-shelled sea turtles but have a comparatively small head. Adult green sea turtles reach weights of 250 to 400 pounds (113 to 181 kilograms) and reach three to four feet (1.2 meters) in length. Adult green sea turtles are unique among sea turtles in that they eat primarily plants, feeding primarily on seagrasses and algae. This diet is thought to give them greenish-colored fat, from which they take their name. After emerging from the nest, hatchlings swim to offshore areas, where they are believed to live for several years, feeding close to the surface on a variety of pelagic plants and occasionally animals. Once the juveniles reach a certain age/size range, they leave the pelagic habitat and travel to nearshore foraging grounds (NOAA Fisheries, 2024h).

Green sea turtles in Massachusetts Bay, including Boston Harbor, might occur in shallow locations with eelgrass beds, a major food source in June through November. However, over the decades, Boston Harbor has lost many of its historic eelgrass beds, so this species would tend to occur more frequently in other locations with more extensive eelgrass beds within Massachusetts Bay or Cape Cod Bay. According to MassDEP's Eelgrass viewer, the closest eelgrass beds are north and east of Boston Logan Airport and therefore conditions in the Action Area do not include the green sea turtle's preferred habitat (MassDEP, 2023). This species, especially at the juvenile stage, will experience cold shock if individuals stay north of Cape Cod during late fall and winter months, so they would not be expected in the Action Area during the months of December through May (NHESP, 2019e). It is unlikely that juveniles would remain north of Cape Cod during the late fall and winter, but rare occurrences of juveniles found washed ashore during December and January along the southeastern beaches of Cape Cod have been recorded (NHESP, 2019e).

Although nesting occurs in over 80 countries throughout the year, peak nesting throughout the southeastern United States occurs in June and July. No nesting occurs along the northern United States Atlantic coastline; therefore, egg-laying females, eggs, and hatchlings would not occur within the Action Area.

The presence of green sea turtles is not expected within the Charles River due to the presence of the locks and dam and the lack of eelgrass. From June to November, adult and juvenile green sea turtles may occur in the Boston Harbor portion of the Area Affected by Vessel Traffic.

6.0 EFFECTS ANALYSIS

In accordance with NOAA Fisheries' Section 7: Consultation Technical Guidance, TRC analyzed the proposed action (Proposed Project) and associated impacts that may occur during construction activities in the Action Area in relation to each of the listed species described in Section 6.0, above (NOAA Fisheries, 2024i).

Project activities with the potential to affect ESA-listed species with the potential to occur in the Action Area, including both sturgeon species, are presented and evaluated below. The three temporary stressors associated with the Proposed Project include:

1. Minor temporary increased turbidity related to the small amount of dredging and removal of the underwater cable. Installation and removal of pipe piles may represent an additional minor source of turbidity.
2. Temporary construction-related hydroacoustic noise associated with pile driving activities. In the analysis of potential effects, the assumed pile driving characteristics included:
    a. Approximately three to five piles will be driven per day via impact hammer. It was estimated that pile installation would result in 6,000 strikes per day (2,000 strikes per pile). It is expected that an impact hammer will be utilized for the installation of the trestle piles, the temporary trestle piles, temporary sheet piles for cofferdams (if necessary), king piles for the abutments, the fender piles, and the MGH dock and ramp replacement.
    b. Approximately three to five piles will be removed per day via vibratory hammer. It was estimated that pile removal would take 30 minutes per pile. Vibratory hammer will be utilized for the removal of the existing trestle piles, fender piles, sheet piles from the cofferdams (if necessary), and removal of the MGH dock and ramp (approximately 15 days). Additionally, vibratory hammer will be utilized for the removal of the temporary trestle piles after construction has been completed (approximately 25 days for the temporary trestle pile removal). The temporary trestle piles will be in place throughout construction for approximately six years on the west side and four years for the east side.
3. Potential vessel strikes during vessel movement to and from home ports and/or staging areas.

6.1 Turbidity

NARW, leatherback turtles, loggerhead turtles, Kemp's Ridley turtles, and green sea turtles are not expected within the Area Affected by Turbidity. Therefore, the Proposed Project will not result in turbidity-related effects to these species. This discussion focuses on potential effects to Atlantic and shortnose sturgeons, which could occur in the Area Affected by Turbidity.

Project-related turbidity effects will occur from major silt-producing activities such as dredging and minor silt-producing activities such as driving piles (impact or vibratory), installing micropiles, driving sheet piles (impact or vibratory), and installing drilled shaft casing. Multiple periods of dredging are planned to be spread out over several years of construction; therefore, no single dredging event is likely to generate a substantial amount of sediment due to the size of the piles being driven. A Project-specific NPDES SWPPP and a SPCC Plan will describe BMPs to be implemented during construction, such as sediment reduction and spill cleanup measures. In addition, TOY restrictions will be implemented to avoid dredging and major silt-producing activities during peak periods of fish movement in spring and fall, and silt curtains will be used outside these periods.

Pile driving has the potential to generate a very small amount of localized turbidity for a short period of time during pipe pile installation and removal. The riverbed in this area consists of soft bottom sediments with an absence of macroalgae or SAV. Any associated turbidity would be short-lived and settle out rapidly. Silt curtains used during minor silt producing activities will be written into contract specifications and the removal of the existing caissons (done within cofferdams in order to reduce TSS) is an option for the contractor.

Pile installation will disturb bottom sediments and may cause a temporary increase in suspended sediment in the Area Affected by Turbidity (NOAA Fisheries, 2024j). Using information collected from a project in the Hudson River, pile driving activities are estimated to produce TSS concentrations of approximately 5.0 to 10.0 mg/L above background levels within approximately 300 feet (91 meters) of the pile being driven (FHWA, 2012). Using a grapple to extract piles allows sediment attached to the pile to move vertically through the water column until gravitational forces cause it to slough off under its own weight. The small resulting sediment plume is expected to settle out of the water column within a few hours. Studies of the effects of turbid water on fish suggest that concentrations of suspended sediment can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). The TSS levels expected for pile driving or removal (5.0 to 10.0 mg/L) are below those shown to have adverse effects on fish (typically up to 1,000.0 mg/L; see summary of scientific literature in Burton 1993; Wilber and Clarke 2001) and benthic communities (390.0 mg/L [EPA, 1986]).

In other recent projects along the coast of Massachusetts, NOAA Fisheries and DMF have concurred that pile driving and removal of temporary piles produces negligible amounts of suspended sediments. Compared to other sources of suspended sediments in the shallow waters of the Action Area, such as wind-driven waves, boat wakes, storms, and stormwater runoff, the effects from the Project are too small to be meaningfully measured, detected, or evaluated.

Turbidity affects sturgeon species by stressing individuals exposed to dissolved oxygen levels lower than 1,000 mg/L, which may change typical behavior (NOAA Fisheries, 2024j). Although the TOY restriction period (February 15-July 15 and September 1-November 15) would prevent turbidity-related effects to the sturgeon for part of the year, both species could also be present outside the restriction period. Effects to individuals, however, are unlikely based on the low potential for both species to be found in the Charles River and the insignificant increase in turbidity expected from the silt-producing activities.

Based on the information above, habitat changes from turbidity as a result of Project activities will be insignificant and the behavior changes of sturgeon will be too small to be meaningfully measured or detected, or evaluated; therefore any potential effects would be insignificant.

6.2 Hydroacoustics

NARW, leatherback turtles, loggerhead turtles, Kemp's Ridley turtles, and green sea turtles are not expected within the Area Affected by Underwater Noise. Therefore, the Proposed Project will not result in noise-related effects to these species. This discussion focuses on potential effects to Atlantic and shortnose sturgeons, which could occur in the Area Affected by Underwater Noise.

Pile-driving activities required for the Project construction have the potential to create hydroacoustic noise in the Area Affected by Underwater Noise. Pile-driving activities may generate intense underwater sound pressure waves that can adversely affect nearby marine organisms. The effects of pile driving can vary greatly depending on a species' response to sound; intense sound pressure waves can change fish behavior, or injure/kill fish through rupturing swim bladders. NOAA Fisheries' *Ocean Noise Strategy Roadmap* (NOAA Fisheries, 2016) document provides the following information:

> "Studies on fish have focused more on characterizing the physical effects such as hearing impairment, barotrauma, and death, but behavioral effects such as changes in direction, speed, or schooling patterns as well as changes in stress hormones have been documented." (NOAA Fisheries, 2016)

Pile driving is anticipated to occur only during daylight hours, five days a week and eight hours per day. This will leave 16 hours of a 24-hour period when species that happen to be in the area can use and travel within and through the Area Affected by Underwater Noise without potentially injurious noise exposure levels.

The NOAA Fisheries Tool was used to analyze the potential impacts to fish species exposed to elevated underwater noise levels caused by pile-driving activities. The NOAA Fisheries Tool uses proxy projects to estimate the peak sound exposure level (SEL), single-strike sound exposure level (SEL_{ss}), and route mean square-sound pressure level (RMS) for a pile driving scenario that is similar to the conditions for the Project. While the NOAA Fisheries Tool shows that the extent of hydroacoustic noise associated with pile driving could go far beyond the Charles River Dam and Locks, the locks, bends in the Charles River, and the geomorphology of the surrounding landforms would significantly attenuate the hydroacoustic noise, limiting potential effects to the upstream portion of the river, above the dam and locks.

Table 9 indicates the calculated Project-specific distance isopleths, by weight, where physical injury and/or behavioral impacts for ESA listed fish may occur.

Table 9. Range to Effect Isopleths for Fish

Scenario Number	Scenario	Physical Injury for Fish ≥ 2 grams		Behavior
		SEL_{cum}* (feet)	Peak* (feet)	RMS* (feet)
1	Removal of the existing 15-inch timber trestle and fender piles via vibratory hammer	-	-	207
2	Removal of the existing 24-inch steel or fiberglass piles for the MGH dock and ramp via vibratory hammer	-	-	52
3	Installation of 30-inch steel trestle and temporary trestle piles via impact hammer	2,070	61	15,228
4	Installation of 16-inch solid fiberglass plastic fender piles via impact hammer	207	0	52
5	Replacement of the 24-inch steel or fiberglass piles for the MGH dock and ramp via impact hammer	2,070	61	15,228
6	Removal of the 30-inch steel temporary trestle piles via vibratory hammer	-	-	131
7	Installation of 28-inch pile AZ sheet pile for king pile abutment via impact hammer	273	28	15,228
8	Installation of 30-inch steel pile for king pile abutment via impact hammer	2,070	61	15,228
9	Installation of 24-inch AZ sheet pile for cofferdam, via impact hammer	2,823	28	15,228
10	Removal of 24-inch AZ sheet pile for cofferdam via vibratory hammer	-	-	241

*Based only on measurement of distance from the pile and does not account for how the land, bends in the river, islands, and other structures, such as the Charles River Dam and Locks that may alter the transmission of sound during pile driving activities.

Exposure to underwater noise levels of 206 dB peak and 187 dB SELcum can result in impacts to sturgeon such as avoidance or disruption of foraging activities (NOAA Fisheries, 2024k). In addition to the peak exposure criteria that relate to the energy received from a single pile strike, the potential for injury exists for multiple exposures to noise over a period of time; this is accounted for by the SELcum. The SELcum is not instantaneous maximum noise levels but represents a measure of the accumulated energy over a specific period of time (e.g., the period of time it takes to install a pile) (NOAA Fisheries, 2024l).

In order to reduce impacts to sturgeon species, a "soft start" will be implemented for pile driving, which is expected to direct sturgeon and other species away from the area before full-energy pile driving occurs. These species will not remain in or enter the ensonified area once full pile driving starts because they would avoid the area with behavioral sound level effects, which is much larger than the area with levels of 206 dB. Given this behavioral avoidance, sturgeon will not remain in the ensonified area long enough to accumulate enough sound energy to be injured. Further, pile driving is limited to eight hours per day, which leaves 16 hours within a 24-hour period for species to use and travel through the Area Affected by Underwater Noise without pile-driving noise.

Vessel activity required for Project construction also has the potential to create hydroacoustic noise in the Area Affected by Underwater Noise. As an example of baseline vessel activity and underwater noise, the Boston to Hingham ferry passes through the Draw One Bridge area 36 times a day, and the nearby Boston-Hull-Hingham ferry makes 39 transits a day, during weekdays (MBTA, 2024). Other commercial vessels (e.g., container ships, cruise ships, fishing vessels) and recreational vessels operating out of the many marinas within the greater Boston Harbor area add considerably more vessel activity and noise than Project related activities will. Overall, when added to baseline conditions, the underwater noise associated with construction vessels in the Area Affected by Underwater Noise would be insignificant.

Given the low probability of sturgeon occurrence in the Area Affected by Underwater Noise, the small area within the Charles River that would experience injurious noise levels, the proposed noise-reducing mitigation measures, and the insignificant increase over baseline, the potential for behavioral or injurious noise effects on Atlantic and shortnose sturgeons as a result of Project activities is unlikely.

6.3 Vessel Transit

While the location of potential staging areas and/or home ports that may be used to support the Proposed Project are not known at this time, it is assumed that there will be construction vessel transits between the East Boston or Quincy/Weymouth waterfronts and the Project Site and that barges moved by tugs, supply vessels, and work boats will operate from one or more of these locations and pass through the Charles River Dam and Locks into the Project Site. The Area Affected by Vessel Traffic is shown on **Figure 1**. In addition, it is anticipated that construction vessels will be sourced locally within Boston Harbor due to the numerous qualified contractors in the area.

The Atlantic and shortnose sturgeons, NARW, and four sea turtles could be passing through the Action Area at various times of year and could be struck by vessels used for construction if they are at or near the surface within the transit pathway. Most of the species are unlikely to occur so close to the surface, so individuals would rarely be near the vessels. Vessel collisions are also considered unlikely because vessels transiting to and from home ports and/or staging areas will primarily be barges, either towed or self-propelled, which will be traveling at speeds of less than 10 knots. This allows time for individuals to move away from the vessel. The use of vessels and other Project-related activities would not impede movement of listed species through the Action Area, although slight adjustments to movement may be expected as the species avoid the work areas.

In addition, the use of vessels during construction will increase the risk of a vessel strike to such a small degree that the effect of the action (i.e., any increase in the risk of a strike attributable to the Proposed Project) cannot be meaningfully measured or detected. Given the large number of existing vessel movements in the Action Area, likely in excess of several thousand per year, the comparatively small number of additional Project-related vessel transits above this baseline represents an insignificant increase in potential impacts to listed species from the risk of collision. The movement of Project-related vessels will also be intermittent, temporary, and restricted to a small portion of the overall Action Area on any given day. As a result, the risk of a vessel strike in the Action Area to both sturgeon species, the NARW, the leatherback turtle, the loggerhead turtle, the Kemp's ridley turtle, and the green sea turtle is unlikely.

6.4 Habitat Modification

Habitat modification associated with the Proposed Project would be limited to the Project Site, where Atlantic and shortnose sturgeons have potential to occur. Habitat for other listed species would not be affected. Demolition activities will temporarily disturb approximately 0.5 acre (24,000 square feet) of the riverbed, and other construction activities will temporarily disturb approximately 0.1 acre (5,300 square feet) and permanently modify approximately 0.3 acre (11,400 square feet) of the riverbed.

The subsurface conditions within the Project Site consist of historically placed fill overlying organic silt tidal estuary deposits often intermixed with fill material, overlying silty sand, marine clay (Boston Blue Clay), discontinuous strata of glaciomarine deposits and/or glacial till, weathered argillite, and argillite bedrock. The substrates on site consist of approximately 70 percent silt/mud, 20 percent sand, and ten percent pebble/gravel/cobble. The organic silt stratum primarily comprises very soft to hard, dark gray-to-black organic silt with up to ten percent shells. Because of the fill dumped atop this layer within the historic mud flats adjacent to the Charles River, the stratum is intermixed with up to 20 percent fine-to-coarse sand and debris including brick, wood and cinders, and up to ten percent gravel (Pizzi, 2020). Because the dredging activities will occur within a silt curtain, sand and gravels will largely remain in place, with mainly the fines (including a portion of the fine sand) having the potential to remain in suspension and be transported beyond the silt curtain.

Project-related dredging, pile driving/removal, and cable removal activities will disturb sediment infauna, removing suitable cover, and may result in the loss of submerged aquatic vegetation, benthic infauna, and sedentary epifauna. Dredging and excavating will cause some mixing of these sediment types, but in the end will result in similar heterogeneity as no new soil would be brought in and dredged soil would be removed. When dredging activities are completed, the excavated sediment will be loaded onto containment barges for proper disposal, most likely at a contained landfill suitable for receipt of contaminated soils.

The removal of existing bridge elements, including timber piles and caissons from the existing Draw One Bridge and the remnants of its previously demolished elements, will offset the construction of replacement bridge elements, drilled shafts and piles, such that the amount of habitat loss would be negligible within the context of available Charles River habitat. Given the stressed and likely depauperate benthic community currently in the vicinity of the bridge, these impacts would not modify quality foraging or breeding habitat for sturgeon.

The Project Site is in a low-quality migratory pathway due to the Charles River Dam Locks located between the freshwater and marine habitats that these species use during different life phases. While unlikely, habitat disturbance attributable to construction activities including dredging, pile driving/removal, and cable removal could directly impact the benthic community by reducing prey species (e.g., crustaceans, snails, small fish and macroinvertebrates) until the bottom habitat is recolonized. This will result in a temporary loss of bottom habitat for adult and juvenile sturgeon; however, benthic organisms removed by dredging activities in shallow mud and sand bottom areas typically have rapid recolonization rates through reproductive mechanisms, thereby minimizing the loss of benthic prey. In addition, abundant similar habitat exists throughout the Charles River and provides comparable feeding opportunities. The Proposed Project would not modify habitat in a way that would prevent the sturgeon and other aquatic species from using the river or moving through area, especially with TOY restrictions in place that ensure fish passage is maintained during spring and fall migrations.

Given the negligible loss of habitat and temporary nature of most habitat impacts, effects on sturgeon and their habitat would be insignificant.

7.0 EFFECTS DETERMINATION FOR ESA LISTED SPECIES

The determination of the Proposed Project's potential effects on ESA-listed species with potential occurrence in the Action Area was undertaken by evaluating the stressors associated with construction activities when added to existing or baseline conditions. Once a potential effect was identified, it was then assessed to determine the nature of the effect and to characterize the effect in terms of the categories specified in ESA implementing regulations. Effects can be insignificant in that they are so small they cannot be meaningfully measured, detected, or evaluated; extremely unlikely to occur; or wholly beneficial. The results of this assessment are summarized below in **Table 10**.

Table 10. Effects Determination Summary Table for ESA Listed Species

Species	Potential for Occurrence	Effects Determination
Atlantic Sturgeon	Extremely unlikely to occur	May affect, but not likely to adversely affect.
Shortnose Sturgeon	Extremely unlikely to occur	May affect, but not likely to adversely affect.
North Atlantic Right Whale	Extremely unlikely to occur	May affect, but not likely to adversely affect.
Fin Whale	No potential to occur	No effect.
Leatherback Turtle	Extremely unlikely to occur	May affect, but not likely to adversely affect.
Loggerhead Turtle	Extremely unlikely to occur	May affect, but not likely to adversely affect.
Kemps Ridley Turtle	Extremely unlikely to occur	May affect, but not likely to adversely affect.
Green Turtle	Extremely unlikely to occur	May affect, but not likely to adversely affect.

Based on the analysis presented above, the Proposed Project may affect, but is not likely to adversely affect, seven of the eight listed species considered in this document. The Proposed Project will have no effect on the fin whale because it would not occur in the Action Area. Supporting rationale for the effects includes the following:

- Only the Atlantic and shortnose sturgeons have potential to occur throughout the Action Area, and the potential for occurrence is unlikely due to the generally low quality of the aquatic habitat. The NARW and four sea turtles would not occur above the Charles River Dam and Locks and are unlikely to occur in the Boston Harbor or downstream areas, although transient individuals could be present.
- The quality of aquatic habitat in the Charles River is not suitable for breeding activities and is marginally suitable for foraging. The sturgeons could use the river for migration or movement and potentially foraging, but would not breed or lay eggs in the river.
- Potential effects from the Proposed Project relate to increased turbidity during in-water construction activities; noise generated by pile driving and other construction activities;

vessel strikes in the Boston Harbor and upstream into the river; and habitat modification from dredging, demolition activities, and installation of new bridge components in the river. The multi-year schedule for construction would spread out some of the effects, and various conservation measures, such as TOY restrictions and sediment control, would minimize or avoid some effects. Overall, these effects would be insignificant and discountable with little potential to adversely affect the listed species that could be found in the Action Area.

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Appendix A: Interagency Consultation Meeting Minutes

USACE Interagency Consultation Meeting #1
Meeting Minutes

Meeting Date:	May 7, 2020
Client:	MBTA
Project Name:	Draw 1 North Station Bridge Replacement
Designer:	STV Incorporated
Meeting Place:	Virtual
Prepared by:	Colin Duncan (CD) and Sam Moffett (SM), TRC
Attendees:	Amelia Croteau (AC), Boston ConCom Nick Moreno (NM), Boston ConCom Jennifer Letourneau (JL), Cambridge ConCom Eric Papetti (EP), FTA Leah Sirmin (LS), FTA Kristin Wood (KW), FTA Michelle Muhlanger (MM), FRA Alan Anachecka-Naseman (A A-N), ACOE Ed Reiner (ER), EPA Mike Johnson (MJ), NOAA fisheries Jeff Stieb (JS), USCG Sean Casey (SC), DCR Rob Lowell (RL), DCR Bill Gode (BG), DCR Daniel Padien (DP), DEP Chapter 91 Phil DiPietro (PD), DEP Tay Evans (TE), DMF Holly Palmgren (HP), MBTA Karl Eckstrom (KE), MBTA Kris Kretch (KK), MBTA Mark Ennis (ME), STV Tamia Burkett (TB), STV Diane Stallings (DS), TRC

Introduction – HP and SM

- *MBTA Environmental informed the group that the project has been recently federalized and the Design Team will be working with FTA on MEPA. MBTA also informed the team that there have been preliminary meetings with historic agencies as well to introduce the project.*

Discussion Items/Topics – ME presented project slides to group

- **Project Overview**
  - *Overview using presentation provided by STV Design Team ME & SM*
  - Continuity of Rail Operations throughout Construction

- Type Study – June 2020
  - *This document will provide a recommendation on the best structure type & recommend best configuration of tracks that provides a long-term solution for MBTA ridership in & out of North Station*
- **Bridge Components and Type Study**
  - Spans
  - North and South Trestles
  - Control Tower
  - Rail System/North Station Platforms
  - Channel width change
  - Pedestrian Bridge, *DCR to weigh in*
  - Stormwater
  - Climate Resilience
- **Project Location and Jurisdictional Resource Areas**
  - Charles River and Millers River
  - Filled/Flowed Tidelands
  - Floodplain
  - Historical Structures
- **Likely Permit/Review Programs –** Presented by Colin Duncan, TRC
  - FTA – NEPA – CoA TBD
    - Section 106 NHPA
  - USACE – Section 404/10/14 (no 408)
    - Consultation: EPA, NOAA NMSF, FWS, DMF, DFW NHESP
    - BUAR
  - US Coast Guard – Navigation Impact Report and Preliminary Navigation Determination
    - *Bridge Permit TBD*
    - *Design team informed agencies that DCR has primary control at the project site location in collaboration with the Coast Guard*
    - *Navigation impact report produced by the Design Team will lead to preliminary navigation determination*
      - *USCG confirmed that they will lean on DCRs input for changes to vertical and horizontal clearance, including closed vertical clearance*
  - DCR – Project Consultation
  - MEPA – ENF
  - MassDEP – Chapter 91 License Modification
  - MassDEP – Section 401 Water Quality Certification
  - Boston and Cambridge Conservation Commissions – MWPA NOIs
  - MWRA - 8(m)
  - TBD: MA CZM CD; Others
- **Project Schedule**
- **Permitting Data Needs**
- **Permitting Timeline**
  - Individual Agency Pre-Application Consultations
  - Application Filings

Future Agency Meetings/Consultations

The next meetings will be by either permit or topic area. Might need another full agency meeting in the future.

Other Issues

- *If any construction in floodplain/way – it was suggested to the Design Team to review Section 60.3 of the National Insurance Program Regulations*

Q&A

BG – Is sidewalk on downstream side of project?
ME replied the depiction on the slide is an old. Discussions have advanced and walkways along the trestle are no longer planned.

Tower A still in place?
ME – Yes, and demo might be first step in the project.
SM, conclusion that there is not a track configuration that will allow tower A to be retained, but STV cannot be said with certainty.
ME, tower A structure and condition is more relevant.
KE also said current ops being done in temporary structure. Tower A mostly houses old equipment at this point and building had essentially been abandoned

PD –Are we in flood way of Charles River?
CD – We believe so

PD - Any dredging?
CD, yes in terms of removing old timber and associated with drilling

A A-N – Don't we also need USCG input?
SM, yes and Coast Guard is present at this meeting
Above Charles river DAM DCR is primary moderator with some USCG. Need Navigational Impact Study report for this

JS – yes report will lead to preliminary nav determination and horizontal and vertical clearances. In mid permit stage a CG permit will be required

AC – MEPA process in the future. Questions regarding floodplain, is Tower A only building to be removed?
SM – Tower A only Building but south trestle and bridge spans will also be removed and replaced. North Trestle will be altered. Will require disturbance of river bed.

AC- Are buildings considered historic?

SM - We are in active discussions currently to decide on trajectory for an MOA to allow this to proceed.

AC – Fill in floodway urge Section 60.3 regulations review.

SM Physical constraints make grading options difficult to revise. Not much option to change heights, etc.

DP from DEP waterways – Slide indicate Chapter 91 license mod. Are we going to ask for a mod or new license?

SM – not sure yet, dependent on how design evolves. Idea or MBTA is to seek mod of existing license. We think this will be suitable for Chapter 91 licensing. Waterways is ready to assist with this project and MBTA. Mod will be dependent on what alternative is selected. Dan confident we will get to a license.

A A-N needs to leave meeting – we are on right track and need to look at alternatives He is confident that project will have least amount of environmental impacts. Is he or FTA Lead applicant?

HP – thinking to federalize, FTA will be lead agency for this.

FTA – good presentation – can team talk about track work on North side?

ME – challenge to project tracks from the west and North come into North Station, need to access the BET for storage and maintenance. Tracks cross a lot to the north and looking at optimal configuration of track

FTA - Is there the potential for track and switch replacement?

ME- 90% of track work will happen will be within MBTA ROW in that area

FTA – how will to the north affect service north of project area? There could be interception of future projects to the north. Do we know plans of other projects?

ME- we do know that NH RR there is a design project to replace that bridge future expansion for areas is under discussion with RR ops

KE. – MBTA is revamping signal system from analog to programable, this will be done before and is in place before Draw 1 project is design. Part of phase project.

SM – Any fisheries?

MJ to everyone:

I have another call at 11, so need to drop off. But wanted to mention that the River is important for diadromous fish (river herring, shad, rainbow smelt, American eel) migratory and spawning. A winter-spring TOY restriction will likely be necessary, and potentially a fall restriction, as well. Also, interested in seeing how projected sea level rise is being addressed, especially the vertical clearance from the river for new bridge height. Thanks for presentation.

HP to everyone:
thanks Mike we will be in touch to discuss further

ER – corps dam regulates water levels at this site at about MSL. He is confused about flood plain and sea level rise. Is Corps dam going to regulate sea level rise?

> *SM – team engaged with DCR we developed better understanding of how WL is managed by DCR. Scenario is where dam is overtopped rather than day-to-day.*

How is flood plain defined on both sides of Dam? How does that work?

> *SM – we are looking at options for an approach to this and will work with the team as design advances*

ER – kayakers go through opening in trestle – in future, will this be improved? This should be taken into consideration? Is there section 10 or 404 Corps work?

PD – did not understand P bridge in vicinity of Spaulding rehab

> *HP – DCR has proposed bridge. A 3rd pedestrian bridge spanning entire river, details being discussed with DCR.*

BG – good presentation – comments will be e-mailed to HP. On permitting with DCR construction access permit required. HP – they will be in touch

USACE Interagency Consultation Meeting #2
Meeting Minutes

Meeting Date:	April 15, 2021
Client:	MBTA
Project Name:	Draw 1 North Station Bridge Replacement
Designer:	STV Incorporated
Meeting Place:	Virtual - Webex
Prepared by:	Colin Duncan and Diane Stallings, TRC
Attendees:	Alan Anachecka-Naseman, USACE Jennifer Letourneau, Cambridge Conservation Commission Rachel Croy, EPA Ed Reiner, EPA Ryan Bartlett, FTA Leah Sirmin, FTA Kristin Wood, FTA Karl Eckstrom, MBTA Holly Palmgren, MBTA Tess Paganelli, MBTA Erikk Hokenson, MassDEP David Wong, MassDEP Kaitlyn Shaw, NOAA Mark Ennis, STV Preethi Sreeraj, STV Karol Szaro, STV Diane Stallings, TRC Annie Cornell, TRC

Safety Moment – TRC, Distracted Driving

Introductions

HP, USCG not in attendance today but have been involved to date.

Discussion Items/Topics

Presentation provided by Mark Ennis, STV, Sam Moffett, TRC and Colin Duncan, TRC

- Project Overview and Status
- Project Schedule
- Anticipated Construction Approach and Impacts

- Pedestrian Bridge Considerations
- Anticipated Permits/Reviews and Schedule
- Consultation and Data Needs

<u>Future Agency Meetings/Consultations</u>

<u>Discussion, Q&A</u>

Ed Reiner, EPA:

- Cutting piles at/above mudline is not standard approach for bridge replacement. SM: comment acknowledged; approach advantages to be fully discussed.
  - David Wong concurs with EPA's assessment.
  - STV and MBTA design based on functionality but some adjustments can be made later in the design process.
  -
- What is the minimum vertical clearance under fixed trestles, for boat passage? SM: clearance will be very close to existing.
- Proposed bridge looks ugly. ME: function and longevity are primary concerns for design. MBTA seeking inputs from multiple stakeholders including historical agencies.
- Will new wider area of bridge & trestles increase shading of river? SM: area will be larger but waterway will maintain same water column for fish passage. MBTA will be conducting EFH & Fisheries studies & consult with NOAA & DMF for fisheries issues.
- Will cutting piles at mudline vs. removing altogether interfere with new piles? Could old piles, which contain creosote, be removed? ME: new piles will be offset from existing so that they will not interfere below mudline. Approximate ratio of old piles to new will be 1:3. Removing piles altogether could cause issues with settlement of sediments that is more problematic. Piles for fender system will be pulled altogether.
- Will small vessels such as kayaks be able to pass under trestles? ME: the existing passage is very tight even for small vessels and there will not be an appreciable difference.

David Wong, MassDEP Ch. 91

- For new bridge design, Charles River represents Massachusetts, which should be considered for appearance.
- DEP considers removal of all materials below mudline in tidal waters as fill and part of dredging calculation under Section 401. SM: acknowledged. ER: everybody knows that

Charles is dammed with constant water level and no longer considered tidal. (Also see Alan A-N comment)

- A WQC must be tied to a MEPA filing (ENF and/or EIR).

Alan Anachecka-Naseman, USACE

- Piles in waterway are considered as structures under 404, not fill.
- Permitting: As lead federal agency, FTA will coordinate fisheries ESA review with NMFS and DMF, etc. Also, Section 106, consulting Tribes will be Aquinnah Wampanoags, Mashpee Wampanoags, and Narragansetts.
- Alternatives to be considered appear to be No Action and proposed replacement, which seems to be acceptable.
- Mitigation will likely be In Lieu Fee.

Kaitlyn Shaw, NOAA

- Appreciates the presentation; will review presentation for impacts including fish passage.

Stallings, Diane

From: Palmgren, Holly <HPalmgren@MBTA.com>
Sent: Tuesday, May 4, 2021 9:41 AM
To: Moffett, Samuel; Duncan, Colin; Stallings, Diane
Cc: Eckstrom, Karl; Paganelli, Tess; John M. Ennis
Subject: [EXTERNAL] Fwd: MBTA Draw 1 and Tower A Interagency Coordination Meeting #2

FYI

617-875-3807
Sent from my iPhone

Begin forwarded message:

> **From:** Kaitlyn Shaw - NOAA Federal <Kaitlyn.shaw@noaa.gov>
> **Date:** May 4, 2021 at 9:11:18 AM EDT
> **To:** "Palmgren, Holly" <HPalmgren@mbta.com>
> **Subject: Re: MBTA Draw 1 and Tower A Interagency Coordination Meeting #2**
>
> Hi Holly,
> I wanted to circle back on this. While I can provide pre-app technical assistance, an EFH assessment will still need to be provided by FTA. Because adverse effects associated with removal will be minimized through the preferred method of cutting at the mudline, we would not have major concerns with cutting the pilings at the mudline rather than below. I would anticipate a TOY under FWCA for diadromous species; ie. controls (e.g., cofferdams) should not encroach: >25% from OHW during the TOY restriction. We would refer to the TOY restrictions in Mass DMF TR-47 in this instance for trust species (Spring: Feb 15 to July 15 and downstream passage maintained during the Fall out migration from September 1 to November 15). Of course I understand this project has many overlapping requirements, so additional coordination on timing can be discussed during the consultation process. Please let me know if you have any questions.
> Best,
> **Kaitlyn Shaw**
> Marine Resources Management Specialist
> Habitat and Ecosystem Services Division
> NOAA/ National Marine Fisheries Service
> Gloucester, MA
> Office: 978-282-8457
> Pronouns: she/her/hers
> kaitlyn.shaw@noaa.gov
> www.nmfs.noaa.gov
>
> On Thu, Apr 22, 2021 at 2:23 PM Palmgren, Holly <HPalmgren@mbta.com> wrote:

Attached are the slides from the interagency coordination meeting on North Station Draw which was held on 4/15/2021. Please feel free to send any questions or comments along to me.

Thanks

Holly

-----Original Appointment-----
From: Duncan, Colin <CDuncan@trccompanies.com>
Sent: Wednesday, March 17, 2021 5:00 PM
To: Duncan, Colin; 'Alan.R.Anacheka-nasemann@nae02.usace.army.mil'; Padien, Daniel (DEP); Grafe, Jerome (DEP); Worrall, Eric (DEP); Wong, David W (DEP); Bartlett, Ryan (FTA); Nicholas Moreno; Letourneau, Jennifer; Reiner.Ed@epa.gov; Boeri, Robert (EEA); Evans, Tay (FWE); 'Sirmin, Leah (FTA)'; Wood, Kristin (FTA); Hopps, Christine (DEP); kaitlyn.shaw@noaa.gov; james.l.rousseau2@uscg.mil; Palmgren, Holly; Eckstrom, Karl; Paganelli, Tess; Ennis, John M.; Moffett, Samuel; Stallings, Diane; jeffrey.d.stieb@uscg.mil; Cornell, Annie
Cc: Anacheka-Nasemann, Alan R CIV USARMY CENAE (USA); Hokenson, Erikk (ENV)
Subject: MBTA Draw 1 and Tower A Interagency Coordination Meeting #2
When: Thursday, April 15, 2021 11:00 AM-12:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Webex Virtual Meeting

All,

Due to a change in project topics on Alan's interagency call, we are changing the Draw 1 meeting date to April 15, same time. Sorry for any inconvenience and we hope to see you there. Thank you.

Greetings,

On behalf of MBTA, TRC is inviting you to participate in the next virtual interagency coordination meeting for the MBTA's North Station Draw and Tower A project. The initial meeting was held in May 2020.

This project is intending to use federal funding, and MBTA has begun coordinating with the FTA as the lead federal agency.

We would like to use this meeting to update the scope of the project and discuss permitting requirements and any concerns or issues the agencies might have.

Thank you and we hope you can join us on April 1, 2021 at 11 am.

Colin Duncan

TRC Environmental

617-549-8506

-- Do not delete or change any of the following text. --

Colin Duncan is inviting you to a Webex Personal Room meeting.

Join meeting

More ways to join:

Join from the meeting link
https://trcenvironmentalcorp.my.webex.com/meet/cduncan

Join by meeting number
Meeting number (access code): 132 071 4637

Tap to join from a mobile device (attendees only)

+1-415-655-0001,,1320714637## US Toll

Join by phone

+1-415-655-0001 US Toll

Global call-in numbers

Join from a video conferencing system or application
Dial cduncan.trcenvironmentalcorp.my@webex.com You can also dial 173.243.2.68 and enter your meeting number.

If you are the host, you can also enter your host PIN in your video conferencing system or application to start the meeting.

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Interagency Consultation Meeting #3
Meeting Minutes

Meeting Date:	February 25, 2022
Client:	MBTA
Project Name:	Draw 1 North Station Bridge Replacement
Designer:	STV Incorporated
Meeting Place:	Virtual - Webex
Prepared by:	Colin Duncan and Diane Stallings, TRC
Attendees:	Alex Hammond, FTA
	Chrissy Hopps, MassDEP Ch. 91
	Christina Szczepanski, TRC
	Cindy Martin, TRC
	Dan Driscoll, DCR
	David Wong, MassDEP
	Eric Papetti, FTA
	Jeff Parenti, DCR
	Jeffrey Stieb, USCG
	Jennifer Letourneau, Cambridge Conservation Commission
	Kaitlin Shaw, NOAA
	Karl Eckstrom, MBTA
	Karol Szaro, STV
	Katelyn Rainville, USACE
	Kyle Lally, MassDEP
	Marissa Murphy, TRC
	Mark Ennis, STV
	Meg Langley, City Point Partners
	Michael Stroman, MassDEP
	Nicholas Moreno, Boston Conservation Commission
	Page Czepiga, MEPA
	Bob Boeri, MA CZM
	Ruth Helfeld, DCR
	Ryan Bartlett, FTA
	Sean Barry, STV
	Sean Casey, DCR
	Sam Moffett, TRC
	Tamia Burkett, STV
	Tess Paganelli, MBTA
	Tori Kim, MEPA

Safety Moment – TRC, Safety during Snow Events

Introductions
Karl Eckstrom.

Discussion Items/Topics

Presentation provided by Sam Moffett, TRC and Colin Duncan, TRC

- Introductions
- Project Overview/Tour
- Project Schedule
- Project Approach
- Footbridges
- Schedule
- Q&A

Future Agency Meetings/Consultations
To be set up as individual Agency meetings in the near future.

Discussion, Q&A

Dan Driscoll (DD), DCR

- DD expressed concerns about the viability of the South Bank Bridge construction. There is concern that construction of the South Bank Bridge will not be possible. Suggests the team think of alternatives to allow for pedestrian and bike travel in the vicinity of Causeway or Nashua streets
- Add DCR Construction Access Permit to permit list because bridge dismantling will need a permit and will trigger other issues.

Eric Papetti, FTA

- Once the Annotated Outline (AO) of the Environmental Assessment (EA) is approved, the project will be on NEPA dashboard and EA will need to be completed in 1-year.
- The AO should provide details documenting the coordination between MBTA and MassDCR relative to the footbridges and how this pertains to Section 4(f). The FTA will want to understand to understand all processes, etc. of the bridges before there is an approval. The footbridge is on a critical path and FTA will want to see details regarding MBTA engagement with MassDCR on the footbridge

Mark Ennis, STV

- Over a year ago, the design team presented concepts of the footbridge conflict to DCR, and understands the stress that the idea has generated. All feedback is being considered. A new plan is being developed to move and relocate the footbridge bridge so the period of closure will be greatly reduced.

Karl Eckstrom, MBTA

- MBTA looks forward to having more opportunities to meet with DCR in the near future

Kaitlyn Shaw NOAA Fisheries

- An email was sent to MBTA (May 4, 2021 at 9:11 am) agreeing that the preferred method of cutting piles at the mudline is ok
- The presence of winter flounder triggers time of year restrictions from Jan 15 to July 15 for diadromous resources. Any filling activities should be done outside of time of year restrictions

Nick Moreno, Boston Conservation Commission

- For resource areas on the figures, add Area Subject to Flooding which occurs on the trestle and North Station platform.

David Wong, MASSDEP

- Suggest an e-mail or letter from MA DMF for time of year restrictions to get the 401 approved.
- This project falls into a major dredging category due to the volume of dredging/disturbance shown on the matrix of >5,000 CY. DW suggests be WW-08, not a WW-07. Dredging includes all sediment removal and repositioning of sediment that occurs below the Mean High Tide line
- Quantification should include any material repositioned below the mean high tide line, inclusive of existing piles would be considered dredged material, cassions, etc.
- SAMP needs to be submitted to DEP for reviewed and approval prior to submittal of 401 application.

Page Czepiga, MEPA

- MEPA regulations were recently revised on January 1, 2022. This project will be required to file a mandatory EIR because the project is located within a mile of an EJ area.

- All MEPA meetings are remote and TRC can set a meeting online.

Mike Stroman, MassDEP

- Has anyone considered Article 97 for changing use of public properties?
  - Sam Moffett, design team understands need to look at Article 97 but it might not fit the project.
  - Dan Driscoll, does not anticipate Article 97 review since no land currently under Art. 97 jurisdiction is proposed to be taken or impacted for D1. If footbridge impacted (location, etc.), Art. 97 could be triggered.

Comments received via e-mail following the meeting

Jeffrey Stieb, USCG

Today's project update was very helpful. The next step for the CG would be the submission of a Project Initiation letter for the replacement bridges. Guidance regarding the Initiation Letter is in the Bridge Program Application Guide (BPAG) The initiation letter need not be exhaustive, a page or two with a project timeline and a conceptual drawing should work.

An additional important next step is to address the removal requirements the navigation centric agencies (CG, Army Corps, State Police Marine Unit and DCR) have for the removal of pilings, etc. of the old bridge. Removal "to the mudline" should work for water under elevated RR tracks which vessels cannot transit over. However below the mudline might be required for parts of the old bridge that vessels can transit over. From my perspective the best approach is for the MBTA to develop a proposal then get the agencies concerned with vessel transits and water bottoms on a Teams meeting to discuss. Seems this needs to be done before approaching the resource agencies.

After the Initiation letter is the development of a set of CG plans to precede or accompany the CG permit application. Attached is a guide to preparing the CG plans, a CG permit application template, and a recent plan sheet prepared for an Amtrak bridge in CT as an example. We should schedule a short meeting before the MBTA starts completing the CG permit application template.

William Gode, DCR

… a next step is to seek input from relevant agencies regarding work to remove pilings. Among these agencies are DCR and the MSP Marine Unit. For DCR I expect a Construction Access Permit (CAP) will be

the appropriate path with review coming to me and others inside the agency. A CAP can be applied for online here.

The MSP Marine Unit is commanded by Det. Lt. David Twomey, cc'd hereto. I suggest reaching out to him regarding plans as they are devolved so he may provide relevant feedback.

Katelyn Rainville, USACE

Prior to the meeting on Thursday February 24, 2022, KR requested TRC provide the project location, to help confirm if a 408 is needed or not. Based on the information USACE concluded " *the project is located outside any USACE projects".*

PRESENTATION

MBTA CONTRACT NO. H32PS01

ENGINEERING SERVICES FOR

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

AND ASSOCIATED TRACK AND SIGNALS UPGRADES

Interagency Consultation Meeting

February 25, 2022

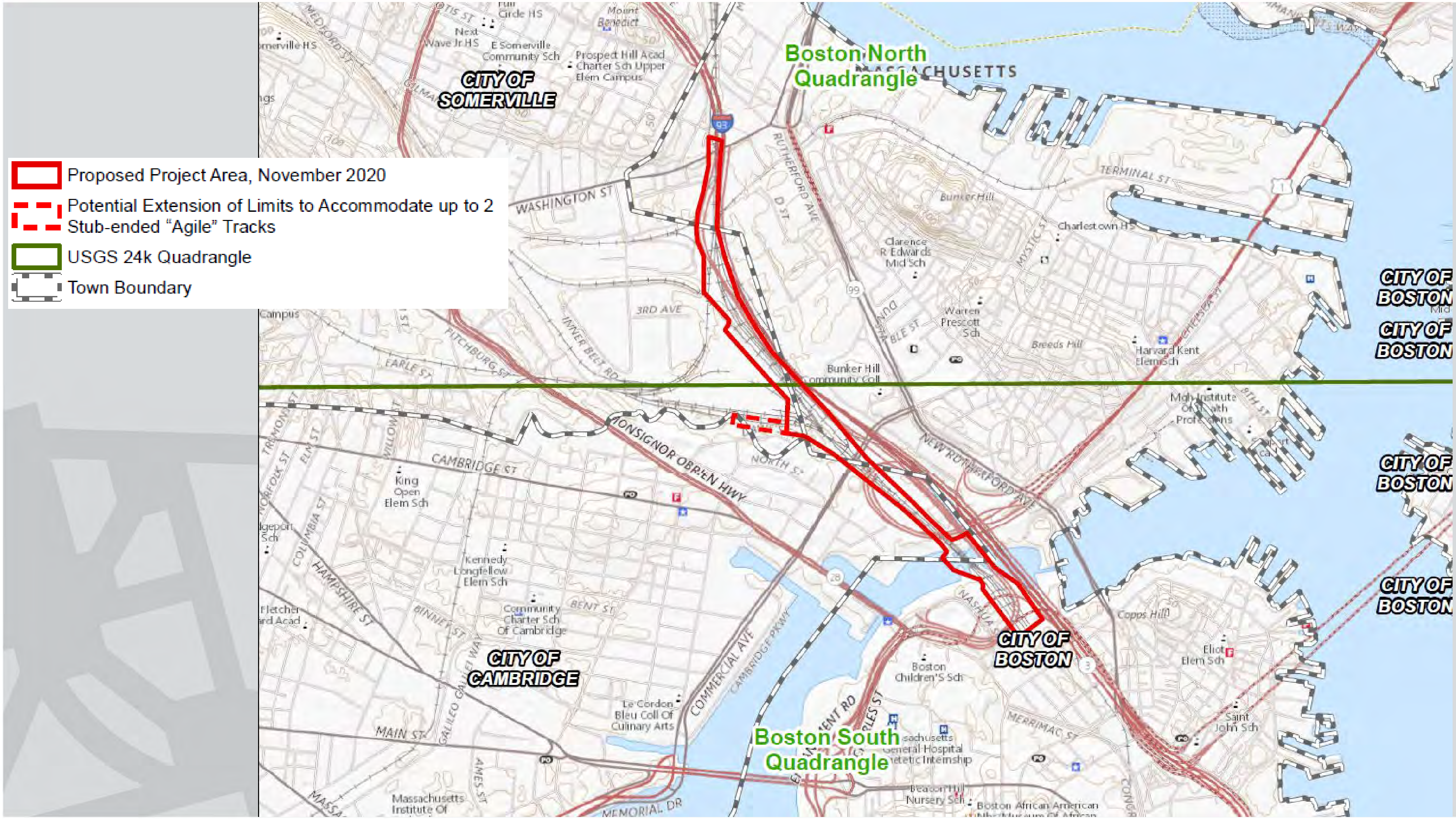
STV 100 Years

AGENDA

- INTRODUCTIONS
- PROJECT OVERVIEW/TOUR
- PROJECT SCHEDULE
- PROJECT APPROACH/PLANS
  - *Demolition Approach (Removal of In-water Structures)*
  - *Dredge and Fill (Fisheries Considerations)*
  - *Riverbank Sheetpile/Tremie Pour*
- FOOTBRIDGES
- PERMITTING
- SCHEDULE
- Q&A

PROJECT OVERVIEW

PROJECT AREA



Existing Site Overview

DCR PARK **A**

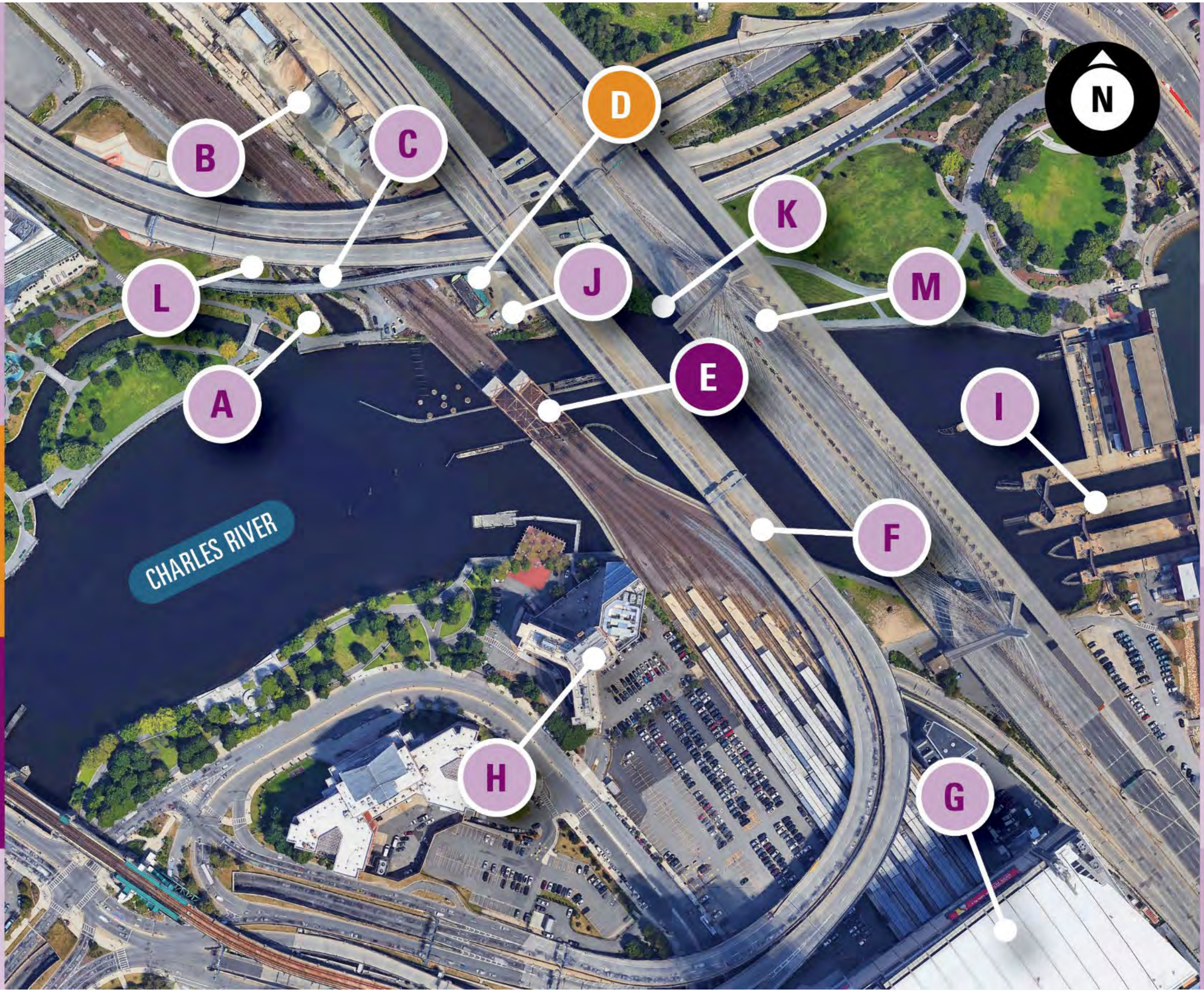
BOSTON SAND & GRAVEL **B**

NORTH BANK BRIDGE **C**

TOWER A **D**

DRAW 1 BRIDGES **E**

LEVERETT CIRCLE CONNECTOR BRIDGE **F**



G NORTH STATION

H MGH BUILDING (FORMERLY SPAULDING REHAB)

I CHARLES RIVER DAM

J TEMPORARY STEEL FRAME CONTROL TOWER

K MILLERS RIVER

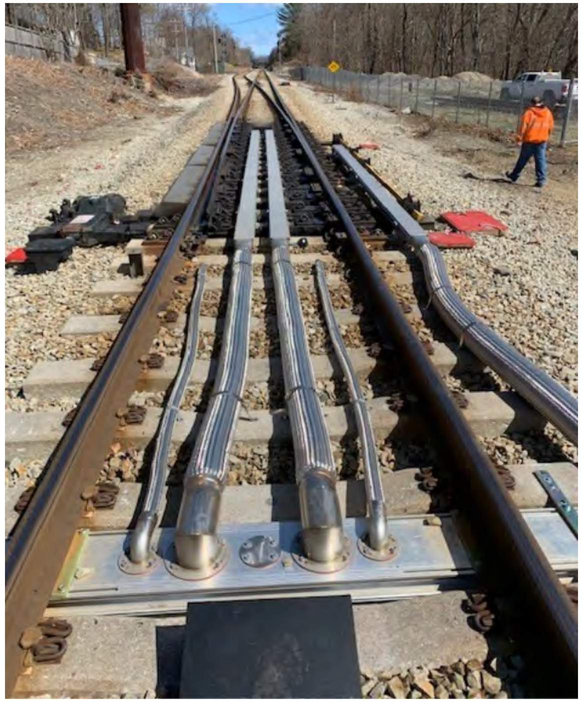
L DUCK BOAT RAMP

M ZAKIM BRIDGE

Project Scope – Additional Considerations

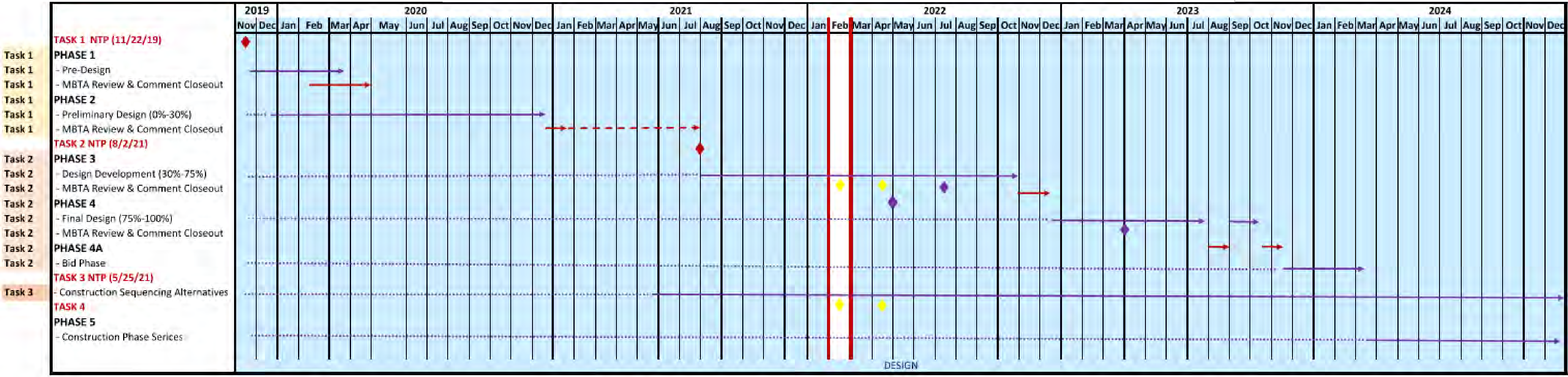
- **A minimum of four active tracks over the river during construction**
- **A minimum of ten active tracks at North Station during construction (six on weekends)**
- Signal control system upgrade using new microprocessor technology
- Local manned bridge control structure with provision for remote operation
- Pedestrian connection to walkways on each bank of the Charles River
- Environmental approvals & permits
- Agency & stakeholder coordination & public outreach
- Provisions for future electrification

Switch Heaters



Current Project Status – Schedule at Start of Task 2 & 3

	Milestone	Duration	Cumulative	Date	
	Task 1 NTP (11/22/2019)			*11/22/2019*	
Task 1	*Phase 1 Including MBTA Review*	*5.0 Mo*	*5.0 Mo*	*4/12/2020*	
Task 1	*Phase 2 Including MBTA Review*	*9.0 Mo*	*14.0 Mo*	*1/22/2021*	All Phase 1 and Phase 2 Deliverables submitted
	Task 2 NTP (8/2/2021)			*8/2/2021*	
Task 2	*Phase 3*	*15.0 Mo*	*15.0 Mo*	*11/1/2022*	
Task 2	*Phase 3 MBTA Review*	*1.5 Mo*	*16.5 Mo*	*12/16/2022*	
Task 2	*Phase 4*	*10.0 Mo*	*26.5 Mo*	*10/17/2023*	
Task 2	*Phase 4 MBTA Review*	*1.0 Mo*	*27.5 Mo*	*11/16/2023*	
Task 2	*Phase 4A (previously termed Phase 5)*	*4.0 Mo*	*31.5 Mo*	*3/17/2024*	
	Task 3 NTP (5/25/2021)			*5/25/2021*	
Task 3	*Construction Sequencing Alternative*	*concurrent with Phases 3, 4, and 5*		*11/11/2026*	
	Task 4				
	Phase 5	*72.0 Mo*	*103.5 Mo*	*11/11/2026*	



Legend

- Notice-to-Proceed Milestone
- Constructability Charettes (tentative dates

Draw 1 - Project Status

Project Timeline

- Effort on Design commenced in November 2019
- 30% Design submitted for MBTA review in December 2020 (Task 1 Complete)
- 75% Design to be submitted in November 2022
- PS&E submission to be submitted in Fall 2023
- Construction begins Spring 2024
- Construction Duration 72 months +/-

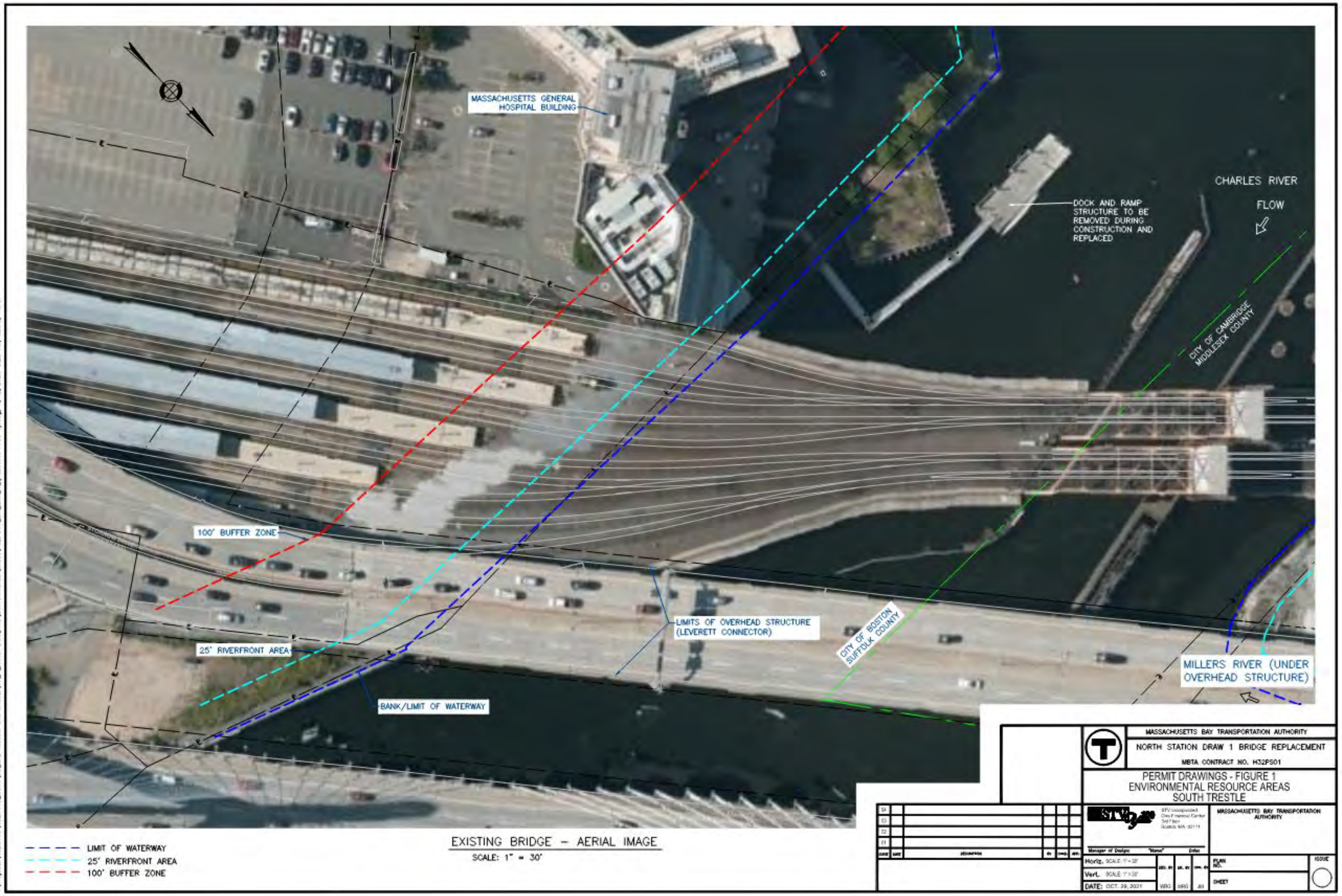
Project Drivers

- Bridge Deterioration
- Accommodation for Electrification
- Construction Staging

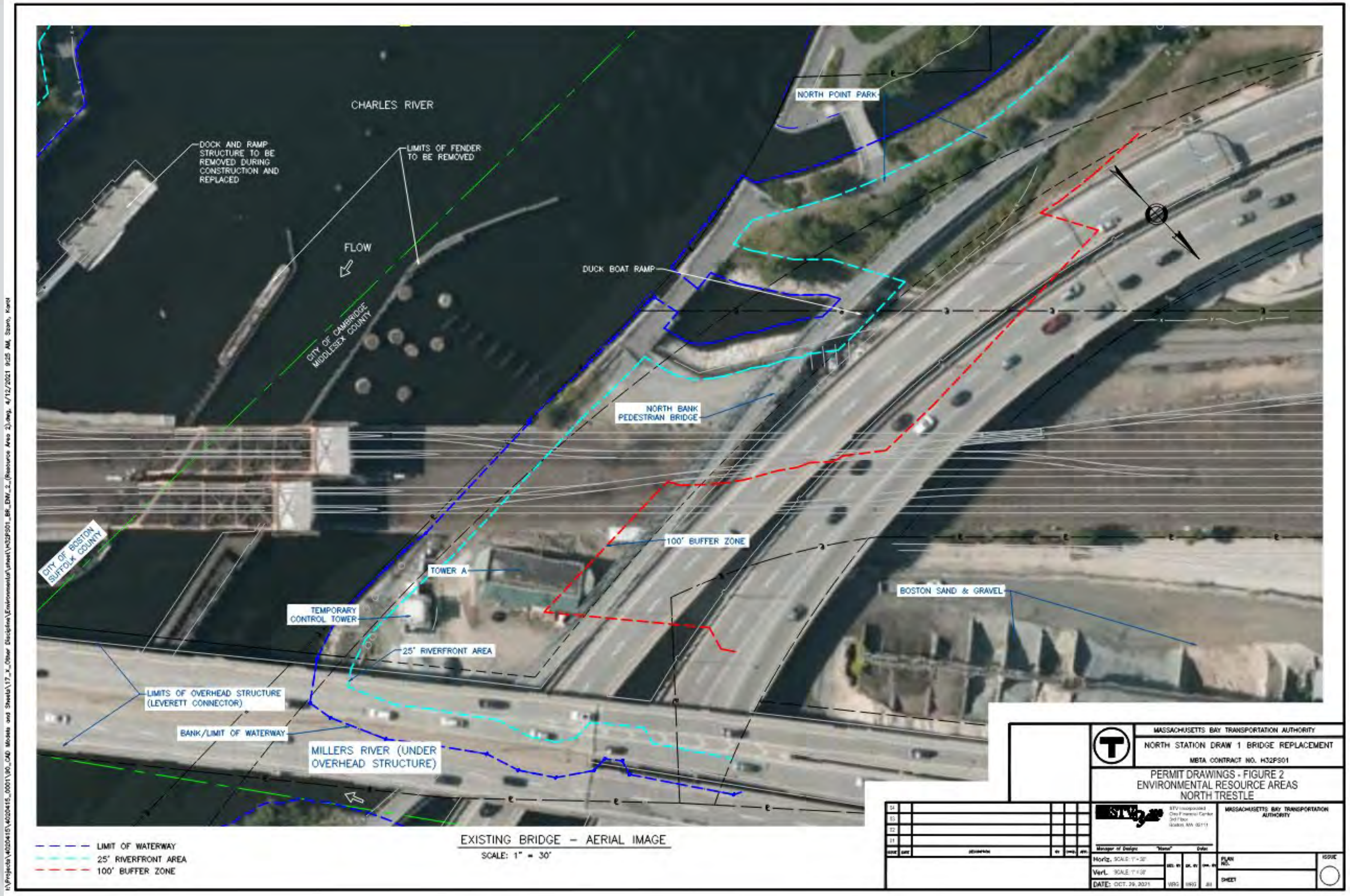
Rendered Model – Design Team Update

[North Station Rail Bridge - Virtual Tour (123bim.com)]

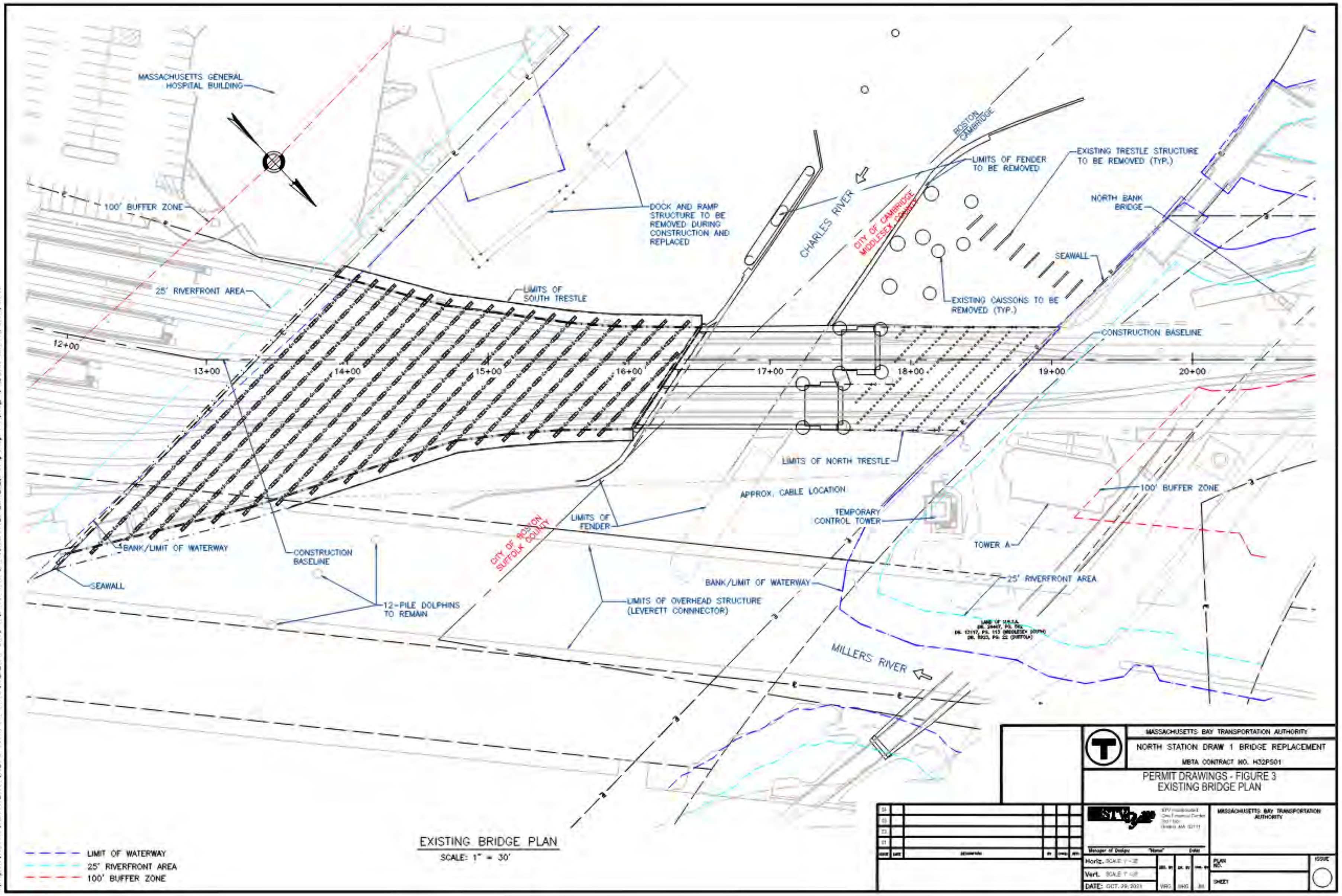
ENVIRONMENTAL RESOURCE AREAS – SOUTH TRESTLE



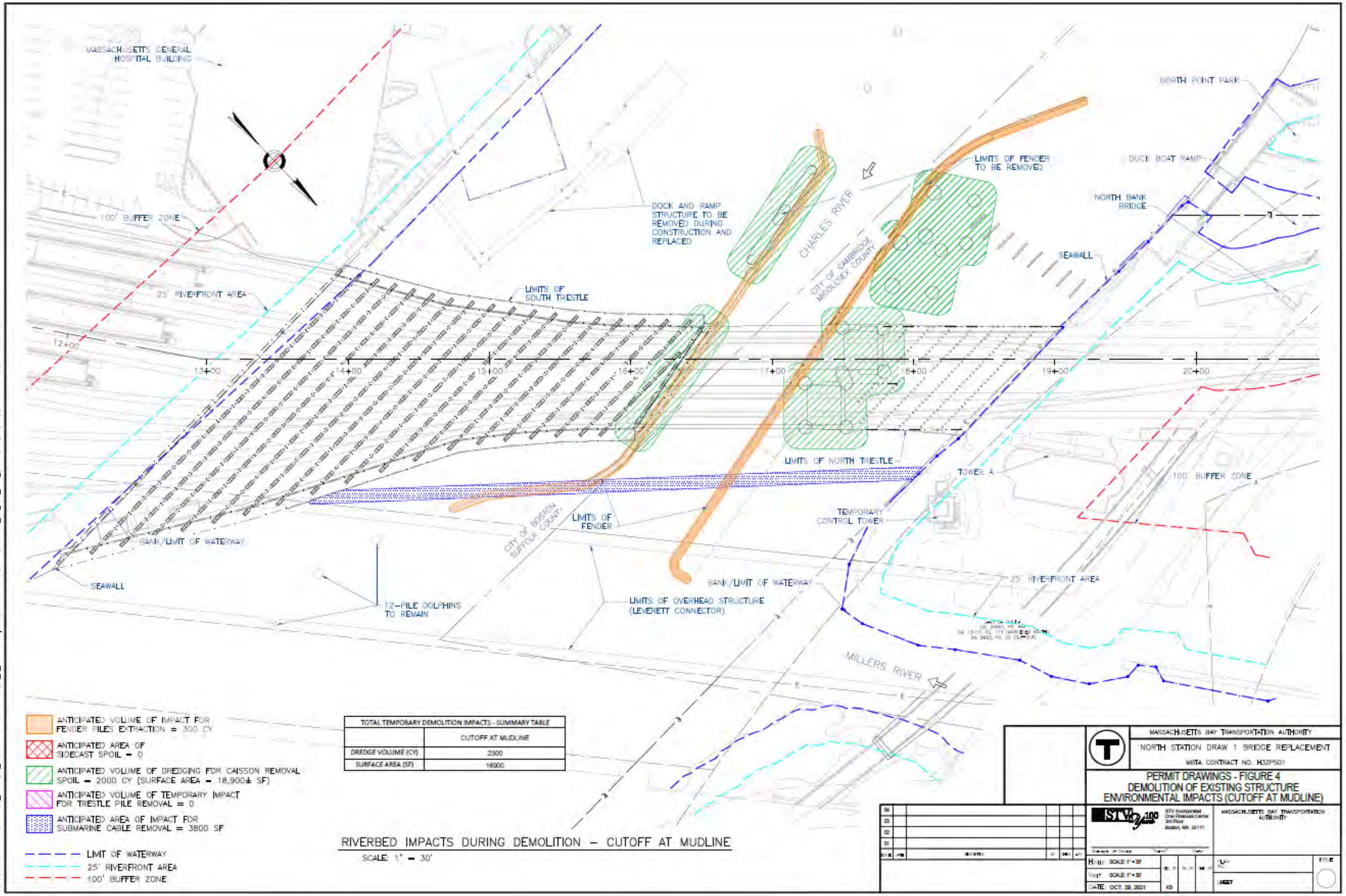
ENVIRONMENTAL RESOURCE AREAS – NORTH TRESTLE



PERMIT DRAWINGS – EXISTING BRIDGE PLAN

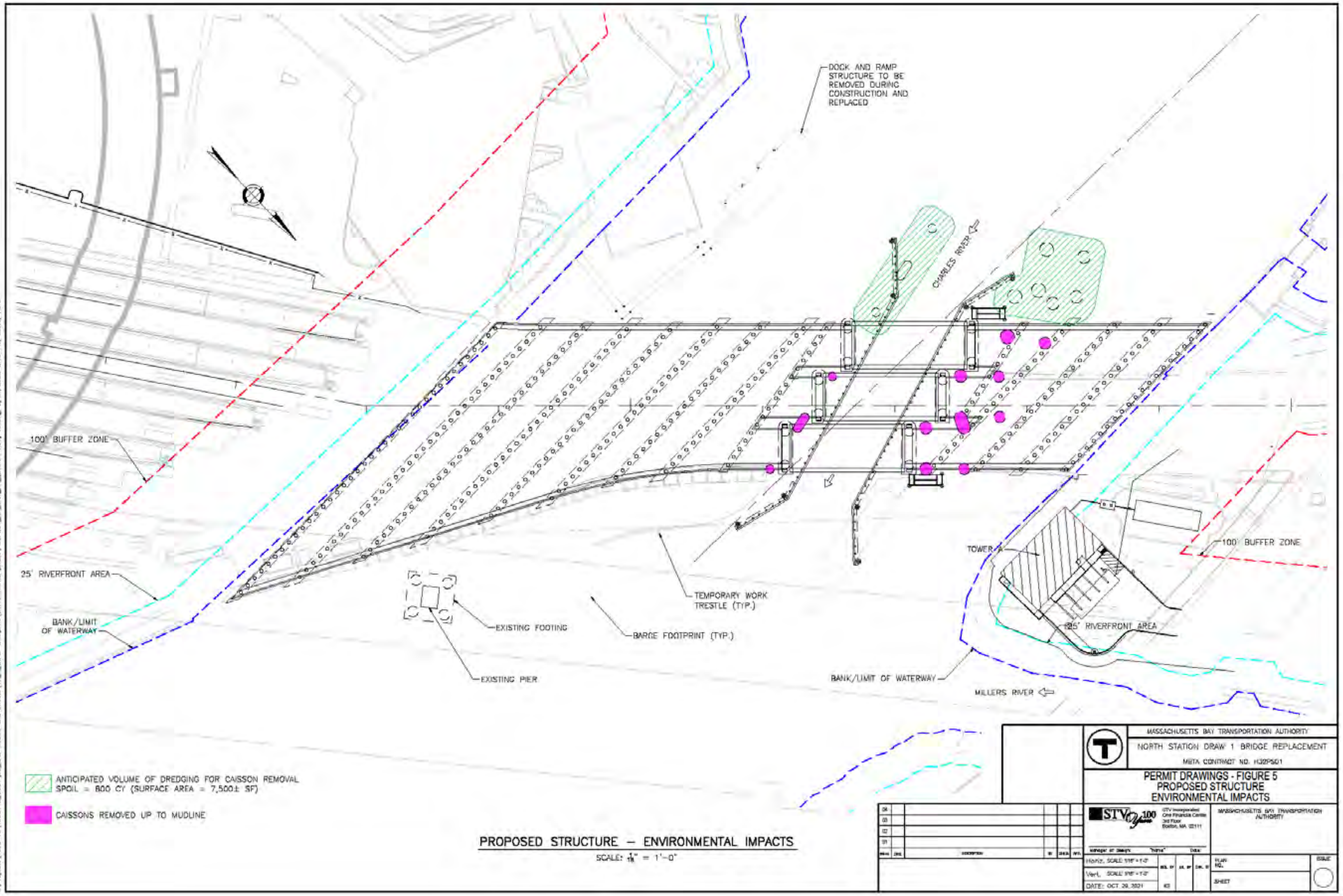


PERMIT DRAWINGS – DEMOLITION OF EXISTING STRUCTURE (CUTOFF AT MUDLINE)

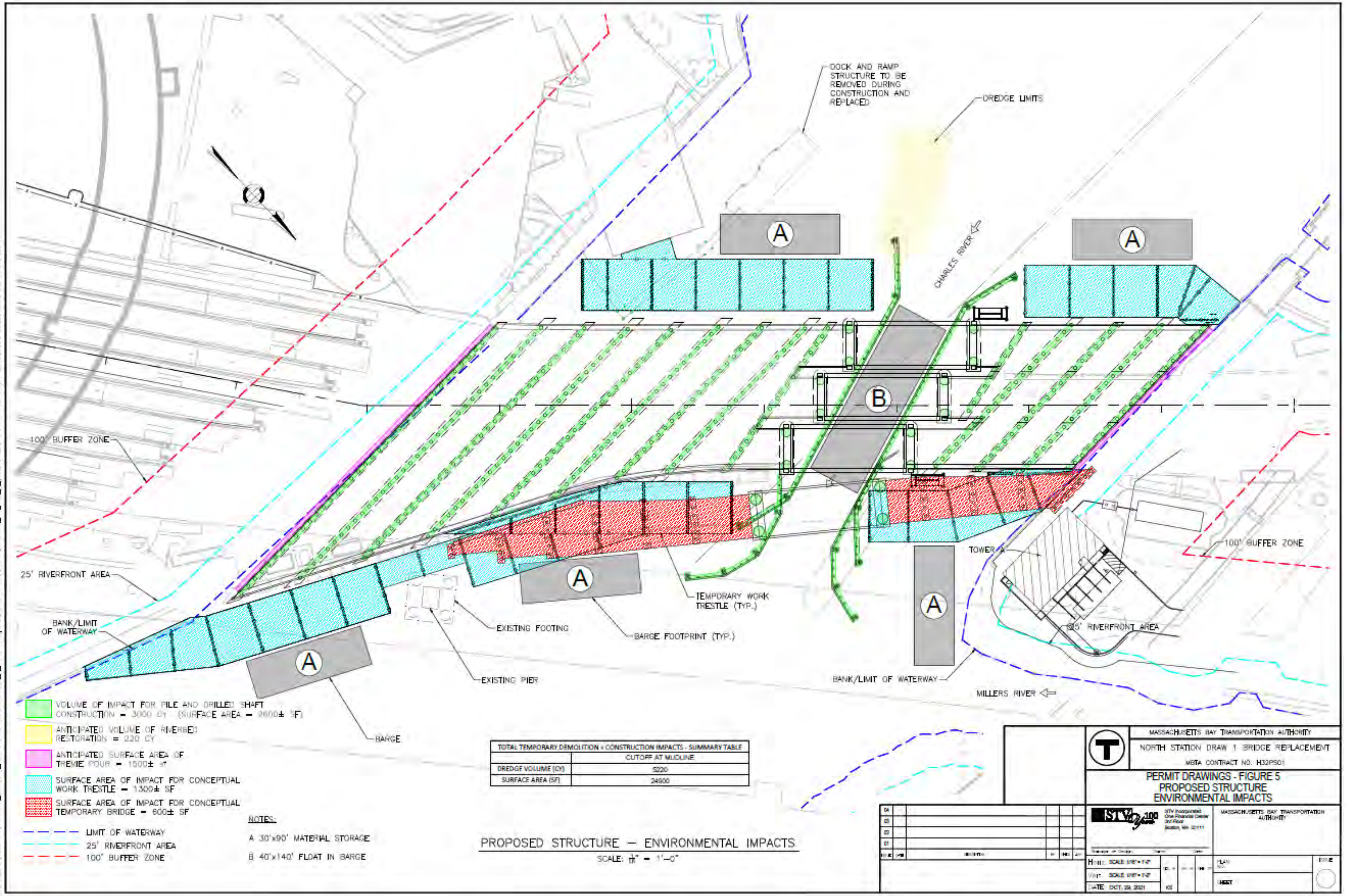


TOTAL TEMPORARY DEMOLITION IMPACTS - SUMMARY TABLE	
	CUTOFF AT MUDLINE
DREDGE VOLUME (CY)	2300
SURFACE AREA (SF)	18900

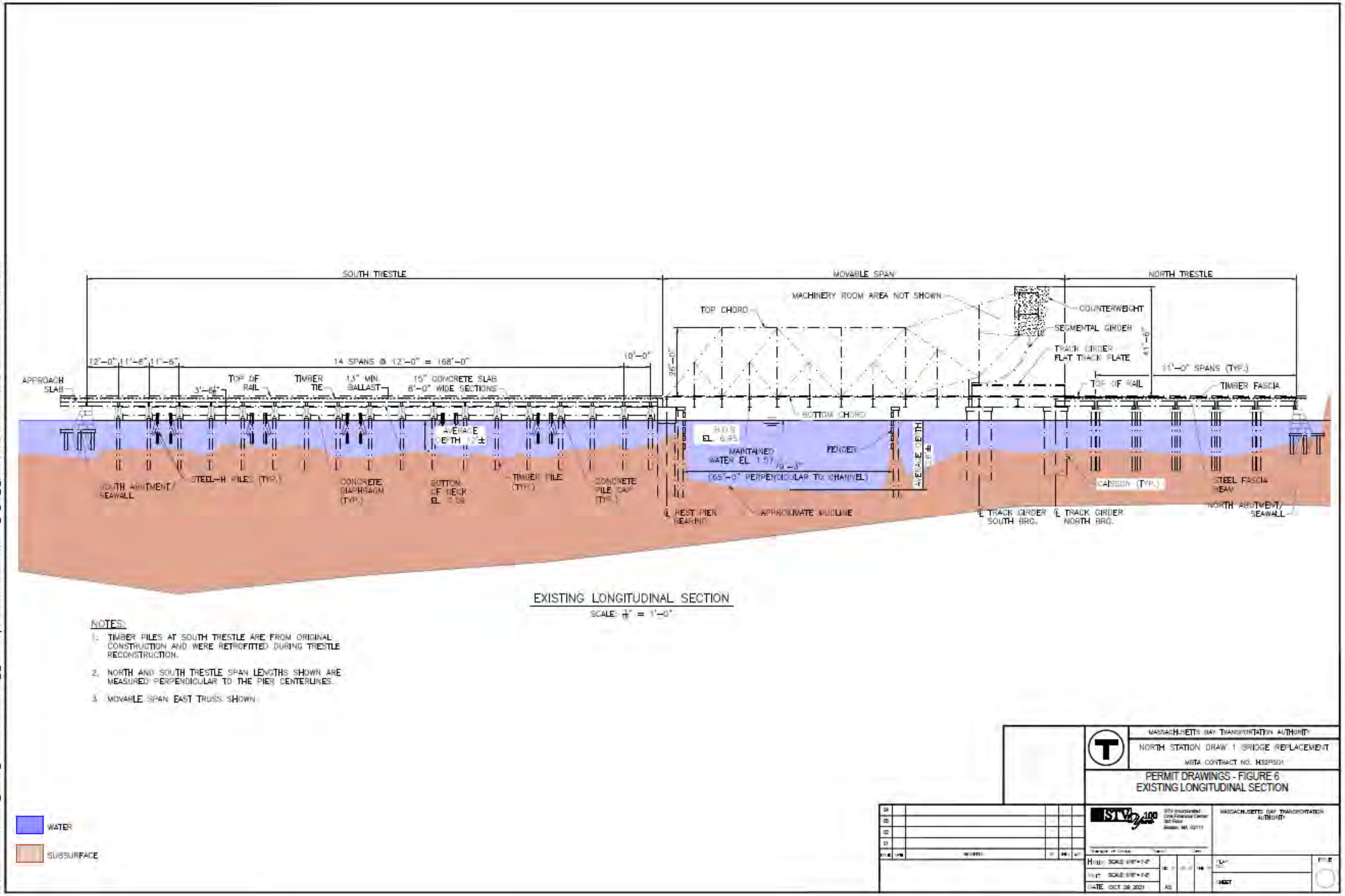
PERMIT DRAWINGS – PROPOSED STRUCTURE AND EXISTING CAISSONS



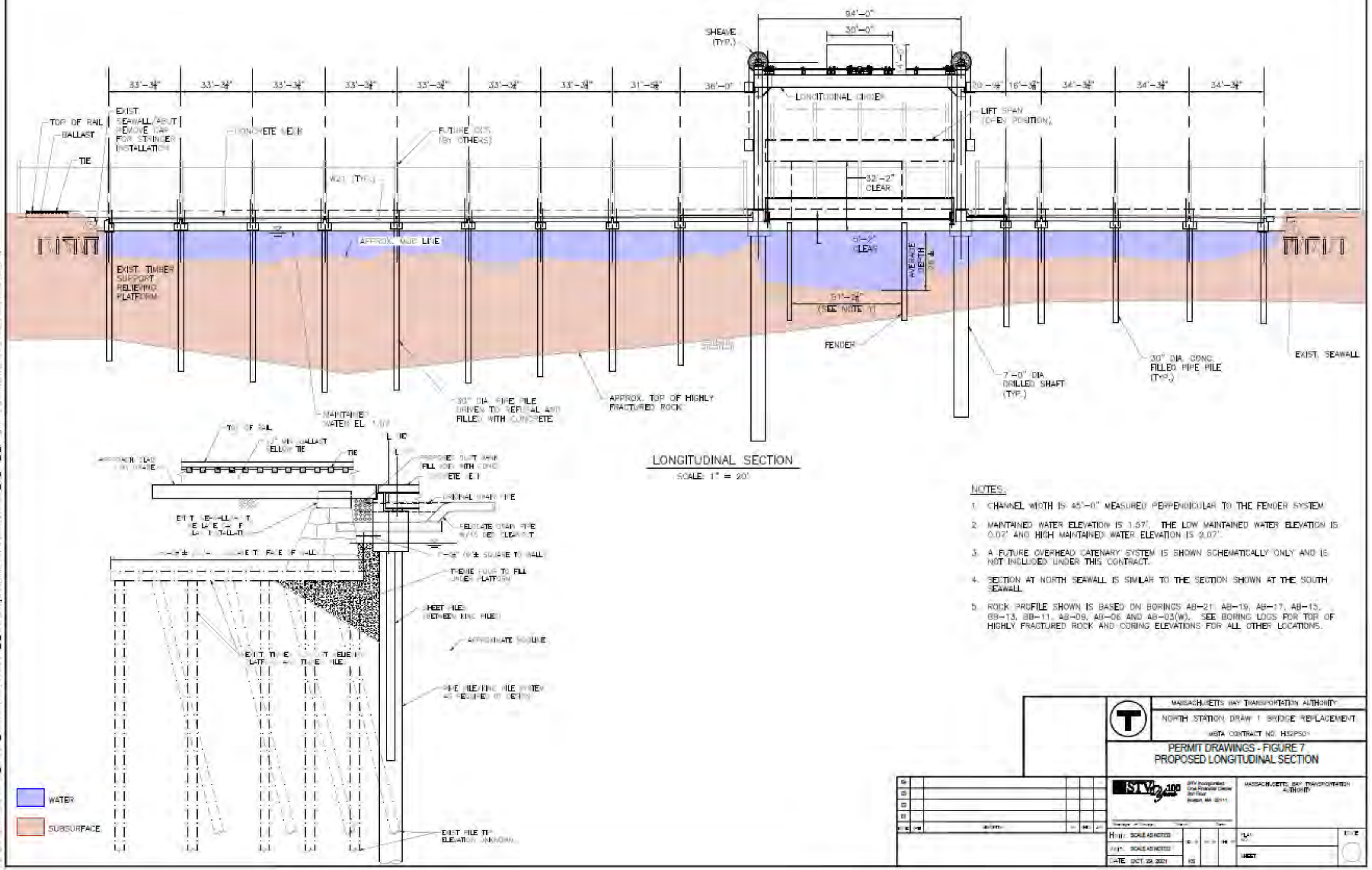
PERMIT DRAWINGS – CONSTRUCTION AND PERMANENT ENVIRONMENTAL IMPACTS



PERMIT DRAWINGS – EXISTING LONGITUDINAL SECTION



PERMIT DRAWINGS – PROPOSED LONGITUDINAL SECTION



NOTES:

1. CHANNEL WIDTH IS 45'–0" MEASURED PERPENDICULAR TO THE FENDER SYSTEM.
2. MAINTAINED WATER ELEVATION IS 1.57'. THE LOW MAINTAINED WATER ELEVATION IS 0.07' AND HIGH MAINTAINED WATER ELEVATION IS 3.07'.
3. A FUTURE OVERHEAD CATENARY SYSTEM IS SHOWN SCHEMATICALLY ONLY AND IS NOT INCLUDED UNDER THIS CONTRACT.
4. SECTION AT NORTH SEAWALL IS SIMILAR TO THE SECTION SHOWN AT THE SOUTH SEAWALL.
5. ROCK PROFILE SHOWN IS BASED ON BORINGS AB–21, AB–19, AB–17, AB–15, BB–13, BB–11, AB–09, AB–06 AND AB–03(W). SEE BORING LOGS FOR TOP OF HIGHLY FRACTURED ROCK AND CORING ELEVATIONS FOR ALL OTHER LOCATIONS.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01

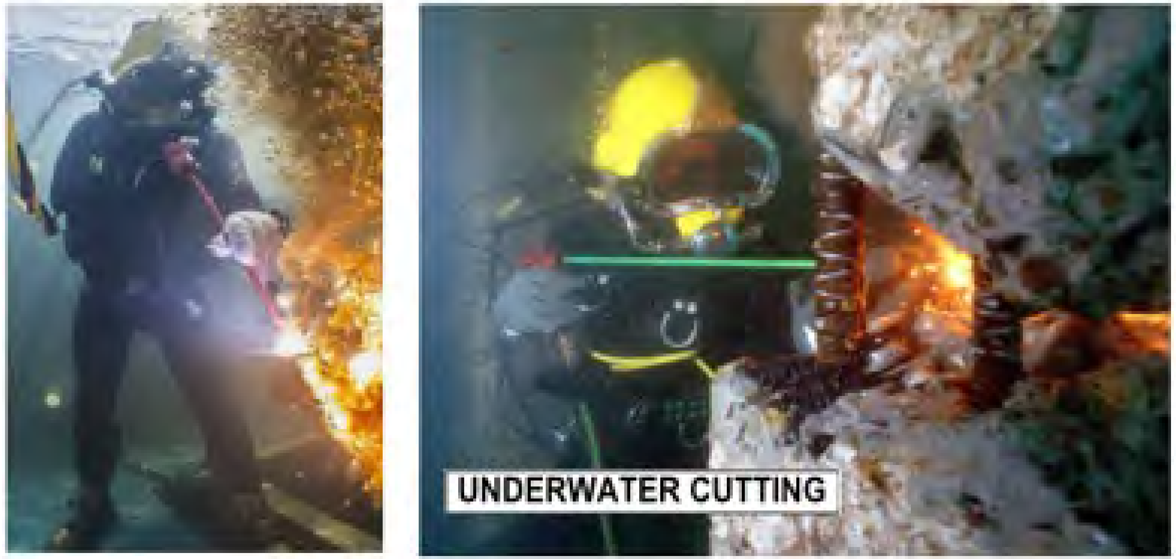
PERMIT DRAWINGS - FIGURE 7
PROPOSED LONGITUDINAL SECTION

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

HORIZ.: SCALE AS NOTED
VERT.: SCALE AS NOTED
DATE: OCT. 29, 2021

Construction Activities & Equipment

TIMBER PILES



STEEL PILES

Pedestrian Bridge Discussion

Environmental Permitting – Federal

Agency	Permit/Review Program	Trigger	Relevant Project Impacts	Likely Permit Required (w/Thresholds)
Federal				
US Army Corps of Engineers	Section 10/404 Permit Individual Permit or General Permit 10	Discharge of Dredged or Fill to WOUS	Construct with Piles Cut At Mudline: **TEMP + PERM: 24,900 SF (0.57 AC)**	General Permit 10 (5,000 SF – 1 AC)
Federal Transit Administration	NEPA Categorical Exclusion or Env. Assess.	Action using federal funding (initiated 4/20)	Federal Action	Environmental Assessment
FTA, State Historic Preservation Office (Massachusetts Historical Commission), BLC, CHC, and BUAR	Section 106 and 4(f) reviews or Finding of Adverse Impact; Inter-agency Memorandum of Agreement	Finding of Adverse Effect on NRHP-eligible structures	Potential Adverse Effect	MOA
Massachusetts Division of Marine Fisheries, US Fish and Wildlife Service, and US EPA	Section 7 Fisheries and Wildlife Consultations, Federal Permit Review Consultation	CWA Sections 10/404 and 401 permitting	Work in Waterway	Section 7 Consultation submittals
US Environmental Protection Agency	National Pollutant Discharge Elimination System – Construction General Permit	Disturbance of 1 or more acres of land	>1 AC total land disturbance	NPDES CGP via NOI and preparation of Stormwater Pollution Prevention Plan

Environmental Permitting – State and Local

Agency	Permit/Review Program	Trigger	Relevant Project Impacts	Likely Filing/Permit Required
State				
Massachusetts Department of Environmental Protection	Section 401 Water Quality Certification	Dredging	Construct with Piles Cut At Mudline: **5,520 CY**	WQC Major WW07 (>5,000 CY)
		Fill/Excavation	Pile & Drilled Shafts; Tremie pour bulkhead stabilization in riverbed: **PERM: 4,100 SF** **TEMP & PERM: 24,900 SF**	WQC Minor WW11 (<5,000 SF) or Major WW10 (>5,000 SF)
Executive Office of Environmental Affairs/ MEPA Unit	MEPA Review	Construction in Wetlands, Waterways, and Tidelands requiring state permits <1 mile from EJ Community	Expansion Solid Fill Structure: **4,100 SF** Alteration of Bank: **517 LF**	Environmental Notification Form (Expanded) (>1,000 SF structure; >500 LF bank); Environmental Impact Report?
MassDEP	Chapter 91 Waterways License/Modification	Construction and occupation of Commonwealth Waterway	Bridge and Trestle crossing with existing license(s)	Chapter 91 License or Modification
Massachusetts Water Resources Authority	8(m) Permit	Crossing of MWRA facilities	Track modifications over MWRA facilities	8(m) Permit
Local				
Boston and Cambridge Conservation Commission	Wetlands Protection Act Notices of Intent	Construction in Areas Subject to Jurisdiction under Wetlands Protection Act	Alteration of Land Under Waterway: **PERM: 4,100 SF** **TEMP + PERM: 24,900 SF** Alteration of Bank: **517 LF** Alteration Riverfront Area: **TBD SF** Alteration of Buffer Zone: **TBD SF**	Order of Conditions >5,000 SF LUW >50 LF Bank Work in RA Work in Buffer Zone

Other Environmental Considerations

Environmental Site Assessment

To identify soil and groundwater management constraints and approach/specs for construction

Building and Hazardous Materials Assessment

To identify building and hazardous materials constraints and approach/specs for construction

Environmental Permitting – Current Schedule

Permitting Schedule		
Permit Agency/Program	**Activity**	**Approximate Timeframe***
FTA - NEPA Environmental Assessment	Prepare Annotated Outline/Section 106 & Section 7 Consultations	Winter - Spring 2022
	Submit EA	**Summer 2022**
USACE - Section 10/404 General Permit	Inter-Agency Consultations – MDFW, NOAA NMFS, US EPA, US FWS	Spring 2022 - Ongoing
	Submit General Permit	**Summer 2022**
MassDEP – Section 401 Water Quality Certification WW08 Dredging and WW11 or WW10 Fill	Review of Sediment & Water Sampling Program	Spring 2022- Ongoing
	Pre-application Consultation	Spring 2022
	Submit 401 WQC Applications	**Summer 2022**
MassDEP – Chapter 91 Waterways License	Pre-application Consultation	Spring 2022
	Submit Ch. 91 Application	**Summer 2022**
MEPA	Pre-Submittal Consultation	Spring 2022
	Submit MEPA Filing	**Summer 2022**
Boston and Cambridge Conservation Commissions	Submit Notice of Intent Applications	**Fall 2022**
MWRA 8(M) Permit	Pre-application Consultation	Summer 2022
	Submit Application	**Fall 2022**
NPDES Construction General Permit NOI	**Prepare SWPPP and Submit eNOI**	**14 days prior to construction**
*Based on current Project design timeline		

Massachusetts Bay Transportation Authority

PRESENTATION
MBTA CONTRACT NO. H32PS01

QUESTIONS & ANSWERS

THANK YOU

STV 100 Years

Conclusion and Key Issue for Discussion

Dredging and Riverbed Impacts

– *Proposed cutting of piles above mudline will significantly reduce riverbed dredging volumes and area impacts*

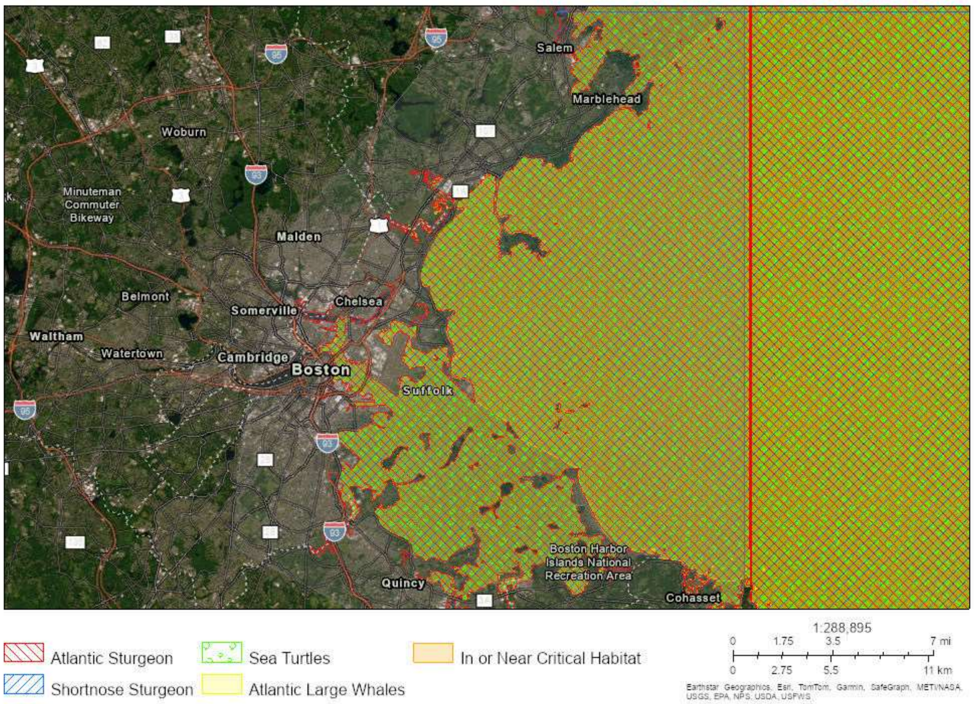
Appendix B: ESA Mapper Results

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 229,235.65 acres

Oct 14 2024 12:13:43 Eastern Daylight Time



Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	4	255,106.32	N/A
Shortnose Sturgeon	3	127,553.77	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	4	499,393.10	N/A
Atlantic Large Whales	4	498,127.64	N/A
In or Near Critical Habitat	1	88,888.92	N/A

Atlantic Sturgeon

#	Feature ID	Species	Lifestage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	ANS_C50_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	N/A	01/01	12/31	N/A	N/A	127,552.79
2	ANS_C50_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	N/A	01/01	12/31	N/A	N/A	127,553.53

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	SNS_C50_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	N/A	04/01	11/30	N/A	N/A	127,553.77

Sea Turtles

#	Feature ID	Species	Life Stage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	GRN_STN_AJV_MAF	Green sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)	6/1	11/30	*No Data*	*No Data*	124,848.27
2	KMP_STN_AJV_MAF	Kemp's ridley sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)	6/1	11/30	*No Data*	*No Data*	124,848.27
3	LTR_STN_AJV_MAF	Leatherback sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)	6/1	11/30	*No Data*	*No Data*	124,848.27
4	LOG_STN_AJV_MAF	Loggerhead sea turtle	Adults and juveniles	Migrating & Foraging	Maine to Massachusetts (N of Cape Cod)	6/1	11/30	*No Data*	*No Data*	124,848.27

Atlantic Large Whales

#	Feature ID	Species	Lifestage	Behavior	Zone	From	Until	From (2)	Until (2)	Area(acres)
1	RIT_WRN_AJV_FOR	North Atlantic right whale	Adults and juveniles	Foraging	Northeast (ME to Cape Cod, MA)	1/1	12/31	*No Data*	*No Data*	124,531.91
2	RIT_WRN_AJV_WIN	North Atlantic right whale	Adults and juveniles	Overwintering	Northeast (ME to Cape Cod, MA)	11/1	1/31	*No Data*	*No Data*	124,531.91
3	FIN_WFN_AJV_WIN	Fin whale	Adults and juveniles	Overwintering	Northeast (ME to Cape Cod, MA)	11/1	3/31	*No Data*	*No Data*	124,531.91
4	FIN_WFN_AJV_FOR	Fin whale	Adults and juveniles	Foraging	Northeast (ME to Cape Cod, MA)	1/1	12/31	*No Data*	*No Data*	124,531.91

In or Near Critical Habitat

#	Species	In or Near Critical Habitat	Area(acres)
1	North Atlantic Right Whale	Critical Habitat Unit 1: Feeding Area	88,888.92

Appendix G
Essential Fish Habitat (EFH) Assessment

Essential Fish Habitat Assessment

North Station Draw One Bridge Replacement Project

November 2024

Prepared For:

Massachusetts Bay Transportation Authority (MBTA)
10 Park Plaza
Boston, MA 02116

Federal Transportation Authority (FTA)

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LIST OF ACRONYMS AND DEFINITIONS

Notation	Definition
BMP	Best Management Practice
^{o}C	Degrees Celsius
CCTV	Closed-circuit television
cSEL	Cumulative sound exposure levels
CWA	Clean Water Act
CZM	Coastal Zone Management
dB	decibels
DCR	Massachusetts Department of Conservation and Recreation
DFE	Design Flood Elevations
DMF	Massachusetts Division of Marine Fisheries
Draw One Bridge	Commuter rail draw bridges just north of North Station
EFH	Essential Fish Habitat
^{o}F	Degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FMC	Fishery Management Council
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
HAPC	Habitat Area of Particular Concern
ILF	Massachusetts In-Lieu Fee Program
LNG	Liquid natural gas
MassDEP	Massachusetts Department of Environmental Protection
MassGIS	Massachusetts Bureau of Geographic Information
MBTA	Massachusetts Bay Transit Authority
MEPA	Massachusetts Environmental Policy Act
mg/L	Milligrams per liter
MGH	Massachusetts General Hospital
MHW	Mean high water
mph	miles per hour
mS/cm	Millisiemens per centimeter
MSA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
MWRA	Massachusetts Water Resources Authority
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
North Bank Bridge	North Bank Pedestrian and Bicycle Bridge north of the Draw One Bridge (**Figure 1** on page 2 and **Figure A4** on page 17)
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unites
OHWM	Ordinary High Water Mark

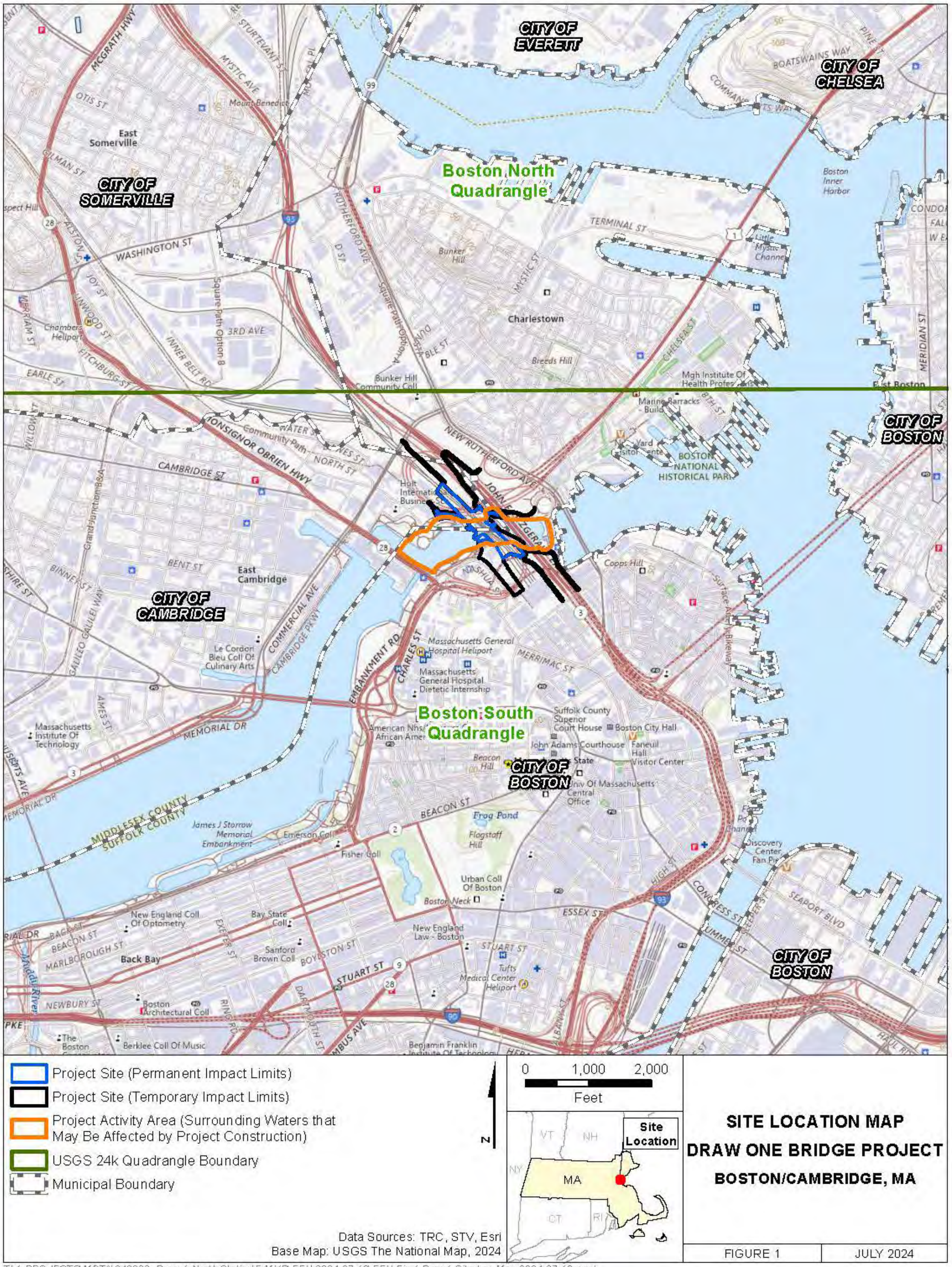
Notation	Definition
PAHs	Polyaromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PLC	Programmable logic controller
Proposed Project	Draw One Bridge Replacement Project
Project Site	Area where permanent and temporary impacts are expected from construction of the Proposed Project (**Figure 1** on page 2)
Project Activity Area	Waters surrounding the Project Site that may be affected by Project construction (**Figure 1** on page 2)
ppt	parts per thousand
PSU	practical salinity units
ROW	Right of way; land owned by the MBTA
SAV	Submerged Aquatic Vegetation
SEL_{cum}	Cumulative Sound Exposure Levels
SFA	Sustainable Fisheries Act
SIH	Signal Instrument House
Silt Producing Activity	Various construction activities that when performed in a water body disturb the sediment on the bottom of the waterbody which mixes with the water, increasing the amount of sediment in the water.
SPCC	Spill Prevention, Control and Countermeasures
SPMTs	Self-propelled modular transporters
SWPPP	Stormwater Pollution Prevention Plan
SWQS	Massachusetts Surface Water Quality Standards
T-pad	Area owned by MTBA north of the Draw One Bridge to be used by the contractor for construction storage and staging shown on **Figure A5** on page 19.
TOY	Time of Year
TRC	TRC Environmental Corporation
TSS	Total Suspended Solids
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
WOTUS	Waters of the United States
WQC	Water Quality Certificate
YOY	Young-of-the-Year

1.0 PROJECT PURPOSE AND OVERVIEW

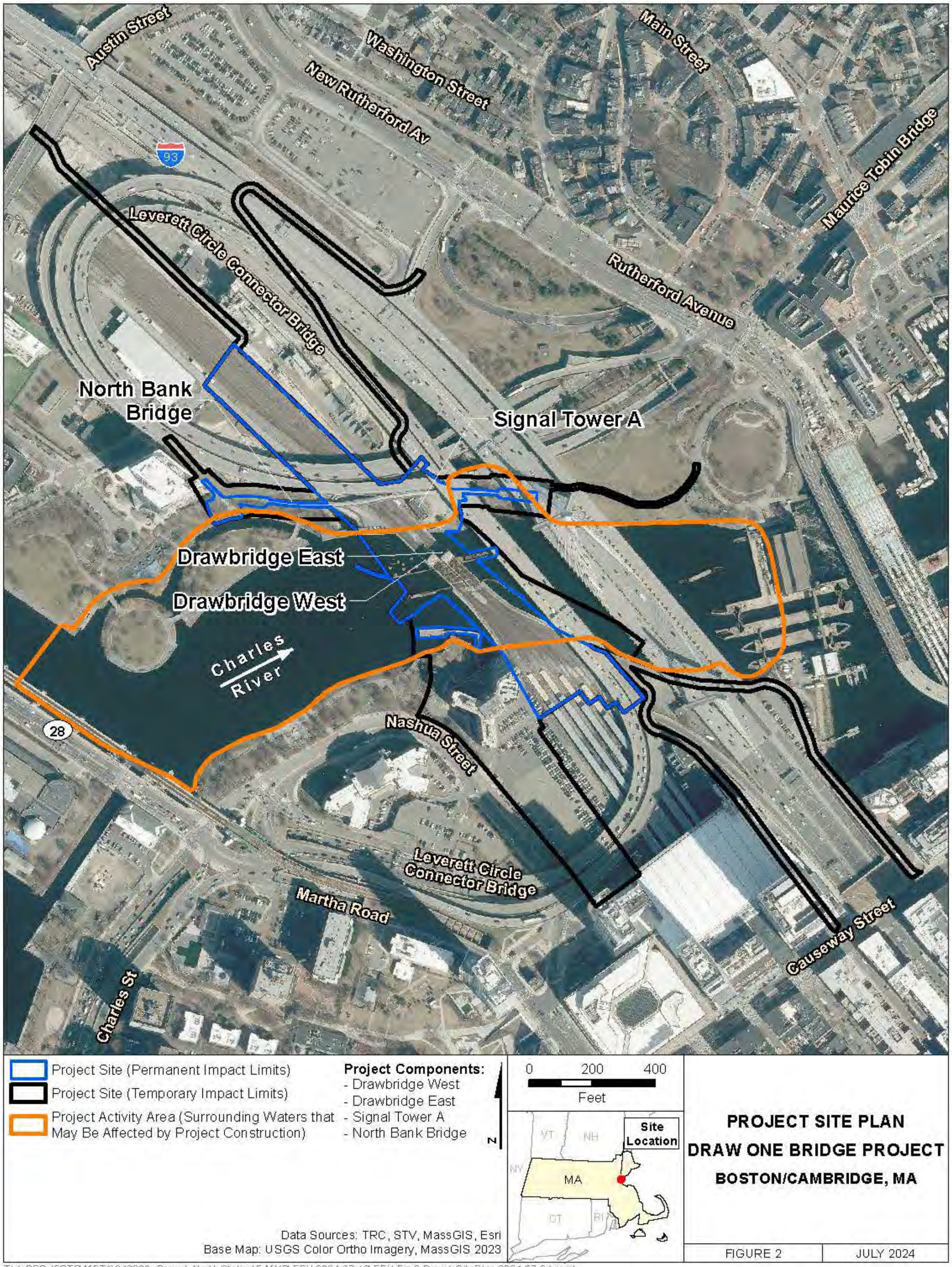
The Massachusetts Bay Transit Authority (MBTA) is seeking funds to be provided through the Federal Transit Administration (FTA), as the lead federal agency for the Draw One Bridge Replacement Project (the Proposed Project). The Proposed Project would replace the existing two structures comprising the Draw One Bridge over the Charles River with three new vertical lift bridge structures. Associated activities include replacement of the adjacent Signal Tower A, replacement of the approach trestles, and related adjustments and upgrades to track alignments and communications and signaling systems. **Figure 1** on page 2 highlights the direct footprint of the work area including the temporary impacts (shown on figures as “Project Site (Temporary Impact Limits”) and permanent impact areas (shown on figures as “Project Site (Permanent Impact Limits”) for the Proposed Project. “Project Site” is used throughout the document to refer to the temporary and permanent impacts. The Project Site, comprising approximately 8 acres, is roughly located within the bounds of the Charles River (in the same area as the previous Draw One Bridge) but extends 200 feet upstream and 300 feet downstream of the existing Draw One Bridge. The purpose of the Proposed Project is to bring the Draw One Bridge into a state of good repair, improving the reliability and safety of MBTA Commuter Rail and Amtrak service at North Station in Boston. The details of construction are further detailed in Section 2.0 while conditions within the Project Activity Area (the surrounding waterbodies within an 0.25-mile radius from the center of the Project Site) are described in Section 4.0.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), (16 U.S.C. § 1801 *et seq.*) established a management system to promote conservation of marine fisheries resources along the United States coastlines. This included the establishment of eight regional Fishery Management Councils (FMCs) that develop fishery management plans to properly manage fishery resources, the designation of federally managed species and their respective habitats throughout all life stages referred to as Essential Fish Habitat (EFH). The MSA requires federal agencies, FTA in this case, to consult with National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) on any action or proposed action authorized, funded, or undertaken by such agency that may adversely affect EFH identified under the MSA. The MSA further mandates NOAA Fisheries to coordinate with other federal agencies to avoid, minimize, or otherwise offset effects on EFH that could result from activities that are proposed by, funded by, or receiving approvals and/or authorizations from federal agencies.

The Sustainable Fisheries Act (SFA) of 1996 was an amendment to the MSA. The SFA recognized that many fisheries are dependent on nearshore and estuarine habitats for at least part of their life cycles and included evaluation of habitat loss and protection of critical habitat, which are explained in Section 5.0. The Fish and Wildlife Coordination Act (FWCA) requires that all federal agencies consult with NOAA Fisheries when proposed actions might result in modifications to a natural stream or body of water. The FWCA also requires that federal agencies consider the effects that projects would have on fish and wildlife such as shellfish, diadromous species, crustaceans, or their habitats, and other commercially and recreationally important species that are not managed under a federal fisheries management plan, may serve as prey for a number of federally-managed species, and are considered a component of EFH. Stressors and potential impacts are discussed in Section 6.0. These species and their habitats are referred to as NOAA Fisheries Trust Resource Species and will be considered as part of the EFH/FWCA consultation process which may result in additional recommendations to avoid, minimize, or offset any adverse effects concurrently with EFH conservation recommendations, as explained in Section 5.0.



T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\EFH 2024-07-18\EFH Fig 1 Draw1 Site Loc Map 2024-07-18.mxd



PROJECT SITE PLAN
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA

FIGURE 2 | JULY 2024

T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\EFH 2024-07-18\EFH Fig 2 Draw1 SitePlan 2024-07-24.mxd

Consultation with NOAA Fisheries is required whenever a federal agency is going to undertake or approve activities or work in an area that has the potential to affect EFH. FTA is using this EFH Assessment to support consultation with NOAA Fisheries, which would also support other federal actions, such as the United States Army Corps of Engineers (USACE) Section 404 and Section10 permits and a United States Coast Guard (USCG) Permit. In the following narrative, the Proposed Project description, existing conditions, the EFH species of the Project Activity Area, as well as impacts and mitigation measures are discussed alongside the EFH Worksheet (rev. August 2021) **(Appendix A).**

1.1 Agency Correspondence

Three interagency consultation meetings have occurred (May 7, 2020, April 15, 2021, and February 25, 2022) to discuss the Proposed Project, likely permitting/review programs, the schedule, data needs, and the permitting timeline **(Appendix B).** These interagency consultation meetings included members from MBTA, FTA, FRA, NOAA Fisheries, the USCG, USACE, the Massachusetts Division of Marine Fisheries (DMF), the Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Department of Conservation and Recreation (DCR), Cambridge and Boston Conservation Commission, Coastal Zone Management (CZM) Office and the Massachusetts Environmental Policy Act (MEPA) Office.

In response to questions asked during the interagency consultation meetings, email correspondence from Kaitlyn Shaw (NOAA Fisheries) dated May 4, 2021, provided guidance on time of year (TOY) restrictions (Section 3.1) and Best Management Practices (BMPs) (Section 3.2). Additionally, discussions during the interagency consultation meetings further guided the design and permitting process and helped confirm some of the BMPs and TOY restrictions that will be followed during the Proposed Project construction. FTA and MBTA met with the Greater Atlantic Regional Fisheries Office (GARFO) Protected Resources Division on November 26, 2024, to discuss the Proposed Project and consultation approach.

2.0 PROPOSED PROJECT

The Proposed Project would replace the existing Draw One Bridge over the Charles River, which currently comprises two bascule bridge structures, with three new vertical lift bridge structures. It would provide six, rather than the current four, tracks across the Charles River to maintain service during construction and operations. It would also replace the adjoining Signal Tower A and the approach spans and upgrade track alignments and communications and signaling systems. The purpose of the Proposed Project is to bring the Draw One Bridge into a state of good repair, improving the reliability and safety of MBTA Commuter Rail and Amtrak.

2.1 Project Components

2.1.1 Vertical Lift Bridges

The two operational bridge structures (of the original four) each carry two rail tracks over the Charles River. The Proposed Project includes the replacement of the original four bridges with three vertical lift bridge structures. Each new vertical lift bridge would support two tracks, for a total of six tracks over the Charles River.

Throughout the construction period, four tracks would remain in service. One new vertical lift bridge would be constructed to the west of the existing bridges and commissioned, then each of the existing draw spans would be replaced in succession. Once construction is complete, any one bridge could be removed from service for maintenance or repair while leaving four bridge tracks in operation.

The proposed bridges would rise 76 feet above the water level and have a 45-foot horizontal clearance, a 5.17-foot vertical clearance in the closed position, and a 32.2-foot vertical clearance when open. The existing bridges rise 51.5 feet above the water level and have a 65-foot horizontal clearance, a 5.38-foot vertical clearance in the closed position, and infinite vertical clearance when open. The new bridge structures accommodate future electrification of the rail lines by providing sufficient vertical clearance for fixed catenary when the bridge spans are fully open. The elevation of both the existing and proposed bridge structures is constrained by the elevation of adjacent track, which is at an elevation of approximately 11 feet. Although the Design Flood Elevation (DFE) for the Proposed Project is 13.1 feet, track elevations cannot be adjusted to clear this elevation as they are constrained by platform access at North Station and connections north of the Charles River.

Foundations from the two previously demolished bascule bridges would be removed. The north and south trestles of the existing structures would be replaced, as would the existing fender system. The new bridge and trestles would span the same distance of approximately 550 feet as the existing bridge infrastructure.

2.1.2 Signal Tower A Replacement

Existing operational controls would be relocated from a temporary control tower to a new Tower A building. The new building would be constructed along the seawall on the north bank of the Charles River, east of the mainline tracks, positioned to best serve operation of the proposed new three-span structure.

2.1.3 North Bank Bridge Modification

The North Bank Bridge would be raised approximately one foot to accommodate the new track alignment required with the new bridge structures. This would require the relocation of two bridge supports, the addition of one additional support, modification of the bridge truss structure, and modification and lengthening of the bridge landings in North Point Park and Paul Revere Park. Regrading of adjacent park pathways would require the relocation of an existing staircase in North Point Park. Landscaping at each end of the bridge would be replaced to tie into existing park infrastructure.

2.1.4 Track Work

Trackwork and associated signals would extend throughout the Project Site to connect the new bridge tracks to the mainline tracks north of Tower A. Trackwork, including reconstruction of direct fixation and platform modifications where required, and associated signals would be constructed to connect the new bridge tracks to station tracks.

Existing tracks would be realigned to provide consistent spacing and new special track work and signals will be installed to facilitate the track phasing required to allow the three proposed lift bridges to be constructed while maintaining connectivity of four tracks between the station and the rail lines north of the bridges. Existing track will have new ballast, ties, and rails installed as part of the project. Where new portions of track are being added to align with the third bridge or where track is constructed along a new alignment to realign to new bridges, new subgrade, drainage, ballast and track work and signals will be constructed.

2.1.5 Signal System

The Proposed Project would replace up to three sets of Signal Instrument Houses (SIHs). The microprocessor controller equipment for each of the new SIHs would support the new track and signal system configuration. All wayside devices, cables, and infrastructure (e.g., cable troughs, signal heads, railroad switches, etc.) currently located within MBTA right of way (ROW) and serving the existing Draw One Bridge would be upgraded with the Proposed Project.

2.1.6 Switch Heaters

Approximately 11 existing switch heaters would be replaced, and an additional six switch heaters would be installed to accommodate the new track alignment across the river, for a total of 17 proposed switch heaters. The types of switch heaters (e.g., gas- or electric-powered) that would be installed as part of the Proposed Project have not yet been determined.

2.1.7 Drainage System

A drainage system would be added to the north trestles to collect runoff from the proposed bridge and Tower A infrastructure and provide infiltration and detention before being returned to the Millers River at a new outfall to be installed along the west bank of the river, just south of the North Bank Bridge. Similarly, a drainage system would be added to the south trestles to collect runoff and direct it to a water quality structure that would remove sediment and other stormwater pollutants (e.g., nitrogen, phosphorous) before returning runoff to the Charles River at a new outfall to be installed along the south bank of the river within the limits of the MBTA ROW.

2.1.8 Safety and Security

Safety and security measures would be implemented in accordance with MBTA's policies and procedures and would consist of fencing, a closed-circuit television (CCTV) system, exterior lighting located along the bridge structure, and navigational lighting to meet USCG requirements. Further, MBTA would maintain controlled access locations at the bridge stair towers, Tower A doors, and pedestrian and vehicular fence gates for MBTA's situational awareness of the bridge and Tower A.

2.1.9 Resilience

The Proposed Project has been designed in accordance with MBTA's Flood Resiliency Design Directive and Drainage Design Directive. Electrical and mechanical equipment within Tower A (e.g., control desk, programmable logic controller [PLC]) would be located on the second floor, above the DFE of 13.1 feet. Flood walls and a deployable flood barrier would be provided at Tower A, and submersible equipment (e.g., junction boxes, lift span bearings, etc.) would be utilized on the bridge structure.

2.2 Construction Schedule, Sequence and Access

Based on permit/mitigation requirements that have been set forth, MBTA will include in the contract specifications parameters and requirements for the contractor, which are aligned with what is presented in the document below and will include all identified BMP's, commitments, and other measures presented. The construction methods described within the document will be followed to the extent practicable; however, actual construction methods and materials may vary slightly, depending in part on how the construction contractors choose to implement their work to be most cost effective, within the requirements set forth in this document and, in turn, the bid, contract, and construction documents, as well as to comply with mitigation requirements. It is understood that substantial deviations from these methods would require reinitiation of consultation; such deviations are not anticipated and will be avoided.

2.2.1 Construction Schedule and Sequence

Construction is expected to begin in 2026 and be complete in 2034. Construction would be undertaken in five phases. The existing Signal Tower A would be demolished and replaced in the first phase. The new bridge span, to the west/upstream of the existing structures, would be constructed and commissioned first, then each of the existing bridge spans would be replaced in two successive stages so that four tracks across the Charles River would remain in operation at all times. In-water work would be undertaken approximately eight hours per day and five days per week: primarily during the daytime from 7am to 3pm. At certain times in construction, nighttime work may be performed between 3pm to 11pm and 11pm to 7am with differences and changes based on weather conditions and Project and contractor schedules. Additionally, work will be completed outside of the TOY restrictions, which are discussed in Table 6 below, and therefore the Proposed Project will not likely stop work during the winter due to the potential for barges to be used for material delivery and storage.

The contractor will be required to follow the sequencing in the contract documents. The contractor will determine the details of the sequencing activities and associated staging. Bridge construction will be carried out in five phases following site preparation and mobilization, which is estimated to take approximately four months, as shown in **Table 1**, below, and on **Figure A1** on page 10.

Table 1. Construction Sequence and Duration

Phase	Key Components	Estimated Duration (months)
Site Preparation & Mobilization	Signal duct banks, temporary control tower relocation, demolition of existing bridge foundations west of the bridges in use, western temporary trestle construction, early track and signal work	4
Bridge Phase 1	Demolition of Existing Tower A, Construction of Proposed Tower A, North Bank Bridge Modification, West Bridge north and south approach trestles and West Bridge vertical lift span, track and signal work in order to maintain service, one track on West Bridge brought into service	31
Bridge Phase 2	Construction of new south approach trestles between west and center bridges, track and signal work, second track on West Bridge brought into service	5
Bridge Phase 3	Eastern temporary trestle construction, Center Bridge demolition, Center Bridge new north approach trestle and vertical lift span, track and signal work, one track on Center Bridge brought into service	20
Bridge Phase 4	Construction of new south approach trestle between center and east bridges, track and signal work, second track on Center Bridge brought into service, demolition of west temporary trestle	9
Bridge Phase 5	East Bridge demolition, construction of East Bridge north approach trestles and East Bridge vertical lift span, track and signal work, East Bridge brought into service, demolition of east temporary trestle	27
	Total	**96**

Source: STV (Jan 2023)

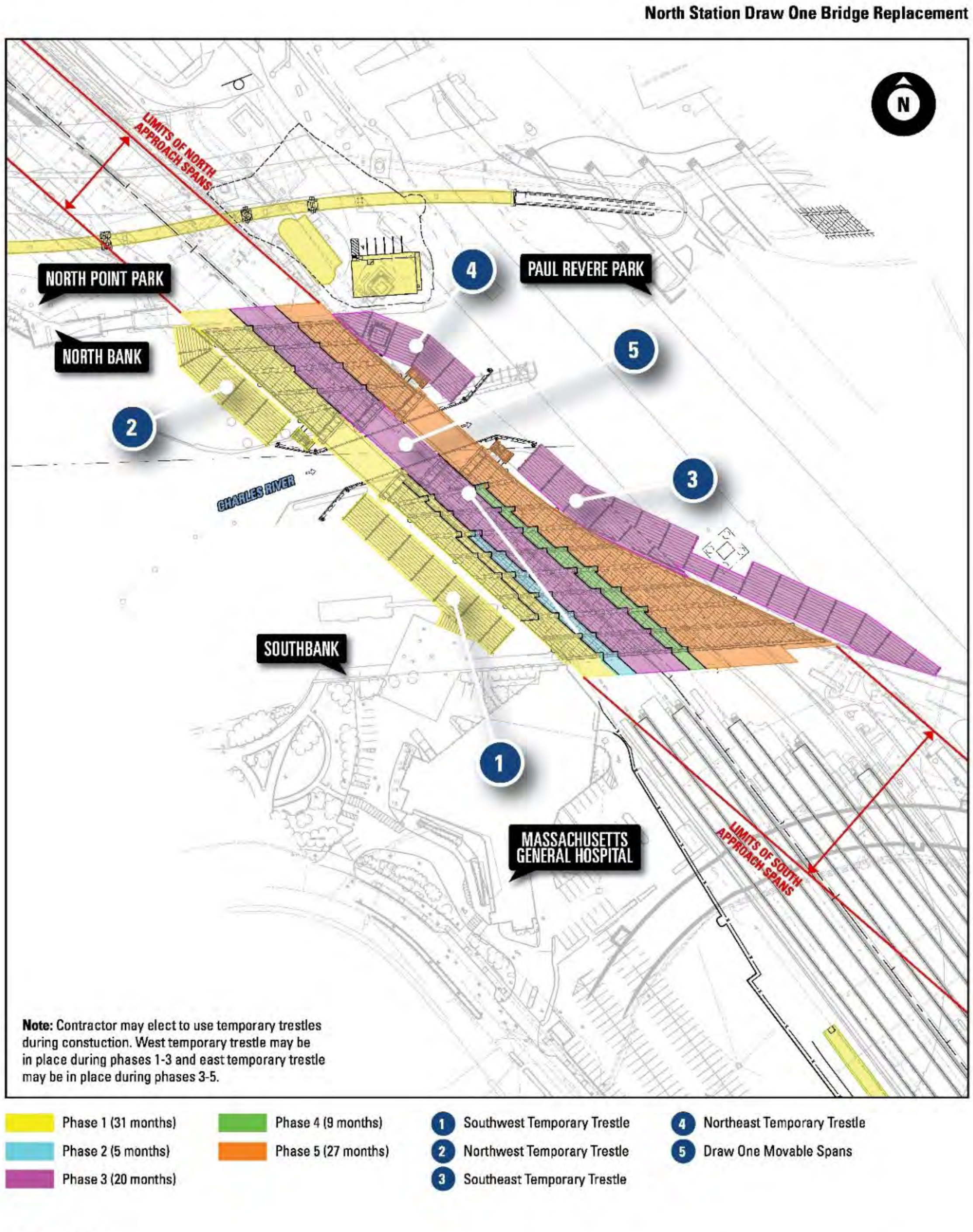


Figure A1: Bridge Construction Phases

Three pier foundations of the North Bank Pedestrian and Bicycle Bridge (North Bank Bridge) on MBTA right-of-way conflict with the Proposed Project construction. Existing piers 3, 4, and 5 of the North Bank Bridge are located on MBTA property, and one (Pier 3) conflicts with the Proposed Project. To allow for construction of the Proposed Project, the North Bank Bridge would be required to be raised 1 foot. This would entail relocating two bridge supports (existing Piers 3 and 4) and adding one additional support (Pier 4A), modifying the bridge truss structure, and modifying and lengthening the landings of the bridge within North Point Park and Paul Revere Park (Figure A2 on page 12 below).

Construction activities may occur up to seven days a week. Work shifts would be primarily during the daytime from 7am to 3pm. At certain times in the construction as defined by weather and the Project and contractor's schedule, nighttime work may be performed between 3pm to 11pm and 11pm to 7am.

Various construction activities when performed in a waterbody disturb the sediment on the bottom of the waterbody which mixes with the water, increasing the amount of sediment in the water. These activities are referred to as "silt producing" activities. Construction activities that disturb a relatively small amount of sediment are referred to as minor silt producing activities and those that disturb a relatively large amount of sediment are referred to as major silt producing activities.

For the Proposed Project, all major silt producing activities, such as pile (timber, steel, and sheet piles) removal, dredging of the channel/riverbed to realign the navigational channel with the new bridge structures, riverbed disturbance for removal of existing piles or caissons by cutting below the mudline, and removal of a bottom laid cable used for the existing bridge would be conducted outside of the prime TOY fisheries windows (February 15 to July 15 and September 1 to November 15) or with silt curtains. Per the Proposed Project contracting requirements, the specific construction methodologies will be developed by the contractor, and until that is known, a more specific schedule is not available.

2.2.2 Construction Access

The primary areas of construction within the Project Site are the Draw One Bridge, existing Signal Tower A, and the MBTA owned construction materials staging area and laydown site (T-Pad) in Somerville, Massachusetts **Figure A3** on page 14 below.

Access to the T-Pad is expected to occur throughout the Proposed Project and can be used for material deliveries that will utilize the existing tracks to make deliveries to the Project Site. Access to these primary construction areas will be accomplished through developed and/or disturbed areas via the following quadrants shown on **Figure 1** on page 2 and **Figure A1** on page 10 above:

- The Southwest Quadrant - access near Massachusetts General Hospital (MGH) allows access for construction of the Draw One Bridge Phases 1 through 3, west of the bridges currently in service. This area, proposed for use as construction access, is disturbed and currently comprises of the MGH, associated parking lots, and portions of North Station. The existing MGH ramp and dock into the river are proposed to be removed and reinstalled after construction is complete.

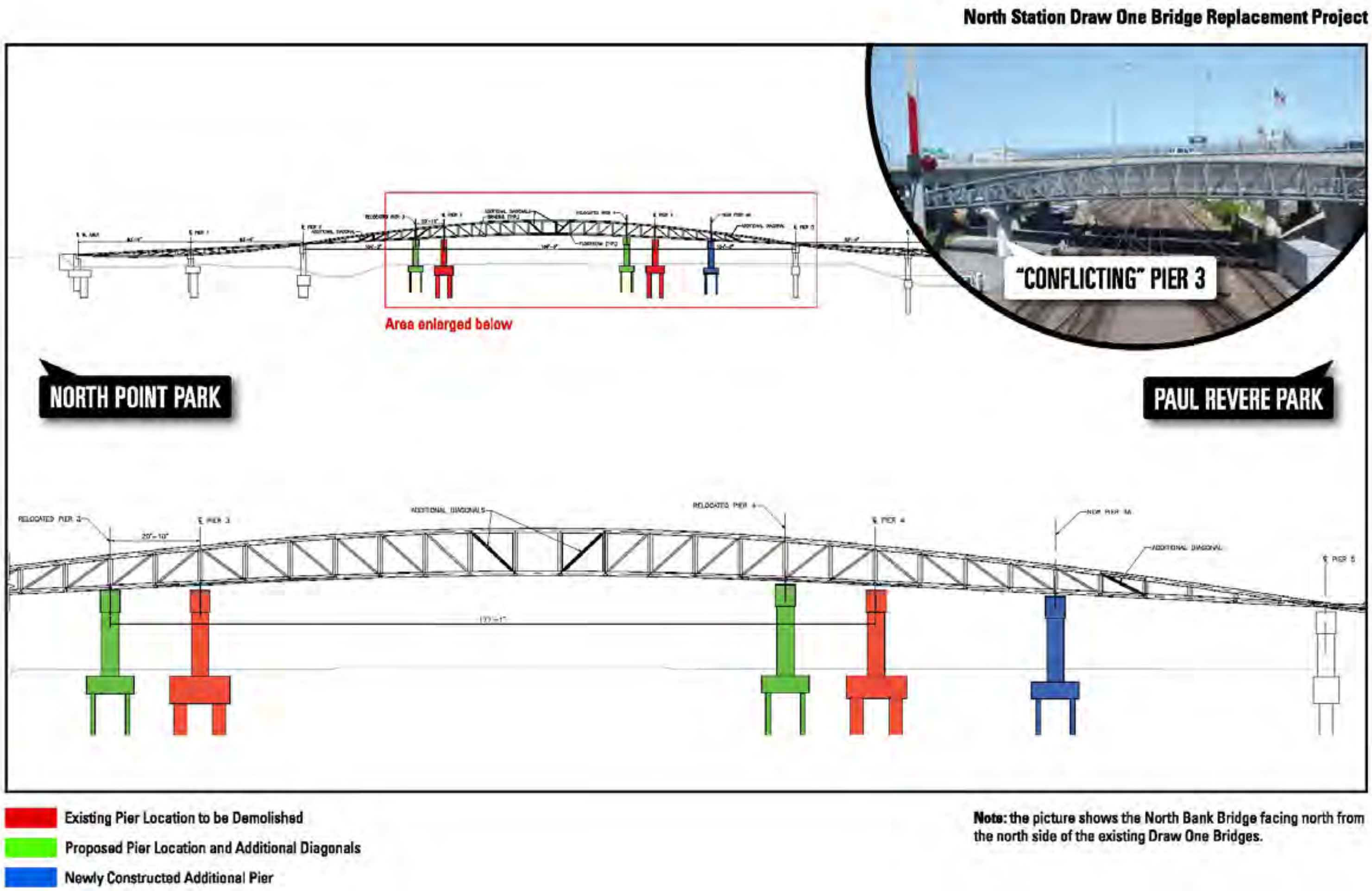


Figure A2: North Bank Bridge – Modifications

North Station Draw One Bridge Replacement Project

Figure A3: Construction Laydown Area – T-Pad

- The Northwest Quadrant - access to construct the Draw One Bridge Phases 1 through 3, the west end of the North Bank Bridge, and access to the mainline tracks up through the T-Pad. This area, proposed for use as construction access, is currently comprised of walking paths, as well as mowed and landscaped areas of the North Point Park; however, it has been historically disturbed by the construction and use of the previous rail bridges and tracks.
- The Southeast Quadrant - access to construct the Draw One Bridge Phases 3 through 5 (eastern bridge). This area, proposed for use as construction access, is disturbed and currently comprises of existing roadways and parking lots associated with the Charles River Dam and Locks and North Station.
- The Northeast Quadrant - access to construct the Draw One Bridge Phases 3 through 5 (eastern bridge), the replacement Tower A, the east end of the North Bank Bridge, and access to the T-Pad. This area, proposed for use as construction access, is currently comprised of walking paths and mowed and landscaped areas of the Paul Revere Park, as well as existing roadways which has been historically disturbed by the construction and use of the previous rail bridges and tracks.

2.3 Construction Overview

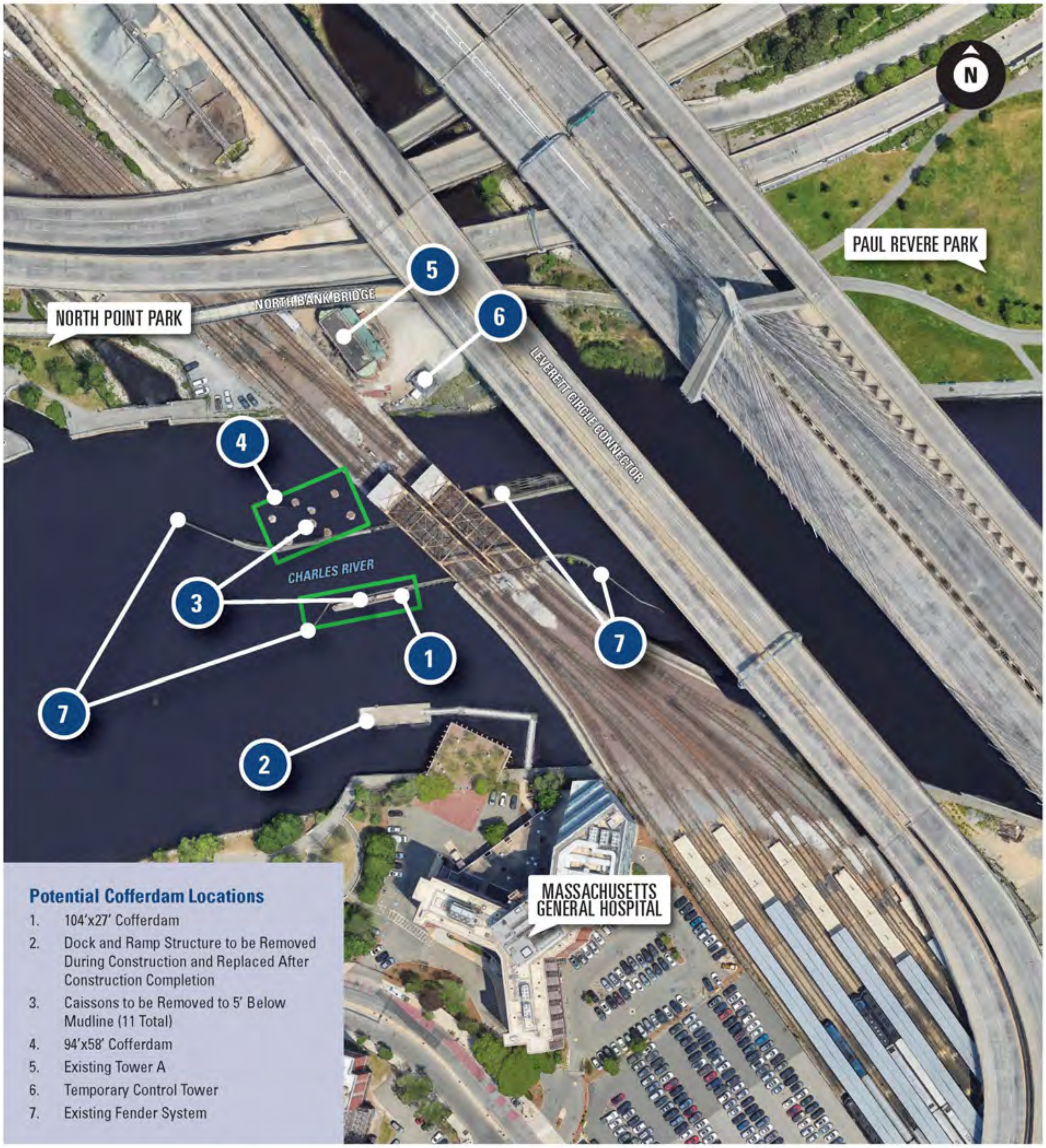
2.3.1 Substructures

Construction of the bridge substructures would comprise the installation of a combination of foundation types, including spread footings along the riverbanks and the following within the river: concrete-filled pipe piles, micropiles, composite fiberglass-reinforced piles, drilled shafts, and driven H-piles. In-river foundations would include a total of 12 drilled shafts, 321 concrete-filled pipe piles, and 39 micropiles. The navigational channel fender system associated with the bridge and the navigational channel would require 207 composite piles within the river. The North Bank Bridge modifications would require 16 micropiles on land. Tower A would require 65 driven H-piles on land.

2.3.2 Cofferdams

To support the removal of eleven caissons from the demolished bridge structures to the west of the existing Draw One Bridge, two cofferdams may be installed. One cofferdam, approximately 98 feet (29 meters) long by 58 feet (18 meters) wide, would encapsulate the set of eight caissons on the north side of channel (Location 4 on **Figure A4** on page 17). A second cofferdam, approximately 104 feet (32 meters) long by 27 feet (8 meters) wide, would encapsulate the three caissons on the south side of channel with the concrete cap on top which connects all three of the caissons (Location 1 on **Figure A4** on page 17). If used, it is expected that the cofferdams be in the water for approximately four months while the caissons within the cofferdams are removed. Please see Section 2.4.1.1 below for more information on caisson removal and **Table 4** below for more information on sheet piles.

North Station Draw One Bridge Replacement



Note: Contractor may elect to use Cofferdams as shown to assist in the demolition of remaining caissons and piers.

Figure A4: Potential Cofferdam Locations

2.3.3 Temporary Trestles and Barges

Construction work activities for each bridge structure would begin simultaneously at multiple locations, starting with the construction of temporary work trestles to drive piles using barge-mounted equipment. Four temporary work trestles for materials and equipment would then be constructed, two on the east side and two on the west side of the Project Site (**Figure A5** on page 19 and **Figure A6** on page 20). Each trestle could be in place for approximately six years. The temporary work trestles are expected to have an overwater length of up to 1,000 feet (305 meters) in total, with individual lengths ranging from 150 feet (45 meters) to 465 feet (142 meters) and a width of 40 feet (12 meters); they would be placed as shown on **Figure A5** on page 19 and **Figure A6** on page 20. The use of several barges is anticipated for the construction of the temporary trestles, drilled shafts, caps, and piers (**Figure A5** on page 19 and **Figure A6** on page 20). Barges may also be used for mounted cranes, storage barges, and material delivery. Precast concrete, steel reinforcement bars, structural steel members, and machinery components may be transported to the Project Site by barge.

Drilled shaft construction for lift span piers could begin concurrently and be performed using barge-mounted equipment or trestle-supported equipment. The abutments and approach trestle piles would be constructed using equipment mounted on the work trestles or located on constructed portions of each proposed bridge structure.

2.3.4 Land-Side Structures

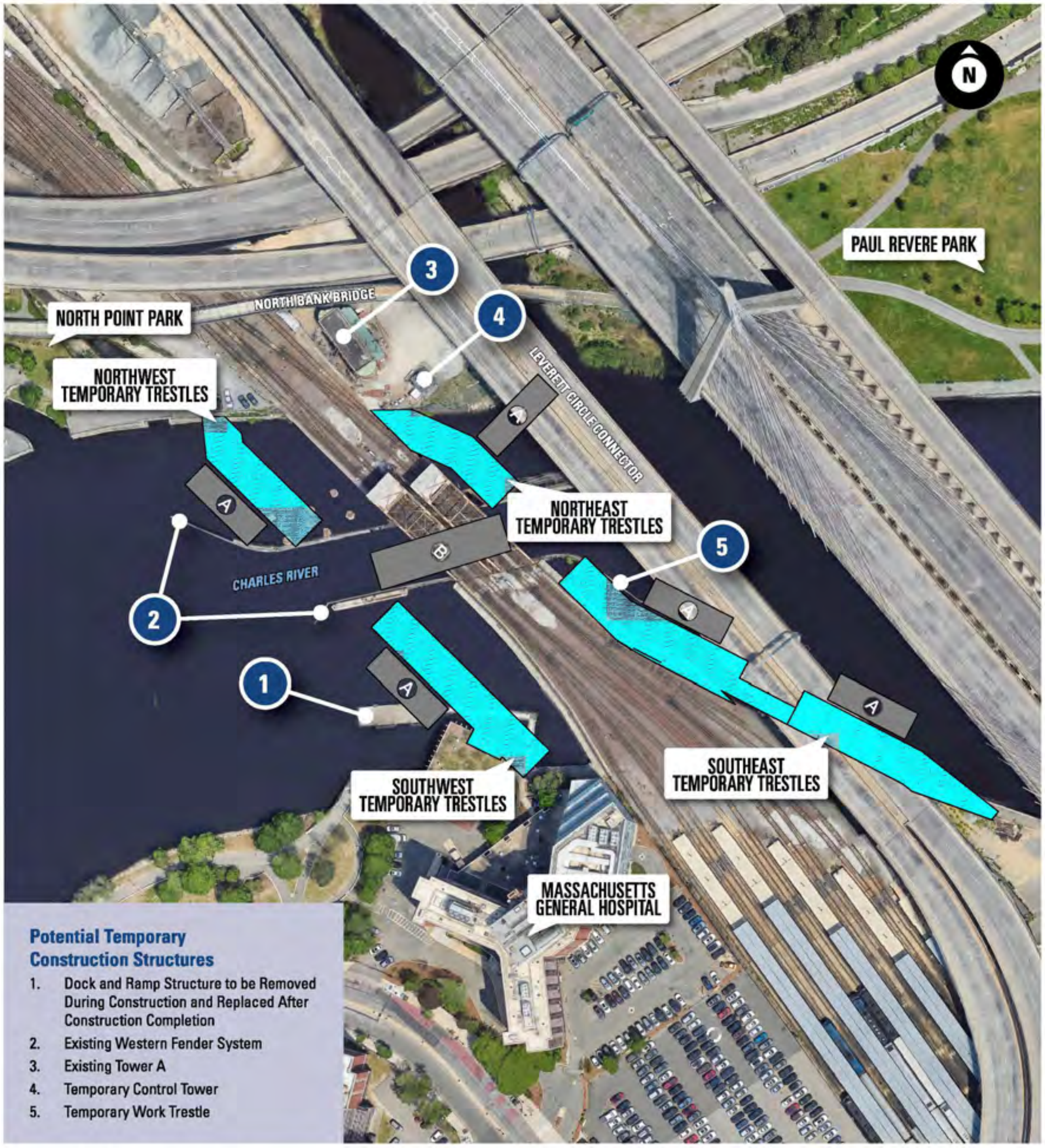
As currently contemplated, Phase 1 work activities would include demolition of the original unused Tower A, relocating the existing temporary Tower A onto the Northeast Temporary Trestle structure which will be installed in the river adjacent to the existing north bank seawall, and construction of a new Tower A (**Table 1**). Foundation work would comprise the installation of test pits to determine the extent of the existing seawall landward and the installation of driven piles with land-side equipment. Phase 1 would include the installation of a water detention system below the proposed parking lot at the new Tower A site and a new waterline utility using jack and bore methods beneath the MBTA tracks adjacent to the Tower A site.

Modification of the North Bank Bridge is assumed to start during Phase 1 of construction. New foundations for the relocated Pier 3, relocated Pier 4, and new Pier 4A would consist of the installation of micropiles from ground supported equipment. The North Bank Bridge superstructure would be raised approximately one foot in height to allow for the additional track to be constructed under this bridge. Additional work would consist of regrading the approach pathways at each end of the North Bank Bridge after it is raised and adjusting the drainage structures (**Figure A2** on page 12).

2.3.5 Superstructure

Superstructures of the new bridge structures would be erected from the temporary work trestles in Phases 1, 2, 4, and 5. Phase 3, the new eastern bridge, would be constructed from a combination of the already-constructed bridge and the temporary work trestles. Materials delivery would primarily be by barge or rail; materials would be stored at the T-Pad, on barges, or on the temporary trestle system.

North Station Draw One Bridge Replacement

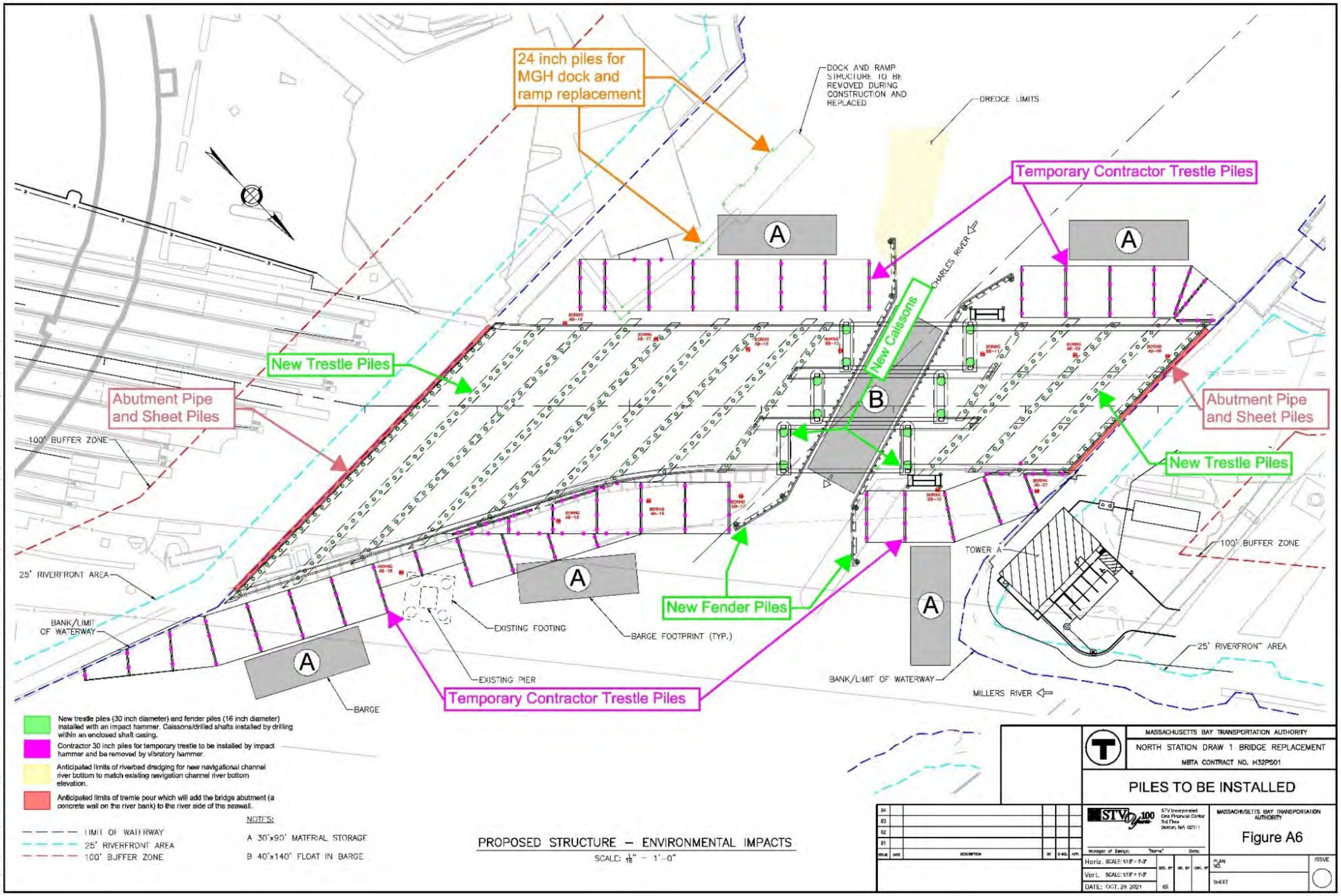


A Barge for Material Delivery and Storage

B Barge for Float-out of Existing Spans (Temporary Channel Closure)

Note: Contractor may elect to use temporary trestles and barges during construction. All of the barges and temporary trestles shown are underneath the elevated overhead structures.

Figure A5: Temporary Trestles with Barges


24 inch piles for MGH dock and ramp replacement
DOCK AND RAMP STRUCTURE TO BE REMOVED DURING CONSTRUCTION AND REPLACED
DREDGE LIMITS
Temporary Contractor Trestle Piles
CHARLES RIVER
New Caissons
New Trestle Piles
Abutment Pipe and Sheet Piles
100' BUFFER ZONE
25' RIVERFRONT AREA
BANK/LIMIT OF WATERWAY
EXISTING FOOTING
BARGE FOOTPRINT (TYP.)
EXISTING PIER
New Fender Piles
TOWER A
BANK/LIMIT OF WATERWAY
MILLERS RIVER
BARGE
A
B
New trestle piles (30 inch diameter) and fender piles (16 inch diameter) installed with an impact hammer. Caissons/drilled shafts installed by drilling within an enclosed shaft casing.
Contractor 30 inch piles for temporary trestle to be installed by impact hammer and be removed by vibratory hammer.
Anticipated limits of riverbed dredging for new navigational channel river bottom to match existing navigation channel river bottom elevation.
Anticipated limits of tremie pour which will add the bridge abutment (a concrete wall on the river bank) to the river side of the seawall.
LIMIT OF WATERWAY
25' RIVERFRONT AREA
100' BUFFER ZONE
NOTES:
A 30'x90' MATERIAL STORAGE
B 40'x140' FLOAT IN BARGE
PROPOSED STRUCTURE – ENVIRONMENTAL IMPACTS
SCALE: 1/16" = 1'-0"
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
PILES TO BE INSTALLED
Figure A6
DATE: OCT. 29 2021

2.3.6 Demolition of Remaining Movable Span Structures and Tower A

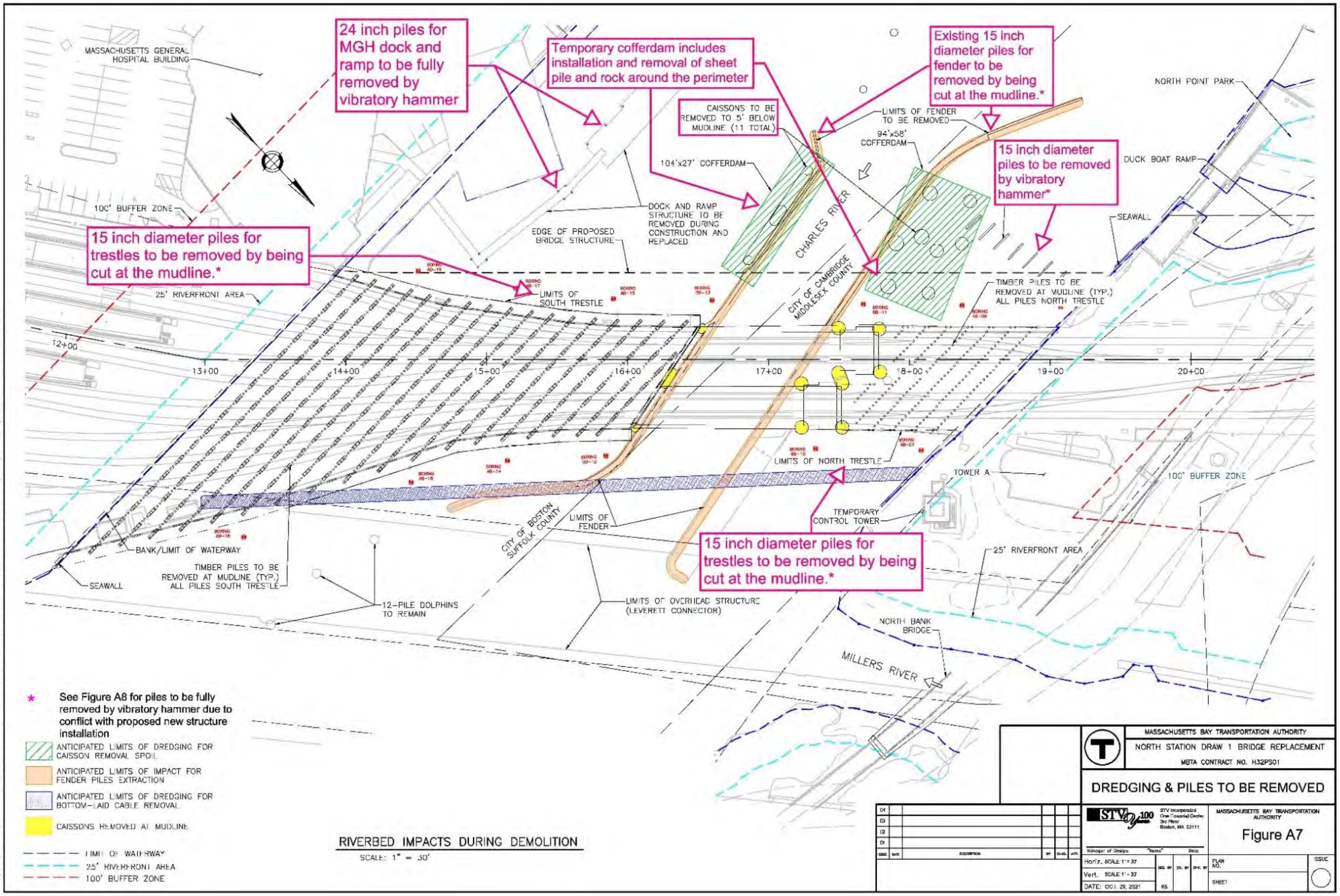
Demolition of the original Tower A would include abatement of existing hazardous materials and relocation of any remaining electrical and bridge operation related services out of Tower A so existing equipment can be decommissioned. Selective demolition will be used to remove the existing Boston and Maine cast stone sign from the façade along with any other elements that may be used in the mitigation measures undertaken pursuant to Section 106 of the National Historic Preservation Act of 1966 Memorandum of Agreement. Shielding will be erected to protect the tracks, existing signal equipment, and the North Bank Bridge. Traditional demolition methods would then be used to demolish the building and foundation, which may include excavators, demolition hammers, and steel shears.

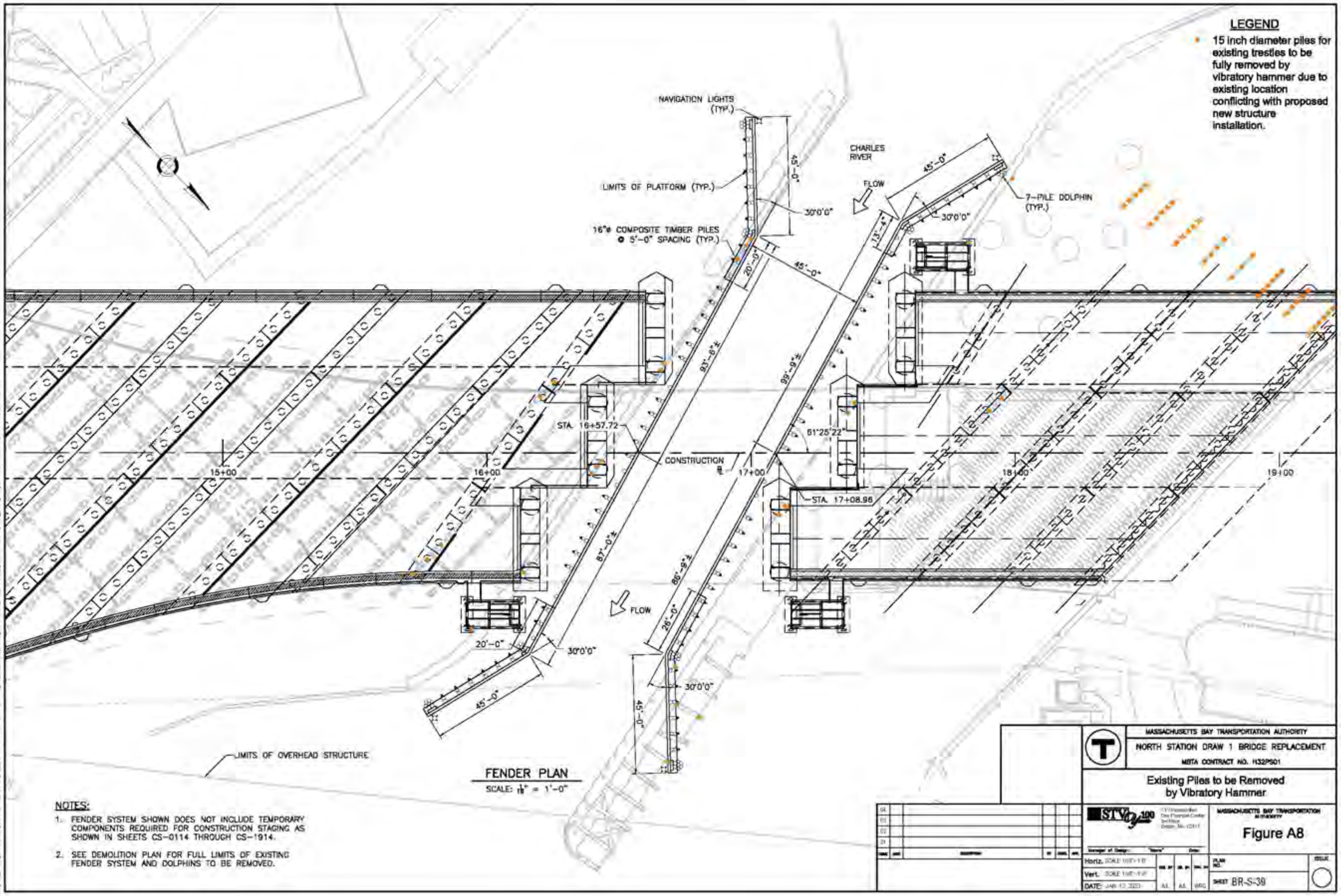
Foundations for the existing Draw One Bridge that would be demolished with the Proposed Project include 25 piers and 21 caissons, as well as the navigational channel fender system and Tower A.

Demolition of the remaining operational Draw One Bridge movable span structures would likely entail removing the counterweight and machinery room and transporting them to the existing Tower A site for demolition using self-propelled modular transporters (SPMTs), which are multi-axle trailers designed for large and heavy cargoes. The existing trusses would be cut apart and portions removed by crane, and remaining portions floated out on a barge. Existing caissons outside of the navigable channel would be demolished down to the mudline by wire saw cutting, cutting torches, or other mechanical means chosen by the contractor. Caissons within the proposed navigational channel would be demolished down to five feet below the proposed channel elevation. Caisson demolition is anticipated to be performed by wire-saw cutting and removing sections of each caisson. Alternate methods could include the use of silt curtains and demolition hammers.

Demolition of the south approach trestle would entail cutting the existing deck precast panels at the original construction joints and removing sections of the deck. Pier caps would have areas of local demolition so sections could be removed. Where original timber piles were grouted into the pier caps, the tops of piles would be cut to facilitate pile cap removal. Timber piles would be cut off at the mudline, except at locations where they would conflict with the proposed foundations, in which case they would be extracted. Approximately 1,380 timber piles would be cut off at the mudline and 20 piles would be extracted at the existing south approach trestles (**Figure A7** on page 23).

Demolition of the operational north approach trestle and navigational channel fender would consist of removal of deck timber and timber pile caps prior to cutting timber piles off at the mudline. Where timber piles conflict with the proposed foundations, the piles would be extracted. Where piles would be located in the proposed channel, the piles would be cut off five feet below the mudline. Approximately 560 piles would be cut off at or below the mudline and 50 piles would be extracted at the operational north approach trestles and existing navigational channel fender system (**Figure A7** on page 23 and **Figure A8** on page 24).


24 inch piles for MGH dock and ramp to be fully removed by vibratory hammer
Temporary cofferdam includes installation and removal of sheet pile and rock around the perimeter
Existing 15 inch diameter piles for fender to be removed by being cut at the mudline.*
15 inch diameter piles to be removed by vibratory hammer*
15 inch diameter piles for trestles to be removed by being cut at the mudline.*
15 inch diameter piles for trestles to be removed by being cut at the mudline.*
MASSACHUSETTS GENERAL HOSPITAL BUILDING
100' BUFFER ZONE
25' RIVERFRONT AREA
CAISSONS TO BE REMOVED TO 5' BELOW MUDLINE (11 TOTAL)
104'x27' COFFERDAM
94'x58' COFFERDAM
LIMITS OF FENDER TO BE REMOVED
NORTH POINT PARK
DUCK BOAT RAMP
SEAWALL
DOCK AND RAMP STRUCTURE TO BE REMOVED DURING CONSTRUCTION AND REPLACED
EDGE OF PROPOSED BRIDGE STRUCTURE
CHARLES RIVER
CITY OF CAMBRIDGE MIDDLESEX COUNTY
CITY OF BOSTON SUFFOLK COUNTY
LIMITS OF SOUTH TRESTLE
LIMITS OF NORTH TRESTLE
TIMBER PILES TO BE REMOVED AT MUDLINE (TYP.) ALL PILES NORTH TRESTLE
TIMBER PILES TO BE REMOVED AT MUDLINE (TYP.) ALL PILES SOUTH TRESTLE
TOWER A
TEMPORARY CONTROL TOWER
LIMITS OF FENDER
BANK/LIMIT OF WATERWAY
12-PILE DOLPHINS TO REMAIN
LIMITS OF OVERHEAD STRUCTURE (LEVERETT CONNECTOR)
NORTH BANK BRIDGE
MILLERS RIVER
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
* See Figure A8 for piles to be fully removed by vibratory hammer due to conflict with proposed new structure installation
ANTICIPATED LIMITS OF DREDGING FOR CAISSON REMOVAL SPOIL
ANTICIPATED LIMITS OF IMPACT FOR FENDER PILES EXTRACTION
ANTICIPATED LIMITS OF DREDGING FOR BOTTOM-LAID CABLE REMOVAL
CAISSONS REMOVED AT MUDLINE
LIMIT OF WATERWAY
25' RIVERFRONT AREA
100' BUFFER ZONE
RIVERBED IMPACTS DURING DEMOLITION
SCALE: 1" = 30'
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
DREDGING & PILES TO BE REMOVED
Figure A7
DATE: OCT. 29, 2021


LEGEND
15 inch diameter piles for existing trestles to be fully removed by vibratory hammer due to existing location conflicting with proposed new structure installation.
NAVIGATION LIGHTS (TYP.)
LIMITS OF PLATFORM (TYP.)
16"φ COMPOSITE TIMBER PILES @ 5'-0" SPACING (TYP.)
CHARLES RIVER
FLOW
7-PILE DOLPHIN (TYP.)
STA. 16+57.72
STA. 17+08.96
CONSTRUCTION ℄
15+00
16+00
17+00
18+00
19+00
LIMITS OF OVERHEAD STRUCTURE
FENDER PLAN
SCALE: 1/16" = 1'-0"
NOTES:
1. FENDER SYSTEM SHOWN DOES NOT INCLUDE TEMPORARY COMPONENTS REQUIRED FOR CONSTRUCTION STAGING AS SHOWN IN SHEETS CS-0114 THROUGH CS-1914.
2. SEE DEMOLITION PLAN FOR FULL LIMITS OF EXISTING FENDER SYSTEM AND DOLPHINS TO BE REMOVED.
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
Existing Piles to be Removed by Vibratory Hammer
Figure A8
BR-S-39

2.3.7 Construction Staging Areas

Construction staging areas, also referred to as “laydown areas,” are sites used for storage of materials or equipment, assembly, or other temporary construction-related activities. Staging areas are typically fenced for security and to protect the public, have gates to allow vehicle access, take deliveries, and are often lighted for security. Staging areas of adequate size and proximity to the work activities are essential to support construction activities.

One construction staging area is an existing MBTA commuter rail material storage yard and maintenance staging area known as the “T-Pad.” The T-Pad is located at 28 Inner Belt Road, in Somerville, Massachusetts, which is north approximately 5,000 feet on rail from the center of the Charles River (**Figure A3** on page 14 above).

The T-Pad site currently contains a bridge and building shop as well as track material storage and MBTA Operations staging area to support MBTA Commuter Rail maintenance, but these uses would be temporarily relocated during Proposed Project construction. The T-Pad yard has a direct connection into the existing track network throughout the Project Site. The site’s rail proximity would allow for equipment to get on and off rail on uncontrolled track, thereby not delaying MBTA Commuter Rail operations. This close proximity also enables ballast cars and flat cars to be loaded to move track materials from the laydown area to the project construction sites.

Additional laydown areas would be located in construction zones based on the track phasing. During the construction of the movable spans, the two tracks that connect to the bridge under construction, immediately north of the bridges, would be out of service and can be used for onsite laydown areas during each phase.

If the construction contractors choose to use staging areas that differ from those identified herein, they will be required to obtain all the necessary permits and approvals from federal, state and local regulatory agencies. This would include any remote staging areas for loading barges with material and equipment, or for partial preassembly.

2.4 In-water Construction Details

The overall footprint within which bottom disturbance could occur is shown in **Figure 2** on page 3 above.

2.4.1 Demolition

The existing bridge superstructure would be sequentially demolished using cranes mounted on the temporary trestle and/or barges. This section of the bridge currently above the water will be kept above the water throughout demolition. In-water demolition activities are described below.

2.4.1.1 Caisson Removal

To remove the foundations/caissons of the currently unused bridge structures within the navigational channel, sediment would be excavated to a depth of five feet below mudline, while caissons at the bridge would be cut at the mudline to minimize sediment disturbance. Wire saw cutting, cutting torches, or other mechanical means would be used to cut metal and pneumatic hammers or other tools chosen by the contractor would be used to break up and remove the concrete.

Two cofferdams may be installed to support caisson removal. One approximately 98-foot by 58-foot cofferdam would surround the set of eight caissons on north side of channel, and a second approximately 104-foot by 27-foot cofferdam would encapsulate the three caissons that supported the "rest piers" on south side of channel. Cofferdam installation using a vibratory hammer or impact hammer would be conducted from a barge prior to the construction of the temporary trestle and would take approximately one week. The cofferdams would not be dewatered but would be closed to contain debris and disturbed sediment. Cofferdam sheet piles would also be removed via vibratory or impact hammer. As needed, silt curtains or other methods of minimizing sediment dispersal would be installed around the cofferdams during their removal. It is anticipated that each cofferdam would be in place for approximately four months during the Site Preparation and Mobilization construction phase.

2.4.1.2 Timber and Steel Pile Removal

Timber piles would be removed by cutting the piles three feet below the mudline or defined bottom channel. Full removal would be undertaken where piles conflict with the proposed structure and the remaining piles would be cut at the mudline and placed on a barge for upland disposal (**Figure A7** on page 23). A pneumatic shear would cut the pile, while an excavator or other device with a grapple would connect to the pile and lift it out of the water and onto a barge. If positioning pneumatic shear equipment for cutting steel is determined to be difficult, piles may be cut using a thermal or arc process or mechanical methods. Piles would be properly disposed of or considered for reuse (e.g., dried, chipped and used for biofuel). See **Table 2** for details on the timber and steel pile removal.

Table 2. Removals by Vibratory Hammer

Figure No.	Structure (action)	Size & Diameter	Duration of Work	Technique
A7	48 Existing Bridge Trestle piles removed	• 15" diameter • timber	• 15 days to remove all ~86 piles in this table	• 3 to 6 piles per day • 30 minutes of vibratory hammer per pile
A6	22 Existing Navigational Fender piles removed	• 15" diameter • timber		
A6	16 MGH dock and ramp piles removed	• 24" diameter (conservative est.) • Steel or fiberglass		

2.4.1.3 Bottom-laid Cable Removal

While the cable comprises a bottom-laid system on the riverbed, portions of the cable may have settled into the underlying sediments. Therefore, cable removal may require excavation of any overlaying sediments to a sufficient depth to either expose the cable or allow it to be pulled out of a partially excavated trench. The removed cable would be placed on a barge for proper upland disposal or recycling.

2.4.2 Dredging

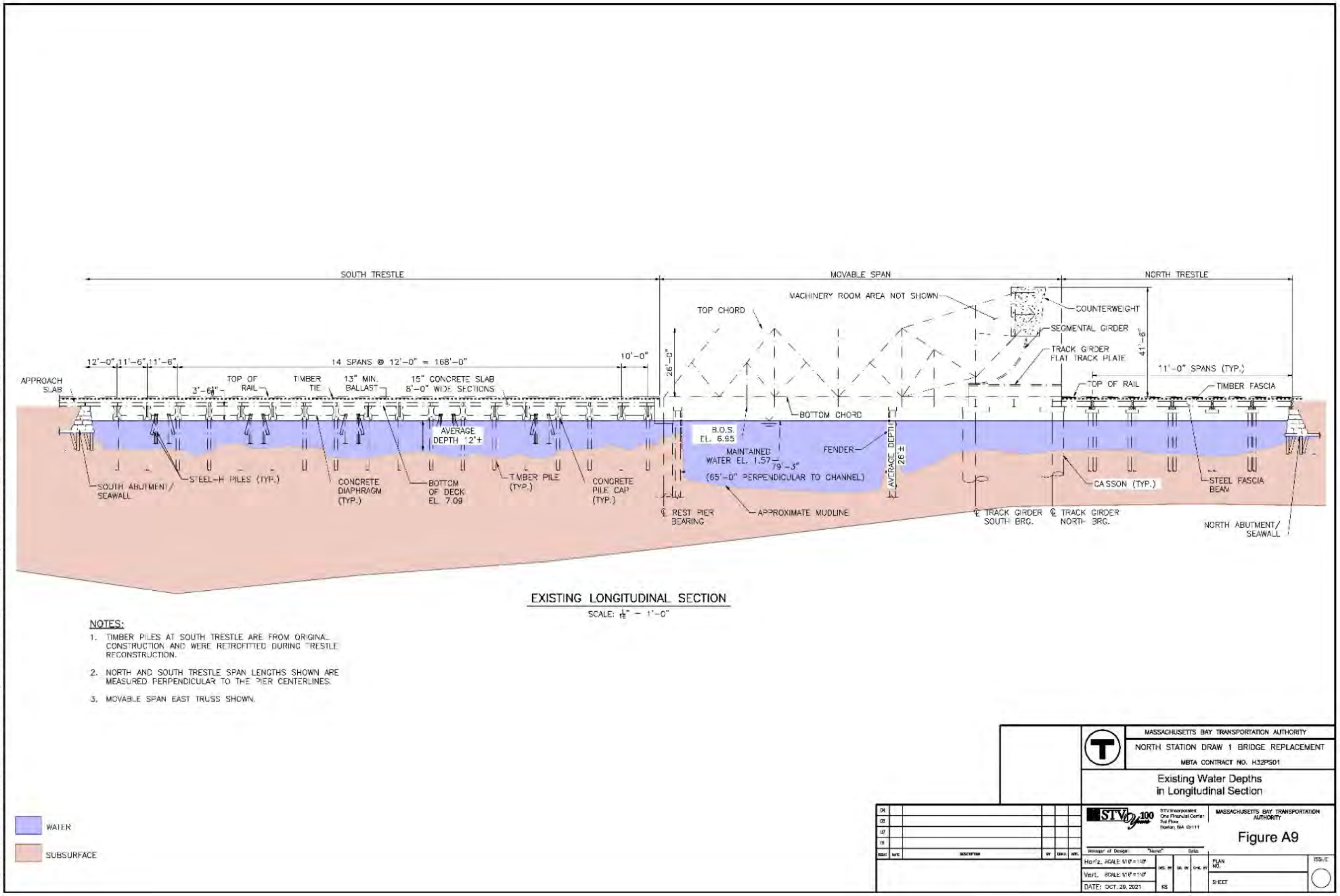
This section describes all activities that remove structures or soil from the riverbed.

Dredge volume includes the volume of existing piles and structures removed in addition to removed sediments. The estimated dredge volume associated with bridge and approach trestle demolition and construction totals 2,689 cubic yards of riverbed material (**Figure A7** on page 23 and **Figure A8** on page 24). Volumes of sediment to be dredged by project stage is presented in **Table 3**. The estimated fill volume for drilled shafts is 1,487 cubic yards (**Figure A6** on page 20). The estimated total temporary surface area disturbance of the riverbed associated with Proposed Project demolition and construction is 30,912 square feet (0.71 acres), and the estimated total area of permanent fill to be placed in the riverbed from all construction activity is 11,411 square feet (0.26 acres).

Dredging would involve removing underwater sediment via barge-mounted bucket excavator or clamshell dredge. Excavated sediment would be loaded onto containment barges for proper disposal, most likely at a contained landfill suitable for receipt of contaminated soils.

Sediment-disturbing activities during Proposed Project demolition and construction would include:

1. Existing structure demolition
    a. Demolition of existing caissons (21 total: 11 for previous bridges not in service, 10 for current bridges in service), including the optional installation of temporary cofferdams around previous bridge caissons as determined by the contractor.
    b. Pile extraction and/or cutting of existing MGH dock and ramp, bridge trestles, and navigational channel fender system piles (**Figure A4** on page 17**, Figure A6** on page 20, **Figure A7** on page 23, and **Figure A9** on page 28)
    c. Bottom-laid cable removal.
2. Proposed structure construction
    a. Installation of temporary work trestle system
    b. Construction of proposed bridge drilled shafts and trestle piles, MGH dock and ramp replacement piles, and navigational channel fender piles.
    c. Existing riverbed dredging - Dredging is proposed for areas outside of the proposed fender system that now may be in the assumed travel path for vessels traversing the channel and are no longer protected by the existing fender to ensure the required depth of the navigational channel.
    d. Construction of the king (sheet) pile abutments along the north and south seawalls
3. Proposed temporary structure demolition impacts.
    a. Temporary work trestle piles extraction


SOUTH TRESTLE
MOVABLE SPAN
NORTH TRESTLE
MACHINERY ROOM AREA NOT SHOWN
TOP CHORD
COUNTERWEIGHT
SEGMENTAL GIRDER
TRACK GIRDER
FLAT TRACK PLATE
41'-6"
12'-0" 11'-6" 11'-6"
14 SPANS @ 12'-0" = 168'-0"
10'-0"
26'-0"
11'-0" SPANS (TYP.)
APPROACH SLAB
3'-6"
TOP OF RAIL
TIMBER TIE
13" MIN. BALLAST
15" CONCRETE SLAB 8'-0" WIDE SECTIONS
TOP OF RAIL
TIMBER FASCIA
BOTTOM CHORD
AVERAGE DEPTH 12'±
B.O.S. EL. 6.95
MAINTAINED WATER EL. 1.57
79'-3"
(65'-0" PERPENDICULAR TO CHANNEL)
FENDER
AVERAGE DEPTH 26'±
SOUTH ABUTMENT/ SEAWALL
STEEL-H PILES (TYP.)
CONCRETE DIAPHRAGM (TYP.)
BOTTOM OF DECK EL. 7.09
TIMBER PILE (TYP.)
CONCRETE PILE CAP (TYP.)
℄ REST PIER BEARING
APPROXIMATE MUDLINE
℄ TRACK GIRDER SOUTH BRG.
℄ TRACK GIRDER NORTH BRG.
CASSON (TYP.)
STEEL FASCIA BEAM
NORTH ABUTMENT/ SEAWALL
EXISTING LONGITUDINAL SECTION
SCALE: 1/16" = 1'-0"
NOTES:
1. TIMBER PILES AT SOUTH TRESTLE ARE FROM ORIGINAL CONSTRUCTION AND WERE RETROFITTED DURING TRESTLE RECONSTRUCTION.
2. NORTH AND SOUTH TRESTLE SPAN LENGTHS SHOWN ARE MEASURED PERPENDICULAR TO THE PIER CENTERLINES.
3. MOVABLE SPAN EAST TRUSS SHOWN.
WATER
SUBSURFACE
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
Existing Water Depths in Longitudinal Section
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
Figure A9
DATE: OCT. 29, 2021

A summary of the dredging and fill estimates for the various elements of the Project is provided in **Table 3**, below.

Table 3. Dredge/Excavation Volumes and Surface Area Permanent Impacts Associated with the Draw One Bridge Replacement

Figure No.	In Water Activity (Below MHW/OHW)*	Demolition (D) and Construction (C) Impacts			
		Dredge Volume (CY)	Fill Volume (CY)	Temporary Riverbed Disturbance (SF)	Perm Fill in Riverbed (SF)
Demolition					
A4 & A7	Removal of Caissons from Bridge Not In Service[1]	386	0	694	0
A7	Removal of Bridge Trestle and Fender Timber Piles (16-inch) & Trestle Steel H-piles (piles cut off)	1567	0	11,122	0
A7 & A8	Removal of Timber Trestle Piles (piles extracted)[3,5]	143	0	86	0
A4 & A7	Removal of Caissons from Bridge Not In Service with Optional Cofferdams and Bridges In Use[2]	500	0	8,260	0
A7	Bottom-Laid Cable Removal	10	0	3,800	0
A7	MGH Dock and Ramp 24-inch Pile Removal	84	0	50	0
	Total for Demolition (6 lines above)	2,689	0	24,012	0
Construction					
A6	Drilled Shafts[4]	941	1,487	0	462
A6	Micropiles for King Pile Abutment	77	96	0	35
A6	New Bridge 30-inch Trestle Piles and 16-inch Navigational Channel Fender Piles	0	1,149	0	1,865
A6	Temporary Work Trestle 30-inch Pile Installation[6]	0	900	1,600	0
A6	Riverbed Dredging to get Navigational Channel to Correct Depth	220	0	3,700	0
A6	Tremie Pour Behind King Pile Abutment North and South Seawalls[7]	0	1,200	0	9,000
A6	MGH Dock and Ramp 24-inch Pile Replacement	0	84	0	50
	Construction (7 lines above)	1,238	4,915	5,300	11,411
Additional Demolition					
A6	Temporary Work Trestle 30-inch Pile Extraction[8]	900	0	1,600	0
Total Loss or Alteration of Resource Area		**4,827**	**4,915**	**30,912**	**11,411**

Table 3. Dredge/Excavation Volumes and Surface Area Permanent Impacts Associated with the Draw One Bridge Replacement

Figure No.	In Water Activity (Below MHW/OHW)*	Demolition (D) and Construction (C) Impacts			
		Dredge Volume (CY)	Fill Volume (CY)	Temporary Riverbed Disturbance (SF)	Perm Fill in Riverbed (SF)
Combined Total		9,742		42,323	
Total with added 10% Dredge Volume and Fill Area Factor of Safety for Permitting Purposes		10,716		46,555	

[1] Cut at mudline. Existing piles and caissons not located where new construction is proposed are to be removed at the mudline (dredging impact = 0).
[2] Existing caissons within the proposed navigational channel are to be removed 5 feet below mudline at 1:3 slope.
[3] Existing piles located where new construction is proposed are to be removed using vibratory hammer extraction method.
[4] Drilled shafts assumed to extend 60 feet below mudline.
[5] Includes North & South Approach Trestles. Piles assumed to extend 25 feet below mudline.
[6] Layout of temporary work trestle may change based on contractor approach to Project construction, to be determined. Impacts are multiplied by 2 due to uncertainty in the final layout.
[7] Assumes no fill below mudline for tremie pour.
[8] Volume of temporary trestle piles removed; surface area included in Figure A7 on page 23. Removal assumed to use vibratory hammer extraction method. Impacts are multiplied by 2 due to uncertainty in the final layout.

*These activities are not changing the nature of the land. The final conditions would be essentially the same as existing conditions.

2.4.2.1 Drilled Shaft Installation

The movable span would be supported on piers, which in turn would be supported on concrete drilled shafts installed through the sediment directly into bedrock. Each of the 12 drilled shafts would be 7 feet in diameter. Other than a momentary disturbance when each casing is first lowered onto the channel bottom, sediment disturbance during installation would only occur within the enclosed shaft casing. The casing is essentially the formwork for the concrete drilled shaft, and both the casing and drilled shaft would be permanent.

During drilling activity within the shaft, sediments would be moved within and up the casing to the drilling equipment, and would not enter the water. As the drilling continues, the casing would continue to advance downward into the sediment until the casing is seated on bedrock. A rock socket would then be drilled into the bedrock in a similar manner. Concrete would be pumped into the casing to finish construction of the drilled shaft. Concrete placement for the proposed drilled shafts would be undertaken using a pump truck on a temporary trestle. See **Figure A10** on page 32 below for the Proposed Water Depths in Longitudinal Sections.

2.4.2.2 King Pile Abutment

King pile abutment installation would comprise installing pipe piles with sheet piles between them, both driven beyond the mudline to form a wall structure. A concrete abutment cap would be cast on top of the wall created by the pipe and sheet piles and concrete would be placed between the sheet pile and pipe pile wall and abutment cap and the existing seawall using the tremie pour technique to reduce concrete washout from the surrounding water. The tremie pour will also allow concrete to fill underneath the existing seawall extending the seawall. The extended seawall and sheet pile and pipe pile wall formed together with the concrete would comprise the abutment portion of the bridge on the riverbank. Pipe piles and sheet piles would be driven by pneumatic hammer or vibratory hammer, or a combination of both, depending on subsurface conditions.

Additional information on the pipe and sheet piles for the king pile abutment is in **Table 4** and **Figure A10** on page 32 below.

2.4.2.3 Fender, Trestle Piles, and Temporary Piles Installation

The proposed fender system would line both sides of the navigational channel under the bridge, acting as a "guard rail" for boats, barges, and other vessels to help avoid collisions into, or allisions with, the new bridge that would compromise its structural integrity and damage vessels. Twelve seven-foot-diameter drilled shafts are proposed for the new bridge structures. The proposed fenders would be made up of 207 sixteen-inch diameter composite piles. 321 30-inch-diameter piles and 39 13-inch-diameter micropiles for the approach trestles would be driven to an adequate depth to provide the required lateral capacity for the new bridge structures. 16 24-inch steel piles would be installed to support the replacement MGH ramp and dock (**Figure A6** on page 20). A quantity of 167, thirty-inch diameter piles would be driven to provide temporary trestles for the required load capacity to support the contractor's equipment. As identified below in **Table 4**, piles will be driven either by a crane mounted pneumatic hammer or vibratory hammer. See **Table 4** for details on the installation of navigational channel fender piles, approach trestle piles, and temporary contractor trestle piles.

The temporary work trestles will be removed towards the end of construction once they are no longer required to support construction (**Figure A5** on page 19 and **Figure A6** on page 20). See **Table 5** for details on the removal of the temporary trestle piles post construction.

2.4.2.4 Pier Caps

Prefabricated steel/concrete formwork frames would be installed on the drilled shafts and act as the form for the pier caps. Concrete placement for the pier caps above mean high water (MHW) would likely be performed using a concrete pump truck.

2.5 Vessel Activity

While not definitive since a construction contractor has not been selected, construction is likely to primarily involve barges and tugboats, small work boats (25 feet in length), and occasional shallow draft material supply vessels operating between staging areas and the Project Construction Site. In most instances, construction support vessels coming from Boston Harbor are likely to move slow speeds, less than ten knots. Transit routes are unknown at this time but are likely to be either from staging areas in East Boston or Quincy/Weymouth based on the limited number of contractors that are qualified to undertake work specific to a movable bridge.

In addition, Boston hosts a commercial fishing fleet and has port facilities for oil tankers, liquid natural gas (LNG) tankers, container ships, and cruise ships. While exact numbers cannot be known since vessel tracking is not performed across all vessel types, it is likely that the baseline vessel activity between potential home ports and/or staging areas in Weymouth/Quincy and Boston/East Boston and the Charles River is well in excess of several thousand transits per year. It is estimated that Project-related construction vessel transits would number in the hundreds during Proposed Project construction.

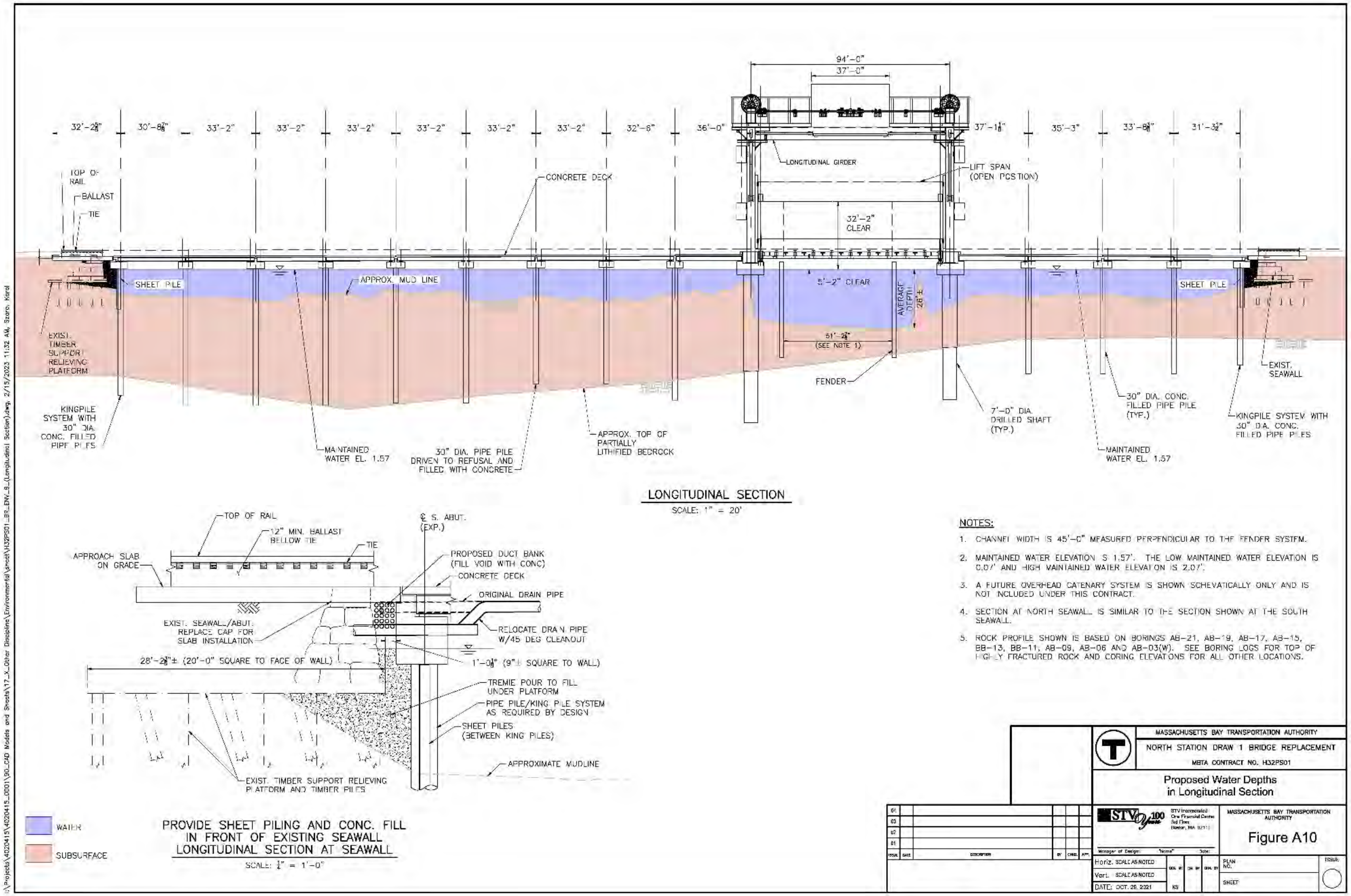

94'-0"
37'-0"
32'-2⅞"
30'-8⅞"
33'-2"
32'-6"
36'-0"
37'-1⅛"
35'-3"
33'-8⅞"
31'-3½"
TOP OF RAIL
BALLAST
TIE
CONCRETE DECK
LONGITUDINAL GIRDER
LIFT SPAN (OPEN POSITION)
32'-2" CLEAR
SHEET PILE
APPROX. MUD LINE
5'-2" CLEAR
AVERAGE DEPTH 28'±
51'-2⅛" (SEE NOTE 1)
FENDER
EXIST. TIMBER SUPPORT RELIEVING PLATFORM
KINGPILE SYSTEM WITH 30" DIA. CONC. FILLED PIPE PILES
MAINTAINED WATER EL. 1.57
30" DIA. PIPE PILE DRIVEN TO REFUSAL AND FILLED WITH CONCRETE
APPROX. TOP OF PARTIALLY LITHIFIED BEDROCK
7'-0" DIA. DRILLED SHAFT (TYP.)
30" DIA. CONC. FILLED PIPE PILE (TYP.)
EXIST. SEAWALL
KINGPILE SYSTEM WITH 30" DIA. CONC. FILLED PIPE PILES
LONGITUDINAL SECTION
SCALE: 1" = 20'
TOP OF RAIL
12" MIN. BALLAST BELLOW TIE
TIE
℄ S. ABUT. (EXP.)
APPROACH SLAB ON GRADE
PROPOSED DUCT BANK (FILL VOID WITH CONC)
CONCRETE DECK
ORIGINAL DRAIN PIPE
EXIST. SEAWALL/ABUT. REPLACE CAP FOR SLAB INSTALLATION
RELOCATE DRAIN PIPE W/45 DEG CLEANOUT
28'-2⅞"± (20'-0" SQUARE TO FACE OF WALL)
1'-0⅜" (9"± SQUARE TO WALL)
TREMIE POUR TO FILL UNDER PLATFORM
PIPE PILE/KING PILE SYSTEM AS REQUIRED BY DESIGN
SHEET PILES (BETWEEN KING PILES)
APPROXIMATE MUDLINE
EXIST. TIMBER SUPPORT RELIEVING PLATFORM AND TIMBER PILES
WATER
SUBSURFACE
PROVIDE SHEET PILING AND CONC. FILL IN FRONT OF EXISTING SEAWALL
LONGITUDINAL SECTION AT SEAWALL
SCALE: ½" = 1'-0"
NOTES:
1. CHANNEL WIDTH IS 45'-0" MEASURED PERPENDICULAR TO THE FENDER SYSTEM.
2. MAINTAINED WATER ELEVATION IS 1.57'. THE LOW MAINTAINED WATER ELEVATION IS 0.07' AND HIGH MAINTAINED WATER ELEVATION IS 2.07'.
3. A FUTURE OVERHEAD CATENARY SYSTEM IS SHOWN SCHEMATICALLY ONLY AND IS NOT INCLUDED UNDER THIS CONTRACT.
4. SECTION AT NORTH SEAWALL IS SIMILAR TO THE SECTION SHOWN AT THE SOUTH SEAWALL.
5. ROCK PROFILE SHOWN IS BASED ON BORINGS AB-21, AB-19, AB-17, AB-15, BB-13, BB-11, AB-09, AB-06 AND AB-03(W). SEE BORING LOGS FOR TOP OF HIGHLY FRACTURED ROCK AND CORING ELEVATIONS FOR ALL OTHER LOCATIONS.
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
NORTH STATION DRAW 1 BRIDGE REPLACEMENT
MBTA CONTRACT NO. H32PS01
Proposed Water Depths in Longitudinal Section
STV Incorporated
One Financial Center
3rd Floor
Boston, MA 02111
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
Figure A10
Horiz. SCALE AS NOTED
Vert. SCALE AS NOTED
DATE: OCT. 29, 2021
KS
PLAN NO.
SHEET
ISSUE

Table 4. Installation of Piles by Impact Hammer

Structure (action)	Size & Diameter	Duration of Work	Technique
New Bridge Trestle piles (installation)	• 30” diameter • Steel	• Phase 1: 49 days • Phase 3: 19 days • Phase 4: 11 days • Phase 6: 60 days • Phase 8: 16 days • Phase 10: 121 days	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day
Contractor Temporary Trestle piles (installation) [1, 2]	• 30” diameter • Steel	• Southwest temp trestle: 22 days[1] • Northwest temp trestle: 14 days[1] • Southeast temp trestle: 25 days[2] • Northeast temp trestle: 16 days[2]	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day
New Navigational Channel Fender piles (installation)	• 16” diameter • Solid fiberglass plastic	• 35 days	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week/8 hours per day
Replacement MGH dock and ramp (replacement)	• 24” diameter (conservative) • Steel	• 16 piles, 4 days	• 3 to 5 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day

Table 4. Installation of Piles by Impact Hammer

Structure (action)	Size & Diameter	Duration of Work	Technique
Sheet Pile for King Pile Abutment	• 24” diameter (conservative) • Steel	• 132 piles, 16 days	• 6 piles per day • 20 strikes per pile • 5 days a week and 8 hours per day • Installed alternating between pipe piles (below)
Pipe pile for King Pile Abutment	• 30” diameter (conservative) • Steel	• 49 piles, 17 days	• 3 piles per day • 6000 blows per day; 2000 blows per pile • 5 days a week and 8 hours per day • Installed alternating between sheet piles (above)
Temporary sheet piles for cofferdams[3]	• 24” diameter (conservative) • Steel • No pipe piles in the cofferdam	• 250 piles, 15 days	• 15 to 20 piles per day • 200 strikes per pile • 5 days a week and 8 hours per day

Notes:
[1] Temporary work trestles on the west side of the bridges will be in place for approximately 6 years before being removed.
[2] Temporary work trestles on the east side of the bridges will be in place for approximately 4 years before being removed.
[3] Temporary sheet piles for the cofferdams will be in place for approximately 4 months before being removed.

Table 5. Vibratory Removal of Temporary Trestle Piles

Structure (action)	Size & Diameter	Duration	Technique
Contractor Temporary trestle piles (removal)	• 30” diameter • Steel	• Southwest temp trestle: 22 days • Northwest temp trestle: 14 days • Southeast temp trestle: 25 days • Northeast temp trestle: 16 days	• 3 to 6 piles per day • 30 minutes of vibratory hammer per pile
Temporary sheet piles for cofferdams	• 24” diameter • Steel	• 250 piles, 15 days	• 15 to 20 piles per day • 20 minutes of vibratory hammer per pile

2.6 Operation

Once construction is finished, bridge operations would be similar to current operations except that there would be six tracks crossing the river on three bridge structures instead of four tracks crossing the river on two bridge structures today. The Proposed Project is intended to bring the Draw One Bridge to a state of good repair, reducing the need for in-water repair and unscheduled maintenance activities.

3.0 Conservation Measures

3.1 Time of Year (TOY) Restrictions

TOY restrictions for the Proposed Project's construction schedule are proposed as a method of offsetting potential construction-period effects, as discussed in more detail in Section 3.0.

The DMF released Technical Report TR-47, *Recommended TOY for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts* in April 2011, revised January 2015 (Evans et al., 2015), in which the recommended TOY restrictions for any in-water construction work are listed. Five of the 26 EFH-designated species in the vicinity of the Proposed Project have associated TOY restrictions, including Atlantic cod (*Gadus morhua*), winter flounder (*Pseudopleuronectes americanus*), Atlantic surfclam (*Spisula solidissima*), longfin inshore squid (*Doryteuthis pealeii*), and northern shortfin squid (*Illex illecebrosus*). **Table 6** presents managed EFH species and NOAA Fisheries Trust Resource Species with the TR-47-recommended spring and fall TOY restrictions for each, in the Project region. NOAA Fisheries Trust Resource Species potentially present in the Project Activity Area with spring and fall TOY restrictions include alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), rainbow smelt (*Osmerus mordax*), white perch (*Morone americana*) and American eel (*Anguilla rostrata*).

Table 6. EFH and NOAA Fisheries Trust Resource Species with Construction TOY Restrictions in the Project Activity Area[1]

Species	Spring TOY Restrictions	Fall TOY Restrictions
EFH Listed Species		
Atlantic cod	April 1 – June 30	Dec. 1 – Jan. 31
Winter flounder	Feb. 15 – June 30	-
Atlantic surfclam[2]	June 15 – Oct. 15	-
Longfin inshore squid	April 15 – June 15	-
Northern shortfin squid[2]	June 15 – Oct. 15	-
NOAA Trust Resource Species - Diadromous		
Alewife	April 1 – June 15	Sept. 1 – Nov. 15
Blueback herring	April 1 – June 30	Sept. 1 – Nov. 15
American shad	May 1 – July 15	Sept. 30 – Oct. 31
Rainbow smelt	March 1 – May 31	-
White perch	April 1 – June 15	-
American eel	March 15 – June 30	Sept. 15 – Oct. 31

[1]Source: DMF Technical Report TR-47 (Evans et al., 2015).
[2]Species are not expected to be present within the Project Activity Area and have been categorized as Category III below (See Section 6.1 for additional information), therefore TOY Restrictions for them are not proposed to be implemented into the Project BMPs and are not discussed further.

Table 7 below lists construction activities, construction methods, and the TOY restrictions per email recommendation from NOAA Fisheries dated May 4, 2021 (**Appendix B**). As noted in the table below, MBTA is committed to implementing TOY restrictions on all major silt-producing activities. MBTA shall schedule major silt-producing construction activities outside the TOY restriction periods and use silt curtains during the rest of the year for those activities. For any minor silt-producing activities that would occur during a TOY restriction, MBTA shall require the use of silt curtains to minimize impacts from silt.

Table 7. TOY by Construction Activity

Activity	Construction method	TOY Restriction[1,2]
Major Silt-Producing Activities		
Channel dredging	Dredge	February 15 to July 15 September 1 to November 15
Remove existing caissons	Dredge around caissons and cut off/demolish as required.	February 15 to July 15 September 1 to November 15
Remove existing piles where required	Extract existing piles	February 15 to July 15 September 1 to November 15
Remove temporary piles for construction trestle or any sheet pile cofferdams if used.	Extract temporary piles and sheet piles	February 15 to July 15 September 1 to November 15
Minor Silt-Producing Activities		
Remove surface laid submarine cables	Lift surface laid cable	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install temporary piles for temporary construction trestle or sheet pile cofferdams if used.	Drive piles or sheet piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install pipe piles for approach trestles	Drive piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install sheeting and piles at abutments	Drive piles and sheet piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install Drilled Shafts for lift spans	Install drilled shaft	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Install navigational channel fender system	Drive piles	If performed February 15 through July 15 or September 1 through November 15, silt curtain or other device is required.
Anchoring of barges	Spud, jack-up or anchor moored barges (temporary)	None

Table 7. TOY by Construction Activity

Activity	Construction method	TOY Restriction[1,2]
[1] NOAA Fisheries Trust Resource Species TOY restrictions for upstream passage for spawning and migratory fish known to be within the Project Activity Area (**Table 6**). [2] Based on recommendation from NOAA Fisheries email **(Appendix B**).		

The effects of the minor silt-producing activities described in **Table 7** above will be controlled with measures including, but not limited to, silt curtains or potential cofferdams (at the discretion of the contractor), and water quality monitoring requirements if performed during TOY restriction dates pursuant to an email recommendation from NOAA Fisheries dated May 4, 2021 (Appendix B). Furthermore, during the TOY restrictions, the contractor will be required to maintain and allow free flow and fish passage through 75% of the river channel within the work site. This will allow any fish able to pass through the upstream and downstream dams to move through the work site.

3.2 Best Management Practices

MBTA's construction contractor will be required to implement standard construction practices and follow TOY restrictions for certain in-water activities. Restrictions on the proposed construction activity are expected to include the following which will be incorporated into the Project plans and specifications as contract requirements:

1. Piles in the area where new portions of the bridge structures will be installed must be fully removed from the riverbed. Piles within the navigational channel are to be cut off three feet below the defined bottom of channel. However, the majority of the existing piles will be cut at the mudline rather than below the mudline to minimize sediment disturbance. This activity will not be subject to TOY restrictions because it is not considered a silt-producing activity.
2. MBTA will develop a Project-specific National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP) to describe BMPs that will be implemented during construction to control erosion and contain and treat stormwater runoff generated during construction. If necessary, construction dewatering will be undertaken in compliance with the NPDES requirements for these types of activities.
3. To reduce and mitigate the risk of spills, boats, barges, and construction equipment will have spill kits readily available to address small accidental spills. Reporting of accidental spills will be done in accordance with state and federal regulations and a Project-specific Spill Prevention, Control and Countermeasures (SPCC) Plan will be developed and incorporated into contract specifications.
4. As currently contemplated, construction methods entail the use of an impact hammer, which may produce underwater noise levels (peak and SEL_{cum} [cumulative sound exposure levels]) that exceed the behavioral disturbance threshold for aquatic species. Therefore, ramp-up procedures for impact hammers, also known as a “soft start,” shall be used before continuing with the activity. The contractor will be required to employ a ramp-up period of at least 60 seconds to gradually increase sound intensity of pile driving activities, allowing species to leave the work zone. This is measure is expected to minimize underwater noise levels generated during construction activities.

3.3 Environmental Compliance and Monitoring

MBTA would also require the construction contractor to implement an environmental monitoring program overseen by a Construction Supervisor and an Environmental Monitor, both of whom would be responsible for daily inspections of work areas that would note any potential effects and recommend measures to address them. The Construction Supervisor, working with the Environmental Monitor, will be on site daily to perform inspections and will have “stop work” authority to address observed or reported infractions of required standards and procedures that pose a threat to aquatic habitat and potential inhabitants. The Environmental Monitor would confirm compliance with permit and other regulatory requirements and inspect the work area for sediment and erosion to minimize the potential for sediment-laden water to drain into the river and increase turbidity for fish.

Construction crews will be trained prior to the start of work to recognize and respond to changing field conditions, particularly as they relate to fisheries, and prevent sedimentation, unauthorized stormwater runoff, accidental spills, and releases of fuel, lubricant, grease, or oil.

4.0 PROJECT ACTIVITY AREA DESCRIPTION

4.1 Physical Characteristics

The Project Site is located near the mouth of the Charles River, within the Charles River Basin. The Charles River is approximately 79.5 miles long and the Project Site, where the direct footprint of the work is located, is approximately 0.75 miles from its confluence with Boston's Inner Harbor. The Project Site is surrounded by a densely developed urban environment characterized by limited access highways, commercial businesses, a sand and gravel facility, a rail station, a hospital, and protected open spaces, such as mowed parkland, along the Charles River. The Charles River channel is situated in an east-west orientation under the Draw One Bridge and hardened with sea walls on each bank. Marinas and moorings are located upstream of the Draw One Bridge and the Charles River Dam and Locks are located downstream (**Figure 2** on page 3).

The Project Activity Area includes waterbodies surrounding the Project Site that may experience effects such as temporary increases in turbidity and noise during construction. It includes the upstream and downstream portions of the Charles River and the confluence of the Millers River as it flows into the Charles River just downstream of the Draw One Bridge (**Figure 2** on page 3). The Project Activity Area, approximately 27 acres, encompasses a majority of the Project components (with the exception of vessel traffic) and includes the Charles River from the Charles River Dam Road out to the Charles River Dam Locks (described below).

The Millers River flows into the Charles River immediately north and east of the Project Site. The exposed, or daylighted, portion of the river emanates from a culvert approximately 1,200 feet (366 meters) upstream to the north of the Draw One Bridge. The modern-day Millers River is a remnant of what used to be a much longer river; owing to development, most of the river now flows through culverts. The exposed portion of the river is located under the Leverett Circle Connector Bridge. Though there is some riparian corridor along the current extent of the Miller River, a majority of its extent has been hardened with riprap under overpasses and highway infrastructure. Therefore, this area is highly disturbed habitat.

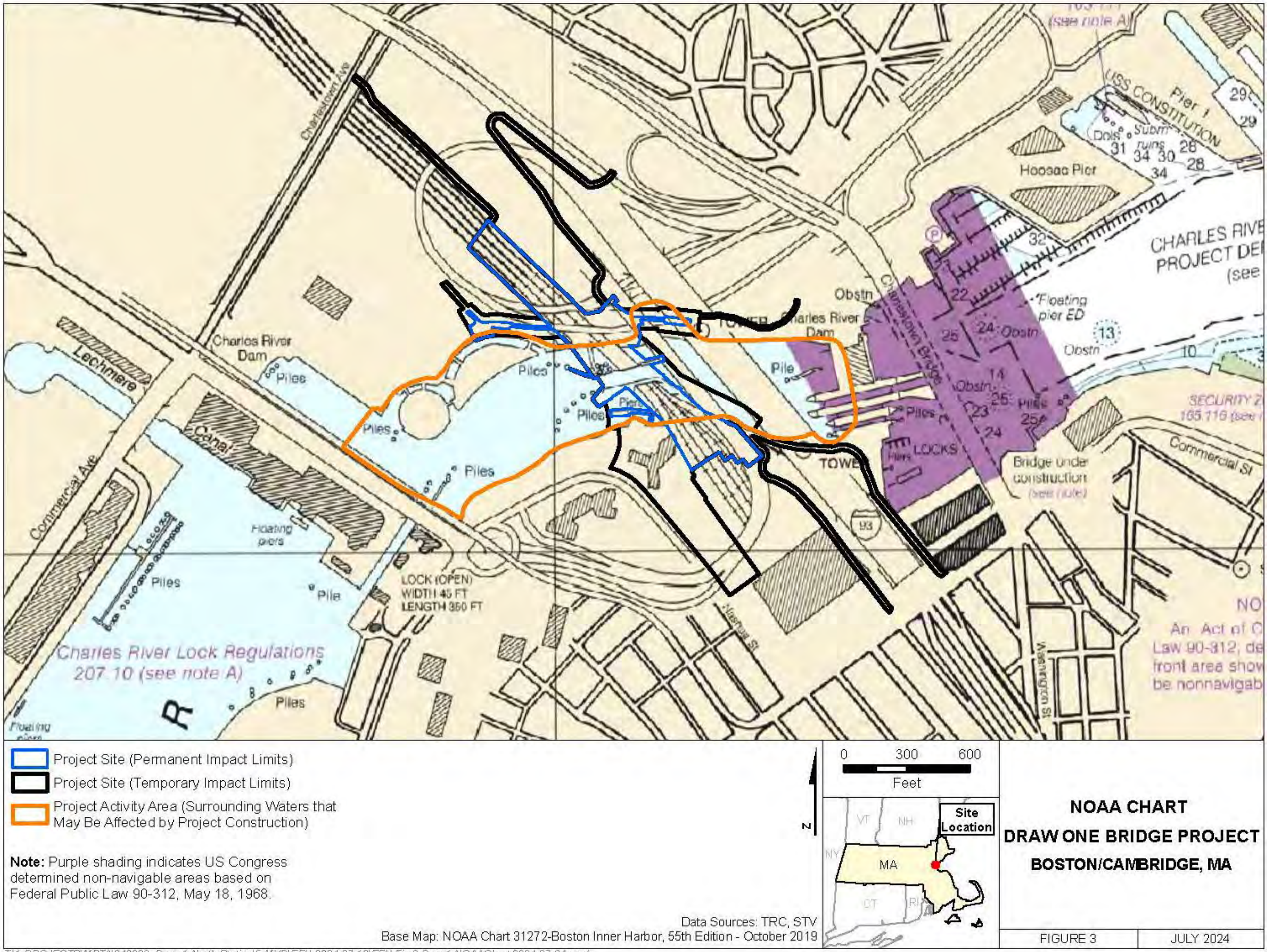
The Project Site is located in the lower portion of the Charles River Basin, which separates Boston and Cambridge. Although historically tidal, this portion of the river was cut off from the ocean by the Charles River Dam and Locks, which turned the river into a basin. The water level of the portion of the Charles River Basin that contains the Project Site is controlled by DCR via the Charles River Dam and Locks and is associated with seasonal flows within the Charles River as well as stormwater flows.

The Charles River Dam and Locks were constructed in 1978 and are operated by DCR. The locks are located 700 feet (213 meters) downstream of the Project Site and within the Project Activity Area, just west of the North Washington Street (Route 99) bridge. One of the three locks is wider than the other two to accommodate the occasional passing of larger vessels. These concrete and steel structures create a physical barrier largely preventing the upstream flow of water from the Boston Inner Harbor into the Charles River (Brady et al., 2005).

The Charles River Dam and Locks operate 24 hours a day. The locks remain closed, however, for the vast majority of any given 24-hour period. Openings occur much less frequently during winter months than during summer months, reflecting the seasonal nature of the recreational boat traffic that generates most openings.

The Charles River is home to numerous freshwater fish species, including golden shiner (*Notemigonus crysoleucas*), yellow perch (*Perca flavescens*), bluegill (*Lepomis macrochirus*), common carp (*Cyprinus carpio*), largemouth bass (*Micropterus nigricans*), redbreast sunfish (*Lepomis auratus*), black crappie (*Pomoxis nigromaculatus*), white sucker (*Catostomus commersonii*), chain pickerel (*Esox niger*), redfin pickerel (*Esox americanus americanus*), smallmouth bass (*Micropterus dolomieu*), and pumpkinseed (*Lepomis gibbosus*) (CRWA, 2003). It is also home to a few diadromous or migrating species, as described in Section 6.2 below.

Fish can pass through the lock system when it is opened, but the variability of opening frequency throughout the year affects fish passage, which is therefore also highly variable. A vertical slot fishway/ladder alongside the locks enables passage of migratory finfish (Brady et al., 2005). The fish ladder was installed in 1978 and modified in the early 1990s to improve its functioning. It is 170 feet (52 meters) long, with 29 slots (Brady et al., 2005). The condition of the fish ladder was considered to be "fair" and its function was deemed "not passable" in the January 2005 Technical Report TR-18 released by the DMF. A NOAA Fisheries navigation chart excerpt has been provided as **Figure 3** on page 43.



T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\EFH 2024-07-18\EFH Fig 3 Draw1 NOAAChart 2024-07-24.mxd

4.2 Description of the Aquatic Habitat

4.2.1 Currents and Tides

At the location where the Draw One Bridge crosses the Charles River, the River has a relatively slow-moving current owing to the Charles River Dam Locks, which changed the formerly tidal character of the Project Site. Currents under the bridge vary based on seasonal flow levels in the Charles River, as well as pre- and post-storm conditions, such as tides, wind, etc. Lock openings and some leakage create a bottom-oriented salt wedge that migrates upstream into the lower Charles River Basin, but there are no reversing tidal flows upstream of the lock and dam system.

Bridge structures on the north and south banks of the Charles River are within the Federal Emergency Management Agency (FEMA) 100-year floodplain.

4.2.2 Depth and Bathymetry

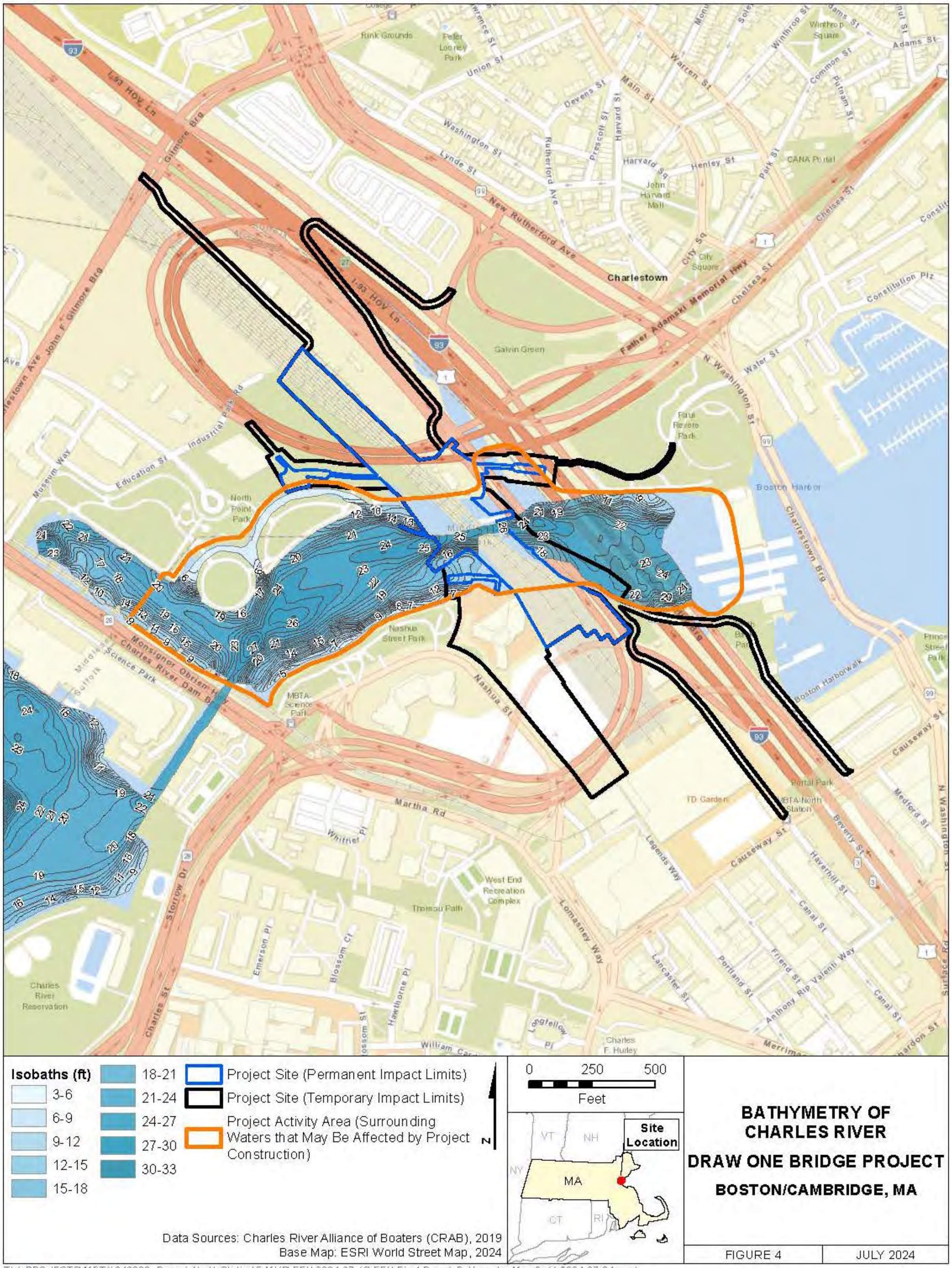
The depth of the Charles River Basin (the pool created by the Charles River Dam and Locks) is generally shallow, with an average water depth of approximately one to 30 feet (9 meters) deep. Water depths in the vicinity of the Project Activity Area range from 7 to 27 feet (2 to 8 meters). The deepest portions in the Project Activity Area are located in the center of the river and portions closer to the northern bank, whereas shallower water areas dominate the portions closer to the southern bank. A bathymetry map of the Charles River and Project Activity Area is provided in **Figure 4** on page 45. The existing and proposed water depths in longitudinal sections are provided in **Figure A9** on page 28 and **Figure A10** on page 23.

The depth of the Charles River at the Project Site is approximately ten feet (3 meters), and the existing 65-foot-wide (20 meter) navigation channel is 25 feet (8 meters) deep (**Figure A9** on page 28 and **Figure A10** on page 23). The Charles River Basin has an average width of approximately 380 feet (116 meters).

4.2.3 Substrates and Sediments

According to the Draw One Bridge Geotechnical Engineering Memorandum, the subsurface conditions within the Project Activity Area consist of historically placed fill overlying organic silt tidal estuary deposits often intermixed with fill material, overlying silty sand, marine clay (Boston Blue Clay), discontinuous strata of glaciomarine deposits and/or glacial till, weathered argillite and argillite bedrock. The substrates on site consist of approximately 70 percent silt/mud, 20 percent sand and ten percent pebble/gravel/cobble. The organic silt stratum primarily comprises very soft to hard, dark gray to black organic silt with up to ten percent shells. Because of the fill dumped atop this layer within the historic mud flats adjacent to the Charles River, the stratum is intermixed with up to 20 percent fine to coarse sand and debris including brick, wood and cinders, and up to ten percent gravel (Pizzi, 2020).

Historic studies indicate that the benthic (bottom of a water body) habitat of the lower Charles River is contaminated by a suite of inorganic and organic constituents, such as lead, polychlorinated biphenyls (PCBs), organochlorine pesticides, and polyaromatic hydrocarbons (PAHs) (Breault et al., 2000). During 2020, TRC collected preliminary sediment samples from the Project Site. Data collected indicates the presence of PCBs, PAHs, and lead, among other organic and inorganic contaminants, above MassDEP and USACE reporting limits.



T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\EFH 2024-07-18\EFH Fig 4 Draw1 Bathymetry Map 8x11 2024-07-24.mxd

4.2.4 Water Quality

There are no tidal flows that reverse the general downstream passage of water from the Charles River upstream of the Charles River Dam Locks, including at the Project Site. However, when the locks are opened, there is an upstream incursion of salt water along the bottom of the river that extends into the lower Charles River Basin to varying degrees. Water salinity varies with the tides and seasonally, depending upon the amount of freshwater outflow from the Charles River. Species with EFH-designated life stages that depend on marine waters with higher salinity levels ranging from approximately 30 to 35 practical salinity units (PSU) may not tolerate the lower salinity levels within the Charles River.

Under the Massachusetts Surface Water Quality Standards (SWQS) (Massachusetts Administrative Code 314 CMR 4.00), inland water is characterized as Class A, Class B, or Class C. The state classifies the waters within the Project Site as Class B warm water, which is designated as suitable as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary recreation. Coastal and marine water is characterized as Class SA, Class SB, or SC. Boston Harbor, upstream of the Project Site, is classified by the state as Class SB water, which is designated as suitable for habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary recreation.

According to the SWQS, the following conditions are associated with Class B waters. Dissolved oxygen is not less than 5.0 mg/l in warm water fisheries. Temperature shall not exceed 85 degrees Fahrenheit (°F) (29 degrees Celsius [°C]). The pH shall be in the range of 6.5 to 8.3 standard units and not more than 0.5 units outside of the natural background range. The water shall be free from floating, suspended and settleable solids; color and turbidity; oil, grease; and taste and odor in concentration or combinations that would impair any use assigned to Class B.

The Massachusetts Water Resources Authority (MWRA) has collected environmental monitoring data in the Charles River since 1989. The closest monitoring station, Station 11, is located approximately 600 feet (183 meters) downstream of the Project Site, but upstream of the Charles River Dam Locks. Currently, phosphorus is the primary cause of impairment throughout the Charles, although the river is also impaired by bacterial pollutants, algal growth, excessive nutrients, and stormwater (EPA 2024a).

Table 8. Charles River Water Quality Monitoring Data, MWRA Station 11[1]

Parameter	Surface			Bottom		
	Min	Max	Average	Min	Max	Average
Temperature (°C)[2]	3.23	28.73	19.14	3.35	25.17	16.7290
Dissolved Oxygen (mg/L)[3]	4.60	13.86	8.59	0.77	12.	5.68
Turbidity (NTU)[4]	0.00	40.90	4.35	0.00	39.54	5.75
Salinity (PSU)[5]	0.22	3.18	0.82	0.27	28.34	15.14
Specific Conductance (mS/cm)[6]	0.46	5.83	1.61	0.55	43.86	24.40

Table 8. Charles River Water Quality Monitoring Data, MWRA Station 11[1]

Parameter	Surface			Bottom		
	Min	Max	Average	Min	Max	Average
pH	6.15	8.69	7.30	5.89	7.96	7.05

[1]Source: MWRA, 2024 Boston Harbor and River Monitoring Data: Charles River
[2]°C = degrees Celsius
[3]mg/L = milligrams per liter
[4]NTU = nephelometric turbidity units
[5]PSU = Practical Salinity Units
[6]mS/cm = millisiemens per centimeter

Table 8 above provides water quality data recorded at MWRA's Station 11 from 2013 to 2023 (note: no data was recorded in 2020) during April to October of each year. Due to the proximity of the Project Site to the marine waters of the Boston Inner Harbor, and reflecting the operation of the locks, Charles River waters experience saltwater intrusion visible in the data collected at Station 11. Data indicates that average surface salinity is 0.82 practical salinity units (PSU), while bottom salinity averages are close to 15.14 PSU, indicating an estuarine environment exists at the Project Site (MWRA, 2024).

Generally, specific conductance measurements are affected by the presence of dissolved solids such as salts (EPA 2024b). At Station 11, bottom specific conductance is high, averaging at 24.40 milisiemens per centimeter (mS/cm), likely due to the close proximity of marine waters. At Station 11, surface pH levels range from 6.15 to 8.69 and bottom pH levels range from 5.89 to 7.96. The bottom dissolved oxygen measurements average at 5.68 milligrams per liter (mg/L), lower than the surface dissolved oxygen measurements which average at 8.59mg/L.

Surface turbidity at Station 11 ranges from 0.00 to 40.90 nephelometric turbidity units (NTU), with an average of 4.35 NTU, while bottom turbidity ranges from 0.00 to 39.54 NTU), with an average of 5.75 NTU. The Charles River has hundreds of stormwater outfalls and therefore the maximum measurements are likely due to very large rain events that discharge stormwater into these outfalls (EPA 2024b).

4.3 Benthic Community

The benthic habitat in the Project Activity Area consists of estuarine/riverine conditions, with both banks of the river consisting of granite block bulkhead walls. Substrate consists of soft bottom sediments with an absence of macroalgae or submerged aquatic vegetation (SAV).

According to the Massachusetts Bureau of Geographic Information (MassGIS), the closest area suitable for shellfish is within the Boston Inner Harbor, more than 2,755 feet (840 meters) away from the Project Site, and occurs within waters classified as prohibited for growing shellfish (MassGIS, 2024). Based on the substrate characteristics, soft bottom, estuarine benthic infauna and epifauna are likely to occur to some extent, but given the extreme range of salinities, ranging at times from essentially freshwater, to a nearly marine saltwater wedge, the benthic community is likely stressed and depauperate.

5.0 EFH DESIGNATED SPECIES AND ESSENTIAL FISH HABITAT

The objectives of this EFH Assessment are to characterize EFH and NOAA Trust Species within the Project Activity Area and assess how the Project may affect those resources. TRC utilized the NOAA Fisheries EFH Mapper (NOAA Fisheries, 2024a) to identify EFH species that could occur in the Charles River or downstream in the Boston Harbor.

The Project Activity Area overlaps with designated EFH near Boston which encompasses Boston Harbor as well as the Charles, Millers, Mystic, and Chelsea rivers. According to the NOAA Fisheries EFH Mapper, the Project Activity Area overlaps with areas designated as EFH for one or more life stages of 26 finfish and shellfish species (**Table 9**). However, of the 26 mapped finfish and shellfish species, this assessment focuses only on those with the potential to occur within the Project Activity Area. This was determined by comparing the Project Activity Area with the suitable aquatic characteristics and habitat conditions for each species (see Section 6.1.1 below). Many of the mapped species are associated with the marine and open water conditions of Boston Harbor within the Project Activity Area rather than the more isolated and estuarine/riverine conditions of the Project Site.

Given its coastal river environment and the presence of the Charles River Dam and Locks immediately downstream, the Project Activity Area largely does not provide appropriate habitat conditions for many of the life stages and species presented in **Table 9** below. In addition to the species listed, the NOAA Fisheries EFH Mapper identified a Habitat Area of Particular Concern (HAPC) for juvenile cod in the Boston Inner Harbor outside the Project Activity Area, past the Charles River Dam Locks (**Figure 5** on page 50). This HAPC is outside of the anticipated habitat impact area (limited to the Project Activity Area) and is not further discussed in this document.

5.1 EFH Species Potential for Occurrence

The life history of each of the 26 EFH species in **Table 9** was researched to determine the habitat requirements and behavioral characteristics for each life stage of species with designated EFH within the Project Site (**Appendix C**).

Based on the findings from *Final Omnibus Essential Fish Habitat Amendment 2. Volume 2: EFH and HAPC Designation Alternatives and Environmental Impacts* (NEFMC, 1998), *Distribution and Abundance of Fishes and Invertebrates in North Atlantic Estuaries* (Jury et al., 1994), the likelihood of each EFH species and life stage to occur within Project Activity Area was evaluated. No Project Activity Area-specific habitat assessments were conducted and no other specific reports were found.

Life history characteristics and habitat preferences including depth, salinity, sediment, temperature, and prey requirements were evaluated for all life stages of each EFH species listed in **Table 9** below. Sections 6.1.1 through 6.1.2 provide the details of this evaluation. Based on the likelihood of Project Activity Area occurrence for each life stage of each species, species were separated into three categories:

- **Category I:** Potential for Project Activity Area occurrence of the life stage (in green)
- **Category II**: Unlikely, but possible potential Project Activity Area occurrence of the life stage (in yellow)
- **Category III**: No potential for Project Activity Area occurrence of the life stage (in red)

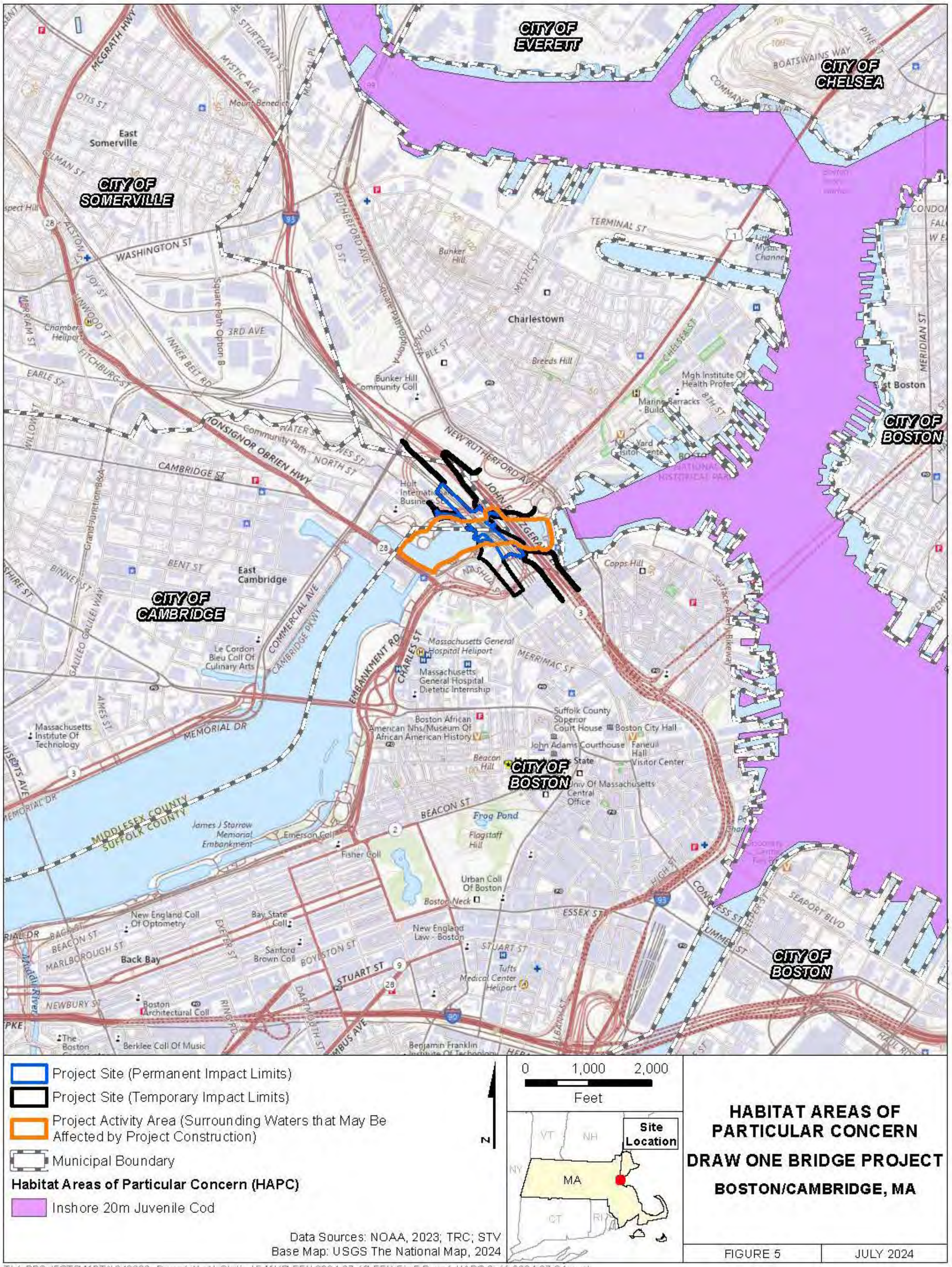

CITY OF EVERETT
CITY OF CHELSEA
CITY OF SOMERVILLE
CITY OF BOSTON
CITY OF CAMBRIDGE
East Somerville
Charlestown
East Cambridge
Project Site (Permanent Impact Limits)
Project Site (Temporary Impact Limits)
Project Activity Area (Surrounding Waters that May Be Affected by Project Construction)
Municipal Boundary
Habitat Areas of Particular Concern (HAPC)
Inshore 20m Juvenile Cod
Data Sources: NOAA, 2023; TRC; STV
Base Map: USGS The National Map, 2024
0 1,000 2,000
Feet
N
Site Location
VT
NH
NY
MA
CT
RI
HABITAT AREAS OF PARTICULAR CONCERN
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 5
JULY 2024
T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\EFH 2024-07-18\EFH Fig 5 Draw1 HAPC 8x11 2024-07-24.mxd

Table 9. Species and Life Stages with Designated EFH in the Project Activity Area [1]

Species	Eggs	Larvae	Juveniles	Adults	Category (see Section 6.1 below)
Finfish					
American plaice (*Hippoglossoides platessoides)*	X	X	X	X	All Category III
Atlantic bluefin tuna *(Thunnus thynnus)*				X	All Category III
Atlantic butterfish *(Peprilus triacanthus)*	X	X		X	All Category II
Atlantic cod *(Gadus morhua)*	X	X	X	X	Most Category II
Atlantic herring *(Clupea harengus)*		X	X	X	All Category III
Atlantic mackerel *(Scomber scombrus)*	X	X	X	X	All Category III
Atlantic wolffish (*Anarhichas lupus*)	X	X	X	X	All Category III
Black sea bass *(Centropristis striata)*				X	All Category III
Bluefish *(Pomatomus saltatrix)*			X	X	All Category II
Ocean pout *(Macrozoarces americanus)*			X	X	All Category III
Pollock *(Pollachius virens)*	X	X	X		One Category I
Red hake *(Urophycis chuss)*	X	X	X	X	All Category II
Scup *(Stenotomus chrysops)*			X		All Category I
Silver hake *(Merluccius bilinearis)*	X	X		X	All Category III
Spiny dogfish *(Squalus acanthias)*				X (Adults and sub-adult females)	All Category III
Summer flounder *(Paralichthys dentatus)*				X	All Category III
White hake *(Urophycis tenuis)*	X	X	X	X	All Category III
Windowpane flounder (*Scophthalmus aquosus)*	X	X	X	X	All Category I
Winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X	All Category I
Yellowtail flounder *(Limanda ferruginea)*	X	X	X	X	All Category III

Table 9. Species and Life Stages with Designated EFH in the Project Activity Area [1]

Species	Eggs	Larvae	Juveniles	Adults	Category (see Section 6.1 below)
Skates					
Little skate (*Leucoraja erinacea*)			X	X	All Category II
Thorny skate *(Amblyraja radiata)*			X		All Category III
Winter skate *(Leucoraja ocellata)*			X	X	All Category II
Invertebrates					
Atlantic surfclam *(Spisula solidissima)*			X	X	All Category III
Longfin inshore squid (*Doryteuthis pealeii*)			X	X	All Category II
Northern shortfin squid (*Illex illecebrosus*)				X	All Category III

[1] Source: NOAA Fisheries, 2024a
Green shading = Potential for Project Activity Area occurrence of the life stage.
Yellow shading = Unlikely, but possible potential Project Activity Area occurrence of the life stage.
Red shading = No potential for Project Activity Area occurrence of the life stage.

Of the species listed in **Table 7** above**,** four species with EFH designation were determined to have one or more life stages in Category I (Section 6.1.1and 7.1.1), seven species with EFH designation were determined to have one or more life stages in Category II (Section 6.1.2 and 7.1.1), and the remaining 15 species with EFH designation and their respective life stages are listed in Category III (Section 6.1.3).

The Project Site's location upstream of the Charles River Dam and Locks reduces the likelihood that EFH and NOAA Fisheries Resource Trust Resource Species in Boston Harbor would reach the Project Site; to do so, they would need to traverse the fish ladder that was deemed "not passable" in January 2005 by the DMF or enter the locks at the exact time that they're opened for vessel traffic.

5.1.1 Category I

Pollock (*Pollachius virens*)

Pollock juveniles have the potential to occur within the Project Activity Area. Conditions where most pollock juveniles are found include water temperatures below 64°F (18°C), depths ranging from shore to 820 feet (250 meters), and salinities between 29 and 32 ppt (NEFMC, 1998). While the salinity of the Project Activity Area is not consistent with these conditions, its temperature and depths are. Juveniles are also likely to occur in the intertidal zone and shallow-water habitats, which are used as nursery grounds. Juveniles can occur in Boston Harbor at any time of year(Jury et al., 1994). Given the presence of this type of habitat, and their yearlong residency in this portion of the Charles River, juvenile pollock may occur in the Project Activity Area, indicating that this life stage of pollock should be Category I.

Boston Harbor has been designated as EFH for pollock eggs, larvae, and juveniles, but not adults (**Table 9**). Pollock eggs and larvae have been designated in seawater salinity zones of greater than 25 parts per thousand (ppt). Juveniles have been designated in brackish salinity zones of 0.5 to 25 ppt as well as in seawater salinity zones of greater than 25 ppt (NEFMC, 1998). The eggs and larvae are found throughout the water column within Boston Harbor from December to April. However, both are rare in November, and in April only larvae are rare (Jury et al., 1994). Pollock eggs and larvae are unlikely but possible to occur within the Project Activity Area because they are not known to be associated with any specific substrate type and are usually found at depths much deeper than the Project Activity Area, indicating that these life stages of pollock should be Category II.

Because the categories were assigned by species (and not by life stage), pollock are classified as Category I in this assessment.

Scup (*Stenotomus chrysops*)

Boston Harbor has been designated EFH only for scup juveniles (**Table 9**).

Juveniles are found during spring and summer in large estuaries, waters that have an open, sandy bottom, and habitats that are structured with mussel beds, reefs, and/or rock rubble. Scup habitat ranges from Cape Cod to Cape Hatteras (NOAA Fisheries, 1994). Juveniles prefer habitats with muddy/sandy/silty bottoms that include rocky ledges, artificial reefs, mussel beds, sand/silty sand, shells, and eelgrass. They occur at depths from 0 to 124 feet (0 to 38 meters) and salinities greater than 15 ppt (NOAA Fisheries, 1994). According to Jury et al., 1994, scup are most commonly found in Massachusetts Bay from June through September. This reference did not identify any scup occurrences in Boston Harbor. Since depths within the Project Activity Area range from 7 to 27 feet (2 to 8 meters), however, scup juvenile may be present.

Windowpane Flounder (*Scophthalmus aquosus*)

Both the Inner and Outer portions of Boston Harbor have been designated as EFH for all four life stages of the windowpane flounder (**Table 9**).

Eggs and larvae of the windowpane flounder stay at the sea surface in waters less than 68°F (20°C) and 230 feet (70 meters) deep. While the Project Site is not in the sea, it would meet the temperature and depth requirements. Therefore, windowpane flounder eggs and larvae could occur within the Project Activity Area in the spring and fall when spawning takes place.

Juvenile windowpane flounder prefer bottom habitats with mud or fine sand, which is similar to the substrate at the Project Activity Area. Juveniles stay in waters with temperatures of less than 77°F (25°C), depths between 3 and 328 feet (1 to 100 meters), and salinity between 5.5 and 36 ppt (NEFMC, 1998). Conditions near the Project Activity Area are consistent with these preferences, and according to Jury et al., 1994, juveniles are common in Boston Harbor year-round. Therefore, there is potential for them to occur in the Project Activity Area.

Adult windowpane flounder are found in habitats with mud or fine sand, consistent with conditions in the Project Activity Area. However, they prefer depths of 246 feet (75 meters) or less. Windowpane flounder spawn in waters with temperatures under 70°F (21°C), depths of 3 to 246 feet (1 to 75 meters), and salinity between 5.5 to 36 ppt (NEFMC, 1998); therefore, the species may spawn within the Project Activity Area. In Boston Harbor, adults commonly occur from March through December and rarely from January to February (Jury et al., 1994). Therefore, windowpane flounder adults may occur within the Project Activity Area.

While the preferred conditions for all life stages are consistent with conditions in the Project Activity Area, the number of individuals coming up through the Charles River Dam and Locks into the relatively shallow waters of the Charles River is likely to be low based on the fish ladder being deemed “not passable” in January 2005 by the DMF.

Winter Flounder (*Pseudopleuronectes americanus*)

Boston Harbor has been designated as EFH for all four life stages of the winter flounder (**Table 9**). All life stages of the winter flounder are found in bottom habitats with sand, muddy sand, mud and gravel, which are similar to the substrate in the Project Activity Area.

In Boston Harbor, eggs are abundant during the months of February through June and are common in January (Jury et al., 1994). Winter flounder eggs prefer water temperatures of less than 50°F (10°C), water depths of less than 16 feet (5 meters), and salinities between 10 to 30 ppt. The average winter temperature at the bottom of the Project Activity Area is 62°F (17°C), but it can fall as low as 38°F (3.3°C), which aligns with winter flounder egg preferences (NEFMC, 1998). Therefore, winter flounder eggs may occur in the Project Activity Area.

Winter flounder larvae prefer waters with sea surface temperatures of less than 59°F (15°C), water depths of less than 20 feet (6 meters), and salinities between 4 and 30 ppt (NEFMC, 1998). Winter flounder larvae are highly abundant in Boston Harbor from March through May, abundant in February and June, common in July and August, and rare during January (Jury et al., 1994). Because its conditions are consistent with the preferred conditions for winter flounder larvae, they may occur in the Project Activity Area.

YOY juveniles are found in bottom habitats with mud or fine sand, water temperatures of less than 82°F (28°C), depths of 0.3 to 33 feet (.09 to 10 meters), and salinities between 5 to 33 ppt. Winter flounder juveniles are found at water temperatures below 77°F (25 °C), depths between 3 and 164 feet (1 and 50 meters), and salinities between 10 and 30 ppt (NEFMC, 1998). Juvenile winter flounder are highly abundant throughout the year in Boston Harbor (Jury et al., 1994). Adult winter flounder are found in conditions similar to those preferred by juveniles, with bottom habitats of sand, mud and gravel, water temperatures of less than 77°F (25°C), depths of 3 to 328 feet (1 to 100 meters), and salinities between 15 and 33 ppt. The conditions preferred by both juveniles and adults are very similar to the conditions within the Project Activity Area. Therefore, winter flounder at both life stages may occur within the Project Activity Area.

5.1.2 Category II

Atlantic Butterfish (*Peprilus triacanthus*)

Boston Harbor has been designated as EFH for Atlantic butterfish eggs, larvae, and adults (**Table 9**).

Eggs occur at depths of 4,921 feet or less with the upper 656 feet (1,500 meters or less with the upper 200 meters) maintaining a temperature range of 45 to 72°F (7 to 22°C) (Mid-Atlantic Fishery Management Council, 2011). They are rarely found in Boston Harbor during June and September, but common throughout July and August (Jury et. al., 1994). It is possible but unlikely that Atlantic butterfish eggs would be found within the Project Activity Area based on the fish ladder within the Charles River Lock and Dan that was deemed “not passable” in January 2005 by the DMF.

Atlantic butterfish larvae have been collected between 39 to 82°F (4 to 28°C), at salinities that range from estuarine to full seawater. They have been collected at night between depths of 3 to

13 feet (1 to 4 meters) and are abundant in the mixing portions of the estuaries (Cross et al., 1999). Atlantic butterfish larvae are generally found over bottom depths between 135 and 1,148 feet (41 and 350 meters) where average temperatures in the upper 656 feet (200 meters) of the water column are 48 to 72°F (9 to 22°C) (Mid-Atlantic Fishery Management Council, 2011). They are common in Boston Harbor from July to October (Jury et al., 1994). It is possible but unlikely that Atlantic butterfish larvae would be found within the Project Activity Area.

Adult Atlantic butterfish have been observed to spawn a few miles offshore near Woods Hole, Massachusetts (Cross et al., 1999), south of the Project Activity Area. Adult butterfish prefer the bottom during the day and disperse upward at night. They prefer sandy rather than rocky or muddy bottoms and generally stay near the surface over depths of 72 to 180 feet (22 to 55 meters) when near the coast in the summer and fall. In the winter and early spring, they tend to stay close to the bottom. Adult butterfish are common in Boston Harbor from June through October (Jury et al., 1994). It is possible but unlikely that Atlantic butterfish adults would be found within the Project Activity Area.

Atlantic Cod (*Gadus morhua*)

Boston Harbor has been designated as EFH for all four life stages of the Atlantic cod (**Table 9**) and an HAPC for juvenile cod (**Figure 5** on page 50).

In Boston Harbor, Atlantic cod eggs and larvae are rare during August through November but common from December to July (Jury et al., 1994). However, Atlantic cod eggs or larvae would not be present within the Project Activity Area given its shallow depth and distance from spawning areas in Massachusetts Bay (NOAA Fisheries, 2022h). Atlantic cod eggs and larvae are pelagic and do not associate with any particular substrate. Eggs occur at water depths below 361 feet (110 meters) and larvae occur at depths from 98 to 230 feet (30 to 70 meters) (NEFMC, 1998). It is possible but unlikely that Atlantic cod eggs and larvae would occur within the Project Activity Area.

Juvenile cod in Massachusetts prefer shallow inlets, rock pools, river mouths, and harbors, yet depart from coastal waters by the middle of June (Hardy, 1978 et al., as cited in Stevenson et al., 2014). Since juvenile cod favor water temperatures below 68°F (20°C), they are likely to leave the area in mid-June and return in the fall once temperatures have cooled (Jury et al., 1994). Occurrences of Atlantic cod juveniles within the Project Activity Area are possible but unlikely due to the fish ladder within the Charles River Lock and Dam that was deemed “not passable” in January 2005 by the DMF.

Atlantic cod adults prefer water temperatures below 50ºF (10°C) and depths ranging from 33 and 492 feet (10 and 150 meters); they tolerate a wide range of oceanic salinities (NEFMC, 1998). In Boston Harbor, Atlantic cod adults are rare between January and March but common from April to December (Jury et al., 1994). The depths of the Project Activity Area range from 7 to 27 feet (2 to 8 meters), which is shallower than Atlantic cod adults’ preferred depth range, so they are unlikely to occur within the Project Activity Area.

Bluefish (*Pomatomus saltatrix*)

Boston Harbor has been designated as EFH for bluefish juveniles and adults (**Table 9**).

Juveniles are pelagic and occur in North Atlantic estuaries and large bays from May through October. Their preferred temperature, water depth, and salinity are unknown (Mid-Atlantic Fishery Management Council, 1998). In Boston Harbor they are rare in May but common from June through October (Jury et al., 1994). The presence of a few incidental juvenile bluefish in the Project Activity Area is possible but unlikely.

Adult bluefish are found inshore, offshore, and in Massachusetts Bay from June through October. Their distribution varies seasonally. They prefer salinities of 25 ppt and temperatures above 61ºF (16°C). The depth preference of bluefish in Massachusetts is unknown. Adults are rare in Boston Harbor in May and common from October through June (Jury et al., 1994). Their presence within the Project Activity Area is possible but unlikely.

Red Hake (*Urophycis chuss*)

Boston Harbor has been designated as EFH for all four life stages of red hake (**Table 9**).

Conditions in EFH for red hake larvae include surface water temperatures of less than 66°F (19°C), salinity greater than 0.5 ppt, and water depths of less than 656 feet (200 meters) (NEFMC, 1998). All three of these conditions can be found in the Project Activity Area. However, because larval red hake associate with floating debris, sargassum and jellyfish, there is no known association between substrate type and the occurrence of red hake eggs and larvae. Little information on red hake eggs is available, but it is known that spawning is concentrated off Massachusetts and Rhode Island. Therefore, it is possible but unlikely that red hake eggs and larvae would be found in the Project Activity Area.

Lazzari and Stone, 2006 (as cited in Stevenson et al., 2014) collected young-of-the-year (YOY) juvenile red hake at depths less than 32.8 feet (<10 meters) along the Maine coast and concluded that shallow-water habitats in the Gulf of Maine are important nursery habitats for red hake. However, in a Massachusetts bottom trawl survey, older juvenile and adult red hake were rarely found in depths less than 32.8 feet (<10 meters) (Packer et al., 2003, as cited in Stevenson et al., 2014). Based on this data and the depths in the Project Activity Area, which range from 7 to 27 feet (2 to 8 meters), the presence of juvenile red hake in the Project Activity Area is possible but unlikely.

In the spring, adult red hake migrate to shallower and warmer waters, where they spawn in late spring and early summer. In the fall, they migrate to the deep basins in the Gulf of Maine and the outer continental shelf, where they stay throughout winter. The species prefers temperatures between 45 to 50°F (7 and 10°C) (NOAA Fisheries, 2024b). According to the 2024 Charles River Buoy, located next to the Museum of Science upstream of the Project Site, water quality readings on October 11, 2023, exhibited 62°F (17°C) (MWRA, 2024). This was the lowest temperature throughout the rest of the spring, summer, and late October, when the buoy went offline for the season. Therefore, because the water temperatures within the Project Activity Area during spring and summer are higher than preferred, adult red hake are possible but unlikely to occur in the Project Activity Area.

Little Skate (*Leucoraja erinacea*)

Boston Harbor has been designated EFH for little skate juveniles and adults (**Table 9**).

Habitat requirements for little skate juveniles and adults are similar. Their preferred benthic habitats, which include sand, gravel, and soft mud, are found in the Project Site. In general, juveniles and adults move to deeper waters in the winter and shallower waters in the spring (Bigelow and Schroeder, 1953; McEachran, 2002 as cited in Packer et al., 2003). Juvenile little skate are typically found at depths between shore and 450 feet (137 meters), and at temperatures from 39 to 59ºF (4 to 15°C). Adult little skate are typically found at depths between shore and 450 feet (137 meters), with the highest abundance from 240 to 299 feet (73 to 91 meters), and at temperatures from 36 to 59ºF (2 to 15°C) (NOAA Fisheries, 2024j). However, salinity requirements for this species are greater than 25 percent ppt, including higher salinity zones in bays and estuaries (NEFMC,1998). These conditions are largely unavailable in the Project Activity Area, with the exception of the small salt wedge within the water column close to the river bottom.

Furthermore, the Charles River Dam and Locks would likely deter most little skates from reaching the Project Site. Although little skate juveniles and adults have the potential to occur in the Project Activity Area during the spring, their occurrence would be rare and transient due to the salinity conditions and the locks. Therefore, it is possible but unlikely that juvenile and adult little skate would be present in the Project Activity Area.

Winter Skate (*Leucoraja ocellata*)

Boston Harbor has been designated as EFH for winter skate juveniles and adults (**Table 9**).

The habitat requirements for juvenile winter skate are gravelly or sandy substrates or mud, which are found in the Project Activity Area. Juvenile winter skate are typically found at depths between shoreline and 1,312 feet (400 meters), and at temperatures from 30 to 70ºF (-1.2 to 21°C), with most found from 39 to 61ºF (4 to 16°C). Adult winter skate are typically found at depths between shore and 1,217 feet (371 meters), but are most abundant at depths less than 364 feet (111 meters). They prefer temperatures from 34 to 68ºF (1.2 to 20°C), with most found from 41 to 59ºF (5 to 15°C) depending on the season (NOAA Fisheries, 2024c). They are generally found offshore in the summer and early fall and inshore in the winter and spring, and they prefer areas with high salinity (NOAA Fisheries, 2024c). Incidental occurrences of juvenile and adult winter skate in the Project Activity Area during the winter and spring are possible but unlikely based on the fish ladder within the Chares River Lock and Dam that was deemed “not passable” in January 2005 by the DMF.

Longfin Inshore Squid (*Doryteuthis pealeii*)

Boston Harbor has been designated as EFH for longfin inshore squid juveniles and adults (**Table 9**).

Juvenile longfin inshore squid prefer water depths from 164 to 492 feet (50 to 150 meters) and will inhabit the upper 33 feet (10 meters) of the water column. During surveys conducted in the Massachusetts coastal waters during the spring and fall, juveniles were primarily found in waters 41 to 62ºF (5 to 17ºC) and depths between 20 to 82 feet (6 and 25 meters) (Jacobson, 2005). Salinity ranges for juvenile longfin inshore squid are from 30 to 37 ppt, with most found at 32 to 33 ppt (Jacobson, 2005).

Most adult squids occur in Boston Harbor in the summer and fall. During this period, they have been observed in shallow waters, with depths between 20 to 92 feet (6 to 28 meters) (Jacobson, 2005). The rest of the year, adults will inhabit much deeper offshore waters along the shelf edge and continental slope. They prefer mud or a combination of mud and sand bottom habitat (NOAA Fisheries, 2024d). Adult longfin inshore squid are found at surface temperatures ranging from 48 to 70ºF (9 to 21ºC) and bottom temperatures ranging from 46 to 59ºF (8 to 15ºC). Salinity ranges for adult longfin inshore squid are from 30 to 36 ppt, with most found at 34 to 35 ppt (Jacobson, 2005).

The depths of the Project Activity Area range from 7 to 27 feet (2 to 8 meters), which is generally unsuitable for adults and juveniles. Therefore, occurrence of juvenile and adult longfin inshore squid in the Project Activity Area from spring through late autumn is possible but unlikely.

5.1.3 Category III

None of the life stages of American plaice *(Hippoglossoides platessoides)***,** Atlantic bluefin tuna (*Thunnus thynnuus*), Atlantic mackerel *(Scomber scombrus)***,** Atlantic herring (*Clupea harengus*), Atlantic wolffish (*Anarhichas lupus*), black sea bass (*Centropristis striata*), ocean pout *(Macrozoarces americanus)***,** spiny dogfish (*Squalus acanthias*), summer flounder *(Paralichthys dentatus)***,** white hake *(Urophycis tenuis)***,** silver hake (*Merluccius bilinearis*), yellowtail flounder (*Limanda ferruginea*), thorny skate (*Amblyraja radiata*), Atlantic surfclam *(Spisula solidissima),* and northern shortfin squid (*Illex illecebrosus*) are likely occur within the Project Activity Area and/or be affected by the Proposed Project based on unsuitable habitat characteristics and species life history characteristics that favor open ocean conditions, higher salinities, or greater water depths than those in the Project Activity Area.

5.2 NOAA Fisheries Trust Resource Species -- Diadromous Species

Diadromous fish are a group of species that rely on both fresh and saltwater environments to survive and reproduce, and are classified as either anadromous or catadromous. Anadromous species spawn in fresh water and mature in marine water, while catadromous species mature in fresh water and return to marine water to spawn. Estuarine systems such as Boston Harbor are used as nursery, feeding, and migration pathways for diadromous fish. The riverine systems that maintain a capacity to support anadromous fish near Boston Harbor are Fore River, Back River, Furnace Brook, Chelsea Creek, Neponset River, Charles River, and Mystic River (NRWA, 2015; Evans et al., 2015). These freshwater systems currently or historically support the diadromous species discussed below.

Anadromous species present in the Charles River include finfish that utilize the Project Activity Area for both spring and fall migration, such as alewife, blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), rainbow smelt (*Osmerus mordax*), white perch, (*Morone americana*), and gizzard shad (*Dorosoma cepedianum*) (Brady et al., 2005). In addition, the catadromous species American eel (*Anguilla rostrata*) has the potential to migrate through the Project Activity Area. As stated in Section 4.4 above, the Project Activity Area is not suitable for shellfish. **Table 10** provides habitat information and identifies the potential for occurrence for the NOAA Fisheries Trust Resource diadromous species present in the Charles River.

None of the diadromous species would reside for extended periods of time at the Project Activity Area, as explained in **Table 10** below, and the Project Site is partially in the migratory pathway between the freshwater and marine habitats that these species inhabit during different phases of their lives.

Table 10. NOAA Fisheries Trust Resource Species – Diadromous Species Present in the Charles River

Species (scientific name)	Classification (anadromous or catadromous)	Habitat Preferences	Potential to Occur within the Project Site
Alewife *(Alosa pseudoharengus)*	Anadromous	Will spawn in slow moving rivers and ponds[1]. Females will move back to their native freshwater to spawn and then migrate back to marine[2]. Mature in the ocean and return to spawn in natal streams.	Unlikely, but possible
American Eel (*Anguilla rostrata*)	Catadromous	Live in freshwater rivers, tidal creeks, harbors, salt ponds with muddy or sandy bottoms[1], but returns to the ocean to spawn[3].	Unlikely, but possible
American Shad (*Alosa sapidissima*)	Anadromous	Spawn in shallow areas with sand or gravel along freshwater coasts[1]. After spawning, adults migrate back to marine environments[4].	Unlikely, but possible
Blueback Herring (*Alosa aestivalis*)	Anadromous	Spawn in rocky or gravel streams with swift flowing water[1].	Unlikely, but possible
Gizzard Shad (*Dorosoma cepedianum*)	Anadromous	Shallow areas with soft, muddy bottoms in freshwater rivers and ponds and brackish and coastal waters[5].	Potential
Rainbow Smelt *(Osmerus mordax)*	Anadromous	Overwinter in the upper estuaries and bays then spawn in early spring in pool and riffle areas above the head-of-tide in coastal streams and rivers[6].	Potential
White Perch *(Morone americana)*	Anadromous	Spawn upstream in coastal rivers and begins when water temperatures rise in the spring. After spawning, white perch swim back downstream towards the tidal zone. Fresh, brackish, and coastal waters. Adults tend to be found in areas with mud, silt, or sand bottoms[5].	Potential

[1] Hartel, Halliwell & Launer, 2002
[2] DMF, 2024a
[3] DMF, 2024b
[4] NHESP, 2015
[5] Fuller, Neilson, Hopper, 2022
[6] Enterline et al, 2012

6.0 EFFECTS ANALYSIS

In-water construction has the potential to add stressors and impact aquatic species. Stress from construction noise, sediment disturbance, vessel traffic, and changes in the physical habitat can affect species in the Project Activity Area and nearby waters. The extent of these stressors and their potential effects are described below.

6.1 Impacts to EFH and EFH Species

The construction associated with the Project will have direct and indirect temporary effects on the EFH within the Project Activity Area, resulting in temporary impacts to EFH species. The temporary impacts may include: 1) temporary habitat disturbance resulting from dredging and pile driving/removal and 2) temporary changes in water quality resulting from construction-related disturbance of bottom sediments. Minor permanent EFH modifications will also occur from replacement of bridge elements in the river. Overall, the effects of the Proposed Project would not alter the ability of EFH species to use the lower portion of the Charles River or the quality of the aquatic habitat over the long term. The temporary construction activities could deter use of the river by EFH species, such as through general disturbance, human presence, and increases in noise, but the generally low quality of the aquatic habitat in the Project Activity Area likely already precludes most species from using the river.

6.1.1 Habitat Modification

Habitat modification associated with the Proposed Project would be limited to the Project Site. Demolition activities will temporarily disturb approximately 0.5 acre (24,000 square feet) of the riverbed, and other construction activities will temporarily disturb approximately 0.1 acre (5,300 square feet) and permanently modify approximately 0.3 acre (11,400 square feet) of the riverbed. Dredging would take place along the riverbed to maintain the bottom elevation of the navigable channel to meet USCG requirements. Pile driving is proposed for installation of new bridge elements, and some disturbance and excavation along the riverbed would be required for removal of cables and other demolition activities.

Subsurface conditions within the Project Site consist of historically placed fill overlying organic silt tidal estuary deposits often intermixed with fill material, overlying silty sand, marine clay (Boston Blue Clay), discontinuous strata of glaciomarine deposits and/or glacial till, weathered argillite and argillite bedrock. The substrates on site consist of approximately 70 percent silt/mud, 20 percent sand, and ten percent pebble/gravel/cobble. The organic silt stratum primarily comprises very soft to hard, dark gray to black organic silt with up to ten percent shells. Because of the fill dumped atop this layer within the historic mud flats adjacent to the Charles River, the stratum is intermixed with up to 20 percent fine to coarse sand and debris including brick, wood and cinders, and up to ten percent gravel (Pizzi, 2020). Because the dredging activities will occur within a silt curtain, sand and gravels will largely remain in place, with mainly the fines (including a portion of the fine sand) having the potential to remain in suspension and be transported beyond the silt curtain.

The dredging, pile driving/removal, and cable removal activities associated with the Project will disturb sediment infauna, removing suitable cover, and may result in loss of submerged aquatic vegetation, benthic infauna, and sedentary epifauna. Dredging and other riverbed disturbance could also remove suitable cover, homogenize bottom substrates, and reduce the structural complexity of habitats for fish. This will result in the temporary loss of prey and cover within EFH for some species until the bottom habitat is recolonized. These modifications to the riverbed could affect EFH specifically for juvenile and adult windowpane flounder, all life stages of winter flounder, and juvenile scup and are less likely to affect adult butterfish, eggs and larvae and possibly juveniles of pollock, juvenile and adult little and winter skates, and possibly juvenile and adult squid. Disturbance to breeding habitat for winter flounder and pollock would be adverse, but not considered substantial because of the unlikely potential for eggs and larvae to be found in the affected portion of the river. Other lifestages or species are not expected to use riverbed habitat and would primarily be affected by water quality-type effects, as discussed below.

Benthic organisms removed by dredging activities in shallow mud and sand bottom areas typically have rapid recolonization rates through reproductive mechanisms, however, thereby minimizing the loss of benthic prey. There is also abundant similar habitat throughout the Charles River that provides comparable feeding opportunities, and juvenile and adult fish and squids would be expected to avoid the Project Site during construction and return when the disturbance is complete. Where dredging and excavating mixes sediment types, similar heterogeneity based on current conditions will return after completion. When dredging activities are completed, the excavated sediment will be loaded onto containment barges for proper disposal, most likely at a contained landfill suitable for receipt of contaminated soils as to cause no additional changes to the habitat.

The removal of existing bridge elements, including timber piles and caissons from the bridge structures in use and the remnants of those not currently in use, will temporarily disturb EFH but would not modify the habitat as the construction of replacement bridge elements, drilled shafts, and piles will provide similar replacement habitat. Overall the square footage of habitat loss would be negligible within the context of available lower Charles River Basin and Boston Harbor habitat.

Underwater noise and increased turbidity, as well as changes to the area with new/modified bridge components, may deter EFH species from using the habitat in the Project Activity Area; however, the construction noise and turbidity will be temporary and recolonization by prey species will draw the EFH species back into the area.

With the use of silt curtains, the avoidance of major silt-producing activities during TOY restrictions, stormwater BMPs , and the rapid recolonization rates of prey species, it is anticipated that the effects on EFH and EFH species would be minor.

6.1.2 Water Quality

Construction activities for the Proposed Project, such as dredging, pile driving, and drilled shaft installation, may have a direct effect on water quality by elevating levels total suspended solids (TSS), which have been shown to have adverse effects on benthic communities at 390mg/l, in the water column. These activities have the potential to create short periods with a very small amount of localized turbidity within the soft bottom sediments in the riverbed, which could reduce dissolved oxygen and cause stress for marine species. Increased turbidity could affect EFH for species that are found in the water channel, including eggs of windowpane flounder and juvenile pollock (shallow water in particular). Although less likely to occur, EFH for eggs and larvae of butterfish, juvenile cod, juvenile and adult bluefish, eggs and larvae of pollock, red hake, and squid (shallow water in particular) could also be affected by degradation of water quality.

The construction activities would not be undertaken all at once, rather they would occur over a long period, spreading the magnitude of impact over time. Multiple periods of dredging are planned to be spread out over several years of construction; therefore, no single dredging event is likely to generate a substantial amount of sediment due to the size of the piles being driven.

The impact of this increased turbidity would be temporary and short-term, with sediment settling out shortly after activities are completed. Additionally, an option for the contractor to further lower TSS during removal of the existing caissons could be to complete the work within cofferdams. A Project-specific NPDES SWPPP and a SPCC Plan will describe BMPs to be implemented during construction, such as sediment reduction and spill cleanup measures. In addition, TOY restrictions will be implemented to avoid dredging and major silt-producing activities during peak periods of fish movement in spring and fall, and silt curtains will be used outside these periods. Should minor silt-producing activities occur during TOY restrictions, silt curtains will be used to mitigate water quality impacts from turbidity to all the life stages of EFH and EFH species. The TOY restrictions would help minimize the extent of water quality impacts, although EFH could still be affected outside of these periods. The disturbance to water quality, TSS, and prey species would be temporary and occur in a relatively small area, which is expected to result in negligible reductions in EFH.

6.2 Impacts to NOAA Fisheries Trust Resource Species

Project construction may have direct and indirect temporary effects on the NOAA Fisheries Trust Resource Species within the Project Activity Area. The temporary impacts to NOAA Fisheries Trust Resource Species are identified in the sections below. As described in **Tables 6 and 7** above, the Spring TOY Restrictions for alewife, blueback herring, American shad, rainbow smelt, white perch, and the American eel (February 15 to July 15) will be implemented for all major activities, including pile driving/removal and dredging. Additionally, downstream passage will be maintained during Fall out-migration from September 1 to November 15 (Fall TOY Restriction for alewife, blueback herring, American shad, and American eel) for all major activities. For all minor activities, silt curtains will be required if performed from February 15 to July 15 or September 1 to November 15. The implementation of these TOYs will be written into contract specifications to prevent impacts to some of the trust species by keeping construction activities from occurring within these sensitive windows.

6.2.1 Habitat Disturbance

Habitat disturbance resulting from construction activities, including dredging, pile driving/removal, and cable removal, will directly impact the benthic community by reducing submerged aquatic vegetation, benthic infauna, and sedentary epifauna, including food sources; removing suitable cover; homogenizing bottom substrates; and reducing the structural complexity of habitats on the floor of the Charles River. This will result in a temporary loss of bottom habitat, including cover and foraging for NOAA Fisheries Trust Resource Species such as the white perch, rainbow smelt, and gizzard shad that may use the Project Activity Area, as described in **Table 10** above. There is, however, abundant similar habitat throughout the Charles River that provides comparable feeding opportunities. Further, benthic organisms removed by dredging activities in shallow mud and sand bottom areas typically have rapid recolonization rates through reproductive mechanisms, thereby minimizing the long-term loss of benthic prey. The impacts to white perch, rainbow smelt, and gizzard shad would be temporary, short-term, and insignificant. Alewife, American eel, blueback herring, and American shad are not likely to use the Project Activity Area for these purposes and will not be impacted by these construction activities.

The construction of temporary cofferdams and trestles, dredging, and location of equipment within the Charles River may delay migrating fish, such as alewife, American eel, blueback herring, American shad, gizzard shad, white perch, and rainbow smelt from moving through the Project Activity Area; however, construction activity is limited to 8 hours per day, which leaves 16 hours of a 24-hour period for species to use and travel through the Project Activity Area without pile driving noise and other construction activity. These impacts would be temporary, short-term, and insignificant.

6.2.2 Vessel Transits

While the location of potential staging areas for barges and other vessels that may be used to support the Proposed Project are not known at this time, it is anticipated that there is sufficient capacity in the East Boston or Quincy/Weymouth waterfronts. Barges moved by tugs, supply vessels, and work boats would likely operate from one or more of these locations. Project barges moving to and from home ports would travel at relatively slow speeds, generally less than 10 miles per hour (mph). Construction-related vessel traffic would represent a small percentage of the annual commercial and recreational vessel traffic within the Project Activity Area.

The movement of vessels serving the Proposed Project would be intermittent, temporary, and restricted to a small portion of the Project Activity Area on any given day. TOY restrictions do not apply to vessel transit because NOAA Fisheries Trust Resource Species have a startle response such that they sense approaching vessels and rapidly move out of harm's way; the response is especially protective given the slower speeds typical of construction vessels. Alewife, American eel, blueback herring, American shad, rainbow smelt, gizzard shad, and white perch prefer the middle or bottom of the water column and are not expected to be directly impacted by vessel transit on the water surface; however, there is a very low potential for fish mortality by vessel transit. Any loss of individuals would have a negligible effect on any species population.

Potential indirect impacts to alewife, American eel, blueback herring, American shad, rainbow smelt, gizzard shad, and white perch from vessel transits in the Project Activity Area include general stress and disruption of regular daily activities. It is likely that the baseline vessel activity surrounding the Project Activity Area between potential home ports and/or staging areas in Weymouth/Quincy and Boston/East Boston and the Charles River is well in excess of several thousand transits per year. It is estimated that Project-related construction vessel transits would number in the hundreds during the construction period. These impacts would be temporary and short-term and would occur only while the vessels are moving. When added to the baseline vessel traffic, the traffic associated with construction vessels in the Project Activity Area would be insignificant.

6.2.3 Hydroacoustics

Construction activities within the Charles River would generate a variety of intermittent noise, resulting from the operation of diesel-powered equipment, such as dredges, pile drivers, vibratory hammers, boat motors, and generators. Noise levels from these sources will vary and some of them may have the potential to impact behavior and, in the case of in-water pile driving, they could have physiologically harmful effects on American eel, blueback herring, American shad, rainbow smelt, gizzard shad, and white perch.

Pile-driving activities and other underwater construction may generate intense underwater sound pressure waves that can adversely affect nearby aquatic organisms. Studies of the effects of pile driving have found that there is substantial variation in a species' response to sound, as intense sound pressure waves can change fish behavior or injure/kill fish through rupturing swim bladders or causing internal hemorrhaging. The degree to which an individual fish that is exposed to sound waves would be affected depends on variables such as the peak sound pressure level, frequency, cumulative sound exposure levels (cSEL), and distance from the source, as well as the species, size, auditory physiology, and condition of a fish (e.g., small fish are more prone to injury by intense sound waves than are larger fish of the same species) (NOAA Fisheries, 2016).

In addition, the intensity of the sound pressure levels produced during sheet and pile driving depends on a variety of factors, including but not limited to the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer. To reduce impacts to American eel, blueback herring, American shad, rainbow smelt, gizzard shad, and white perch from underwater noise, a "soft start" will be implemented for pile driving, which is expected to direct species away from the area before full-energy pile driving occurs. Fish species would avoid the area before they accumulate enough sound energy to be injured. Further, pile driving is limited to 8 hours per day, which leaves 16 hours of a 24-hour period for species to use and travel through the Project Activity Area without pile driving noise. Vessel activity will also create underwater noise; however, when added to baseline vessel noise conditions, the underwater noise associated with construction vessels in the Project Activity Area would be insignificant.

6.2.4 Water Quality

Disturbance of bottom sediments during dredging and pile driving/removal can increase suspended sediment or TSS concentrations and down-current deposition of re-suspended sediments. Increased levels of suspended sediments can result in reduced fish egg and larvae development, abrasion of sensitive gill epithelial tissue, reduced feeding and growth of filter-feeding benthic organisms, and mortality to American eel, blueback herring, American shad, rainbow smelt, gizzard shad, and white perch. Depending on the species, episodic increases in suspended sediments can create an avoidance behavior, whereby mobile life stages would move out of or away from areas of higher concentrations, which could interrupt foraging or cause them to move into less optimal habitat. The effects of elevated suspended sediments will depend on the volume of water and distance of a plume associated with different concentrations that cause a range of potential affects, from avoidance behavior to harm.

The use of silt curtains for minor silt-producing activities during TOY restriction periods and for major silt-producing activities outside the TOY restrictions will be included as requirements in contract specifications, and the removal of the existing caissons within the cofferdams to reduce TSS will be listed as an option for the contractor. Additionally, TOY restrictions will apply to the dredging, pile driving, and drilled shaft installation to minimize impacts to fish species.

Over the course of the construction sequence, it is anticipated that multiple dredging events, spread out over the construction period, will occur. Therefore, it is expected that no single dredging event would remove a substantial amount of sediment, reducing the amount of sediments that may go into suspension at any one time. Impacts to American eel, blueback herring, American shad, rainbow smelt, gizzard shad, and white perch within the Project Activity Area are expected to be minimal, temporary, and insignificant.

7.0 Conclusions

As discussed above, the Proposed Project will have temporary and permanent effects on the EFH within the Project Activity Area and on NOAA Fisheries Trust Resource Species that could occur in the Project Activity Area. Though construction activities, like most anthropogenic development activities, are known to have an adverse effect on EFH and fish species, they will be minimized by the employment of various conservation measures. Furthermore, the physical barrier of the Charles River Dam and Locks reduces the likelihood that EFH species would be present at the Project Site, and the slow water speed allows the suspended solids to drop from the water and continually build up upstream of the dam, which would not allow vegetative habitats to develop. The conclusion of this EFH Assessment is that the Proposed Project may have adverse, but not substantial, effects on EFH species, because the impacts will be avoided, minimized, and offset.

For NOAA Fisheries Trust Resource Species, a similar conclusion can be drawn, since the Project will implement various measures to minimize the effects of major silt producing activities or high noise levels. The passage past the work site will not be more than 25 percent restricted to allow upstream and downstream migrating fish sufficient room to move through the work site. Work activities that produce potentially harmful effects on migrating fish will be intermittent over the course of any given day, and the days of a week; for example, nighttime work would occur on a very limited basis, if at all.

The Proposed Project has been designed, and construction methods selected, to minimize impacts. For example, drilled casings would be used to limit sediment disturbance, and existing piles that do not need to be removed below the mudline would be cut at the mudline to limit sediment disturbance.

Therefore, the conclusion of this assessment is that the Proposed Project will likely have only a minor adverse impact on EFH and fish species, as well as NOAA Fisheries Trust Resource Species, which is not substantial enough to measurably affect population levels of any species. Measures to minimize and mitigate impacts will be implemented, further reducing the impacts to these species.

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Appendix A

EFH Worksheet

EFH Assessment Worksheet rev. August 2021

Please read and follow all of the directions provided when filling out this form.

1. General Project Information

Date Submitted:

Project/Application Number:

Project Name: MBTA Draw One Bridge Replacement Project

Project Sponsor/Applicant: Massachusetts Bay Transit Authority (MBTA)

Federal Action Agency (or state agency if the federal agency has provided written notice delegating the authority[1]): Federal Transit Administration

Fast-41: Yes ☐ No ☑

Action Agency Contact Name: Jonathan Schmidt

Contact Phone: 617-494-4742 Contact Email: Jonathan.Schmidt@dot.gov

Address, City/Town, State:

220 Binney Street Suite 940, Cambridge, MA 02142-1093

2. Project Description

[2]Latitude: 42.369250°N Longitude: 71.065508°W

Body of Water (e.g., HUC 6 name): Charles River

Project Purpose:

The Massachusetts Bay Transit Authority (MBTA) is replacing its Draw One Bridge No. B-16-479 and performing associated track and signal upgrades.

Project Description:

The Project consists of the replacement of the Draw One Bridges No. B-16-479 over the Charles River including the north and south approach trestles and demolition and replacement of the building housing the operating system for the drawbridges (Signal Tower A). The bridges are located above the Charles River and support commuter rail service between communities north of Boston and Boston, located immediately adjacent to and northwest of MBTA's North Station. Several other upgrades within the bridge construction limits will also be addressed including signals, communications, and drainage.

Anticipated Duration of In-Water Work including planned Start/End Dates and any seasonal restrictions proposed to be included in the schedule:

The entire Proposed Project is expected to take eight years to complete. In-water work will be necessary throughout the entire eight years without seasonal shut downs.

[1] A federal agency may designate a non-Federal representative to conduct an EFH consultation by giving written notice of such designation to NMFS. If a non-federal representative is used, the Federal action agency remains ultimately responsible for compliance with sections 305(b)(2) and 305(b)(4)(B) of the Magnuson-Stevens Act. [2] Provide the decimal, or the degrees, minutes, seconds values for latitude and longitude using the World Geodetic System 1984 (WGS84) and negative degree values where applicable.

3. Site Description

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH[3]?	☑ Yes	☐ No
Is the project in designated HAPC?	☐ Yes	☑ No
Does the project contain any Special Aquatic Sites[4]?	☐ Yes	☑ No
Is this coordination under FWCA only?	☐ Yes	☑ No

Total area of impact to EFH (indicate sq ft or acres): 46,555 SF

Total area of impact to HAPC (indicate sq ft or acres): None

Current range of water depths at MLW	Salinity range (PPT):	Water temperature range (°F):
10 - 20 feet	0.8 (surface) - 14.0 (bottom)	37.8 - 83.1°F

[3]Use the tables in Sections 5 and 6 to list species within designated EFH or the type of designated HAPC present. See the worksheet instructions to find out where EFH and HAPC designations can be found. [4] Special aquatic sites (SAS) are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. They include sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes (40 CFR Subpart E). If the project area contains SAS (i.e. sanctuaries and refuges, wetlands, mudflats, vegetated shallows/SAV, coral reefs, and/or riffle and pool complexes, describe the SAS, species or habitat present, and area of impact.

4. Habitat Types

In the table below, select the location and type(s) for each habitat your project overlaps. For each habitat type selected, indicate the total area of expected impacts, then what portion of the total is expected to be temporary (less than 12 months) and what portion is expected to be permanent (habitat conversion), and if the portion of temporary impacts will be actively restored to pre- construction conditions by the project proponent or not. A project may overlap with multiple habitat types.

Habitat Location	Habitat Type	Total impacts ($lf/ft^2/ft^3$)	Temporary impacts ($lf/ft^2/ft^3$)	Permanent impacts ($lf/ft^2/ft^3$)	Restored to pre-existing conditions?*
Estuarine	Substrate (silt/mud)	46,555 SF/10,716 CF	30,912 SF/4,827 CF (+10%)	11,411 SF/4,915 CF (+10%)	Yes
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one

*Restored to pre-existing conditions means that as part of the project, the temporary impacts will be actively restored,such as restoring the project elevations to pre-existing conditions and replanting. It does not include natural restoration or compensatory mitigation.

Submerged Aquatic Vegetation (SAV) Present?:

Yes: ☐ No: ☑

If the project area contains SAV, or has historically contained SAV, list SAV species and provide survey results including plans showing its location, years present and densities if available. Refer to Section 12 below to determine if local SAV mapping resources are available for your project area.

Sediment Characteristics:

The level of detail required is dependent on your project – e.g., a grain size analysis may be necessary for dredging. In addition, if the project area contains rocky/hard bottom habitat [6](pebble, cobble, boulder, bedrock outcrop/ledge) identified as Rocky (coral/rock), Substrate (cobble/gravel), or Substrate (rock) above, describe the composition of the habitat using the following table.

Substrate Type* (grain size)	Present at Site? (Y/N)	Approximate Percentage of Total Substrate on Site
Silt/Mud (<0.063mm)	Yes	70
Sand (0.063-2mm)	Yes	20
Rocky: Pebble/Gravel /Cobble(2-256mm)**	Yes	10
Rocky: Boulder (256-4096mm)**	No	
Rocky: Coral	No	
Bedrock**	No	

[6]The type(s) of rocky habitat will help you determine if the area is cod HAPC.

* Grain sizes are based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders.

** Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.

If no grain size analysis has been conducted, please provide a general description of the composition of the sediment. If available please attach images of the substrate.

According to the Geotechnical Engineering Memorandum, the few feet of sediment in the Project area primarily consists of organic silt and fill. The organic silt stratum primarily comprises very soft to hard, dark gray to black organic silt with up to 10 percent shells. Because of the fill dumped atop this layer within the historic mud flats adjacent to the Charles River, the stratum is intermixed with up to 20 percent fine to coarse sand and debris including brick, wood, and cinders, and up to 10 percent gravel (STV, 2020).

Diadromous Fish (migratory or spawning habitat- identify species under Section 10 below):

Yes: ☑ No: ☐

5. EFH and HAPC Designations

Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries. Use the EFH mapper to determine if EFH may be present in the project area and enter all species and life stages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present at your project site. If the habitat characteristics described in the text descriptions do not exist at your site, you may be able to exclude some species or life stages from additional consideration. For example, the water depths at your site are shallower that those described in the text description for a particular species or life stage. We recommend this for larger projects to help you determine what your impacts are.

Species Present	EFH is designated/mapped for:				What is the source of the EFH information included?
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
American plaice	☑	☑	☑	☑	EFH Mapper c
bluefin tuna	☐	☐	☐	☑	EFH Mapper c
Atlantic butterfish	☑	☑	☐	☑	EFH Mapper c
Atlantic cod	☑	☑	☑	☑	EFH Mapper c
Atlantic mackerel	☑	☑	☑	☑	EFH Mapper c
Atlantic herring	☐	☑	☑	☑	EFH Mapper c
Atlantic wolffish	☑	☑	☑	☑	EFH Mapper c
Black sea bass	☐	☐	☐	☑	EFH Mapper c
bluefish	☐	☐	☑	☑	EFH Mapper c
ocean pout	☐	☐	☑	☑	EFH Mapper c
pollock	☑	☑	☑	☐	EFH Mapper c

Species Present	EFH is designated/mapped for:				What is the source of the EFH information included?
	EFH: eggs	EFH: larvae	EFH: juvenile	EFH: adults/ spawning adults	
red hake	✓	✓	✓	✓	EFH Mapper c
scup	☐	☐	✓	☐	EFH Mapper c
spiny dogfish	☐	☐	☐	✓	EFH Mapper c
summer flounder	☐	☐	☐	✓	EFH Mapper c
white hake	✓	✓	✓	✓	EFH Mapper c
silver hake	✓	✓	☐	✓	EFH Mapper c
windowpane flounder	✓	✓	✓	✓	EFH Mapper c
winter flounder	✓	✓	✓	✓	EFH Mapper c
yellowtale flounder	✓	✓	✓	✓	EFH Mapper c
little skate	☐	☐	✓	✓	EFH Mapper c
thorny skate	☐	☐	✓	☐	EFH Mapper c
Atlantic surf clam	☐	☐	✓	✓	EFH Mapper c
long-finned squid	☐	☐	✓	✓	EFH Mapper c
northern shortfin squid	☐	☐	☐	✓	EFH Mapper c
winter skate	☐	☐	✓	✓	EFH Mapper c

6. Habitat Areas of Particular Concern (HAPCs)

HAPCs are subsets of EFH that are important for long-term productivity of federally managed species. HAPCs merit special consideration based their ecological function (current or historic), sensitivity to human-induced degradation, stresses from development, and/or rarity of the habitat.While many HAPC designations have geographic boundaries, there are also habitat specific HAPC designations for certain species, see note below. Use the EFH mapper to identify HAPCs within your project area. Select all that apply.

☐	Summer flounder: SAV[7]	☐	Alvin & Atlantis Canyons
☐	Sandbar shark	☐	Baltimore Canyon
☐	Sand Tiger Shark (Delaware Bay)	☐	Bear Seamount
☐	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	☐	Heezen Canyon
☐	Inshore 20m Juvenile Cod[8]	☐	Hudson Canyon
☐	Great South Channel Juvenile Cod	☐	Hydrographer Canyon
☐	Northern Edge Juvenile Cod	☐	Jeffreys & Stellwagen
☐	Lydonia Canyon	☐	Lydonia, Gilbert & Oceanographer Canyons
☐	Norfolk Canyon (Mid-Atlantic)	☐	Norfolk Canyon (New England)
☐	Oceanographer Canyon	☐	Retriever Seamount
☐	Veatch Canyon (Mid-Atlantic)	☐	Toms, Middle Toms & Hendrickson Canyons
☐	Veatch Canyon (New England)	☐	Washington Canyon
☐	Cashes Ledge	☐	Wilmington Canyon
☐	Atlantic Salmon		

[7] Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

[8] The purpose of this HAPC is to recognize the importance of inshore areas to juvenile Atlantic cod. The coastal areas of the Gulf of Maine and Southern New England contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. Although this habitat type is not rare in the coastal Gulf of Maine, it provides two key ecological functions for juvenile cod: protection from predation, and readily available prey. See EFH mapper for links to text descriptions for HAPCs.

7. Activity Details

Select all that apply	Project Type/Category
☐	Agriculture
☐	Aquaculture - List species here:
☑	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
☐	Beach renourishment
☑	Dredging/excavation
☐	Energy development/use e.g., hydropower, oil and gas, pipeline, transmission line, tidal or wave power, wind
☑	Fill
☐	Forestry
☑	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port, railroad)
☑	Intake/outfall
☐	Military (e.g., acoustic testing, training exercises)
☐	Mining (e.g., sand, gravel)
☐	Overboard dredged material placement
☑	Piers, ramps, floats, and other structures
☐	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, mitigation bank/ILF creation)
☐	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
☑	Water quality (e.g., storm water drainage, NPDES, TMDL, wastewater, sediment remediation)
☐	Other:

8. Effects Evaluation

Select all that apply	Potential Stressors Caused by the Activity
☑	Underwater noise
☑	Water quality/turbidity/ contaminant release
☑	Vessel traffic/barge grounding
☐	Impingement/entrainment
☐	Prevent fish passage/spawning
☑	Benthic community disturbance
☐	Impacts to prey species

Select all that apply and if temporary[9] or permanent		Habitat alterations caused by the activity
Temp	Perm	
☐	☐	Water depth change
☐	☐	Tidal flow change
☑	☑	Fill
☑	☑	Habitat type conversion
☐	☐	Other:
☐	☐	Other:

[9] Temporary in this instance means during construction. [10] Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

Details - project impacts and mitigation

Briefly describe how the project would impact each of the habitat types selected above and the amount (i.e., acreage or sf) of each habitat impacted. Include temporary and permanent impact descriptions and direct and indirect impacts. For example, dredging has a direct impact on bottom sediments and associated benthic communities. The turbidity generated can result in a temporary impact to water quality which may have an indirect effect on some species and habitats such as winter flounder eggs, SAV or rocky habitats. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

The Project will begin with the demolition/removal of existing structures remaining from the bridges partially removed including the demolition of existing caissons, pile extraction of the existing fender system, and submarine cable removal west of the existing bridges. This portion of work will result in a temporary impact of 24,012 SF. These impacts on the estuarine silt/mud habitat are due to dredging that is required for the removal of the cable, fender system, and 11 of the caissons. This will disrupt the bottom sediment and impact benthic communities as the sediment will be removed and disposed of off-site since some of the sediment at the Project Site is contaminated. Turbidity would increase from this work, but would likely only increase within 100 feet of the Project Site. Timber piles and a portion of the caissons that will be removed will be cut at the mudline so that the river bottom is not impacted and there's no resulting increase in turbidity.

After the initial demolition work, the proposed structure construction will include riverbed dredging and constructing drill shafts, trestles, temporary trestles, fender piles, and a king pile abutment in front of the existing seawall. This work will result in a temporary impact of 30,912 SF and a permanent impact of 11,411 SF. Dredging will disrupt the bottom sediment and impact benthic communities, and turbidity would increase from this work, but would likely only increase within 100 feet of the Project area.

After construction of the new structures is complete, additional demolition will be needed which involves extracting the temporary work trestle piles. This work would result in a temporary impact of 0 SF. Dredging will disrupt the bottom sediment and impact benthic communities, and turbidity would increase from this work, but would likely only increase within 100 feet of the Project area.

See EFH Assessment Narrative for additional details.

What specific measures will be used to avoid and minimize impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided or minimized, why not?

Turbidity and sediment controls will be implemented during construction which may include cofferdams and silt curtains. Existing timber piles will be cut and removed at the mudline to reduce disturbance to the river bottom. Based on the hydroacoustic modeling, the effects from the pile driving noise are expected to extend out approximately 5.5 miles from the Project Site; however, the model is unable to take into account the effects the Charles River Dam and Locks would have on the sound. It is believed that the sound would dampen when the dam is encountered and would not continue into Boston Harbor or reach 5.5 miles. However, as a fish protection best practice, a single cautionary blow will be made with the barge mounted impact hammer as a soft start prior to initiating the daily pile driving activities. As per email recommendation from Kaitlyn Shaw (NOAA Fisheries) dated May 4, 2021, time of year restrictions for diadromous species will be employed and would follow the spring TOY for upstream passage for spawning and migratory fish trust species would be as follows – Spring from February 15 to July 15 and downstream passage maintained during the Fall out migration from September 1 to November 15), as per the DMF Technical Report TR-47 (Evans et al. 2015). During these time of year restrictions, turbidity and sediment controls will not extend more than 25% from the ordinary high water mark of the river to allow for fish passage. Additional guidance from NOAA is expected during the consultation process.

Is compensatory mitigation proposed? Yes ☑ No ☐

If compensatory mitigation is not proposed, why not? If yes, describe plans for compensatory mitigation (e.g. permittee responsible, mitigation bank, in-lieu fee) and how this will offset impacts to EFH and other aquatic resources. Include a proposed compensatory mitigation and monitoring plan as applicable.

Throughout permitting process we will determine the extent of compensatory mitigation required for this work (e.g. in-lieu fee assessment).

9. Effects of Climate Change

Effects of climate change should be included in the EFH assessment if the effects of climate change may amplify or exacerbate the adverse effects of the proposed action on EFH. Use the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 8.5/high greenhouse gas emission scenario (IPCC 2014), at a minimum, to evaluate the future effects of climate change on the proposed projections. For sea level rise effects, use the intermediate-high and extreme scenario projections as defined in Sweet et al. (2017). For more information on climate change effects to species and habitats relative to NMFS trust resources, see Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes.

1. Could species or habitats be adversely affected by the proposed action due to projected changes in the climate?If yes, please describe how:

No

2. Is the expected lifespan of the action greater than 10 years? If yes, please describe project lifespan:

Yes, the lifespan of the Project is expected to be 75 years.

3. Is climate change currently affecting vulnerable species or habitats, and would the effects of a proposed action be amplified by climate change? If yes, please describe how:

No

4. Do the results of the assessment indicate the effects of the action on habitats and species will be amplified by climate change? If yes, please describe how:

No

5. Can adaptive management strategies (AMS) be integrated into the action to avoid or minimize adverse effects of the proposed action as a result of climate? If yes, please describe how:

No

10. Federal Agency Determination

Federal Action Agency's EFH determination (select one)	
☐	There is no adverse effect[7] on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA only request.
☑	The adverse effect[7] on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
☐	The adverse effect[7] on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA documents, if applicable.

[7] An adverse effect is any impact that reduces the quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

11. Fish and Wildlife Coordination Act

Under the FWCA, federal agencies are required to consult with us if actions that the authorize, fund, or undertake will result in modifications to a natural stream or body of water. Federal agencies are required to consider the effects these modifications may have on fish and wildlife resources, as well as provide for the improvement of those resources. Under this authority, we consider the effects of actions on NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats, that are not managed under a federal fisheries management plan. Some examples of other NOAA-trust resources are listed below. Some of these species, including diadromous fishes, serve as prey for a number of federally-managed species and are therefore considered a component of EFH pursuant to the MSA. We will be considering the effects of your project on these species and their habitats as part of the EFH/FWCA consultation process and may make recommendations to avoid, minimize or offset and adverse effects concurrently with our EFH conservation recommendations.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or species listed under the Endangered Species Act and the appropriate consultation procedures.

Fish and Wildlife Coordination Act Resources

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	Alewife are anadromous and adults migrate up rivers from marine waters to spawn. They typically spawn in slow-moving rivers and ponds. After spawning, adults migrate back to sea and juveniles will migrate to marine waters after they hatch. Alewife would not be inhibited from passing through the project area and would likely not spawn at the Project site.
American eel	American eels are catadromous and some juveniles migrate up rivers to live in fresh or brackish water for multiple years before they mature and migrate back out to sea to spawn. Juvenile American eels spend typically live in freshwater rivers, tidal creeks, harbors, and salt ponds with muddy bottoms. American eels can traverse dams and fish ladders, so they could potentially pass through the Gridley Locks and through the Project site. The project could take place in juvenile American eel habitat, but eels migrating up stream would not be inhibited from passing through the Project area.
American shad	American shad are anadromous and migrate up rivers from marine waters to spawn in shallow areas with sand or gravel. After spawning, adults migrate back to sea, and juveniles will eventually migrate to marine waters. American shad could potentially migrate through the Project and would not be inhibited from passing, but likely wouldn't stay in that type of habitat.
Atlantic menhaden	
blue crab	
blue mussel	
blueback herring	Blueback herring are anadromous and adults migrate upstream to spawn in rocky or gravely areas of swiftly flowing sections of streams. Blueback herring could potentially get through the Gridley Locks and could migrate through the Project area, but they would not be inhibited from passing through the Project area is not their preferred habitat. After spawning, adults migrate back out to sea and newly hatched juveniles will follow soon after where they spend most of their lives.
Eastern oyster	
horseshoe crab	
quahog	
soft-shell clams	
striped bass	
other species:	Rainbow smelt are anadromous and adults migrate to the lower edge of freshwater to spawn in areas of swiftly flowing sections of water with gravel or boulder substrate. Rainbow smelt do not typically pass over dams more than two feet tall, but could potentially get through the Gridley Locks and migrate through the Project site, but they would not stay in the Project area since it's not their preferred habitat.
other species:	White perch live in fresh, brackish, and coastal waters. Adults tend to be found in areas with mud, silt, or sand. Adults living in marine waters migrate to freshwater areas to spawn. They could potentially get through the Gridley Locks and could be found in the Project area, but they would not be inhibited from passing through the Project area.
other species:	Gizzard Shad are found in freshwater rivers and ponds and brackish and coastal waters. They prefer shallow water with soft, muddy bottoms. Adults spawn near the surface of slow-moving water. They could potentially get through the Gridley Locks and could be found in the Project area, but they would not be inhibited from passing through the Project area.

Appendix B

Interagency Consultation Meeting Minutes and Agency Correspondence

USACE Interagency Consultation Meeting #1
Meeting Minutes

Meeting Date:	May 7, 2020
Client:	MBTA
Project Name:	Draw 1 North Station Bridge Replacement
Designer:	STV Incorporated
Meeting Place:	Virtual
Prepared by:	Colin Duncan (CD) and Sam Moffett (SM), TRC
Attendees:	Amelia Croteau (AC), Boston ConCom Nick Moreno (NM), Boston ConCom Jennifer Letourneau (JL), Cambridge ConCom Eric Papetti (EP), FTA Leah Sirmin (LS), FTA Kristin Wood (KW), FTA Michelle Muhlanger (MM), FRA Alan Anachecka-Naseman (A A-N), ACOE Ed Reiner (ER), EPA Mike Johnson (MJ), NOAA fisheries Jeff Stieb (JS), USCG Sean Casey (SC), DCR Rob Lowell (RL), DCR Bill Gode (BG), DCR Daniel Padien (DP), DEP Chapter 91 Phil DiPietro (PD), DEP Tay Evans (TE), DMF Holly Palmgren (HP), MBTA Karl Eckstrom (KE), MBTA Kris Kretch (KK), MBTA Mark Ennis (ME), STV Tamia Burkett (TB), STV Diane Stallings (DS), TRC

Introduction – HP and SM

- *MBTA Environmental informed the group that the project has been recently federalized and the Design Team will be working with FTA on MEPA. MBTA also informed the team that there have been preliminary meetings with historic agencies as well to introduce the project.*

Discussion Items/Topics – ME presented project slides to group

- **Project Overview**
  - *Overview using presentation provided by STV Design Team ME & SM*
  - Continuity of Rail Operations throughout Construction

- Type Study – June 2020
  - *This document will provide a recommendation on the best structure type & recommend best configuration of tracks that provides a long-term solution for MBTA ridership in & out of North Station*
- **Bridge Components and Type Study**
  - Spans
  - North and South Trestles
  - Control Tower
  - Rail System/North Station Platforms
  - Channel width change
  - Pedestrian Bridge, *DCR to weigh in*
  - Stormwater
  - Climate Resilience
- **Project Location and Jurisdictional Resource Areas**
  - Charles River and Millers River
  - Filled/Flowed Tidelands
  - Floodplain
  - Historical Structures
- **Likely Permit/Review Programs –** Presented by Colin Duncan, TRC
  - FTA – NEPA – CoA TBD
    - Section 106 NHPA
  - USACE – Section 404/10/14 (no 408)
    - Consultation: EPA, NOAA NMSF, FWS, DMF, DFW NHESP
    - BUAR
  - US Coast Guard – Navigation Impact Report and Preliminary Navigation Determination
    - *Bridge Permit TBD*
    - *Design team informed agencies that DCR has primary control at the project site location in collaboration with the Coast Guard*
    - *Navigation impact report produced by the Design Team will lead to preliminary navigation determination*
      - *USCG confirmed that they will lean on DCRs input for changes to vertical and horizontal clearance, including closed vertical clearance*
  - DCR – Project Consultation
  - MEPA – ENF
  - MassDEP – Chapter 91 License Modification
  - MassDEP – Section 401 Water Quality Certification
  - Boston and Cambridge Conservation Commissions – MWPA NOIs
  - MWRA - 8(m)
  - TBD: MA CZM CD; Others
- **Project Schedule**
- **Permitting Data Needs**
- **Permitting Timeline**
  - Individual Agency Pre-Application Consultations
  - Application Filings

Future Agency Meetings/Consultations

The next meetings will be by either permit or topic area. Might need another full agency meeting in the future.

Other Issues

- *If any construction in floodplain/way – it was suggested to the Design Team to review Section 60.3 of the National Insurance Program Regulations*

Q&A

BG – Is sidewalk on downstream side of project?

ME replied the depiction on the slide is an old. Discussions have advanced and walkways along the trestle are no longer planned.

Tower A still in place?

ME – Yes, and demo might be first step in the project.
SM, conclusion that there is not a track configuration that will allow tower A to be retained, but STV cannot be said with certainty.
ME, tower A structure and condition is more relevant.
KE also said current ops being done in temporary structure. Tower A mostly houses old equipment at this point and building had essentially been abandoned

PD –Are we in flood way of Charles River?

CD – We believe so

PD - Any dredging?

CD, yes in terms of removing old timber and associated with drilling

A A-N – Don't we also need USCG input?

SM, yes and Coast Guard is present at this meeting
Above Charles river DAM DCR is primary moderator with some USCG. Need Navigational Impact Study report for this

JS – yes report will lead to preliminary nav determination and horizontal and vertical clearances. In mid permit stage a CG permit will be required

AC – MEPA process in the future. Questions regarding floodplain, is Tower A only building to be removed?

SM – Tower A only Building but south trestle and bridge spans will also be removed and replaced. North Trestle will be altered. Will require disturbance of river bed.

AC- Are buildings considered historic?

SM - We are in active discussions currently to decide on trajectory for an MOA to allow this to proceed.

AC – Fill in floodway urge Section 60.3 regulations review.

SM Physical constraints make grading options difficult to revise. Not much option to change heights, etc.

DP from DEP waterways – Slide indicate Chapter 91 license mod. Are we going to ask for a mod or new license?

SM – not sure yet, dependent on how design evolves. Idea or MBTA is to seek mod of existing license. We think this will be suitable for Chapter 91 licensing. Waterways is ready to assist with this project and MBTA. Mod will be dependent on what alternative is selected. Dan confident we will get to a license.

A A-N needs to leave meeting – we are on right track and need to look at alternatives He is confident that project will have least amount of environmental impacts. Is he or FTA Lead applicant?

HP – thinking to federalize, FTA will be lead agency for this.

FTA – good presentation – can team talk about track work on North side?

ME – challenge to project tracks from the west and North come into North Station, need to access the BET for storage and maintenance. Tracks cross a lot to the north and looking at optimal configuration of track

FTA - Is there the potential for track and switch replacement?

ME- 90% of track work will happen will be within MBTA ROW in that area

FTA – how will to the north affect service north of project area? There could be interception of future projects to the north. Do we know plans of other projects?

ME- we do know that NH RR there is a design project to replace that bridge future expansion for areas is under discussion with RR ops

KE. – MBTA is revamping signal system from analog to programable, this will be done before and is in place before Draw 1 project is design. Part of phase project.

SM – Any fisheries?

MJ to everyone:

I have another call at 11, so need to drop off. But wanted to mention that the River is important for diadromous fish (river herring, shad, rainbow smelt, American eel) migratory and spawning. A winter-spring TOY restriction will likely be necessary, and potentially a fall restriction, as well. Also, interested in seeing how projected sea level rise is being addressed, especially the vertical clearance from the river for new bridge height. Thanks for presentation.

HP to everyone:
thanks Mike we will be in touch to discuss further

ER – corps dam regulates water levels at this site at about MSL. He is confused about flood plain and sea level rise. Is Corps dam going to regulate sea level rise?

> *SM – team engaged with DCR we developed better understanding of how WL is managed by DCR. Scenario is where dam is overtopped rather than day-to-day.*

How is flood plain defined on both sides of Dam? How does that work?

> *SM – we are looking at options for an approach to this and will work with the team as design advances*

ER – kayakers go through opening in trestle – in future, will this be improved? This should be taken into consideration? Is there section 10 or 404 Corps work?

PD – did not understand P bridge in vicinity of Spaulding rehab

> *HP – DCR has proposed bridge. A 3rd pedestrian bridge spanning entire river, details being discussed with DCR.*

BG – good presentation – comments will be e-mailed to HP. On permitting with DCR construction access permit required. HP – they will be in touch

USACE Interagency Consultation Meeting #2
Meeting Minutes

Meeting Date:	April 15, 2021
Client:	MBTA
Project Name:	Draw 1 North Station Bridge Replacement
Designer:	STV Incorporated
Meeting Place:	Virtual - Webex
Prepared by:	Colin Duncan and Diane Stallings, TRC
Attendees:	Alan Anachecka-Naseman, USACE Jennifer Letourneau, Cambridge Conservation Commission Rachel Croy, EPA Ed Reiner, EPA Ryan Bartlett, FTA Leah Sirmin, FTA Kristin Wood, FTA Karl Eckstrom, MBTA Holly Palmgren, MBTA Tess Paganelli, MBTA Erikk Hokenson, MassDEP David Wong, MassDEP Kaitlyn Shaw, NOAA Mark Ennis, STV Preethi Sreeraj, STV Karol Szaro, STV Diane Stallings, TRC Annie Cornell, TRC

Safety Moment – TRC, Distracted Driving

Introductions

HP, USCG not in attendance today but have been involved to date.

Discussion Items/Topics

Presentation provided by Mark Ennis, STV, Sam Moffett, TRC and Colin Duncan, TRC

- Project Overview and Status
- Project Schedule
- Anticipated Construction Approach and Impacts

- Pedestrian Bridge Considerations
- Anticipated Permits/Reviews and Schedule
- Consultation and Data Needs

Future Agency Meetings/Consultations

Discussion, Q&A

Ed Reiner, EPA:

- Cutting piles at/above mudline is not standard approach for bridge replacement. SM: comment acknowledged; approach advantages to be fully discussed.
  - David Wong concurs with EPA's assessment.
  - STV and MBTA design based on functionality but some adjustments can be made later in the design process.
  -
- What is the minimum vertical clearance under fixed trestles, for boat passage? SM: clearance will be very close to existing.
- Proposed bridge looks ugly. ME: function and longevity are primary concerns for design. MBTA seeking inputs from multiple stakeholders including historical agencies.
- Will new wider area of bridge & trestles increase shading of river? SM: area will be larger but waterway will maintain same water column for fish passage. MBTA will be conducting EFH & Fisheries studies & consult with NOAA & DMF for fisheries issues.
- Will cutting piles at mudline vs. removing altogether interfere with new piles? Could old piles, which contain creosote, be removed? ME: new piles will be offset from existing so that they will not interfere below mudline. Approximate ratio of old piles to new will be 1:3. Removing piles altogether could cause issues with settlement of sediments that is more problematic. Piles for fender system will be pulled altogether.
- Will small vessels such as kayaks be able to pass under trestles? ME: the existing passage is very tight even for small vessels and there will not be an appreciable difference.

David Wong, MassDEP Ch. 91

- For new bridge design, Charles River represents Massachusetts, which should be considered for appearance.
- DEP considers removal of all materials below mudline in tidal waters as fill and part of dredging calculation under Section 401. SM: acknowledged. ER: everybody knows that

Charles is dammed with constant water level and no longer considered tidal. (Also see Alan A-N comment)

- A WQC must be tied to a MEPA filing (ENF and/or EIR).

Alan Anachecka-Naseman, USACE

- Piles in waterway are considered as structures under 404, not fill.
- Permitting: As lead federal agency, FTA will coordinate fisheries ESA review with NMFS and DMF, etc. Also, Section 106, consulting Tribes will be Aquinnah Wampanoags, Mashpee Wampanoags, and Narragansetts.
- Alternatives to be considered appear to be No Action and proposed replacement, which seems to be acceptable.
- Mitigation will likely be In Lieu Fee.

Kaitlyn Shaw, NOAA

- Appreciates the presentation; will review presentation for impacts including fish passage.

Stallings, Diane

From:	Palmgren, Holly <HPalmgren@MBTA.com>
Sent:	Tuesday, May 4, 2021 9:41 AM
To:	Moffett, Samuel; Duncan, Colin; Stallings, Diane
Cc:	Eckstrom, Karl; Paganelli, Tess; John M. Ennis
Subject:	[EXTERNAL] Fwd: MBTA Draw 1 and Tower A Interagency Coordination Meeting #2

FYI

617-875-3807
Sent from my iPhone

Begin forwarded message:

> **From:** Kaitlyn Shaw - NOAA Federal <Kaitlyn.shaw@noaa.gov>
> **Date:** May 4, 2021 at 9:11:18 AM EDT
> **To:** "Palmgren, Holly" <HPalmgren@mbta.com>
> **Subject: Re: MBTA Draw 1 and Tower A Interagency Coordination Meeting #2**
>
> Hi Holly,
> I wanted to circle back on this. While I can provide pre-app technical assistance, an EFH assessment will still need to be provided by FTA. Because adverse effects associated with removal will be minimized through the preferred method of cutting at the mudline, we would not have major concerns with cutting the pilings at the mudline rather than below. I would anticipate a TOY under FWCA for diadromous species; ie. controls (e.g., cofferdams) should not encroach: >25% from OHW during the TOY restriction. We would refer to the TOY restrictions in Mass DMF TR-47 in this instance for trust species (Spring: Feb 15 to July 15 and downstream passage maintained during the Fall out migration from September 1 to November 15). Of course I understand this project has many overlapping requirements, so additional coordination on timing can be discussed during the consultation process. Please let me know if you have any questions.
> Best,
> **Kaitlyn Shaw**
> Marine Resources Management Specialist
> Habitat and Ecosystem Services Division
> NOAA/ National Marine Fisheries Service
> Gloucester, MA
> Office: 978-282-8457
> Pronouns: she/her/hers
> kaitlyn.shaw@noaa.gov
> www.nmfs.noaa.gov
>
> On Thu, Apr 22, 2021 at 2:23 PM Palmgren, Holly <HPalmgren@mbta.com> wrote:

Attached are the slides from the interagency coordination meeting on North Station Draw which was held on 4/15/2021. Please feel free to send any questions or comments along to me.

Thanks

Holly

-----Original Appointment-----
From: Duncan, Colin <CDuncan@trccompanies.com>
Sent: Wednesday, March 17, 2021 5:00 PM
To: Duncan, Colin; 'Alan.R.Anacheka-nasemann@nae02.usace.army.mil'; Padien, Daniel (DEP); Grafe, Jerome (DEP); Worrall, Eric (DEP); Wong, David W (DEP); Bartlett, Ryan (FTA); Nicholas Moreno; Letourneau, Jennifer; Reiner.Ed@epa.gov; Boeri, Robert (EEA); Evans, Tay (FWE); 'Sirmin, Leah (FTA)'; Wood, Kristin (FTA); Hopps, Christine (DEP); kaitlyn.shaw@noaa.gov; james.l.rousseau2@uscg.mil; Palmgren, Holly; Eckstrom, Karl; Paganelli, Tess; Ennis, John M.; Moffett, Samuel; Stallings, Diane; jeffrey.d.stieb@uscg.mil; Cornell, Annie
Cc: Anacheka-Nasemann, Alan R CIV USARMY CENAE (USA); Hokenson, Erikk (ENV)
Subject: MBTA Draw 1 and Tower A Interagency Coordination Meeting #2
When: Thursday, April 15, 2021 11:00 AM-12:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Webex Virtual Meeting

All,

Due to a change in project topics on Alan's interagency call, we are changing the Draw 1 meeting date to April 15, same time. Sorry for any inconvenience and we hope to see you there. Thank you.

Greetings,

On behalf of MBTA, TRC is inviting you to participate in the next virtual interagency coordination meeting for the MBTA's North Station Draw and Tower A project. The initial meeting was held in May 2020.

This project is intending to use federal funding, and MBTA has begun coordinating with the FTA as the lead federal agency.

We would like to use this meeting to update the scope of the project and discuss permitting requirements and any concerns or issues the agencies might have.

Thank you and we hope you can join us on April 1, 2021 at 11 am.

Colin Duncan

TRC Environmental

617-549-8506

-- Do not delete or change any of the following text. --

Colin Duncan is inviting you to a Webex Personal Room meeting.

Join meeting

More ways to join:

Join from the meeting link
https://trcenvironmentalcorp.my.webex.com/meet/cduncan

Join by meeting number
Meeting number (access code): 132 071 4637

Tap to join from a mobile device (attendees only)

+1-415-655-0001,,1320714637## US Toll

Join by phone

+1-415-655-0001 US Toll

Global call-in numbers

Join from a video conferencing system or application
Dial cduncan.trcenvironmentalcorp.my@webex.com You can also dial 173.243.2.68 and enter your meeting number.

If you are the host, you can also enter your host PIN in your video conferencing system or application to start the meeting.

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Interagency Consultation Meeting #3
Meeting Minutes

Meeting Date:	February 25, 2022
Client:	MBTA
Project Name:	Draw 1 North Station Bridge Replacement
Designer:	STV Incorporated
Meeting Place:	Virtual - Webex
Prepared by:	Colin Duncan and Diane Stallings, TRC
Attendees:	Alex Hammond, FTA
	Chrissy Hopps, MassDEP Ch. 91
	Christina Szczepanski, TRC
	Cindy Martin, TRC
	Dan Driscoll, DCR
	David Wong, MassDEP
	Eric Papetti, FTA
	Jeff Parenti, DCR
	Jeffrey Stieb, USCG
	Jennifer Letourneau, Cambridge Conservation Commission
	Kaitlin Shaw, NOAA
	Karl Eckstrom, MBTA
	Karol Szaro, STV
	Katelyn Rainville, USACE
	Kyle Lally, MassDEP
	Marissa Murphy, TRC
	Mark Ennis, STV
	Meg Langley, City Point Partners
	Michael Stroman, MassDEP
	Nicholas Moreno, Boston Conservation Commission
	Page Czepiga, MEPA
	Bob Boeri, MA CZM
	Ruth Helfeld, DCR
	Ryan Bartlett, FTA
	Sean Barry, STV
	Sean Casey, DCR
	Sam Moffett, TRC
	Tamia Burkett, STV
	Tess Paganelli, MBTA
	Tori Kim, MEPA

Safety Moment – TRC, Safety during Snow Events

Introductions
Karl Eckstrom.

Discussion Items/Topics

Presentation provided by Sam Moffett, TRC and Colin Duncan, TRC

- Introductions
- Project Overview/Tour
- Project Schedule
- Project Approach
- Footbridges
- Schedule
- Q&A

Future Agency Meetings/Consultations
To be set up as individual Agency meetings in the near future.

Discussion, Q&A

Dan Driscoll (DD), DCR

- DD expressed concerns about the viability of the South Bank Bridge construction. There is concern that construction of the South Bank Bridge will not be possible. Suggests the team think of alternatives to allow for pedestrian and bike travel in the vicinity of Causeway or Nashua streets

- Add DCR Construction Access Permit to permit list because bridge dismantling will need a permit and will trigger other issues.

Eric Papetti, FTA

- Once the Annotated Outline (AO) of the Environmental Assessment (EA) is approved, the project will be on NEPA dashboard and EA will need to be completed in 1-year.

- The AO should provide details documenting the coordination between MBTA and MassDCR relative to the footbridges and how this pertains to Section 4(f). The FTA will want to understand to understand all processes, etc. of the bridges before there is an approval. The footbridge is on a critical path and FTA will want to see details regarding MBTA engagement with MassDCR on the footbridge

Mark Ennis, STV

- Over a year ago, the design team presented concepts of the footbridge conflict to DCR, and understands the stress that the idea has generated. All feedback is being considered. A new plan is being developed to move and relocate the footbridge bridge so the period of closure will be greatly reduced.

Karl Eckstrom, MBTA

- MBTA looks forward to having more opportunities to meet with DCR in the near future

Kaitlyn Shaw NOAA Fisheries

- An email was sent to MBTA (May 4, 2021 at 9:11 am) agreeing that the preferred method of cutting piles at the mudline is ok

- The presence of winter flounder triggers time of year restrictions from Jan 15 to July 15 for diadromous resources. Any filling activities should be done outside of time of year restrictions

Nick Moreno, Boston Conservation Commission

- For resource areas on the figures, add Area Subject to Flooding which occurs on the trestle and North Station platform.

David Wong, MASSDEP

- Suggest an e-mail or letter from MA DMF for time of year restrictions to get the 401 approved.

- This project falls into a major dredging category due to the volume of dredging/disturbance shown on the matrix of >5,000 CY. DW suggests be WW-08, not a WW-07. Dredging includes all sediment removal and repositioning of sediment that occurs below the Mean High Tide line

- Quantification should include any material repositioned below the mean high tide line, inclusive of existing piles would be considered dredged material, cassions, etc.

- SAMP needs to be submitted to DEP for reviewed and approval prior to submittal of 401 application.

Page Czepiga, MEPA

- MEPA regulations were recently revised on January 1, 2022. This project will be required to file a mandatory EIR because the project is located within a mile of an EJ area.

- All MEPA meetings are remote and TRC can set a meeting online.

Mike Stroman, MassDEP

- Has anyone considered Article 97 for changing use of public properties?

  - Sam Moffett, design team understands need to look at Article 97 but it might not fit the project.

  - Dan Driscoll, does not anticipate Article 97 review since no land currently under Art. 97 jurisdiction is proposed to be taken or impacted for D1. If footbridge impacted (location, etc.), Art. 97 could be triggered.

Comments received via e-mail following the meeting

Jeffrey Stieb, USCG

Today's project update was very helpful. The next step for the CG would be the submission of a Project Initiation letter for the replacement bridges. Guidance regarding the Initiation Letter is in the Bridge Program Application Guide (BPAG) The initiation letter need not be exhaustive, a page or two with a project timeline and a conceptual drawing should work.

An additional important next step is to address the removal requirements the navigation centric agencies (CG, Army Corps, State Police Marine Unit and DCR) have for the removal of pilings, etc. of the old bridge. Removal "to the mudline" should work for water under elevated RR tracks which vessels cannot transit over. However below the mudline might be required for parts of the old bridge that vessels can transit over. From my perspective the best approach is for the MBTA to develop a proposal then get the agencies concerned with vessel transits and water bottoms on a Teams meeting to discuss. Seems this needs to be done before approaching the resource agencies.

After the Initiation letter is the development of a set of CG plans to precede or accompany the CG permit application. Attached is a guide to preparing the CG plans, a CG permit application template, and a recent plan sheet prepared for an Amtrak bridge in CT as an example. We should schedule a short meeting before the MBTA starts completing the CG permit application template.

William Gode, DCR

… a next step is to seek input from relevant agencies regarding work to remove pilings. Among these agencies are DCR and the MSP Marine Unit. For DCR I expect a Construction Access Permit (CAP) will be

the appropriate path with review coming to me and others inside the agency. A CAP can be applied for online here.

The MSP Marine Unit is commanded by Det. Lt. David Twomey, cc'd hereto. I suggest reaching out to him regarding plans as they are devolved so he may provide relevant feedback.

Katelyn Rainville, USACE

Prior to the meeting on Thursday February 24, 2022, KR requested TRC provide the project location, to help confirm if a 408 is needed or not. Based on the information USACE concluded " *the project is located outside any USACE projects".*

PRESENTATION
MBTA CONTRACT NO. H32PS01

ENGINEERING SERVICES FOR

NORTH STATION DRAW 1 BRIDGE REPLACEMENT

AND ASSOCIATED TRACK AND SIGNALS UPGRADES

Interagency Consultation Meeting

February 25, 2022

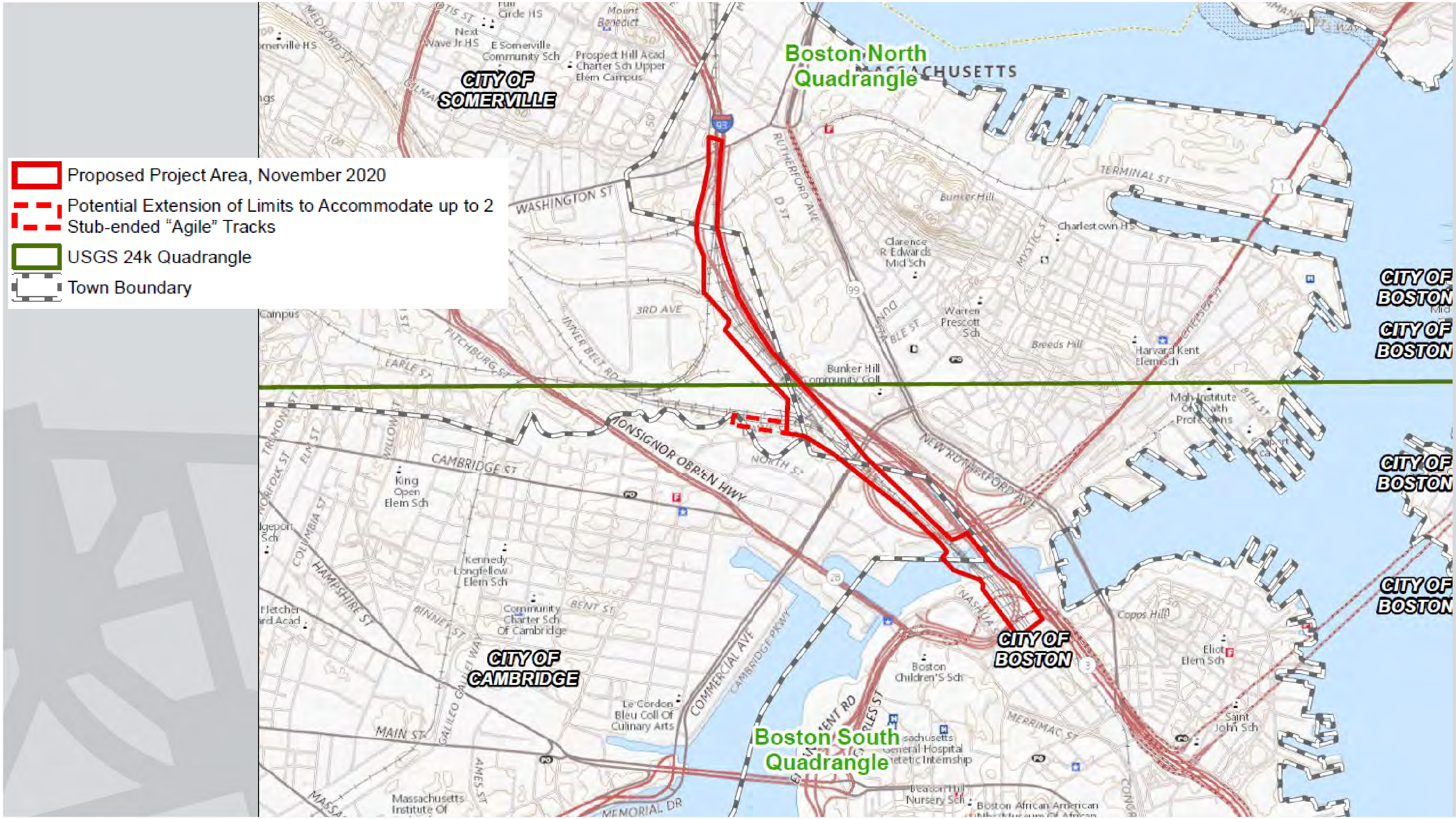
STV 100 Years

AGENDA

- INTRODUCTIONS
- PROJECT OVERVIEW/TOUR
- PROJECT SCHEDULE
- PROJECT APPROACH/PLANS
  - *Demolition Approach (Removal of In-water Structures)*
  - *Dredge and Fill (Fisheries Considerations)*
  - *Riverbank Sheetpile/Tremie Pour*
- FOOTBRIDGES
- PERMITTING
- SCHEDULE
- Q&A

PROJECT OVERVIEW

PROJECT AREA



Existing Site Overview

DCR PARK **A**

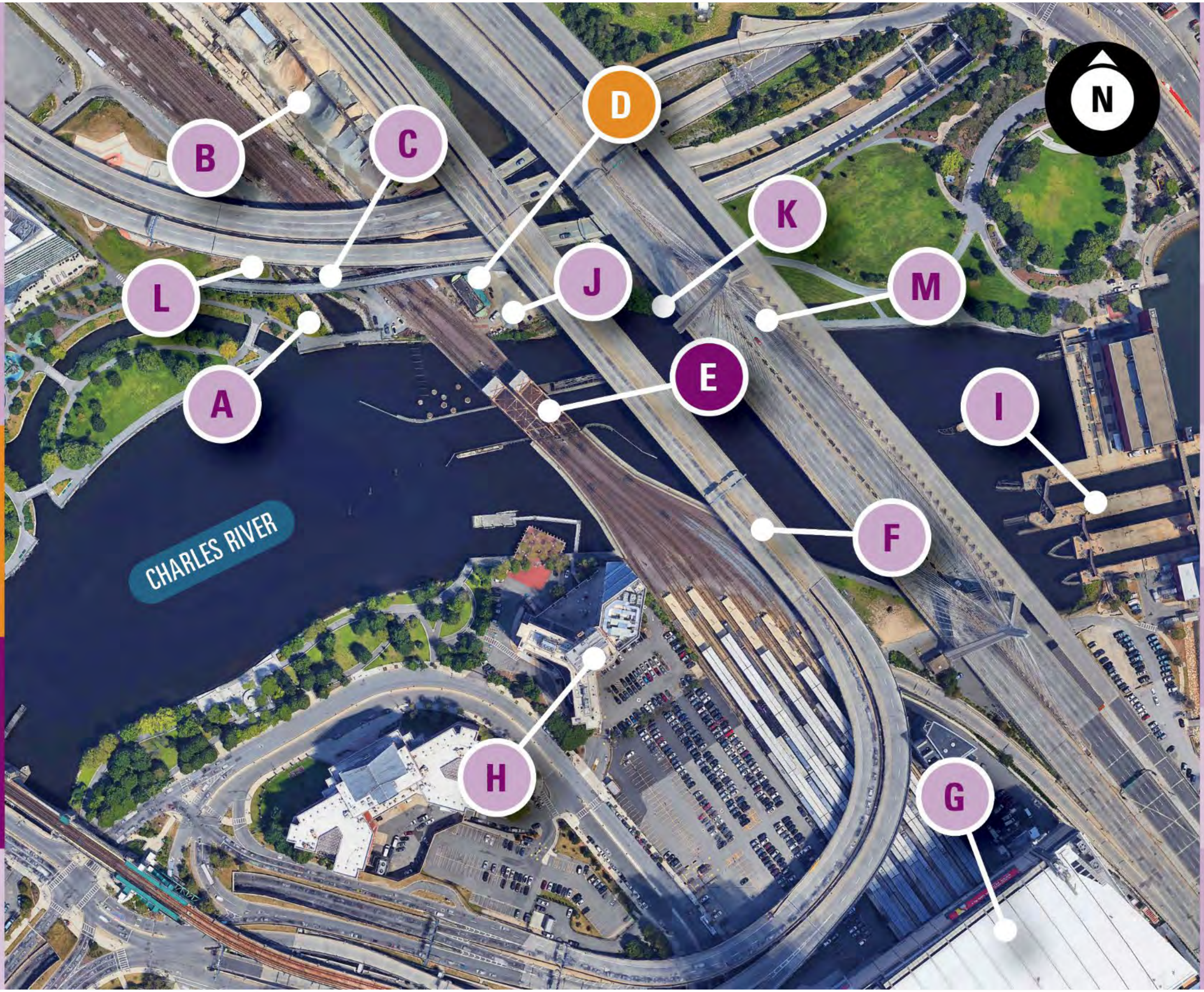
BOSTON SAND & GRAVEL **B**

NORTH BANK BRIDGE **C**

TOWER A **D**

DRAW 1 BRIDGES **E**

LEVERETT CIRCLE CONNECTOR BRIDGE **F**



G NORTH STATION

H MGH BUILDING (FORMERLY SPAULDING REHAB)

I CHARLES RIVER DAM

J TEMPORARY STEEL FRAME CONTROL TOWER

K MILLERS RIVER

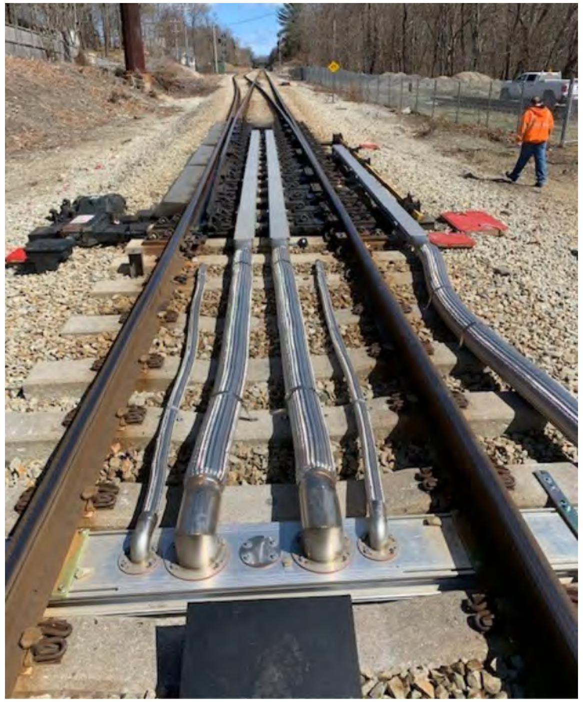
L DUCK BOAT RAMP

M ZAKIM BRIDGE

Project Scope – Additional Considerations

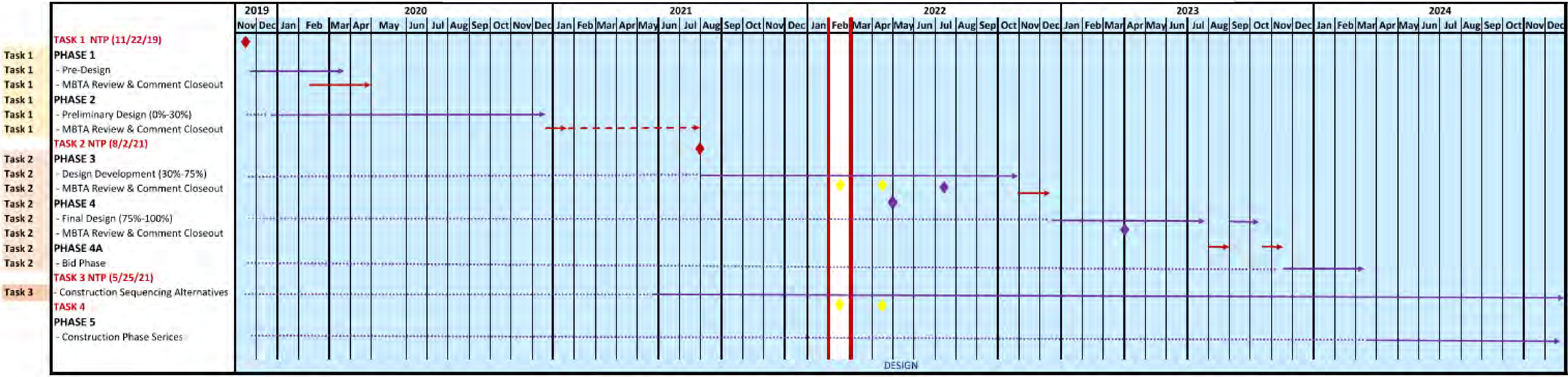
- **A minimum of four active tracks over the river during construction**
- **A minimum of ten active tracks at North Station during construction (six on weekends)**
- Signal control system upgrade using new microprocessor technology
- Local manned bridge control structure with provision for remote operation
- Pedestrian connection to walkways on each bank of the Charles River
- Environmental approvals & permits
- Agency & stakeholder coordination & public outreach
- Provisions for future electrification

Switch Heaters



Current Project Status – Schedule at Start of Task 2 & 3

	Milestone	Duration	Cumulative	Date	
	Task 1 NTP (11/22/2019)			*11/22/2019*	
Task 1	*Phase 1 Including MBTA Review*	*5.0 Mo*	*5.0 Mo*	*4/12/2020*	
Task 1	*Phase 2 Including MBTA Review*	*9.0 Mo*	*14.0 Mo*	*1/22/2021*	All Phase 1 and Phase 2 Deliverables submitted
	Task 2 NTP (8/2/2021)			*8/2/2021*	
Task 2	*Phase 3*	*15.0 Mo*	*15.0 Mo*	*11/1/2022*	
Task 2	*Phase 3 MBTA Review*	*1.5 Mo*	*16.5 Mo*	*12/16/2022*	
Task 2	*Phase 4*	*10.0 Mo*	*26.5 Mo*	*10/17/2023*	
Task 2	*Phase 4 MBTA Review*	*1.0 Mo*	*27.5 Mo*	*11/16/2023*	
Task 2	*Phase 4A (previously termed Phase 5)*	*4.0 Mo*	*31.5 Mo*	*3/17/2024*	
	Task 3 NTP (5/25/2021)			*5/25/2021*	
Task 3	*Construction Sequencing Alternative*	*concurrent with Phases 3, 4, and 5*		*11/11/2026*	
	Task 4				
	Phase 5	*72.0 Mo*	*103.5 Mo*	*11/11/2026*	



Legend

Notice-to-Proceed Milestone

Constructability Charettes (tentative dates

Draw 1 - Project Status

Project Timeline

- Effort on Design commenced in November 2019
- 30% Design submitted for MBTA review in December 2020 (Task 1 Complete)
- 75% Design to be submitted in November 2022
- PS&E submission to be submitted in Fall 2023
- Construction begins Spring 2024
- Construction Duration 72 months +/-

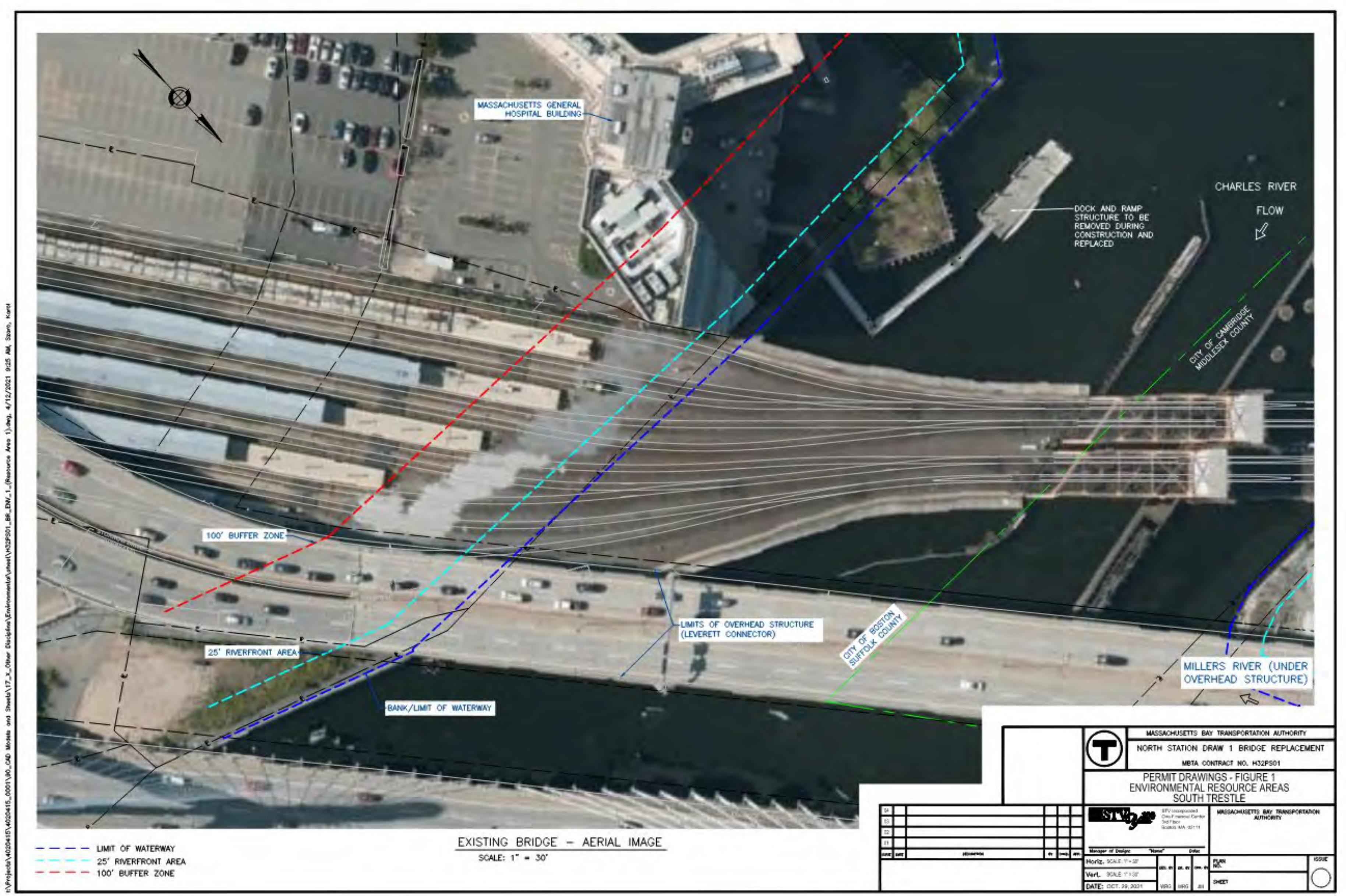
Project Drivers

- Bridge Deterioration
- Accommodation for Electrification
- Construction Staging

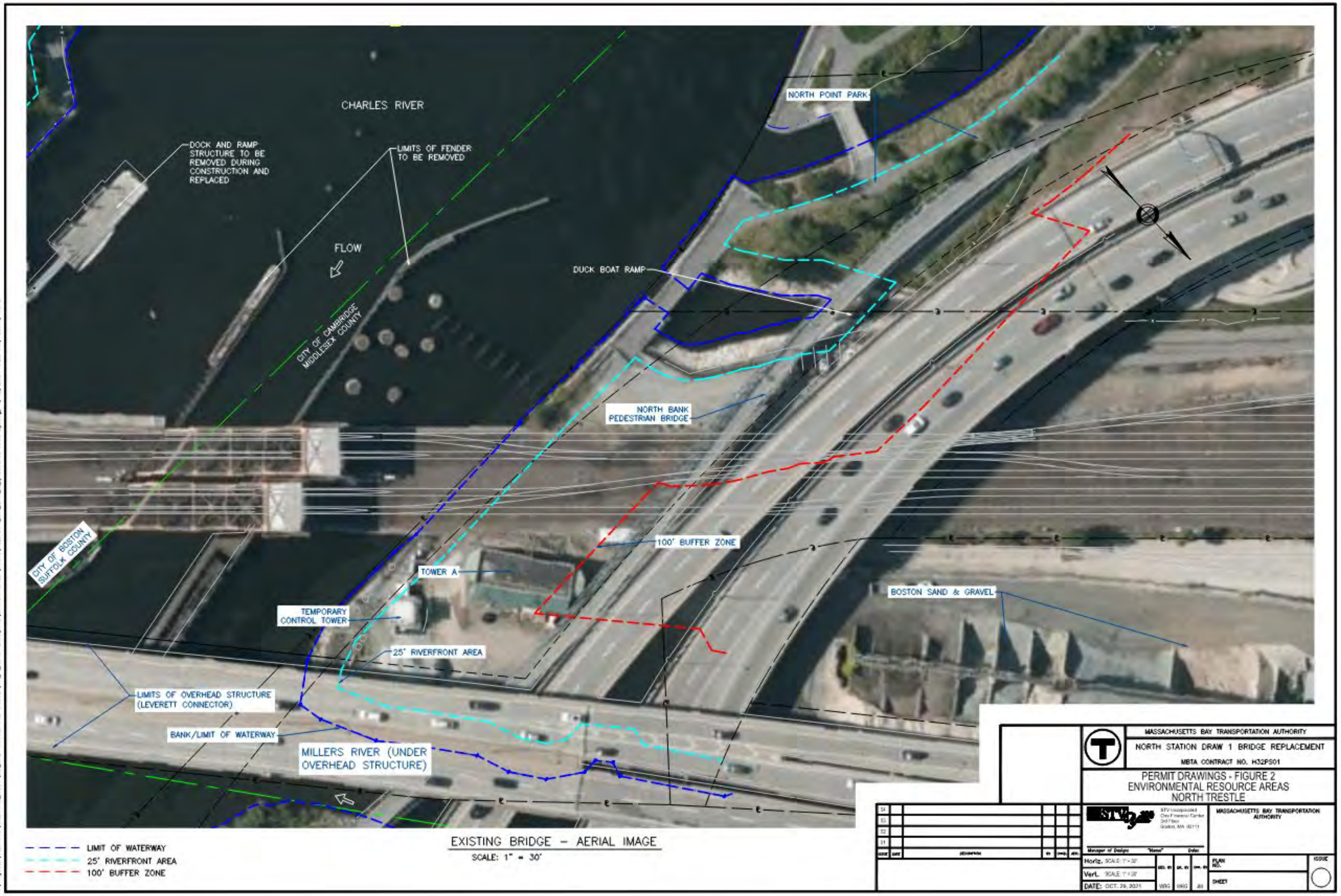
Rendered Model – Design Team Update

[North Station Rail Bridge - Virtual Tour (123bim.com)](123bim.com)

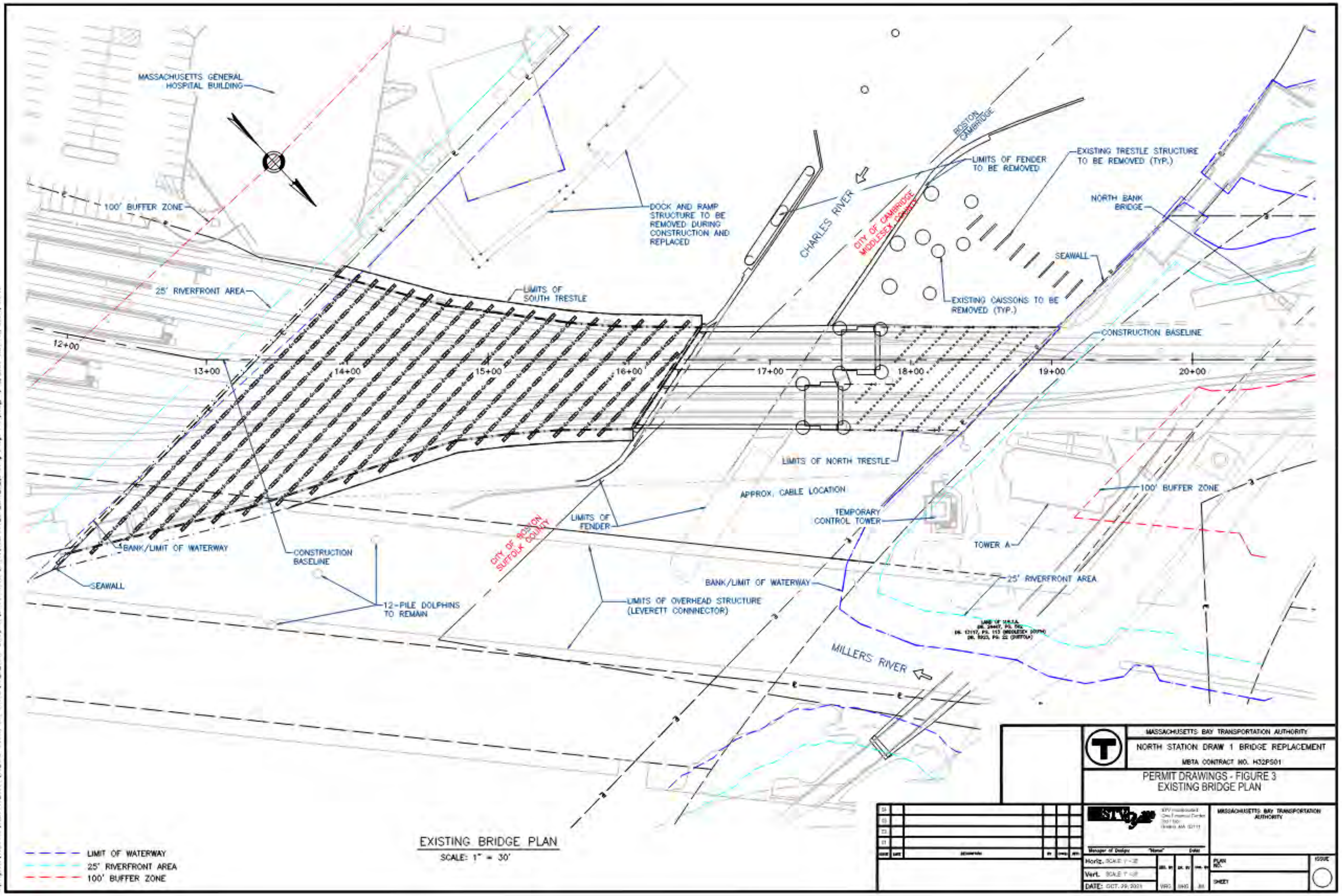
ENVIRONMENTAL RESOURCE AREAS – SOUTH TRESTLE



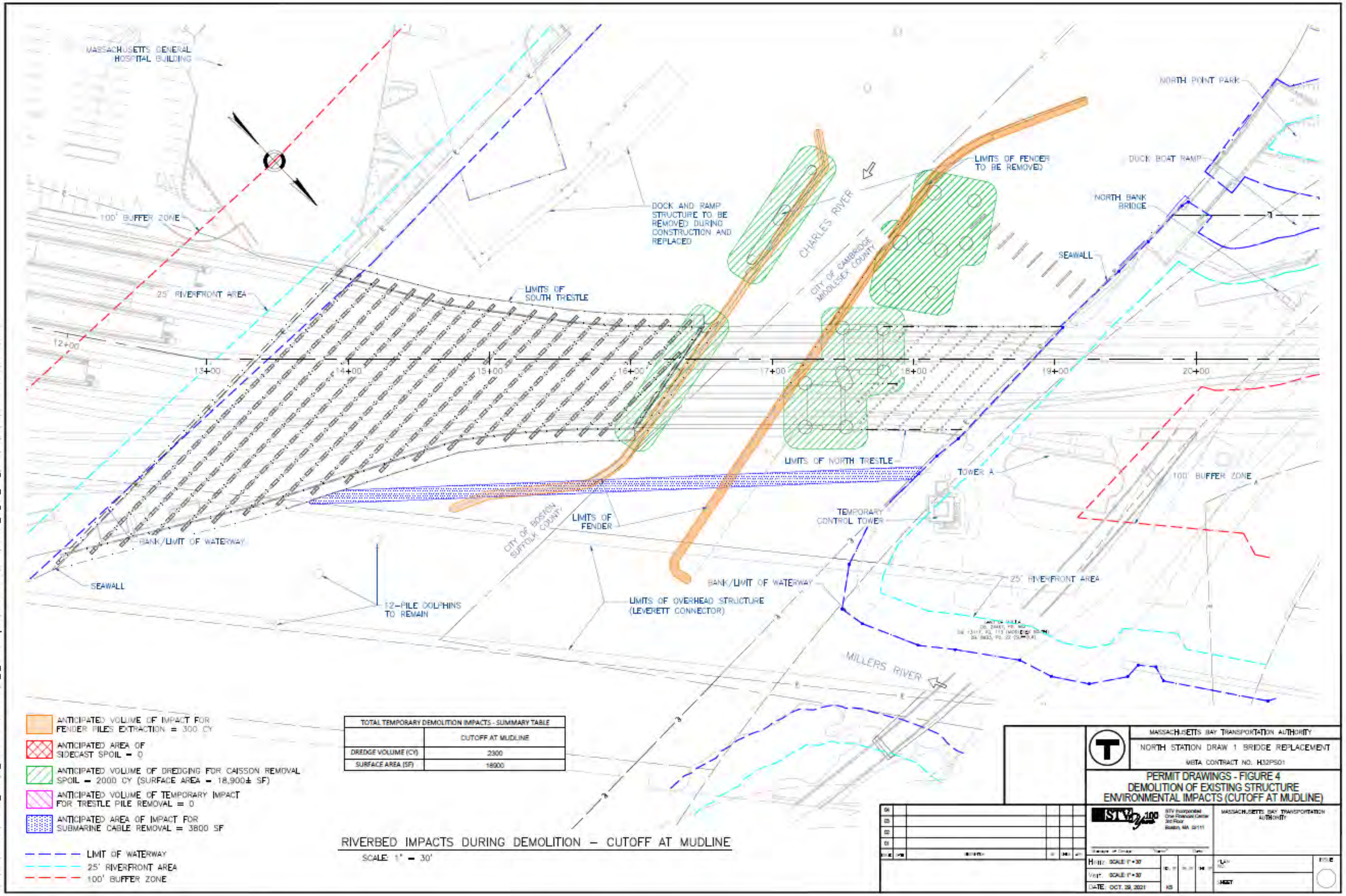
ENVIRONMENTAL RESOURCE AREAS – NORTH TRESTLE



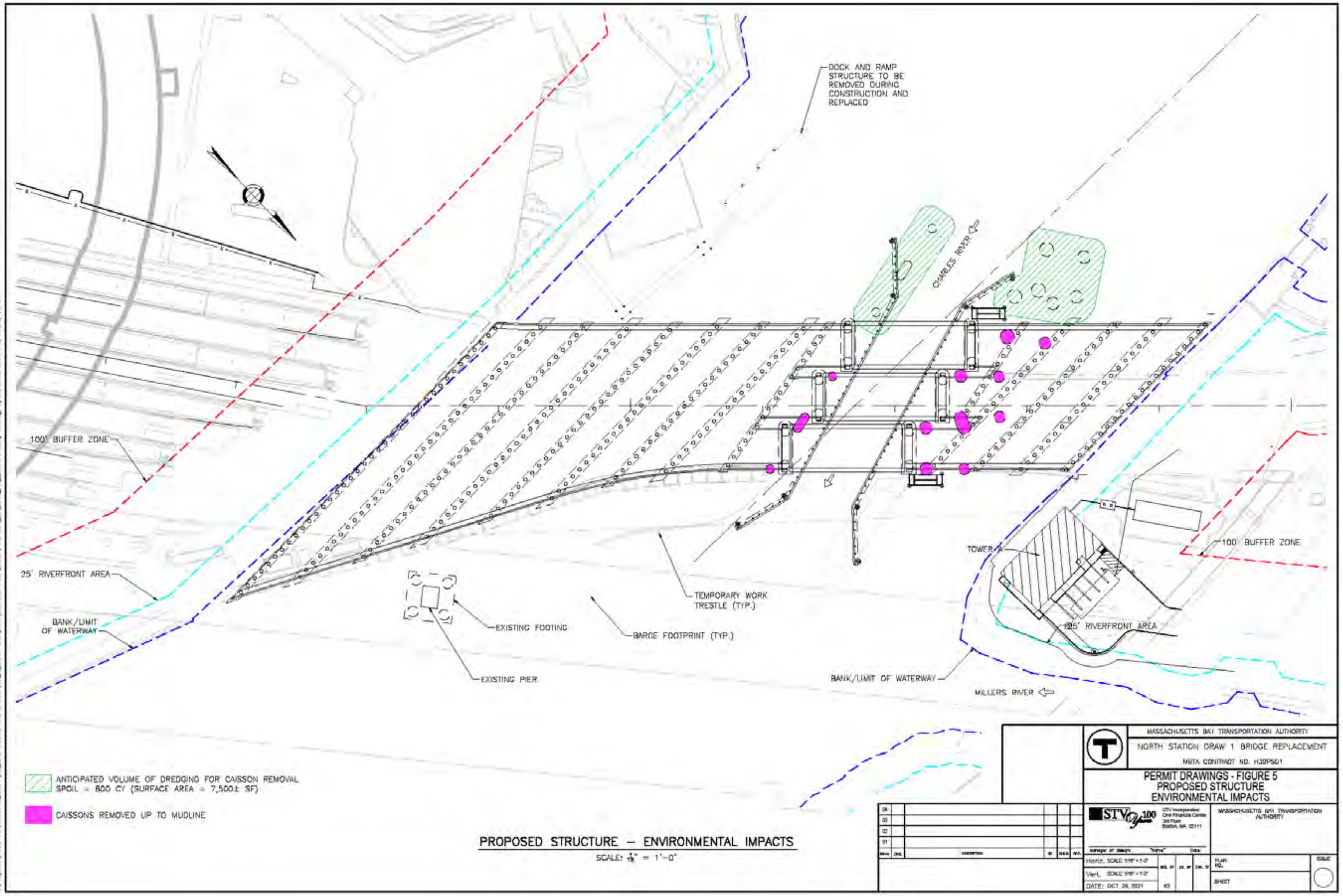
PERMIT DRAWINGS – EXISTING BRIDGE PLAN



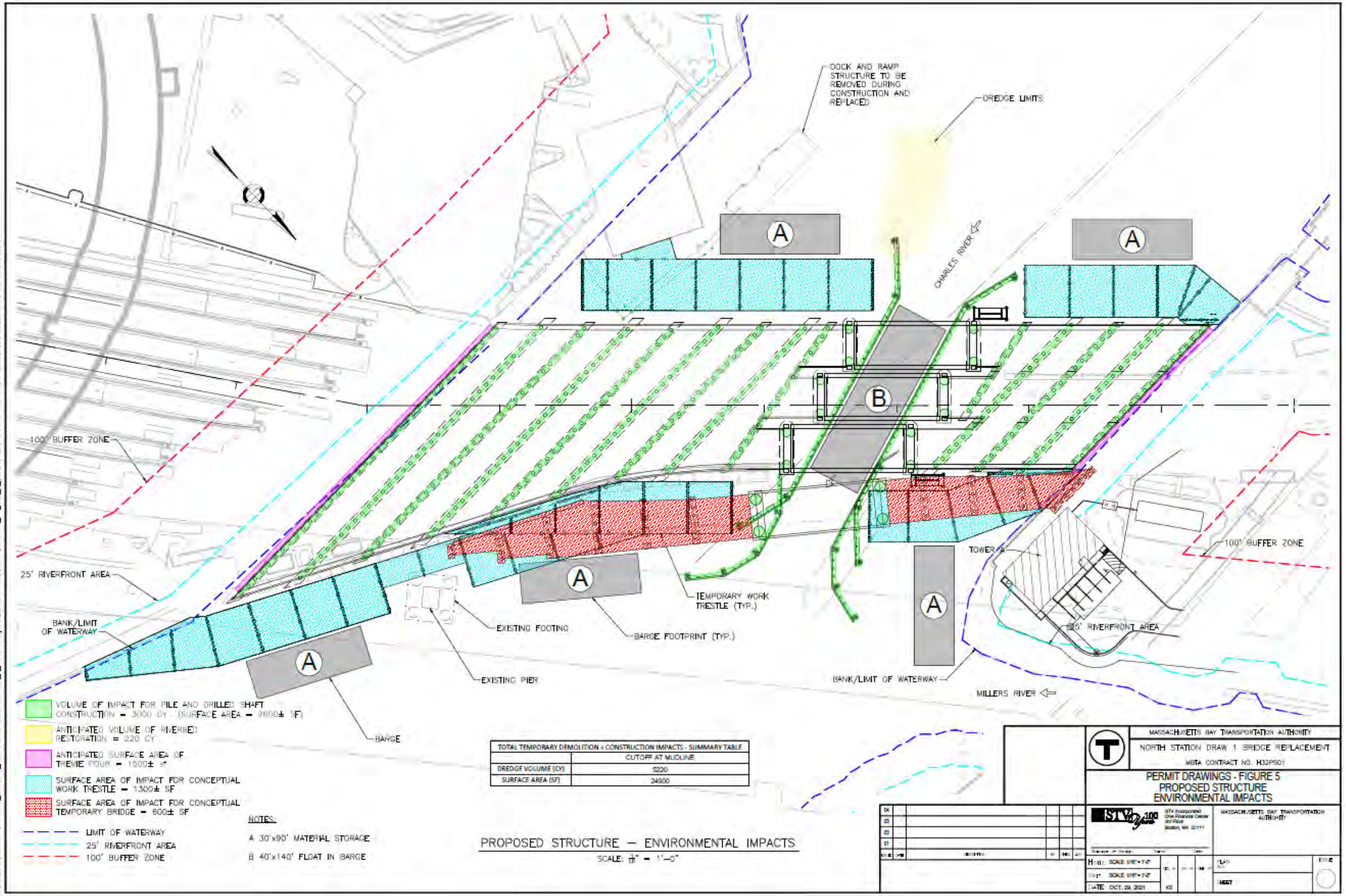
PERMIT DRAWINGS – DEMOLITION OF EXISTING STRUCTURE (CUTOFF AT MUDLINE)



PERMIT DRAWINGS – PROPOSED STRUCTURE AND EXISTING CAISSONS

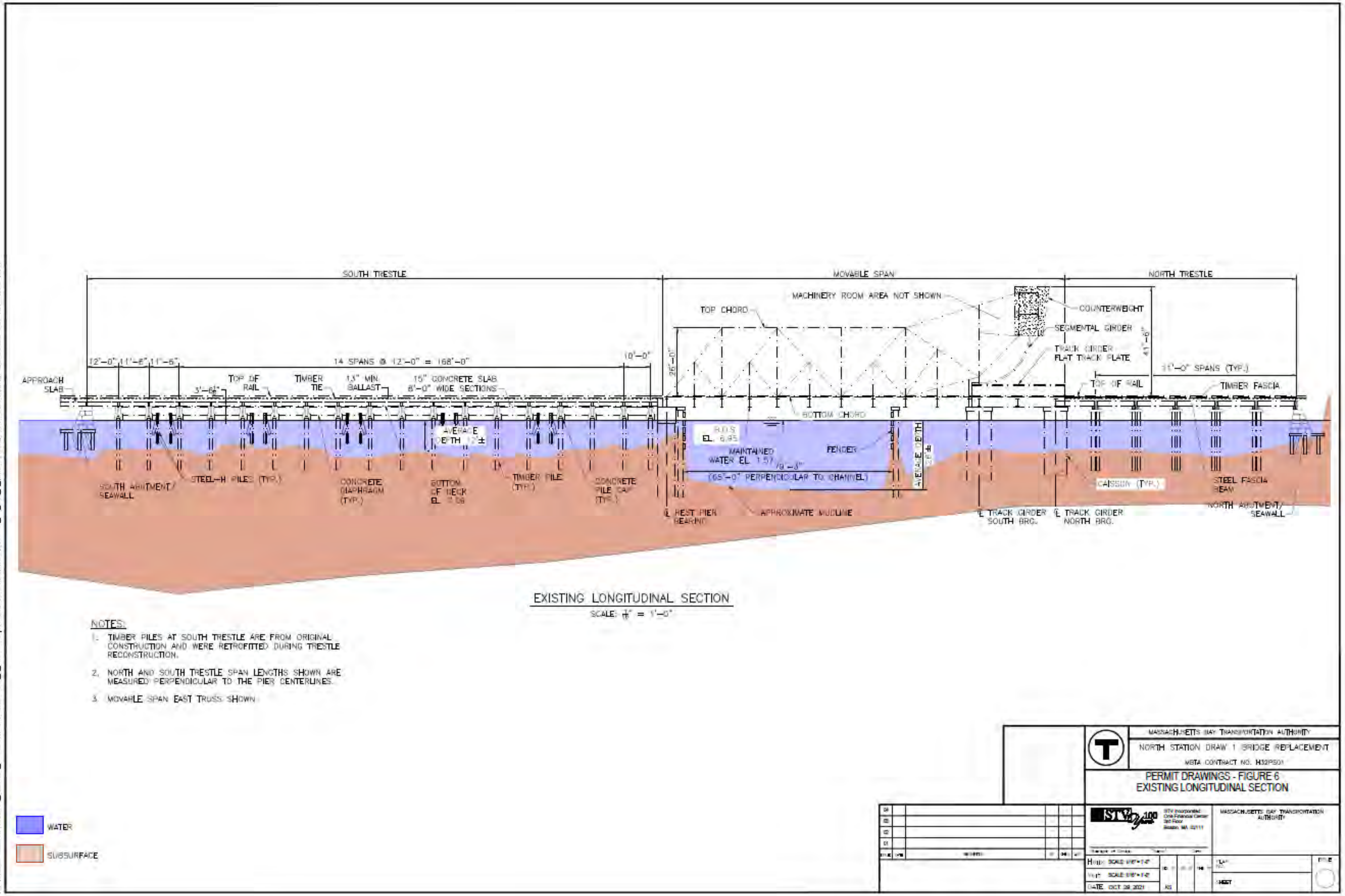


PERMIT DRAWINGS – CONSTRUCTION AND PERMANENT ENVIRONMENTAL IMPACTS

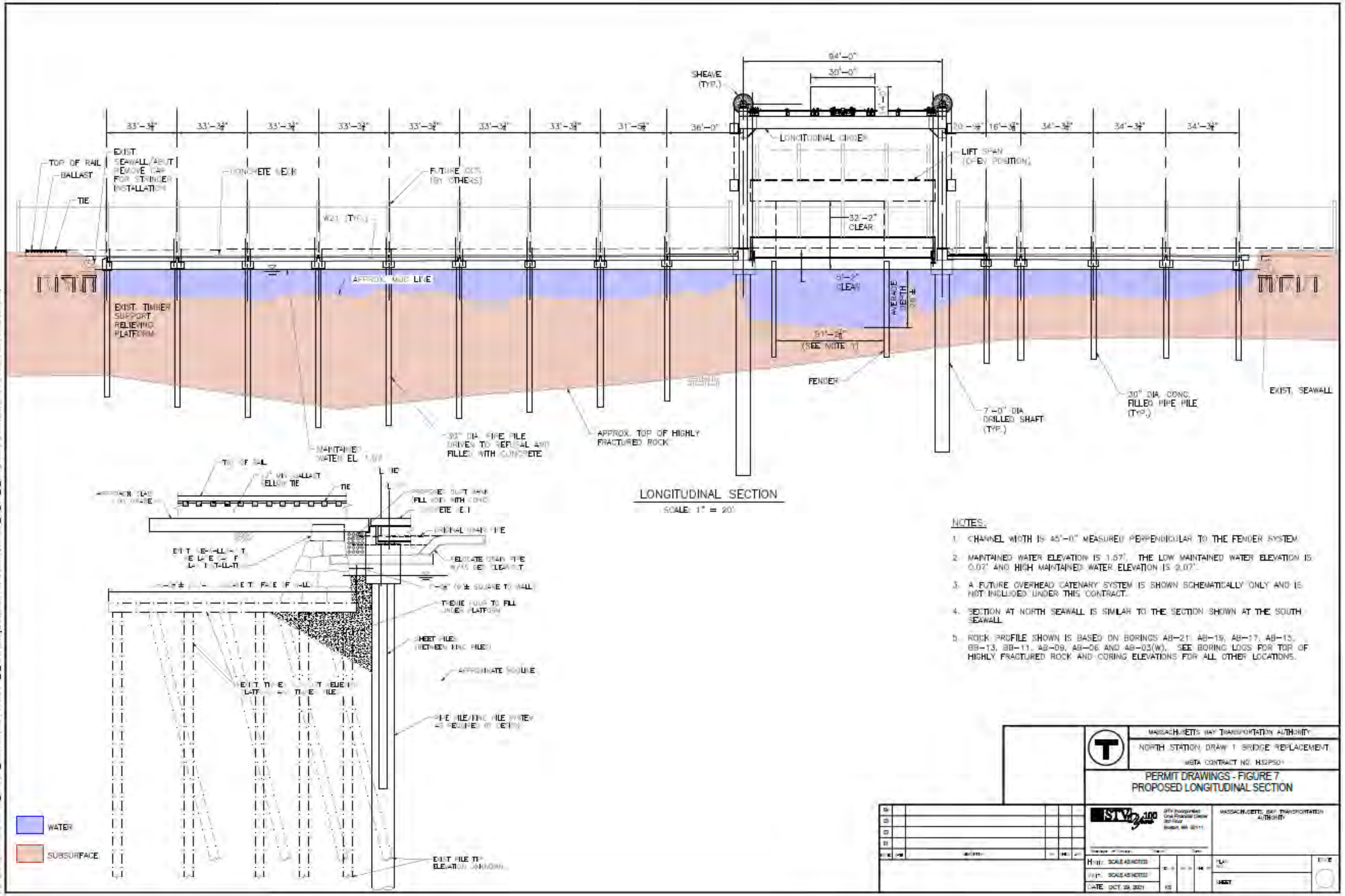


TOTAL TEMPORARY DEMOLITION + CONSTRUCTION IMPACTS - SUMMARY TABLE	
	CUTOFF AT MUDLINE
DREDGE VOLUME (CY)	5220
SURFACE AREA (SF)	24900

PERMIT DRAWINGS – EXISTING LONGITUDINAL SECTION

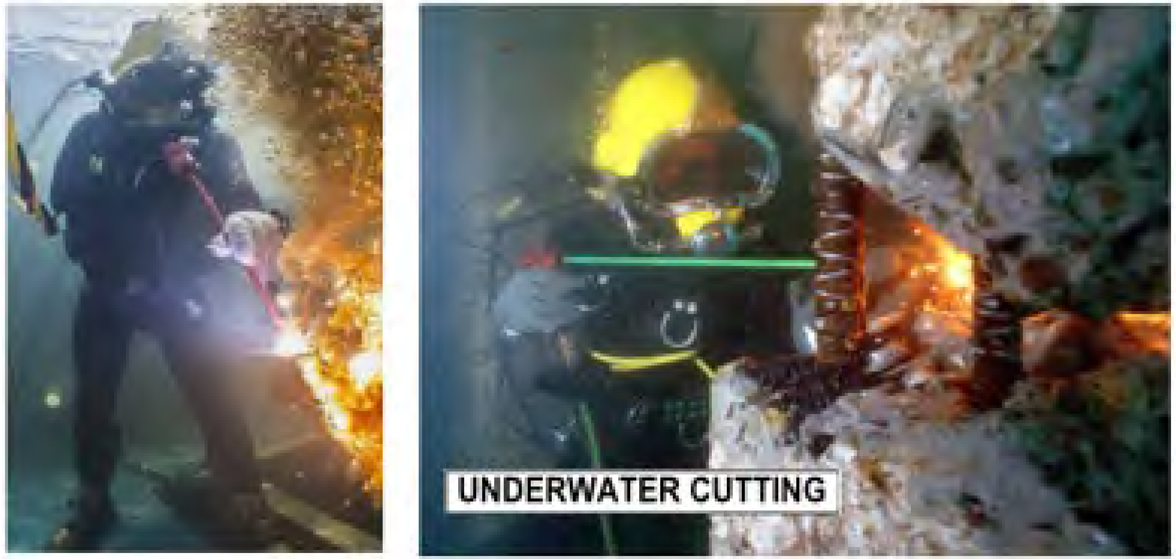


PERMIT DRAWINGS – PROPOSED LONGITUDINAL SECTION



Construction Activities & Equipment

TIMBER PILES



STEEL PILES

Pedestrian Bridge Discussion

Environmental Permitting – Federal

Agency	Permit/Review Program	Trigger	Relevant Project Impacts	Likely Permit Required (w/Thresholds)
Federal				
US Army Corps of Engineers	Section 10/404 Permit Individual Permit or General Permit 10	Discharge of Dredged or Fill to WOUS	Construct with Piles Cut At Mudline: **TEMP + PERM: 24,900 SF (0.57 AC)**	General Permit 10 (5,000 SF – 1 AC)
Federal Transit Administration	NEPA Categorical Exclusion or Env. Assess.	Action using federal funding (initiated 4/20)	Federal Action	Environmental Assessment
FTA, State Historic Preservation Office (Massachusetts Historical Commission), BLC, CHC, and BUAR	Section 106 and 4(f) reviews or Finding of Adverse Impact; Inter-agency Memorandum of Agreement	Finding of Adverse Effect on NRHP-eligible structures	Potential Adverse Effect	MOA
Massachusetts Division of Marine Fisheries, US Fish and Wildlife Service, and US EPA	Section 7 Fisheries and Wildlife Consultations, Federal Permit Review Consultation	CWA Sections 10/404 and 401 permitting	Work in Waterway	Section 7 Consultation submittals
US Environmental Protection Agency	National Pollutant Discharge Elimination System – Construction General Permit	Disturbance of 1 or more acres of land	>1 AC total land disturbance	NPDES CGP via NOI and preparation of Stormwater Pollution Prevention Plan

Environmental Permitting – State and Local

Agency	Permit/Review Program	Trigger	Relevant Project Impacts	Likely Filing/Permit Required
State				
Massachusetts Department of Environmental Protection	Section 401 Water Quality Certification	Dredging	Construct with Piles Cut At Mudline: **5,520 CY**	WQC Major WW07 (>5,000 CY)
		Fill/Excavation	Pile & Drilled Shafts; Tremie pour bulkhead stabilization in riverbed: **PERM: 4,100 SF** **TEMP & PERM: 24,900 SF**	WQC Minor WW11 (<5,000 SF) or Major WW10 (>5,000 SF)
Executive Office of Environmental Affairs/ MEPA Unit	MEPA Review	Construction in Wetlands, Waterways, and Tidelands requiring state permits <1 mile from EJ Community	Expansion Solid Fill Structure: **4,100 SF** Alteration of Bank: **517 LF**	Environmental Notification Form (Expanded) (>1,000 SF structure; >500 LF bank); Environmental Impact Report?
MassDEP	Chapter 91 Waterways License/Modification	Construction and occupation of Commonwealth Waterway	Bridge and Trestle crossing with existing license(s)	Chapter 91 License or Modification
Massachusetts Water Resources Authority	8(m) Permit	Crossing of MWRA facilities	Track modifications over MWRA facilities	8(m) Permit
Local				
Boston and Cambridge Conservation Commission	Wetlands Protection Act Notices of Intent	Construction in Areas Subject to Jurisdiction under Wetlands Protection Act	Alteration of Land Under Waterway: **PERM: 4,100 SF** **TEMP + PERM: 24,900 SF** Alteration of Bank: **517 LF** Alteration Riverfront Area: **TBD SF** Alteration of Buffer Zone: **TBD SF**	Order of Conditions >5,000 SF LUW >50 LF Bank Work in RA Work in Buffer Zone

Other Environmental Considerations

Environmental Site Assessment

To identify soil and groundwater management constraints and approach/specs for construction

Building and Hazardous Materials Assessment

To identify building and hazardous materials constraints and approach/specs for construction

Environmental Permitting – Current Schedule

Permitting Schedule		
Permit Agency/Program	**Activity**	**Approximate Timeframe***
FTA - NEPA Environmental Assessment	Prepare Annotated Outline/Section 106 & Section 7 Consultations	Winter - Spring 2022
	Submit EA	**Summer 2022**
USACE - Section 10/404 General Permit	Inter-Agency Consultations – MDFW, NOAA NMFS, US EPA, US FWS	Spring 2022 - Ongoing
	Submit General Permit	**Summer 2022**
MassDEP – Section 401 Water Quality Certification WW08 Dredging and WW11 or WW10 Fill	Review of Sediment & Water Sampling Program	Spring 2022- Ongoing
	Pre-application Consultation	Spring 2022
	Submit 401 WQC Applications	**Summer 2022**
MassDEP – Chapter 91 Waterways License	Pre-application Consultation	Spring 2022
	Submit Ch. 91 Application	**Summer 2022**
MEPA	Pre-Submittal Consultation	Spring 2022
	Submit MEPA Filing	**Summer 2022**
Boston and Cambridge Conservation Commissions	Submit Notice of Intent Applications	**Fall 2022**
MWRA 8(M) Permit	Pre-application Consultation	Summer 2022
	Submit Application	**Fall 2022**
NPDES Construction General Permit NOI	**Prepare SWPPP and Submit eNOI**	**14 days prior to construction**
*Based on current Project design timeline		

PRESENTATION

MBTA CONTRACT NO. H32PS01

QUESTIONS & ANSWERS

THANK YOU

STV 100 Years

Conclusion and Key Issue for Discussion

Dredging and Riverbed Impacts

– *Proposed cutting of piles above mudline will significantly reduce riverbed dredging volumes and area impacts*

Appendix C

EFH Species Life Histories

Finfish EFH Species Life Histories

American Pliace (Hippoglossoides platessoides)

Primary reference: Johnson, 2005

Boston Harbor has been designated EFH for all life stages of American plaice (*Hippoglossoides platessoides)*, including spawning adults in the seawater salinity zone of greater than 25.0 parts per thousand (ppt) (NEFMC, 1998b). The American plaice is a commercially important flatfish found in the western North Atlantic from Labrador south to Cape Cod and Narragansett Bay, Rhode Island (Collette and Klein-MacPhee, 2002). With the exception of witch flounder, plaice is considered the most abundant of all flatfish in the Gulf of Maine at depths between 177 to 295 feet (54 to 90 meters) (Klein-MacPhee, 2002, as cited in Johnson, 2005). Generally, American plaice from southern Labrador to Rhode Island are found in deep water from 295 to 590 feet (90 to 180 meters) and do not normally occur in water less than 82 to 114 feet (25 to 35 meters) (O'Brien, 2000, Dery, 1998, as cited in Johnson, 2005).

American plaice eggs are pelagic. NEFMC (1998b) describes EFH for American plaice eggs as surface waters of the Gulf of Maine and Georges Bank. Conditions where most American plaice eggs are found include the following: sea surface temperatures below 54 °F (<12 °C), water depths between 98 and 295 feet (30 and 90 meters) and a wide range of salinities up to 32 ppt (NEFMC, 1998b, NMFS Northeast Regional Office, Habitat Conservation Division Table). Since eggs are pelagic, there is no recorded substrate preference for egg habitat. American plaice eggs are in Boston Harbor are rare in February but common March through June (Jury et al., 1994).

American plaice larvae are pelagic. NEFMC (1998b) describes EFH for American plaice larvae as surface waters off of the Gulf of Maine, Georges Bank, and southern England. Conditions where most American plaice larvae are found include the following: sea surface temperatures below 57 °F (14 °C), water depths between 98 and 427 feet (30 and 130 meters) and a wide range of salinities (NEFMC, 1998b). American plaice eggs are in Boston Harbor are rare in February but common March through June (Jury et al., 1994). Since larvae are pelagic, there is no recorded substrate preference for larval habitat. Larvae feed on plankton, diatoms and copepods found in upper water layers.

NEFMC (1998b) describes EFH for American plaice juveniles and adults as bottom habitats with fine-grained sediments, gravel or sand substrate in the Gulf of Maine and Georges Bank. Conditions where most American plaice juveniles and adults are found include the following: water temperatures below 63 °F (17 °C), depths ranging between 148 and 492 feet (45 and 150 meters) and a wide range of salinities (NEFMC, 1998b). Juveniles feed on small crustaceans, cumaceans and polychaetes prior to settling. After settling the juvenile diet changes with growth and mouth gape size and can include ophiuroids, mysids, amphipods and polychaetes. Bowman and Michaels (1984, as cited in Cross et al., 1999) reported that polychaetes were especially important prey of plaice < 20 cm and noted that the largest fish fed mostly on echinoderms. Juvenile and adult American plaice are abundant year-round in Boston Harbor (see Appendix F of Jury et al., 1994).

EFH for adults is similar to that for juveniles except that water depths range from 148 and 574 feet (45 to 175 meters). The age and length at which fifty percent of female American plaice reach maturity in the Gulf of Maine has been documented at approximately 3.80 and 3.60 years and at 29.70 and 26.80 centimeters. American plaice are opportunistic feeders, flexible in their dietary habits, and will take whatever is most abundant or accessible, but the diet of adults consists primarily of echinoderms, chiefly sand dollars, sea urchins, and brittle stars, in their normal habitat at or near the ocean floor. Plaice are categorized as a predator whose diet composition consists of a combination of small benthic crustaceans, echinoderms, cnidarians, and polychaetes

NEFMC (1998b) describes EFH for American plaice spawning adults as bottom habitats of all substrate types in the Gulf of Maine and Georges Bank. Spawning American plaice adults, in Boston Harbor, are rare in February, but common but common April through July (Jury et al., 1994).

Spawning adults migrate from deeper depths into shallower grounds before spawning which occurs at depths, less than 295 feet (< 90 meters) and spawning (Bigelow and Schroeder, 1953, as cited in Johnson, 2005).

Atlantic Bluefin Tuna (Thunnus thynnus)

Primary reference: Collette and Klein-MacPhee, 2002

Within this quadrant of Massachusetts Bay which encompasses the Project area, EFH has been designated for adult life stages of Atlantic bluefin tuna (*Thunnus thynnus*). The Atlantic bluefin tuna is a large, pelagic, highly migratory, piscivorous sport fish that can be found throughout the western Atlantic from Gulf of St. Lawrence to Florida and occurs in the Gulf of Maine in the summer and fall.

Adults inhabit temperate surface waters, but frequently dive to depths of 1,640 to 3,281 feet (500 to 1,000 meters). Adults have no strong association with any substrate. EFH for adults in the Gulf of Maine includes the area from the 164 feet (50 meter) isobath to the exclusive economic zone (EEZ) boundary (NEFMC, 1998b). Spawning has been noted to occur in two primary locations including the Mediterranean Sea and the Gulf of Mexico (Collette and Klein-MacPhee, 2002). Within Massachusetts Bay, no presence/absence data is presented in Jury *et al*. 1994 for this species.

Atlantic Butterfish (Peprilus triacanthus)

Primary reference: Cross et al., 1999

Boston Harbor has been designated EFH for eggs, larvae, and adult Atlantic butterfish *(Peprilus triacanthus)* in the seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b). Atlantic butterfish range from Newfoundland to Florida but are most abundant from the Gulf of Maine to Cape. Atlantic butterfish winter near the edge of the continental shelf in the Middle Atlantic Bight and migrate inshore in the spring into southern New England and Gulf of Maine waters. During the summer, butterfish occur over the entire mid-Atlantic shelf from sheltered bays and estuaries out to about 656 feet (200 meters).

In Boston Harbor, Atlantic butterfish eggs are rare during June and September but common throughout July and August (Jury et al., 1994). Atlantic butterfish eggs have been collected between 55.0 and 72.5 °F (12.8 – 22.5 °C) at salinities that range from estuarine to full strength seawater. Atlantic butterfish eggs are buoyant and have an incubation period of 2 to 3 days at 59 °F (15 °C). Although butterfish are usually reported to spawn offshore, butterfish may spawn a few miles offshore in Massachusetts near Woods Hole and then return inshore when they are spent (Klein-MacPhee, in review, as cited in Cross et al., 1999). Butterfish may spawn in the upper part of the water column during the evening more as more eggs have been collected between than during the day (Kendall and Naplin, 1981, as cited in Cross et al., 1999).

Atlantic butterfish larvae are common from July to October. (Jury et al., 1994). Larvae have been collected between 4-28°C at salinities that range from estuarine to full strength seawater. Larvae are free-swimming and may undertake diel vertical migrations; more butterfish larvae have been collected at night between depths of approximately 3 to 13 feet (0 to 4 meters) than during the day (Kendall and Naplin 1981, as cited in Cross et al., 1999). Larvae are abundant in the mixing portions of estuaries along the Atlantic coast. Generally, butterfish larvae are collected at depths between 33 and 5,906 feet (10 and 1,800 meters) and temperatures between 48 and 66 °F (9 and 19 °C). Metamorphosis is gradual as the larvae progressively assume juvenile characters (Able and Fahay, 1998, as cited in Stevenson et al., 2014) tending to remain in shallow waters at night and descending into relatively food-depleted depths during the day (Cross et al., 1999).

Butterfish feed mainly on planktonic prey including thaliaceans, mollusks (primarily squids), crustaceans (copepods, amphipods, and decapods), coelenterates (primarily hydrozoans), polychaetes, small fishes, and ctenophores. During bottom trawl surveys arthropods dominated the identifiable items of stomach contents, followed by urochordates (thaliaceans and larvaceans), unidentified plankton, annelids (probably polychaetes), chaetognaths (arrowworms), mollusks (probably squids), cnidarians (coelenterates, probably jellyfish), and fishes. Butterfish are preyed on by many species including haddock, silver hake, goosefish, weakfish, bluefish, swordfish, sharks (hammerhead), and longfin inshore squid (Bigelow and Schroeder, 1953, Scott and Tibbo, 1968, Horn, 1970a, Maurer and Bowman, 1975, Tibbets, 1977, Stillwell and Kohler, 1985, Brodziak, 1995, Klein- MacPhee, in review, as cited in Cross et al., 1999).

Similar to the larvae, adult butterfish prefer the bottom during the day and disperse upwards at night. In addition, adults prefer sandy rather than rocky or muddy bottoms, and generally keep near the surface over depths of 72 to 180 feet (22 to 55 meters) when near the coast in the summer and fall. In the winter and early spring, they tend to stay close to the bottom. Adult butterfish are common in Boston Harbor from June through October (Jury et al., 1994).

Atlantic butterfish are broadcast spawners and do so annually primarily in the evening or at night as they migrate north and inshore on their annual migration in association with seasonal warming of waters on the northeast shelf (Cross et al., 1999). Generally, adult butterfish are collected at depths between 33 and 1,198 feet (10 and 365 meters) and temperatures between 37 and 82 °F (3 and 28 °C). Butterfish are pelagic fishes that form loose schools, often near the surface (Schreiber, 1973, Dery, 1988, Brodziak, 1995, as cited in Cross et al., 1999). They winter near the edge of the continental shelf in the Middle Atlantic Bight and migrate inshore in the spring into southern New England and Gulf of Maine waters. During the summer, butterfish occur over the entire Mid-Atlantic shelf from sheltered bays and estuaries out to about 656 feet (200 meters). In late fall, butterfish move southward and offshore in response to falling water temperatures (Fritz, 1965, Horn, 1970a, Schreiber, 1973, Waring, 1975, Azarovitz et al., 1980, Klein-MacPhee, in review, as cited in Cross et al., 1999).

Atlantic Cod (Gadus morhua)

Primary reference: Lough, 2004

Boston Harbor has been designated EFH for Atlantic cod (*Gadus morhua*) eggs, larvae, juveniles, and adults in seawater salinity zones of greater than 25.0 ppt and for juveniles and adults for brackish salinity zones of 0.5 to 25.0, as well as seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b).

Atlantic cod eggs found in surface waters around the perimeter of the Gulf of Maine, Georges Bank, and the eastern portion of the continental shelf off southern New England. Cod eggs are pelagic, buoyant, spherical, and transparent. NEFMC (1998b) describes EFH for Atlantic cod eggs where sea surface conditions are below 54 °F (12 °C), water depths are less than 361 feet (110 meters) and a salinity ranges from 32 to 33 ppt. Cod eggs are most often observed beginning in the fall, with peaks in the winter and spring. In Boston Harbor, Atlantic cod eggs are rare during July and November but common from December to June (Jury et al., 1994).

Atlantic cod larvae are pelagic. NEFMC (1998b) describes EFH for Atlantic cod larvae as pelagic waters of the Gulf of Maine, Georges Bank and also the eastern portion of the continental shelf off southern New England. Conditions where most Atlantic cod larvae are found include, sea surface temperatures below 50 °F (10 °C), water depths between 98 and 230 feet (30 and 70 meters) and salinities ranging from 32 to 33 ppt (NEFMC, 1998b). Since larvae are pelagic, there is no recorded substrate preference for larvae habitat. In Boston Harbor, Atlantic cod larvae are rare during August and November but common from December to July (Jury et al., 1994).

Juvenile Atlantic cod are demersal and prefer cobble compared to finer grain sediment and use vegetation to avoid predation. NEFMC (1998b) describes EFH for Atlantic cod juveniles as bottom habitats with a substrate of cobble or gravel in the Gulf of Maine, Georges Bank, and eastern portions of the continental shelf off southern New England. Conditions where most Atlantic cod juveniles are found include the following: water temperatures that are below 68 °F (20 °C), depths ranging from 82 and 246 feet (25 and 75 meters) and salinities ranging from 30 to 35 ppt (NEFMC, 1998b). In Boston Harbor, Atlantic cod juveniles are common throughout the year (Jury et al., 1994). In addition, Stevenson et al., (2014) rank gravel cobble and eelgrass as habitats most often utilized by juvenile cod, followed by mud, sand, boulder and ledge.

Juvenile nursery grounds for Atlantic cod include nearshore mud, sand, gravel/cobble, and vegetated habitats (Hardy, 1978, Keats, 1990, Dalley and Anderson, 1997, Linehan et al., 2001, Cote et al., 2004, Lough, 2005, Lazzari and Stone, 2006, as cited in Stevenson et al., 2014). Without the risk predation, juvenile Atlantic cod are common over unvegetated fine-grained sediments and forage over sandy substrates at night yet seek shelter from predators during the day in more diverse bottom habitats. Recent juveniles often seek refuge from predators in shallow cobble bottom habitats. The survival value of the gravel/cobble habitat for juveniles is high, yet they also prefer eelgrass beds for refuge. Once settled, juveniles often select eelgrass habitats for refuge over gravel/cobble habitats (Stevenson et al., 2014). This is largely an effort to evade predators (Borg et al., 1997, Linehan et al., 2001, as cited in Stevenson et al., 2014). Older juvenile cod, up to three years of age, are more common in boulder and kelp habitats (Stevenson et al., 2014).

Seasonal movements of juveniles in coastal Massachusetts trend towards shallows in the spring and deep (>52.4 feet [>16 meters]) in the fall (Lough, 2005, as cited in Stevenson et al., 2014). Young-of-the-year juveniles have been found to prefer shallow inlets, rock pools, river mouths and harbors in Massachusetts, yet depart from coastal waters by the middle of June (Hardy, 1978, as cited in Stevenson et al., 2014).

NEFMC (1998b) describes EFH for Atlantic cod adults as bottom habitats with a substrates of rocks, pebbles or gravel in the Gulf of Maine, Georges Bank, southern New England, and middle Atlantic south to Delaware Bay. Conditions where most Atlantic cod adults are found include the following: water temperatures that are below 50 ºF 10 °C, depths ranging from 33 and 492 feet (10 and 150 meters) and a wide range of oceanic salinities (NEFMC, 1998b). Atlantic cod are opportunistic feeders. Food items include Atlantic sand lance (*Ammodytes americanus*), *Cancer* crabs and herring. In Boston Harbor, Atlantic cod adults are rare between January and March but common from March (Jury et al., 1994).

The majority of spawning occurs in the Georges Bank area although reproduction also occurs in nearshore areas, where eggs are found November through July (with a peak in April) at temperatures between -2 and 20°C (Elliott et al., 1979, as cited in Lough 2004). In Boston Harbor, Atlantic cod spawning adults are rare during June and November, but common from December to May (Jury et al., 1994).

Atlantic Mackerel (Scomber scombrus)

Primary reference: Studholme et al., 1999

Boston Harbor has been designated EFH for Atlantic mackerel (*Scomber scombrus*) eggs, larvae, juveniles and adults in brackish salinity zones of 0.5 to 25.0, as well as seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b). The Atlantic mackerel is a pelagic schooling species that is found in the northwest Atlantic from the Gulf of St. Lawrence to Cape Lookout, North Carolina.

The eggs are spherical and pelagic and are typically found above the thermocline or in the upper 33 to 49 feet (10 to 15 meters) of the water column. Eggs have been collected over depths ranging from 33 to 1,066 feet (10 to 325 meters). Atlantic mackerel eggs are free floating and have no known association with any particular substrate. Eggs are abundant during June and July in Boston Harbor and are common during May and August (Jury et al., 1994).

Atlantic mackerel larvae are distributed at depths from 33 to 427 feet (10 to 130 meters) and are usually found at depths less than 164 feet (50 meters). Larval Atlantic mackerel are pelagic and have no known association with any particular substrate. Larvae are abundant during June and July in Boston Harbor and are common during May and August (Jury et al., 1994).

Depending on the TOY, juveniles may be found almost anywhere in the water column. Juvenile Atlantic mackerel that occur in Boston Harbor are common from June through October and rare during May (Jury et al., 1994).

Adult Atlantic mackerel are highly mobile and undergo extensive migrations generally from the deep-water outer continental shelf toward inshore areas in the spring and summer. Juvenile Atlantic mackerel feed primarily on invertebrates including copepods, amphipods, mysids, and squid, while adults are more piscivorous. Prey items for adults include hakes, herring, sand lance, sculpins and squid. Because adults are pelagic, there is no known association with any particular substrate. All life stages of Atlantic mackerel are independent from benthic habitats. Collete and Klein-MacPhee (2002) state: "*Neither are they directly dependent either on the coastline or on the bottom in any way at any stage in their lives*." Adult Atlantic mackerel that occur in Boston Harbor are common from June through September and rare during May (Jury et al., 1994).

Atlantic Herring (Clupea harengus)

Primary reference: Stevenson and Scott, 2005

Boston Harbor has been designated EFH for Atlantic herring (*Clupea harengus*), larvae in seawater salinity zones of greater than 25.0 ppt and for juveniles and adults for brackish salinity zones of 0.5 to 25.0, as well as seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b). Atlantic herring is a pelagic schooling species that is found in the northwest Atlantic from Labrador to Cape Hatteras, North Carolina.

Atlantic herring larvae are pelagic. NEFMC (1998b) describes EFH for Atlantic herring larvae as surface waters of the Gulf of Maine and Georges Bank. Conditions where most Atlantic herring larvae are found include the following: sea surface temperatures below 61 °F (16 °C), water depths from 164 to 295 feet (50 to 90 meters) and salinities around 32 ppt (NEFMC, 1998b). Larvae feed on plankton, diatoms and copepods found in upper water layers. In Boston Harbor, larvae are abundant from November to January, and are common February through May and in October (Jury et al., 1994).

NEFMC (1998b) describes EFH for Atlantic herring juveniles as pelagic waters and bottom habitats in the Gulf of Maine and Georges Bank. Conditions where most Atlantic herring juveniles are found include the following: water temperatures below 50 °F (10 °C), depths ranging between 49 and 443 feet (15 and 135 meters) and a salinity range from 26 to 32 ppt (NEFMC, 1998b). Juveniles feed on up to 15 different groups of zooplankton; the most common are copepods, decapod larvae, barnacle larvae, cladocerans, and molluscan larvae. Juvenile Atlantic herring in Boston Harbor are present year-round, abundant September through May, and common June through August (Jury et al., 1994).

NEFMC (1998b) describes EFH for Atlantic herring adults as pelagic waters and bottom habitats in the Gulf of Maine and Georges Bank. Conditions where most Atlantic herring adults are found include the following: water temperatures below 50 °F (10 °C), depths ranging between 67 and 427 feet (20 and 130 meters) and salinities above 28 ppt (NEFMC, 1998b). Adult Atlantic herring feed mainly on euphausiids, chaetognaths, and copepods. Adult Atlantic herring are abundant in Boston Harbor from December through May, and common September through November, and rare in June through August (Jury et al., 1994).

Atlantic Wolffish (Anarhichas lupus)

Primary reference: NEFMC, 2017

EFH has been designated for all four life stages of Atlantic wolffish within the quadrant of Massachusetts Bay encompassing the Project area.

Eggs are found in sub-tidal benthic habitats, typically under rocks and boulders in nests at depths less than 328 feet. Atlantic wolffish larvae are pelagic and found in sub-tidal benthic habitats. Larvae stay at the bottom for approximately six days before becoming more buoyant as the yolk sac is absorbed (NEFMC, 2017).

Juveniles, approximately <65 cm total length, are found in sub-tidal benthic habitats. They stay at depths of 196 to 603 feet and do not tend to have a strong substrate association (NEFMC, 2017).

Adult wolffish, approximately >65 cm total length, are also found in sub-tidal benthic habitats. They stay at depths less than 567 feet and have been observed spawning in boulder reef habitats in the Gulf of Maine at depths of 164 feet to 328 feet (NEFMC, 2017). After spawning, adults are distributed over sand and gravel substrates, and are rarely found over a muddy bottom.

Black Sea Bass (Centropristis striata)

Primary references: Drohan et al., 2007 and Steimle et al., 1999a

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated for only the adult life stage of black sea bass (*Centropristis striata*). Jury *et al*. (1994) does not include information on temporal distribution and relative abundance of any life stages of Atlantic halibut in Massachusetts Bay.

However, the egg stage has been given a designation of "n/a" in Massachusetts Bay indicating there is no data available on the designated life stages, or those life stages are not present in the species' reproductive cycle. The black sea bass is a warm temperate species that ranges southern Nova Scotia and the Bay of Fundy to southern Florida and into the Gulf of Mexico.

Although black sea bass has been reported on the Grand Banks of Canada they are generally uncommon in cooler waters north of Cape Cod. Black sea bass are typically found on the continental shelf and are strongly associated with structurally complex habitats, including rocky reefs, cobble and rock fields, stone coral patches, exposed stiff clay, reefs and shipwrecks.

Adult black sea bass are found in various locations according to the season of the year, where they distributed primarily offshore during the winter (November to April) south of New York to North Carolina and found primarily inshore during warmer months (May to October) in estuaries and bays with structured habitats of sand and shell fragments and water depths of approximately 65 to 164 feet (20 to 50 meters) (NMFS 1994). During the spring (1978-2003) inshore trawl surveys revealed, adults were mostly found south of Cape Cod, around the islands, and in Buzzards Bay, with the highest numbers near Nantucket Island and south of the Cape in Nantucket Sound. Distributions were similar in the fall, with the highest numbers occurring in Nantucket Sound and in Buzzards Bay. Black sea bass adults feed on a wide variety of crustaceans, fishes, mollusks, and worms (Collette and Klein-MacPhee, 2002). Spawning generally occurs from April to June in coastal habitats, aggregating on sand bottoms by broken ledges (Steimle *et al.,* 1999a) but not in estuaries (NMFS 1994). Drohan *et al.,* 2007 stated that black sea bass are generally uncommon in cooler waters north of Cape Cod.

Bluefish (Pomatomus saltatrix)

Primary reference: Shepard and Packer, 2006

Boston Harbor has been designated EFH for bluefish (*Pomatomus saltatrix*), juveniles and adults in brackish salinity zones of 0.5 to 25.0 ppt, as well as seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b).

Bluefish are highly migratory, recreationally important sportfish ranging from Nova Scotia to Argentina, but within the United States are found along the Atlantic coast from Maine to Florida. According to Jury et al., (1994), bluefish eggs and larvae are not present in Boston Harbor any time of the year.

Juvenile bluefish are pelagic and generally occur in North Atlantic estuaries from May through October within mixing zones. Shepherd and Packer (2006) reported that juvenile bluefish have been recorded from all estuaries and large bays across the entire continental shelf furthermore they state that it remains unknown if juvenile bluefish are in fact "estuarine dependent". Juveniles apparently prey on available items, ranging from crustaceans to polychaetes to fish. They are not known to be associated with any other particular substrate. Juvenile bluefish are rare in Boston Harbor in May and common from June through October (Jury et al., 1994).

Adult bluefish are oceanic, found both inshore and offshore, and in Massachusetts Bay during the same months as juveniles. In shore trawl surveys during spring and autumn in Massachusetts coastal waters revealed that adult bluefish occurred in the spring were found in a temperature ranges of 50 to 57 °F (10 to 14 °C), at depth ranges of 20 to 82 feet (6 to 25 meters). In the fall, adult bluefish occurred at temperature ranges between 50 to 72 °F (10 to 22 °C), with most between 63 and 68 °F (17 and 20 °C). Their depth range during that season was from about 20 to 131 feet (6 to 40 meters), with the majority at 20 to 49 feet (6 to 15 meters). Adult bluefish are not known to be associated with any particular substrate and are almost completely piscivorous. Adult bluefish are highly migratory, and distribution varies seasonally; however, they can be found in North Atlantic estuaries from June through October, preferring salinities of 25 ppt and temperatures greater than 61 °F (16 °C). Adult bluefish are rare in Boston Harbor in May and common from June through October (Jury et al., 1994).

Ocean Pout (Macrozoarces americanus)

Primary reference: Steimle et al., 1999b

Boston Harbor has been designated EFH for ocean pout (*Macrozoarces americanus*), juveniles and adults in seawater salinity zones of greater than 25.0 ppt (NEFMC, 1998b). The ocean pout is a cool-temperate species found in marine waters, across the continental shelf and on the upper continental slope from Labrador to south of Cape Hatteras, North Carolina. The ocean pout is a benthic, non-migratory fish that prefers cool waters 35.6 to 50 °F (2 to 10 °C) and hard substrates. This species is generally found from Cape Hatteras north into Nova Scotia. Adult ocean pout range from the intertidal zone out to the upper continental slope and are often collected at depths less than 328 feet (100 meters). Juveniles occur in shallow coastal waters in rocky substrates, algae and shellfish beds. Adults and juveniles are abundant in Massachusetts Bay, with adults being less abundant in summer and fall. Ocean pout spawn over nests located in protected areas such as rocky crevices and artificial debris. Larvae remain near the bottom and as juveniles they disperse (Steimle et al., 1999b).

Ocean pout will utilize a variety of substrates depending on the season and water temperature. They tend to occupy rocky areas in the summer and fall and sand/gravel habitats in the winter/spring. They feed on benthic prey, sorting through mouthfuls of sediment to consume copepods, amphipods, polychaetes, crustaceans, mollusks and sand dollars (Steimle et al., 1999b).

NEFMC (1998b) describes EFH for ocean pout juveniles as bottom habitats, often smooth bottom near rocks or algae in the Gulf of Maine and Georges Bank. Conditions where most ocean pout juveniles are found include the following: water temperatures below 57 °F (14 °C) and depths less than 262 feet (80 meters), and salinities greater than 25 ppt (NEFMC, 1998b). Juvenile ocean pout are common year-round in Boston Harbor (Jury et al., 1994).

NEFMC (1998b) describes EFH for ocean pout adults as bottom habitats in the Gulf of Maine and Georges Bank. Conditions where most ocean pout adults are found include the following: water temperatures below 59 °F (15 °C), depths less than 361 feet (110 meters) and a salinity range from 32 to 34 ppt (NEFMC, 1998b). In the waters of coastal Maine and George’s Bank, sand dollars are a primary prey, but brittlestars and mollusks were also eaten. In the northern Gulf of Maine, ocean pout switch from crustaceans during the spring to mollusks and polychaetes during the summer and fall. Adult ocean pout in Boston Harbor are common November through June and rare July through October (Jury et al., 1994).

Pollock (Pollachius virens)

Primary reference: Cargnelli et al., 1999a

Boston Harbor has been designated EFH for pollock (*Pollachius virens*), eggs and larvae in seawater salinity zones of greater than 25.0 ppt and for juveniles in brackish salinity zones of 0.5 to 25.0, as well as in seawater salinity zones of greater than 25.0 ppt (NEFMC, 1998b). Pollock is a commercially important groundfish ranging in the northwest Atlantic from the Hudson and Davis straits to North Carolina, although they are rare at the extreme ends of their range.

(Collette and Klein-MacPhee 2002). Pollock are active, schooling fish that use the entire water column. In the spring, older juvenile, pollock are abundant in inshore Gulf of Maine waters. By the end of June, they have moved out of the southern section of Massachusetts Bay due to elevated water temperatures, only to return again in the fall. Juvenile pollock are abundant throughout the summer and fall in harbors and bays along the Gulf of Maine coast (Klein-MacPhee 2002c, as cited in Stevenson et al., 2014). On the Maine coast, one-year-old pollock were a common catch in the rocky subtidal zone in depths <75 feet (23 meters) and were classified as summer-fall residents (Ojeda and Dearborn 1990, as cited in Stevenson et al., 2014). Juvenile pollock are present, though not common, in unvegetated intertidal and subtidal creeks and channels of salt marsh estuaries in the Gulf of Maine (Dionne et al., 1999).

In a survey of shallow-water habitats along the Maine coast, YOY juvenile pollock were common in eelgrass beds and to a lesser extent in kelp dominated habitats. The study concluded that shallow-water habitats in the Gulf of Maine are key nursery habitats for pollock. When in algae, especially rockweed, they preferred dense algal habitat (>50 percent algal cover) over sparse (<50 percent cover). Young-of-the-year juveniles use this habitat extensively. They may also be present around boulders and ledges as well. On falling tides, they schooled in the open habitat in down shore intertidal and subtidal zones. These findings suggest that pollock were using both refuging and schooling antipredator tactics during intertidal zone movements, and that rocky shores in the Gulf of Maine are important nurseries for juvenile pollock.

Pollock eggs and larvae are pelagic and buoyant but not known to be associated with any specific substrate type. EFH for eggs is pelagic waters of the Gulf of Maine and Georges Bank, at water depths from 90 to 886 feet (30 to 270 meters) with temperatures less than 67 °F (17 C). In Boston Harbor, eggs and larvae generally occur in the water column from December through April and are rare in November. Larvae are also rare in April. (Jury et al., 1994).

Juvenile pollock inhabit the water column, feed primarily on pelagic prey. NEFMC (1998b) describes EFH for pollock juveniles as bottom habitats with aquatic vegetation or a substrate of sand, mud or rocks in the Gulf of Maine and Georges Bank. Conditions where most pollock juveniles are found include the following: water temperatures below 64 °F (18 °C) and depths ranging from shore to 820 feet (250 meters), and salinities between 29 and 32 ppt (NEFMC, 1998b). Juvenile pollock feed mainly on crustaceans and fish and mollusks make up a smaller proportion of their diet. Juvenile pollock can occur in Boston Harbor any month of the year but are rare June through August (Jury et al., 1994).

Red Hake (Urophysis chuss)

Primary reference: Steimle et al., 1999c

Boston Harbor has been designated EFH for red hake (*Urophysis chuss*) eggs, larvae, juveniles, and adults in seawater salinity zones of greater than 25.0 ppt (NEFMC, 1998b). Red hake is a demersal fish that occurs from southern Newfoundland to North Carolina. This species is most abundant between Georges Bank and New Jersey. Juvenile and adult red hake are fish found in close association with the substrate.

Understanding of the environmental associations of red hake eggs is poor because they co-occur north of Cape Hatteras and are not readily separable to species in plankton collections (Steimle et al., 1999c). Some characteristics were identified based on eggs taken from spawning red hake. From this, it was determined that the eggs are approximately 0.6 – 1.0 mm in diameter, buoyant, and float near the surface. Hatching occurs within 3 – 7 days at typical spawning temperatures, which range from between 5 – 10°C from April to November (Steimle et al., 1999c).

EFH for red hake larvae includes conditions of surface water temperatures less than 66 °F (19 C), salinity greater than 0.5 ppt, and water depths less than 656 feet (200 meters) (NEFMC, 1998b). Since larval red hake associate with floating debris, sargassum and jellyfish, there is no known association between substrate type and the occurrence of red hake eggs and larvae. Red hake larvae are pelagic, common in the Middle Atlantic Bight and less so in the Gulf of Maine, suggesting that spawning in the Mid-Atlantic produces the majority of recruits to the Gulf of Maine stock. Red hake larvae in Boston Harbor are common from July through October and rare during November (Jury et al., 1994).

Red hake juveniles that are recently metamorphosed stay pelagic until they reach a length of 0.9 to 1.2 inches (25 to 30 millimeters). Demersal settlement usually occurs between September and December when juveniles reach lengths of 1.4 to 1.6 inches (35 to 40 millimeters). NEFMC (1998b) describes EFH for red hake juveniles as bottom habitats with a substrate of shell fragments, including areas with abundant live scallops, in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Conditions where red hake juveniles are generally found include the following: water temperatures below 61 °F (16 °C), water depths less than 328 feet (100 meters) and salinities ranging from 31 to 33 ppt (NEFMC, 1998b). Juvenile red hake leave shelter at night and prey on small benthic and pelagic crustaceans. Juvenile red hake in Boston Harbor occur November through April and are rare during June through August (Jury et al., 1994).

Along the Maine coast the presence of YOY juvenile red hake was significantly linked to one or more of three types of vegetated habitats: eelgrass, kelp and macroalgae. They utilize these habitats for refuge from predators (Stevenson et al., 2014). Young-of-the-year juveniles may utilize unvegetated soft bottom habitats as well (Lazzari and Stone 2006, as cited in Stevenson et al., 2014). In deeper water, red hake are found on sand and mud bottoms with few being caught on gravelly, shelly, or rocky grounds (Klein-MacPhee 2002d, as cited in Stevenson et al., 2014). Juveniles are frequently found inside live scallops and inside or under mollusk shells and shell structure appears to be crucial for their survival (Able and Fahay 1998, Klein-MacPhee 2002d, as cited in Stevenson et al., 2014). A similar symbiotic association has not been observed with blue mussels, the most common shellfish species that forms beds in shallow Gulf of Maine coastal waters. Although red hake were collected in a tidal salt marsh creek in the lower Kennebec River in Maine, they were not collected in six other Gulf of Maine salt marsh systems (Dionne et al., 1999, as cited in Stevenson et al., 2014).

Lazzari and Stone (2006, as cited in Stevenson et al., 2014) collected YOY juvenile red hake at depths <32.8 feet (<10 meters) along the Maine coast and concluded that shallow-water habitats in the Gulf of Maine are important nursery habitats for red hake. Older juvenile and adult red hake are rarely caught in depths <32.8 feet <10 m in the Massachusetts bottom trawl survey (Packer et al., 2004, as cited in Stevenson et al., 2014). Klein-McPhee (2002d, as cited in Stevenson et al., 2014) concludes that adult red hake are found in relatively deep water in the Gulf of Maine, which is likely true of the older juveniles as well.

NEFMC (1998b) describes EFH for red hake adults as bottom habitats in depressions that have a substrate of sand and mud in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic south to Cape Hatteras. Conditions where red hake adults are generally found include the following: sea water temperatures below 54 °F (12 °C), water depths ranging from 33 to 427 feet (10 to 130 meters) and salinities ranging from 33 to 34 ppt (NEFMC, 1998b). Food of red hake adults is similar to that of juveniles but also includes various demersal and pelagic fish and squid. Adult red hake in Boston Harbor are common April through November and rare December through March (Jury et al., 1994).

Scup (Stenotomus chrysops)

Primary reference: Steimle, 1999d

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated EFH for juvenile scup *(Stenotomus chrysops)*. However, the egg and larval life stages have been given a designation of “n/a” in Massachusetts Bay indicating there is no data available on the designated life stages, or those life stages are not present in the species’ reproductive cycle. Scup are temperate species and are most common south and west of Cape Cod and north of Cape Hatteras (NMFS, 1994). They undertake extensive migrations between coastal waters in summer and offshore waters in winter, moving north and inshore to spawn in spring.

Juvenile scup prefer estuaries and bays from Massachusetts to Virginia with various sands, mud, mussel and eelgrass substrates, temperatures greater than 45 °F (7 °C), and salinities greater than 15 ppt. Juvenile and scup prey on invertebrates such as polychaetes, epibenthic amphipods, and other small crustaceans. NMFS EFH tables (NMFS, 1994) indicate that juvenile scup occur at depths from 0 to 124 feet (0 to 38 meters) during spring and summer in both estuaries and bays. In Massachusetts Bay, juvenile scup are common during June through September and rare during June and October (Jury *et al.,* 1994).

Spiny Dogfish (Squalus acanthias)

Primary reference: MAFMC, 2014

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated for sub-adult female and adult life stages of spiny dogfish (*Squalus acanthias*). However, the egg and larval life stages have been given a designation of "n/a" in Massachusetts Bay indicating there is no data available on the designated life stages, or those life stages are not present in the species' reproductive cycle. Spiny dogfish are most common between Nova Scotia and Cape Hatteras. They undertake extensive migrations between northern waters in spring and summer and southern waters in fall and winter (MAFMC, 2014).

Female sub-adult spiny dogfish prefer pelagic and epibenthic habitats throughout a wide range of depths with temperatures between 45 to 59 °F (7 to 15 □C) and salinities from 32 to 35 ppt (MAFMC, 2014). Jury *et al.* (1994) does not include information on temporal distribution and relative abundance of sub-adult spiny dogfish in Massachusetts Bay.

Adult spiny dogfish prefer pelagic and epibenthic habitats throughout a wide range of depths with temperatures between 45 to 59 °F (7 to 15 □C) and salinities from 32 to 35 ppt (MAFMC, 2014). Adult spiny dogfish in Boston Harbor are rare from May through November and in Massachusetts Bay they are common in June and October and abundant from July through September (Jury et al., 1994).

Summer Flounder (Paralichthys dentatus)

Primary reference: Packer et al., 1999

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated for adult life stages of summer flounder *(Paralichthys dentatus)*. Jury *et al.* (1994) does not include information on temporal distribution and relative abundance of any life stages of Atlantic halibut in Massachusetts Bay.

Summer flounder are distributed from the southern Gulf of Maine to South Carolina but are rare north of Cape Cod and migrate into the Gulf of Maine in the summer from southern waters (Collette and Klein-MacPhee, 2002).

Adults are concentrated in estuaries and bays during warmer months from late spring through early fall and undertake migrations to the outer continental shelf at depths of 492 feet (150 meters) in colder months. The majority of the population lies farther offshore even in the warmer months in depths of 230 to 509 feet (70 to 155 meters) (Collette and Klein-MacPhee, 2002). Adult summer flounder are opportunistic feeders, and diet appears to consist of whatever suitable fish and crustaceans are available. Summer flounder are found on a variety of substrates but appear to prefer sandy substrate. They are also found on muddy substrates and can use vegetation for cover. Spawning occurs during autumn and early winter (Terceiro, 2006). Massachusetts Bay is designated as EFH for adult summer flounder.

White Hake (Urophysis tenuis)

Primary reference: Chang et al., 1999a

Boston Harbor has been designated EFH for all life stages of white hake (*Urophysis tenuis*), with the exception of spawning adults in the seawater salinity zone of greater than 25.0 parts per thousand (ppt) (NEFMC, 1998b). White hake have a range in the northwest Atlantic from the Gulf of St. Lawrence to Cape Hatteras, North Carolina. They occur from estuaries across the continental shelf to submarine canyons along the upper continental slope and deep, muddy basins in the Gulf of Maine.

EFH for white hake eggs and larvae are the surface waters of the Gulf of Maine, Georges Bank, and southern New England. White hake eggs and larvae cannot be distinguished from the closely related red hake. White hake eggs are buoyant and remain near the surface, being most often observed in Boston Harbor May through October (Jury et al., 1994).

EFH for white hake larvae are the surface waters of the Gulf of Maine, Georges Bank, and southern New England, with larvae being most common in the Gulf of Maine and Georges Bank during May through October (Jury et al., 1994). Larval white hake are difficult to distinguish from red hake but are pelagic and have no known association with a specific substrate. White hake larvae in Boston Harbor are common May through November and rare in December (Jury et al., 1994).

Early juvenile white hake are pelagic and older juveniles become demersal when they are about 2.0 to 2.3 inches (50 to 60 millimeters) in total length. NEFMC (1998b) describes EFH for white hake pelagic stage juveniles as pelagic waters of the Gulf of Maine, southern edge of Georges Bank, and southern New England to the middle Atlantic. EFH for the demersal stage is described as bottom habitats with seagrass beds or substrates of mud or fine-grained sand in the Gulf of Maine, southern edge of Georges Bank, or southern New England to the middle Atlantic.

Larger demersal juvenile white hake have been collected offshore at a wide range of temperatures between 39 and 66 °F (4 and 19 °C) and at depths ranging between 16 and 1,066 feet (5 and 325 meters). Smaller juveniles collected in Massachusetts inshore trawl surveys were most abundant at temperatures of 39 to 57 °F (4 to 14 °C) in spring and 46 to 66 °F (8 to 19 °C) in autumn, at depths less than 246 feet (75 meters). Eelgrass is an important habitat for demersal juveniles and younger fish are spatially segregated from older year classes by occupying shallow areas, but they are not tied to eelgrass, other vegetation, or structured habitats. Demersal juvenile white hake mostly feed on shrimp and other crustaceans and polychaetes. Juvenile white hake in Boston Harbor are common March through November and rare December (Jury et al., 1994).

On the coast of Maine, YOY juvenile white hake presence has been significantly linked to eelgrass habitats (Lazzari and Stone, 2006, as cited in Stevenson et al., 2014). A prior study showed that juveniles were common in eelgrass and unvegetated soft bottom habitats but did not prefer one over the other (Lazzari, 2002, as cited in Stevenson et al., 2014). A long term survey of shallow-water habitats in three zones along the Maine coast concluded the presence of YOY juvenile white hake was significantly related to one or more of three types of vegetated habitats: eelgrass, kelp, and algae (Lazzari and Stone, 2006, as cited in Stevenson et al., 2014). Young-of-the-year juveniles use shallow macroalgal habitats in the Gulf of Maine as important nursery grounds. White hake are also common in unvegetated salt marsh creeks and channels in addition to eelgrass meadows in Gulf of Maine coastal waters (Heck et al., 1989, Dionne et al., 1999, as cited in Stevenson et al., 2014).

Along the Maine coast, juvenile white hake were common in catches from shallow-water ((<19.6 feet [<6 meters]) habitats (Lazzari, 2002, as cited in Stevenson et al., 2014). Depth preference for YOY juveniles in Massachusetts coastal areas is likely similar to those in Maine, in addition to their preference for vegetated nursery grounds.

White hake adults are demersal. NEFMC (1998b) describes EFH for white hake adults as bottom habitats with a substrate of mud or fine-grained sand in the Gulf of Maine, the southern edge of Georges Bank, and southern New England to the middle Atlantic. Conditions where white hake adults are generally found include the following: water temperatures below 57 °F (14 °C) and water depths ranging from 16 to 1,066 feet (5 to 325 meters) (NEFMC, 1998b). Adult white hake feed on shrimp and other crustaceans. They also prey on fish that may include juveniles of their own species. Adult white hake in Boston Harbor are common March through October and are rare in November (Jury et al., 1994).

Whiting (Silver Hake) (Merluccius bilinearis)

Primary reference: Lock and Packer, 2004

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated for egg, larvae, and adult life stages of whiting *(Merluccius bilinearis)*. Whiting, also known as silver hake, are distributed on the continental shelf of the northwest Atlantic from the Gulf of St. Lawrence to Cape Fear, North Carolina.

Whiting eggs are pelagic and there is no known association between substrate characteristics and occurrence of eggs, which occur in Massachusetts Bay all year, with peak numbers from June through October (NEFMC, 1998b). NEFMC (1998b) defines EFH for whiting eggs as water depths from 164 to 427 feet (50 to 130 meters) with temperatures less than 68 °F (20 °C). In Massachusetts Bay, whiting eggs are common during May through October and absent during the remainder of the year (Jury *et al.,* 1994).

Whiting larvae are initially pelagic but become benthic at about 17 to 20 millimeters in length. There is no proven correlation between substrate characteristics and occurrence of silver hake larvae, which are observed all year, with peaks from July through September (NEFMC, 1998b). EFH for whiting larvae has the same temperature criterion as eggs (less than 68 °F [less than 20 °C]) within similar depth ranges as the eggs (164 to 427 feet [approximately 50 to 130 meters)] (NEFMC, 1998b). In Massachusetts Bay, whiting larvae are common during May through October and absent during the remainder of the year (Jury *et al.,* 1994).

NEFMC (1998b) describes EFH for whiting adults as bottom habitats of all substrate types in the Gulf of Maine, on Georges Bank, the continental shelf off southern New England, and the middle Atlantic to Cape Hatteras. Conditions where white hake adults are generally found include the following: water temperatures below 72 °F (22 °C) and water depths ranging from 98 to 1,066 feet (30 to 325 meters) (NEFMC, 1998b). Adults are nocturnal feeders with a diet consisting of fish, crustaceans, and squid. In Massachusetts Bay, adult whiting are common during April through July, October and November rare during August September and December and absent during the remainder of the year (Jury *et al.,* 1994).

Windowpane Flounder (Scopthalmus aquosus)

Primary reference: Chang et al., 1999b

Boston Harbor has been designated EFH for all life stages of windowpane flounder (*Scopthalmus aquosus*), including spawning adults in brackish salinity zones of 0.5 to 25.0, as well as seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b). Windowpane is a coastal flatfish distributed from the Gulf of St. Lawrence to Cape Hatteras, North Carolina. This species is most common south of Nova Scotia. Windowpane flounder are very common on sandy bottoms in southern New England and further south, but they also occupy muddy bottoms in the Gulf of Maine (Klein-MacPhee, 2002g, as cited in Stevenson et al., 2014). These flounder are common as YOY juveniles, older juveniles, and adults in featureless sand habitat.

Windowpane flounder eggs are buoyant and pelagic and are most common at depths less than 230 feet (70 meters). The conditions where windowpane flounder eggs are mainly found are as follows: sea surface temperatures less than 68 °F (20 °C) and water depths less than 230 feet (70 meters) (NEFMC, 1998b). Windowpane flounder eggs in Boston Harbor are common May through September and are rare December through February (Jury et al., 1994).

Windowpane flounder larvae are pelagic. NEFMC (1998b) describes EFH for windowpane flounder larvae as pelagic waters around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. The conditions where windowpane flounder larvae are mainly found are as follows: sea surface temperatures less than 68 °F (20 °C) and water depths less than 230 feet (70 meters) (NEFMC, 1998b). Windowpane flounder larvae in Boston Harbor are common May through October and are rare in April (Jury et al., 1994).

NEFMC (1998b) describes EFH for juvenile windowpane flounder as bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. The conditions where juvenile windowpane flounder are mainly found are as follows: water temperatures less than 77 °F (25 °C) and depths from 3 to 328 feet (1 to 100 meters), and salinities between 5.5 and 36 ppt (NEFMC, 1998b). Juvenile windowpane feed exclusively on mysid shrimps in Johns Bay, Maine. Juvenile windowpane flounder in Boston Harbor are common throughout the year (Jury et al., 1994).

Young-of-the-year juveniles may inhabit five benthic habitats: mud, sand, eelgrass, macroalgae and saltmarsh (Stevenson et al., 2014). In the Gulf of Maine, juvenile and adult windowpane flounder are common in shallow-water habitats and prefer sand over mud. Laboratory experiments have illustrated that transitional and larger juveniles favor sand to mud (Klein-MacPhee 2002g, as cited in Stevenson et al., 2014), perhaps because it is a more useful substrate for burial or because their prey are more common over sandy bottom.

Windowpane flounder inhabit the intertidal zone and shallow-water Gulf of Maine habitats as juveniles and adults. The young flounder settle in shallow inshore waters and generally relocate into deeper, offshore waters as they develop (Klein-MacPhee, 2002g, as cited in Stevenson et al., 2014). Juveniles (<22 centimeters) and adults (>22 centimeters) are common in bottom trawl harvests between 19 to 32 feet (6 to 10) meters in Massachusetts (NEFSC, 2004, as cited in Stevenson, 2014, 2014). They feed entirely on swimming prey such as mysids, decapod shrimp, and fish larvae (Chang et al., 1999, Klein-MacPhee, 2002g, as cited in Stevenson et al., 2014).

Adult windowpane flounder occur at depths less than 246 feet (75 meters). NEFMC (1998b) describes EFH for windowpane flounder adults as bottom habitats with a substrate of mud or fine-grained sand around the perimeter of the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras. Adult windowpane flounder in Boston Harbor are common March through December and are rare during December through February (Jury et al., 1994).

The conditions where windowpane flounder spawn are generally in water temperatures less than 70 °F (21 °C) at depths from 3 to 246 feet (1 to 75 meters), and with salinities between 5.5 and 36 ppt (NEFMC, 1998b). Spawning adult windowpane flounder in Boston Harbor are common May through September and are rare during April and October (Jury et al., 1994).

Winter Flounder (Pleuronectes americanus)

Primary reference: Pereira et al., 1999

Boston Harbor has been designated EFH for all life stages of winter flounder (*Pleuronectes americanus*), including spawning adults in brackish salinity zones of 0.5 to 25.0, as well as seawater salinity zone of greater than 25.0 ppt (NEFMC, 1998b).

Winter flounder is an economically important demersal flatfish occurring in coastal waters from Labrador to Georgia. This species is managed as three separate stocks: Gulf of Maine, southern New England/Middle Atlantic, and Georges Bank. Adult winter flounder migrate inshore during the fall/early winter and spawn during late winter/early spring throughout most of the range. After spawning, adults usually leave the inshore areas though some remain in the inshore areas year-round.

Winter flounder eggs are demersal and adhesive. NEFMC (1998b) describes EFH for winter flounder eggs as bottom habitats with substrates of sand, muddy sand, mud and gravel on Georges Bank, inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to Delaware Bay. Conditions where winter flounder eggs are found include the following: water temperatures less than 50 °F (10 °C), water depths of less than 16 feet (5 meters), and salinities between 10-30 ppt (NEFMC, 1998b). Winter flounder eggs in Boston Harbor are abundant February and June and are common during January and June (Jury et al., 1994).

Winter flounder larvae do not disperse far from egg habitat and remain in close association with the bottom. NEFMC (1998b) describes EFH for winter flounder larvae as pelagic and bottom waters of Georges Bank, inshore areas of the Gulf of Maine, southern New England, and the middle Atlantic south to Delaware Bay. Conditions where winter flounder larvae are found include the following: sea surface temperatures less than 59°F (15°C), water depths of less than 20 feet (6 meters), and salinities between 4-30 ppt (NEFMC, 1998b). Winter flounder larvae in Boston Harbor are highly abundant March through May, abundant February and June, common June and August and rare during January (Jury et al., 1994).

NEFMC (1998b) describe the EFH of the YOY winter flounder as bottom habitats with a substrate of mud or fine-grained sand on Georges Bank, the inshore of the Gulf of Maine, southern New England and the middle Atlantic south to Delaware Bay. Existing conditions where winter flounder YOY are found are water temperatures below 82 °F (28 °C), depths from 0.3 to 33 feet (0.1 to 10 meters), and salinities between 5 and 33 ppt. The EFH of juveniles (age 1+) is bottom habitats with a substrate of mud or fine-grained sand on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle Atlantic south to Delaware Bay. Winter flounder juveniles are found at water temperatures below 77 °F (25 °C), depths between 3 and 164 feet (1-50 meters), and salinities between 10 and 30 ppt (NEFMC, 1998b). Amphipods and polychaetes are important parts of the YOY and yearling flounder's diet. Juvenile winter flounder in Boston Harbor are highly abundant throughout the year (Jury et al., 1994).

In southern New England and the Mid-Atlantic, winter flounder spawn in the winter and early spring in nearshore, marine and estuarine habitats in areas less than five meters deep (Pereira et al., 1999, Klein-MacPhee 2002h, Able and Fahay 2010, as cited in Stevenson et al., 2014). Their adhesive eggs are deposited in groups on sand, muddy sand, and mud and gravel, with sand being the most common (Pereira et al., 1999, as cited in Stevenson et al., 2014). Tagging studies in the southwestern Gulf of Maine have illustrated that winter flounder tend to spawn in deeper coastal waters more than in shallow nearshore waters (DeCelles and Cadrin, 2010, E. Fairchild, pers. comm., as cited in Stevenson et al., 2014). Adults may holdover in spawning areas following spawning before transitioning into deeper water as water temperatures increase (McCracken, 1963, as cited in Stevenson et al., 2014). Although winter flounder in the Gulf of Maine spawn primarily in deeper coastal waters, shallow nearshore benthic habitats are vital nursery areas because the planktonic larvae are transported shoreward before metamorphosing into juveniles and settling to the bottom. Shallow, nearshore habitats and the intertidal zone (Tyler, 1971, as cited in Stevenson et al., 2014) also provide an abundance of shelter and food resources for juvenile winter flounder. Organisms that are found in soft sediments, such as polychaetes and amphipods, are primary prey of juvenile winter flounder (Stevenson et al., 2014).

Field research has demonstrated that recently metamorphosed juvenile winter flounder are most likely to settle on the bottom in areas of fine sediments with low current velocity, yet older YOY juveniles may inhabit a variety of substrates (Curran and Able, 2002, Chant et al., 2000, Stoner et al., 2001, as cited in Stevenson, 2014, 2014). Juvenile winter flounder spend most of their first year of life in shallow-water habitats, migrating into deeper water during the fall when water temperatures decrease (Able and Fahay, 2010, as cited in Stevenson et al., 2014). Field and laboratory studies have demonstrated that in different areas of the eastern seaboard and New England, YOY juveniles may utilize coarse sand or mud with debris present, depending on the size of the individual (Howell, et al., 1999; Phelan et al., 2001, as cited in Stevenson et al., 2014).

NEFMC (1998b) describe the EFH of the adult winter flounder as bottom habitats including estuaries with a substrate of mud, sand, and gravel on Georges Bank, the inshore of the Gulf of Maine, southern New England and the middle Atlantic south to Delaware Bay. Existing conditions where winter flounder adults are found are water temperatures below 77 °F (25 °C), depths from 3 to 328 feet (1 to 100 meters), and salinities between 15 and 33 ppt (NEFMC, 1998b). Polychaetes and crustaceans (mostly amphipods) generally make up the bulk of the adult winter flounder diet. Adult winter flounder in Boston Harbor are highly abundant throughout the year (Jury et al., 1994).

The EFH of spawning adult winter flounder is bottom habitats including estuaries with a substrate of sand, muddy sand, mud, and gravel on Georges Bank, the inshore areas of the Gulf of Maine, southern New England and the middle

Atlantic south to the Delaware Bay. The following conditions generally exist where the spawning adults are found: water temperatures below 77 °F (25 °C), depths less than 20 feet (6 meters), except on Georges Bank where they spawn as deep as 262 feet (80 meters), and salinities between 5.5 and 36 ppt (NEFMC, 1998b). Spawning most commonly occurs during February through June. Spawning adult winter flounder in Boston Harbor are abundant February through May and common during June, July, December and January (Jury et al., 1994).

Yellowtail Flounder (Pleuronectes ferruginea)

Primary reference: Johnson et al., 1999

Boston Harbor has been designated EFH for all life stages of yellowtail flounder (*Pleuronectes ferruginea*), including spawning adults in the seawater salinity zone of greater than 25.0 parts per thousand (ppt) (NEFMC, 1998b). The range of the yellowtail flounder along the Atlantic coast of North America is from the Gulf of St. Lawrence, Labrador and Newfoundland south to the Chesapeake Bay. Yellowtail flounder are common on the offshore shoals such as George's Bank and Stellwagen Bank, as well as eastern Cape Cod and the western Gulf of Maine and are typically found in depths greater than 66 feet (20 meters), up to 4,101 feet (1,250 meters) offshore. Although, this species is typically rare in most North Atlantic estuaries and rivers and generally do not inhabit estuaries or rivers, they are known to be common in Boston Harbor (Johnson et al., 1999).

Yellowtail flounder eggs are pelagic and occur near the surface where water depths range from 33 to 2,475 feet (10 to 750 meters). Most occurrences are where water depths range from 99 to 297 feet (30 to 90 meters). Eggs are deposited at depths from 98 to 295 feet (30 to 90 meters) between March and May (Johnson et al., 1999). The nursery area for this species' eggs is described as mostly oceanic rather than estuarine. NEFMC (1998b) describes EFH for yellowtail flounder as surface waters of Georges Bank, Massachusetts Bay, Cape Cod Bay, and the southern New England continental shelf south to Delaware Bay. Conditions where yellowtail flounder eggs are generally found include the following: sea surface temperatures below 59 °F (15 °C), water depths ranging from 99 to 295 feet (30 to 90 meters) and salinities ranging from 32.4 to 33.5 ppt (NEFMC, 1998b). Yellowtail flounder eggs in Boston Harbor are abundant from May through July and are common during August, September and April (Jury et al., 1994).

Yellowtail flounder larvae are pelagic and occur in the water column where water depths range from 33 to 4,101 feet (10 to 1250 meters). Most occurrences are where water depths range from 33 to 297 feet (10 to 90 meters). Larvae settle between 32.8 to 295 feet (10 to 90 meters) depth, and juveniles occupy between 16 to 246 feet (5 to 75 meters) (Johnson et al., 1999). The nursery area for this species' larvae is described as mostly oceanic rather than estuarine. NEFMC (1998b) describes EFH for yellowtail flounder larvae as surface waters of Georges Bank, Massachusetts Bay, Cape Cod Bay, and throughout the middle Atlantic south to Chesapeake Bay. Conditions where yellowtail flounder larvae are generally found include the following: sea surface temperatures below 63 °F (17 °C), water depths ranging from 33 to 297 feet (10 to 90 meters) and salinities ranging from 32.4 to 33.5 ppt (NEFMC, 1998b). Yellowtail flounder larvae in Boston Harbor are abundant from May through August, are common in September and April and are rare in October (Jury et al., 1994).

Juvenile yellowtail flounder become demersal at lengths of 11.6 to 16 millimeters (standard length). EFH for juveniles in the Gulf of Maine, Georges Bank and the southern New England shelf is bottom habitat with sand or sand and mud substrates at water depths ranging from 66 to 164 feet (20 to 50 meters) with temperatures below 59 °F (15 C) and salinities from 32.4 to 33.5 ppt (NEFMC, 1998b). Prey for juvenile yellowtail flounder include benthic macrofauna such as amphipods, polychaetes, and sand dollars. Juvenile yellowtail flounder in Boston Harbor are abundant from throughout the year (Jury et al., 1994).

Adult yellowtail flounder have substrate and depth preferences similar to juvenile fish. Adult yellowtail flounder prefer to inhabit sand and sandy mud substrates at 66 - 164 feet (20 – 50 meters), where they forage on amphipods and polychaetes (Johnson et al., 1999). Adult yellowtail flounder in Boston Harbor are abundant throughout the year (Jury et al., 1994).

EFH for spawning adults is similar to that for juveniles and adults except that water depths range from 33 to 410 feet (10 to 125 meters) with temperatures below 59 °F (15 °C) (NEFMC 1998b). Spawning adult yellowtail flounder in Boston Harbor are abundant April through August and rare in September (Jury et al., 1994).

Skate EFH Species Life Histories

Little Skate (Leucoraja erinacea)

Primary reference: Packer at al., 2003a

Boston Harbor has been designated EFH for juveniles and adult little skate (*Leucoraja erinacea*) (NEFMC, 1998b). The little skate is distributed from Nova Scotia south to Cape Hatteras, North Carolina. They are a benthic and typically nocturnal species, tending to remain buried in depressions on the seafloor during the day and becoming more active at night. Little skate occur along the entire inshore coastline of the Gulf of Maine (McEachran and Musick, 1975, McEachran, 2002, as cited in Stevenson et al., 2014). Little skate are generally found on sandy or gravel bottoms, but also occur on mud (McEachran, 2002, as cited in Stevenson et al., 2014). Individuals on the Maine coast were found in the rocky subtidal zone, and in sandy areas further south in New Hampshire.

Juvenile little skate EFH includes gravelly or sandy substrates or mud and water temperatures between 41 and 59 °F (5 and 15 °C). During spring and fall most juveniles were found at water depths less than 230 feet (70 meters). Jury et al., (1994) does not provide temporal abundance data for juvenile little skate, in Boston Harbor.

Over sandy bottom habitat, little skate are common at all five life stages and also use this habitat for spawning (Stevenson et al., 2014). Shallow gravel and cobble habitat is commonly inhabited by juvenile and adult little skate as they grow and mature. Shallow unvegetated mud habitats may be inhabited by YOY juveniles, older juveniles and adults (Stevenson et al., 2014).

Adult little skate are found to occur on gravelly or sandy substrates or mud, from shore to 449 feet (137 meters) offshore and most commonly at water depths less than 240 to 299 feet (73 to 91 meters). However, EFH for adults includes temperatures from 36 to 59 °F (2 to 15 °C) (NEFMC, 2009). There is no salinity data available for little skate in Massachusetts Bay. Prey items for adults include decapod crustaceans and amphipods, with isopods, bivalves, and fishes also playing a minor role in their diet. Jury et al., (1994) does not provide temporal abundance data for adult little skate, in Boston Harbor.

Thorny Skate (Amblyraja radiata)

Primary reference: Packer et al., 2003b

Boston Harbor has been designated EFH for juvenile thorny skate (*Amblyraja radiata*) (NEFMC, 1998b). The thorny skate is a benthic species that can be found in the western Atlantic Ocean from western Greenland south to North Carolina. Thorny skates are one of the most abundant skate species in the Gulf of Maine, widespread from Gulf of St. Lawrence to Cape Hatteras.

Thorny skates occupy a variety of substrates, including sand, gravel, shell hash, pebbles and soft mud. Some studies have identified seasonal migrations of this species, while others suggest they are more sedentary and reside year-round. In Massachusetts surveys, juveniles tend to prefer depths from 19.5 to 279 feet (6 to 85 meters) in the spring and fall, and temperatures of 39.2 to 42.8 °F (4 to 6 °C) in the spring and 42.8 to 48.2 °F (6 to 9 °C) in the fall. Juvenile thorny skate generally outcompete the smooth skate, as they are opportunistic feeders described as “demersal”, “crab” and “shrimp/amphipod” predators. They feed on hydrozoans, polychaetes, octopus, copepods, isopods, amphipods, crabs and shrimp. Throughout their range they prefer temperatures between 39.2 to 48.2 °F (4 to 9 °C) and depths from 59 to 3937 feet (18 to 1200 meters). Jury et al., (1994) does not provide temporal abundance data for juvenile thorny skate, in Boston Harbor.

Winter Skate (Leucoraja ocellata)

Primary reference: Packer et al., 2003c

Boston Harbor has been designated EFH for juvenile and adult winter skate (*Leucoraja ocellata*) (NEFMC, 1998b). The winter skate can be found from south coast of Newfoundland to Cape Hatteras, North Carolina. It is a nocturnal, benthic species, often remaining buried in depressions in the seafloor during the day and becoming active at night. Winter skate are the second most common skate in the Gulf of Maine, next to the little skate. They are common throughout the Gulf of Maine including the coast of Massachusetts and Massachusetts Bay.

Juvenile winter skate EFH includes gravelly or sandy substrates or mud, water temperatures between 30 and 70 °F (-1 and 21ºC), with most found from 39 to 61 °F (4 to 16ºC) and are found from shoreline to 1,312 feet (400 meters) offshore and at water depths less than 364 feet (111 meters) (NEFMC, 2009). Prey items for juvenile winter skate includes polychaetes and amphipods, with decapods, isopods, bivalves, and fish also playing a minor role in their diet. Jury et al., (1994) does not provide temporal abundance data for juvenile winter skate, in Boston Harbor.

Adult winter skate are distributed around Cape Cod and Massachusetts Bays. They exhibit a seasonal movement towards the shore in autumn and offshore in the summer. During surveys it has been observed that juvenile winter skate are much more common in the spring and fall versus the abundance of adults. Eggs are deposited from the fall through January in southern New England, and mating activity may take place all year. Adults typically inhabit sandy and gravelly bottoms but will forage in muddy substrates as well. Prey includes polychaetes, amphipods, decapods, isopods and bivalves (Parker et al., 2003, as cited in Stevenson et al., 2014). In Massachusetts, adult winter skate is most often found in depths from 19 - 82 feet (6 - 25 meters) and are found in waters ranging from 6 – 12 ºC in the spring and 5 - 19 ºC in the fall (Packer et al., 2003c).

Invertebrate EFH Species Life Histories

Atlantic Surfclam (Spisula solidissima)

Primary reference: NEFMC, 2017

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated juvenile and adult Atlantic surfclam (*Spisula solidissima*). However, the egg and larval life stages have been given a designation of “n/a” in Massachusetts Bay indicating there is no data available on the designated life stages, or those life stages are not present in the species’ reproductive cycle. The Atlantic surfclam bivalve mollusks found in continental shelf waters ranging from the Gulf of St. Lawrence and Newfoundland to Cape Hatteras (NEFMC, 2017).

Juvenile and adult Atlantic surfclam are most commonly found in depths ranging from 32 to 131 feet (10-40 meters) in water with medium or fine grain sand or silty fine sand (NEFMC, 2017). They are found within the top 3 feet (1 meter) of substrate (MAFMC, 1998).

Longfin Inshore Squid (Loligo pealeii)

Primary reference: Jacobson, 2005

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated juvenile and adult longfin inshore squid (*Loligo pealeii*). The longfin inshore squid is a schooling species mollusk that occurs in slope waters near the continental shelf from Newfoundland to the Gulf of Venezuela and occurs in commercial abundance from southern Georges Bank to Cape Hatteras.

Juveniles inhabit the upper 33 feet (10 meters) of the water column in areas with water depths of 164 to 492 feet (50 to 150 meters). During spring surveys and autumn surveys in Massachusetts coastal waters, juveniles have been found in temperatures ranging from 41 to 62 °F (5 to 17 °C), with most at 50 to 57 °F (10 to 14 °C) and at depths between

20 and 213 feet (6 and 65 meters), with most being within 20 feet to 82 feet (6 to 25 meters). During fall they have been found in temperatures ranging from 41 to 72 °F (5 to 22 °C) and at depths between 3 and 279 feet (1 and 85 meters), with most being within 20 to 82 feet (6 to 25 meters).

Adult longfin inshore squid inhabit the continental shelf and upper continental slope to depths of 1312 feet (400 meters), but depth varies seasonally. In spring they occur at depths of 361 to 656 feet (110 to 200 meters) in summer and autumn they inhabit inshore waters as shallow as 20 to 92 feet (6 to 28 meters), and in winter they inhabit offshore waters to depths of 1198 feet (365 meters). They are found on mud or sand/mud substrate, at surface temperatures ranging from 48 to 70 °F (9 to 21 °C), and bottom temperatures ranging from 46 to 61 °F (8 to16 °C). Adults, like juveniles, migrate up and down in the water column in response to light conditions and the importance of off-bottom habitat is unknown. Longfin inshore squid can spawn year-round, but usually occur from May to August in New England waters (Cargnelli *et al.,* 1999b).

Northern Shortfin Squid (Illex illecebrosus)

Primary reference: Hendrickson and Holmes, 2004

Within the quadrant of Massachusetts Bay encompassing the Project area, EFH has been designated for adult life stages of northern shortfin squid (*Illex illecebrosus*).

During the spring, adults are most common between 394 to 1,312 feet (120 to 400 meters). During the fall they were most common between 98 and 459 feet (30 and 140 meters) and also between 656 and 984 feet (200 and 300 meters).

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Appendix H
Technical Report: Air Quality

Draw One Bridge Replacement

Draft Environmental Assessment

Air Quality Technical Report

December 4, 2024

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TABLES

APPENDICES

List of Acronyms and Abbreviations

40 CFR	Chapter 40 of the Code of Federal Regulations
310 CMR	Title 310 of the Code of Massachusetts Regulations
BRMPO	Boston Region Metropolitan Planning Organization
CAA	Clean Air Act
CAFÉ	Corporate Average Fuel Economy
CFR	Code of Federal Regulations
CH4	methane
CO	carbon monoxide
CO2	carbon dioxide
CPA	Comprehensive Plan Application
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	greenhouse gas
HFC	hydrofluorocarbons
hp	horsepower
LMP	Limited Maintenance Plan
LPA	Limited Plan Application
LRTP	Long Range Transportation Plan
MAAQS	Massachusetts ambient air quality standards
MassDEP	Massachusetts Department of Environmental Protection
MBTA	Massachusetts Bay Transportation Authority
MMBtu/hr	million British Thermal Units per hour
MPO	Metropolitan planning organization
MOVES	Motor Vehicle Emission Simulator
MSAT	Mobile source air toxic
NAA	Nonattainment area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NSR	New Source Review
NO2	nitrogen dioxide
NOX	nitrogen oxides
NSR	New Source Review
N2O	nitrous oxide
O3	ozone
Pb	lead
PM	particulate matter
PM10	particulate matter with a diameter ≤ 10 microns
PM2.5	particulate matter with a diameter ≤ 2.5 microns
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
SF6	sulfur hexafluoride
SIP	State Implementation Plan
SO2	sulfur dioxide
TIP	Transportation Improvement Plan

TPY	tons per year
µg/m3	micrograms per cubic meter
U.S.	United States
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USEPA	U.S. Environmental Protection Agency
VMT	Vehicle Miles Traveled
VOC	volatile organic compound(s)

1.0 Introduction

The MBTA is seeking funds to be provided through the Federal Transit Administration (FTA) and the Federal Railroad Administration (FRA) to demolish and replace the superstructure and substructures of the two North Station Draw One Bridge spans and approach spans over the Charles River, as well as the adjoining Signal Tower A, and upgrade the track network, communications and signaling systems. The two remaining operational bridges are rolling lift bridges and each carry two tracks. Portions of two additional bridges that were partially demolished are located to the west of the operational bridges. The Proposed Project includes the replacement of the original four bridges with three vertical lift bridge structures. Each vertical lift bridge will support two tracks (for a total of six tracks) over the Charles River.

This Air Quality Technical Report has been prepared in support of the National Environmental Policy Act (NEPA) Environmental Assessment (EA) being prepared for the Proposed Project.

2.0 Applicable Regulations

The Federal Clean Air Act (CAA) is the overarching statute regulating air quality in the United States. Among other things, it requires the U.S. Environmental Protection Agency (USEPA) to set the National Ambient Air Quality Standards (NAAQS), designate areas that are not in attainment of the NAAQS, and subsequently approve State Implementation Plans (SIP) for achieving those standards. The CAA Amendments of 1990 and the Final Transportation Conformity Rule [40 code of federal regulations (CFR) Parts 51 and 93] direct the USEPA to implement environmental policies and regulations that ensure acceptable levels of air quality. In addition to the CAA, other major regulations within the Project Site (shown on **Figure 2-1**) that apply to the potential air quality impacts of transportation projects include:

- The General Conformity Rule, 40 CFR Part 93 Subpart B; and
- Air Pollution Control, Code of Massachusetts Regulations (CMR) 310 CMR 7.00.

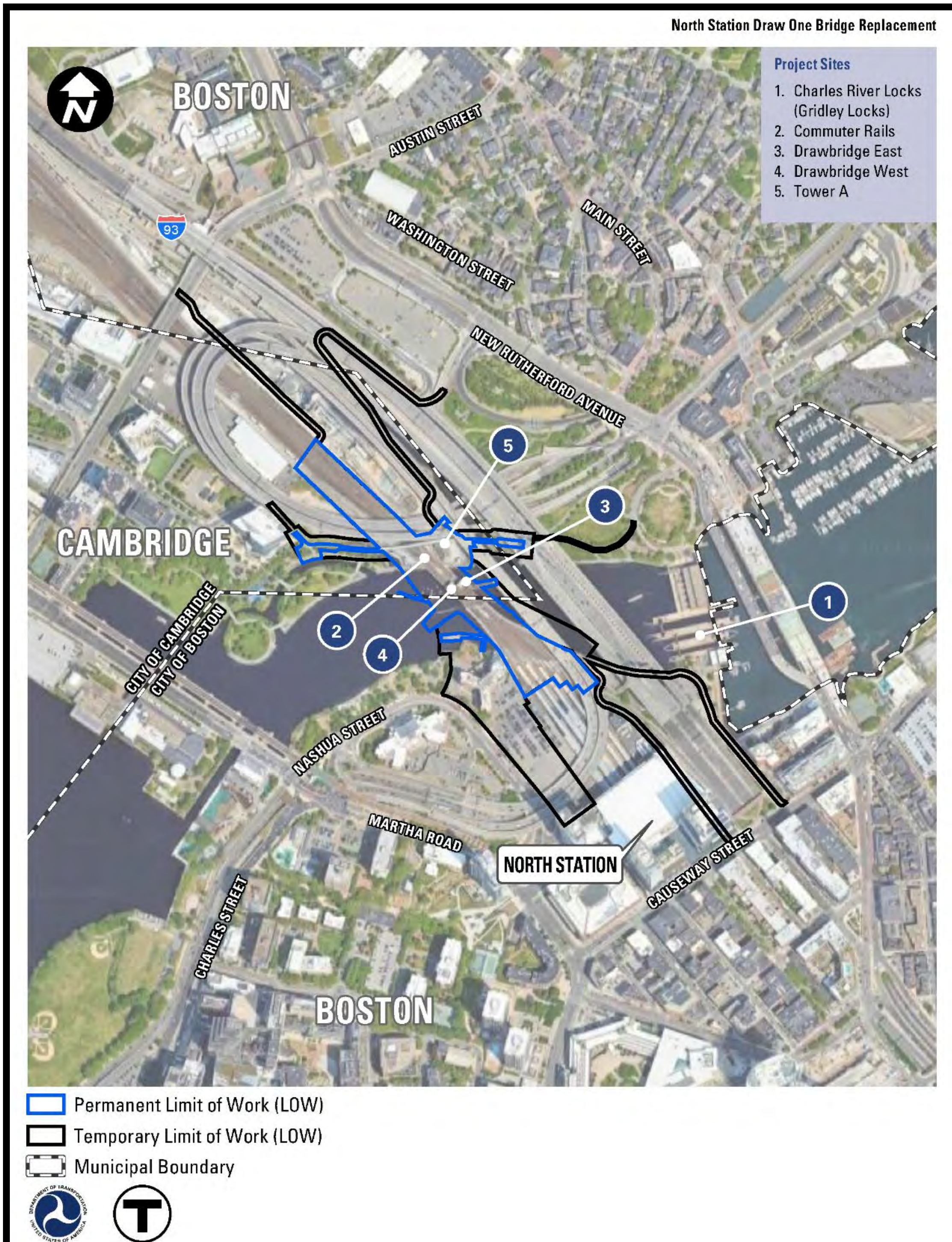

Figure 2-1. Project Site Boundary

2.1 Massachusetts

The Massachusetts Department of Environmental Protection (MassDEP) is the primary authority for ensuring that federal (and state) air quality regulations are met in Massachusetts. MassDEP is responsible for air quality monitoring throughout the state as well as the development and implementation of the SIP. MassDEP also has jurisdiction over the permitting of stationary emission sources, the regulation of mobile source emissions, and air programs related to criteria pollutants.

The management of air quality conditions in Massachusetts is the responsibility of federal, state, regional, and local governmental air quality regulatory agencies. The Commonwealth of Massachusetts administers the Federal Prevention of Significant Deterioration (PSD) program under 40 CFR 52.21 pursuant to a delegation agreement with USEPA. MassDEP also administers its New Source Review (NSR) program under 310 CMR 7.00 Appendix A.

Any facility or emission unit with the potential to increase the emissions of any single air contaminant by 10 tons per year (TPY) or more is required to submit a Comprehensive Plan Application (CPA) under 310 CMR 7.02(5)(a)1. Any natural gas-fired fuel utilization equipment, excluding internal combustion machinery such as reciprocating engines, with the potential to increase emissions of any single air contaminant by an amount equal to or greater than 1 TPY, and with a rated maximum heat input capacity of greater than or equal to 40 million British Thermal Units per Hour (MMBtu/hr), is also required to obtain CPA approval prior to construction under 310 CMR 7.02(5)(a)2. However, emissions from units installed in accordance with the Industry Performance Standards in 310 CMR 7.26 are not included when calculating an increase in potential emissions for purposes of determining applicability under 310 CMR 7.02(5)(a)1 and 2.

Any fuel utilization equipment, excluding internal combustion engines such as reciprocating engines, with a rated maximum heat input capacity of less than 10 MMBtu/hr and utilizing gas, is exempt from Massachusetts Plan Approval requirements in accordance with 310 CMR 7.02(2)(b)15.

2.2 Federal Agencies

Under the Federal CAA, the USEPA establishes the guiding principles and policies for protecting air quality conditions throughout the United States. The USEPA's primary responsibilities in this area include promulgating the NAAQS and approving SIPs, plans that demonstrate compliance with the NAAQS. The CAA requires states to develop, update and maintain SIPs that define attainment timeframes or milestones, area-wide emissions inventories, budgets, control strategies, and mitigation strategies.

The FRA is the primary agency involved in, and responsible for, ensuring that air quality impacts associated with proposed railroad projects adhere to the reporting and disclosure requirements of the National Environmental Policy Act (NEPA) as well as the General Conformity rule of the CAA. However, projects funded and approved by the FTA are subject to the transportation conformity regulations at Subpart A of 40 CFR Part 93. A transportation conformity applicability analysis is provided in **Section 3.0**.

General Conformity may also apply for transportation projects when non-road (i.e., construction equipment) emissions are excluded from an applicable SIP. A General Conformity applicability analysis is required for the Proposed Project under Section 176(c) of the CAA, since federal permits will be issued for the Proposed Project by the United States Coast Guard (USCG) and United States Army Corps of Engineers (USACE) and funding is being sought from FRA. An applicability analysis determines whether a Federal action (such as issuing a permit) must be supported by a General Conformity determination. As described in 40 CFR 93.153, the applicability analysis may find that a conformity determination is not required if, among other things, the Federal action:

- is part of a continuing response to an emergency or disaster;
- is covered by an existing transportation conformity determination;
- will result in no emissions increase or an increase in emissions that is clearly de minimis;
- is presumed to conform (e.g., based on comparisons with other projects); or
- will result in total direct and indirect emissions of the criteria pollutants or precursors below the de minimis rates contained in 40 CFR 93.153(b).

An applicability analysis has been undertaken for the Proposed Project in **Section 3.0**. Based on that analysis, the Proposed Project's emissions will be de minimis, and a General Conformity determination will therefore not be required.

2.3 Metropolitan Planning Organizations

Federally designated Metropolitan Planning Organizations (MPO) are required by law to demonstrate that the Long-Range Transportation Plan (LRTP) and Transportation Improvement Plan (TIP) conform to the transportation emission budgets set forth in the SIP for each state. Conformity requirements are met if emissions generated from the projects included in the TIP and LRTP are equal to or less than the emission budgets in the SIPs.

The Boston Region Metropolitan Planning Organization (BRMPO) is the MPO for the Project Site. The BRMPO routinely performs air quality conformity determinations before it endorses a Long-Range Transportation Plan or Transportation Improvement Program, and at other times, as required by State and Federal regulations under the CAA Amendments of 1990.

MassDEP reviews all BRMPO plans, programs, and projects annually for consistency with the SIP for meeting Federal air quality standards—as required under both Federal (40 CFR Part 93) and Massachusetts (310 CMR 60.03) regulations. This ensures that Federal funds are going only to those transportation activities consistent with air quality goals under the CAA.

2.4 National and Massachusetts Ambient Air Quality Standards

Pursuant to CAA requirements, the USEPA establishes, enforces, and periodically reviews the NAAQS. NAAQS are set to safeguard public health and environmental welfare against the detrimental impacts of outdoor air pollution and are defined as primary and/or secondary standards. Primary NAAQS are health-based standards geared toward protecting sensitive or at-risk portions of the population such as asthmatics, children, and the elderly. Secondary NAAQS are welfare oriented and are designed to prevent decreased visibility and damage to animals, vegetation, and physical structures. NAAQS have been established for six common air pollutants, referred to as criteria pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter (PM), and sulfur dioxide (SO_2). PM includes particulate matter with a diameter of 10 microns or less (PM_{10}) and a diameter of 2.5 microns or less (PM2.5). Nitrogen oxides (NO_x) and volatile organic compound (VOC) emissions are precursors to ozone formation. The NAAQS are summarized in **Table 1-1**. **Table 1-1** also summarizes the current Ambient Air Quality Standards for the Commonwealth of Massachusetts as promulgated in Section 6, Title 310 of the Code of Massachusetts Regulations (310 CMR) because the standards are identical with the exception of annual PM2.5, which was recently updated by USEPA with an effective date of May 6, 2024.

Table 1-1. National Ambient Air Quality Standards (NAAQS) and Massachusetts Ambient Air Quality Standards (MAAQS)

Pollutant	Primary/Secondary	Averaging Time	Level
Carbon Monoxide (CO)[a]	Primary	8-hour	9 ppm
	Primary	1-hour	35 ppm
Lead (Pb)[b]	Primary and Secondary	Rolling 3-month average	0.15 µg/m^3
Nitrogen Dioxide (NO_2)[c]	Primary	1-hour	100 ppb
	Primary and Secondary	Annual	53 ppb[d]
Ozone (O_3)[e]	Primary and Secondary	8-hour	0.070 ppm[f]
$PM_{2.5}$[g]	Primary	Annual	9 µg/m^3
	Primary (MAAQS only)	Annual	12 µg/m^3
	Secondary	Annual	15 µg/m^3
	Primary and Secondary	24-hour	35 µg/m^3
PM_{10}[h]	Primary and Secondary	24-hour	150 µg/m^3
Sulfur Dioxide (SO_2)[i]	Primary	1-hour	75 ppb[j]
	Secondary	3-hour	0.5 ppm

Sources: USEPA, National Ambient Air Quality Standards (NAAQS), 2024, https://www.epa.gov/criteria-air-pollutants/naaqs-table and Code of Massachusetts Regulations, 2024, https://www.mass.gov/doc/310-cmr-6-ambient-air-quality-standards-for-the-commonwealth-of-massachusetts/download.

Notes: ppb = parts per billion, ppm = parts per million, and µg/m^3 = micrograms per cubic meter of air.

[a] CO 1-hour and 8-hour standard not to be exceeded more than once per year.

[b] Lead rolling 3-month average standard not to be exceeded. Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[c] NO_2 1-hour standard represents the 98th percentile of 1-hour daily maximum concentrations, averaged over three years.

[d] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is presented for the purpose of clearer comparison to the 1-hour standard.

[e] Ozone 8-hour standard represents the annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years.

Table 1-1. National Ambient Air Quality Standards (NAAQS) and Massachusetts Ambient Air Quality Standards (MAAQS)

Pollutant	Primary/Secondary	Averaging Time	Level
[f] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.			
[g] $PM_{2.5}$ annual standards represent annual mean, averaged over three years. $PM_{2.5}$ 24-hour standard represents 98th percentile, averaged over three years.			
[h] PM_{10} 24-hour standard not to be exceeded more than once per year on average over three years.			
[i] SO_2 1-hour standard represents 99th percentile of 1-hour daily maximum concentrations, averaged over three years. SO_2 3-hour standard not to be exceeded more than once per year.			
[j] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)).			

2.4.1 Attainment Status

The USEPA designates areas as either meeting (attainment) or not meeting (nonattainment) the NAAQS. An area with measured pollutant concentrations which are lower than the NAAQS is designated as an attainment area and an area with pollutant concentrations that exceed the NAAQS is designated as a nonattainment area. Once a nonattainment area meets the NAAQS and the additional re-designation requirements in the CAA, the USEPA will designate the area as a maintenance area. Ozone nonattainment areas are further classified as extreme, severe, moderate, or marginal. An area is designated as unclassifiable when there is a lack of sufficient data to form the basis of an attainment status determination. The CAA requires states to develop a general plan to attain and/or maintain the primary and secondary NAAQS in all areas of the country and to develop a specific plan to attain the standards for each area designated nonattainment area (NAA) for a NAAQS.

When the USEPA designates an NAA, states are required to develop and implement a SIP. The SIP outlines how the state will achieve air quality that meets the NAAQS under the deadlines established by the CAA, followed by a plan for maintaining attainment status once the area has achieved attainment (and is then classified as a "maintenance area"). The SIP also compiles the state's air quality control plans and rules that are approved by USEPA. Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP.

The attainment classifications for each of the USEPA-designated areas[1] in the Project Site[2] are provided in **Table 1-2**.

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[1] USEPA, Green Book for Middlesex and Suffolk Counties, MA, https://www.epa.gov/green-book.
[2] The state of dispersion science and health effects of GHG emissions have not sufficiently advanced to accurately consider the microscale level of mobile sources. For this reason, this analysis does not determine a Local Study Area for GHG emissions for mobile sources and only considered them on a regional scale. GHG emissions from the Proposed Project would be due to fossil fuel combustion of vehicles, diesel trains, potential change in GHG emissions

Table 1-2. Middlesex County and Suffolk County Attainment Classifications for Project Site

NAAQS	Attainment	Nonattainment	Maintenance
Ozone (1-hour, 1979) - Revoked			X
Ozone (8-hour, 1997) - Revoked			X
Ozone (8-hour, 2008) - Revoked	X		
Ozone (8-hour, 2015)	X		
PM10 (1987)	X		
PM2.5 (2012)	X		
CO (1971)			X
Source: USEPA Greenbook, 2024. Note: Classifications are identical for Middlesex and Suffolk Counties.			

Table 1-3 presents the background concentrations of pollutants for the Project Site based on air quality monitoring from 2020 to 2022. The values describe the air quality status of a given location relative to the NAAQS. These values provide a way to designate and classify nonattainment areas and to assess progress toward meeting the NAAQS. The monitoring locations were selected for the most conservative representation of background levels for each of the NAAQS within the Project Site.

Table 1-3. Regional Background Air Quality Concentrations, 2020-2022

Pollutant	Units	Averaging Period	2020	2021	2022	Monitoring Location	NAAQS
CO	ppm	8-hour	1.1	1.0	1.0	Boston[1], MA	9
CO	ppm	1-hour	1.6	1.5	1.6	Boston[1], MA	35
Pb	μ/m³	3-month	0.0072	0.0042	0.0091	Boston[1], MA	0.15
NO_2	ppb	1-hour	42	44	46	Boston[1], MA	100
NO_2	ppb	Annual	9.3	9.6	10.0	Boston[1], MA	53
O_3	ppm	8-hour	0.057	0.060	0.060	Boston[1], MA	0.070

from implementation of the project is calculated for the same sources and categories as identified for the analysis of local operational emissions.

Table 1-3. Regional Background Air Quality Concentrations, 2020-2022

Pollutant	Units	Averaging Period	2020	2021	2022	Monitoring Location	NAAQS
$PM_{2.5}$	μ/m³	Annual	5.8	7.9	6.5	Boston[1], MA	9
$PM_{2.5}$	μ/m³	24-hour	14.3	18.2	14.7	Boston[1], MA	35
PM_{10}	μ/m³	24-hour	25	30	31	Boston[1], MA	150
SO_2	ppb	1-hour	2.0	2.1	3.1	Boston[1], MA	75

Source: Massachusetts Air Quality Reports from 2019-2021, Massachusetts Department of Environmental Protection – Air Assessment Branch.

[1]Boston, MA Monitor, Harrison Avenue (EPA ID 25-025-0042)

Note: (ppm) – parts per million; (ppb) parts per billion; (μ/m³) micrograms per meter cubed

As shown in **Table 1-3**, the monitored regional background concentrations are below the NAAQS.

3.0 Conformity

The CAA requires that a SIP be prepared for each nonattainment area and a maintenance plan be prepared for each former nonattainment area that subsequently demonstrated compliance with the standards. The SIP includes the state's air quality control plans and rules approved by USEPA. Under Section 176(c) of the CAA, Federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the project conforms to the applicable SIP. This is intended to eliminate or reduce the severity and number of NAAQS violations and to achieve expeditious attainment. The CAA defines conformity as:

A. Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of NAAQS violations and achieving expeditious attainment of such standards; and
B. that such activities will not:
    i. cause or contribute to any new violation of any NAAQS in any area;
    ii. increase the frequency or severity of any existing violation of any NAAQS in any area; and
    iii. delay timely attainment of any NAAQS, any required interim emission reductions, or other milestones in any area.

The conformity requirements of the CAA and regulations promulgated thereunder limit the ability of Federal agencies to assist, fund, permit, and approve projects in non-attainment areas or maintenance areas that do not conform to the applicable SIP. Conformity is regulated under two categories—Transportation Conformity and General Conformity.

3.1 Transportation Conformity

Section 176(c) of the CAA of 1977, as amended (42 USC § 7506) forbids any department, agency, or instrumentality of the Federal government from engaging in, supporting in any way or providing financial assistance for, licensing or permitting, or approving any activity which does not conform to a SIP after the activity has been approved or promulgated. As defined in Section 176(c)(1), conformity to an implementation plan means conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards.

Projects funded and approved by the FTA are subject to the transportation conformity regulations of Subpart A, 40 CFR Part 93. The BRMPO is the MPO for the Project Site. The Project Site is within the area subject to the Boston Metropolitan Area Carbon Monoxide Limited Maintenance Plan (LMP). An LMP is a maintenance plan that USEPA has determined meets its LMP policy criteria for a given NAAQS and pollutant. To qualify for a LMP an area must, for example, have a design value that is significantly below a given NAAQS, and it must be reasonable to expect that a NAAQS violation will not result from any level of future motor vehicle emissions growth.

With the LMP in place, the Project Site is within an area classified as CO maintenance. No regional air quality analysis is required in LMP areas, as emissions may be treated as essentially not constraining for the length of the maintenance period because it is unreasonable to expect that such areas will experience enough growth during the 10-year LMP duration to trigger a violation of the carbon monoxide NAAQS. Therefore, in areas with approved LMPs, Federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the "budget test." All other transportation conformity requirements under 40 CFR 93.109(b) continue to apply in limited maintenance areas, including conformity determinations based on carbon monoxide hot spot analyses under 40 CFR 93.116. Under the USEPA guidance document for LMP, Federal actions in the LMP area requiring conformity determinations under the Transportation Conformity rule satisfy the emissions "budget test" required in the conformity rule in 40 CFR sections 93.118, 93.119, and 93.120.11. Therefore, the Proposed Project is presumed to conform with the CO LMP, and thus CO de minimis levels will not apply for the Proposed Project under Transportation Conformity.

The Federal transportation conformity rule in 40 CFR 93.123(a) includes the following requirements for demonstrating compliance with CO "hot spot" assessments:

1. The demonstrations required by 40 CFR 93.116 ("Localized CO, PM_{10}, and $PM_{2.5}$ violations") must be based on quantitative analysis using the applicable air quality models, databases, and other requirements specified in 40 CFR part 51, Appendix W (Guideline on Air Quality Models). These procedures shall be used in the following cases, unless different procedures developed through the interagency consultation process required in § 93.105 and approved by the USEPA Regional Administrator are used:
    i. For projects in or affecting locations, areas, or categories of sites which are identified in the applicable implementation plan as sites of violation or possible violation;

ii. For projects affecting intersections that are at Level-of-Service D, E, or F, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes related to the project;

iii. For any project affecting one or more of the top three intersections in the nonattainment or maintenance area with highest traffic volumes, as identified in the applicable implementation plan; and

iv. For any project affecting one or more of the top three intersections in the nonattainment or maintenance area with the worst level of service, as identified in the applicable implementation plan.

2. In cases other than those described in paragraph (a)(1) of this section, the demonstrations required by § 93.116 may be based on either:

    i. Quantitative methods that represent reasonable and common professional practice; or

    ii. A qualitative consideration of local factors, if this can provide a clear demonstration that the requirements of § 93.116 are met.

The Project is rail-only and does not include construction on any roadway intersections. As such, the requirements of 40 CFR 93.123(a) are not applicable. Thus, the Proposed Project requires a qualitative demonstration of local factors per 40 CFR 93.123(2)(ii).

As demonstrated in **Section 4**, the results of the local scale emissions for the Build Alternative are below the federal Transportation Conformity de minimis levels for CO. No construction will occur on local roadways or public parking spaces as part of the Proposed Project. The Proposed Project has the potential to reduce future regional vehicle miles traveled (VMT) compared with existing conditions, as upgrades to the rail system may cause vehicular users to switch to rail. Since the Proposed Project does not include at-grade railroad crossings of roadways, walkways, or bike paths in the Project Site, there will be no permanent impacts to vehicular traffic, pedestrians, or cyclists.

For the 2040 No Action and Build Alternatives, localized Project-related emissions will be substantially reduced from existing conditions due to implementation of USEPA's vehicle and fuel regulations[3]. Additionally, the Build Alternative will decrease regional CO emissions compared to existing conditions, as discussed in **Section 4.2**. Therefore, MBTA expects any local CO impacts to be minor and the requirements of 40 CFR 93.123(a) are met.

3.2 General Conformity

If construction equipment non-road emissions are considered to not be included in the SIP (transportation conformity covers on-road emissions), General Conformity may also apply. As the Proposed Project would require a bridge permit from the USCG, a waterway permit from the USACE, and is seeking funding from the FRA, a General Conformity applicability analysis is required under Section 176(c) of the CAA since the Proposed Project would require Federal permits from agencies other than the FTA. An applicability analysis is the process of determining

[3]https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-passenger-cars-and

whether a Federal action (such as issuing a permit) must be supported by a General Conformity determination. As described in 40 CFR Part 93.153, the applicability analysis may find that a conformity determination is not required if, among other things, the Federal action:

- Is part of a continuing response to an emergency or disaster;
- Is covered by an existing transportation conformity determination;
- Will result in no emissions increase or an increase in emissions that is clearly de minimis;
- Is presumed to conform (e.g., based on comparisons with other projects); or
- Will result in total direct and indirect emissions of the criteria pollutants or precursors that is less than the de minimis rates contained in 40 CFR § 93.153(b). For the Project Site, the applicable de minimis emission thresholds are 100 tons per year of carbon monoxide.

Actions taken by FRA, USACE, and USCG, including a decision to fund or approve the Proposed Project, are subject to General Conformity; therefore, General Conformity would apply to the Proposed Project. A General Conformity Applicability Analysis determines whether emissions (e.g., CO, NO_x, SO_2, PM_{10}, $PM_{2.5}$) from a Federal action will exceed certain thresholds and be subject to General Conformity requirements. If General Conformity applies, then a separate analysis, referred to as a Conformity Determination, is required to document that the Federal action conforms to the applicable SIP for the nonattainment or maintenance area.

As part of the General Conformity Applicability Analysis, the total of direct and indirect emissions of nonattainment pollutants or designated precursors from a proposed Federal action is calculated and compared to annual general conformity applicability emissions thresholds in 40 CFR Part 93.153. The General Conformity applicability thresholds are listed in 40 CFR Part 93.153(b)(1) for nonattainment areas and 40 CFR Part 93.153(b)(2) for maintenance areas. If emissions are below the applicability thresholds, then the emissions are considered de minimis, General Conformity requirements do not apply, and a General Conformity Determination is not required.

The Project Site is located in an area that is part of the Boston Metropolitan Area Carbon Monoxide maintenance area. The CO emissions were calculated in Section 4.2.6 for comparison to the General Conformity applicability thresholds listed in 40 CFR Part 93.153(b)(2). **Table 1-8** provides a detailed summary of the estimated annual emissions with comparisons to the General Conformity de minimis emissions thresholds. As shown, the annual CO emissions are well below de minimis emission thresholds. As such, a General Conformity determination is not required.

4.0 Air Quality Assessment

4.1 No Action Alternative

Under the No Action Alternative, the Proposed Project would not occur and interstate highway traffic along the I-93 corridor would presumably continue to increase based on population growth. Existing air quality as discussed in Section 2.4.1, compared to future predicted air quality without the Project, would be affected by two key factors: regional growth and air quality regulatory actions. Regional growth, such as increased residential development and density, along with additional industry, results in more and greater sources of air emissions. These increases in air emissions are offset by transportation projects as discussed in Section 4.2 for the Project, which generally reduce traffic congestion, thus minimizing local effects for emissions, as well as vehicle regulatory programs that control the level of emissions from on-road and non-road vehicles.

4.2 Build Alternative

The existing Draw 1 Bridges form a critical physical bottleneck for daily train movements into and out of North Station. The bridges are subject to malfunction, while the four tracks carry limited capacity and constrain operational resiliency in the wake of service disruptions. A February 2023 MBTA ridership report estimated existing ridership for the train lines at North Station at approximately 37,300 passengers per day and projected that it would increase to 46,100 passengers per day by the year 2040 with the Build scenario.

No construction is proposed on local roadways or public parking spaces as part of the Proposed Project. The Proposed Project has the potential to reduce future regional VMT compared with existing conditions by creating a more reliable rail system that could convert current vehicular users to rail. The Build Alternative will not increase or expand rail capacity until other infrastructure improvements are implemented by MBTA. As such, the Build Alternative will not result in any new or additional train engine emissions.

4.2.1 Criteria and Toxic Air Pollutants

This section examines the impact of criteria and toxic air pollutants at both the local and regional levels. Pollutants that can be traced principally to motor vehicles, construction equipment, and diesel locomotives are relevant to the evaluation of the Project's impacts. These pollutants include CO, VOC, NO_x, O_3, SO_2, PM_{10}, $PM_{2.5}$. Transportation sources account for a small percentage of regional emissions of Pb; thus, a detailed analysis is not required. The Proposed Project's direct and indirect impacts on air quality are considered, including post-construction operations mobile sources and construction emissions. While mobile source air toxics (MSAT) and greenhouse gases (GHG) are not criteria pollutants and are not subject to conformity requirements, they are also considered in this section. Potential operational air quality effects of the Proposed Project include:

- Changes in rail-related emissions due to an increase in daily ridership from the existing condition; and
- Changes in the overall regional emissions due to travelers shifting from one mode of transportation to another (i.e., from vehicles to commuter rail).

Regional effects on air quality were evaluated based on both the direct and indirect emissions from the operation of the Proposed Project. The proposed improvements have the potential to affect regional air quality by direct emissions. Railroad activity releases emissions, primarily from diesel combustion during train operations. Emissions of CO, NO_x and $PM_{2.5}$ from diesel combustion contribute to ambient concentrations of CO, NO_2, and $PM_{2.5}$. Per USEPA fuel regulations, emissions of SO_2 from diesel combustion are negligible due to their very low sulfur content. As such, SO_2 emissions from diesel trains are typically not expected to significantly contribute to ambient concentrations of SO_2. A localized adverse effect occurs if a project causes a localized air emission increase that has the potential to cause violation of the NAAQS or causes or contributes to a substantial air toxic emission increase that exposes sensitive populations to a high level of air toxic concentrations. The local emissions assessment for the Proposed Project considered the comparison of operational emissions from the Build Alternative to the Existing conditions and No Action Alternative, as described below. Emissions from diesel engine locomotives were compared using existing and predicted train schedules provided by MBTA.

Operation of the Build Alternative would generally result in a long-term net benefit to air quality by reducing emissions of criteria pollutants and air toxics. Several factors would contribute to the potential long-term effect on air quality. These include the forecasted ridership volume of the rail system and the subsequent vehicle emission change due to the shift of commuter travel mode from on-road vehicles to trains. Long-term regional effects of the Build Alternative were evaluated based on the total direct and indirect emissions associated with the operation of the Proposed Project.

4.2.2 Locomotive Emissions

USEPA established a comprehensive program (40 CFR Part 93) to reduce emissions from locomotives, including line-haul, switch, and passenger engines. The program set emission standards with applicability dependent on the date a locomotive is first manufactured. For switch engine locomotives, the first set of standards (Tier 0) applies to most locomotives originally manufactured before 2001. The most stringent set of standards (Tier 4) applies to locomotives manufactured in 2015 and later. Additional passenger locomotives that would operate as a result of the Proposed Project will, at a minimum, meet the emissions standards set by USEPA.

Direct emissions resulting from the Proposed Project relate to the change in locomotive volume from the No Action to the Build condition. The No Action operation of the rail corridor for the analysis year 2040, including train characteristics and maximum average daily locomotive frequency, was provided by MBTA. Comparing the 2040 estimates for the Build and No Action Alternatives, there would be no increases in scheduled trains with the Proposed Project. The MBTA projects that ridership on the train lines would increase to 46,100 passengers per day by the year 2040 for the No Action and the Build scenarios as compared to 37,100 for the existing conditions.

Table 1-4 presents the emissions inventory of expected Project-generated locomotive emissions under the, No Action and Build Alternatives.

Table 1-4: Locomotive Emissions: No Action and Build Alternatives - Year 2040

Alternative	Annual Number of Passengers	Gallons of Diesel Fuel[1]	NOx Emissions[2] (Tons/Year)	VOC Emissions[2] (Tons/Year)	CO Emissions[2] (Tons/Year)
No Action	16,826,500	710,078	18.0	0.4	20.8
Build	16,826,500	710,078	18.0	0.4	20.8

Table 1-4: Locomotive Emissions: No Action and Build Alternatives - Year 2040

Alternative	Annual Number of Passengers	Gallons of Diesel Fuel[1]	NOx Emissions[2] (Tons/Year)	VOC Emissions[2] (Tons/Year)	CO Emissions[2] (Tons/Year)
Net Change (Build minus No Action)	0.0	0.0	0.0	0.0	0.0
De minimis Threshold	N/A	N/A	100	50	100

Notes:
[1]Represents the number of gallons of diesel fuel used to transport passengers along the 2.0-mile distance from North Station to Union Square Station (i.e., minimum distance from North Station to MBTA Station). The MBTA average number of gallons per passenger mile traveled (PMT) is 0.0211 gal/PMT (Sources: https://www.transit.dot.gov/ntd/data-product/2019-metrics and https://www.transit.dot.gov/ntd/data-product/2019-fuel-and-energy)
[2]EPA has published expected fleet average pollutant emission rates for commuter rail in 2040 in their Technical Highlights: Emission Factors for Locomotives USEPA-420-F-09-025. NOx – 23 grams/gallon, VOC – 0.5 grams/gallon, CO – 26.6 grams/gallon.

Table 1-4 shows Project-generated predicted annual pollutant emissions by the Proposed Project, which are all below General Conformity de minimis threshold values. Pursuant to its Conformity Rules, USEPA considers project-generated emissions below these de minimis values to be minimal. The General Conformity de minimis thresholds applicable to the Project Site are 100 tons per year of NO_x, CO, and $PM_{2.5}$ and 50 tons per year of VOC. The Project-generated predicted emissions are considered conservatively high because they do not account for any reduction in automobile emissions related to travelers diverting from auto to rail travel. These emission reductions are accounted for in the regional passenger vehicle emissions assessment below.

4.2.3 Passenger Vehicle Emissions

Carbon monoxide (CO) emissions are associated with large volumes of slow-moving traffic, such as highly congested intersections. Areas experiencing high levels of CO are referred to as CO “hot spots.” The purpose of a CO hot-spot analysis is to determine if CO emissions generated by a proposed project would cause or contribute to an exceedance of the USEPA air quality standard for CO.

The 2040 No Action and Build Alternatives will decrease total regional VMT and CO emissions compared to existing conditions based on MBTA projection that ridership on the train lines would increase by the year 2040. Under the 2040 No Action and Build Alternatives, the increased annual MBTA commuter rail trips could otherwise occur by other transportation modes; therefore, the availability of improved commuter rail service is expected to reduce the number of regional vehicle trips. Also, in 2040 with the No Action and Build Alternatives, CO emissions from regional traffic are expected to be less than in the existing conditions as a result of increased annual MBTA ridership.

The Build Alternative is not predicted to increase the roadway VMT of traffic local to the Project Site as compared to the No Action Alternative because it includes no construction on local roadways or additional public parking spaces. As shown in **Tables 1-5 and 1-6**, CO emissions in the local Project Site (i.e., those along the 2.0-mile railway from North Station to the nearest MBTA Station and adjacent I-93 Bridge) will be reduced as a result of the Proposed Project as compared to the existing conditions and will be the same as the No Action alternative. The distance between emissions sources and receptors will change only by the separation distance between rails, since only the number of tracks is increasing. Based on the emissions provided in **Table 1-4**, the amount of locomotive air pollutant emissions that would be dispersed to a local receptor along the railroad on an hourly, daily, or annual basis is anticipated to be minor. With the improvement in local air quality anticipated from the removal of passenger vehicles from the I-93 Bridge as compared to the existing conditions, the overall local air quality condition will improve with the Build Alternative. As such, a local hot-spot analysis would be expected to show an overall improvement in local CO concentrations with the Build Alternative.

Table 1-5. Net Change in Regional Vehicle Emissions - Year 2040

Alternative	Annual Number of Passengers[1]	Annual VMT	NOx Emissions[2] (Tons/Year)	VOC Emissions[2] (Tons/Year)	CO Emissions[2] (Tons/Year)
Net Change (Build minus Existing)	**(3,212,000)**	**6,424,000**	**(0.05)**	**(0.29)**	**(5.9)**
Net Change (Build minus No Action)	0.0	0.0	0.0	0.0	0.0

Notes:
1. Represents the net change in the number of passengers for the Build minus No Action Alternative and Build minus Existing Conditions.
2. Emission factors based on the USEPA MOVES4 mobile source emission model for the Project Site in 2040 and the current fleet of passenger vehicles and trucks per the BRMPO Memo: *MOVES Emission Factors and Travel Demand Model Application* (August 2021). NOx – 0.0074 grams/VMT, VOC – 0.0407 grams/VMT, CO – 0.833 grams/VMT.

Table 1-6. Change in Projected NOx, VOC, and CO Emissions in the Project Site Compared to the Existing conditions and No Action Alternative (tons per year) – Year 2040

Alternative	Annual Number of Rail Passengers	Annual Number of Personal Vehicles	NOx Emissions (Tons/Year)	VOC Emissions (Tons/Year)	CO Emissions (Tons/Year)
Net Change (Build minus Existing)	**3,212,000**	**(3,212,000)**	**(0.05)**	**(0.29)**	**(5.9)**
Net Change (Build minus No Action)	0.0	0.0	0.0	0.0	0.0

4.2.4 Climate Change and Greenhouse Gas Emissions

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to GHG emissions, particularly those generated from the production and use of fossil fuels. While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change by the United Nations and World Meteorological Organization in 1988 led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with GHG emissions generated by human activity, including CO_2, methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), and various hydrofluorocarbons (HFCs). CO_2 is the most abundant GHG; while it is a naturally occurring component of Earth's atmosphere, fossil-fuel combustion is the main source of additional human- generated CO_2.

To date, no national standards have been established for nationwide mobile-source GHG reduction targets, nor have any regulations or legislation been enacted specifically to address climate change and GHG emissions reduction at the project level. NEPA (42 USC Part 4332) requires Federal agencies to assess the environmental effects of their proposed actions prior to making a decision on the action or project.

The Federal government has established various programs to address climate change and its associated effects. The most important of these was the Energy Policy and Conservation Act of 1975 (42 USC Section 6201) as amended by the Energy Independence and Security Act of 2007, and Corporate Average Fuel Economy (CAFÉ) Standards. This act establishes fuel economy standards for on-road motor vehicles sold in the United States. Compliance with Federal fuel economy standards is determined through the CAFE program based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the United States. The USEPA, with the National Highway Traffic Safety Administration, is responsible for setting GHG emission standards to significantly increase the fuel economy of all new passenger cars and light trucks sold in the United States. Fuel efficiency standards directly influence GHG emissions. USEPA calculates average fuel economy levels for manufacturers and sets related GHG emissions standards under the CAA.

USEPA published a final rulemaking on December 30, 2021 that raised Federal GHG emissions standards for passenger cars and light trucks for model years 2023 through 2026, increasing in stringency each year. This rulemaking revised lower emissions standards that had been previously established for model years 2021 through 2026 in the Safer Affordable Fuel-Efficient Vehicles Rule Part 2 in June 2020. The updated standards will avoid more than 3 billion tons of GHG emissions through 2050.

The state of atmospheric dispersion science and health effects of GHG emissions have not sufficiently advanced to accurately consider the microscale level of mobile sources. For this reason, this analysis only considered GHG emissions on a regional scale. For the consideration of the Proposed Project, GHG emissions are a result of fossil fuel combustion in vehicles and diesel trains. Any potential change in GHG emissions from implementation of the Project is calculated from the same sources and categories that are identified in the analysis of local operational emissions.

GHG emissions from railway projects can be divided into those produced during operation of the railroad (i.e., locomotive emissions) and those produced during construction. The primary GHG produced by the transportation sector is CO_2, a product of the combustion of petroleum-based products, like gasoline or diesel, in internal combustion engines.

The projected change in 2040 CO_2 emissions for the Build Alternative relative to the No Action Alternative is shown in **Table 1-7**. Increases in CO_2 emissions associated with additional MBTA passenger rail service is expected to be more than offset by reductions in CO_2 emissions due to reduced use of passenger vehicles.

Table 1-7. Change in Projected CO_2 Emissions in the Project Site Compared to the Existing Conditions (tons per year) - Year 2040

Annual Number of Rail Passengers	Annual Number of Passenger Vehicles	Rail Travel CO_2 Emissions (Tons/Year)	Passenger Vehicle Travel CO_2 Emissions (Tons/Year)	Net Change CO_2 Emissions (Tons/Year)
3,212,000	(3,212,000)	699	1,144	(445)

Source:
1.Emission based on136.1 grams CO_2 per rail passenger mile traveled (US Congressional Budget Office, Emissions of Carbon Dioxide in the Transportation Sector (December, 2022)), https://www.cbo.gov/file-download/download/private/165572
2. Emission based on 223.0 grams CO2 per passenger vehicle mile traveled (USEPA MOVES4 Model for Metropolitan Boston MPO)

While the Proposed Project would result in GHG emissions during construction, as summarized in **Table 1-8** and detailed in **Appendix A**, it is anticipated that the Proposed Project would not result in any increase in operational GHG emissions. The Proposed Project will not conflict with any currently applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.

4.2.5 Mobile Source Air Toxics

A qualitative Mobile Source Air Toxics (MSAT) assessment was conducted and followed the Federal Highway Administration (FHWA) guidelines on air toxics, and the Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Technical shortcomings of emissions and dispersion models, and uncertain science with respect to health effects, prevent meaningful or reliable estimates of MSAT emissions and effects of this Project. However, even though reliable methods do not exist to estimate accurately the health impacts of MSATs at the project level, it is possible to qualitatively assess future MSAT emissions with the Project. Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences in MSAT emissions, if any, with the Build and No Action Alternatives.

The regional MSAT effects associated with the Proposed Project were assessed based on FHWA *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents,* released January 18, 2023, and in part from an FHWA study entitled *A Methodology for Evaluating*

Mobile Source Air Toxic Emissions among Transportation Project Alternatives, as applicable to the Proposed Project. The FHWA's guidance was utilized as neither FTA, FRA, nor USEPA have guidelines for MSAT analysis, including hot-spot analyses. A hot-spot analysis is known as a "microscale" analysis as it focuses on a small geographic area in the immediate vicinity of the Project Site. FHWA's interim guidance groups projects into the following categories: Exempt Projects and Projects with No Meaningful Potential MSAT Effects; Projects with Low Potential MSAT Effects; and Projects with Higher Potential MSAT Effects.

4.2.5.1 Regional MSAT Effects

In 2040, MBTA projects that the Build Alternative will result in 3.212 million more rail passenger trips annually to/from/within North Station (compared to existing conditions). By shifting this travel to rail, MBTA expects that up to 8,800 vehicles per day and 17,600 vehicle miles per day will be removed from the parallel roads of I-93 and U.S. Route 1 in the 2.0-mile one -way distance from North Station to the nearest MBTA Station in the year 2040.

With an average fuel efficiency of 25.7 miles per gallon in the BRMPO and a typical passenger rail trip traveling 2.0 miles, this equates to a reduction of approximately 250,000 gallons of fuel per year. In comparison, the MBTA commuter trains that will operate more efficiently with higher ridership per train with the Proposed Project are estimated to consume the same number of gallons of fuel per year as in existing conditions. Therefore, overall fuel consumption will be reduced with the Build Alternative.

The Build Alternative will decrease the total regional VMT and MSAT emissions compared to existing conditions and will result in the same total regional VMT and MSAT emissions compared to the No Action Alternative. Under existing conditions, the approximately 3.212 million annual MBTA commuter rail trips from the Build Alternative could otherwise occur by other transportation modes; therefore, the availability of improved commuter rail service will reduce the number of vehicle trips on a regional basis. Because the Build Alternative will not substantially change the regional traffic mix, the amount of MSAT emissions emitted from highways and other roadways along the Project Site corridor would be proportional to the VMT. Because the regional VMT estimated for the Build Alternative will be less than the existing conditions and the same as the No Action Alternative in 2040, MSAT emissions from regional vehicle traffic will also be less than the existing conditions and identical with the Build Alternative compared to the No Action Alternative in 2040. Emissions for the Build Alternative will also likely be lower than current levels in 2040 because USEPA's national control programs are projected to reduce annual MSAT emissions by over 90 percent from 2010 to 2050.

The Build Alternative is not predicted to increase roadway VMT of traffic local to the Project Site as compared to the No Action Alternative because the Project includes no construction on local roadways or additional public parking spaces. As such, based on the recommended tiering approach detailed in the FHWA methodology, the operational impact of the Proposed Project falls within the Tier 1 category as a project with no meaningful potential MSAT effects.

4.2.5.2 Local MSAT Effects

The potential MSAT emission sources directly related to Proposed Project operation will be from trains operating along the Project Site corridor and passenger vehicles traveling to and from train stations. Localized changes in MSAT emissions will occur as a result of all of these activities.

The Proposed Project includes no construction on local roadways or public parking spaces. It has the potential to reduce future regional VMT compared with existing conditions. Since there are no at-grade railroad crossings of roadways, walkways, or bike paths in the Study Area, there will be no permanent impacts to vehicular traffic, pedestrians, or cyclists.

For the 2040 Build Alternative, localized Project-related emissions will be substantially reduced from existing conditions due to implementation of USEPA's vehicle and fuel regulations. The Build Alternative will also decrease regional MSAT emissions compared to existing conditions. Therefore, local MSAT effects with the Proposed Project are expected to be minor.

4.2.6 Construction

Construction effects on air quality are generally short-term and attributable to emissions from construction equipment and fugitive dust from ground-level disturbances. Potential construction impacts on air quality are evaluated based on the intensity of the construction activities and duration.

The potential air quality effects of the Build Alternative will be short-term, occurring only while demolition and construction work is in progress and local conditions are conducive. The potential for fugitive dust emissions typically is associated with building demolition, ground clearing, site preparation, grading, stockpiling of materials, onsite movement of equipment, and transportation of materials.

Air pollutant emissions from construction of the Proposed Project include emissions from diesel and gasoline-powered construction equipment, diesel-powered generators, diesel trucks, marine-based diesel equipment and tugboats, and heavy-duty trucks transporting excavated material and delivering construction materials. The construction equipment usage factors, sizes, types, and number of construction equipment were estimated based on preliminary construction activity plans developed by MBTA and are provided in **Appendix A**. Emission factors for NOx, VOC, CO, SO2, and PM2.5 from on-site construction engines were developed using USEPA's NONROAD Emissions Model. For on-road heavy duty truck engines, emissions rates for NOx, VOC, CO, SO2, and PM2.5 were developed using USEPA's Motor Vehicle Emission Simulator (MOVES4) model. Estimates of emissions from tugboats were based on the USEPA Ports Emissions Inventory Guidance.

Total emissions were calculated based on the methodology described above for on-site and on-road emissions. The calculated construction emissions are designed to be conservative estimates and likely overestimate the expected emissions for several reasons, including that the emission factors for nonroad engines made use of underlying default distributions in the NONROAD model and do not account for the greater availability of newer and lower-emitting construction equipment.

An analysis of construction emissions determined the peak year of construction (e.g., 2027 as provided in **Table 1-8**), defined as the year in which the largest amount of pollutant emissions occurs. The assessment then compares the emissions inventory of the peak year of construction to the de minimis thresholds to evaluate whether a General Conformity determination, if required, would indicate that there was a potential for adverse air quality impacts to the attainment of the NAAQS. **Table 1-8** provides a detailed summary of the estimated annual construction emissions with comparisons to the General Conformity de minimis emissions thresholds. As shown, the annual construction emissions are all well below de minimis emission thresholds, and thus anticipated construction air quality impacts are minor.

Table 1-8. Build Alternative Construction Emissions

Construction Year	Emission Totals (tons/year)				
	CO	NOx	VOC	PM2.5	CO_2
2026	7.5	16.5	1.7	0.7	4,978.5
2027	12.4	27.3	2.9	1.1	9,173.9
2028	9.7	24.9	2.6	0.9	8,263.2
2029	7.2	24.2	2.5	1.0	7,585.7
2030	9.5	27.8	2.9	1.1	8,496.1
2031	8.1	27.6	2.9	1.1	8,718.2
2032	9.0	26.7	2.8	1.1	8,271.0
2033	7.8	26.6	2.7	1.0	8,418.3
2034	3.1	5.7	0.6	0.2	2,004.4
***De Minimis* Thresholds**	**100.0**	**100.0**	**50.0**	**100.0**	**NA**

Based on this analysis, MBTA estimates that fewer than 10,000 tons per year of CO_2 will be generated from construction activities. The USEPA major source threshold for CO_2 is 100,000 tons per year. As such, Proposed Project construction emissions are well below the USEPA major source thresholds for GHGs. Given this relatively small contribution, the construction of the Proposed Project will have a negligible impact on climate change due to GHG emissions.

4.2.6.1 Minimization Strategies

Although the Build Alternative would not cause any major adverse impacts during construction, compliance with all applicable laws and regulations would reduce pollutant emissions from construction activity. To mitigate these emissions, construction activities would be performed in accordance with construction level best management practices (BMPs). Strategies that could be considered during construction include:

- apply water suppression at least twice a day to all active construction areas to minimize dust;

- tarp all trucks hauling soil, sand, and other loose materials or require that all trucks maintain at least two feet of freeboard;
- pave, apply water daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites;
- use water sweepers to sweep all paved access roads, parking areas and staging areas at construction sites daily, use water sweepers to sweep all streets daily if visible soil material is carried onto adjacent public streets;
- hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more);
- enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.);
- limit traffic speeds on unpaved roads to 15 miles per hour;
- comply with MassDEP's idling regulations [310 CMR 7.11(1) (b)], requiring that engines idle for no more than five minutes. Post idling restriction signage on project construction sites;
- comply with MassDEP's Diesel Retrofit Program (DRP), which promotes the use of such engine emission controls as oxidation catalysts or particulate filters for diesel engines to the maximum extent practicable. In January 2008, MassDEP amended the retrofit applicability requirement to include engines of 50 horsepower or greater that would be on-site for 30 days or more;
- comply with the State's Low Sulfur Diesel standards (301 CMR 7.05) and USEPA's Clean Air Non-road Diesel Rule; and
- replant vegetation as quickly as possible to minimize erosion in disturbed areas.

4.3 Conclusion

The Proposed Project is not expected to cause any air quality impacts as result of operational emissions since there would be no projected increase in diesel passenger train operations.

The Build Alternative is expected to decrease total regional VMT and emissions compared to the existing conditions, and is not expected to change the total regional VMT and emissions compared to the No Action Alternative. With the Build Alternative, the increased annual MBTA commuter passenger trips could otherwise occur by other transportation modes; therefore, the availability of improved commuter rail service will reduce the number of regional vehicle trips. In 2040, the level of emissions from the Build Alternative from regional traffic is expected to be less than in existing conditions as a result of the increased annual MBTA ridership that would otherwise occur by other transportation modes.

As such, the operational phase of the project is not predicted to have any negative impact on regional air quality, or cause or contribute to any new violation of any NAAQS. Locally, the operation of the Build Alternative would not cause adverse impact or increase the frequency or severity of any existing violation of any NAAQS in any area, since the operational condition of the corridor is to remain unchanged with both the Build and No Action alternatives.

Emissions from construction activity are expected to be minimal and are not expected to substantially affect ambient air quality. The construction phase emissions of the Project are not predicted to exceed the General Conformity Rule’s de minimis emission thresholds and thus, anticipated construction air quality impacts are minor. The Project will comply with the Transportation Conformity Rule, and therefore the anticipated operational air quality impacts are minor.

Appendix A: Construction Period Emission Estimates

Table A-1
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2026 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2026	2026	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	6	250,879	0.49	3.07	0.14	0.05	589.91	0.13	0.85	0.040	0.014	163.13
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	3	31,122	0.72	1.31	0.24	0.12	625.79	0.02	0.05	0.008	0.004	21.47
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	0	0	0.12	0.30	0.13	0.01	536.41	0.00	0.00	0.000	0.000	0.00
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	2	130,806	0.10	0.39	0.13	0.01	530.61	0.01	0.06	0.019	0.002	76.51
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	2	115,970	0.12	0.31	0.13	0.01	536.41	0.02	0.04	0.017	0.001	68.57
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	0	0	0.51	1.84	0.17	0.08	530.49	0.00	0.00	0.000	0.000	0.00
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	6	85,045	0.21	0.46	0.14	0.03	536.39	0.02	0.04	0.013	0.003	50.28
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	6	965,952	0.43	1.76	0.19	0.09	530.42	0.46	1.87	0.207	0.093	564.77
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	6	2,294,136	0.48	1.73	0.17	0.07	530.50	1.22	4.38	0.432	0.184	1341.52
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	2	184,470	4.45	4.33	0.56	0.35	588.58	0.91	0.88	0.114	0.072	119.68
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	3	9,224	1.05	3.39	0.20	0.14	589.72	0.01	0.03	0.002	0.001	6.00
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	0	0	1.20	2.04	0.25	0.19	589.57	0.00	0.00	0.000	0.000	0.00
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	0	0	4.45	4.33	0.56	0.35	588.58	0.00	0.00	0.000	0.000	0.00
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	2	11,007	0.72	1.31	0.24	0.12	625.79	0.01	0.02	0.003	0.002	7.59
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	1	61,490	2.34	4.46	0.45	0.35	588.94	0.16	0.30	0.030	0.024	39.92
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	1	55,341	0.53	1.86	0.21	0.12	530.38	0.03	0.11	0.013	0.007	32.35
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	1	110,682	0.48	1.73	0.17	0.07	530.50	0.06	0.21	0.021	0.009	64.72
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	2	200,569	0.10	0.39	0.13	0.01	530.61	0.02	0.09	0.030	0.003	117.31
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	2	1,106,820	0.48	1.73	0.17	0.07	530.50	0.59	2.12	0.208	0.089	647.23
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	6	561,600	0.69	4.21	0.22	0.11	506.69	0.42	2.60	0.136	0.066	313.66
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	4	374,400	0.69	4.21	0.22	0.11	506.69	0.28	1.74	0.091	0.044	209.11
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	6	1,106,820	0.12	0.54	0.14	0.02	530.60	0.15	0.65	0.167	0.025	647.36
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	0	0	0.44	1.76	0.19	0.09	530.42	0.00	0.00	0.000	0.000	0.00
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	0	0	0.12	0.29	0.13	0.01	536.41	0.00	0.00	0.000	0.000	0.00
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	0	0	0.35	0.44	0.14	0.03	589.93	0.00	0.00	0.000	0.000	0.00

On-Road and Marine Sources

Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	Units	Total Miles per Round Trip within Boston Metro	Vehicle Category Code	Construction Activity Duration		Monthly average number of units	Total Vehicle Miles Traveled	MOVES Model Emission Factor (g/VMT)					2026 Emission Totals (tons)				
				Average Days/Week	Average hrs/day	2024	2024	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Worker Commutes	Number of Workers per Day	40	LDT/LDC	5	NA	96	998,400	2.44	0.10	0.08	0.01	334.57	2.69	0.11	0.093	0.010	368.20
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40	HDDV	5		4	41,600	2.13	1.17	0.23	0.04	928.52	0.10	0.05	0.011	0.002	42.58
Dump Truck	Number of Vehicles per Day	5	HDDV	2	4	6	12,480	2.13	1.17	0.23	0.04	928.52	0.03	0.02	0.003	0.001	12.77
Tractor Trailer	Number of Vehicles per Day	5	HDDV	2	4	6	12,480	2.59	4.42	0.16	0.09	1716.62	0.04	0.06	0.002	0.001	23.61
Truck Mixer	Number of Vehicles per Day	5	HDDV	3	4	1	3,120	2.13	1.17	0.23	0.04	928.52	0.01	0.00	0.001	0.000	3.19
Flat deck barges (materials transport)	Number of Vessels per Day	30	MARINE	1	4	2	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30	MARINE	1	4	2											
												TOTAL	**2.86**	**0.25**	**0.11**	**0.01**	**450.36**

Notes - Includes total estimates for all three stages of construction as outlined in EA.
Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.
Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.

Table A-2
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2027 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2027	2027	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	4	41,496	0.72	1.31	0.24	0.12	625.79	0.03	0.06	0.011	0.006	28.62
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	1	39,761	0.12	0.30	0.13	0.01	536.41	0.01	0.01	0.006	0.000	23.51
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	6	392,418	0.10	0.39	0.13	0.01	530.61	0.04	0.17	0.058	0.006	229.52
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	11	983,840	0.10	0.39	0.13	0.01	530.61	0.11	0.43	0.145	0.016	575.44
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	1	128,291	0.40	1.65	0.19	0.08	530.45	0.06	0.23	0.026	0.012	75.01
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	2	115,970	0.12	0.31	0.13	0.01	536.41	0.02	0.04	0.017	0.001	68.57
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	2	440,045	0.51	1.84	0.17	0.08	530.49	0.25	0.89	0.084	0.040	257.32
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	1	92,235	4.45	4.33	0.56	0.35	588.58	0.45	0.44	0.057	0.036	59.84
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	1.5	20,285	2.34	4.46	0.45	0.35	588.94	0.05	0.10	0.010	0.008	13.17
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	2	90,558	1.20	2.04	0.25	0.19	589.57	0.12	0.20	0.025	0.019	58.85
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	2	11,007	0.72	1.31	0.24	0.12	625.79	0.01	0.02	0.003	0.002	7.59
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	5	276,705	0.53	1.86	0.21	0.12	530.38	0.16	0.57	0.063	0.035	161.77
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	2	238,335	0.40	1.65	0.19	0.08	530.45	0.10	0.43	0.049	0.021	139.36
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	4	374,400	0.69	4.21	0.22	0.11	506.69	0.28	1.74	0.091	0.044	209.11
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	4	134,160	0.44	1.76	0.19	0.09	530.42	0.06	0.26	0.029	0.013	78.44
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	3	93,421	0.12	0.29	0.13	0.01	536.41	0.01	0.03	0.014	0.001	55.24
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	3	55,341	0.35	0.44	0.14	0.03	589.93	0.02	0.03	0.008	0.002	35.99

On-Road and Marine Sources

Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	Units	Total Miles per Round Trip within Boston Metro	Vehicle Category Code	Construction Activity Duration		Monthly average number	Total Vehicle Miles Traveled	MOVES Model Emission Factor (g/VMT)					2027 Emission Totals (tons)				
				Average Days/Week	Average hrs/day	2025	2025	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Worker Commutes	Number of Workers per Day	40	LDT/LDC	5	NA	190	1,976,000	2.44	0.10	0.08	0.01	334.57	5.32	0.22	0.183	0.020	728.73
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40	HDDV	5		5	52,000	2.13	1.17	0.23	0.04	928.52	0.12	0.07	0.013	0.003	53.22
Dump Truck	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5	HDDV	3	4	7	21,840	2.13	1.17	0.23	0.04	928.52	0.05	0.03	0.006	0.001	22.35
Flat deck barges (materials transport)	Number of Vessels per Day	30	MARINE	1	4	3	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30	MARINE	1	4	1											
												TOTAL	**5.62**	**0.47**	**0.21**	**0.03**	**877.08**

Notes - Includes total estimates for all three stages of construction as outlined in EA.

Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.

Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.

Stage 3 consists of the replacement of the existing east bridge.

Table A-3
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2028 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2028	2028	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	1	10,374	0.72	1.31	0.24	0.12	625.79	0.01	0.02	0.003	0.001	7.16
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	4	159,045	0.12	0.30	0.13	0.01	536.41	0.02	0.05	0.023	0.002	94.04
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	3	196,209	0.10	0.39	0.13	0.01	530.61	0.02	0.08	0.029	0.003	114.76
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	12	1,073,280	0.10	0.39	0.13	0.01	530.61	0.11	0.46	0.158	0.017	627.75
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	3	173,956	0.12	0.31	0.13	0.01	536.41	0.02	0.06	0.025	0.002	102.86
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	0	0	0.51	1.84	0.17	0.08	530.49	0.00	0.00	0.000	0.000	0.00
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	1	92,235	4.45	4.33	0.56	0.35	588.58	0.45	0.44	0.057	0.036	59.84
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	0	0	1.20	2.04	0.25	0.19	589.57	0.00	0.00	0.000	0.000	0.00
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	3	166,023	0.53	1.86	0.21	0.12	530.38	0.10	0.34	0.038	0.021	97.06
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	4	374,400	0.69	4.21	0.22	0.11	506.69	0.28	1.74	0.091	0.044	209.11
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	1	33,540	0.44	1.76	0.19	0.09	530.42	0.02	0.07	0.007	0.003	19.61
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	1	31,140	0.12	0.29	0.13	0.01	536.41	0.00	0.01	0.005	0.000	18.41
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	9	166,023	0.35	0.44	0.14	0.03	589.93	0.06	0.08	0.025	0.005	107.96

On-Road and Marine Sources

Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	Units	Total Miles per Round Trip within Boston Metro	Vehicle Category Code	Construction Activity Duration		Monthly average number of units in	Total Vehicle Miles Traveled (VMT)	MOVES Model Emission Factor (g/VMT)					2028 Emission Totals (tons)				
				Average Days/Week	Average hrs/day	2026	2026	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Worker Commutes	Number of Workers per Day	40	LDT/LDC	5	NA	120	1,248,000	2.44	0.10	0.08	0.01	334.57	3.36	0.14	0.116	0.013	460.25
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40	HDDV	5		4	41,600	2.13	1.17	0.23	0.04	928.52	0.10	0.05	0.011	0.002	42.58
Dump Truck	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5	HDDV	3	4	3	9,360	2.13	1.17	0.23	0.04	928.52	0.02	0.01	0.002	0.000	9.58
Flat deck barges (materials transport)	Number of Vessels per Day	30	MARINE	1	4	3	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30	MARINE	1	4	1											
												TOTAL	**3.61**	**0.36**	**0.14**	**0.02**	**585.19**

Notes - Includes total estimates for all three stages of construction as outlined in EA.

Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.

Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.

Stage 3 consists of the replacement of the existing east bridge.

Table A-4
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2029 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2029	2029	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	3	119,284	0.12	0.30	0.13	0.01	536.41	0.02	0.04	0.017	0.001	70.53
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	12	1,073,280	0.10	0.39	0.13	0.01	530.61	0.11	0.46	0.158	0.017	627.75
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	3	173,956	0.12	0.31	0.13	0.01	536.41	0.02	0.06	0.025	0.002	102.86
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	0	0	0.51	1.84	0.17	0.08	530.49	0.00	0.00	0.000	0.000	0.00
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	2	184,470	4.45	4.33	0.56	0.35	588.58	0.91	0.88	0.114	0.072	119.68
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	2	90,558	1.20	2.04	0.25	0.19	589.57	0.12	0.20	0.025	0.019	58.85
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	2	110,682	0.53	1.86	0.21	0.12	530.38	0.06	0.23	0.025	0.014	64.71
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	2	187,200	0.69	4.21	0.22	0.11	506.69	0.14	0.87	0.045	0.022	104.55
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	1	33,540	0.44	1.76	0.19	0.09	530.42	0.02	0.07	0.007	0.003	19.61
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	1	31,140	0.12	0.29	0.13	0.01	536.41	0.00	0.01	0.005	0.000	18.41
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	0	0	0.35	0.44	0.14	0.03	589.93	0.00	0.00	0.000	0.000	0.00
On-Road and Marine Sources																			
Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	**Units**	**Total Miles per Round Trip within Boston Metro**		**Vehicle Category Code**		**Construction Activity Duration**		**Monthly average number of units**	**Total Vehicle Miles Traveled (VMT)**	**MOVES Model Emission Factor (g/VMT)**					**2029 Emission Totals (tons)**				
						Average Days/Week	**Average hrs/day**	**2027**	**2027**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**
Worker Commutes	Number of Workers per Day	40		LDT/LDC		5	NA	20	208,000	2.44	0.10	0.08	0.01	334.57	0.56	0.02	0.019	0.002	76.71
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40		HDDV		5		1	10,400	2.13	1.17	0.23	0.04	928.52	0.02	0.01	0.003	0.001	10.64
Dump Truck	Number of Vehicles per Day	5		HDDV		2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5		HDDV		2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5		HDDV		3	4	6	18,720	2.13	1.17	0.23	0.04	928.52	0.04	0.02	0.005	0.001	19.16
Flat deck barges (materials transport)	Number of Vessels per Day	30		MARINE		1	4	1	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30		MARINE		1	4	1											
														TOTAL	**0.76**	**0.21**	**0.04**	**0.01**	**179.29**

Notes - Includes total estimates for all three stages of construction as outlined in EA.

Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.

Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.

Stage 3 consists of the replacement of the existing east bridge.

Table A-5
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2030 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2030	2030	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	4	159,045	0.12	0.30	0.13	0.01	536.41	0.02	0.05	0.023	0.002	94.04
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	12	1,073,280	0.10	0.39	0.13	0.01	530.61	0.11	0.46	0.158	0.017	627.75
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	4	231,941	0.12	0.31	0.13	0.01	536.41	0.03	0.08	0.034	0.003	137.14
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	2	440,045	0.51	1.84	0.17	0.08	530.49	0.25	0.89	0.084	0.040	257.32
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	5	461,175	4.45	4.33	0.56	0.35	588.58	2.26	2.20	0.285	0.180	299.20
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	0	0	1.20	2.04	0.25	0.19	589.57	0.00	0.00	0.000	0.000	0.00
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	3	166,023	0.53	1.86	0.21	0.12	530.38	0.10	0.34	0.038	0.021	97.06
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	2	200,569	0.10	0.39	0.13	0.01	530.61	0.02	0.09	0.030	0.003	117.31
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	2	238,335	0.40	1.65	0.19	0.08	530.45	0.10	0.43	0.049	0.021	139.36
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	4	374,400	0.69	4.21	0.22	0.11	506.69	0.28	1.74	0.091	0.044	209.11
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	2	67,080	0.44	1.76	0.19	0.09	530.42	0.03	0.13	0.014	0.007	39.22
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	1	31,140	0.12	0.29	0.13	0.01	536.41	0.00	0.01	0.005	0.000	18.41
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	0	0	0.35	0.44	0.14	0.03	589.93	0.00	0.00	0.000	0.000	0.00

On-Road and Marine Sources

Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	Units	Total Miles per Round Trip within Boston Metro	Vehicle Category Code	Construction Activity Duration		Monthly average number of units in	Total Vehicle Miles Traveled (VMT)	MOVES Model Emission Factor (g/VMT)					2030 Emission Totals (tons)				
				Average Days/Week	Average hrs/day	2028	2028	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Worker Commutes	Number of Workers per Day	40	LDT/LDC	5	NA	36	374,400	2.44	0.10	0.08	0.01	334.57	1.01	0.04	0.035	0.004	138.08
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40	HDDV	5		1	10,400	2.13	1.17	0.23	0.04	928.52	0.02	0.01	0.003	0.001	10.64
Dump Truck	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5	HDDV	3	4	6	18,720	2.13	1.17	0.23	0.04	928.52	0.04	0.02	0.005	0.001	19.16
Flat deck barges (materials transport)	Number of Vessels per Day	30	MARINE	1	4	3	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30	MARINE	1	4	1											
												TOTAL	**1.21**	**0.23**	**0.05**	**0.01**	**240.66**

Notes - Includes total estimates for all three stages of construction as outlined in EA.
Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.
Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.
Stage 3 consists of the replacement of the existing east bridge.

Table A-6
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2031 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2031	2031	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	4	41,496	0.72	1.31	0.24	0.12	625.79	0.03	0.06	0.011	0.006	28.62
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	3	119,284	0.12	0.30	0.13	0.01	536.41	0.02	0.04	0.017	0.001	70.53
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	3	196,209	0.10	0.39	0.13	0.01	530.61	0.02	0.08	0.029	0.003	114.76
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	12	1,073,280	0.10	0.39	0.13	0.01	530.61	0.11	0.46	0.158	0.017	627.75
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	6	769,743	0.40	1.65	0.19	0.08	530.45	0.34	1.40	0.157	0.069	450.08
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	1	57,985	0.12	0.31	0.13	0.01	536.41	0.01	0.02	0.008	0.001	34.29
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	4	880,090	0.51	1.84	0.17	0.08	530.49	0.50	1.78	0.168	0.079	514.64
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	2	184,470	4.45	4.33	0.56	0.35	588.58	0.91	0.88	0.114	0.072	119.68
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	3	48,901	2.34	4.46	0.45	0.35	588.94	0.13	0.24	0.024	0.019	31.75
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	0	0	1.20	2.04	0.25	0.19	589.57	0.00	0.00	0.000	0.000	0.00
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	4	221,364	0.53	1.86	0.21	0.12	530.38	0.13	0.45	0.050	0.028	129.42
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	2	187,200	0.69	4.21	0.22	0.11	506.69	0.14	0.87	0.045	0.022	104.55
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	1	33,540	0.44	1.76	0.19	0.09	530.42	0.02	0.07	0.007	0.003	19.61
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	1	31,140	0.12	0.29	0.13	0.01	536.41	0.00	0.01	0.005	0.000	18.41
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	6	110,682	0.35	0.44	0.14	0.03	589.93	0.04	0.05	0.017	0.003	71.97

On-Road and Marine Sources

Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	Units	Total Miles per Round Trip within Boston Metro	Vehicle Category Code	Construction Activity Duration		Monthly average number of units in	Total Vehicle Miles Traveled (VMT)	MOVES Model Emission Factor (g/VMT)					2031 Emission Totals (tons)				
				Average Days/Week	Average hrs/day	2029	2029	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Worker Commutes	Number of Workers per Day	40	LDT/LDC	5	NA	22	228,800	2.44	0.10	0.08	0.01	334.57	0.62	0.03	0.021	0.002	84.38
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40	HDDV	5		1	10,400	2.13	1.17	0.23	0.04	928.52	0.02	0.01	0.003	0.001	10.64
Dump Truck	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5	HDDV	2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5	HDDV	3	4	5	15,600	2.13	1.17	0.23	0.04	928.52	0.04	0.02	0.004	0.001	15.97
Flat deck barges (materials transport)	Number of Vessels per Day	30	MARINE	1	4	1	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30	MARINE	1	4	1											
												TOTAL	**0.81**	**0.21**	**0.04**	**0.01**	**183.77**

Notes - Includes total estimates for all three stages of construction as outlined in EA.
Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.
Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.
Stage 3 consists of the replacement of the existing east bridge.

Table A-7
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2032 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2032	2032	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	2	20,748	0.72	1.31	0.24	0.12	625.79	0.02	0.03	0.005	0.003	14.31
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	5	198,806	0.12	0.30	0.13	0.01	536.41	0.03	0.07	0.029	0.002	117.55
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	12	1,073,280	0.10	0.39	0.13	0.01	530.61	0.11	0.46	0.158	0.017	627.75
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	5	289,926	0.12	0.31	0.13	0.01	536.41	0.04	0.10	0.042	0.003	171.43
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	0	0	0.51	1.84	0.17	0.08	530.49	0.00	0.00	0.000	0.000	0.00
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	5	461,175	4.45	4.33	0.56	0.35	588.58	2.26	2.20	0.285	0.180	299.20
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	0	0	1.20	2.04	0.25	0.19	589.57	0.00	0.00	0.000	0.000	0.00
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	2	110,682	0.53	1.86	0.21	0.12	530.38	0.06	0.23	0.025	0.014	64.71
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			2	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	5	595,838	0.40	1.65	0.19	0.08	530.45	0.26	1.08	0.122	0.054	348.39
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	2	187,200	0.69	4.21	0.22	0.11	506.69	0.14	0.87	0.045	0.022	104.55
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	4	134,160	0.44	1.76	0.19	0.09	530.42	0.06	0.26	0.029	0.013	78.44
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	1	31,140	0.12	0.29	0.13	0.01	536.41	0.00	0.01	0.005	0.000	18.41
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	0	0	0.35	0.44	0.14	0.03	589.93	0.00	0.00	0.000	0.000	0.00
On-Road and Marine Sources																			
Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	**Units**	**Total Miles per Round Trip within Boston Metro**		**Vehicle Category Code**		**Construction Activity Duration**		**Monthly average number of units in**	**Total Vehicle Miles Traveled (VMT)**	**MOVES Model Emission Factor (g/VMT)**					**2032 Emission Totals (tons)**				
						Average Days/Week	**Average hrs/day**	**2030**	**2030**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**
Worker Commutes	Number of Workers per Day	40		LDT/LDC		5	NA	28	291,200	2.44	0.10	0.08	0.01	334.57	0.78	0.03	0.027	0.003	107.39
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40		HDDV		5		1	10,400	2.13	1.17	0.23	0.04	928.52	0.02	0.01	0.003	0.001	10.64
Dump Truck	Number of Vehicles per Day	5		HDDV		2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5		HDDV		2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5		HDDV		3	4	5	15,600	2.13	1.17	0.23	0.04	928.52	0.04	0.02	0.004	0.001	15.97
Flat deck barges (materials transport)	Number of Vessels per Day	30		MARINE		1	4	1	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30		MARINE		1	4	1											
														TOTAL	**0.97**	**0.22**	**0.04**	**0.01**	**206.78**

Notes - Includes total estimates for all three stages of construction as outlined in EA.
Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.
Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.
Stage 3 consists of the replacement of the existing east bridge.

Table A-8
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2033 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2033	2033	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	12	501,758	0.49	3.07	0.14	0.05	589.91	0.27	1.70	0.080	0.028	326.27
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	1	10,374	0.72	1.31	0.24	0.12	625.79	0.01	0.02	0.003	0.001	7.16
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	1	39,761	0.12	0.30	0.13	0.01	536.41	0.01	0.01	0.006	0.000	23.51
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	3	196,209	0.10	0.39	0.13	0.01	530.61	0.02	0.08	0.029	0.003	114.76
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	12	1,073,280	0.10	0.39	0.13	0.01	530.61	0.11	0.46	0.158	0.017	627.75
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	2	256,581	0.40	1.65	0.19	0.08	530.45	0.11	0.47	0.052	0.023	150.03
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	1	57,985	0.12	0.31	0.13	0.01	536.41	0.01	0.02	0.008	0.001	34.29
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	2	440,045	0.51	1.84	0.17	0.08	530.49	0.25	0.89	0.084	0.040	257.32
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	12	170,090	0.21	0.46	0.14	0.03	536.39	0.04	0.09	0.026	0.006	100.57
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	12	1,931,904	0.43	1.76	0.19	0.09	530.42	0.92	3.74	0.413	0.185	1129.55
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	12	4,588,272	0.48	1.73	0.17	0.07	530.50	2.45	8.77	0.864	0.367	2683.04
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	0	0	4.45	4.33	0.56	0.35	588.58	0.00	0.00	0.000	0.000	0.00
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	6	18,447	1.05	3.39	0.20	0.14	589.72	0.02	0.07	0.004	0.003	11.99
Paver	Diesel	224	0.45	2270002009	0.43	1	6	1	13,523	2.34	4.46	0.45	0.35	588.94	0.03	0.07	0.007	0.005	8.78
Roller	Diesel	135	0.45	2270002009	0.43	3	4	3	48,901	2.34	4.46	0.45	0.35	588.94	0.13	0.24	0.024	0.019	31.75
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	2	90,558	1.20	2.04	0.25	0.19	589.57	0.12	0.20	0.025	0.019	58.85
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	6	22,932	1.25	1.92	0.28	0.16	625.66	0.03	0.05	0.007	0.004	15.82
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	4	221,364	0.53	1.86	0.21	0.12	530.38	0.13	0.45	0.050	0.028	129.42
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			4	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	2	238,335	0.40	1.65	0.19	0.08	530.45	0.10	0.43	0.049	0.021	139.36
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	12	1,123,200	0.69	4.21	0.22	0.11	506.69	0.85	5.21	0.273	0.133	627.33
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	4	374,400	0.69	4.21	0.22	0.11	506.69	0.28	1.74	0.091	0.044	209.11
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	12	2,213,640	0.12	0.54	0.14	0.02	530.60	0.30	1.31	0.335	0.050	1294.71
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	2	67,080	0.44	1.76	0.19	0.09	530.42	0.03	0.13	0.014	0.007	39.22
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	0	0	0.12	0.29	0.13	0.01	536.41	0.00	0.00	0.000	0.000	0.00
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	9	166,023	0.35	0.44	0.14	0.03	589.93	0.06	0.08	0.025	0.005	107.96
On-Road and Marine Sources																			
Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	**Units**	**Total Miles per Round Trip within Boston Metro**		**Vehicle Category Code**		**Construction Activity Duration**		**Monthly average number of units in**	**Total Vehicle Miles Traveled (VMT)**	**MOVES Model Emission Factor (g/VMT)**					**2033 Emission Totals (tons)**				
						Average Days/Week	**Average hrs/day**	**2031**	**2031**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**
Worker Commutes	Number of Workers per Day	40		LDT/LDC		5	NA	42	436,800	2.44	0.10	0.08	0.01	334.57	1.18	0.05	0.040	0.004	161.09
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40		HDDV		5		2	20,800	2.13	1.17	0.23	0.04	928.52	0.05	0.03	0.005	0.001	21.29
Dump Truck	Number of Vehicles per Day	5		HDDV		2	4	12	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Tractor Trailer	Number of Vehicles per Day	5		HDDV		2	4	12	24,960	2.59	4.42	0.16	0.09	1716.62	0.07	0.12	0.004	0.002	47.23
Truck Mixer	Number of Vehicles per Day	5		HDDV		3	4	8	24,960	2.13	1.17	0.23	0.04	928.52	0.06	0.03	0.006	0.001	25.55
Flat deck barges (materials transport)	Number of Vessels per Day	30		MARINE		1	4	3	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30		MARINE		1	4	1											
														TOTAL	**1.41**	**0.26**	**0.06**	**0.01**	**280.70**

Notes - Includes total estimates for all three stages of construction as outlined in EA.
Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.
Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.
Stage 3 consists of the replacement of the existing east bridge.

Table A-9
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Equipment	Type of Fuel	Equipment Rated Engine HP	Average Daily Utilization Rate	Source Classification Code (SCC)	Average Daily Load Factor	Construction Activity Duration		Monthly average number of units in operation	Total Equipment Utilization (hp-hrs)	NONROAD Model Emission Factor (g/hp-hr)					2034 Emission Totals (tons)				
						Average Days/Week	Average hrs/day	2034	2034	CO	NOx	VOC	PM2.5	CO2	CO	NOx	VOC	PM2.5	CO2
Land Based Equipment																			
Air Compressor (185 CFM)	Diesel	55	0.85	2270006015	0.43	5	8	3	125,440	0.49	3.07	0.14	0.05	589.91	0.07	0.43	0.020	0.007	81.57
Back Hoe (Cat 325 or equivalent)	Diesel	190	0.25	2270002066	0.21	5	4	2	20,748	0.72	1.31	0.24	0.12	625.79	0.02	0.03	0.005	0.003	14.31
Ballast Grader	Diesel	270	0.60	2270002048	0.59	2	4	2	79,523	0.12	0.30	0.13	0.01	536.41	0.01	0.03	0.012	0.001	47.02
Crane (Crawler, 150 Ton)	Diesel	225	0.65	2270002045	0.43	5	4	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Crane (Crawler, 200 Ton)	Diesel	250	0.80	2270002045	0.43	5	4	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Crane (RT, 60 Ton)	Diesel	190	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Drill Rig (Tieback)	Diesel	225	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Dozer (Cat D7 or equivalent)	Diesel	180	0.35	2270002069	0.59	5	6	2	115,970	0.12	0.31	0.13	0.01	536.41	0.02	0.04	0.017	0.001	68.57
Drill Rig (Soilmec 622)	Diesel	410	0.80	2270002033	0.43	5	6	0	0	0.51	1.84	0.17	0.08	530.49	0.00	0.00	0.000	0.000	0.00
Forklift (10000 lb)a	Diesel	105	0.55	2270002057	0.59	2	4	3	42,522	0.21	0.46	0.14	0.03	536.39	0.01	0.02	0.006	0.001	25.14
Generator (150 kWh)	Diesel	200	0.90	2270006005	0.43	5	8	3	482,976	0.43	1.76	0.19	0.09	530.42	0.23	0.94	0.103	0.046	282.39
Generator (350 kWh)	Diesel	475	0.90	2270006005	0.43	5	8	3	1,147,068	0.48	1.73	0.17	0.07	530.50	0.61	2.19	0.216	0.092	670.76
Hoe Ram	Diesel	250	0.55	2270002006	0.43	5	6	0	0	4.45	4.33	0.56	0.35	588.58	0.00	0.00	0.000	0.000	0.00
Light Plant	Diesel	55	0.25	2270002027	0.43	5	2	3	9,224	1.05	3.39	0.20	0.14	589.72	0.01	0.03	0.002	0.001	6.00
Paver	Diesel	224	0.45	2270002009	0.43	1	6	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Roller	Diesel	135	0.45	2270002009	0.43	3	4	2	32,601	2.34	4.46	0.45	0.35	588.94	0.08	0.16	0.016	0.013	21.16
Slurry Plant (75 HP Pump)	Diesel	75	0.90	2270006010	0.43	5	6	0	0	1.20	2.04	0.25	0.19	589.57	0.00	0.00	0.000	0.000	0.00
Tamping Machine	Diesel	130	0.60	2270002006	0.43	2	4	1	13,953	4.45	4.33	0.56	0.35	588.58	0.07	0.07	0.009	0.005	9.05
Track Loader (Cat 973 or equivalent)	Diesel	210	0.20	2270002066	0.21	3	4	0	0	0.72	1.31	0.24	0.12	625.79	0.00	0.00	0.000	0.000	0.00
Welding Machine	Diesel	350	0.25	2270006025	0.21	2	2	0	0	1.25	1.92	0.28	0.16	625.66	0.00	0.00	0.000	0.000	0.00
Dynamic Soil Compaction	Diesel	250	0.55	2270002009	0.43	5	4	0	0	2.34	4.46	0.45	0.35	588.94	0.00	0.00	0.000	0.000	0.00
Pile driving hammer	Diesel	150	0.55	2270006005	0.43	5	6	0	0	0.53	1.86	0.21	0.12	530.38	0.00	0.00	0.000	0.000	0.00
Marine Based Equipment																			
Sheetpile vibratory hammer	Diesel	300	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Barge mounted 200 Ton Crane	Diesel	340	0.80	2270002045	0.43			0	0	0.21	0.83	0.14	0.03	530.60	0.00	0.00	0.000	0.000	0.00
Barge mounted 100 Ton Crane	Diesel	230	0.65	2270002045	0.43	5	6	0	0	0.10	0.39	0.13	0.01	530.61	0.00	0.00	0.000	0.000	0.00
Pile driving hammer – 800 kJ	Diesel	1500	0.55	2270006005	0.43	5	6	0	0	0.48	1.73	0.17	0.07	530.50	0.00	0.00	0.000	0.000	0.00
Rock Socket Drilling Rig	Diesel	209	0.85	2270002033	0.43	5	6	0	0	0.40	1.65	0.19	0.08	530.45	0.00	0.00	0.000	0.000	0.00
Tugboats (1500 HP)- Main Engine	Diesel	1500	0.6	-	0.50	2	2	3	280,800	0.69	4.21	0.22	0.11	506.69	0.21	1.30	0.068	0.033	156.83
Delivery Barges	Diesel	1500	0.6	-	0.50	1	4	0	0	0.69	4.21	0.22	0.11	506.69	0.00	0.00	0.000	0.000	0.00
Compressors - surface tools	Diesel	275	0.75	2270006015	0.43	5	8	3	553,410	0.12	0.54	0.14	0.02	530.60	0.07	0.33	0.084	0.012	323.68
Concrete pump - general	Diesel	250	0.75	2270006010	0.43	2	4	0	0	0.44	1.76	0.19	0.09	530.42	0.00	0.00	0.000	0.000	0.00
Excavator - long reach, tracked	Diesel	203	0.25	2270002036	0.59	5	4	0	0	0.12	0.29	0.13	0.01	536.41	0.00	0.00	0.000	0.000	0.00
Telescopic boom - self-propelled	Diesel	75	0.55	2270002045	0.43	5	4	3	55,341	0.35	0.44	0.14	0.03	589.93	0.02	0.03	0.008	0.002	35.99
On-Road and Marine Sources																			
Construction Dirt Handling, Marine Vessels, Material Deliveries and Removals	**Units**	**Total Miles per Round Trip within Boston Metro**		**Vehicle Category Code**		**Construction Activity Duration**		**Monthly average number of units in**	**Total Vehicle Miles Traveled (VMT)**	**MOVES Model Emission Factor (g/VMT)**					**2034 Emission Totals (tons)**				
						Average Days/Week	**Average hrs/day**	**2032**	**2032**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**	**CO**	**NOx**	**VOC**	**PM2.5**	**CO2**
Worker Commutes	Number of Workers per Day	40		LDT/LDC		5	NA	58	603,200	2.44	0.10	0.08	0.01	334.57	1.62	0.07	0.056	0.006	222.45
Trucks - Delivery, Removal, Worker, Dirt Handling, etc.	Number of Vehicles per Day	40		HDDV		5		2	20,800	2.13	1.17	0.23	0.04	928.52	0.05	0.03	0.005	0.001	21.29
Dump Truck	Number of Vehicles per Day	5		HDDV		2	4	3	6,240	2.13	1.17	0.23	0.04	928.52	0.01	0.01	0.002	0.000	6.39
Tractor Trailer	Number of Vehicles per Day	5		HDDV		2	4	3	6,240	2.59	4.42	0.16	0.09	1716.62	0.02	0.03	0.001	0.001	11.81
Truck Mixer	Number of Vehicles per Day	5		HDDV		3	4	0	0	2.13	1.17	0.23	0.04	928.52	0.00	0.00	0.000	0.000	0.00
Flat deck barges (materials transport)	Number of Vessels per Day	30		MARINE		1	4	0	Included in NonRoad Estimates										
Pile delivery barges	Number of Vessels per Day	30		MARINE		1	4	0											
														TOTAL	**1.70**	**0.13**	**0.06**	**0.01**	**261.94**

Notes - Includes total estimates for all three stages of construction as outlined in EA.

Stage 1: constructing the new bridge to the west along with new Station Tracks 11 and 12, the associated platform, and a new Tower A, and modifying the North Bank Bridge.

Stage 2 consists of the replacement of the existing west bridge. During this phase of work, the North and South Trestle will be constructed to the limits that are available without impacting active tracks.

Stage 3 consists of the replacement of the existing east bridge.

Table A10
MBTA Draw 1 Project
Construction Equipment Estimates
Construction activity in Boston, MA

Construction Year	Emission Totals (tons/year)				
	CO	NOx	VOC	PM2.5	CO2
2026	7.5	16.5	1.7	0.7	4,978.5
2027	12.4	27.3	2.9	1.1	9,173.9
2028	9.7	24.9	2.6	0.9	8,263.2
2029	7.2	24.2	2.5	1.0	7,585.7
2030	9.5	27.8	2.9	1.1	8,496.1
2031	8.1	27.6	2.9	1.1	8,718.2
2032	9.0	26.7	2.8	1.1	8,271.0
2033	7.8	26.6	2.7	1.0	8,418.3
2034	3.1	5.7	0.6	0.2	2,004.4
Conformity DeMinimis Thresholds	100.0	100.0	50.0	100.0	NA

Appendix I
Technical Report: Noise and Vibration

MBTA Draw One Bridge Replacement

Draft Noise and Vibration Technical Report

HMMH Report No. 23-0217A
11/18/2024

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1 Introduction and Summary

Harris Miller Miller & Hanson Inc. (HMMH) conducted a noise and vibration impact assessment for the Massachusetts Bay Transportation Authority (MBTA) Draw One Bridge Replacement Project (Project). This assessment was carried out for MBTA under subcontract to STV Inc. (STV) in support of the National Environmental Policy Act (NEPA) Environmental Assessment (EA) for the Project. The objective of the study was to assess the potential for noise and vibration impact at sensitive locations and identify if mitigation along the Project corridor would be required.

1.1 Project Description

MBTA proposes the construction of the Draw One Bridge Replacement and associated trackwork in order to bring the crossing of the Charles River to a state of good repair and improve operation flexibility and reliability at North Station.

The project is located just north of North Station and crosses the Charles River and extends just north into Cambridge. The project area is located within the MBTA ROW except for a small acquisition required at the corner of the MGH property.

The project consists of the following elements:

- Replace the existing two bascule bridges with three vertical lift bridges
- Demolish remaining foundations from two previous bascule bridges located on the site
- Replace the north and south trestles
- Replace existing fender along a new alignment
- Raise the North Bank Bridge, relocate Piers 3 and 4, and construct a new pier 4A
- Relocate the temporary control tower
- Demolish the existing Tower A and construct the new Tower A with parking lot
- Construct a closed drainage system for the new bridge with new outfalls to the Charles River and Millers River
- Cutover signals from the existing signal houses to the new signal houses
- Connect bridge tracks to existing North Station tracks, including reconstruction of direct fixation where required
- Connect bridge tracks to mainline tracks north of the bridge

Construction will require maintenance of service into and out of the station, including a minimum of 8 active station tracks and 4 active tracks across the river during weekdays and a minimum of 5 active station tracks on weekends. This construction would impact tracks, drainage, signals, and electrical services during each stage of construction. The existing approach slab, sub-ballast slab and direct fixation slabs along with the existing seawall will all be impacted and require varying levels of modification or replacement. Construction will occur between active tracks and require equipment to operate over active tracks and will necessitate close coordination between construction and train operations for the duration of the project.

Construction is expected to last 8 years, starting spring 2026 and be completed spring of 2034.

Sequencing of activities: This work is planned to be performed as part of staged construction

- Construct the upstream temporary work trestle structures
- Construct the westerly vertical lift bridge, Tower A, and modify the North Bank Bridge
- Activate one track on the westerly bridge and construct a portion of the south trestle between the westerly bridge and center bridge.
- Construct the downstream temporary work trestle structures
- Move all train service from the center bridge to the westerly bridge and demolish the center bascule bridge and construct the center vertical lift bridge
- Activate one track on the center bridge and construct a portion of the south trestle between the center bridge and the easterly bridge.
- Demolish the upstream temporary work trestle structures
- Remove all train service from the easterly bridge, demolish the easterly bascule bridge and construct the easterly vertical lift bridge.
- Demolish the downstream temporary work trestle structures

The project is intended to improve safety and reliability and would not result in increased train activity. Therefore, the potential for effects would be limited to changes in how trains would move into and out of the existing station via the replacement bridge, as described above. Additionally, 5-mph speed increases may be possible with the new bridge structure, though such increases would remain limited by movement into and out of the station. Construction activities would be of limited durations in any particular location, and all together would be limited physically and geographically and would be limited to certain time periods.

Other planned projects in the vicinity include the following:

- MBTA proposes to perform Track and Signal Upgrades, including track realignment, installation of new special trackwork and signals and is located immediately to the north of the Draw One Replacement Project. Anticipated construction is expected to begin in Fall of 2024 and continue through Fall of 2027.
- MBTA proposes to rehabilitate and extend North Station Platform F which includes the extension of Platform F, Tracks 11 and 12 and tying Tracks 11 and 12 into the track network. The North Station Platform F work is located immediately south of the Draw One Replacement Project. Anticipated construction is expected to begin in Fall of 2024 and continue through Spring 2026.
- MBTA proposes to construct the Cross River Bridge which would be upstream of the Draw One Bridge and would provide a pedestrian connection from North Point Park across the Charles River to the Nashua Street Park. Anticipated Construction is expected to begin in Spring 2032 and continue through Fall 2034.
- DCR proposes to construct the South Bank Bridge which would cross the MBTA ROW along the bank of the Charles River from the Nashua Street Park to a new currently undeveloped park. There is no planned construction timeline for the bridge at this point.

It is expected that construction of the adjacent Track and Signal Upgrades Project and the North Station Platform F Project will be sufficiently complete when construction begins on the Draw One Project that there will be minimal impacts on the Draw One Project. The first new vertical lift bridge is not expected to be commissioned until 2029, well after completion of these two projects and allowing sufficient separation in schedule for the Draw One Project to construct additional trackwork and tie into the station and mainline tracks. The Cross River Bridge will begin construction after all construction from the upstream side of the Draw One Replacement Project is completed and will not impact construction on the downstream side of the Draw One Replacement Project. The South Bank Bridge construction has not been scheduled at this point but will be required to wait until construction of the Draw One Replacement Project is substantially complete since it will be constructed above the south trestle.

1.2 Summary of Results

A summary of the study results is described below. Section 2 provides a discussion of environmental noise and vibration basics, and Section 3 describes the criteria used to assess noise and vibration impact. Section 4 includes existing noise and vibration conditions, and Section 5 includes noise and vibration measurement results. Section 6 includes projections and impact assessment of future noise and vibration conditions, and potential mitigation measures are outlined in Section 7. Appendix A includes measurement site photographs and calibration sheets.

1.2.1 Noise and Vibration Impact Assessment

The project would not result in operational noise or vibration impacts, but it would result in temporary construction impacts. Operationally, the project enables more efficient movement of trains into and out of North Station by increasing capacity at the river crossing; however, there is no associated increase or change in operations associated with the project, other than slight speed increases of 5 miles per hour in some areas. While the tracks will be somewhat closer to some noise and vibration sensitive uses, the change in alignment is not predicted to cause exceedances of applicable impact criteria.

Construction of the project would result in noise and vibration impacts prior to mitigation. The main cause of these impacts is the use of heavy construction equipment and pile driving in relatively close proximity to various noise and vibration sensitive uses. A variety of mitigation strategies should be employed to reduce these levels where feasible to avoid damage and annoyance. Specific mitigation will be agreed to in a noise and vibration control plan prepared for the project during final design and prior to construction.

2 Environmental Noise and Vibration Basics

2.1 Noise Fundamentals and Descriptors

Noise is typically defined as unwanted or undesirable sound, where sound is characterized by small air pressure fluctuations above and below the atmospheric pressure. The basic parameters of environmental noise that affect human subjective response are (1) intensity or level, (2) frequency content and (3) variation with time. The first parameter is determined by how greatly the sound pressure fluctuates above and below the atmospheric pressure and is expressed on a compressed scale in units of decibels. By using this scale, the range of normally encountered sound can be expressed by values between 0 and 120 decibels. On a relative basis, a 3-decibel change in sound level generally represents a barely noticeable change outside the laboratory, whereas a 10-decibel change in sound level would typically be perceived as a doubling (or halving) in the loudness of a sound.

The frequency content of noise is related to the tone or pitch of the sound and is expressed based on the rate of the air pressure fluctuation in terms of cycles per second (called Hertz and abbreviated as Hz). The human ear can detect a wide range of frequencies from about 20 Hz to 17,000 Hz. However, because the sensitivity of human hearing varies with frequency, the “A-weighting system” is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response. Sound levels measured using this weighting system are called "A-weighted" sound levels and are expressed in decibel notation as "dBA." The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise.

Because environmental noise fluctuates from moment to moment, it is common practice to condense all this information into a single number, called the “equivalent” sound level (L_{eq}). L_{eq} can be thought of as the steady sound level that represents the same sound energy as the varying sound levels over a specified time period (typically 1 hour or 24 hours). Often the L_{eq} values over a 24-hour period are used to calculate cumulative noise exposure in terms of the Day-Night Sound Level (L_{dn}). L_{dn} is the A-weighted L_{eq} for a 24-hour period with an added 10-decibel penalty imposed on noise that occurs during the nighttime hours (between 10 P.M. and 7 A.M.). Many surveys have shown that L_{dn} is well correlated with human annoyance, and therefore this descriptor is widely used for environmental noise impact assessment. Figure 1 provides examples of typical noise environments and criteria in terms of L_{dn}. While the extremes of L_{dn} are shown to range from 35 dBA in a wilderness environment to 85 dBA in noisy urban environments, L_{dn} is generally found to range between 55 dBA and 75 dBA in most communities. As shown in Figure 1, this spans the range between an “ideal” residential environment and the threshold for an unacceptable residential environment according to some U.S. Federal agencies criteria.

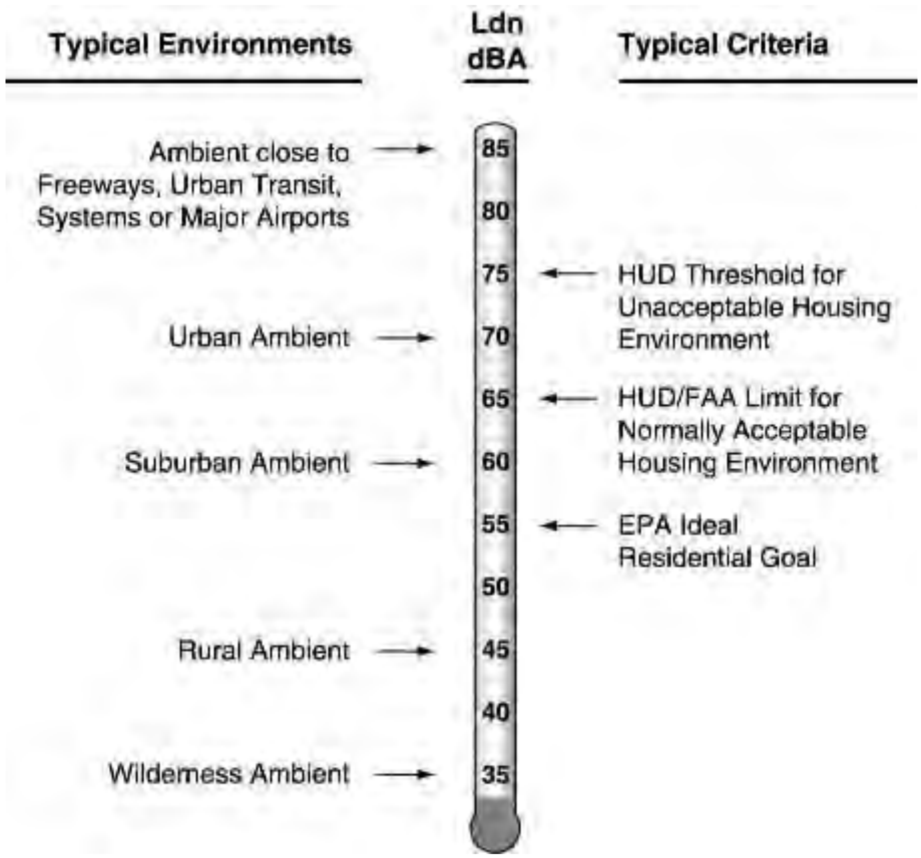

Figure 1. Examples of Outdoor Noise Exposure

2.2 Ground-Borne Noise and Vibration Fundamentals and Descriptors

Ground-borne vibration is the oscillatory motion of the ground about some equilibrium position that can be described in terms of displacement, velocity or acceleration. Because sensitivity to vibration typically corresponds to the amplitude of vibration velocity within the low-frequency range of most concern for environmental vibration (roughly four to 80 Hz), velocity is the preferred measure for evaluating ground-borne vibration from transit projects.

The most common measure used to quantify vibration amplitude is the peak particle velocity (PPV), defined as the maximum instantaneous peak of the vibratory motion. PPV is typically used in monitoring blasting and other types of construction-generated vibration, since it is related to the stresses experienced by building components. Although PPV is appropriate for evaluating building damage, it is less suitable for evaluating human response, which is better related to the average vibration amplitude. Thus, ground-borne vibration from trains is usually characterized in terms of the "smoothed" root mean square (rms) vibration velocity level, in decibels (VdB), with a reference quantity of one micro-inch per second. VdB is used in place of dB to avoid confusing vibration decibels with sound decibels.

Figure 2 illustrates typical ground-borne vibration levels for common sources as well as criteria for human and structural response to ground-borne vibration. As shown, the range of interest is from approximately 50 to 100 VdB, from imperceptible background vibration to the threshold of damage. Although the approximate threshold of human perception to vibration is 65 VdB, annoyance is usually not significant unless the vibration exceeds 70 VdB.

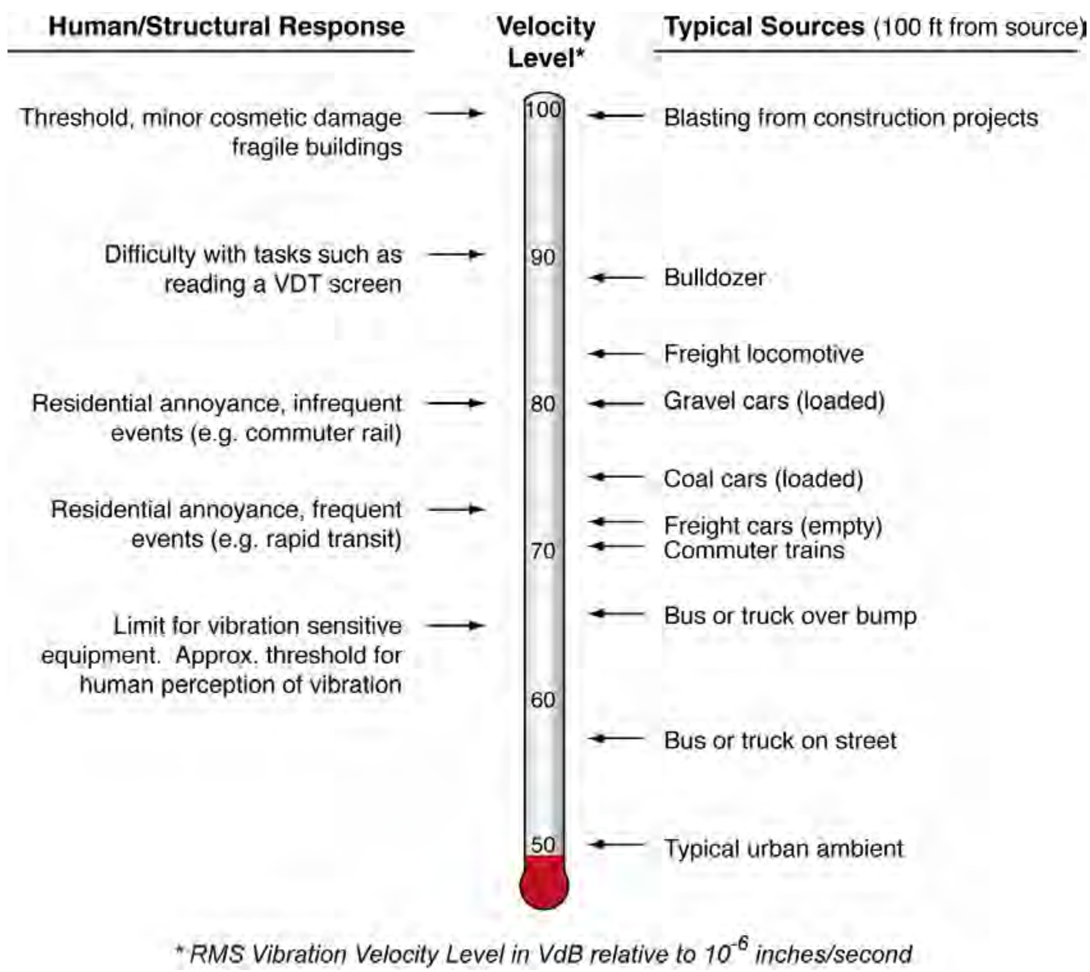

Figure 2. Typical Ground-Borne Vibration Levels

Ground-borne noise is produced when ground-borne vibration propagates into a room and radiates noise from the motion of the surfaces. The room surfaces essentially act like a giant loudspeaker from the vibration. Ground-borne noise is perceived as a low frequency rumble and is generally considered only when airborne paths are not present (e.g., train inside a tunnel or a large masonry building with no windows or other openings to the outdoors). Ground-borne noise is assessed according to the A-weighted sound level in dBA. As presented in the following section, there are separate noise criteria for potential impact from airborne noise versus ground-borne noise.

3 Noise and Vibration Impact Criteria

3.1 Noise and Vibration Sensitive Land Use Categories

The FTA classifies noise-sensitive land uses into the following three categories.

- Category 1: Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
- Category 2: Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity is assumed to be of utmost importance.
- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

The FTA classifies vibration-sensitive land uses into the same three categories as noise. Although, since vibration is only assessed inside buildings, outdoor land uses are not considered to be sensitive. In addition to the potential for human annoyance from vibration, vibration impact is also assessed for certain equipment that is sensitive to vibration and the potential for damage to building structures.

- Vibration Category 1: High Sensitivity: Included in this category are buildings where vibration would interfere with operations. Vibration levels may be well below those associated with human annoyance. These buildings include vibration-sensitive research and manufacturing facilities, hospitals with sensitive equipment and university research operations. The sensitivity to vibration is dependent on the specific equipment present. Some examples of sensitive equipment include electron-scanning microscopes, magnetic resonance imaging scanners and lithographic equipment.
- Vibration Category 2: Residential: Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels.
- Vibration Category 3: Institutional: This category includes buildings with primarily daytime and evening use. This category includes schools, libraries and churches.

There are some buildings, such as concert halls, recording studios, and theaters that can be very sensitive to noise and/or vibration but do not fit into any of the three categories. Due to the sensitivity of these buildings, they usually warrant special attention during the environmental assessment of a transit project. Potential ground-borne vibration and ground-borne noise impact is assessed at special-use buildings such as concert halls, recording studios, auditoriums and theatres.

3.2 Noise Impact Criteria

The FTA airborne noise impact criteria are founded on well-documented research on community reaction to noise and are based on the future change in noise exposure using a sliding scale. At locations with higher levels of existing noise, smaller increases in total noise exposure are allowed.

The Day-Night Sound Level (L_{dn}) is used to characterize noise exposure for locations with nighttime sensitivity (Category 2). For institutional land uses with primarily daytime use, such as parks and school buildings (Categories 1 and 3), the one-hour “equivalent” sound level (L_{eq}) during the facility’s operating period is used. L_{dn} and L_{eq} are explained in Section 2.1.

There are two levels of impact included in the FTA criteria, as summarized below:

- Severe Impact: Project-generated noise in the severe impact range can be expected to cause a significant percentage of people to be highly annoyed by the new noise and represents the most compelling need for mitigation. Noise mitigation will normally be specified for severe impact areas unless there are truly extenuating circumstances that prevent it.
- Moderate Impact: In this range of noise impact, the change in the cumulative noise level is noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These factors include the existing noise level, the predicted level of increase over existing noise levels, the types and numbers of noise-sensitive land uses affected, the noise sensitivity of the properties, the effectiveness of the mitigation measures, community views and the cost of mitigating noise to more acceptable levels.

The FTA noise impact criteria used in this assessment are shown in graphical form in Figure 3. One example would be a residential use with an existing environment of 50 dBA L_{dn} would experience a moderate impact if the Project creates a noise exposure of approximately 53 dBA to 59 dBA L_{dn}. Another example would be a residence with an existing environment of 65 dBA L_{dn} would be classified as having moderate impact if the Project creates a noise exposure of 61 dBA to 66 dBA L_{dn}. Those same existing environments (50 or 65 dBA L_{dn}) would be classified as having a severe impact if the Project creates noise exposure levels greater than 59 dBA and 66 dBA L_{dn}, respectively.

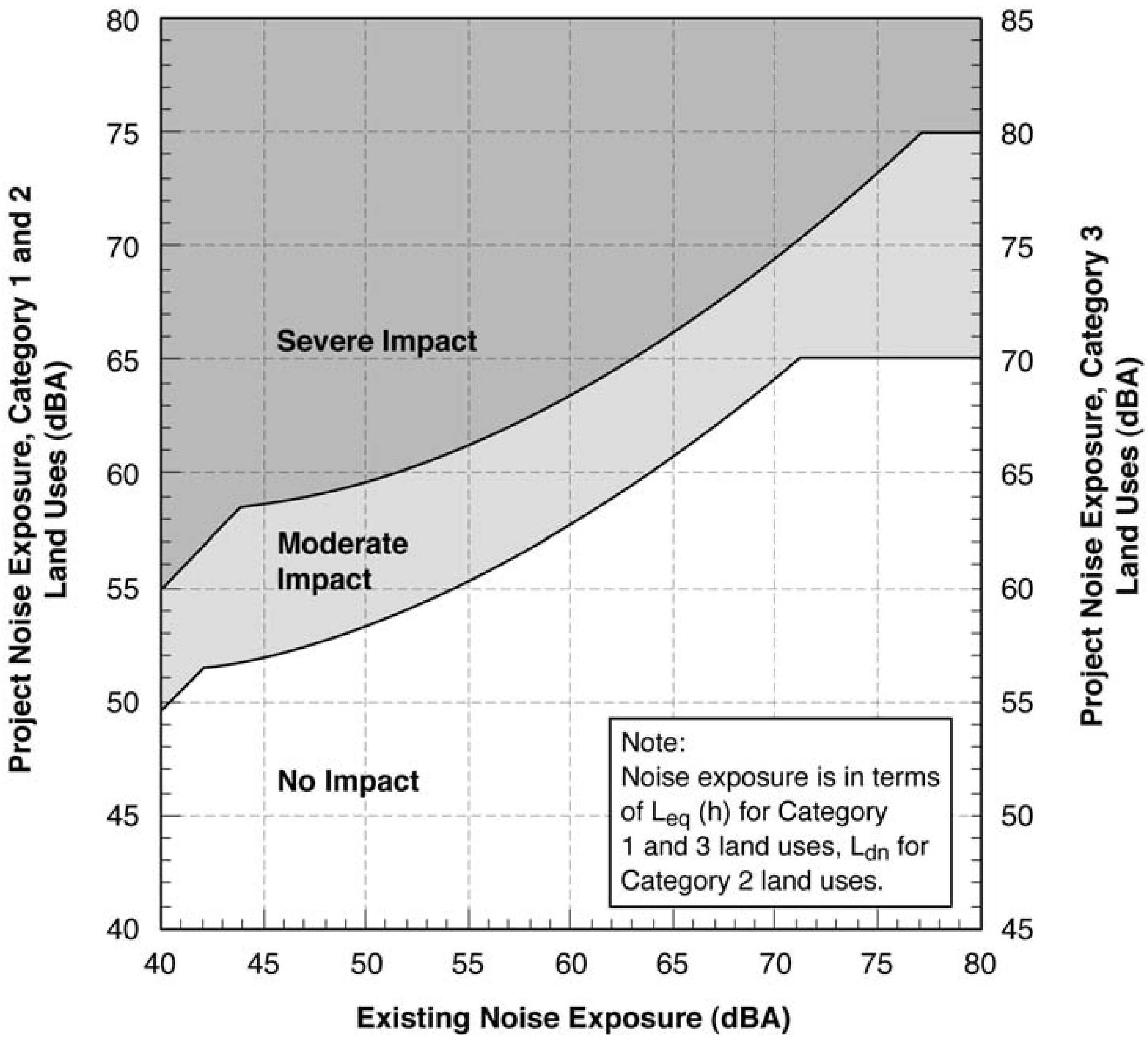

Figure 3. FTA Noise Impact Criteria

3.3 Ground-Borne Noise and Vibration Impact Criteria

The FTA vibration impact criteria are based on land use and train frequency, as shown in Table 1. There are some buildings, such as concert halls, recording studios and theaters that can be very sensitive to vibration but do not fit into any of the three categories listed in Table 1. Due to the sensitivity of these buildings, they usually warrant special attention during the environmental assessment of a transit project. Table 2 gives criteria for acceptable levels of ground-borne vibration for various types of special buildings.

It should also be noted that there are separate FTA criteria for ground-borne noise, the "rumble" that can be radiated from the motion of room surfaces in buildings due to ground-borne vibration. Such criteria are particularly important for underground transit operations. However, because airborne noise tends to mask ground-borne noise from above ground (i.e., at-grade or elevated) rail systems, ground-borne noise levels are generally only assessed in buildings without significant airborne noise paths.

Table 1. FTA Ground-Borne Noise and Vibration Impact Criteria

Land Use Category	Ground-Borne Vibration Impact Criteria (VdB re: 1 micro-inch per second)			Ground-Borne Noise Impact Criteria (dBA re: 20 mico-Pascal)		
	Frequent[1] Events	Occasional[2] Events	Infrequent[3] Events	Frequent[1] Events	Occasional[2] Events	Infrequent[3] Events
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	n/a[5]	n/a[5]	n/a[5]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:
1 “Frequent Events” is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2 “Occasional Events” is defined as between 30 and 70 vibration events of the same kind per day. Most commuter rail trunk lines have this many operations.
3 “Infrequent Events” is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
5 Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

Source: FTA 2018

Table 2. FTA Gound-Borne Nosie and Vibration Impact Criteria for Special Buildings

Type of Building or Room	Ground-Borne Vibration Impact Criteria (VdB re: 1 micro-inch per second)		Ground-Borne Noise Impact Criteria (dBA re: 20 mico-Pascal)	
	Frequent Events	Occasional or Infrequent Events	Frequent Events	Occasional or Infrequent Events
Concert Halls	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theatres	72 VdB	80 VdB	35 dBA	43 dBA

Source: FTA 2018

In addition to the criteria provided in Table 1 and Table 2 for general assessment purposes, FTA has established criteria in terms of one-third octave band frequency spectra for use in detailed analyses. Table 3 and Figure 4 show the more detailed vibration criteria and the description of their use.

Table 3. Vibration Criteria for Detailed Analysis

Criterion Curve	Maximum Vibration Level (VdB re: 1 micro-inch per second)	Description of Use
Workshop	90	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas
Office	84	Feelable vibration. Appropriate to offices and non-sensitive areas
Residential Day	78	Barely feelable vibration. Adequate for computer equipment and low-power optical microscopes (up to 20X)
Residential Night, Operating Rooms	72	Vibration not feelable, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100X) and other equipment of low sensitivity
VC-A	66	Adequate for medium- to high-power optical microscopes (400X), microbalances, optical balances, and similar specialized equipment
VC-B	60	Adequate for high-power optical microscopes (1000X), inspection and lithography equipment to 3 micron line widths
VC-C	54	Appropriate for most lithography and inspection equipment to 1 micron detail size
VC-D	48	Suitable in most instances for the most demanding equipment, including electron microscopes operating to the limits of their capability
VC-E	42	The most demanding criterion for extremely vibration-sensitive equipment

Source: FTA 2018

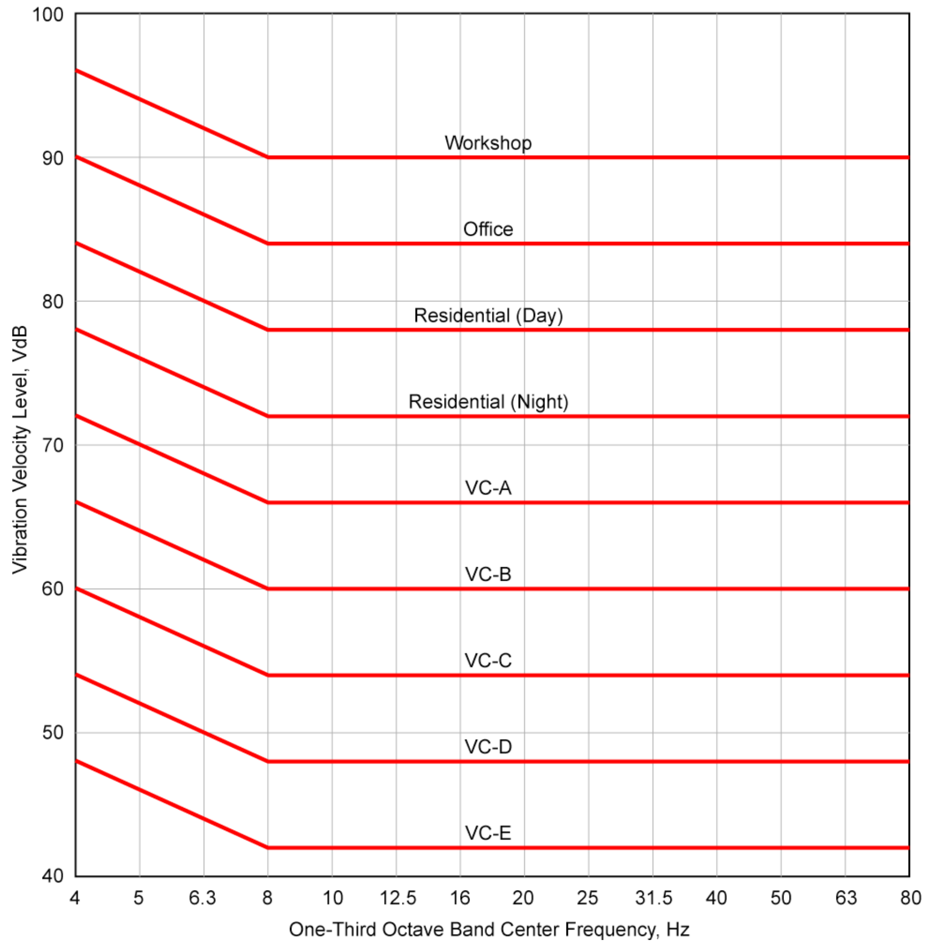

Figure 4. Criteria for Detailed Vibration Analysis

3.4 Construction Noise Criteria

Applicable construction noise criteria include those from the FTA and the cities of Boston and Cambridge, Massachusetts. The FTA construction noise guidelines are provided in Table 4 and the city Boston criteria is listed in Table 5. The City of Boston's criteria are associated with the L_{10} and L_{max} metrics. Pile driving is not regulated by the City of Boston. The L_{10} is the level exceeded 10-percent of a given period, in this case hourly, and the L_{max} is the maximum level over the same period. Boston's noise regulation indicates that an impact occurs if the background L_{10} is exceeded by 5 dB. For this analysis the background L_{10} plus 5 dB is used to assess potential impact conditions. The City of Boston, via their municipal code, also limits construction to occurring weekdays between the hours of 7:00 a.m. and 6:00 p.m. Cambridge regulates construction noise via their noise ordinance which limits construction noise to daytime periods from 7:00 a.m. to 6:00 p.m. on weekdays, 9:00 a.m. to 6:00 p.m. on Saturdays and holidays, and is not allowed on Sundays without approval from the Cambridge police department. Federal guidelines, such as those provided in Table 4 do not supersede local regulations.

Table 4. FTA Construction Noise Criteria

Land Use Category	Daytime Construction Period (dBA L_{eq})	Nighttime Construction Period (dBA L_{eq})
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: FTA 2018

Table 5. City of Boston Construction Noise Limits

Land Use Category	dBA L_{10}	dBA L_{max}
Residential or Institutional	75	86
Business or Recreational	80	n/a
Industrial	85	n/a

Source: City of Boston

3.5 Construction Vibration Criteria

In addition to ground-borne vibration criteria for humans in residential, institutional, and special buildings and vibration-sensitive equipment, there are ground-borne vibration criteria for potential damage to structures. The limits of vibration that structures can withstand are substantially higher than those for humans and for sensitive equipment. Table 6 presents criteria for assessing the potential for vibration damage to structures based on the type of building construction. This table includes rms vibration levels in VdB reference to 1 micro-inch per second and peak-particle velocity levels in inches per second. A crest factor of four, representing a difference of 12 decibels between peak and rms is used in this table. It should be noted that these criteria are more conservative than other standards such as the U.S. Bureau of Mines frequency-dependent vibration criteria which is equivalent to approximately 114 VdB at 40 Hz and above.

Table 6. Construction Vibration Damage Criteria

Building Category	Ground-Borne Vibration Level (VdB) and Peak-Particle Velocity Equivalent (in/sec)
Reinforced-concrete, steel or timber	102 VdB (0.5 in/s)
Engineered concrete and masonry	98 VdB (0.3 in/s)
Non-engineered timber and masonry buildings	94 VdB (0.2 in/s)
Buildings extremely susceptible to vibration damage	90 VdB (0.12 in/s)

Source: FTA 2018

4 Existing Conditions

4.1 Noise and Vibration Sensitive Land Use

Noise and vibration-sensitive land use near the Proposed Action include institutional sites such as parks and an office. Parks that are considered to have passive recreation are sensitive to noise. Five sensitive uses are located near the project, specifically:

- North Point Park (R13 on Figure 5)
- Paul Revere Playground (N2 on Figure 5)
- Nashua Street Park (N1/R12 on Figure 5)
- Jail cells at the Suffolk County Sheriff's Department (R26 on Figure 5)
- Massachusetts General Hospital Administration Building (R27 on Figure 5; note no medical uses, only administrative offices. This will be confirmed prior to construction.)

North Point Park, Paul Revere Playground, and Nashua Street Park all have a number of passive uses, such as park benches; therefore, these uses are considered Category 3 FTA uses. Other than the North Point Park all of these Category 3 FTA uses are within the City of Boston and would be considered recreational. The jail cells at the Suffolk County Sheriff's Department are considered Category 2 FTA uses because the cells are places where people sleep. The Massachusetts General Hospital Administration Building is not considered noise sensitive; however, the office building is considered in the vibration assessment since the primary use is office space (see Table 3). For construction noise, the Massachusetts General Hospital Administration Building is considered a business for the City of Boston's construction noise criteria.

5 Noise and Vibration Measurements

Four noise and vibration measurements were conducted in the project analysis area. Figure 5 is a map of the measurement locations, sensitive land uses, and project track alignment.

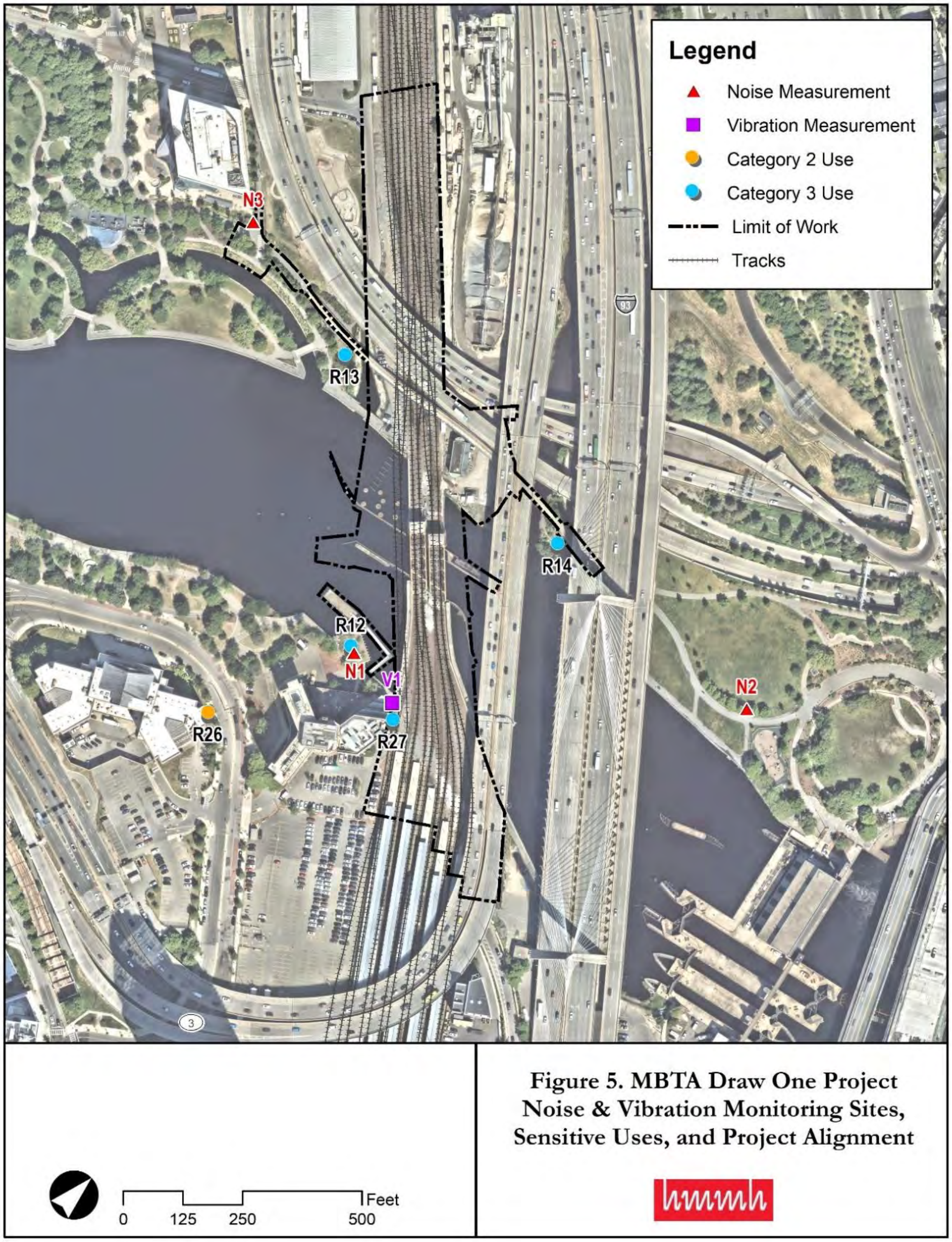

Figure 5. Noise and Vibration Measurements, Sensitive Uses, and Project Track Alignment

5.1 Noise and Vibration Measurement Equipment

All noise measurement equipment used in the study conforms to American National Standards Institute (ANSI) Standard S1.4 for Type 1 (precision) sound level meters. Calibrations traceable to the U.S. National Institute of Standards and Technology (NIST) were carried out in the field before and after each set of measurements using acoustical calibrators. Table 7 presents a list of noise and vibration measurement equipment used including manufacturer, model, and serial number. Appendix A provides the calibration certifications for each of the meters used in this analysis.

Table 7. Noise and Vibration Measurement Equipment

Equipment	Manufacturer	Model	Serial Num
Noise Meter	Bruel & Kjaer	2245	2245-100483
Vibration Meter	Bruel & Kjaer	2270	3011812

Source: HMMH 2024

5.2 Noise Measurement Methodology

Measurements to characterize the existing noise environment in the study area were conducted at three representative noise-sensitive receptors. Long-term (24-hour) measurements provide a direct measurement of both L_{dn} and peak transit-hour L_{eq}. One-second time histories of sound levels were measured along with audio recordings of events to identify noise from train activity. These measurements allowed us to separate noise generated from trains from other ambient sources.

Noise impact is assessed at outdoor land uses with frequent use such as passive park uses (i.e., benches) or at the nearest building façade. Noise measurement sites were selected based on the location of noise-sensitive land use along the project corridor, their proximity to the proposed project and the surrounding terrain. The distance from the measurement location to significant noise sources (i.e., rail line or busy streets) was chosen to be representative of typical noise-sensitive locations in each area. Furthermore, the microphone was positioned to characterize the exposure of the site to the dominant noise sources in the area, such as trains operating on the rail lines. Figure 6 through Figure 8 are photos of the noise monitoring locations.

Figure 6. Noise Measurement Location Photo at Massachusetts General Hospital Administrative Building

Figure 7. Noise Measurement Location Photo at Paul Revere Playground

Figure 8. Noise Measurement Location Photo at North Point Park

5.3 Vibration Measurements

One vibration measurement of existing commuter and Amtrak trains was conducted to provide detail on vibration generated by these sources. This information is used to characterize the levels of vibration experienced throughout the corridor at sensitive structures. The ground vibration measurement was conducted with a high-sensitivity accelerometer mounted in the vertical direction on top of steel stakes driven into soil. The acceleration signal was recorded on a Bruel and Kjaer 2270 meter and further analyzed in the HMMH lab. Figure 9 is a photo of the vibration measurement location with an MBTA train operating nearby.

Figure 9. Vibration Measurement Location Photo at Massachusetts General Hospital Administrative Building

5.4 Noise Measurement Results

To characterize the existing noise conditions throughout the Proposed Action, three long-term (24 hour) measurements were conducted. Sound levels throughout the area are consistent with an urbanized environment with dominant sources including train traffic on the existing rail alignment as well as roadway noise from busy highways such as I-93. Figure 5 shows the noise measurement site locations. Table 8 provides the existing noise measurement results including L_{dn} peak hour L_{eq}, and distance to the near track. Train pass-by events were logged while in the field and the L_{dn} as well as peak hour L_{eq} were adjusted to exclude these events to identify baseline conditions without train events as shown in Table 9. These tables show that much of the project analysis area is dominated by highway noise from the busy roadway network. The largest contribution of rail noise occurs at the receptors near Massachusetts General Hospital Administrative Building with the L_{dn} 3 dB higher with train activity than without.

Table 8. Summary of Existing Noise Measurements with Train Events

Measurement Site	Location	Existing Day-Night Average Sound Level (L_{dn})	Existing Peak Hour Sound Level (L_{eq})	Distance to Near Track (feet)
N1	MA General Hospital Administration Building	72	69	119
N2	Paul Revere Playground	73	69	588
N3	North Point Park	71	69	299

Source: HMMH 2024

Table 9. Summary of Existing Noise Measurements without Train Events

Measurement Site	Location	Existing Day-Night Average Sound Level (L_{dn})	Existing Peak Hour Sound Level (L_{eq})	Distance to Near Track (feet)
N1	MA General Hospital Administration Building	69	66	119
N2	Paul Revere Playground	73	69	588
N3	North Point Park	70	69	299

Source: HMMH 2024

5.5 Vibration Measurement Results

Existing vibration along the project alignment varies depending on proximity to rail lines and which track vehicles are operating on. To characterize existing vibration levels, vibrations from MBTA commuter trains and Amtrak trains were measured as they operated on the existing track alignment. Measurements were made using PCB 393A accelerometers and Brüel & Kjær noise and vibration monitors (model 2270). The vibration measurement location is shown in Figure 5. Table 10 provides a summary of the vibration levels measured at the measurement location which was at Massachusetts General Hospital. The highest vibration levels were associated with trains operating on tracks closest to the measurement position, although there was some variation due to vehicle specific conditions such as differences in wheel condition.

Table 10. Summary of Existing Vibration Measurements

Train Event Track[1]	Maximum VdB	Distance to Near Track (feet)
Track 7	77.4	71.8
Track 9	85.9	45.5
Track 6	80.9	83
Track 7	80.2	71.8
Track 7	80.0	71.8
Track 7	76.2	71.8
Track 5	82.3	98.5
Track 6	80.7	83
Track 6	77.3	83
Track 2	82.5	130
Track 10	89.6	19.5
Track 7	78.0	71.8
Track 10	91.3	19.5
Track 8	79.4	54
Track 6	77.0	83

Note:
1 Track 10 is closest to the measurement position, track 9 is the next closest track, and so on.

Source: HMMH 2024

6 Noise and Vibration Impact Assessment

The steps described in FTA's Transit Noise and Vibration Impact Assessment Manual (FTA 2018) were followed to evaluate the potential noise and vibration impacts from the project. FTA methodology identifies a noise/vibration screening procedure, a general noise/vibration assessment, and a detailed noise/vibration analysis, which are outlined below. The screening procedure was used to identify what noise or vibration sensitive uses could potentially be impacted by the project and the detailed noise/vibration impact assessment procedures were used to identify potential noise and vibration impacts.

6.1 Noise Projections Methods

Existing noise levels (see Section 5) at all sensitive receptors have been estimated based on the nearest existing noise measurement location and relative distances to the dominant noise source, which is roadway noise in the vicinity of the project site. For use in the noise assessment, baseline sound levels collected were then adjusted by "removing" existing train pass activity noise to prevent operational noise from being "double-counted" as background noise when modeling the operational noise effects attributable only to the slight change in alignment that would result with the proposed project. Modeled operational sound levels were then added to this adjusted baseline logarithmically, and the impact thresholds shown in Figure 3 were used.

Noise impact is assessed at the closer location of either an outdoor area with frequent human use or the nearest building façade. The effects of terrain and intervening objects such as buildings have been included in the estimation of existing noise levels.

The contribution to future noise levels from the project is based on the distance between receptor locations and the project tracks, site-specific conditions such as the terrain, intervening objects, presence of special trackwork, presence of buildings, the train schedules and speeds.

The principal assumptions used in the analysis are summarized below:

- The track alignments used in the impact assessment were dated January 2023 based on the 75% design submittal.
- The operating periods, schedule, and consist of the commuter trains and Amtrak trains are not expected to change as part of the Project.
- The locations of the rail lines are expected to be modified as described in Section 1.1.
- The speeds of the commuter trains and Amtrak trains would increase by approximately 5 miles per hour under the new track alignment.
- Train warning horns will not be used on a routine basis.

6.1.1 Three-Dimensional Predictive Model

Operational sound levels can be assessed using spreadsheet models; however, efficiencies can be gained by implementing “off the shelf” acoustic modeling software that implements the FTA calculation methods. Additionally, analyses of complex rail operations are not easily accomplished via the spreadsheet models, such as the multiple track configurations near Boston’s North Station. Therefore, for this assessment, a three dimensional off the shelf predictive model, SoundPLAN software version 8.2, was used to calculate rail noise levels implementing the FTA methods. The project received approval from the FTA to use this modeling approach via approval of the non-standard modeling request titled “MBTA Draw One Project Nosie Modeling Methodology” (HMMH 2023). The SoundPLAN model includes an array of data inputs, such as sound sources, topography, buildings, and ground characteristics, such as paved areas and vegetated areas. The following steps were taken to implement the FTA/FRA standard for rail noise sources in SoundPLAN:

- Each train configuration (i.e., MBTA commuter trains and Amtrak trains) and the number of train movements on a given track location were entered into SoundPLAN as a train noise source.
- Each source term was applied to specific rail lines based on estimates of trains with the project in place.
- Modeling included terrain along the project corridor and the sensitive uses.
- Buildings were modeled as three-dimensional shapes to capture attenuation impacts.
- Although there are small patches of grass and dirt in the Project study area, the noise predictions conservatively assume a uniformly hard and acoustically reflective surface like that of a paved area.

6.2 Vibration Projections Methods

The FTA procedures for a general operational vibration assessment were used for this analysis (FTA 2018). This FTA vibration impact assessment uses the following data:

Number of daily vibration events: The number of daily events was classified as frequent because there would be over 70 vibration events from commuter and Amtrak trains per day.

- Receiver land use designation (categories specified above): Category 2 (for the residences) or Category 3 (parks, schools, daycare) land use designations were used for all of the receivers analyzed.
- Vibration source levels: The source levels were derived from Figure 6, 4, and Table 6-10 of the FTA manual (FTA 2018) using the curve for “locomotive powered passenger or freight”.
- Distance from source to receiver (building) footprints: The distance between the source (i.e., rail centerline) and the receiver was measured using a geographic information system.
- Train speed, suspension, wheel condition (worn or flat spots), and track condition: Train speeds are the same as those used for the noise impact assessment. Because the train types are regional and intercity rail the train’s wheels were assumed to be well-maintained and in good condition (i.e., no flat spots).
- Soil characteristics of ground between the vibration source and receiver: Soil propagation characteristics were assumed to be normal. Typical vibration sensitive structures were assumed to be large masonry buildings based on field observations.

- Receiver construction/foundation type and description, including whether it is fragile or extremely fragile: Using the generalized ground surface vibration curve, the root mean square velocity level data at the receiver distance of interest were adjusted based on the factors affecting the source, factors affecting the vibration path, and factors affecting the receiver (FTA 2018). Structure types and associated adjustments were also obtained from the FTA manual (FTA 2018).

Following FTA methodology, the potential for vibration damage and annoyance was assessed at sensitive land uses.

6.3 Noise Impact Assessment

Changing the railroad alignment would shift the noise source, commuter trains and Amtrak trains, closer to some noise sensitive receptors which has the potential to cause impact. Predicted operational noise levels at receptors included in this analysis are provided in Table 11 with a comparison to the moderate and severe impact thresholds identified based on the existing sound level at each receptor. As these results demonstrate the project would not result in an operational noise impact.

Table 11. Summary of Operational Noise Levels

Receptor (floor)[1]	Land Use Category	Units	Existing[2] L_{dn}/L_{eq}	Impact Threshold[1]		Proposed Action[1] (L_{dn}/L_{eq})	Impact Category
				Moderate	Severe		
R12(G)	3	1	65.8	68.5	73.7	68.4	No Impact
R13(G)	3	1	70.0	69.4	74.5	67.7	No Impact
R14(G)	3	1	77.5	70.0	80.0	64.5	No Impact
R26(G)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F2)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F3)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F4)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F5)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F6)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F7)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F8)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F9)	2	1	66.2	63.8	68.9	62.8	No Impact
R26(F10)	2	1	66.2	63.8	68.9	62.8	No Impact

1 Receptor ID/location are shown on **Figure 5**.
2 Category 2 receptors are assessed using the L_{dn} metric and Category 3 are assessed using the L_{eq} metric.
Source: HMMH 2024

6.4 Vibration Impact Assessment

Like the noise impact assessment, changing the railroad alignment would shift the vibration source, commuter trains and Amtrak trains, closer to some noise sensitive receptors which has the potential to cause impact. Predicted operational vibration levels at receptors included in this analysis are provided in Table 12 with a comparison to the impact thresholds based on the use at each receptor. As these results demonstrate the project would not result in an operational vibration impact.

Table 12. Summary of Operational Vibration Levels

Receptor (floor)	FTA Category	GBV Impact Threshold (VdB)	Significant Increase Threshold (dB)	GBN Impact Threshold (dBA)	Distance to Existing Track (feet)	Distance to Project Track (feet)	Existing Speed (mph)	Future Speed (mph)	Existing VdB	Project VdB	Increase over Existing[1]	Project GBN	GBV Impact	GBN Impact
R12(G)	3	73	3.0	43	133	102	10	10	64	66	3	16	No Impact	No Impact
R13(G)	3	73	3.0	38	136	110	15	20	67	71	5	21	No Impact	No Impact
R27(F10)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F11)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F12)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F13)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F2)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F3)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F4)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F5)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F6)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F7)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F8)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(F9)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact
R27(G)	3	84	3.0	43	12	12	10	10	82	83	0	33	No Impact	No Impact

Note:
1 If increase over existing exceeds significant increase threshold the project VdB is compared to the GBV Impact Threshold.

Source: HMMH 2024

6.5 Temporary Construction Noise Impacts

The construction noise criteria applicable to the Proposed Action are based on the City of Boston noise limits (see Section 3.4). According to the project Construction Staging Report (MBTA June 2023) the project would be constructed via four stages listed in Table 13.

Table 13. Construction Stages

Stage	Description
Stage 1	Construction Staging Trestle Plan[1]
Stage 2	Plan and Elevation[1]
Stage 3	North Bank Bridge Over Millers River & MBTA Plan and Profile
Stage 4	North Bank Bridge Over Millers River MBTA General Plan and Elevation[1]

Notes:
1 Stage includes pile driving.
Source: MBTA 2023

Construction noise for each stage was calculated using source levels and methods provided in the Federal Highway Administration Roadway Construction Noise Model (RCNM). FTA provides prediction methods for calculating construction noise which are used in this analysis since the City of Boston does not identify specific methods to be used. The analysis conservatively assumes all construction equipment, except for pile driving, for each stage would operate simultaneously at the closest construction location to each receptor point. Pile driving is allowed as long as it occurs during weekdays between the hours of 7:00 a.m. and 6:00 p.m. Table 14 lists the construction equipment that is included in the analysis for each stage. A comparison is made to the background L_{10} plus 5 dB limits for each location to identify potential impacts in Table 15. Based on the results of the construction noise analysis, the project would result in construction noise impacts that would require mitigation.

Table 14. Construction Equipment by Stage

Stage 1	Stage 2	Stage 3	Stage 4
Compressor	Compressor	Compressor	Compressor
Crane	Backhoe	Backhoe	Backhoe
Generator	Paving - Asphalt (Paver + Dump Truck)	Concrete Mixer Truck	Concrete Mixer Truck
Impact Wrench	Compactor (Plate)	Concrete Pump Truck	Concrete Pump Truck
Chipping Gun	Concrete Mixer Truck	Vibratory Concrete Consolidator	Vibratory Concrete Consolidator
Circular Saw	Concrete Pump Truck	Crane	Crane
	Vibratory Concrete Consolidator	Generator	Generator
	Crane	Impact Wrench	Impact Wrench
	Generator	Jackhammer	Front End Loader (Passby)
	Power Tools - Impact Wrench	Front End Loader (Passby)	Paving - Asphalt (Paver + Dump Truck)
	Jackhammer	Paving - Asphalt (Paver + Dump Truck)	Chipping Gun
	Front End Loader (Cyclical)	Chipping Gun	Compactor (Roller)
	Paving - Asphalt (Paver + Dump Truck)	Compactor (Roller)	Flatbed Truck
	Chipping Gun	Circular Saw	Pile Driver (Impact)
	Circular Saw	Flatbed Truck	
	Compactor (Roller)		
	Circular Saw		
	Power Tools - Jackhammer		
	Circular Saw		
	Excavator		
	Flatbed Truck		
	Pile Driver (Impact)		

Source: MBTA 2023

Table 15. Summary of Construction Noise Levels

Receptor (floor)	Land Use	Background dBA L_{10} plus 5 dB	Stage 1 dBA L_{10}	Stage 2 dBA L_{10}	Stage 3 dBA L_{10}	Stage 4 dBA L_{10}
R12(G)	Institutional	75	97	91	78	92
R13(G)	Institutional	76	84	79	90	88
R14(G)	Institutional	83	84	84	106	78
R26(F10)	Institutional	72	78	81	74	81
R26(F2)	Institutional	72	79	81	74	81
R26(F3)	Institutional	72	79	81	74	81
R26(F4)	Institutional	72	78	81	74	81
R26(F5)	Institutional	72	78	81	74	81
R26(F6)	Institutional	72	78	81	74	81
R26(F7)	Institutional	72	78	81	74	81
R26(F8)	Institutional	72	78	81	74	81
R26(F9)	Institutional	72	78	81	74	81
R26(G)	Institutional	72	79	81	74	81
R27(F10)	Institutional	77	87	93	77	82
R27(F11)	Institutional	77	86	92	77	82
R27(F12)	Institutional	77	86	91	77	81
R27(F13)	Institutional	77	85	91	77	81
R27(F2)	Institutional	77	89	103	77	82
R27(F3)	Institutional	77	89	101	77	82
R27(F4)	Institutional	77	89	100	77	82
R27(F5)	Institutional	77	89	98	77	82
R27(F6)	Institutional	77	88	97	77	82
R27(F7)	Institutional	77	88	96	77	82
R27(F8)	Institutional	77	88	95	77	82
R27(F9)	Institutional	77	87	94	77	82
R27(G)	Institutional	77	89	104	77	82

Source: HMMH 2024

6.6 Temporary Construction Vibration Impacts

Temporary construction vibration levels were predicted for the most vibration intensive pieces of equipment that would be used in each project stage, such as pile driving. The analysis conservatively assumes that all buildings are Category III for the damage assessment, see Section 3.5. Annoyance thresholds are 80 VdB for places where people sleep, 83 VdB for institutional uses, and 84 VdB for offices. Construction vibration predictions are provided in Table 16 through Table 21 shows that impacts would occur under all stages and would require mitigation.

Table 16. Stage 1 Heavy Equipment Construction Vibration Levels

Receptor (floor)	Distance (ft)	Pile Driver Construction PPV	Pile Driver Construction VdB	Jackhammer Construction PPV	Jackhammer Construction VdB	Damage Threshold PPV	Annoyance Threshold VdB	Pile Driver Construction Damage	Jackhammer Construction Damage	Pile Driver Construction Annoyance	Jackhammer Construction Annoyance
R12(G)	44.5	0.6382	104.5	0.0147	71.5	0.2	83	IMPACT	None	IMPACT	None
R13(G)	182.7	0.0768	86.1	0.0018	53.1	0.2	83	None	None	IMPACT	None
R14(G)	187.1	0.0742	85.8	0.0017	52.8	0.2	83	None	None	IMPACT	None
R26(F10)	366.6	0.0270	77.0	0.0006	44.0	0.2	80	None	None	None	None
R26(F2)	354.4	0.0284	77.5	0.0007	44.5	0.2	80	None	None	None	None
R26(F3)	355.0	0.0284	77.4	0.0007	44.4	0.2	80	None	None	None	None
R26(F4)	355.8	0.0283	77.4	0.0007	44.4	0.2	80	None	None	None	None
R26(F5)	356.9	0.0281	77.4	0.0006	44.4	0.2	80	None	None	None	None
R26(F6)	358.3	0.0280	77.3	0.0006	44.3	0.2	80	None	None	None	None
R26(F7)	360.0	0.0278	77.2	0.0006	44.2	0.2	80	None	None	None	None
R26(F8)	362.0	0.0276	77.2	0.0006	44.2	0.2	80	None	None	None	None
R26(F9)	364.2	0.0273	77.1	0.0006	44.1	0.2	80	None	None	None	None
R26(G)	354.1	0.0285	77.5	0.0007	44.5	0.2	80	None	None	None	None
R27(F10)	138.2	0.1167	89.7	0.0027	56.7	0.2	84	None	None	IMPACT	None
R27(F11)	145.3	0.1083	89.1	0.0025	56.1	0.2	84	None	None	IMPACT	None
R27(F12)	152.7	0.1006	88.4	0.0023	55.4	0.2	84	None	None	IMPACT	None
R27(F13)	160.3	0.0935	87.8	0.0022	54.8	0.2	84	None	None	IMPACT	None
R27(F2)	101.5	0.1855	93.7	0.0043	60.7	0.2	84	None	None	IMPACT	None
R27(F3)	103.5	0.1802	93.5	0.0042	60.5	0.2	84	None	None	IMPACT	None
R27(F4)	106.3	0.1730	93.1	0.0040	60.1	0.2	84	None	None	IMPACT	None
R27(F5)	110.0	0.1644	92.7	0.0038	59.7	0.2	84	None	None	IMPACT	None
R27(F6)	114.5	0.1549	92.2	0.0036	59.2	0.2	84	None	None	IMPACT	None
R27(F7)	119.6	0.1450	91.6	0.0033	58.6	0.2	84	None	None	IMPACT	None
R27(F8)	125.3	0.1352	91.0	0.0031	58.0	0.2	84	None	None	IMPACT	None
R27(F9)	131.6	0.1257	90.4	0.0029	57.4	0.2	84	None	None	IMPACT	None
R27(G)	100.5	0.1882	93.9	0.0043	60.9	0.2	84	None	None	IMPACT	None

Source: HMMH 2024

Table 17. Stage 2 Construction Vibration Levels

Receptor (floor)	Distance (ft)	Vibratory Roller Construction PPV	Vibratory Roller Construction VdB	Loaded Trucks Construction PPV	Loaded Trucks Construction VdB	Jackhammer Construction PPV	Jackhammer Construction VdB	Damage Threshold PPV	Annoyance Threshold VdB	Vibratory Roller Construction Damage	Loaded Trucks Construction Damage	Jackhammer Construction Damage	Vibratory Roller Construction Annoyance	Loaded Trucks Construction Annoyance	Jackhammer Construction Annoyance
R12(G)	121	0.0198	73.5	0.0072	65.5	0.0033	58.5	0.2	83	None	None	None	None	None	None
R13(G)	493	0.0024	55.1	0.0009	47.1	0.0004	40.1	0.2	83	None	None	None	None	None	None
R14(G)	264	0.0061	63.3	0.0022	55.3	0.0010	48.3	0.2	83	None	None	None	None	None	None
R26(F10)	406	0.0032	57.7	0.0012	49.7	0.0005	42.7	0.2	80	None	None	None	None	None	None
R26(F2)	395	0.0033	58.0	0.0012	50.0	0.0006	43.0	0.2	80	None	None	None	None	None	None
R26(F3)	396	0.0033	58.0	0.0012	50.0	0.0006	43.0	0.2	80	None	None	None	None	None	None
R26(F4)	397	0.0033	58.0	0.0012	50.0	0.0006	43.0	0.2	80	None	None	None	None	None	None
R26(F5)	398	0.0033	58.0	0.0012	50.0	0.0006	43.0	0.2	80	None	None	None	None	None	None
R26(F6)	399	0.0033	57.9	0.0012	49.9	0.0005	42.9	0.2	80	None	None	None	None	None	None
R26(F7)	400	0.0033	57.9	0.0012	49.9	0.0005	42.9	0.2	80	None	None	None	None	None	None
R26(F8)	402	0.0033	57.8	0.0012	49.8	0.0005	42.8	0.2	80	None	None	None	None	None	None
R26(F9)	404	0.0032	57.7	0.0012	49.7	0.0005	42.7	0.2	80	None	None	None	None	None	None
R26(G)	395	0.0033	58.0	0.0012	50.0	0.0006	43.0	0.2	80	None	None	None	None	None	None
R27(F10)	99	0.0266	76.1	0.0096	68.1	0.0044	61.1	0.2	84	None	None	None	None	None	None
R27(F11)	109	0.0232	74.9	0.0084	66.9	0.0039	59.9	0.2	84	None	None	None	None	None	None
R27(F12)	118	0.0204	73.7	0.0074	65.7	0.0034	58.7	0.2	84	None	None	None	None	None	None
R27(F13)	128	0.0181	72.7	0.0066	64.7	0.0030	57.7	0.2	84	None	None	None	None	None	None
R27(F2)	32	0.1465	90.9	0.0530	82.9	0.0244	75.9	0.2	84	None	None	None	IMPACT	None	None
R27(F3)	38	0.1141	88.7	0.0413	80.7	0.0190	73.7	0.2	84	None	None	None	IMPACT	None	None
R27(F4)	45	0.0874	86.4	0.0316	78.4	0.0146	71.4	0.2	84	None	None	None	IMPACT	None	None
R27(F5)	53	0.0680	84.2	0.0246	76.2	0.0113	69.2	0.2	84	None	None	None	IMPACT	None	None
R27(F6)	62	0.0541	82.2	0.0196	74.2	0.0090	67.2	0.2	84	None	None	None	None	None	None
R27(F7)	71	0.0441	80.4	0.0160	72.4	0.0073	65.4	0.2	84	None	None	None	None	None	None
R27(F8)	80	0.0366	78.8	0.0133	70.8	0.0061	63.8	0.2	84	None	None	None	None	None	None
R27(F9)	90	0.0310	77.4	0.0112	69.4	0.0052	62.4	0.2	84	None	None	None	None	None	None
R27(G)	28	0.1728	92.3	0.0625	84.3	0.0288	77.3	0.2	84	None	None	None	IMPACT	IMPACT	None

Source: HMMH 2024

Table 18. Stage 2 Pile Driver Construction Vibration Levels

Receptor (floor)	Distance (ft)	Pile Driver Construction PPV	Pile Driver Construction VdB	Damage Threshold PPV	Annoyance Threshold VdB	Pile Driver Construction Damage	Pile Driver Construction Annoyance
R12(G)	103	0.1808	93.5	0.2	83	None	IMPACT
R13(G)	241	0.0507	82.5	0.2	83	None	None
R14(G)	158	0.0954	88.0	0.2	83	None	IMPACT
R26(F10)	412	0.0227	75.5	0.2	80	None	None
R26(F2)	402	0.0236	75.8	0.2	80	None	None
R26(F3)	402	0.0235	75.8	0.2	80	None	None
R26(F4)	403	0.0235	75.8	0.2	80	None	None
R26(F5)	404	0.0234	75.7	0.2	80	None	None
R26(F6)	405	0.0233	75.7	0.2	80	None	None
R26(F7)	407	0.0231	75.7	0.2	80	None	None
R26(F8)	408	0.0230	75.6	0.2	80	None	None
R26(F9)	410	0.0228	75.5	0.2	80	None	None
R26(G)	401	0.0236	75.8	0.2	80	None	None
R27(F10)	122	0.1400	91.3	0.2	84	None	IMPACT
R27(F11)	130	0.1275	90.5	0.2	84	None	IMPACT
R27(F12)	139	0.1163	89.7	0.2	84	None	IMPACT
R27(F13)	147	0.1065	88.9	0.2	84	None	IMPACT
R27(F2)	79	0.2717	97.1	0.2	84	IMPACT	IMPACT
R27(F3)	81	0.2592	96.6	0.2	84	IMPACT	IMPACT
R27(F4)	85	0.2428	96.1	0.2	84	IMPACT	IMPACT
R27(F5)	89	0.2244	95.4	0.2	84	IMPACT	IMPACT
R27(F6)	95	0.2054	94.6	0.2	84	IMPACT	IMPACT
R27(F7)	101	0.1870	93.8	0.2	84	None	IMPACT
R27(F8)	108	0.1698	93.0	0.2	84	None	IMPACT
R27(F9)	115	0.1541	92.1	0.2	84	None	IMPACT
R27(G)	77	0.2785	97.3	0.2	84	IMPACT	IMPACT

Source: HMMH 2024

Table 19. Stage 3 Construction Vibration Levels

Receptor (floor)	Distance (ft)	Vibratory Roller Construction PPV	Vibratory Roller Construction VdB	Loaded Trucks Construction PPV	Loaded Trucks Construction VdB	Jackhammer Construction PPV	Jackhammer Construction VdB	Damage Threshold PPV	Annoyance Threshold VdB	Vibratory Roller Construction Damage	Loaded Trucks Construction Damage	Jackhammer Construction Damage	Vibratory Roller Construction Annoyance	LOADED TRUCKS Construction ANNOYANCE	JACKHAMMER Construction ANNOYANCE
R12(G)	493	0.0024	55.2	0.0009	47.2	0.0004	40.2	0.2	83	None	None	None	None	None	None
R13(G)	117	0.0207	73.9	0.0075	65.9	0.0035	58.9	0.2	83	None	None	None	None	None	None
R14(G)	20	0.2901	96.8	0.1050	88.8	0.0484	81.8	0.2	83	IMPACT	None	None	IMPACT	IMPACT	None
R26(F10)	791	0.0012	49.0	0.0004	41.0	0.0002	34.0	0.2	80	None	None	None	None	None	None
R26(F2)	785	0.0012	49.1	0.0004	41.1	0.0002	34.1	0.2	80	None	None	None	None	None	None
R26(F3)	785	0.0012	49.1	0.0004	41.1	0.0002	34.1	0.2	80	None	None	None	None	None	None
R26(F4)	786	0.0012	49.1	0.0004	41.1	0.0002	34.1	0.2	80	None	None	None	None	None	None
R26(F5)	786	0.0012	49.1	0.0004	41.1	0.0002	34.1	0.2	80	None	None	None	None	None	None
R26(F6)	787	0.0012	49.1	0.0004	41.1	0.0002	34.1	0.2	80	None	None	None	None	None	None
R26(F7)	788	0.0012	49.0	0.0004	41.0	0.0002	34.0	0.2	80	None	None	None	None	None	None
R26(F8)	788	0.0012	49.0	0.0004	41.0	0.0002	34.0	0.2	80	None	None	None	None	None	None
R26(F9)	789	0.0012	49.0	0.0004	41.0	0.0002	34.0	0.2	80	None	None	None	None	None	None
R26(G)	785	0.0012	49.1	0.0004	41.1	0.0002	34.1	0.2	80	None	None	None	None	None	None
R27(F10)	531	0.0021	54.2	0.0008	46.2	0.0004	39.2	0.2	84	None	None	None	None	None	None
R27(F11)	533	0.0021	54.1	0.0008	46.1	0.0004	39.1	0.2	84	None	None	None	None	None	None
R27(F12)	535	0.0021	54.1	0.0008	46.1	0.0004	39.1	0.2	84	None	None	None	None	None	None
R27(F13)	537	0.0021	54.0	0.0008	46.0	0.0004	39.0	0.2	84	None	None	None	None	None	None
R27(F2)	523	0.0022	54.4	0.0008	46.4	0.0004	39.4	0.2	84	None	None	None	None	None	None
R27(F3)	523	0.0022	54.4	0.0008	46.4	0.0004	39.4	0.2	84	None	None	None	None	None	None
R27(F4)	523	0.0022	54.4	0.0008	46.4	0.0004	39.4	0.2	84	None	None	None	None	None	None
R27(F5)	524	0.0022	54.4	0.0008	46.4	0.0004	39.4	0.2	84	None	None	None	None	None	None
R27(F6)	525	0.0022	54.3	0.0008	46.3	0.0004	39.3	0.2	84	None	None	None	None	None	None
R27(F7)	526	0.0022	54.3	0.0008	46.3	0.0004	39.3	0.2	84	None	None	None	None	None	None
R27(F8)	528	0.0022	54.3	0.0008	46.3	0.0004	39.3	0.2	84	None	None	None	None	None	None
R27(F9)	529	0.0022	54.2	0.0008	46.2	0.0004	39.2	0.2	84	None	None	None	None	None	None
R27(G)	522	0.0022	54.4	0.0008	46.4	0.0004	39.4	0.2	84	None	None	None	None	None	None

Source: HMMH 2024

Table 20. Stage 4 Construction Vibration Levels

Receptor (floor)	Distance (ft)	Vibratory Roller Construction PPV	Vibratory Roller Construction VdB	Loaded Trucks Construction PPV	Loaded Trucks Construction VdB	Jackhammer (Pneumatic Tool) PPV	Jackhammer (Pneumatic Tool) VdB	Damage Threshold PPV	Annoyance Threshold VdB	Vibratory Roller Construction Damage	Loaded Trucks Construction Damage	Jackhammer Construction Damage	Vibratory Roller Construction Annoyance	LOADED TRUCKS Construction ANNOYANCE	JACKHAMMER (Pneumatic Tool) ANNOYANCE
R12(G)	83	0.0346	78.3	0.0125	70.3	0.0058	63.3	0.2	83	None	None	None	None	None	None
R13(G)	137	0.0164	71.9	0.0059	63.9	0.0027	56.9	0.2	83	None	None	None	None	None	None
R14(G)	399	0.0033	57.9	0.0012	49.9	0.0005	42.9	0.2	83	None	None	None	None	None	None
R26(F10)	306	0.0049	61.4	0.0018	53.4	0.0008	46.4	0.2	80	None	None	None	None	None	None
R26(F2)	291	0.0053	62.0	0.0019	54.0	0.0009	47.0	0.2	80	None	None	None	None	None	None
R26(F3)	291	0.0053	62.0	0.0019	54.0	0.0009	47.0	0.2	80	None	None	None	None	None	None
R26(F4)	292	0.0052	62.0	0.0019	54.0	0.0009	47.0	0.2	80	None	None	None	None	None	None
R26(F5)	294	0.0052	61.9	0.0019	53.9	0.0009	46.9	0.2	80	None	None	None	None	None	None
R26(F6)	296	0.0052	61.8	0.0019	53.8	0.0009	46.8	0.2	80	None	None	None	None	None	None
R26(F7)	298	0.0051	61.7	0.0019	53.7	0.0009	46.7	0.2	80	None	None	None	None	None	None
R26(F8)	300	0.0051	61.6	0.0018	53.6	0.0008	46.6	0.2	80	None	None	None	None	None	None
R26(F9)	303	0.0050	61.5	0.0018	53.5	0.0008	46.5	0.2	80	None	None	None	None	None	None
R26(G)	290	0.0053	62.0	0.0019	54.0	0.0009	47.0	0.2	80	None	None	None	None	None	None
R27(F10)	274	0.0058	62.8	0.0021	54.8	0.0010	47.8	0.2	84	None	None	None	None	None	None
R27(F11)	278	0.0057	62.6	0.0021	54.6	0.0009	47.6	0.2	84	None	None	None	None	None	None
R27(F12)	282	0.0055	62.4	0.0020	54.4	0.0009	47.4	0.2	84	None	None	None	None	None	None
R27(F13)	286	0.0054	62.2	0.0020	54.2	0.0009	47.2	0.2	84	None	None	None	None	None	None
R27(F2)	258	0.0063	63.6	0.0023	55.6	0.0011	48.6	0.2	84	None	None	None	None	None	None
R27(F3)	259	0.0063	63.6	0.0023	55.6	0.0011	48.6	0.2	84	None	None	None	None	None	None
R27(F4)	260	0.0063	63.5	0.0023	55.5	0.0010	48.5	0.2	84	None	None	None	None	None	None
R27(F5)	261	0.0062	63.4	0.0022	55.4	0.0010	48.4	0.2	84	None	None	None	None	None	None
R27(F6)	263	0.0061	63.3	0.0022	55.3	0.0010	48.3	0.2	84	None	None	None	None	None	None
R27(F7)	265	0.0061	63.2	0.0022	55.2	0.0010	48.2	0.2	84	None	None	None	None	None	None
R27(F8)	268	0.0060	63.1	0.0022	55.1	0.0010	48.1	0.2	84	None	None	None	None	None	None
R27(F9)	271	0.0059	62.9	0.0021	54.9	0.0010	47.9	0.2	84	None	None	None	None	None	None
R27(G)	257	0.0064	63.6	0.0023	55.6	0.0011	48.6	0.2	84	None	None	None	None	None	None

Source: HMMH 2024

Table 21. Stage 4 Pile Driver Construction Vibration Levels

Receptor (floor)	Distance (ft)	Pile Driver Construction PPV	Pile Driver Construction VdB	Damage Threshold PPV	Annoyance Threshold VdB	Pile Driver Construction Damage	Pile Driver Construction Annoyance
R12(G)	86	0.2375	96	0.2	83	IMPACT	IMPACT
R13(G)	558	0.0144	72	0.2	83	None	None
R14(G)	533	0.0154	72	0.2	83	None	None
R26(F2)	146	0.1072	89	0.2	80	None	IMPACT
R26(F3)	148	0.1057	89	0.2	80	None	IMPACT
R26(F4)	150	0.1036	89	0.2	80	None	IMPACT
R26(F5)	152	0.1009	88	0.2	80	None	IMPACT
R26(F6)	156	0.0978	88	0.2	80	None	IMPACT
R26(F7)	159	0.0943	88	0.2	80	None	IMPACT
R26(F8)	164	0.0906	88	0.2	80	None	IMPACT
R26(F9)	169	0.0867	87	0.2	80	None	IMPACT
R26(G)	146	0.1080	89	0.2	80	None	IMPACT
R27(F10)	274	0.0418	81	0.2	80	None	IMPACT
R27(F11)	278	0.0410	81	0.2	84	None	None
R27(F12)	282	0.0401	80	0.2	84	None	None
R27(F13)	286	0.0392	80	0.2	84	None	None
R27(F2)	258	0.0459	82	0.2	84	None	None
R27(F3)	258	0.0457	82	0.2	84	None	None
R27(F4)	260	0.0454	82	0.2	84	None	None
R27(F5)	261	0.0450	81	0.2	84	None	None
R27(F6)	263	0.0445	81	0.2	84	None	None
R27(F7)	265	0.0439	81	0.2	84	None	None
R27(F8)	268	0.0433	81	0.2	84	None	None
R27(F9)	271	0.0425	81	0.2	84	None	None
R27(G)	257	0.0460	82	0.2	84	None	None

Source: HMMH 2024

7 Mitigation of Noise and Vibration Impacts

The project is predicted to cause construction noise and vibration impacts requiring mitigation. There are no noise or vibration operational impacts predicted from the project. The following sections summarize strategies to address construction noise and vibration impacts from the project.

7.1 Construction Noise Mitigation

Construction noise mitigation includes the preparation of a Noise Control Plan in conjunction with the contractor's specific equipment, schedule and methods of construction, maximum noise limits for each piece of equipment, prohibition on certain types of equipment during the nighttime hours and engineering noise control measures. An Acoustical Engineer will prepare a Noise Control Plan in conjunction with the contractor's specific equipment and methods of construction. Key elements to the Plan include:

- Identification of specific sensitive sites where noise monitoring will occur
- Background noise monitoring prior to and during construction
- Construction equipment noise certification testing
- Prohibition of impact pile-drivers during evening and nighttime hours (i.e., 6:00 PM to 10:00 PM and 10:00 PM to 7:00 AM)
- Prohibition of vibratory sheet pile driving and all impact devices including hoe rams, jackhammers and pavement breakers during nighttime hours
- Requirement for ambient-adjusting or manually adjusted backup alarms set to 5 dBA over background levels
- Truck idling limited to five minutes
- Acoustic shield requirement for jackhammers, chainsaws and pavement breakers
- Methods for projecting construction noise levels
- Detailed engineering noise control measures
- Methods for responding to community complaints
- Reporting of noise monitoring results, noise reduction measures used and responses to the community

Noise control measures will be used to reduce noise emissions and potential impact to sensitive receptors where feasible. Many types of construction equipment include diesel engines which can be the most significant noise source. Therefore, reducing engine noise is often a key element to mitigating potential impact. Examples of such noise control measures include:

- Shields, shrouds or intake and exhaust mufflers
- Noise deadening materials adhered to chutes or storage bins
- Temporary noise barriers
- Acoustic enclosures
- Specialized back-up alarms

- Limiting the size of generators and the duration of their use
- Truck routes that minimize exposure to sensitive receptors

7.2 Construction Vibration Mitigation

To mitigate potential vibration impact from construction activities, the following measures will be applied where feasible:

- Using alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile drivers and compactors)
- Truck routes that minimize exposure to sensitive receptors and maintaining smooth roadway surfaces
- Avoiding nighttime construction in residential neighborhoods
- Continuously monitor construction vibration to identify any vibration levels that may approach damage thresholds and report the levels to the construction contractor and other stakeholders so they can be addressed before damage occurs.

8 References

FTA (Federal Transit Administration). 2018. Transit Noise and Vibration Impact Assessment. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

HMMH. 2023. MBTA Draw One Noise Modeling Methodology.

MBTA. 2023. North Station Draw One Bridge Replacement Construction Staging Report.

Appendix A Equipment Calibration Sheets

HBK
HOTTINGER BRÜEL & KJÆR

The Hottinger Bruel & Kjaer Calibration Laboratory
3079 Premiere Parkway Suite 120
Duluth, GA 30097
Telephone: 770/209-6907
Fax: 770/447-4033
Web site address: http://www.hbkworld.com

Calibration Certificate Number 1568.01

ACCREDITED

CERTIFICATE OF CALIBRATION

Certificate No: CAS-616748-H1Q2T7-101

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CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2245	Serial No: 2245-100483
Microphone:	Brüel & Kjær	4966	Serial No: 3236855
Supplied Calibrator:	Brüel & Kjær	4231	Serial No: 3025161
Software version:	1.1.2.386		

CLIENT:

Harris Miller Miller & Hanson Inc.
700 District Avenue Suite 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 ± 3 °C

Environment conditions: See actual values in Environmental Condition sections

SPECIFICATIONS:

This document certifies that the instrument as listed under "Model/Serial Number" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor *k* = 2 providing a level of confidence of approximately 95%. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurement. The calibration of the listed instrumentation, was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and ISO 10012-1. For "as received" and/or "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation This Certificate and attached data pages shall not be reproduced, except in full, without the written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. This instrument has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

Hottinger Brüel & Kjær Model 3630 Sound Level Meter Calibration System Software 7763 Version 8.6 - DB: 8.60 Test Collection 2245-E, 4966 (BZ-7301).

RESULTS:

As Received Condition	As Received Data	Final Data
_X_ Received in good condition	_X_ Within acceptance criteria	_X_ Within acceptance criteria
___ Damaged - See attached report	___ Outside acceptance criteria	___ Limited test - See attached details
	___ Inoperative	
	___ Data not taken	

Date of Calibration: Jan. 09. 2023

Certificate issued: Jan. 09. 2023

John Avitabile
Calibration Technician

Grant Kennedy
Quality Representative

HBK HOTTINGER BRÜEL & KJÆR
The Hottinger Brüel & Kjær Inc. Calibration Laboratory
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A2LA ACCREDITED

Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-616748-H1Q2T7-402 Page 1 of 4

CALIBRATION OF:

Microphone: Brüel & Kjær Type 4966 Serial No. 3236855

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Ave, Ste 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	23.1	°C
	Air pressure:	98.027	kPa
	Relative Humidity:	30	%RH
Applied polarization voltage:	0 Vdc		

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms to the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of the Hottinger Brüel & Kjær Inc. Microphone Calibration System B&K 9721 with application software WT9649 and WT9650 version 5.3.0.10 using calibration procedure: 4966 S251-FR01

RESULTS:

- [X] "As Received" Data: Within Acceptance Criteria
- [ ] "As Received" Data: Outside Acceptance Criteria
- [X] "Final" Data : Within Acceptance Criteria
- [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: January 11, 2023

Certificate issued: January 11, 2023

John Avitabile

Meshaun Hobbs
Calibration Technician

John Avitabile
Quality Representative

HBK HOTTINGER BRÜEL & KJÆR
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ACCREDITED
Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-616748-H1Q2T7-401 Page 1 of 2

CALIBRATION OF:

Calibrator: Brüel & Kjær Type 4231 Serial No.: 3025161
IEC Class: 1

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Ave, Ste 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	24.1	°C
	Air pressure:	98.18	kPa
	Relative Humidity:	31.1	%RH

SPECIFICATIONS:

This document certifies that the acoustic calibrator as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms to the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Inc. Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants. The acoustic calibrator has been calibrated in accordance with the requirements as specified in IEC60942.

PROCEDURE:

The measurements have been performed with the assistance of Hottinger Brüel & Kjær Inc. acoustic calibrator calibration application
Software version 2.3.4 Type 7794 using calibration procedure4231 Complete

RESULTS:

[X] "As Received" Data: Within Acceptance Criteria [ ] "As Received" Data: Outside Acceptance Criteria
[X] "Final" Data : Within Acceptance Criteria [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the calibrator under calibration.

Date of Calibration: January 11, 2023 Certificate issued: January 11, 2023

Meshaun Hobbs

John atilik

Calibration Technician

Grant Kennedy
Quality Representative

HBK
HOTTINGER BRÜEL & KJÆR

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ACCREDITED Calibration Certificate Number 1568.01

CERTIFICATE OF CALIBRATION

Certificate No: CAS-627959-W7J9D6-103

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2270	Serial No: 3011812
Microphone:	Brüel & Kjær	4189	Serial No: 2578555
Preamplifier:	Brüel & Kjær	ZC-0032	Serial No: 6182
Supplied Calibrator:	Brüel & Kjær	4231	Serial No: 3025680
Software version:	BZ7222 Version 4.7.7		

CLIENT:

Harris Miller Miller & Hanson Inc.
700 District Avenue Suite 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Preconditioning: 4 hours at 23 ± 3 °C

Environment conditions: See actual values in Environmental Condition sections

SPECIFICATIONS:

This document certifies that the instrument as listed under "Model/Serial Number" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95%. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurement. The calibration of the listed instrumentation, was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and ISO 10012-1. For "as received" and/or "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation This Certificate and attached data pages shall not be reproduced, except in full, without the written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. This instrument has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

Hottinger Brüel & Kjær Model 3630 Sound Level Meter Calibration System Software 7763 Version 8.6 - DB: 8.60 Test Collection 2270-4189.

RESULTS:

As Received Condition	As Received Data	Final Data
_X_ Received in good condition	_X_ Within acceptance criteria	_X_ Within acceptance criteria
___ Damaged - See attached report	___ Outside acceptance criteria	___ Limited test - See attached details
	___ Inoperative	
	___ Data not taken	

Date of Calibration: 08 Mar. 2023

Certificate issued: 10 Mar. 2023

John Avitabile
Calibration Technician

Grant Kennedy
Quality Representative

HBK
HOTTINGER BRÜEL & KJÆR

The Hottinger Bruel & Kjaer Calibration Laboratory
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ACCREDITED
Calibration Certificate Number 1568.01

CERTIFICATE OF CALIBRATION

Certificate No: CAS-627959-W7J9D6-104

Page 1 of 10

CALIBRATION OF:

Sound Level Meter:	Brüel & Kjær	2270	Serial No: 3011812
Microphone:	Brüel & Kjær	4189	Serial No: 2009039
Preamplifier:	Brüel & Kjær	ZC-0032	Serial No: 28389
Supplied Calibrator:	Brüel & Kjær	4231	Serial No: 3025680
Software version:	BZ7222 Version 4.7.7		

CLIENT:

Harris Miller Miller & Hanson Inc.
700 District Avenue Suite 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Preconditioning:	4 hours at 23 ± 3 °C
Environment conditions	See actual values in Environmental Condition sections

SPECIFICATIONS:

This document certifies that the instrument as listed under "Model/Serial Number" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor *k* = 2 providing a level of confidence of approximately 95%. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurement. The calibration of the listed instrumentation, was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and ISO 10012-1. For "as received" and/or "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation This Certificate and attached data pages shall not be reproduced, except in full, without the written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. This instrument has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

Hottinger Brüel & Kjær Model 3630 Sound Level Meter Calibration System Software 7763 Version 8.6 - DB: 8.60 Test Collection 2270-4189.

RESULTS:

As Received Condition	As Received Data	Final Data
_X_ Received in good condition	_X_ Within acceptance criteria	_X_ Within acceptance criteria
___ Damaged - See attached report	___ Outside acceptance criteria	___ Limited test - See attached details
	___ Inoperative	
	___ Data not taken	

Date of Calibration: 08 Mar. 2023

Certificate issued: 10 Mar. 2023

John Avitabile
Calibration Technician

Grant Kennedy
Quality Representative

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Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION

No.: CAS-627959-W7J9D6-506

Page 1 of 4

CALIBRATION OF:

Microphone: Brüel & Kjær Type 4189 Serial No. 2578555

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Ave, Ste 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	22.7	°C
	Air pressure:	97.601	kPa
	Relative Humidity:	39	%RH
Applied polarization voltage:	0 Vdc		

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms to the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of the Hottinger Brüel & Kjær Inc. Microphone Calibration System B&K 9721 with application software WT9649 and WT9650 version 5.3.0.10 using calibration procedure: 4189-S251-FF-01

RESULTS:

- [X] "As Received" Data: Within Acceptance Criteria
- [ ] "As Received" Data: Outside Acceptance Criteria
- [X] "Final" Data : Within Acceptance Criteria
- [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: March 10, 2023

Certificate issued: March 10, 2023

John Avitabile

Jimmy Smith
Calibration Technician

John Avitabile
Quality Representative

HBK HOTTINGER BRÜEL & KJÆR
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Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-627959-W7J9D6-501 Page 1 of 4

CALIBRATION OF:

Microphone: Brüel & Kjær Type 4189 Serial No. 2009039

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Ave, Ste 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	22.7	°C
	Air pressure:	97.601	kPa
	Relative Humidity:	39	%RH
Applied polarization voltage:	0 Vdc		

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms to the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of the Hottinger Brüel & Kjær Inc. Microphone Calibration System B&K 9721 with application software WT9649 and WT9650 version 5.3.0.10 using calibration procedure: 4189-S251-FF-01

RESULTS:

[X] "As Received" Data: Within Acceptance Criteria	[ ] "As Received" Data: Outside Acceptance Criteria
[X] "Final" Data : Within Acceptance Criteria	[ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor *k* =2 providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: March 10, 2023

Certificate issued: March 10, 2023

John Avitabile

Jimmy Smith
Calibration Technician

John Avitabile
Quality Representative

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Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-627959-W7J9D6-106 Page 1 of 2

CALIBRATION OF:

Calibrator: Brüel & Kjær Type 4231 IEC Class: 1 Serial No.: 3025680

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Ave, Ste 800
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:

Air temperature:	23	°C
Air pressure:	98.391	kPa
Relative Humidity:	33	%RH

SPECIFICATIONS:

This document certifies that the acoustic calibrator as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms to the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Inc. Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants. The acoustic calibrator has been calibrated in accordance with the requirements as specified in IEC60942.

PROCEDURE:

The measurements have been performed with the assistance of Hottinger Brüel & Kjær Inc. acoustic calibrator calibration application
Software version 2.3.4 Type 7794 using calibration procedure4231 Complete

RESULTS:

[X] "As Received" Data: Within Acceptance Criteria
[ ] "As Received" Data: Outside Acceptance Criteria
[X] "Final" Data : Within Acceptance Criteria
[ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the calibrator under calibration.

Date of Calibration: March 9, 2023

Certificate issued: March 9, 2023

John Avitabile
Calibration Technician

Jimmy Smith
Jimmy Smith
Quality Representative

HBK HOTTINGER BRÜEL & KJÆR

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ACCREDITED

Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-627959-W7J9D6-608A Page 1 of 3

CALIBRATION OF:

Vibration Meter:	B&K	Type	2270/393A03	Serial No.	3011812/65285
Channel 1					

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Avenue
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	23	°C
	Air pressure:	976	mBars
	Relative Humidity:	33	%RH

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Inc. Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The calibrations were performed according to procedure: 2270/393A03 10Hz-3kHz

RESULTS:

- [X] "As Received" Data: Within Acceptance Criteria
- [ ] "As Received" Data: Outside Acceptance Criteria
- [X] "Final" Data : Within Acceptance Criteria
- [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: 3/13/2023

Certificate issued: 3/13/2023

Aundra Welch

Calibration Technician

John Avitabile

John Avitabile

Quality Representative

HBK HOTTINGER BRÜEL & KJÆR

The Hottinger Brüel & Kjær Inc. Calibration Laboratory
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A2LA ACCREDITED

Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-627959-W7J9D6-608B Page 1 of 3

CALIBRATION OF:

Vibration Meter:	B&K	Type	2270/393A03	Serial No.	3011812/65286
Channel 2					

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Avenue
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	23	°C
	Air pressure:	976	mBars
	Relative Humidity:	33	%RH

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Inc. Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The calibrations were performed according to procedure: 2270/393A03 10Hz-3kHz

RESULTS:

[X] "As Received" Data: Within Acceptance Criteria [ ] "As Received" Data: Outside Acceptance Criteria

[X] "Final" Data : Within Acceptance Criteria [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor k =2 providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: 3/13/2023 Certificate issued: 3/13/2023

Aundra Welch — Calibration Technician

John Avitabile — Quality Representative

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ACCREDITED
Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION No.: CAS-627959-W7J9D6-604 Page 1 of 4

CALIBRATION OF:

Accelerometer:	PCB	Type	393A03	Serial No.	65285

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Avenue
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	21.9	°C
	Air pressure:	980.6	mBars
	Relative Humidity:	40	%RH

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Bruel & Kjaer Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of Hottinger Brüel & Kjær Accelerometer Calibration System B&K 3629 with application software 5308 version 3.0.1.230 using calibration procedure: 393A03 10Hz-2kHz

RESULTS:

- [X] "As Received" Data: Within Acceptance Criteria
- [ ] "As Received" Data: Outside Acceptance Criteria
- [X] "Final" Data : Within Acceptance Criteria
- [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: 3/9/2023 Certificate issued: 3/10/2023

Aundra Welch
Calibration Technician

Grant Kennedy
Quality Representative

HBK HOTTINGER BRÜEL & KJÆR

The Hottinger Brüel & Kjær Inc. Calibration Laboratory
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ACCREDITED

Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION

No.: CAS-627959-W7J9D6-606 Page 1 of 4

CALIBRATION OF:

Accelerometer: PCB Type 393A03 Serial No. 65286

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Avenue
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:	Air temperature:	21.9	°C
	Air pressure:	980.6	mBars
	Relative Humidity:	40	%RH

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Bruel & Kjaer Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of Hottinger Brüel & Kjær Accelerometer Calibration System B&K 3629 with application software 5308 version 3.0.1.230 using calibration procedure: 393A03 10Hz-2kHz

RESULTS:

[X] "As Received" Data: Within Acceptance Criteria
[X] "Final" Data : Within Acceptance Criteria
[ ] "As Received" Data: Outside Acceptance Criteria
[ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor k =2 providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: 3/9/2023

Certificate issued: 3/10/2023

Aundra Welch

Calibration Technician

Grant Kennedy

Quality Representative

HBK HOTTINGER BRÜEL & KJÆR

The Hottinger Brüel & Kjær Inc. Calibration Laboratory
3079 Premiere Parkway Suite 120
Duluth, GA 30097
Telephone: 770-209-6907
Fax: 770-447-4033
Web site address: http://www.hbkworld.com

ACCREDITED Calibration Certificate # 1568.01

CERTIFICATE OF CALIBRATION   No.: CAS-627959-W7J9D6-802   Page 1 of 3

CALIBRATION OF:

Calibration Exiter:	IMI	Type	699B02	Serial No.	2771

CUSTOMER:

Harris Miller Miller & Hanson, Inc
700 District Avenue
Burlington, MA 01803

CALIBRATION CONDITIONS:

Environment conditions:			
	Air temperature:	22.4	°C
	Air pressure:	980	mBars
	Relative Humidity:	37	%RH

SPECIFICATIONS:

This document certifies that the instrument as listed under "Type" has been calibrated and unless otherwise indicated under "Final Data", meets acceptance criteria as prescribed by the referenced Procedure. Statements of compliance, where applicable, are based on calibration results falling within specified criteria with no reduction by the uncertainty of the measurements. The calibration of the listed transducer was accomplished using a test system which conforms with the requirements of ISO/IEC 17025, ANSI/NCSL Z540-1, and guidelines of ISO 10012-1. For "as received" and "final" data, see the attached page(s). Items marked with one asterisk (*) are not covered by the scope of the current A2LA accreditation. This Certificate and attached data pages shall not be reproduced, except in full, without written approval of the Hottinger Brüel & Kjær Calibration Laboratory-Duluth, GA. Results relate only to the items tested. The transducer has been calibrated using Measurement Standards with values traceable to the National Institute of Standards and Technology, National Measurement Institutes or derived from natural physical constants.

PROCEDURE:

The measurements have been performed with the assistance of Hottinger Brüel & Kjær Accelerometer Calibration System B&K 3629 with application software 5308 version 3.0.1.230 using calibration procedure: 699B02

RESULTS:

- [X] "As Received" Data: Within Acceptance Criteria
- [ ] "As Received" Data: Outside Acceptance Criteria
- [X] "Final" Data : Within Acceptance Criteria
- [ ] "Final" Data : Outside Acceptance Criteria

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from standards, calibration method, effect of environmental conditions and any short term contribution from the device under calibration.

Date of Calibration: 3/7/2023   Certificate issued: 3/8/2023

Grant Kennedy
Calibration Technician

Meshaun Hobbs
Quality Representative

Appendix J
Section 4(f)

Draw One Bridge Replacement

Draft Environmental Assessment

Analysis of Potential Use of Section 4(f) Properties

December 4, 2024

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FIGURES

ATTACHMENTS

1. DRAFT SECTION 4(F) AGREEMENT
2. CHARLES RIVER WATER SHEET – CORRESPONDENCE

ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADA	American Disabilities Act
APE	Area of Potential Effects
AREMA	American Railway Engineering and Maintenance-of-Way Association
B&MRR	Boston & Maine Railroad
BET	Boston Engine Terminal
CFR	Code of Federal Regulations
CPs	Consulting Parties
CRMF	Commuter Rail Maintenance Facility
DCR	Department of Conservation and Recreation
DFE	Design Flood Elevation
EA	Environmental Assessment
FTA	Federal Transit Administration
GIS	Geographic Information Systems
MEP	Mechanical, Electrical and Plumbing
MGH	Massachusetts General Hospital
MGL	Massachusetts General Law
MHD	Massachusetts Highway Department
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OWJ	Official(s) with Jurisdiction
SHPO	State Historic Preservation Office
SIHs	Signal Instrument Houses
SPMTs	self-propelled modular transporters
THPO	Tribal Historic Preservation Officer
USC	United States Code
USDOT	United States Department of Transportation
Zakim Bridge	Leonard P. Zakim Bunker Hill Memorial Bridge

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1.0 INTRODUCTION

This chapter has been prepared pursuant to the requirements of Section 4(f) of the United States Department of Transportation (USDOT) Act of 1966. Section 4(f) of the Department of Transportation Act of 1966, codified at 23 U.S.C. §138 and 49 U.S.C. §303, articulates a National policy affirming that a special effort shall be made to preserve the natural beauty of the countryside, public park and recreational lands, wildlife and waterfowl refuges, and historic sites. Pursuant to 23 CFR 774.3, the Secretary of Transportation may not approve transportation projects that require use of such properties unless a determination is made that there is no feasible and prudent alternative, and that all possible planning has been done to minimize harm to Section 4(f) land(s) resulting from such use.

The Massachusetts Bay Transportation Authority (MBTA) is seeking funds to be provided through the Federal Transit Administration (FTA) as the lead federal agency for the Draw One Bridge Replacement Project (the Proposed Project). The Proposed Project would replace the existing two structures comprising the Draw One Bridge over the Charles River with three new vertical lift bridge structures. Associated activities include replacement of the adjacent Signal Tower A, replacement of the approach trestles, related adjustments and upgrades to track alignments, and communications and signaling systems. **Figure 1-1** highlights the direct footprint of the work area including the temporary impacts (shown on figures as "Temporary Limits of Work (LOW)") and permanent impact areas (shown on figures as "Permanent Limits of Work (LOW)") for the Proposed Project. "Project Site" is used throughout the document to refer to the "Temporary LOW" and "Permanent LOW." The Project Site, comprising approximately eight acres, is roughly located within the bounds of the Charles River (in the same area as the previous Draw One Bridge) but extends 200 feet upstream and 300 feet downstream of the existing Draw One Bridge. The purpose of the Proposed Project is to bring the Draw One Bridge into a state of good repair, improving the reliability and safety of MBTA Commuter Rail and Amtrak service.

North Station Draw One Bridge Replacement

Figure 1-1: Project Location

2.0 REGULATORY CONTEXT AND METHODOLOGY

The "use" of each protected Section 4(f) property, and the attributes that qualify it as a Section 4(f) property, are defined in 23 CFR §774 of the USDOT Act of 1966 and outlined below:

2.1 SECTION 4(f) PROPERTY DEFINITION

- Any publicly owned parkland, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; or
- Any land from a historic site of national, state, or local significance. Section 4(f) historic properties are those listed, or eligible for listing, on the National Register of Historic Places (NRHP). Archaeological resources are only protected resources when their importance is centered around the location of the resource.

A desktop review of available aerial photography, local land use plans, landowner identification, and other applicable plans have provided the baseline information needed to map and list parks, recreation areas, and wildlife/waterfowl refuges within the Project Site. Historic sites listed or eligible for listing on the NRHP within the Project Site have been identified through consultation under Section 106 of the National Historic Preservation Act (NHPA) of 1966 as described. Existing Section 4(f) properties in the Project Site have been mapped using Geographic Information Systems (GIS) and documented by type (e.g., parks, recreation areas, wildlife and waterfowl refuges, historic sites, etc.), approximate acreage and amenities.

For parks, recreation areas, and wildlife/waterfowl refuges that qualify for protection under Section 4(f), FTA must coordinate with the official(s) with jurisdiction (OWJ) of the agency or agencies that own or administer the property in question, and with staff who are empowered to represent the agency on matters related to the property. The OWJ for parks/recreational areas will depend on the ownership (e.g., relevant city or county).

For historic Section 4(f) properties, the applicable State Historic Preservation Office (SHPO) is an OWJ for the properties that are eligible for or listed on the NRHP except when a Tribal Historic Preservation Officer (THPO) is an OWJ. When the Advisory Council on Historic Preservation (ACHP) is participating in the Section 106 process as a consulting party, the agency is an OWJ for properties that are eligible for, or listed on, the NRHP.

2.2 SECTION 4(f) USE

A project "use" of a Section 4(f) property occurs when the project either temporarily or permanently impacts the property occupied by the Section 4(f) property. Different Section 4(f) "uses" are Direct Use, *de minimis* (a type of Direct Use), Temporary Use, and Constructive Use. These "uses," as well as Section 4(f) Exceptions, are described in more detail in the following sections.

2.2.1 DIRECT USE

A Direct Use of a Section 4(f) property occurs when property is permanently incorporated into a proposed transportation project. This may occur from a partial or full acquisition, permanent easement, or temporary easement.

Section 4(f) *de minimis* Use

In some instances, the FTA may decide the use of the Section 4(f) property is *de minimis*. This is still a Direct Use but is typically a smaller impact, with all the criteria below being true. Under 23 Code of Federal Regulations (CFR) Part 774.3(b), a *de minimis* impact decision incorporates all possible planning to minimize harm by reducing the impacts on a Section 4(f) property to a *de minimis* standard.

Under 49 United Stated Code (U.S.C.) 303(d)(3) parks, recreation sites, or wildlife or waterfowl refuges, the FTA may make a *de minimis* impact decision only if:

- After public notice and opportunity for public review and comment, FTA finds that the transportation program or project will not adversely affect the activities, features, and attributes of the park, recreation area, or wildlife or waterfowl refuge eligible for protection under this section; and
- The finding has received concurrence from the OWJ over the park, recreation area, or wildlife or waterfowl refuge.

Under 49 U.S.C. 303(d)(2), the FTA may make a *de minimis* determination on a historic property only if the following Section 106 consultation process is followed:

- The transportation program or project will have no adverse effect on the historic site, or there will be no historic properties affected by the transportation program or project;
- FTA's finding has received written concurrence from the SHPO or THPO (and from the ACHP if the ACHP is participating in the consultation process); and
- FTA has developed its finding with consulting parties (CPs) as part of the Section 106 consultation process.

2.2.2 SECTION 4(f) TEMPORARY USE

Temporary Use is when a project temporarily occupies Section 4(f) property in a manner that is adverse in terms of the statute's preservation purpose, such as during construction, but has no permanent impact to the Section 4(f) property. A temporary use of a Section 4(f) property occurs when the conditions below are satisfied.

1. Duration is less than the time needed for construction of the project and there is no change in ownership of the land;
2. The nature and magnitude of the changes to the Section 4(f) property are minimal;
3. There are no anticipated permanent adverse physical impacts, nor is there interference with the protected activities, features, or attributes of the property on either a temporary or permanent basis;

4. The land being used will be fully returned to a condition at least as good as that which existed prior to the project; and
5. There is a documented agreement of the OWJ over the Section 4(f) property regarding the above conditions.

2.2.3 SECTION 4(f) CONSTRUCTIVE USE

A Constructive Use of a Section 4(f) property occurs when a transportation project does not incorporate land from the property, but the proximity of the project results in impacts so severe that the protected activities, features, or attributes which qualify the property for protection under Section 4(f) are substantially impaired (23 CFR 774.15). FTA has determined the Proposed Project will not result in the constructive use of any Section 4(f) properties in the Project Site.

2.2.4 SECTION 4(f) EXCEPTION

Section 4(f) Temporary Occupancy Exception occurs when the project does not have an overall negative impact on the Section 4(f) property and may even have a net benefit. Under 23 CFR 774.13(d), temporary occupancy exceptions to Section 4(f) have been established where all of the following apply:

- The duration of use must be less than the full time needed for construction of the project;
- There is no change in ownership of the land;
- The nature and the magnitude of the changes to the Section 4(f) property are minimal;
- There are no anticipated permanent adverse impacts;
- There will be no temporary or permanent interference with the activities, features, or attributes of the Section 4(f) property;
- The land being used must be fully restored to a condition which is at least as good as that which existed prior to the project; and
- There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) property regarding the above conditions.

Transportation enhancement activities, transportation alternatives projects, and mitigation activities, where:

- The use of the Section 4(f) property is only for the purpose of preserving or enhancing an activity, feature, or attribute that qualifies the property for Section 4(f) protection;
- The OWJ of the property agrees in writing to the bullet point above; and
- That the project includes all possible planning to minimize harm to the Section 4(f) property.

Under 23 CFR 774.13(a)(2) exceptions to Section 4(f) have been established that include but are not limited to the use of historic transportation facilities; these include improvement of rail transit lines that are in use for the transportation of goods or passengers (e.g., maintenance, preservation, rehabilitation, operation, modernization, reconstruction, and replacement of railroad or rail transit line elements).

3.0 PROJECT INFORMATION

3.1 PURPOSE AND NEED

The existing Draw One Bridge movable spans present an ongoing maintenance challenge and are found to be beyond repair. Similarly, the approach trestles and the existing Signal Tower A are at the end of their useful life. Therefore, the Draw One Bridge, the existing Signal Tower A, and approach trestles need to be replaced.

The Proposed Project addresses the critical need to bring the Draw One Bridge into a state of good repair and improve the reliability and safety of MBTA commuter rail and Amtrak services. MBTA has identified specific goals for the Proposed Project, which include:

- Maintaining current operations for MBTA commuter rail and Amtrak *Downeaster* service throughout construction;
- Maintaining marine traffic beneath the bridges;
- Providing operational flexibility and redundancy;
- Accommodating potential future MBTA commuter rail and Amtrak *Downeaster* rail operations;
- Minimizing impacts on the built and natural environment, and
- Improving resiliency of the Draw One Bridge to severe storm events.

3.1.1 PROJECT DESCRIPTION – BUILD ALTERNATIVE

The Proposed Project includes the demolition and replacement of the superstructure and substructures of the two Draw One Bridge spans over the Charles River, as well as the adjoining existing Signal Tower A, and related repairs and adjustments to the approach trestles, track alignments, and communications and signaling systems.

The Draw One Bridge has two remaining operational rolling lift movable spans (out of the original four) that each carry two tracks. Portions of the two disused bridges, which have been partially demolished, are located to the west of the operational bridges. The Proposed Project includes the replacement of these structures with three vertical lift bridge structures.

The Proposed Project also includes the demolition and replacement of the existing Boston & Maine Rail Road (B&MRR) Signal Tower A building, which housed the operations control desk for the Draw One Bridge. The B&MRR Signal Tower A building is located on the north bank of the Charles River in Cambridge, immediately to the east of the mainline tracks. An adjacent temporary steel frame control tower houses bridge controls that were relocated from the existing Tower A building, which has been deemed unsafe for occupancy.

The Proposed Project would upgrade service across the Charles River from four bridge tracks to six and upgrade the number of usable tracks north of the river by matching the eight mainline tracks. In other words, the bridge approach trackwork through the Project Site will be upgraded from 10-4-7-8 to 12-6-8-8. This proposed alignment allows all station tracks to access the Commuter Rail Maintenance Facility (CRMF – also known as Boston Engine Terminal [BET]), a maintenance facility for the MBTA commuter rail train sets, which is located north of the Tower A Interlocking. Trackwork is also necessary north of the

Draw One Bridge to align the tracks associated with the northernmost replacement bridge into the existing track configuration. The Proposed Project would upgrade all wayside devices, cables, and infrastructure, along with making modifications to the microprocessor controller equipment for each of the Signal Instrument Houses (SIHs) within the Proposed Project limits. This will support the new track and signal system configuration throughout the Project Site, along with the required construction staging.

During construction of the Proposed Project, a minimum of four active tracks over the Charles River and a minimum of eight active tracks at North Station will be maintained during weekday operations, thereby limiting public transportation disruptions. There are three major stages relating to the Bridge work. The first stage would consist of constructing the first replacement movable bridge to the west, along with the proposed approach spans on each side and the proposed Signal Tower A. It is anticipated that the selected contractor would need to install a temporary trestle over the water immediately upstream of the proposed construction area to support these construction activities. The second stage of construction would consist of the replacement of the existing western bridge. During this phase of work, the north and south approach spans would be constructed to the limits that are available without impacting active tracks. The third phase would consist of the replacement of the existing east bridge and associated approach spans. Construction of the movable spans and north approach can be performed with little impact on the active portions of the track structure.

The Massachusetts Department of Conservation and Recreation (DCR) currently has plans to develop a pedestrian structure connecting Nashua Street Park over the MBTA tracks to a proposed park in the location of the currently vacant DCR parcel between the Leverett Circle Connector Bridge and the Leonard P. Zakim Bunker Hill Memorial Bridge (Zakim Bridge). The new South Bank Park will be developed on the site of a portion of an existing DCR parking lot (referred to as DCR Vacant Parcel within this document) and a portion of the Gridley Locks Footpath, generally located below the I-93 and Route 1 elevated highway on the south side of the Charles River. The Proposed Project would not preclude the implementation of the South Bank Park; however, DCR plans to begin construction as early as 2026. As such, there is the potential for concurrent construction activities, but activities would be coordinated to avoid disruption to either construction program.

The South Bank Bridge will provide pedestrian and bicycle access to the new park over the MBTA ROW just west of North Station, connecting it to Nashua Street Park. The bridge is proposed pursuant to a commitment of the Massachusetts General Law (MGL) Chapter 91, 310 CMR 9.00 permitting for the Massachusetts Highway Department (MHD) Central Artery Tunnel Project. There is currently no timeline for construction or completion of this project. The Proposed Project would not preclude the implementation of the South Bank Bridge; however, construction activities supporting the latter could not begin until after the substantial completion of the construction for the Proposed Project, assuming that the limits of construction for the two areas overlap. It is anticipated that throughout its design and construction planning, the implementation of the South Bank Bridge would be undertaken in coordination with agencies responsible for the properties.

A Cross River Bridge that would connect Nashua Street Park to North Point Park was proposed in 1995 by the Metropolitan District Commission, the predecessor agency to DCR, as a separate Charles River crossing for cyclists and pedestrians. It is not yet designed or planned for construction, though as currently contemplated it would cross the Charles River near, and to the west of, Draw One Bridge, connecting North Point Park with Nashua Street Park and/or the proposed new South Bank Park via the proposed

South Bank Bridge. The Proposed Project would not preclude the Cross River Bridge from being constructed in the future.

4.0 IDENTIFICATION AND POTENTIAL USE OF SECTION 4(F) PROPERTIES

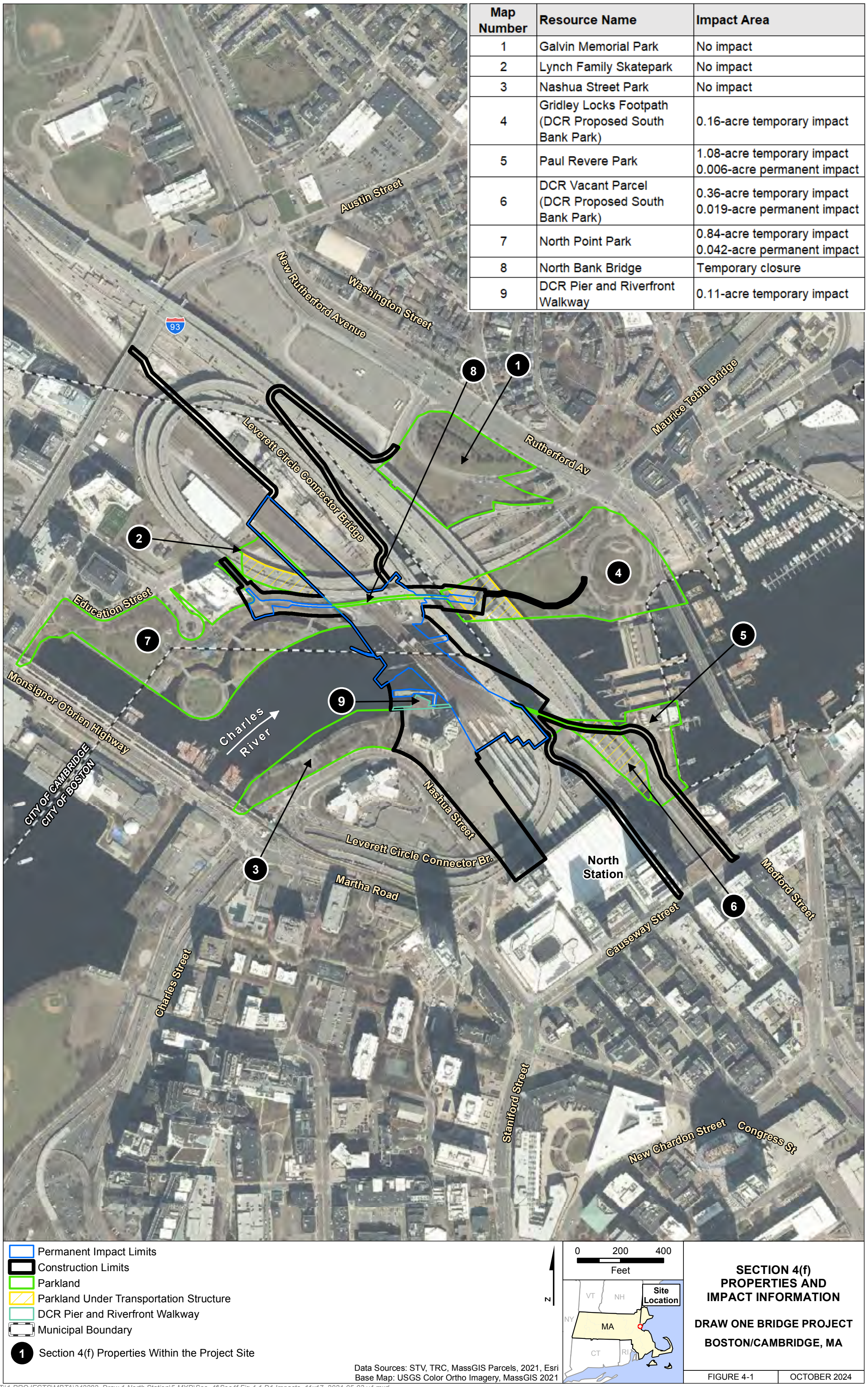
The list below identifies nine publicly owned parks and recreational areas within the Project Site. A determination as to whether the Proposed Project would result in the use of each Section 4(f) property is also included in the paragraphs following. **Figure 4-1** shows locations of each Section 4(f) property. The potential impacts to Section 4(f) properties are shown on **Figure 4-2** through **Figure 4-5.**

4.1 PARKLANDS AND RECREATIONAL RESOURCES

The Project Site is near nine DCR-owned parks and recreation areas, each of which are considered a Section 4(f) property:

- Galvin Memorial Park
- Lynch Family Skatepark
- Nashua Street Park
- Paul Revere Park
- Gridley Locks Footpath (DCR Proposed South Bank Park)
- DCR Parking Lot and Adjacent Vacant Parcel (DCR Proposed South Bank Park)
- North Point Park
- North Bank Bridge
- DCR Pier and Riverfront Walkway

The Proposed Project will not require permanent easements or acquisition of parkland. An evaluation of the Proposed Project's use of Section 4(f) parks and recreational properties is provided below.



Map Number	Resource Name	Impact Area
1	Galvin Memorial Park	No impact
2	Lynch Family Skatepark	No impact
3	Nashua Street Park	No impact
4	Gridley Locks Footpath (DCR Proposed South Bank Park)	0.16-acre temporary impact
5	Paul Revere Park	1.08-acre temporary impact 0.006-acre permanent impact
6	DCR Vacant Parcel (DCR Proposed South Bank Park)	0.36-acre temporary impact 0.019-acre permanent impact
7	North Point Park	0.84-acre temporary impact 0.042-acre permanent impact
8	North Bank Bridge	Temporary closure
9	DCR Pier and Riverfront Walkway	0.11-acre temporary impact

NO SECTION 4(F) USE

Three Section 4(f) properties have been identified within the Project Site that would not experience a use with the Proposed Project, as defined in 23 CFR 774.17: Galvin Memorial Park, Lynch Family Skatepark, and Nashua Street Park. FTA has made this determination based on the following:

- The Proposed Project would not permanently incorporate land into a transportation facility;
- The Proposed Project would result in a temporary occupancy of land that is adverse in the terms of the statute's preservation purpose as determined by the criteria in 23 CFR 774.13(d); and
- The Proposed Project would not result in a constructive use of the above referenced Section 4(f) properties as determined by 23 CFR 774.15.

FTA has determined no further coordination pursuant to 23 CFR 774 is required for Galvin Memorial Park, Lynch Family Skatepark, and Nashua Street Park.

SECTION 4(F) PROPERTIES *DE MINIMIS* USE

As discussed further below, six Section 4(f) properties within the Project Site have been identified that, with the implementation of measures to minimize harm, would experience *de minimis* impacts as a result of the Proposed Project. FTA intends to make a *de minimis* impact finding for these properties pursuant to 23 CFR 774.3(b), 23 CFR 774.5(b)(2)(ii), and 23 CFR 774.17. A *de minimis* impact is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Gridley Locks Footpath and Parcel (Proposed South Bank Park)
Section 4(f) Property No. 4 on Figure 4-1 and shown on Figure 4-4
Temporary Impacts: 7,000 Square Feet (0.16 acre)

The Gridley Locks Footpath and Parcel (proposed South Bank Park) is a 670-foot walking path along the Charles River through the Gridley lock system. The recreational trail and parcel are situated in Boston on the south bank of the Charles River, both east of the Leonard P. Zakim Bunker Hill Memorial Bridge (Zakim Bridge), and northeast of Beverly Street. The Proposed Project would require the construction of a temporary construction road in the parking area on the property. The details of the proposed impact are shown on Figure 4-4. The impact would affect the use of the driveway on the property when deliveries are made to the Proposed Project. The temporary construction access would be in place for approximately three years, which is significantly less than the duration of the construction of the Proposed Project, currently anticipated to be eight years. Construction access is needed to support the movement of equipment and materials to and from the Proposed Project construction site. The area of the proposed impact is approximately 7,000 Square Feet (0.16 acre). The location of the proposed impact is detailed in Figure 4-4.

To minimize the impact, MBTA proposes to repair paved surfaces within the impacted area to a condition as good or better than the existing condition. The impacts from the Proposed Project would not preclude any future development of the property. No recreational qualities of the footpath would experience an impact from the Proposed Project. The Proposed Project would not preclude any future improvements planned by DCR for the proposed South Bank Park. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to Gridley Locks

Footpath and Parcel (proposed South Bank Park) are consistent with the definition of Section 4(f) *de minimis* impact pursuant to 23 CFR 774.17.

DCR Vacant Parcel (Proposed South Bank Park)
Section 4(f) Property No. 6 on Figure 4-1 and shown on Figure 4-4
Permanent Impacts: Less than 1,000 Square Feet (0.02 acre)
Temporary Impacts: 16,000 Square Feet (0.36 acre)

The DCR Vacant Parcel (proposed South Bank Park) is situated on the south bank of the Charles River, beneath the Zakim Bridge, adjacent to its eastern abutment. DCR proposes to develop this 1.67-acre parcel with landscape plantings to reduce impervious surfaces, providing public recreational amenities and improving accommodations for bicycles and pedestrians. In the future with the Proposed Project, construction access for vehicles and materials would be provided in the proposed South Bank Park, temporarily displacing all ten of the northern parking spaces and six of the seven boat trailer parking spaces that would be provided at the proposed park. Proposed Project impacts include the installation of a new manhole for access to newly installed and extant subterranean infrastructure. The duration of the proposed impact is anticipated to last three years, which is significantly less than the duration of the construction of the Proposed Project, currently anticipated to be eight years. The extant recreational walkway along the Charles River is to remain open during the Proposed Project, except during material deliveries when conditions are not safe for the general public. The area of the proposed temporary and permanent impact is approximately 16,000 square feet (0.36 acre). The location of the proposed impact is detailed in Figure 4-4.

To minimize the impact, MBTA proposes to repair paved surfaces within the impacted area to a condition as good or better than the existing condition. The impacts from the Proposed Project would not preclude any future development of the property. No recreational qualities of the footpath would experience an impact from the Proposed Project. The Proposed Project would not preclude any future improvements planned by DCR for the proposed South Bank Park. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to the Vacant Parcel (proposed South Bank Park) are consistent with the definition of Section 4(f) *de minimis* impact pursuant to 23 CFR 774.17.

North Bank Bridge
Section 4(f) Property No. 8 on Figure 4-1 and shown on Figure 4-3 and 4-5
Impacts: Temporary Closure

The North Bank Bridge is a 690-foot multi-use bridge that carries users under the Zakim Bridge and over the MBTA commuter rail tracks which lead to and from North Station. The North Bank Bridge is situated in Cambridge on the north bank of the Charles River. Three piers supporting the North Bank Bridge – numbered three, four, and five – are on MBTA property. Pier Three conflicts with railroad track realignment and construction within MBTA right-of-way. To allow for construction of the Proposed Project, the North Bank Bridge would be required to be raised one foot. This would entail relocating two bridge supports – Piers Three and Four – and constructing one additional bridge support – Pier 4A, modifying the bridge truss structure, and modifying and the lengthening the landings of the bridge within North Point Park and Paul Revere Park. The details of the proposed impact are shown on Figures 4-3 and

4-5. These construction activities would result in multiple closures of the North Bank Bridge for up to two weeks at a time. The total duration of anticipated closures is approximately 30 days. The closures are anticipated to place within a six-month period, which is significantly less than the duration of the construction of the Proposed Project, currently anticipated to be eight years.

To minimize the impact to users of the recreational path, MBTA will coordinate with DCR to develop a detour to connect North Point Park and Paul Revere Park. A signed detour would be posted for path users during construction activities. MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the Proposed Project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. Further, MBTA will coordinate with DCR to review and comment on plans for raising the North Bank Bridge at 30%, 50%, 75%, 100% and Final for Construction benchmarks. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to North Bank Bridge are consistent with the definition of Section 4(f) *de minimis* impact pursuant to 23 CFR 774.17.

Pier and Riverfront Walkway

Section 4(f) Property No. 9 on Figure 4-1 and shown on Figure 4-2
Temporary Impacts: 5,000 Square Feet (0.11 acre)

The Pier and Riverfront Walkway is a waterfront feature on the south bank of the Charles River situated north of the Massachusetts General Hospital administration building, east of Nashua Street Park, and just west of the tracks at the north end of North Station. The Pier and Riverfront Walkway are shown in detail on Figure 4-2. The Proposed Project would require closing the pier for recreational use to allow the contractor to access the south trestle for construction activities. The duration of the closure is anticipated to be five years, which is less than the duration of the Proposed Project, currently anticipated to be eight years. Construction related activities on the Pier and Riverfront Walkway include removing trees to facilitate access for construction vehicles and materials. Multiple deliveries would occur each day at this location. The Riverfront Walkway between the DCR Pier and the fence of the west side of North Station would be temporarily closed during material deliveries. The area of the proposed impact is anticipated to be less than 5,000 square feet (0.11 acre).

To minimize the impact to the Pier and Riverfront Walkway, MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the Proposed Project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to Pier and Riverfront Walkway are consistent with the definition of Section 4(f) *de minimis* impact pursuant to 23 CFR 774.17.

Paul Revere Park

Section 4(f) Property No. 5 on Figure 4-1 and shown on Figure 4-3
Permanent Impacts: 155 Square Feet (< 0.01 acre)
Temporary Impacts: 47,045 Square Feet (1.08 acres)

Paul Revere Park at N. Washington Street in Boston is a 7.5-acre publicly-owned, public park situated east of the Zakim Bridge on the north bank of the Charles River and north of Gridley Locks. Features of the park include open greenspace for passive recreation, paved multi-use paths, and a children's playground. The Proposed Project would impact Paul Revere Park for modifications to the east landing of the North Bank Bridge. The details of the proposed impact are shown on Figure 4-3. Anticipated construction activities comprise approximately 47,045 square feet (1.08 acres) to allow access for vehicles and equipment, jacking the North Bank Bridge abutment, and regrading and planting. Impacts to trees and landscaping plantings would occur within areas of construction activity. Construction activities would require temporary closures of three walkways for up to two weeks at a time. The total duration of anticipated closures is approximately 30 days. The closures are anticipated to take place within a six-month period, which is significantly less than the duration of the construction of the Proposed Project, currently anticipated to be eight years.

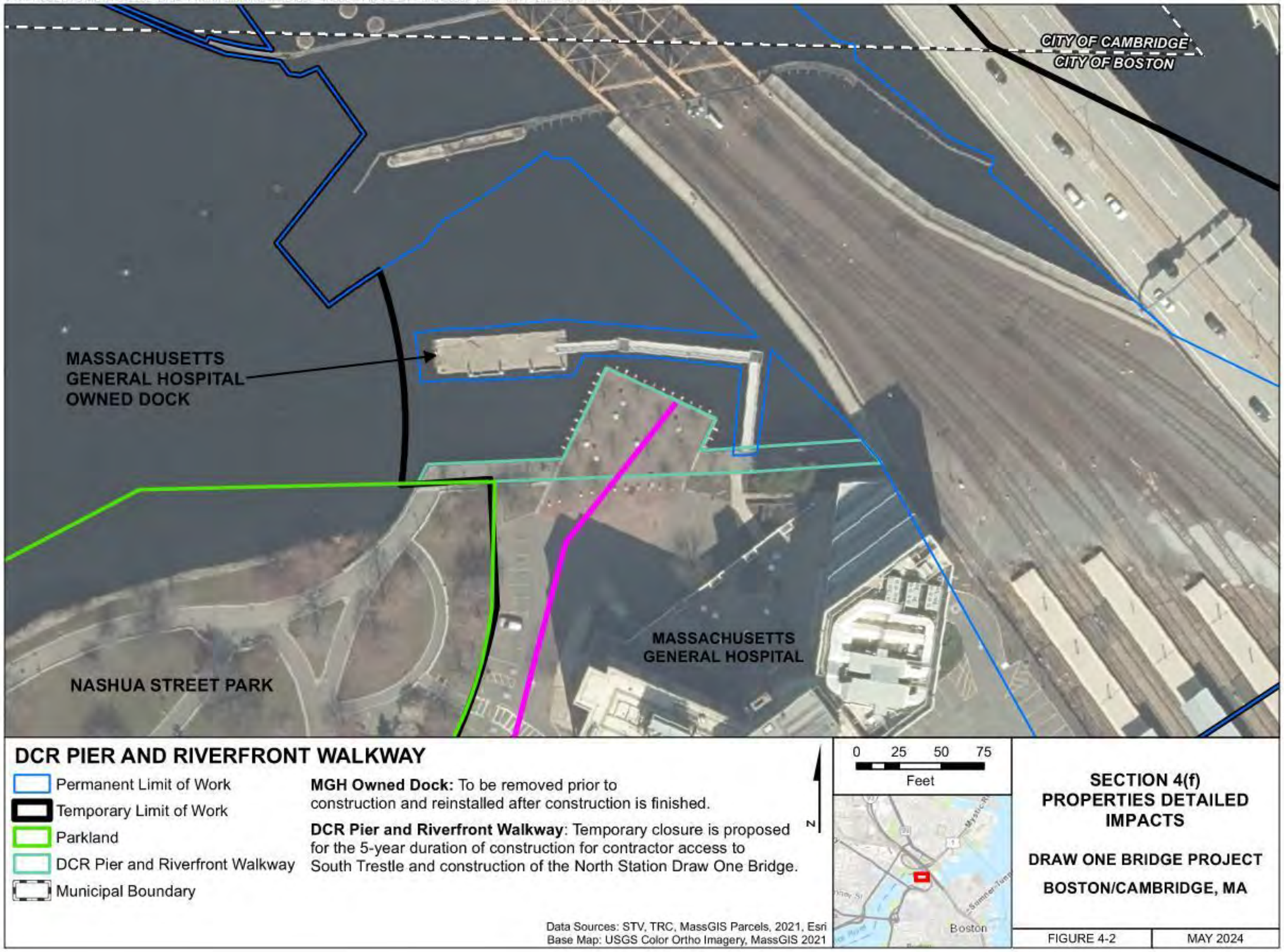
To minimize the impact to users of the recreational path, MBTA will coordinate with DCR to develop a detour to connect North Point Park and Paul Revere Park. A signed detour would be posted for path users during construction activities. MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the Proposed Project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to Paul Revere Park are consistent with the definition of Section 4(f) *de minimis* impact pursuant to 23 CFR 774.17.

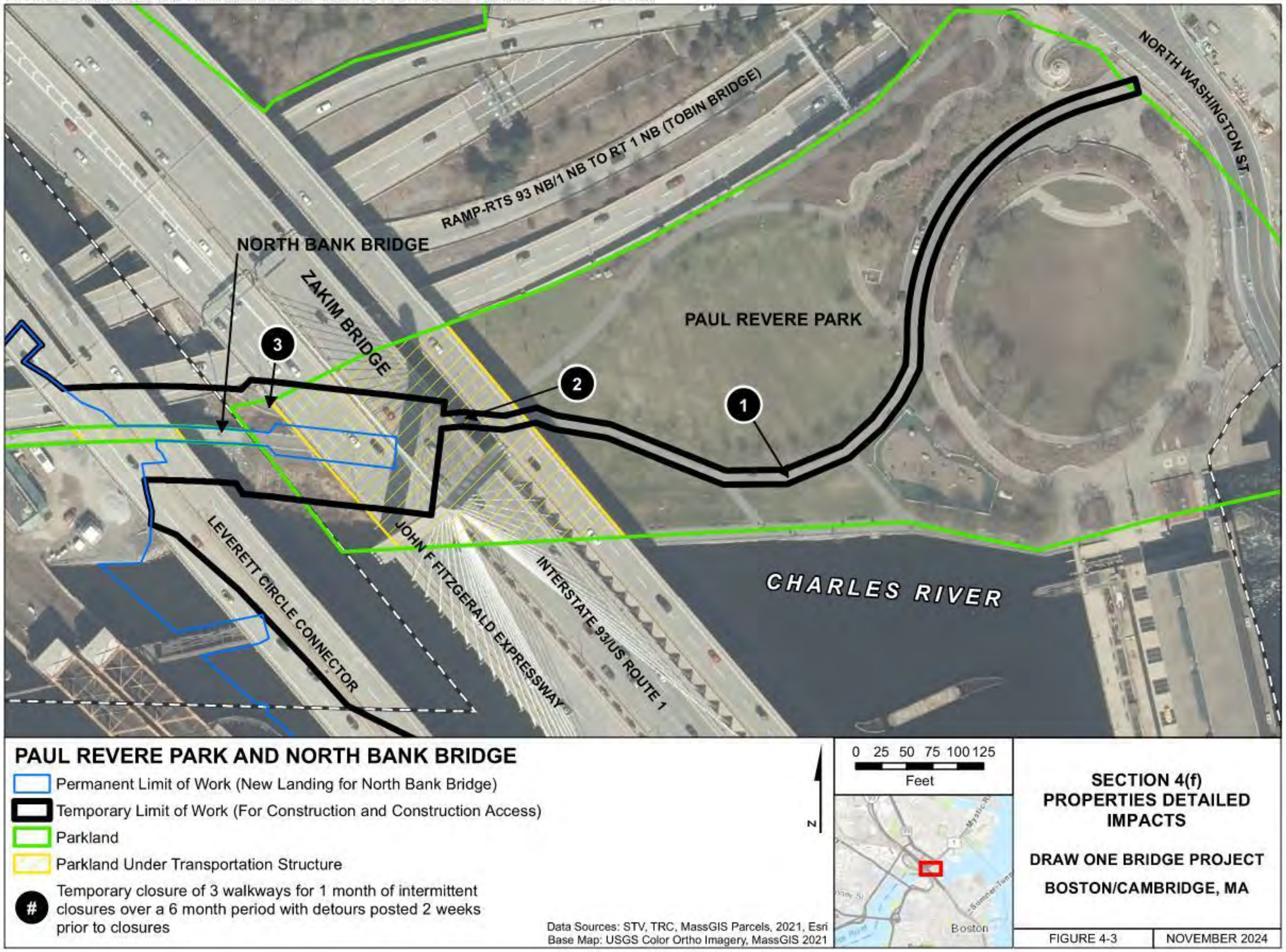
North Point Park

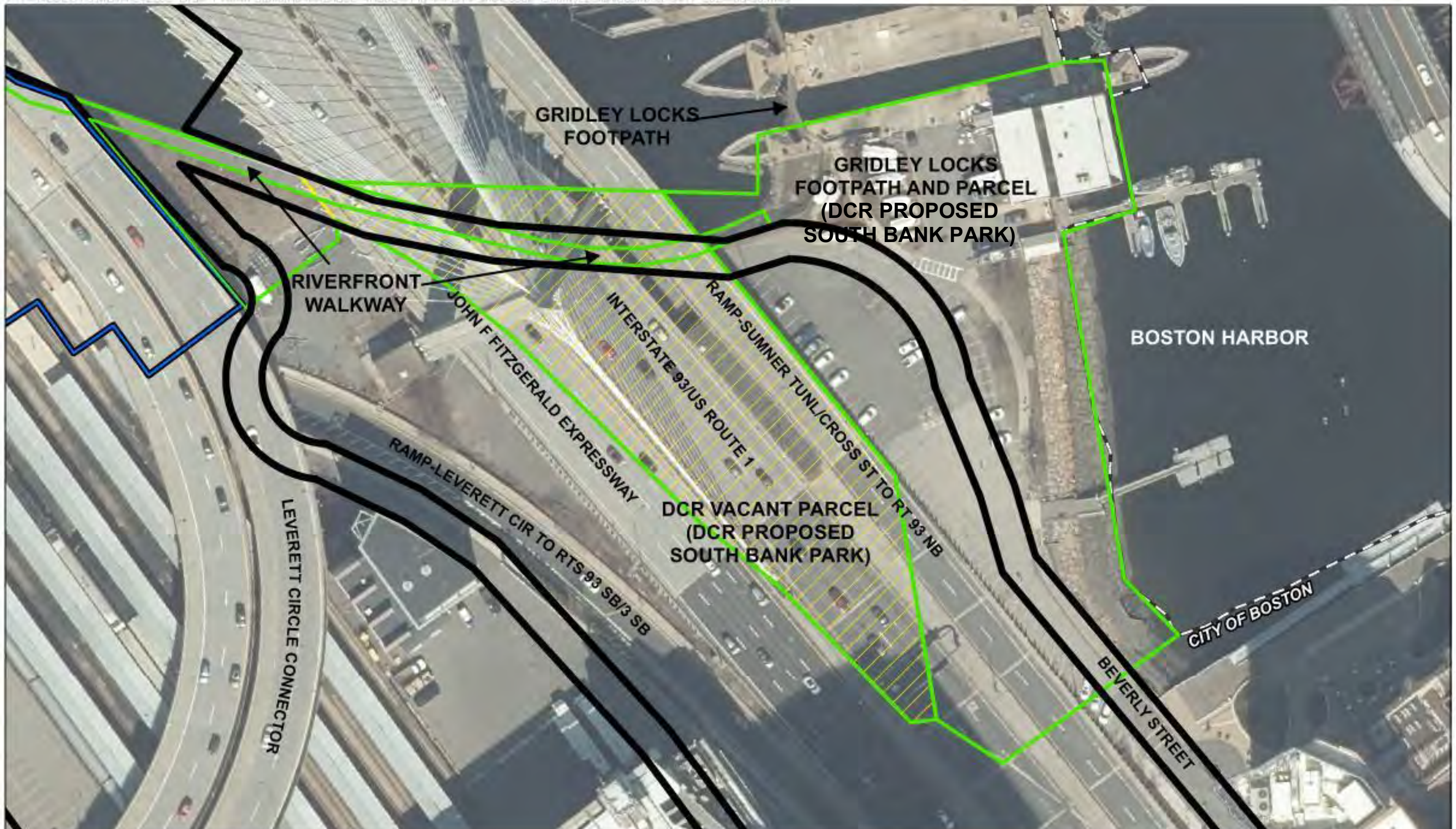
Section 4(f) Property No. 7 on Figure 4-1 and shown on Figure 4-5
Temporary Impacts: 37,500 Square Feet (0.84 acre)
Permanent Impacts: 400 Square Feet (0.04 acre)

North Point Park at 6 Museum Way in Cambridge is an 8-acre publicly-owned, public park situated northwest of Draw One and south of the Leverett Circle Connector. Features of the park include a playground, boat docks, greenspace, multi-use paths, and a waterfront promenade. The Proposed Project would impact North Point Park through modifications to the west landing of the North Bank Bridge. The modification would require erecting three shoring towers under the North Bank Bridge. Each tower would have a footprint of approximately 100 square feet. Construction activities would be staged from the north side of the bridge where there are limited opportunities for recreational activities. Modifications to the North Bank Bridge east landing would permanently impact approximately 140 feet of walkway at the existing abutment. The total anticipated impacts to North Point Park are approximately 37,500 square feet (0.84 acre). The details of the proposed impact are shown on Figure 4-5. Construction activities would require temporary closures of three walkways for up to two weeks at a time. The total duration of anticipated closures is approximately 30 days. The closures are anticipated to place within a six- month period, which is significantly less than the duration of the construction of the Proposed Project, currently anticipated to be eight years.

To minimize the impact to users of the recreational path, MBTA will coordinate with DCR to develop a detour to connect North Point Park and Paul Revere Park. A signed detour would be posted for path users during construction activities. MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the Proposed Project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to North Point Park are consistent with the definition of Section 4(f) *de minimis* impact pursuant to 23 CFR 774.17.


CITY OF CAMBRIDGE
CITY OF BOSTON
MASSACHUSETTS GENERAL HOSPITAL OWNED DOCK
MASSACHUSETTS GENERAL HOSPITAL
NASHUA STREET PARK
DCR PIER AND RIVERFRONT WALKWAY
Permanent Limit of Work
Temporary Limit of Work
Parkland
DCR Pier and Riverfront Walkway
Municipal Boundary
MGH Owned Dock: To be removed prior to construction and reinstalled after construction is finished.
DCR Pier and Riverfront Walkway: Temporary closure is proposed for the 5-year duration of construction for contractor access to South Trestle and construction of the North Station Draw One Bridge.
N
0 25 50 75
Feet
Boston
Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021
SECTION 4(f) PROPERTIES DETAILED IMPACTS
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 4-2
MAY 2024


NORTH WASHINGTON ST
RAMP-RTS 93 NB/1 NB TO RT 1 NB (TOBIN BRIDGE)
NORTH BANK BRIDGE
ZAKIM BRIDGE
PAUL REVERE PARK
CHARLES RIVER
LEVERETT CIRCLE CONNECTOR
JOHN F FITZGERALD EXPRESSWAY
INTERSTATE 93/US ROUTE 1
1
2
3
PAUL REVERE PARK AND NORTH BANK BRIDGE
Permanent Limit of Work (New Landing for North Bank Bridge)
Temporary Limit of Work (For Construction and Construction Access)
Parkland
Parkland Under Transportation Structure
Temporary closure of 3 walkways for 1 month of intermittent closures over a 6 month period with detours posted 2 weeks prior to closures
Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021
N
0 25 50 75 100 125
Feet
Boston
SECTION 4(f) PROPERTIES DETAILED IMPACTS
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 4-3
NOVEMBER 2024



GRIDLEY LOCKS FOOTPATH AND VACANT DCR PARCEL

- Permanent Limit of Work
- Temporary Limit of Work (Construction Access)
- Parkland
- Parkland Under Transportation Structure
- Municipal Boundary

Gridley Locks Footpath and Parcel (DCR Proposed South Bank Park): Construction access through the parking area for 3 years. No impacts to the footpath.

DCR Vacant Parcel (DCR Proposed South Bank Park): Walkway along riverfront to remain open. It is unlikely that stormwater and/or electrical work is needed; however, the worst case acreage has been included if the infrastructure cannot be located off this parcel.

Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021

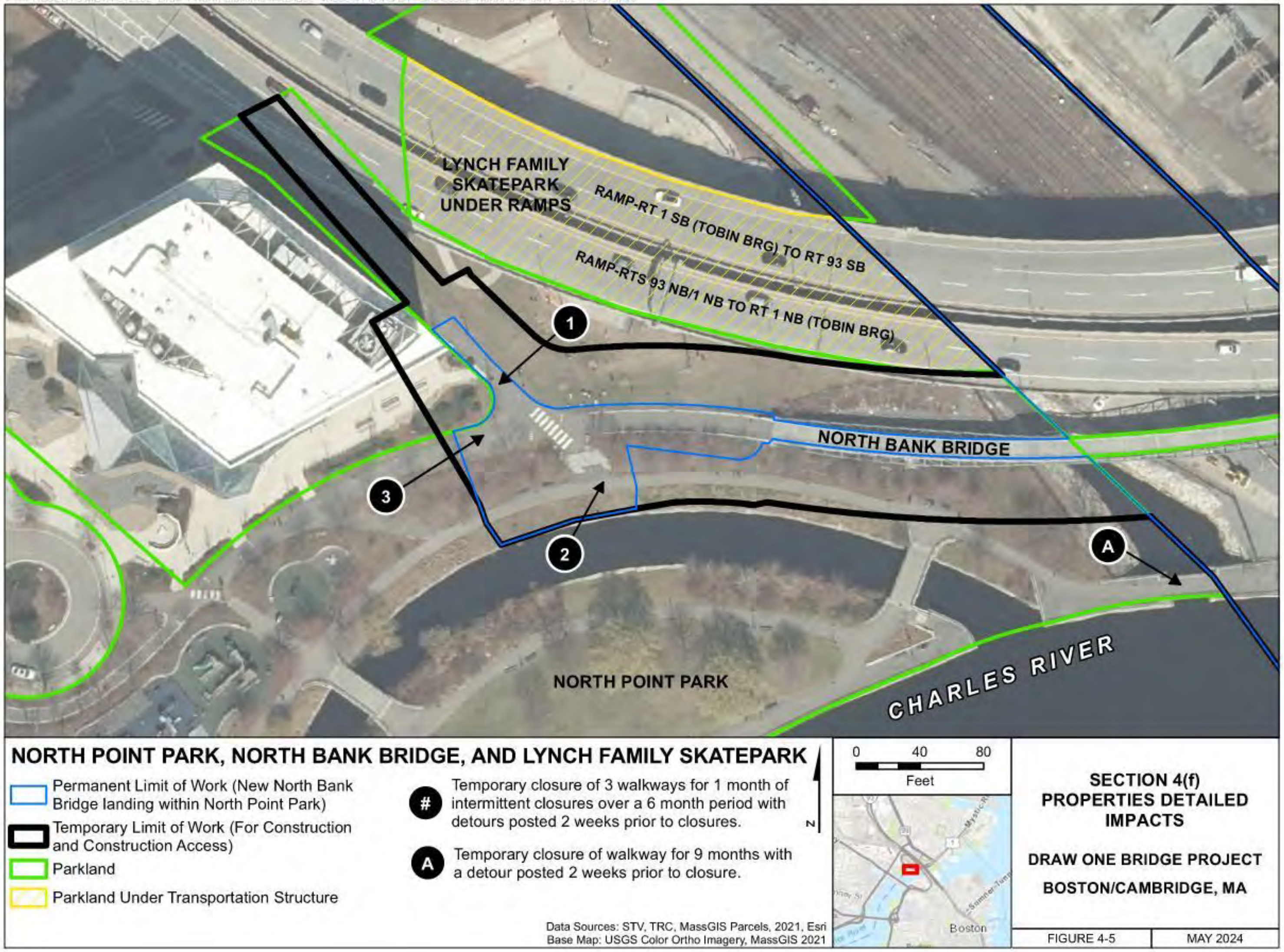
N

0 50 100
Feet

SECTION 4(f) PROPERTIES DETAILED IMPACTS

DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA

FIGURE 4-4 | MAY 2024


LYNCH FAMILY SKATEPARK UNDER RAMPS
RAMP-RT 1 SB (TOBIN BRG) TO RT 93 SB
RAMP-RTS 93 NB/1 NB TO RT 1 NB (TOBIN BRG)
1
NORTH BANK BRIDGE
3
2
A
NORTH POINT PARK
CHARLES RIVER
NORTH POINT PARK, NORTH BANK BRIDGE, AND LYNCH FAMILY SKATEPARK
Permanent Limit of Work (New North Bank Bridge landing within North Point Park)
Temporary Limit of Work (For Construction and Construction Access)
Parkland
Parkland Under Transportation Structure
Temporary closure of 3 walkways for 1 month of intermittent closures over a 6 month period with detours posted 2 weeks prior to closures.
A Temporary closure of walkway for 9 months with a detour posted 2 weeks prior to closure.
N
0 40 80
Feet
Boston
Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021
SECTION 4(f) PROPERTIES DETAILED IMPACTS
DRAW ONE BRIDGE PROJECT
BOSTON/CAMBRIDGE, MA
FIGURE 4-5
MAY 2024

4.2 HISTORIC RESOURCES

A Historic Architectural Survey and Assessment of Effects identified two historic resources that are considered to be Section 4(f) properties within the Project Site: B&MRR Signal Tower A, commonly known as 'Tower A,' and Draw One Bridge (see **Figure 1-1**). They are both eligible to be listed on the NRHP. In May 2024, FTA determined the Draw One Bridge and Tower A are excepted from consideration as 4(f) properties consistent with 23 CFR 774.13(a)(2) as an exception for historic rail lines and elements thereof.

4.3 WILDLIFE OR WATERFOWL REFUGES

No wildlife or waterfowl refuges were identified within the Project Site.

5.0 MEASURES TO MINIMIZE HARM

Coordination with DCR is ongoing for their review and comment on the Proposed Project's use of Section 4(f) parks and recreational properties. Measures to minimize harm to parklands and public recreation areas in the vicinity of the Proposed Project are set forth in a draft agreement between DCR and FTA (see **Attachment 1**).[1] Potential measures to minimize harm may include signed detours for pedestrians and bicyclists posted for each walking/biking path affected during construction activities. Regrading; seeding; planting trees, shrubs, and other permanent plantings; and/or general landscaping are other possibilities for areas disturbed by construction.

[1] The temporary construction easement at Paul Revere Park was previously assumed to be approximately 0.86 acre, which is reflected in the draft Section 4(f) agreement between MBTA and DCR in **Attachment 1**. However, based on DCR review and comment, the easement has been slightly increased to approximately 1.08 acre to accommodate an extension of the access drive.

6.0 COORDINATION

6.1 DEPARTMENT OF CONSERVATION AND RECREATION DCR

MBTA held a meeting with DCR on June 5, 2024, to provide an overview of the Proposed Project and discuss the potential use of Section 4(f) properties and proposed mitigation measures. Coordination with DCR is ongoing for their review and comment on the Proposed Project's impacts to their Section 4(f) parkland properties. Measures to minimize harm, and mitigation for impacts are set forth in an agreement between DCR and MBTA (see **Attachment 1** and **Attachment 2**).

6.2 PUBLIC INVOLVEMENT

A public meeting was held on June 6, 2024, to discuss the Proposed Project and provide an update on the status of Section 106 consultation and 4(f) impacts. FTA will utilize the public comment period associated with the Environmental Assessment (EA) to comply with the requirements of 23 CFR 774.5(b)(2)(i) and (ii) prior to seeking concurrence from DCR, as the official with jurisdiction, on FTA's intent to make a *de minimis* impact determination for the minor Section 4(f) use of parks under DCR's jurisdiction. Any agency or public comments received during the review period will be addressed.

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DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

Attachment 1

Draft Section 4(f) Agreement

U.S. Department of Transportation
Federal Transit Administration

REGION 1
Connecticut, Maine,
Massachusetts,
New Hampshire,
Rhode Island, Vermont

Volpe Center
220 Binney Street
Floor 9-940
Cambridge, MA 02142-1026

November 29, 2024

Brian Arrigo, Commissioner
Massachusetts Department of Conservation & Recreation
10 Park Plaza
Suite 6620
Boston, MA 02116

**RE: MBTA North Station Draw One Bridge Replacement Project,
Boston and Cambridge, MA
Section 4(f) Coordination with Official with Jurisdiction
Determinations for DCR Review and Concurrence**

Dear Brian Arrigo:

The Federal Transit Administration (FTA) is providing financial assistance to the Massachusetts Bay Transportation Authority (MBTA) for the Draw One Bridge Replacement Project in Boston and Cambridge, Massachusetts. The scope of the undertaking involves demolishing the two existing bascule lift spans and replacing them with three vertical lift bridges. Owing to the strategic importance of the Charles River crossing, MBTA will maintain rail service to North Station through the duration of the project. Construction is anticipated to begin in April 2026 and be completed by November 2034.

As shown in **Attachment 1, Figure 1-1**, the proposed project would result in impacts to a variety of publicly-owned, public-parks and recreational properties managed by the Department of Conservation and Recreation (DCR). Due to the use of FTA funds for this transportation project, the properties discussed in this letter are subject to protection under Section 4(f) of the U.S. Department of Transportation (U.S. DOT) Act of 1966. Projects that require a federal action and that use Section 4(f) property require approval by the lead federal agency, unless the work meets one of the exceptions identified at 23 CFR 774.13.

This letter describes the potential impacts to or use of six publicly-owned, public parks and recreational properties managed by DCR: Gridley Locks Footpath and Parcel (Proposed South Bank Park), DCR Unnamed Vacant Parcel (part of Proposed South Bank Park), North Bank Bridge, Pier and Riverfront Walkway, Paul Revere Park, and North Point Park. The Section 4(f) properties, the project's proposed impacts or use, and measures to minimize harm are described below. Figures showing the location of the Section 4(f) properties within the project area and the impacts to these 4(f) properties associated with the proposed Draw One Bridge Replacement Project are enclosed as **Attachment 1**.

The purpose of this letter is to inform DCR of FTA's intention to make a determination of Section 4(f) *de miminis* impacts to the Section 4(f0 properties under the agency's jurisdiction. Pursuant to the coordination requirements at 23 CFR 774.5(b)(2)(i), FTA will publish this information in the Environmental Assessment (EA) being prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) for the proposed project. FTA will utilize the 30-day public comment period for the EA to allow an opportunity for public review and comment on the FTA's intention to make a determination of Section 4(f) *de minimis* impacts. Following the conclusion of the public comment period, FTA will review and consider any relevant comments and provide them to DCR for review and consideration. After consideration of any comments from the public, FTA will then make a *de minimis* impact determination if DCR concurs that the proposed project, after measures to minimize harm are employed, would not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

Project Impacts to Section 4(f) Properties

No Section 4(f) Use

FTA has identified three Section 4(f) properties within the project area that would not experience a use from the proposed project, as defined in 23 CFR 774.17: Galvin Memorial Park, Lynch Family Skatepark, and Nashua Street Park. FTA has made this determination based on the following:

- The proposed project would not permanently incorporate land into a transportation facility;
- The proposed project would result in a temporary occupancy of land that is adverse in the terms of the statute's preservation purpose as determined by the criteria in 23 CFR 774.13(d); and
- The proposed project would not result in a constructive use of the above referenced Section 4(f) properties as determined by 23 CFR 774.15.

FTA has determined no further coordination pursuant to 23 CFR 774 is required for Galvin Memorial Park, Lynch Family Skatepark, and Nashua Street Park.

Project Impacts to Section 4(f) Properties

FTA has identified six Section 4(f) properties within the project area, discussed further below, that including measures to minimize harm, would experience *de minimis impacts* from the project, for which FTA intends to make *a de minimis* impact finding pursuant to 23 CFR 774.3(b), 23 CFR 774.5(b)(2)(ii), and 23 CFR 774.17. A *de minimis* impact is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f).

Gridley Locks Footpath and Parcel (Proposed South Bank Park)
Section 4(f) Property No. 5 on Figure 1-2 in Attachment 1.
Temporary Impacts: 7,000 Square Feet (0.16 Acres)

The Gridley Locks Footpath and Parcel (Proposed South Bank Park) is a 670-foot walking path along the Charles River through the Gridley lock system. The recreational trail and parcel are situated in Boston on the south bank of the Charles River, both east of the Leonard P. Zakim Bunker Hill Memorial Bridge (Zakim Bridge), and northeast of Beverly Street. The proposed project would require the construction of a temporary construction road in the parking area on the property. The details of the proposed impact are shown on **Figure 1-5.** The impact would affect the use of approximately 16 of the 77 parking spaces on the property. The temporary construction access would be in place for approximately three years, which is significantly less than the duration of the construction of the project, currently anticipated to be eight years. Construction access is needed to support the movement of equipment and materials to and from the project construction site. The area of the proposed impact is approximately 7,000 Square Feet (0.16 Acres). The location of the proposed impact is detailed in **Figure 1-5**. To minimize the impact, MBTA proposes to repair paved surfaces within the impacted area to a condition as good or better than the existing condition. The impacts from the proposed project would not preclude any future development of the property. No recreational qualities of the footpath would experience an impact from the proposed project. The proposed project would not preclude any future improvements planned by DCR for the proposed South Bank Park. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to Gridley Locks Footpath and Parcel (proposed South Bank Park) are consistent with the definition of Section 4(f) *de minimis impact* pursuant to 23 CFR 774.17.

DCR Vacant Parcel
(Proposed South Bank Park)
Section 4(f) Property No. 6 on Figure 1-2 in Attachment 1
Permanent Impacts: Less than 1000 Square Feet (0.02 Acres)
Temporary Impacts: 16,000 Square Feet (0.36 Acres)

This Vacant Parcel is part of the Proposed South Bank Park and is situated on the south bank of the Charles River, beneath the Zakim Bridge, adjacent to its eastern abutment. DCR proposes to develop this 1.67-acre parcel with landscape plantings to reduce impervious surfaces, providing public recreational amenities and improving accommodations for bicycles and pedestrians. The proposed project would impact the Proposed South Bank Park by providing construction access for vehicles and materials. Project impacts include the installation of a new manhole for access to newly installed and extant subterranean infrastructure. The duration of the proposed impact is anticipated to last three years, which is significantly less than the duration of the construction of the project, currently anticipated to be eight years. The extant recreational walkway along the Charles River is to remain open during the project, except during material deliveries when conditions are not safe for the general public. The area of the proposed temporary and permanent impact is approximately 16,000 Square Feet (0.36 Acres). The location of the proposed impact is detailed in **Figure 1-5**. To minimize the impact, MBTA proposes to repair paved surfaces within the impacted area to a condition as good or better than the existing condition. The impacts from the proposed project would not preclude any future development of the property. No recreational qualities of the footpath would experience an impact from the proposed project. The proposed project would not preclude any future improvements planned by DCR for the proposed South Bank Park. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to the Vacant Parcel (proposed South Bank Park) are consistent with the definition of Section 4(f) *de minimis impact* pursuant to 23 CFR 774.17.

North Bank Bridge
Section 4(f) Property No. 8 on Figure 1-2 in Attachment 1
Impacts: Temporary Closure

The North Bank Bridge is a 690-foot multi-use bridge that carries users under the Zakim Bridge and over the MBTA commuter rail tracks which lead to and from North Station. The North Bank Bridge is situated in Cambridge on the north bank of the Charles River. Three piers supporting the North Bank Bridge – numbered three, four, and five – are on MBTA property. Pier Three conflicts with railroad track realignment and construction within MBTA right-of-way. To allow for construction of the proposed project, the North Bank Bridge would be required to be raised one foot. This would entail relocating two bridge supports – Piers Three and Four – and constructing one additional bridge support – Pier 4A, modifying the bridge truss structure, and modifying and the lengthening the landings of the bridge within North Point Park and Paul Revere Park. The details of the proposed impact are shown on **Figures 1-4 and 1-6.** These construction activities would result in multiple closures of the North Bank Bridge for up to two weeks at a time. The total duration of anticipated closures is approximately 30 days. The closures are anticipated to place within a six-month period, which is significantly less than the duration of the construction of the project, currently anticipated to be eight years. To minimize the impact to users of the recreational path, MBTA will coordinate with DCR to develop a detour to connect North Point Park and Paul Revere Park. A signed detour would be posted for path users during construction activities. MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the proposed project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. Further, MBTA will coordinate with DCR to review and comment on plans for raising the North Bank Bridge at 30%, 50%, 75%, 100% and Final for Construction benchmarks. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to North Bank Bridge are consistent with the definition of Section 4(f) *de minimis impact* pursuant to 23 CFR 774.17.

Pier and Riverfront Walkway
Section 4(f) Property No. 10 on Figure 1-2 in Attachment 1
Temporary Impacts: 5,000 Square Feet (0.11 Acres)

The Pier and Riverfront Walkway is a waterfront feature on the south bank of the Charles River situated north of the Massachusetts General Hospital Building, east of Nashua Street Park, and just west of the tracks at the north end of North Station. The Pier and Riverfront Walkway are shown in detail on **Figure 1-3**. The proposed project would require closing the pier for recreational use to allow the contractor to access the south trestle for construction activities. The duration of the closure is anticipated to be five years, which is less than the duration of the project, currently anticipated to be eight years. Construction related activities on the Pier and Riverfront Walkway include removing trees to facilitate access for construction vehicles and materials. Multiple deliveries would occur each day at this location. The Riverfront Walkway between the DCR Pier and the fence of the west side of North Station would be temporarily closed during material deliveries. The area of the proposed impact is anticipated to be less than 5,000 square feet (0.11 Acres). To minimize the impact to the Pier and Riverfront Walkway, MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the proposed project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to Pier and Riverfront Walkway are consistent with the definition of Section 4(f) *de minimis impact* pursuant to 23 CFR 774.17.

Paul Revere Park
Section 4(f) Property No. 4 on Figure 1-2 in Attachment 1
Permanent Impacts: 155 Square Feet (< 0.01 Acres)
Temporary Impacts: 37,500 Square Feet (0.86 Acres)

Paul Revere Park at N. Washington Street in Boston is a 7.5-acre publicly-owned, public park situated east of the Zakim Bridge on the north bank of the Charles River and north of Gridley Locks. Features of the park include open greenspace for passive recreation, paved multi-use paths, and a children's playground. The proposed project would impact Paul Revere Park for modifications to the east landing of the North Bank Bridge. The details of the proposed impact are shown on **Figure 1-4.** Anticipated construction activities comprise approximately 37,500 Square Feet (0.86 Acres) to allow access for vehicles and equipment, jacking the North Bank

Bridge abutment, and regrading and planting. Impacts to trees and landscaping plantings would occur within areas of construction activity. Construction activities would require temporary closures of three walkways for up to two weeks at a time. The total duration of anticipated closures is approximately 30 days. The closures are anticipated to take place within a six-month period, which is significantly less than the duration of the construction of the project, currently anticipated to be eight years. To minimize the impact to users of the recreational path, MBTA will coordinate with DCR to develop a detour to connect North Point Park and Paul Revere Park. A signed detour would be posted for path users during construction activities. MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the proposed project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to Paul Revere Park are consistent with the definition of Section 4(f) *de minimis impact* pursuant to 23 CFR 774.17.

North Point Park
Section 4(f) Property No. 7 on Figure 1-2 in attachment 1
Temporary Impacts: 37,500 Square Feet (0.84 Acres)
Permanent Impacts: 400 Square Feet (0.04 Acres)

North Point Park at 6 Museum Way in Cambridge is an 8-acre publicly-owned, public park situated northwest of Draw One and south of the Leverett Circle Connector. Features of the park include a playground, boat docks, greenspace, multi-use paths, and a waterfront promenade. The proposed project would impact North Point Park through modifications to the west landing of the North Bank Bridge. The modification would require erecting three shoring towers under the North Bank Bridge. Each tower would have a footprint of approximately 100 Square Feet. Construction activities would be staged from the north side of the bridge where there are limited opportunities for recreational activities. Modifications to the North Bank Bridge east landing would permanently impact approximately 140 feet of walkway at the existing abutment. The total anticipated impacts to North Point Park are approximately 37,500 Square Feet (0.84 Acres). The details of the proposed impact are shown on **Figure 1-6.** Construction activities would require temporary closures of three walkways for up to two weeks at a time. The total duration of anticipated closures is approximately 30 days. The closures are anticipated to place within a six-month period, which is significantly less than the duration of the construction of the project, currently anticipated to be eight years. To minimize the impact to users of the recreational path, MBTA will coordinate with DCR to develop a detour to connect North Point Park and Paul Revere Park. A signed detour would be posted for path users during construction activities. MBTA has coordinated with DCR park designers to come to agreement on the regrading, reseeding, and planting of all trees, shrubs, and other permanent plantings that may be impacted by the proposed project. Landscaping plans shall be developed in coordination with DCR for the restoration of disturbed areas for DCR to review and comment on at 30%, 50%, 75%, 100% and Final for Construction benchmarks. All paved surfaces would be restored to a condition as good or better than prior to construction. In consideration of the impacts and minimization and mitigation measures described above, the FTA has determined the proposed impacts to North Point Park are consistent with the definition of Section 4(f) *de minimis impact* pursuant to 23 CFR 774.17.

Request for Concurrence

FTA requests your concurrence, as the official with jurisdiction, with its determination that the impacts to Gridley Locks Footpath and Parcel (Proposed South Bank Park), DCR Unnamed Vacant Parcel (part of Proposed South Bank Park), North Bank Bridge, Pier and Riverfront Walkway, Paul Revere Park, and North Point Park are consistent with the definition of Section 4(f) *de minimis impact* at 23 CFR 774.17. Pursuant to the coordination requirements at 23 CFR 774.5(b)(2)(i), FTA will publish this information in the Environmental Assessment (EA) being prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) for the proposed project. Following the conclusion of the public comment period, FTA will review and consider any relevant comments and provide them to DCR for review and consideration. After consideration of any comments from the public, FTA would then make a *de minimis* impact determination, if DCR concurs that the proposed project, after measures to minimize harm are employed, would not adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

By signing your concurrence below, you indicate DCR agrees the proposed project, after consideration of any comments from the public and after measures to minimize harm are employed, would not adversely affect the activities, features or attributes that make the property eligible for Section 4(f) protection and that the agency concurs with FTA's Section 4(f) *de minimis impact* determination.

Thank you for your time and cooperation on this matter. Should you have any questions or concerns or require additional information about the project, please contact Jonathan Schmidt, Environmental Protection Specialist, at 617-494-4742 or via email at Jonathan.Schmidt@dot.gov.

Thank you for your review and coordination on this project.

Sincerely,

PETER SHANNON BUTLER

Digitally signed by PETER SHANNON BUTLER
Date: 2024.11.20 08:12:19 -05'00'

Peter S. Butler
Regional Administrator
FTA Region 1

Attachments:

Attachment 1. Maps and Figures of Proposed Impacts to Section 4(f) Properties

cc: Karl Eckstrom, Senior Director, Bridge & Structures Program, MBTA
Kim Hanton, Chief of Staff, DCR
Meredith Sandberg, Chief of Quality, Compliance & Oversight, MBTA
Tess Paganelli, Director of Environmental Review and Permitting, MBTA

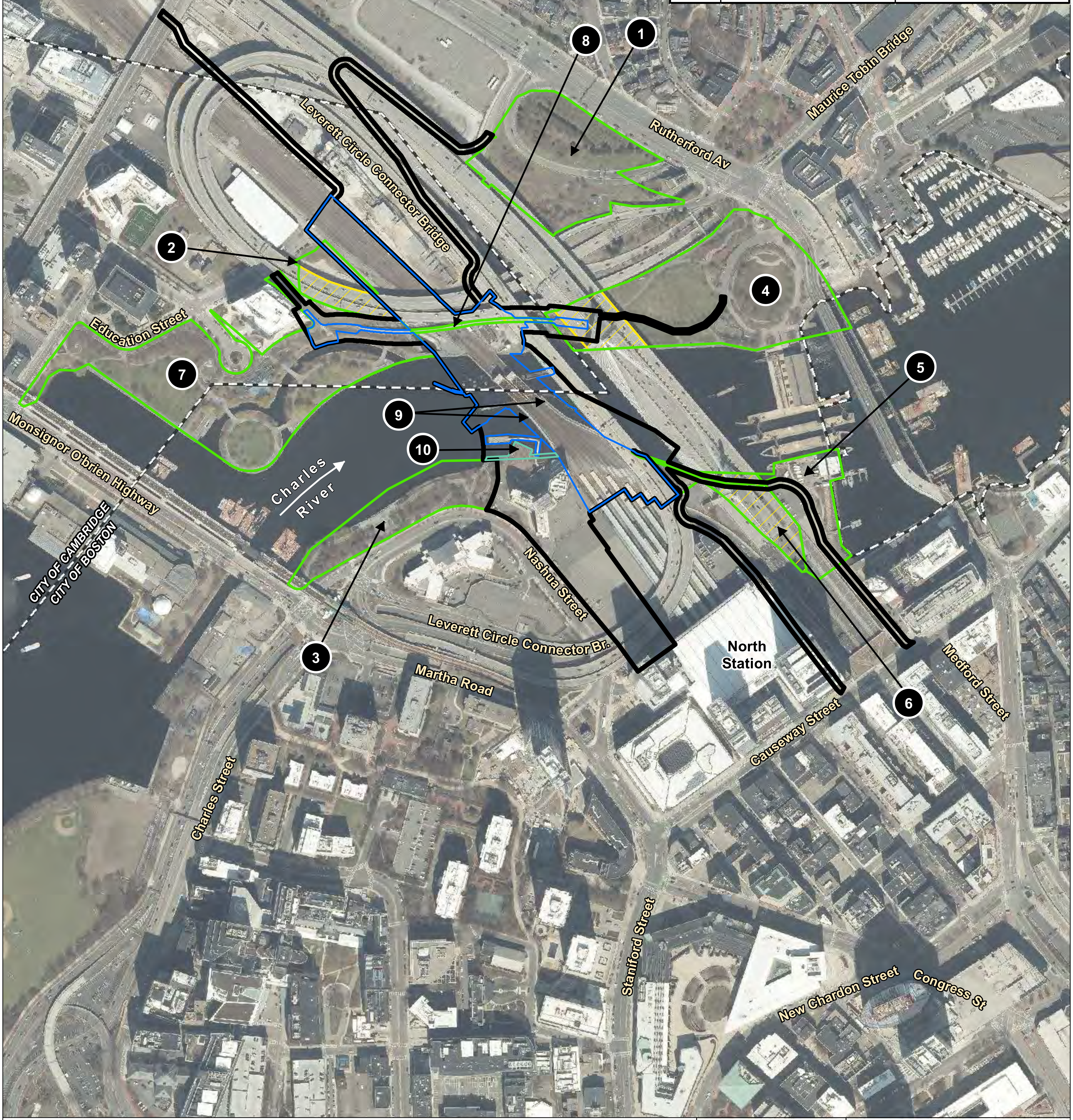
Concurrence:

____

Brian Arrigo, Commissioner Date
Massachusetts Department of Conservation and Recreation

Figure 1-1: Project Location

Map Number	Resource Name	Acres of Impact
1	Galvin Memorial Park	No Impact
2	Lynch Family Skatepark	No Impact
3	Nashua Street Park	No Impact
4	Paul Revere Park	0.86 acre temporary impact 0.006 acre permanent impact
5	Gridley Locks Footpath	0 temporary impact 0 permanent impact
	and Parcel	0 temporary impact 0 permanent impact
6	DCR Vacant Parcel	0.51 acre temporary impact 0.019 acre permanent impact
7	North Point Park	0.84 acre temporary impact 0.042 acre permanent impact
8	North Bank Bridge	Impact due to renovation
9	Draw One Bridge South Approach Sidewalks	675 feet sidewalk impact
10	DCR Pier and Riverfront Walkway	0.11 acre temporary impact



Permanent Impact Limits
Construction Limits
Parkland
Parkland Under Transportation Structure
DCR Pier and Riverfront Walkway
Municipal Boundary
1 Section 4(f) Properties Within the Project Site

Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021

SECTION 4(f) PROPERTIES AND IMPACT INFORMATION

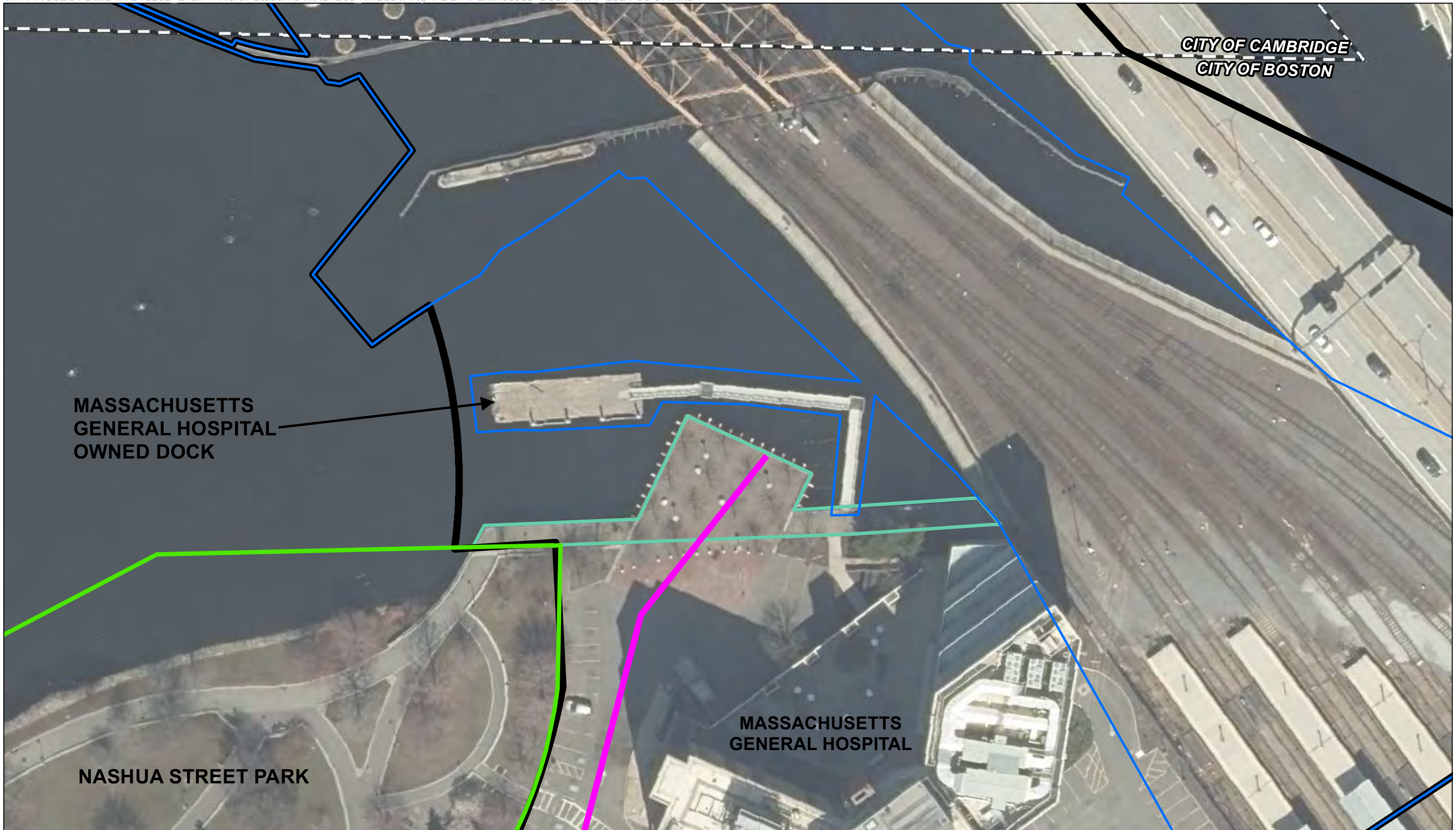
DRAW ONE BRIDGE PROJECT

BOSTON/CAMBRIDGE, MA

FIGURE 1-2 | OCTOBER 2024

T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\Sec_4f\Sec4f Fig 4-1 D1 Impacts_11x17_2024-05-03 v4.mxd

T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\Sec_4f\Sec4f Fig 4-2 D1 ParkAccess_Dock_8x11_2024-05-07.mxd



DCR PIER AND RIVERFRONT WALKWAY

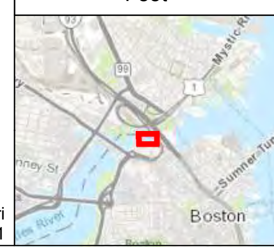
- Permanent Limit of Work
- Temporary Limit of Work
- Parkland
- DCR Pier and Riverfront Walkway
- Municipal Boundary

MGH Owned Dock: To be removed prior to construction and reinstalled after construction is finished.

DCR Pier and Riverfront Walkway: Temporary closure is proposed for the 5-year duration of construction for contractor access to South Trestle and construction of the North Station Draw One Bridge.

N

0 25 50 75
Feet



Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021

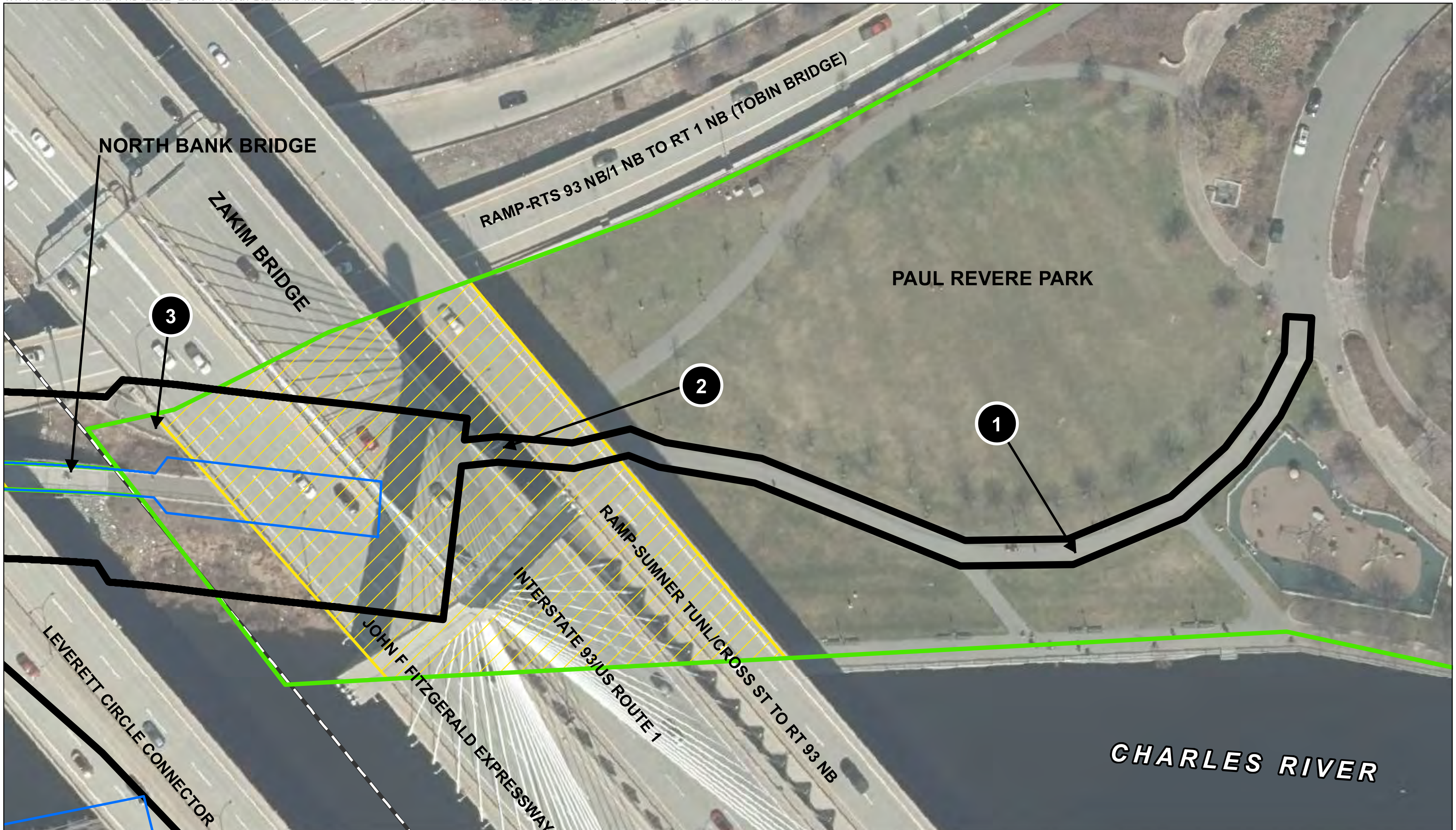
SECTION 4(f) PROPERTIES DETAILED IMPACTS

DRAW ONE BRIDGE PROJECT

BOSTON/CAMBRIDGE, MA

FIGURE 1-3 | OCTOBER 2024

T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\Sec_4f\Sec4f Fig 4-3 D1 ParkAccess_PaulReverePk_8x11_2024-05-07.mxd

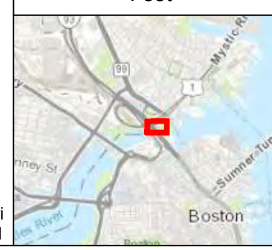


PAUL REVERE PARK AND NORTH BANK BRIDGE

- Permanent Limit of Work (New Landing for North Bank Bridge)
- Temporary Limit of Work (For Construction and Construction Access)
- Parkland
- Parkland Under Transportation Structure
- # Temporary closure of 3 walkways for 1 month of intermittent closures over a 6 month period with detours posted 2 weeks prior to closures

N

0 40 80
Feet



Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021

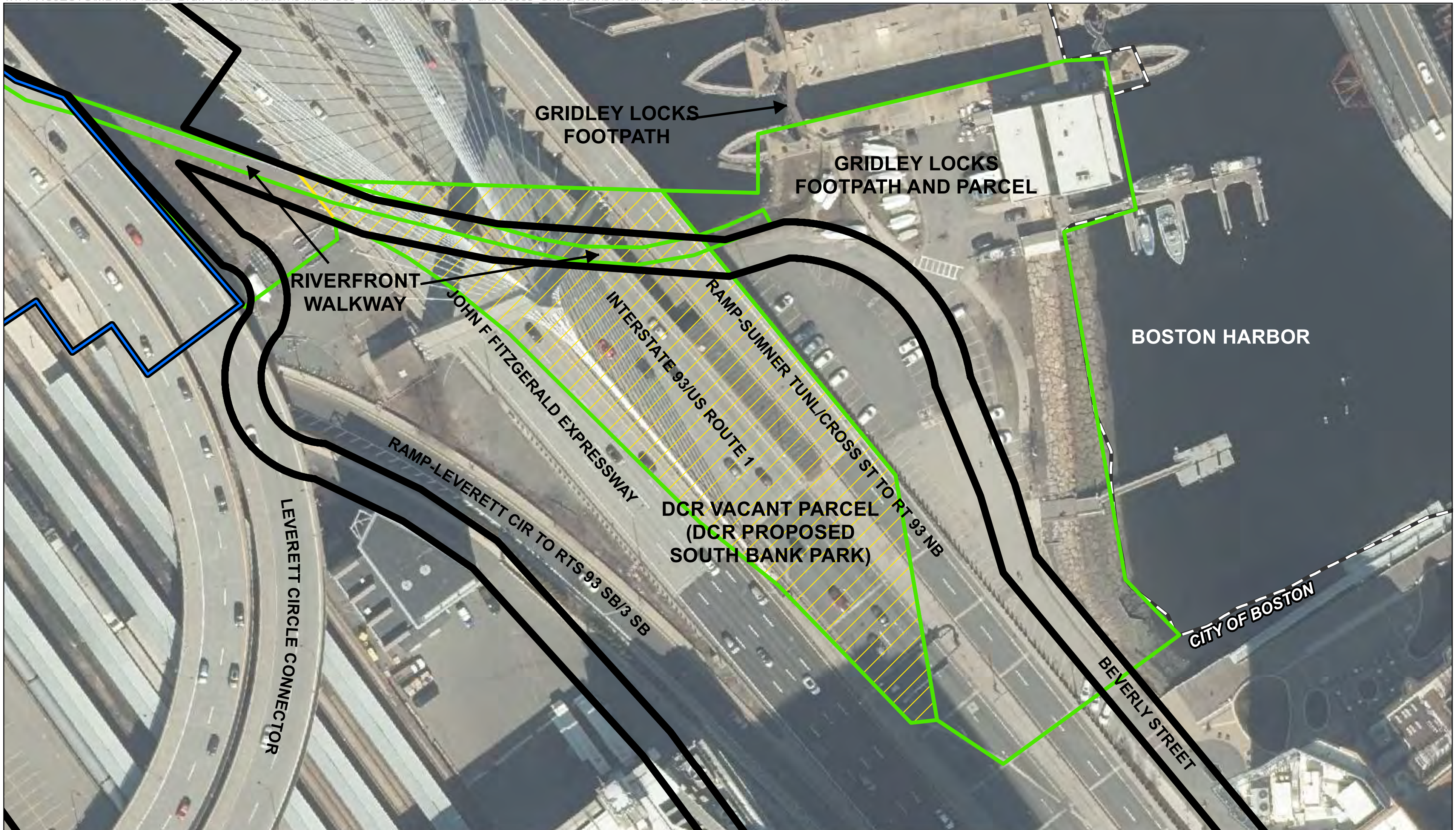
SECTION 4(f) PROPERTIES DETAILED IMPACTS

DRAW ONE BRIDGE PROJECT

BOSTON/CAMBRIDGE, MA

FIGURE 1-4	OCTOBER 2024

T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\Sec_4f\Sec4f Fig 4-4 D1 ParkAccess_GridleyLocksVacantPcl_8x11_2024-05-30.mxd



GRIDLEY LOCKS FOOTPATH AND VACANT DCR PARCEL

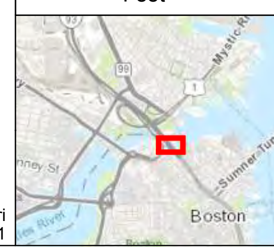
- Permanent Limit of Work
- Temporary Limit of Work (Construction Access)
- Parkland
- Parkland Under Transportation Structure
- Municipal Boundary

Gridley Locks Footpath and Parcel: Construction access through the parking area for 3 years. No impacts to the footpath on the river.

DCR Vacant Parcel (DCR Proposed South Bank Park): Walkway along riverfront to remain open. It is unlikely that stormwater and/or electrical work is needed; however, the worst case acreage has been included if the infrastructure cannot be located off this parcel.

Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021

0 50 100
Feet



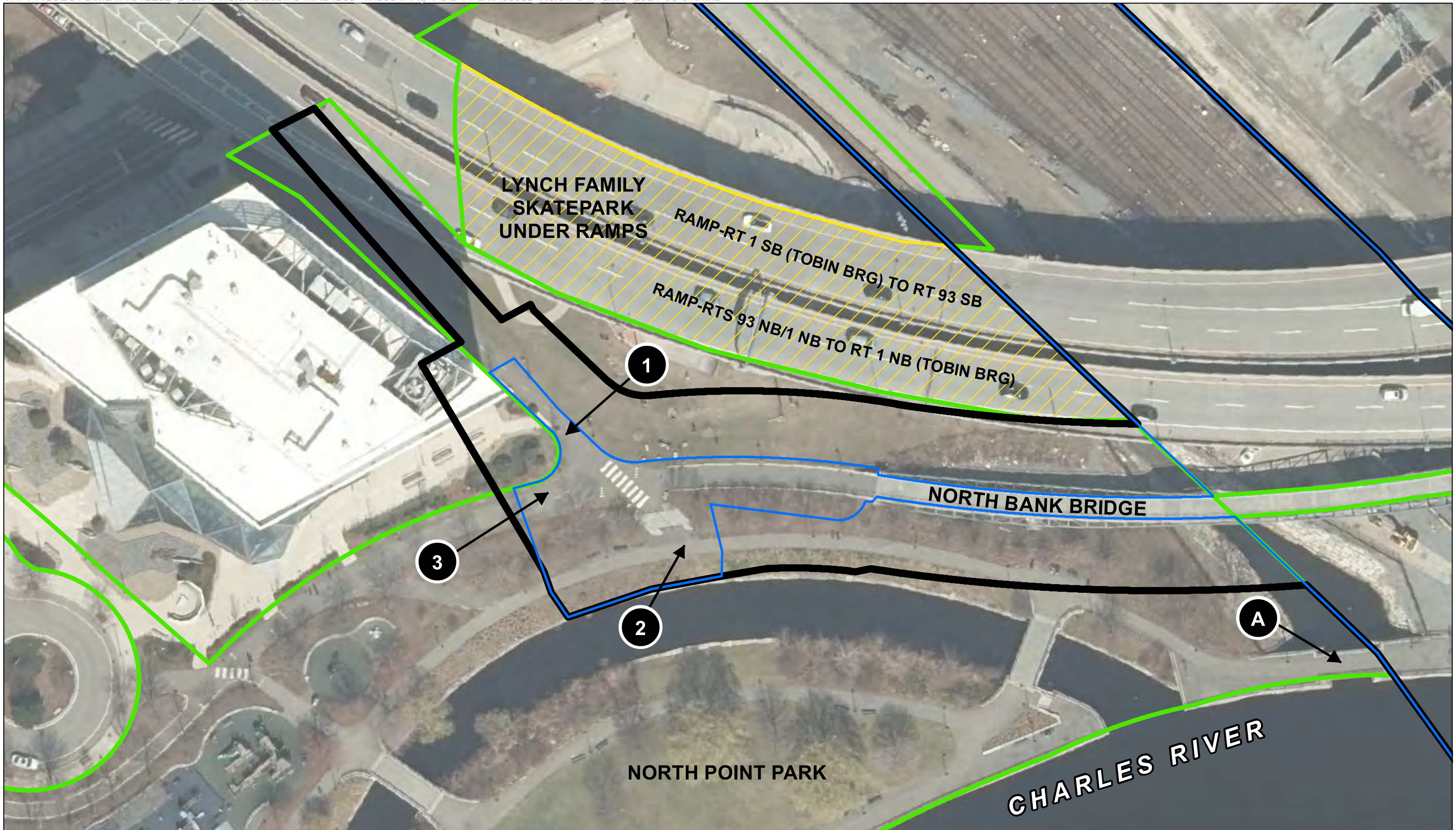
SECTION 4(f) PROPERTIES DETAILED IMPACTS

DRAW ONE BRIDGE PROJECT

BOSTON/CAMBRIDGE, MA

FIGURE 1-5 | OCTOBER 2024

T:\1-PROJECTS\MBTA\342282_Draw 1 North Station\5-MXD\Sec_4f\Sec4f Fig 4-5 D1 ParkAccess_NorthPtPk_8x11_2024-05-07.mxd



NORTH POINT PARK, NORTH BANK BRIDGE, AND LYNCH FAMILY SKATEPARK

- Permanent Limit of Work (New North Bank Bridge landing within North Point Park)
- Temporary Limit of Work (For Construction and Construction Access)
- Parkland
- Parkland Under Transportation Structure

Temporary closure of 3 walkways for 1 month of intermittent closures over a 6 month period with detours posted 2 weeks prior to closures.

A Temporary closure of walkway for 9 months with a detour posted 2 weeks prior to closure.

N

0 40 80
Feet

Data Sources: STV, TRC, MassGIS Parcels, 2021, Esri
Base Map: USGS Color Ortho Imagery, MassGIS 2021

SECTION 4(f) PROPERTIES DETAILED IMPACTS

DRAW ONE BRIDGE PROJECT

BOSTON/CAMBRIDGE, MA

FIGURE 1-6 | OCTOBER 2024

Attachment 2
Charles River Water Sheet – Correspondence

Contents:

1. December 2, 2024 – Massachusetts Department of Conservation and Recreation (DCR) to Federal Transit Administration (FTA)
2. August 13, 2024 – DCR to Massachusetts Bay Transportation Authority (MBTA) and FTA

From: Arrigo, Brian (DCR) <Brian.Arrigo@mass.gov>
Sent: Monday, December 2, 2024 2:27 PM
To: Butler, Peter (FTA) <Peter.Butler@dot.gov>
Cc: Schmidt, Jonathan (FTA) <Jonathan.Schmidt@dot.gov>
Subject: DCR: Draw 1 4F Response

Dear Pete:

The Department of Conservation and Recreation ("DCR") has reviewed the Section 4(f) determination letter and concurs with the scope of FTA's analysis for the MBTA's Draw 1 Bridge replacement project (the "Project"). While DCR previously raised a question regarding the application of Section 4(f) to the Charles River water sheet, upon review of the FHWA's Section 4(f) Policy Paper, we have concluded that the area of the Charles River that will be impacted by the Project is not primarily used for park or recreation purposes. This area of the river is dominated by transportation infrastructure, including the existing Draw 1 Bridge, the Leonard P. Zakim Bunker Hill Memorial Bridge, the Leverett Circle Connector Bridge, the North Washington Street Bridge, the Bill Russell Bridge, and the Gridley Locks -- all of which are located in close proximity to one another (within a distance of about 1,000 feet of water sheet). Consequently, this area of the river serves primarily as a travel corridor for a mix of commercial and other vessels moving between Boston Harbor and the Esplanade Basin. The vast majority of recreational use of the Charles River takes place in and upstream of the Esplanade Basin, which features numerous recreational facilities for rowers, sailors, canoeists, kayakers, paddleboarders, and more.

DCR thanks you for the productive coordination regarding impacts of the Project on our Section 4(f) properties. If you have any questions or require further information from us, please do not hesitate to contact me.

Sincerely,
Brian Arrigo
Commissioner
Department of Conservation and Recreation

From: Kish, Patrice (DCR) <patrice.kish@mass.gov>
Sent: Tuesday, August 13, 2024 10:55 AM
To: Eckstrom, Karl <KEckstrom@MBTA.com>; Paganelli, Tess <tpaganelli@MBTA.com>
Cc: Schmidt, Jonathan (Volpe) <Jonathan.Schmidt@dot.gov>; Gode, William (DCR) <william.gode@mass.gov>
Subject: RE: MBTA Draw 1 4(f) Coordination

As follow up to the request for documentation of DCR's authority over the Charles River Basin and its water sheet, I am providing the references below and attached supporting documents.

1903 – Acts of 1903, Ch. 465 creates the Charles River Basin Commission which is charged with constructing a dam in the vicinity of the Craigie bridge. Section 7 of Ch. 465 states:

> *"The metropolitan park commission, when the work provided for in the preceding sections is finished, shall, subject to the powers vested by law in the state board of health, have exclusive control of the dam and lock and of the basin and river between the dam and the city of Waltham, as a part of the metropolitan parks system, and of all poles,…; may make reasonable rules and regulations, not impairing freight traffic, for the care, maintenance, protection and policing of the basin;…*

Therefore the metropolitan park commission had exclusive control of the basin and the river between the dam and the city of Waltham, and was empowered to make rules and regulations about its operation.

1909 – Acts of 1909, Ch. 524 transfers all the powers, rights, and duties of the Charles River Basin Commission to the Metropolitan Park Commission no later than 01jul1910 as stated in Section 1:

> *"…on and after the first day of July in the year nineteen hundred and ten, all the powers, rights, duties and liabilities of said Charles river basin commission shall be transferred to and imposed upon the metropolitan park commission,…"*

Section 2 defines the "basin" to include:

> *"…the Charles river and the waters thereof, including the public navigable arms, tributaries and inlets thereof, whether covered by ice or not, lying between said dam constructed under authority of said chapter four hundred and sixty-five and the lower dam across said river at Watertown [Watertown Dam],…"*

Section 5 allows the Metropolitan Park Commission to make rules and regulations for the operation of the "basin":

> *"Section 5. The metropolitan park commission may make reasonable rules and regulations, not unreasonably impairing freight traffic, for the care, maintenance, protection and policing of said basin as herein defined,…"*

1919 – Acts of 1919, Ch. 350, §123 abolishes the Metropolitan Park Commission and assigns its authority to the Metropolitan District Commission:

> *"The metropolitan park commission, existing under authority of chapter four hundr ed and seven of the acts of eighteen hundred and ninety-three,…*
> *are hereby abolished. All the rights,*
> *powers, duties and obligations of said boards are hereby*

transferred to and shall hereafter be exercised and performed by the metropolitan district commission established by this act,…".

1962 – Acts of 1962, Ch. 550 authorizes construction of what will become the New Charles River Dam and importantly for the matter at hand extends the Basin from the Old Charles River Dam to the New Charles River Dam:

"SECTION 2. The word "basin", as defined in section two of chapter five hundred and twenty-four of the acts of nineteen hundred and nine, shall include the waters and lands lying between the present Charles River dam and the dam to be constructed under this act."

The Basin's boundaries expanded, the authority of the MDC to regulate the water sheet between the Old Charles River Dam and the New Charles River Dam would be the same as the authority to regulate the water sheet between the Old Charles River Dam and the Watertown Dam.

2003 – Acts of 2003, Ch. 41, §1(2) transfers the MDC to DCR:

"(2) the functions of the metropolitan district commission, as the transferor agency, to the division of urban parks and recreation in the department of conservation and recreation, as the transferee agency;"

It's also worth noting that DCR regulates the Charles River Basin, including activities on the watersheet, in 302 CMR 12.07(23). "Charles River Basin" is defined in our regulations as follows:

Charles River Basin. The Charles River Basin as defined by St. 1909, c. 524, as amended by St. 1962, c. 550, and includes the Charles River and its tributaries lying between the Watertown Dam and the Charles River Dam which is located between the Leonard P. Zakim Bun ker Hill Memorial and North Washington Street Bridges; and the Mystic River Basin as defined by the Upper Mystic Lake Dam at the upstream end and the Amelia Earhart Dam at the downstream end and includes the Mystic River, the Amelia Earhart Dam and its tributaries.

Please let me know if you have any questions.

An Act to authorize the construction of a dam across the Charles river between the cities of Boston and Cambridge. *Chap.465*

Be it enacted, etc., as follows:

Section 1. The governor of the Commonwealth, with the advice and consent of the council, shall appoint three commissioners, residents of the metropolitan parks district, who shall constitute the Charles river basin commission, hereinafter called the commission, and who shall be sworn before entering upon the duties of their office. One commissioner shall be designated by the governor as chairman, and two commissioners shall constitute a quorum. The term of office shall be three years, and all vacancies shall be filled by the governor, with the advice and consent of the council. Any commissioner may be removed by the governor, with the advice and consent of the council, for such cause as he shall deem sufficient and shall assign in the order of removal. Each commissioner shall receive an annual salary of such amount as the governor and council shall determine.

Charles river basin commission, appointment, term, etc.

Compensation.

Section 2. The commission may appoint a secretary, engineers and assistants, shall keep accurate accounts of its expenditures, and shall make an annual report of its doings, including an abstract of its accounts, to the governor and council. The commission whenever the Commonwealth has been authorized by the United States to build a dam and lock under the provisions of this act, shall proceed to do the work herein required of it, and shall in the mean time make examinations and plans therefor.

Powers and duties.

Section 3. The commission shall construct across Charles river between the cities of Boston and Cambridge, a dam, at least sufficiently high to hold back all tides and to maintain in the basin above the dam a substantially permanent water level not less than eight feet above Boston base. The dam shall occupy substantially the site of the present Craigie bridge, which shall be removed by the commission. The dam shall be not less than one hundred feet in width at said water level and a part thereof shall be a highway and the remainder shall be a highway, or a park or parkway, as the commission shall determine. The dam shall be furnished with a lock not

Dam to be constructed across Charles river, etc.

less than three hundred and fifty feet in length between the gates, forty feet in width and thirteen feet in depth below Boston base, and shall be built with a suitable drawbridge or drawbridges, wasteways and other appliances. The part of the dam used as a highway shall be maintained and operated in the same manner as the Cambridge bridge, and under the laws now or hereafter in force relating to said bridge.

Navigable channels to be dredged.

SECTION 4. The commission shall dredge navigable channels in the basin from the lock to the wharves between the dam and Cambridge bridge, to Broad canal and to Lechmere canal, the channel to be not less than one hundred feet in width and eighteen feet in depth; shall dredge Broad canal to such depths as will afford to and at the wharves thereon not less than seventeen feet of water up to the Third Street draw, not less than thirteen feet of water from the Third Street draw to the Sixth Street draw, and not less than eleven feet of water from the Sixth Street draw to the railroad draw, and not less than nine feet of water for one hundred and twenty-five feet above the railroad draw; shall dredge Lechmere canal to such depths as will afford to and at the wharves thereon not less than seventeen feet of water up to and including Sawyer's lumber wharf, and not less than thirteen feet of water from said wharf up to the head of the canal at Bent street; all depths aforesaid to be measured from the water level to be maintained in the basin.

Manner of dredging, etc.

The commission shall do all such dredging and all strengthening of the walls of the canals and of the basin where dredging is done by the driving of prime oak piles two feet on centres along the front of said wharves or walls, and all removing and relocating of pipes and conduits made necessary by such dredging, so that vessels requiring a depth of water not exceeding the respective depths above prescribed can lie alongside of, and in contact with, the wharves; and this work shall be done in such manner as to cause the least possible inconvenience to abutters, and shall be finished on or before the completion of the dam; and after the walls or wharves have been so strengthened, all repairs on or rebuilding of the walls and wharves shall be done by the abutters.

Certain other dredging to be done, etc.

The commission shall do such dredging in the basin outside of the channels aforesaid as may be necessary for the removal of sewage, sludge or any offensive deposit;

shall do such other dredging as it shall deem proper, and shall take all proper measures for the destruction of malarial mosquitoes in the basin and its vicinity.

Marginal conduits to be constructed, etc.

SECTION 5. The commission, before the completion of the dam, shall construct marginal conduits on the north side of the basin from the outlet of the overflow channel in Binney street to a point below the dam, and on the south side of the basin from the present outlet of the Back Bay Fens to a point below the dam, and may construct an extension thereof toward, or to, St. Mary street, the conduits to be used to receive and conduct below the dam the overflow from sewers and the surface drainage and other refuse matter which would otherwise pass into the basin.

Certain lands, etc., may be taken, etc.

SECTION 6. The commission, for the purpose of carrying out the provisions of the preceding sections, may from time to time take in fee or otherwise, by purchase or otherwise, for the Commonwealth, or the city of Boston or the city of Cambridge, as the commission shall determine, lands, flats and lands covered by tide-water on Charles river, by filing in the registry of deeds for the county and district in which the lands or flats are situated a description thereof, sufficiently accurate for identification, signed by a majority of the commissioners; and any person whose property is so taken may have compensation therefor as determined by agreement with the commission, and if they cannot agree the compensation may be determined by a jury in the superior court for the county where the property is situated under the same provisions of law, so far as they are applicable, which apply in determining the value of lands taken for highways under chapter forty-eight of the Revised Laws, upon petition therefor by the commission, or by such person, filed in the clerk's office of said court against the Commonwealth or the city for which the lands or flats are taken within one year after the taking, and costs shall be taxed and execution issued as in civil cases.

The metropolitan park commission to have exclusive control of dam, etc.

SECTION 7. The metropolitan park commission, when the work provided for in the preceding sections is finished, shall, subject to the powers vested by law in the state board of health, have exclusive control of the dam and lock and of the basin and river between the dam and the city of Waltham, as a part of the metropolitan parks system, and of all poles, wires and other structures placed or to be placed on, across, over or in any part of said basin, dam or lock, and of the placing thereof, except the part of the dam used as a highway and the bridges and other structures erected by any city or town within its limits and upon its own lands; may make reasonable rules and regulations, not impairing freight traffic, for the care, maintenance, protection and policing of the basin; and throughout the year shall operate the lock without charge, maintain the lock, channels and canals aforesaid at the depths aforesaid, and clear of obstructions caused by natural shoaling or incident to the building of the dam, and maintain the water in the basin at such level and the lock, channels and canals sufficiently clear of obstructions by ice so that any vessel ready to pass through the lock, and requiring no more depth of water than aforesaid, can pass through to the wharves aforesaid. In the event of an emergency, requiring the temporary reduction of such level, notice thereof shall be given to the occupants of said wharves, and such reduction shall not be lower nor continue longer than the emergency requires. Said metropolitan park commission may order the removal of all direct sewage or factory waste as a common nuisance from the river and its tributaries below the city of Waltham; and no sewer, drain, overflow or other outlet for factory or house drainage shall hereafter be connected with the basin below said city without the approval of the metropolitan park commission.

May make rules and regulations, etc.

Notice to be given in case of emergency requiring temporary reduction of level, etc.

Removal of direct sewage or factory waste may be ordered, etc.

Payment of expenses.

SECTION 8. The Commonwealth shall in the first instance pay all expenses incurred in carrying out the provisions of the preceding sections, and the same shall, except as provided in the following section, constitute part of the cost of construction and maintenance of the metropolitan parks system; and in addition to the amounts heretofore authorized for such construction the treasurer and receiver general shall, from time to time, as authorized by the governor and council, issue notes, bonds or scrip, in the name and behalf of the Commonwealth, entitled Charles River Basin Loan, to the amount which the commission may deem necessary for the expenses incurred under the first six sections of this act; and all acts and parts of acts relative to loans for such construction and providing for their payment shall, so far as they may be applicable and not inconsistent herewith, apply to such notes, bonds and scrip and to their payment.

Charles River Basin Loan.

Section 9. The commissioners next appointed under the provisions of chapter four hundred and nineteen of the acts of the year eighteen hundred and ninety-nine, and amendments thereof, in apportioning the expenses of maintaining the metropolitan parks system shall include as part thereof the expense of maintenance incurred under the preceding sections of this act; shall also determine, as they shall deem just and equitable, what portion of the total amount expended for construction under sections three, four, five and six of this act shall be apportioned to the cities of Boston and Cambridge as the cost of the removal of Craigie bridge and the construction of a suitable bridge in place thereof, and the remainder shall be considered and treated as part of the cost of construction of the metropolitan park system. The treasurer and receiver general shall determine the payments to be made each year by said cities, one half by each, to meet the interest and sinking fund requirements for the amounts apportioned to them as the cost of such bridge, and the same shall be paid by each city into the treasury of the Commonwealth as part of its state tax.

Apportionment of expenses, etc.

Section 10. The city of Boston, by such officer or officers as the mayor may designate, shall forthwith after the passage of this act, do such dredging in the Back Bay Fens as the board of health of said city may require, shall construct a conduit between Huntington avenue and Charles river, to form an outlet into Charles river for the commissioners' channel of Stony brook, shall reconstruct the present connections between the river and the Fens so as to allow free access of water from the river into the streams and ponds in the Fens and thence into the river, and shall construct a sewer in the rear of the houses on the north side of Beacon street between Otter and Hereford streets. Such officer or officers may construct a conduit between Green street and Forest Hills and may construct or rebuild within five years one or more conduits for Stony brook between the westerly side of Elmwood street and the Fens: *provided, however*, that the expense of such conduits between Green street and Forest Hills and between Elmwood street and the Fens shall be paid for out of the annual appropriation for sewer construction under the provisions of chapter four hundred and twenty-six of the acts of the year eighteen hundred

City of Boston to do certain dredging, construct conduits, sewer, etc.

Proviso.

and ninety-seven and acts in amendment thereof or in addition thereto.

Wall or embankment may be built on Boston side of Charles river.

SECTION 11. The board of park commissioners of Boston may, with the approval of the mayor, build a wall or embankment on the Boston side of Charles river beginning at a point in the southwest corner of the stone wall of the Charlesbank, thence running southerly by a straight or curved line to a point in Charles river not more than three hundred feet distant westerly from the harbor commissioners' line, measuring on a line perpendicular to the said commissioners' line at its intersection with the southerly line of Mount Vernon street, but in no place more than three hundred feet westerly from said commissioners' line; thence continuing southerly and westerly by a curved line to a point one hundred feet or less from the wall in the rear of Beacon street; thence by a line substantially parallel with said wall to the easterly line of the Back Bay Fens, extended to intersect said parallel line.

Certain lands, flats, etc., may be taken for a public park.

SECTION 12. The board of park commissioners of said city may take, in fee or otherwise, by purchase or otherwise, for said city, for the purpose of a public park such lands, flats and lands covered by tide-water between Charles, Brimmer and Back streets and the line of the wall or embankment aforesaid, as the mayor shall approve, by filing in the registry of deeds for the county of Suffolk a description thereof sufficiently accurate for identification, signed by a majority of the commissioners, and shall construct a public park on the lands so taken; and any person whose property is so taken may have compensation therefor as determined by agreement with the board, and if they cannot agree the amount thereof may be determined by a jury in the superior court for the county of Suffolk, under the same provisions of law, so far as they may be applicable, which apply in determining the value of lands taken for highways under chapter forty-eight of the Revised Laws, upon petition therefor by the board, or by such person, filed in the clerk's office of said court against said city within one year after the taking, and costs shall be taxed and execution issued as in civil cases.

City of Boston to pay certain expenses, etc.

SECTION 13. The city of Boston shall pay the expenses incurred under sections ten, eleven and twelve of this act, except as otherwise provided in section ten of this act; and to meet said expenses the city treasurer of the city shall, from time to time, on the request of the mayor, issue and sell bonds of the city to an amount not exceeding eight hundred thousand dollars, and the bonds so issued shall not be reckoned in determining the legal limit of indebtedness of the city. City treasurer to issue bonds, etc.

SECTION 14. The lock shall be built above the lower line of the dam, and the Boston and Maine Railroad shall, before the dam is completed, remove its bridge, piles and any other structures in Charles river which are southerly or westerly of a line defined in red on a plan filed in the office of the board of harbor and land commissioners marked "Plan showing line from above or southwest of which the Boston & Maine Railroad shall remove all of its structures in Charles River and between the harbor lines, May 25, 1903. Woodward Emery, Chairman of Harbor and Land Commissioners"; and may rebuild the same northerly and easterly of the line so defined. The draw in the new bridge shall not be easterly of nor more than fifty feet westerly from the location of the present draw, and shall be so located as to be directly opposite the lock. Within the limits herein prescribed the commission shall determine the position of the lock and draw. The Boston and Maine Railroad to remove certain structures, etc.

SECTION 15. The supreme judicial court and the superior court shall, upon application of any party in interest, including any owner or occupant of property abutting on the basin or on Broad canal or Lechmere canal, have jurisdiction to enforce, or prevent violation of, any provision of this act and any order, rule or regulation made under authority thereof. Enforcement of provisions of act, etc.

SECTION 16. Chapter three hundred and forty-four of the acts of the year eighteen hundred and ninety-one, as amended by section one of chapter four hundred and thirty-five of the acts of the year eighteen hundred and ninety-three, and chapter five hundred and thirty-one of the acts of the year eighteen hundred and ninety-eight are hereby repealed. Repeal.

SECTION 17. This act shall take effect on the first day of July in the year nineteen hundred and three. When to take effect.

Approved June 24, 1903.

or notes to an amount not exceeding eight thousand eight hundred dollars. The said bonds or notes shall be signed by the treasurer and countersigned by the selectmen of the town, shall bear interest at a rate not exceeding four and one half per cent per annum, and shall be payable at the rate of not less than five hundred dollars in each year, beginning with the year nineteen hundred and ten and including the year nineteen hundred and twenty-six. Three hundred dollars shall be payable in the year nineteen hundred and twenty-seven. The said notes or bonds shall be disposed of at public or private sale and upon such terms and conditions as the selectmen may determine, but they shall not be sold for less than the par value thereof. Of the said eight thousand eight hundred dollars, six thousand eight hundred dollars shall be borrowed within the statutory debt limit of the town and two thousand dollars may be borrowed outside of the said debt limit. The amount required annually to pay the interest on the said loan, and so much of the principal as comes due, shall be raised annually by taxation in the same manner in which other taxes are raised without any action by the town other than its vote to borrow the said sum.

The town of Clarksburg may renew or refund its indebtedness, etc.

SECTION 2. This act shall take effect upon its passage.

Approved June 18, 1909.

AN ACT RELATIVE TO CHARLES RIVER BASIN AND THE CONTROL THEREOF BY THE METROPOLITAN PARK COMMISSION.

*Chap.*524

Be it enacted, etc., as follows:

SECTION 1. The Charles river basin commission shall certify in writing to the governor and council the date at which, in the opinion of said commission, the main parts of the work which the commission was authorized to construct and perform by chapter four hundred and sixty-five of the acts of the year nineteen hundred and three and acts in addition thereto and in amendment thereof will be completed. On and after the date so certified by said commission, and in any event, on and after the first day of July in the year nineteen hundred and ten, all the powers, rights, duties and liabilities of said Charles river basin commission shall be transferred to and imposed upon the metropolitan park commission, and the Charles river basin

The Charles river basin commission to certify the date when certain work will be completed, etc.

commission shall be abolished. No contracts, liabilities or suits existing on the day on which the Charles river basin commission is abolished, as provided for in this section, shall be affected by this act, but the metropolitan park commission shall in all respects and for all purposes be the lawful successor of the Charles river basin commission. A copy of said certificate of the Charles river basin commission attested by the secretary of the commonwealth shall be prima facie evidence that the Charles river basin commission was abolished on the date certified therein by said commission, and that the metropolitan park commission has become the lawful successor of the Charles river basin commission in the manner herein provided. The commonwealth shall assume all liabilities in any suit at law or in equity either pending or hereafter brought against the Charles river basin commissioners on account of their work or any connection therewith, and the commonwealth shall be deemed by this act to have assumed said liabilities, and the commissioners are hereby relieved of the same. The attorney-general shall defend any such suit and the expense thereof shall be paid out of the proceeds of the sale of notes, bonds or scrip issued under authority of section eight of said chapter four hundred and sixty-five and acts in addition thereto and in amendment thereof.

Copy of the certificate to be evidence that the commission is abolished, etc.

The word "basin" construed, etc.

Section 2. The word "basin", as hereinafter used in this act, shall be construed to mean the dam and any lock, highway, park, parkway, drawbridge or sluiceway constructed in connection therewith under authority of said chapter four hundred and sixty-five and acts in addition thereto and in amendment thereof, the wall, embankment, park, parkway or street constructed under authority of section twelve of said chapter as amended by chapter four hundred and two of the acts of the year nineteen hundred and six, the marginal conduits constructed on the south side of the basin under section five of said chapter four hundred and sixty-five with the right to enter upon the lands of the city of Boston for the purpose of rebuilding, repairing or cleaning said conduits, the Charles river and the waters thereof, including the public navigable arms, tributaries and inlets thereof, whether covered by ice or not, lying between said dam constructed under authority of said chapter four hundred and sixty-five and the lower dam across said river at Watertown, and all lands or rights therein taken by eminent domain or otherwise acquired by the Charles river basin commission either for the commonwealth or for the city of Boston under authority of said chapter four hundred and sixty-five and of acts in addition thereto or in amendment thereof. The word "basin", as used in this act, shall not include the elevated railway structure built by the Boston Elevated Railway Company under the provisions of section twenty-one of chapter five hundred and twenty of the acts of the year nineteen hundred and six.

The metropolitan park commission to have care and control of the basin.

SECTION 3. The metropolitan park commission shall have and exercise exclusive care and control of said basin, as herein defined, as a part of the metropolitan parks system, and of all poles, wires and other structures placed or to be placed on, across, over or in any part of said basin and of the placing thereof except on, across, over or in any existing highway of any city or town or any bridge of any railroad company across said basin. The metropolitan park commission shall also have and exercise over said basin all other powers, duties and liabilities now conferred or imposed upon said commission by chapter four hundred and seven of the acts of the year eighteen hundred and ninety-three and acts in addition thereto and in amendment thereof, so far as the provisions of said acts are consistent with the provisions of this act. The metropolitan park commission may license the maintenance of floats and boat landings and other structures in and upon the waters of said basin upon such terms and conditions as they deem that the public interests require, and no float or boat landing or other structure shall be maintained in or upon the waters of said basin without such license: *provided, however,* that no such license shall be granted to be exercised in that part of said basin which lies easterly of Cottage Farm bridge, so-called, except under the authority of chapter four hundred and four of the acts of the year nineteen hundred and seven, or of section ten of this act.

Proviso.

Responsibility for the operation and maintenance of certain work, etc.

SECTION 4. The city of Boston shall be responsible for the operation and maintenance of the work on the south side of said basin designated in, or constructed under authority of, section ten of said chapter four hundred and sixty-five. The city of Cambridge shall be responsible for the operation, care and maintenance of the marginal conduit constructed on the north side of said basin under authority of section five of said chapter four hundred and sixty-five, except for such parts of said conduit as lie within said dam or land acquired by the Charles river basin commission for the commonwealth.

Rules and regulations, etc.

SECTION 5. The metropolitan park commission may make reasonable rules and regulations, not unreasonably impairing freight traffic, for the care, maintenance, protection and policing of said basin as herein defined, breaches of which rules shall be breaches of the peace punishable by a fine of not more than fifty dollars for each offence. Said commission shall cause the rules and regulations made by it under this act to be published three times in one or more newspapers published in the city of Boston, and such publication shall be sufficient notice to all persons. The sworn certificate of any member of the commission or of its secretary that said rules and regulations have been published as herein provided shall be prima facie evidence thereof. A copy of any such rule or regulation attested by any member of said commission or its secretary, shall be prima facie evidence that said rule or regulation was made by said commission as provided herein.

Operation of locks and drawbridges to be without charge, etc.

SECTION 6. The metropolitan park commission throughout the year shall operate the locks and any drawbridges connected with said dam, without charge, and shall maintain said locks and the channels and canals authorized by section four of said chapter four hundred and sixty-five, at the depths provided for in said act and clear of obstructions caused by natural shoaling or incident to the building of said dam, and shall, except in cases of emergency, maintain the water of said basin at such a level that any vessel ready to pass through said locks and requiring no more depth of water than is provided for by said section four, can pass through to the wharves therein mentioned.

Removal of sewage, etc.

SECTION 7. The metropolitan park commission may order the removal of all sewage, and other polluting matter or factory waste as a common nuisance from said Charles river and its tributaries below the city of Waltham and from said basin, and no sewer, drain or overflow or other outlet for factory or house drainage, or for any other drainage shall hereafter be connected with said basin or the river below said city without the approval of the metropolitan park commission. The metropolitan park commission shall be deemed a party in interest within the meaning of that term as used in section three of chapter four hundred and eighty-five of the acts of the year nineteen hundred and seven for the purpose of enforcing the provisions of that act and preventing any violation thereof.

Jurisdiction of courts.

SECTION 8. The municipal court of the city of Boston, in addition to its present jurisdiction, shall have and exercise concurrently with the municipal court of the Roxbury district, the Brighton district court, the second district court of eastern Middlesex, the third district court of eastern Middlesex and the police court of Newton, the same criminal jurisdiction which said courts have within their respective districts over any territory included in said basin as defined in section two of this act.

Same subject.

SECTION 9. The courts in the county of Suffolk shall have jurisdiction of all crimes committed in any part of the town of Watertown or the cities of Cambridge or Newton lying within said basin as defined in section two of this act concurrently with the courts in the county of Middlesex.

The metropolitan park commission to have full authority after a certain date, etc.

SECTION 10. On and after the date certified by the Charles river basin commission, as provided by section one of this act, and in any event on and after the first day of July in the year nineteen hundred and ten, the metropolitan park commission alone shall exercise the authority granted to said commission and said Charles river basin commission jointly by chapter four hundred and four of the acts of the year nineteen hundred and seven relative to the granting of boat-house locations. The metropolitan park commission shall also have authority to lease to individuals or corporations locations for boat-houses, together with floats and landings in connection therewith, upon so much of the park or parkway provided for by chapter four hundred and two of the acts of the year nineteen hundred and six as lies between the Cambridge bridge and Mount Vernon street extended to the waters of the basin, or upon any lands under the care and control of said commission lying in any part of said basin and river up stream from and above Cottage Farm bridge, so-called. Said leases shall be upon such terms and conditions and for such a period, not exceeding twenty-five years, as said commission may deem best.

Appropriations for expenses, etc.

Section 11. From the time when the metropolitan park commission becomes invested with the care and control of said basin as herein provided, until the general court which convenes next thereafter shall have made an appropriation to meet the expense of carrying out the provisions of this act, said expenses shall be paid out of the proceeds of the sale of notes, bonds or scrip issued under authority of section eight of said chapter four hundred and sixty-five, as amended by section one of chapter four hundred and two of the acts of the year nineteen hundred and six, and shall be deemed to be a part of the cost of construction of said dam. The provisions of said chapter four hundred and sixty-five and of acts in amendment thereof relative to the apportionment and payment of the expense of maintenance incurred under section seven of said chapter shall apply to the apportionment and payment of the expense of maintenance under this act. Nothing contained in this act shall be construed to affect the provisions of chapter four hundred and two of the acts of the year nineteen hundred and six relative to the apportionment, assessment and payment of the cost of construction and maintenance of any part of said basin as defined in section two of this act.

Section 12. This act shall take effect upon its passage.

Approved June 18, 1909.

Chap.525 An Act making appropriations for sundry sinking funds.

Be it enacted, etc., as follows:

Appropriations.

Section 1. The sum of three hundred seventy-eight thousand four hundred and forty-five dollars is hereby appropriated, to be paid out of the treasury of the commonwealth from the ordinary revenue, for the benefit of the following sinking funds, to wit: —

Armory Loan Sinking Fund.

For the Armory Loan Sinking Fund, the sum of fifty-four thousand nine hundred and twenty-three dollars.

Harbor Improvement Loan Sinking Fund.

For the Harbor Improvement Loan Sinking Fund, the sum of thirty-three hundred and eighty-four dollars.

*Chap.*350 AN ACT TO ORGANIZE IN DEPARTMENTS THE EXECUTIVE AND ADMINISTRATIVE FUNCTIONS OF THE COMMONWEALTH.

Be it enacted, etc., as follows:

PART I.

GENERAL PROVISIONS.

Executive and administrative functions of commonwealth organized in departments, etc.

SECTION 1. The executive and administrative functions of the commonwealth, except such as pertain to the governor and council, and such as are exercised and performed by officers serving directly under the governor or the governor and council, shall hereafter be exercised and performed by the departments of the secretary of the commonwealth, the treasurer and receiver general, the auditor of the commonwealth and the attorney-general, and by the following new departments hereby established, namely: —

The department of agriculture.
The department of conservation.
The department of banking and insurance.
The department of corporations and taxation.
The department of education.
The department of civil service and registration.
The department of industrial accidents.
The department of labor and industries.
The department of mental diseases.
The department of correction.
The department of public welfare.
The department of public health.
The department of public safety.
The department of public works.
The department of public utilities.

A metropolitan district commission is also hereby established as hereinafter provided and the provisions of Part I of this act shall apply to said commission.

All executive and administrative offices, boards, commissions and other governmental organizations and agencies, except those now or by virtue of this act serving directly under the governor or the governor and council, are hereby placed in the said departments and said commission, as hereinafter provided; and all such offices, boards, commissions and other governmental organizations and agencies for which provision is not made herein shall be placed by order of the governor, with the advice and consent of the council, under the direction and control of any of the departments above mentioned until such time as the general court shall make provision therefor.

SECTION 2. Where an existing office, board, commission or other governmental organization or agency is abolished by this act, all books, papers, maps, charts, plans, records, and all other equipment in the possession of such organization or agency, or of any member or officer thereof, shall be delivered to the administrative and executive head of the department to which its rights, powers, duties and obligations are transferred. In case such rights, powers, duties and obligations are divided between two or more departments, each of said departments shall receive such books, papers, maps, charts, plans, records and other equipment as pertain to the rights, powers, duties and obligations transferred to that department. All questions arising under this section shall be determined by the governor and council.

Delivery of books, papers, equipment, etc., of abolished offices, boards, commissions, etc.

SECTION 3. Where an existing office, board, commission or other governmental organization or agency is abolished by this act, all employees thereof shall, as temporary appointees of the department to which the rights, powers, duties and obligations of such office, board, commission or other governmental organization or agency are transferred, continue to perform their usual duties, upon the same terms and conditions as heretofore, until removed, appointed to positions in accordance with the provisions of this act relative to such department, or transferred to other departments, and they shall be eligible to such appointment or transfer without further examination, but otherwise shall be subject to the civil service law and rules, where they apply, and to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder. All such temporary employment shall become permanent on January first, nineteen hundred and twenty-one, unless sooner terminated. Where the rights, powers, duties and obligations of any such office, board, commission or other governmental organization or agency are divided between two or more departments, each of said departments shall receive on the above terms and conditions such of the employees of said office, board, commission or other governmental organization or agency as are regularly occupied in connection with the functions thereof which are by this act transferred to such department: *provided*, that every employee of such office, board, commission or other governmental organization or

Employees of abolished offices, boards, commissions, etc., to become temporary appointees, etc.

Temporary employment, when to become permanent.

Placing of certain employees.

Proviso.

agency shall be placed temporarily in one of said departments. All questions arising under this section shall be determined by the governor and council.

Rights to retirement with pension not to be affected.

SECTION 4. Persons who, at the time when this act takes effect, are appointed to or employed by an office, board, commission or other governmental organization or agency abolished by this act, and are appointed to positions in any of the departments established hereby, shall retain all rights to retirement with pension that shall have accrued or would thereafter accrue to them, and their services shall be deemed to have been continuous, as if this act had not been passed.

Compensation not to be reduced.

This act shall not be construed to reduce the compensation of present employees who are appointed to positions under the terms of the act where the compensation of such employee is specifically fixed by statute.

Pending petitions, hearings, etc., to remain in full force and effect.

SECTION 5. All petitions, hearings and other proceedings pending before any officer, board, commission or other governmental organization or agency which is abolished by this act, and all prosecutions, legal or other proceedings and investigations begun by such organization or agency and not completed at the time of the taking effect of this act, shall continue and remain in full force and effect notwithstanding the passage of this act, and may be completed before or by the department which succeeds to the rights, powers, duties and obligations of such office, board, commission or other governmental organization or agency. All questions arising under this section shall be determined by the governor and council.

Orders, rules and regulations to remain in full force and effect.

SECTION 6. All orders, rules and regulations made by any officer, board, commission or other governmental organization or agency which is abolished by this act shall remain in full force and effect until revoked or modified in accordance with law by the department which succeeds to the rights, powers, duties and obligations of such governmental organization or agency.

Existing contracts and obligations to remain in full force and effect.

SECTION 7. All existing contracts and obligations of the offices, boards, commissions or other governmental organizations or agencies abolished by this act shall remain in full force and effect, and shall be performed by the departments to which the rights, powers, duties and obligations of such governmental organizations or agencies are transferred.

Making of reports, etc.

SECTION 8. All reports required by law to be made by any office, board, commission or other governmental organization or agency affected by this act shall hereafter be made by the executive and administrative head of the department in which such governmental organization or agency is placed or to which its rights, powers, duties and obligations are transferred.

Establishment of divisions in departments.

SECTION 9. In all cases where the executive and administrative head of a department is vested with authority to establish within his department divisions, the establishment of such divisions shall be subject to the approval of the governor and council except in cases where divisions are specifically provided for by this act.

Determination of questions of jurisdiction, powers, etc.

SECTION 10. In all cases where a question arises between departments or officers or boards thereof as to their respective jurisdiction or powers, or where departments, or officers or boards thereof, issue conflicting orders or make conflicting rules and regulations, the governor and council shall, on appeal of any such department or any person affected thereby, have jurisdiction to determine the question, and to order any such order, rule or regulation amended or annulled: *provided*, that nothing herein contained shall be construed to deprive any person of the right to pursue any other lawful remedy. The time within which such appeal may be taken shall be fixed by the governor and council.

Proviso.

Appointees of governor may be required to give whole time to duties, etc.

SECTION 11. Any person in any department who is appointed to office by the governor, with the advice and consent of the council, and who is paid a salary, may be required by the governor, with like advice and consent, to give his whole time to the duties of his office. The heads of divisions of departments established by or under authority of this act shall be exempt from the civil service law and the rules and regulations made thereunder.

Heads of divisions in departments to be exempt from civil service law.

Quarters to be provided.

SECTION 12. All departments established by this act shall be provided with suitable quarters which shall, so far as is expedient, be within the state house.

Expenditures by departments.

SECTION 13. The expenses of departments for compensation of officers, members and employees and for other purposes shall not exceed the appropriations made therefor by the general court. The said departments may continue expenditures during the fiscal year nineteen hundred and twenty for the several functions transferred to or placed therein, at the rate of appropriation authorized for such functions during the current fiscal year, until the general court makes appropriations therefor or provides otherwise.

PART II.

THE GOVERNOR AND COUNCIL.

Staff of commander-in-chief and officers in organization of land and naval forces of commonwealth recognized to be under the governor as commander-in-chief.

SECTION 14. The staff of the commander-in-chief and all officers included in the organization of the land and naval forces of the commonwealth, including the adjutant general in his capacity as commissioner of war records under authority of chapter two hundred and eleven of the acts of nineteen hundred and twelve, and in pursuance of his duties under chapter one hundred and seven of the General Acts of the current year, are hereby recognized to be under the governor in his capacity as commander-in-chief.

Office of supervisor of administration to be under governor and council.

SECTION 15. The office of supervisor of administration, existing under authority of chapter two hundred and ninety-six of the General Acts of nineteen hundred and sixteen, and acts in amendment thereof and in addition thereto, shall continue to be under the governor and council, as now provided by law.

Certain offices, boards and commissions to serve under governor and council:

SECTION 16. The following offices, boards and commissions are hereby placed and shall hereafter serve under the governor and council, namely: —

Armory commissioners.

The armory commissioners, existing under authority of section forty of Part I of chapter three hundred and twenty-seven of the General Acts of nineteen hundred and seventeen.

Art commission.

The art commission, existing under authority of chapter four hundred and twenty-two of the acts of nineteen hundred and ten as amended by chapter two hundred and twenty-five of the acts of nineteen hundred and thirteen.

State ballot law commission.

The state ballot law commission, existing under authority of chapter eight hundred and thirty-five of the acts of nineteen hundred and thirteen.

Board of appeal from decisions of tax commissioner.

The board of appeal from decisions of the tax commissioner, existing under authority of section sixty-eight of Part III of chapter four hundred and ninety of the acts of nineteen hundred and nine.

Commissioners on uniform state laws.

The commissioners on uniform state laws, existing under authority of chapter one hundred and twenty-two of the General Acts of nineteen hundred and nineteen.

Commissioner of state aid and pensions.

The commissioner of state aid and pensions, existing under authority of chapter one hundred and ninety-two of the acts of nineteen hundred and two.

Trustees of the state library.

The trustees of the state library, existing under authority of section twenty-four of chapter ten of the Revised Laws and of chapter two hundred and seventeen of the acts of nineteen hundred and ten.

The said offices, boards and commissions shall continue to exercise and perform all their rights, powers, duties and obligations as provided by law, subject to such supervision as the governor and council may deem necessary or proper.

Section 17. The governor, with the advice and consent of the council, shall appoint a superintendent of buildings for the term of three years and fix his salary, and may in like manner remove him and shall fill any vacancy in the office for the unexpired term. The state house commission, existing under authority of section seventeen of chapter ten of the Revised Laws, is hereby abolished. All the rights, powers, duties and obligations of said commission and the rights, powers, duties and obligations of the sergeant-at-arms, as defined by sections four, eight and nine of chapter ten of the Revised Laws, by section two of chapter five hundred and fourteen of the acts of nineteen hundred and nine, by chapter seven hundred and eleven of the acts of nineteen hundred and thirteen, and by chapter two hundred and twenty-four of the General Acts of nineteen hundred and fifteen, are hereby transferred to the superintendent of buildings, and shall hereafter be exercised and performed by him. Upon the appointment and qualification of the superintendent of buildings all records, books, accounts, plans and other documents relating to the rights, powers, duties and obligations transferred by this section, together with supplies and equipment on hand, shall be delivered to the said superintendent.

Superintendent of buildings, appointment.

State house commission abolished.

Superintendent of buildings, rights, powers, duties, etc.

Section 18. The superintendent of buildings, under the supervision of the governor and council, shall have charge of the care and operation of the state house and shall exercise, under like supervision, the authority to assign rooms therein which is now vested in the governor and council by chapter three hundred and twenty-six of the acts of nineteen hundred and ten. He shall, during the sessions of the general court, upon application by the sergeant-at-arms, assign such rooms as may be required for the use of committees and other purposes. He may appoint such clerks, engineers, electricians, firemen, oilers, mechanics, watchmen, elevator operators, porters, cleaners and other persons as may be required to perform the duties prescribed by law. The titles and compensation of all persons employed by the superintendent of buildings shall be determined in accordance with the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen and rules and regulations made thereunder, and subject to the approval of the governor and council, where that is

Superintendent of buildings to have charge of care and operation of state house.

May appoint clerks, engineers, watchmen, elevator operators, porters, etc.

Titles and compensation of persons employed, etc.

required by law, notwithstanding the provisions of existing laws fixing the titles and salaries of employees in the department of the sergeant-at-arms. The compensation aforesaid shall not exceed in the aggregate the sums annually appropriated therefor by the general court. Appointments under this section shall not be subject to the civil service laws and regulations.

Superintendent of buildings to have charge of purchasing office furniture, equipment, stationery, etc., except paper for state printing contract.

SECTION 19. The superintendent of buildings shall have charge of purchasing all office furniture, fixtures and equipment, stationery and office supplies for all executive and administrative departments and divisions and boards thereof, except paper for the state printing contract, which shall be bought by the secretary of the commonwealth as heretofore, and shall direct the making of all repairs and improvements in the state house and on the state house grounds. All said departments, and the divisions and boards thereof shall make requisition upon the superintendent of buildings for all office furniture, fixtures and equipment, stationery and office supplies which they may require, and for any repairs or improvements which may be necessary in the state house or in other buildings or parts of buildings owned, occupied by or leased to the commonwealth and occupied by said departments, divisions and boards. Each department, and division and board thereof, shall be allowed for office furniture, fixtures, equipment, stationery and supplies such sums as are annually appropriated, and all such articles requisitioned by them from the superintendent of buildings shall be charged at cost against the sums so allowed, and shall be credited to the account of the superintendent of buildings. The amounts so credited shall be available for use by the superintendent of buildings during the same fiscal year in making purchases under the provisions of this section. No department, or division or board thereof, shall purchase any article or commodity for the purchase of which provision is made herein.

Allowance to departments for office furniture, equipment, supplies, etc.

Superintendent of buildings to be provided with quarters, etc.

SECTION 20. The superintendent of buildings shall be provided with quarters in the state house, shall establish a supply office therein, and shall keep on hand at all times a reasonable quantity of necessary stationery and office supplies. He may employ a purchasing agent and a storekeeper. The purchasing agent shall be qualified by training and experience in the purchase and sale of office furniture, fixtures, equipment and supplies. The storekeeper shall be qualified by training and experience to conduct the receiving,

May employ a purchasing agent and storekeeper.

storage and issue of articles purchased under the provisions of this act. It shall be the duty of the purchasing agent, under direction of the superintendent of buildings, and subject to such rules and regulations as may be adopted under the provisions of section three of chapter two hundred and ninety-six of the General Acts of nineteen hundred and sixteen, to establish such standards for office furniture, equipment, stationery and supplies used by the commonwealth as may be found feasible, with the object of reducing the variety and cost of such articles. The secretary of the commonwealth may arrange with the superintendent of buildings to assist in the handling of paper purchased for the state printing contract by ordering or issuing such paper through the supply office or storing it therein, or otherwise. The secretary of the commonwealth, the supervisor of administration and the superintendent of buildings shall, after consultation with the heads of departments and superintendents of institutions, determine a uniform style of paper and headings for letterheads to be used by all executive and administrative departments and institutions; but other styles may be authorized in limited quantities for special purposes. Paper for letterheads shall be purchased by the secretary of the commonwealth in the same manner as paper for the state printing contract.

Duties of purchasing agent.

Uniform style of paper and headings for letterheads to be used.

Paper for letterheads to be purchased by secretary of commonwealth.

Section 21. The superintendent of buildings shall give bond to the treasurer and receiver general in a sum to be fixed by the governor and council, for the faithful performance of his duties and for the rendering of a proper account of all money intrusted to him for the use of the commonwealth. He may expend such sums as are annually appropriated for the care of the state house and the state house grounds, and of other buildings or parts of buildings used by state departments and officials, for making necessary repairs and improvements, and for paying the compensation of his officers and employees. He may also expend, in addition to the amounts credited to him for articles requisitioned by departments and institutions, such sum as the general court may annually appropriate, to be used in performing the duties prescribed by the preceding two sections. He shall, under direction of the governor, install a system of accounting for all articles and commodities purchased and distributed through the supply office established under the preceding section. He shall submit estimates of all his requirements in accordance with the provisions of laws governing the

Superintendent of buildings to give bond.

May make expenditures, etc.

To install system of accounting, submit estimates, etc.

budget, and shall submit an annual report to the governor and such other reports as the governor may require.

Sergeant-at-arms, duties, etc.

Section 22. The sergeant-at-arms shall continue to exercise and perform all the rights, powers, duties and obligations of his office, save such as are by this act transferred to the superintendent of buildings. He shall not hereafter be required to give bond as provided by section three of chapter ten of the Revised Laws. He shall appoint, as now provided by law, a doorkeeper for each branch of the general court, assistant doorkeepers, messengers and pages, a postmaster, an assistant postmaster, and a clerk to take charge of the legislative document room, and such assistants in that room as may be required. Subject to the provisions of chapter two hundred and fifty-four of the General Acts of the current year, he may appoint an assistant clerk for said room. All provisions of law relating to the duties and compensation of the above appointees shall remain in full force and effect. He may appoint and remove such clerical and other assistants as the duties of his office may require, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder, and to the approval of the governor and council, where that is required by law, may fix the compensation of such persons, but the compensation so paid shall not exceed in the aggregate the sums annually appropriated therefor by the general court.

Bond not required.

Appointees.

Duties and compensation of appointees.

Certain officials to be appointed by superintendent of buildings.

Section 23. All officials provided by law to be appointed by the sergeant-at-arms, other than those named in the foregoing section, shall hereafter be appointed by the superintendent of buildings, with the exception of the following, which are hereby abolished, namely, the clerk, the clerk having charge of the supplies, the filling of requisitions and other matters of that nature, and the two messengers authorized by chapter one hundred and seventy-four of the acts of nineteen hundred and nine. All officials and employees now serving under the sergeant-at-arms, excepting those included in the preceding section, and including the present incumbents of the offices hereby abolished, shall be transferred to the office of superintendent of buildings under the terms and conditions set forth in section three of this act.

Offices of certain appointees of sergeant-at-arms abolished.

PART III.

The Executive and Administrative Departments.

1. *Department of the Secretary of the Commonwealth.*

Section 24. The office of commissioner of public records, existing under authority of chapter thirty-five of the Revised Laws, is hereby abolished. All the rights, powers, duties and obligations of said office are hereby transferred to and shall hereafter be exercised and performed by the secretary of the commonwealth, who shall be the lawful successor of said commissioner in respect thereto. The secretary, with the approval of the governor and council, shall appoint a competent person, to be known as supervisor of public records, who shall, subject to the supervision of the secretary, exercise the functions heretofore exercised by said commissioner, and shall perform such other duties as the secretary may determine. The compensation of the supervisor shall be fixed by the secretary, with the approval of the governor and council, and the secretary may, with like approval, remove the supervisor.

Office of commissioner of public records abolished, and duties, etc., transferred to secretary of the commonwealth.

Supervisor of public records, appointment, duties, compensation, etc.

Section 25. The duty of taking the decennial census of the commonwealth and of collecting, compiling and publishing information in connection therewith, and the duty of making the enumeration of summer residents of certain towns, under section thirteen of chapter one hundred of the Revised Laws and section eight of chapter three hundred and seventy-one of the acts of nineteen hundred and nine, are hereby transferred to and shall hereafter be performed, as provided herein, by the secretary of the commonwealth. The bureau of statistics, existing under authority of chapter one hundred and seven of the Revised Laws and acts in amendment thereof and in addition thereto, is hereby abolished. All the rights, powers, duties and obligations of said bureau relating to the functions above enumerated are hereby transferred to the secretary of the commonwealth, who shall be the lawful successor of the bureau of statistics with respect to the said rights, powers, duties and obligations. The remaining functions of the bureau of statistics shall be transferred as hereinafter provided.

Secretary to take decennial census of commonwealth and to enumerate summer residents of certain towns.

Bureau of statistics abolished, and duties, etc., transferred to secretary of the commonwealth.

Section 26. The secretary of the commonwealth shall make provision in his department for collecting, compiling and publishing the information required to be collected, com-

Secretary to make provision for taking decennial census, etc.

piled and published in connection with the decennial census, and for making the enumeration of summer residents of certain towns under section thirteen of chapter one hundred of the Revised Laws and under section eight of chapter three hundred and seventy-one of the acts of nineteen hundred and nine. He shall appoint and may remove, with the approval of the governor and council, a competent person to have charge of the said work and to perform such other duties as may be assigned to him, and, with like approval, may fix his salary. The said person shall be known as supervisor of the decennial census. The secretary of the commonwealth may appoint and remove such officers, clerks and other assistants as may be required to perform the duties hereby transferred, and may, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and rules and regulations made thereunder, and to the approval of the governor and council where that is required by law, fix the compensation of such persons. Such appointments shall not be subject to the provisions of chapter nineteen of the Revised Laws and acts in amendment thereof and in addition thereto. The secretary shall include in his annual estimates, for the years when work is to be performed relating to the taking of the census, such amounts as he shall consider to be required therefor.

Supervisor of the decennial census, appointment, duties, etc.

Organization of department of the secretary of the commonwealth.

SECTION 27. Except as aforesaid, the department of the secretary of the commonwealth shall be organized as now provided by law, subject to the provisions of Part I of this act, so far as they apply.

2. *Department of the Treasurer and Receiver General.*

Board of retirement transferred to the department of treasurer and receiver general.

SECTION 28. The board of retirement, as now organized and existing under authority of paragraph one of section four of chapter five hundred and thirty-two of the acts of nineteen hundred and eleven, is hereby placed and shall hereafter serve in the department of the treasurer and receiver general. The board shall continue to exercise its functions as heretofore, except that the treasurer and receiver general shall be its chairman.

Treasurer to be chairman of board.

Treasurer may employ clerks, etc., to carry on work of the board of retirement.

SECTION 29. The treasurer and receiver general may, subject to the civil service law and rules, where they apply, appoint, and remove, such clerical and other assistants as may be required to carry on the work of the board of retirement, and may, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and rules and regulations made thereunder, and to the approval of the governor and council, where that is required by law, fix the compensation of such persons. So much of paragraph four of section four of said chapter five hundred and thirty-two as is inconsistent herewith is hereby repealed.

Repeal.

SECTION 30. The commissioners on firemen's relief, existing under authority of section seventy-three of chapter thirty-two of the Revised Laws as amended, and of section one of chapter eighty-one of the General Acts of nineteen hundred and eighteen, are hereby placed and shall hereafter serve in the department of the treasurer and receiver general. They shall continue to exercise their functions as heretofore, except that they shall hereafter consist of the treasurer and receiver general, two members to be appointed by the governor, with the advice and consent of the council, and two members to be appointed by the Massachusetts state firemen's association. Of those first appointed by the governor and by the said association, respectively, one member shall be appointed for the term of two years, and one for the term of one year, and thereafter the said members shall be appointed for terms of two years. Any vacancy shall be filled for the unexpired term in the manner of the original appointment. The present commissioners shall hold office until this act takes effect and until the new commissioners are appointed and qualified.

Commissioners on firemen's relief transferred to department of treasurer and receiver general.

Membership, duties, etc.

SECTION 31. Except as aforesaid, the department of the treasurer and receiver general shall be organized as now provided by law, subject to the provisions of Part I of this act, so far as they apply.

Organization of department of the treasurer and receiver general.

3. *Department of the Auditor of the Commonwealth.*

SECTION 32. The department of the auditor of the commonwealth shall be organized as now provided by law, subject to the provisions of Part I of this act, so far as they apply.

Organization of department of the auditor of the commonwealth.

4. *Department of the Attorney-General.*

SECTION 33. The department of the attorney-general shall be organized as now provided by law, subject to the provisions of Part I of this act, so far as they apply.

Organization of department of the attorney-general.

5. *Department of Agriculture.*

State department of agriculture abolished and succeeded by department of agriculture.

SECTION 34. The state department of agriculture, existing under authority of chapter two hundred and sixty-eight of the General Acts of nineteen hundred and eighteen is hereby abolished. All the rights, powers, duties and obligations of said state department and of the commissioner thereof, are hereby transferred to and shall hereafter be exercised and performed by the department of agriculture established by this act, which shall be the lawful successor of said state department.

Commissioner of agriculture, office established.

Advisory board, appointment, etc.

SECTION 35. The department of agriculture shall be under the supervision and control of a commissioner to be known as commissioner of agriculture, and an advisory board of six members, all of whom shall be appointed by the governor with the advice and consent of the council. The first appointment of the commissioner shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the commissioner for the term of three years. Of the members of the advisory board first appointed, two shall be appointed for the term of one year, two for two years, and two for three years. Thereafter, as the terms expire, the governor shall appoint the members of the board for terms of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner or any member of the board. The principal vocation of at least three members of the board shall be agriculture.

Commissioner of agriculture, powers, duties, etc.

SECTION 36. The commissioner shall be the executive and administrative head of the department. He shall have charge of the administration and enforcement of all laws which it is the duty of the department to administer and enforce, and shall direct all inspections and investigations. He shall receive such annual salary, not to exceed five thousand dollars, as the governor and council may determine.

Advisory board, powers, compensation, etc.

The advisory board shall exercise advisory powers only and shall meet when requested by the commissioner or by any three members. They shall receive ten dollars a day while in conference and their actual necessary travelling expenses incurred in the performance of their official duties.

Department of agriculture to be organized in divisions.

SECTION 37. The commissioner shall organize the department in divisions, including a division of dairying and animal husbandry, a division of plant pest control, a division of ornithology, a division of markets, and a division of reclamation, soil survey and fairs and such other divisions as he may, from time to time, determine, and shall assign to said divisions their functions. The commissioner may appoint and remove a director of each division to have charge of the work of the division. The compensation of directors shall be fixed by the commissioner, with the approval of the governor and council. The commissioner may also, subject to the civil service law and rules, where they apply, appoint such inspectors, investigators, scientific experts, clerks and such other officers and assistants as the work of the department may require; may assign them to divisions, transfer and remove them, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, may fix the compensation of the said persons.

Directors of divisions, appointment, etc.

Inspectors, clerks, etc., appointment, salaries, etc.

SECTION 38. The department of agriculture through its proper divisions shall have power to:

Powers of department of agriculture.

(a) Execute and carry into effect the laws of the commonwealth relative to dairy products, animal breeding, apple grading, plant pest control with the exception of the gypsy and brown tail moth, ornithology, apiary inspection, and the production, storage, marketing and distribution of agricultural products.

(b) Aid in the promotion and development of the agricultural resources of the commonwealth and the improvement of the conditions of rural life, the settlement of farms and the distribution of the supply of farm labor.

(c) Investigate the cost of the production and marketing in all its phases, and the sources of supply, of agricultural products, and the production, transportation, storage, marketing and distribution of agricultural products sold, offered for sale, stored or held within the commonwealth.

(d) Collect and disseminate data and statistics as to the food produced, stored or held within the commonwealth, with the quantities available from time to time and the location thereof.

(e) Investigate and aid improved methods of co-operative production, marketing and distribution of agricultural products within the commonwealth.

(f) Offer prizes for and conduct exhibits of flowers, fruit, vegetables, grasses, grains or other farm crops, dairy products, honey, horses, cattle, sheep, swine, poultry, poultry products, farm operations, and canned and dried fruits and vegetables.

6. *Department of Conservation.*

Office of state forester, state forest commission and board of commissioners on fisheries and game abolished and succeeded by department of conservation.

SECTION 39. The office of state forester, existing under authority of chapter four hundred and nine of the acts of nineteen hundred and four, and acts in amendment thereof, the state forest commission, existing under authority of chapter seven hundred and twenty of the acts of nineteen hundred and fourteen, and the board of commissioners on fisheries and game, existing under authority of chapter ninety-one of the Revised Laws, and amendments thereof and additions thereto, are hereby abolished. All the rights, powers, duties and obligations of said office, commission and board are hereby transferred to and shall hereafter be exercised and performed by the department of conservation established by this act, which shall be the lawful successor of said office, commission and board.

Department of animal industry to serve in department of conservation.

The department of animal industry as now organized and existing under authority of chapter six hundred and eight of the acts of nineteen hundred and twelve is hereby placed in and shall hereafter serve in the department of conservation.

Commissioner of conservation, office established.

SECTION 40. The department of conservation shall be under the supervision and control of a commissioner to be known as the commissioner of conservation, and shall be organized in three divisions, namely: a division of forestry, a division of fisheries and game, and a division of animal industry. Each division shall be under the charge of a director.

Divisions of department of conservation.

Functions of divisions.

The division of forestry shall include the functions heretofore exercised by the state forester and the state forest commission. The division of fisheries and game shall include the functions heretofore exercised by the board of commissioners on fisheries and game. The division of animal industry shall consist of the department of animal industry as now organized and existing under authority of chapter six hundred and eight of the acts of nineteen hundred and twelve, and said department shall continue to exercise its functions as heretofore, but as a division of the department of conservation.

Commissioner of conservation, appointment, etc.

SECTION 41. The commissioner shall be appointed by the governor, with the advice and consent of the council. The first appointment shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the commissioner for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner. The governor shall designate the commissioner as director of one of the divisions of the department. The commissioner shall receive such annual salary, not exceeding five thousand dollars, as commissioner and director, as may be fixed by the governor and council. The commissioner shall be the executive and administrative head of the department, and shall organize the department in divisions and supervise the same as herein provided. He shall have charge of the administration and enforcement of all laws which it is the duty of the department to administer and enforce, and shall direct all inspections and investigations. The directors of divisions shall act as an advisory council to the commissioner.

Salary, powers, duties, etc.

Advisory council.

Section 42. The director of the division of forestry shall be known as the state forester. He shall exercise the functions of the state forester under chapter four hundred and nine of the acts of nineteen hundred and four and acts in amendment thereof and in addition thereto. He shall also have, exercise and perform the rights, powers, duties and obligations of the state forest commission under chapter seven hundred and twenty of the acts of nineteen hundred and fourteen, subject in all cases to the approval of the commissioner and the advisory council. He shall be appointed by the governor, with the advice and consent of the council. The first appointment shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the said director for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove him. He shall be qualified by training and experience to perform the duties of his position and shall receive such annual salary, not exceeding five thousand dollars, as the governor and council may determine. He may, subject to the approval of the commissioner, and to the civil service law and rules, where they apply, appoint and remove such experts, clerical and other assistants as the work of the division may require and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, fix the compensation of such persons.

State forester, appointment, powers, duties, etc.

Salary.

Experts, clerks, etc., appointment, compensation, etc.

Section 43. The director of the division of fisheries and game shall exercise the functions of the board of commis-

Director of division of fisheries and

game, appointment, duties, salary, etc.

sioners on fisheries and game under chapter ninety-one of the Revised Laws and acts in amendment thereof and in addition thereto. He shall be appointed by the governor, with the advice and consent of the council. The first appointment shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the said director for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove him. He shall be qualified by training and experience to perform the duties of his position, and shall receive such annual salary, not to exceed four thousand dollars, as the governor and council may determine. He may, subject to the approval of the commissioner, and to the civil service law and rules, where they apply, appoint and remove such experts, clerical and other assistants as the work of the division may require and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, fix the compensation of such persons.

Experts, clerks, etc., appointment, compensation, etc.

Director of animal industry, office established, etc.

Section 44. The commissioner of animal industry shall hereafter be known as the director of animal industry, and appointment to the office shall hereafter be made as now provided by law. He may, subject to the approval of the commissioner and to the civil service law and rules, where they apply, appoint and remove such experts, clerical and other assistants, as the work of the division may require, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, fix the compensation of the said persons.

7. *Department of Banking and Insurance.*

Offices of bank commissioner, supervisor of loan agencies and insurance commissioner abolished and succeeded by department of banking and insurance.

Section 45. The office of bank commissioner, existing under authority of chapter two hundred and four of the acts of nineteen hundred and six, and chapter five hundred and ninety of the acts of nineteen hundred and eight, the office of supervisor of loan agencies, existing under authority of chapter seven hundred and twenty-seven of the acts of nineteen hundred and eleven, and the office of the insurance commissioner, existing under authority of chapter five hundred and seventy-six of the acts of nineteen hundred and seven, are hereby abolished. All the rights, powers, duties and obligations of said offices are hereby transferred to and shall hereafter be exercised and performed by the department of banking and insurance established by this act, which shall be the lawful successor of said offices.

Divisions of the department of banking and insurance, etc.

Section 46. The department of banking and insurance shall be organized in three divisions, — namely, a division of banks and loan agencies, a division of insurance, and a division of savings bank life insurance. Each division shall be in charge of a commissioner, who shall be known, respectively, as the commissioner of banks, the commissioner of insurance, and the commissioner of savings bank life insurance.

Division of banks and loan agencies.

Division of insurance.

Division of savings bank life insurance.

The division of banks and loan agencies shall include the functions heretofore exercised by the bank commissioner and the supervisor of loan agencies. The division of insurance shall include the functions heretofore exercised by the insurance commissioner. The division of savings bank life insurance shall consist of the body corporate known as the General Insurance Guaranty Fund as now organized and existing under authority of chapter five hundred and sixty-one of the acts of nineteen hundred and seven, and acts in amendment thereof and in addition thereto, and the board of trustees of said corporation shall continue to exercise its functions as heretofore, except as is otherwise hereinafter provided.

Departmental board.

The commissioners of said divisions shall act as a board in all matters concerning the department as a whole.

Board of bank incorporation to serve in department of banking and insurance, etc.

Section 47. The board of bank incorporation, so-called, existing under authority of chapter two hundred and four of the acts of nineteen hundred and six and section four of chapter five hundred and ninety of the acts of nineteen hundred and eight, is hereby placed and shall hereafter serve in the department of banking and insurance. The said board shall hereafter consist of the treasurer and receiver general, the commissioner of banks, and the commissioner of corporations and taxation as established by this act. The board shall continue to exercise its functions as heretofore, but shall be considered a board of the division of banks and loan agencies.

Board of appeal on fire insurance rates to serve in department of banking and insurance.

Section 48. The board of appeal on fire insurance rates, existing under authority of chapter four hundred and ninety-three of the acts of nineteen hundred and eleven, is hereby placed and shall hereafter serve in the department of banking and insurance, and shall continue to exercise its functions as heretofore, but shall be considered a board of the division of insurance.

Commissioner of banks, appointment, powers, duties, etc.

SECTION 49. The commissioner of banks shall exercise the functions of the bank commissioner and of the supervisor of loan agencies, as now provided by law. He shall also be a member of the board of bank incorporation, as heretofore provided. He shall be appointed by the governor, with the advice and consent of the council. The first appointment shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the commissioner for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner. He shall possess the qualifications and give the bond required of the bank commissioner under chapter two hundred and four of the acts of nineteen hundred and six, and under chapter five hundred and ninety of the acts of nineteen hundred and eight, and shall receive such annual salary, not exceeding five thousand dollars, as the governor and council may determine.

Supervisor of loan agencies, appointment, etc.

The commissioner may, with the approval of the governor and council, appoint and remove a deputy as supervisor of loan agencies, and may, subject to the civil service laws and rules, where they apply, appoint and remove

Clerks, etc., appointment, salaries, etc.

such clerical and other assistants as the work of the division may require and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and rules and regulations made thereunder, and to the approval of the governor and council, where that is required by law, fix the compensation of the said persons.

Commissioner of insurance, appointment, powers, duties, etc.

SECTION 50. The commissioner of insurance shall exercise and perform the functions of the insurance commissioner as now provided by law, and he, or a deputy designated by him, shall be a member of the board of appeal on fire insurance rates under chapter four hundred and ninety-three of the acts of nineteen hundred and eleven. He shall be appointed by the governor, with the advice and consent of the council. The first appointment shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the commissioner for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner. He shall possess the qualifications and give the bond required of the insurance commissioner under chapter one hundred and eighteen of the Revised Laws and chapter five hundred and seventy-six of the acts of nineteen hundred and seven, and shall receive such annual salary, not exceeding five thousand dollars, as the governor and council may determine. The commissioner may appoint and remove, with the approval of the governor and council, a first deputy, who shall discharge the duties of the commissioner during his absence or disability, and such other duties as may be prescribed by the commissioner, an actuary and a chief examiner, and, subject to the civil service laws and rules where they apply, may appoint and remove such clerical and other assistants as the work of the division may require and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder, and to the approval of the governor and council, where that is required by law, may fix the compensation of such persons.

First deputy, appointment.

Actuary, chief examiner, clerks, etc., appointment.

SECTION 51. The commissioner of savings bank life insurance shall be one of the board of trustees of the corporation known as the General Insurance Guaranty Fund, designated by the governor. His term shall be that of his appointment as trustee. He shall act as president of the board of trustees of said corporation, and shall have general supervision and control of the work of the division: *provided*, that the trustees may elect a vice president to act as president of the board in the absence or disability of the commissioner.

Commissioner of savings bank life insurance, powers, duties, etc.

Proviso.

8. *Department of Corporations and Taxation.*

SECTION 52. The department of corporations and taxation shall consist of the office of the tax commissioner and commissioner of corporations, as now organized and existing under authority of Part III of chapter four hundred and ninety of the acts of nineteen hundred and nine, and acts in amendment thereof and in addition thereto, except as is otherwise hereinafter provided. The office of controller of county accounts, existing under authority of chapter twenty-one of the Revised Laws, is hereby abolished. All the rights, powers, duties and obligations of said office and of the bureau of statistics existing under authority of chapter three hundred and seventy-one of the acts of nineteen hun-

Office of tax commissioner and commissioner of corporations to be succeeded by department of corporations and taxation.

Office of controller of county accounts abolished, etc.

dred and nine, or of the director thereof, with relation to the compilation of municipal statistics, the auditing of municipal accounts, and the certification of the notes of towns and districts, are hereby transferred to and shall hereafter be exercised and performed by the said department, which shall be the lawful successor of said controller of county accounts, and of said bureau of statistics, and the director thereof with respect to the said rights, powers, duties and obligations.

Commissioner of corporations and taxation, office established.

SECTION 53. The tax commissioner and commissioner of corporations shall hereafter be known as the commissioner of corporations and taxation. He shall receive such annual salary, not exceeding seven thousand five hundred dollars, as the governor and council may determine. He may, subject to the approval of the governor and council, appoint a deputy and a second deputy commissioner who shall be in lieu of the deputies now provided for by section two of Part III of chapter four hundred and ninety of the acts of nineteen hundred and nine and acts in amendment thereof and in addition thereto, who shall perform such duties as may be assigned to them by the commissioner and in his absence or disability shall perform all duties required by law of said commissioner. The deputy commissioner shall receive such annual salary not exceeding five thousand dollars and the second deputy such annual salary not exceeding four thousand dollars as may be fixed by the commissioner with the approval of the governor and council. The commissioner shall organize the department into such divisions as may be required, including an income tax division, a division of corporations, a division of inheritance taxes, a division of local taxation and a division of accounts. He shall appoint, subject to the approval of the governor and council, a director to take charge of each division and may remove any director with like approval. The director in charge of the income tax division shall be in lieu of the income tax deputy now provided for by section seventeen of chapter two hundred and sixty-nine of the General Acts of nineteen hundred and sixteen. The directors in charge of the divisions of inheritance taxes and local taxation shall be in lieu of two of the assistants provided for by section two of Part III of said chapter four hundred and ninety and acts in amendment thereof and in addition thereto. The commissioner, with the approval of the governor and council, shall fix the salary of the said directors. The directors shall, under the supervision

Deputy commissioners, appointment, duties, salaries, etc.

Divisions of department of corporations and taxation, directors, etc.

and control of the commissioner, exercise the functions assigned to their respective divisions under this act, and shall also perform such other incidental duties as the commissioner may prescribe.

Section 54. The commissioner shall assign to the several divisions their appropriate functions, except that the duties now devolving on the income tax deputy, so-called, shall hereafter be performed by the director in charge of the income tax division, and the duties now performed by the controller of county accounts, and by the bureau of statistics, or the director thereof, with respect to the functions specified in section fifty-two hereof, shall hereafter be performed by the director in charge of the division of accounts. The said director shall be known as the director of accounts, and shall, subject to the supervision and control of the commissioner, perform all of the said duties, including the certification of the notes of towns and districts. The commissioner may designate a competent employee in the said division to perform the functions of the director in case of his absence, death or disability, and notes of towns and districts, when certified by such employee, shall have the same validity as if certified by the director.

Functions of divisions of department of corporations and taxation.

Director of accounts, duties, etc.

Section 55. The commissioner shall administer and enforce all laws which the department is required to administer and enforce under the provisions of this act and of all acts relating to the office of tax commissioner and commissioner of corporations. He may, subject to the provisions of law relative to appointments and removals by the tax commissioner and commissioner of corporations, and subject to the civil service law and rules, where they apply, appoint such officials, agents, clerks and other employees as the work of the department may require, assign to them their respective duties, transfer and remove them, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder, and to the approval of the governor and council, where that is required by law, fix the compensation of the said persons.

Commissioner of corporations and taxation, duties, etc.

Agents, clerks, etc., appointment, salaries, etc.

9. *Department of Education.*

Section 56. The board of education, existing under authority of chapter thirty-nine of the Revised Laws, and acts in amendment thereof and in addition thereto, and the

Board of education and bureau of immigration, abolished and succeeded by department of education.

bureau of immigration, existing under authority of chapter three hundred and twenty-one of the General Acts of nineteen hundred and seventeen, are hereby abolished. All the rights, powers, duties and obligations of said board and bureau are hereby transferred to and shall hereafter be exercised and performed by the department of education established by this act, which shall be the lawful successor of said board and said bureau.

Trustees of Massachusetts Agricultural College, board of commissioners of Massachusetts nautical school, trustees of The Bradford Durfee Textile School, trustees of Lowell Textile School, trustees of New Bedford Textile School, teachers' retirement board, board of free public library commissioners, and commission for the blind placed in department of education.

The trustees of the Massachusetts Agricultural College, existing under authority of chapter two hundred and sixty-two of the General Acts of nineteen hundred and eighteen, the board of commissioners of the Massachusetts nautical school, existing under authority of chapter forty-five of the Revised Laws and acts in amendment thereof and in addition thereto, the trustees of The Bradford Durfee Textile School, existing under authority of chapter two hundred and forty-eight of the General Acts of nineteen hundred and eighteen, the trustees of the Lowell Textile School, existing under authority of chapter two hundred and seventy-four of the General Acts of nineteen hundred and eighteen, the trustees of the New Bedford Textile School, existing under authority of chapter two hundred and forty-six of the General Acts of nineteen hundred and eighteen, the teachers' retirement board, existing under authority of chapter eight hundred and thirty-two of the acts of nineteen hundred and thirteen, the board of free public library commissioners, existing under authority of chapter thirty-eight of the Revised Laws and acts in amendment thereof and in addition thereto, and the commission for the blind, existing under authority of chapter two hundred and sixty-six of the General Acts of nineteen hundred and eighteen, are hereby placed in and shall hereafter serve in the said department.

Commissioner of education, office established.

Advisory board of education established.

SECTION 57. The department of education shall be under the supervision and control of a commissioner, to be known as the commissioner of education, and a board of six members to be known as the advisory board of education, all of whom shall be appointed by the governor, with the advice and consent of the council. The first appointment of the commissioner shall be for the term of one, two, three, four or five years as the governor may determine. Of the members of the advisory board of education first appointed, two shall be appointed for the term of one year, two for two years, and two for three years. Thereafter as the terms expire the governor shall appoint the commissioner for the term of five years, and the members of the board for the term of three years. He shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner or any member of the board. At least two members of the board shall be women, and one shall be appointed from among the teachers of the commonwealth.

Women members.

Section 58. The commissioner shall be the executive and administrative head of the department, and shall organize the department in divisions, and supervise the same as herein provided. He shall have charge of the administration and enforcement of all laws, rules and regulations which it is the duty of the department to administer and enforce, and shall be chairman of the advisory board of education. He shall receive such annual salary, not exceeding seven thousand five hundred dollars, as the governor and council may determine. The board shall meet at least once a month, and at such other times as they may determine by their rules, and when requested by the commissioner or by any three members. They shall serve without compensation, but shall be reimbursed for their actual necessary expenses incurred in the performance of their duties.

Commissioner of education, powers, duties, salary, etc.

Advisory board, meetings, expenses, etc.

Section 59. The department shall be organized in such divisions as the commissioner may from time to time determine, but the department shall include a division of public libraries, a division of education of aliens, and a division of the blind. Each division shall be in charge of a director and shall be under the general supervision of the commissioner.

Divisions of department of education, directors, etc.

The division of public libraries shall consist of the board of free public library commissioners as now organized and existing under authority of chapter thirty-eight of the Revised Laws, and acts in amendment thereof and in addition thereto. The chairman of said board shall hereafter be known as the director of said division. The said board shall continue to exercise its functions as heretofore, but as a division of the said department.

Division of public libraries, director, functions, etc.

The division of education of aliens shall consist of a director, who may be a woman, and an advisory board of six persons to be appointed by the governor with the advice and consent of the council. The director shall be appointed for the term of five years. Of the members of the advisory board first appointed, two shall be appointed for the term of one year, two for two years, and two for three years. Thereafter as the terms expire the governor shall appoint the members of the board for the term of three years, shall fill

Division of education of aliens, director, advisory board, appointment, duties, expenses, etc.

any vacancy for the unexpired term, and may, with the consent of the council, remove the director or any member of the board. The director shall, with the approval of the advisory board, exercise functions of the bureau of immigration under chapter three hundred and twenty-one of the General Acts of nineteen hundred and seventeen. The advisory board shall meet at least once a month, and at such other times as they may determine by their rules, and when requested by the director or by any three members. The director and members of the board shall receive no compensation for their services, but shall be reimbursed for their actual necessary expenses incurred in the performance of their duties.

Division of the blind, director, duties, etc.

The division of the blind shall consist of the commission for the blind as now organized and existing under authority of chapter two hundred and sixty-six of the General Acts of nineteen hundred and eighteen. The director of said commission shall be the director of said division. Said commission shall continue to exercise its functions as heretofore, but as a division of the said department.

Certain directors of divisions of department of education, appointment, compensation, etc.

Section 60. Except as aforesaid, the directors of the divisions of the department shall be appointed and may be removed by the commissioner, with the approval of the advisory board of education and the commissioner shall fix the compensation of the directors with the approval of the governor and council. The commissioner may also, except in the case of the division of public libraries and the division of the blind, subject to the civil service law and rules, where they apply, appoint such agents, clerks and other assistants as the work of the department may require, may assign them to divisions, transfer and remove them, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, may fix the salaries of such persons.

Agents, clerks, etc., appointment, salaries, etc.

Teachers' retirement board, membership, duties, etc.

Section 61. The teachers' retirement board shall hereafter consist of three members, — namely, the commissioner of education, a member of the retirement association to be elected for the term of three years by the association, and one other person whom the two members above designated shall annually choose. The board so constituted shall hereafter exercise the functions of the board under chapter eight hundred and thirty-two of the acts of nineteen hundred and thirteen.

SECTION 62. The commissioner of education shall be, ex officio, a trustee of the Massachusetts Agricultural College under section two of chapter two hundred and sixty-two of the General Acts of nineteen hundred and eighteen, and he or a member of the advisory board of education designated by him shall be ex officio a member of the board of trustees of each of the textile schools hereby placed in the department of education.

Commissioner of education to be, ex officio, a trustee of Massachusetts Agricultural College and certain textile schools, etc.

10. *Department of Civil Service and Registration.*

SECTION 63. The civil service commission, existing under authority of chapter nineteen of the Revised Laws and acts in amendment thereof and in addition thereto, is hereby abolished. All the rights, powers, duties and obligations of said commission and of its members and officers are hereby transferred to and shall hereafter be exercised and performed by the department of civil service and registration established by this act, which shall be the lawful successor of said commission. The board of registration in medicine, the board of dental examiners and the board of registration in pharmacy, as now organized and existing under authority of chapter seventy-six of the Revised Laws and acts in amendment thereof and in addition thereto; the board of registration of nurses, as now organized and existing under authority of chapter four hundred and forty-nine of the acts of nineteen hundred and ten, as amended; the board of registration in embalming, as now organized and existing, under authority of chapter four hundred and seventy-three of the acts of nineteen hundred and five; the board of registration in optometry, as now organized and existing under authority of chapter seven hundred of the acts of nineteen hundred and twelve; the board of registration in veterinary medicine, as now organized and existing under authority of chapter two hundred and forty-nine of the acts of nineteen hundred and three; and the state examiners of electricians, as now organized and existing under authority of chapter two hundred and ninety-six of the General Acts of nineteen hundred and fifteen, are hereby placed in and shall hereafter serve in the said department.

Civil service commission abolished and succeeded by department of civil service and registration.

Board of registration in medicine, board of dental examiners, board of registration in pharmacy, board of registration of nurses, board of registration in embalming, board of registration in optometry, board of registration in veterinary medicine and state examiners of electricians placed in department of civil service and registration.

SECTION 64. The department of civil service and registration shall be organized in two divisions, namely, a division of civil service and a division of registration.

Divisions of department of civil service and registration.

The division of civil service shall include the functions heretofore exercised by the civil service commission. The

Division of civil service and division

of registration, functions, etc.

division of registration shall include the several boards of registration and the state examiners of electricians specified in the foregoing section.

Departmental board.

The commissioner of civil service and the director of registration, hereinafter provided for, shall act as a board in all matters affecting the department as a whole.

Commissioner of civil service and two associate commissioners, offices established, salaries, etc.

SECTION 65. The division of civil service shall be under the supervision and control of a commissioner to be known as the commissioner of civil service, and two associate commissioners, all of whom shall be appointed by the governor with the advice and consent of the council. The first appointment of the commissioner and the associate commissioners shall be for terms of one, two and three years, said terms to be allotted to the commissioner and to the associate commissioners as the governor may determine. Thereafter the governor shall appoint the commissioner and the associate commissioners for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove any commissioner. The commissioner shall receive such annual salary, not exceeding five thousand dollars, and the associate commissioners such annual salary, not exceeding two thousand dollars, as the governor and council may determine. The associate commissioners shall not be of the same political party.

Associate commissioners not to be of same political party.

Commissioner and associate commissioner to constitute board to make rules, decide appeals taken by applicants and appointees, etc.

SECTION 66. The commissioner and associate commissioners shall constitute a board which shall prepare all rules and regulations, hear and decide all appeals taken by an applicant, eligible person, or appointee from any decision of the commissioner, pass on appointments made by the mayor of the city of Boston as required by chapter four hundred and eighty-six of the acts of nineteen hundred and nine, as amended, select special examiners and determine the scope and weight of all examinations. The said board may appoint and remove a deputy commissioner of the division of civil service, determine his powers and duties, and, subject to the approval of the governor and council, fix his compensation. Said board may authorize the commissioner to organize the division into subdivisions, and to assign officers and employees of the division thereto. Meetings of the board shall be held at least once a month, at such times as it may by rule determine, and meetings shall also be held at the request of any member thereof.

Deputy commissioner of division of civil service, appointment, duties, etc.

Subdivisions of division of civil service.

Meetings.

Commissioner of civil service, powers, duties, etc.

The commissioner shall be the executive and administrative head of the division, and shall exercise the functions of the civil service commission, except as is otherwise expressly provided herein. He shall have charge of the administration and enforcement of all laws, rules and regulations which it is the duty of the department to administer and enforce, and shall direct all examinations and investigations which the department is authorized to conduct. He may, subject to the civil service law and rules, where they apply, appoint and remove such officers and employees as the work of the department may require, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder, and to the approval of the governor and council, where that is required by law, fix the compensation of such persons.

Officers and employees, appointment, salaries, etc.

The associate commissioners, or either of them, may at any time require the commissioner or any official or employee of the board to give full information, and produce all papers and records, relating to any official act performed by him.

Official acts of commissioner subject to review by associate commissioners.

Section 67. The division of registration shall be under the supervision of a director to be known as the director of registration. He shall be appointed by the governor, with the advice and consent of the council, for a term not exceeding two years and, with like approval, may be removed by the governor. He shall receive such annual salary, not exceeding fifteen hundred dollars, as the governor and council may determine.

Director of registration, appointment, salary, etc.

The several boards of registration and examination included in said division shall continue to exercise their functions as heretofore. It shall be the duty of the director to supervise the work of the several boards, recommend changes in methods of conducting examinations and transacting business, and from time to time to make such reports to the governor and council as they may require or as he may deem expedient.

Boards of registration and examination, functions, supervision, etc.

11. *Department of Industrial Accidents.*

Section 68. The department of industrial accidents shall consist of the industrial accident board as now organized and existing under chapter seven hundred and fifty-one of the acts of nineteen hundred and eleven, and acts in amendment thereof and in addition thereto. All provisions of law relating to the industrial accident board shall continue in full force and effect except as is otherwise provided in this act.

Industrial accident board succeeded by department of industrial accidents.

12. *Department of Labor and Industries.*

Board of labor and industries, board of conciliation and arbitration, minimum wage commission, office of commissioner of standards, and office of surveyor general of lumber abolished and succeeded by department of labor and industries.

SECTION 69. The board of labor and industries, existing under authority of chapter seven hundred and twenty-six of the acts of nineteen hundred and twelve and acts in amendment thereof and in addition thereto; the board of conciliation and arbitration, existing under authority of chapter five hundred and fourteen of the acts of nineteen hundred and nine, as amended by chapter six hundred and eighty-one of the acts of nineteen hundred and fourteen, and acts in amendment thereof and in addition thereto; the minimum wage commission, existing under authority of chapter seven hundred and six of the acts of nineteen hundred and twelve, and acts in amendment thereof and in addition thereto; the office of commissioner of standards, existing under authority of chapter five hundred and thirty-four of the acts of nineteen hundred and seven and of chapter two hundred and eighteen of the General Acts of nineteen hundred and eighteen; and the office of surveyor general of lumber, existing under authority of chapter sixty of the Revised Laws, are hereby abolished. All the rights, powers, duties and obligations of the said boards, commissions and offices, or of any member or official thereof, and those of the bureau of statistics, or the director thereof, with respect to collecting, arranging and publishing statistical information relative to the commercial and industrial condition of the people, and the productive industries of the commonwealth, usually designated as the statistics of labor and manufactures, and with respect to the establishment and maintenance of public employment offices and with respect to all other matters not otherwise provided for by this act, are hereby transferred to and shall hereafter be exercised and performed by the department of labor and industries, established by this act, which shall be the lawful successor of said boards, commissions, and offices and of said bureau of statistics, and the director thereof, with respect to the said rights, powers, duties and obligations. The powers and duties conferred and imposed upon the industrial accident board by section eighteen of Part IV of chapter seven hundred and fifty-one of the acts of nineteen hundred and eleven are also transferred to and shall hereafter be exercised and performed by said department.

Statistics of labor and manufactures, etc., to be published by department of labor and industries.

Certain powers and duties of industrial accident board transferred to department of labor and industries.

Commissioner of labor and industries,

SECTION 70. The department of labor and industries shall be under the supervision and control of a commissioner, to be known as the commissioner of labor and industries, an assistant commissioner, who may be a woman, and three associate commissioners, one of whom shall be a representative of labor and one of whom shall be a representative of employers of labor, all of whom shall be appointed by the governor, with the advice and consent of the council. The first appointment of the commissioner and assistant commissioner shall be for the term of three years, and of the associate commissioners for the terms of one, two and three years, respectively. Thereafter as the terms expire the governor shall in like manner appoint the said commissioners for terms of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove any commissioner. The commissioner shall receive such annual salary not exceeding seven thousand five hundred dollars, and the assistant commissioner and associate commissioners such annual salary, not exceeding four thousand dollars each, as the governor and council may determine.

an assistant commissioner and three associate commissioners, offices established, salaries, etc.

Section 71. The commissioner shall be the executive and administrative head of the department. He shall have charge of the administration and enforcement of all laws, rules and regulations which it is the duty of the department to administer and enforce, and shall direct all inspections and investigations except as is otherwise provided herein. He may organize the department in such divisions as he may from time to time determine, and may assign the officers and employees of the department thereto. He shall prepare for the consideration of the associate commissioners, rules and regulations, in accordance with existing law, to carry out the provisions of this act relative to the department. All rules and regulations so prepared shall take effect, subject to the provisions of chapter three hundred and seven of the General Acts of nineteen hundred and seventeen where applicable, when approved by the associate commissioners, or upon such date as they may determine. The commissioner may designate an associate commissioner to discharge the duties of the commissioner during his absence or disability.

Commissioner of labor and industries, powers, duties, etc.

Departmental divisions, etc.

Designated associate commissioner to act as commissioner, when.

Section 72. The associate commissioners shall constitute a board to be known as the board of conciliation and arbitration, which shall have the authority and exercise the functions heretofore vested in the board of conciliation and arbitration and in the minimum wage commission, except as to matters of an administrative nature, and in pursuance

Board of conciliation and arbitration, membership, powers, duties, etc.

of the said authority shall, if they deem it necessary, investigate immediately the circumstances of any industrial dispute which arises, shall establish wage boards and review their reports, and may issue special licenses under the provisions of section nine of chapter seven hundred and six of the acts of nineteen hundred and twelve. In all investigations and proceedings conducted by said associate commissioners they shall have authority to summon witnesses, to administer oaths, to take testimony and to require the production of books and documents. In any controversy referred to the board on a joint application under any arbitration agreement they shall employ special experts at the request of either party. One such expert shall be selected from a list furnished by each party to the controversy. The expense of such experts shall be borne by the commonwealth. They shall be assigned such assistants from the officers and employees of the department as the commissioner and they shall from time to time determine. The fees of witnesses before the associate commissioners for attendance and travel shall be the same as those of witnesses before the superior court, and shall be certified and paid in accordance with the provisions of section fifteen of chapter five hundred and fourteen of the acts of nineteen hundred and nine, and acts in amendment thereof and in addition thereto.

Employment of experts.

Fees of witnesses, etc.

Assistant commissioner to have certain powers in matters relating specifically to women and minors.

Section 73. In all matters relating specifically to women and minors the assistant commissioner shall have and exercise such duties and authority as may be prescribed by the commissioner with the approval of the associate commissioners.

Directors, appointment, salaries, etc.

Section 74. The commissioner and associate commissioners may, with the approval of the governor and council, appoint, and fix the salaries of, not more than five directors, and may, with like approval, remove the directors. Each director shall be assigned to take charge of a division of the department. The commissioner may also, subject to the civil service law and rules, where they apply, employ and remove such experts, inspectors, investigators, clerks and such other assistants as the work of the department may require, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations established thereunder, and to the approval of the governor and council, where that is required by law, fix the compensation of the said persons. The commissioner may require that certain

Inspectors, clerks, etc., employment, salaries, etc.

Qualifications of certain inspectors.

inspectors in the department, not more than seven in number, shall be persons qualified by training and experience in matters relating to health and sanitation.

Directors, inspectors and employees to devote their whole time to affairs of the department, etc.

SECTION 75. All directors, inspectors and other permanent employees of the department shall devote their whole time to the affairs of the department, and all directors and inspectors, and such other employees as may be designated by the commissioner, shall, before entering upon their duties, be sworn to the faithful performance thereof. Inspectors shall have the police powers granted by existing law to the inspectors of the board of labor and industries, except that those assigned to exercise the functions now exercised by the commissioner of standards shall have the powers now possessed by inspectors appointed by the commissioner of standards.

Inspectors to have police powers, except, etc.

Inspectors, number, etc.

The number of inspectors employed by the department shall not, at first, exceed the number of inspectors in the service of the boards, commissions, and bureaus hereby abolished, and shall not thereafter be increased without the approval of the governor and council. The commissioner and associate commissioners shall determine from time to time how many of the inspectors employed shall be women. Section ten of chapter seven hundred and twenty-six of the acts of nineteen hundred and twelve shall apply to inspectors appointed under the provisions of this section.

Certain provisions of law to apply to inspectors.

Committees on which employers and employees shall be represented, appointment, etc.

SECTION 76. The commissioner and associate commissioners may appoint committees, on which employers and employees shall be represented, to investigate and recommend rules and regulations, and changes in existing rules and regulations, within the scope of the powers and duties of the department.

Director of standards, office established, functions, powers, etc.

SECTION 77. All the rights, powers, duties and obligations of the commissioner of standards and the surveyor general of lumber shall be assigned to a division of the department, and the director in charge of said division shall be known as the director of standards. He shall exercise the functions of the commissioner of standards and the surveyor general of lumber, and shall perform such other duties as may be assigned to him by the commissioner.

Persons affected by orders, regulations, etc., may appeal, etc.

SECTION 78. Any person affected by an order, rule or regulation of the department may, within such time, as the associate commissioners by vote may fix, which shall not be less than ten days after notice of the order, or the taking effect of the rule or regulation, appeal to the associate commissioners, who shall thereupon grant a hearing, and after the hearing may amend, suspend or revoke such order, rule or regulation. The commissioner may, pending such hearing, grant a temporary suspension of the order, rule or regulation appealed from. Any person aggrieved by an order approved by the associate commissioners may appeal to the superior court: *provided*, that the appeal is taken within fifteen days after the date when the order is approved. The superior court shall have jurisdiction in equity upon such appeal, to annul the order, if it is found to exceed the authority of the department, and upon petition of the commissioner, to enforce all valid orders issued by the department. Nothing herein contained shall be construed to deprive any person of the right to pursue any other lawful remedy.

Appeal to superior court.

Proviso.

Superior court jurisdiction, etc.

13. *Department of Mental Diseases.*

Massachusetts commission on mental diseases succeeded by department of mental diseases.

SECTION 79. The department of mental diseases shall consist of the Massachusetts commission on mental diseases as now organized and existing under chapter two hundred and eighty-five of the General Acts of nineteen hundred and sixteen, and acts in amendment thereof and in addition thereto. All provisions of law relating to the commission on mental diseases shall continue in full force and effect, except as is otherwise provided in this act.

Commissioner of mental diseases, powers, duties, etc.

SECTION 80. The commissioner of mental diseases shall be the executive and administrative head of the department of mental diseases, subject to all provisions of law now in force relating to said commissioner. He may organize the department in such divisions as he may, from time to time, determine, and, with the approval of the governor and council, appoint, and fix the compensation of, an assistant commissioner to discharge the duties of the commissioner during his absence or disability, and such other duties as may be prescribed by the commissioner. Physicians, pathologists and psychiatrists of the department, and engineers, firemen and head farmers employed at institutions under the supervision of the department, shall be exempt from the civil service law, and the rules and regulations made thereunder.

Assistant commissioner, appointment, duties, salary, etc.

Certain employees at institutions under supervision of department of mental diseases to be exempt from civil service law.

Norfolk state hospital placed under supervision of department of mental diseases, etc.

SECTION 81. The Norfolk state hospital, subject to any lease to the federal government made under authority of law, is hereby placed under the supervision and control of the department of mental diseases, which shall exercise over said hospital and the board of trustees thereof the same authority now exercised by the commission on mental diseases over institutions under its supervision and control. The said hospital may be devoted to such uses, in furtherance of the public interests with which the department is charged, as the commissioner and associate commissioners may determine.

14. *Department of Correction.*

Section 82. The Massachusetts bureau of prisons, existing under authority of chapter two hundred and forty-one of the General Acts of nineteen hundred and sixteen, is hereby abolished. All the rights, powers, duties and obligations of said bureau, and of any officer, board or member thereof, are hereby transferred to and shall hereafter be exercised and performed by the department of correction established by this act, which shall be the lawful successor of said bureau.

Massachusetts bureau of prisons abolished and succeeded by department of correction.

Section 83. The department of correction shall be under the supervision and control of a commissioner, to be known as the commissioner of correction, who shall be appointed by the governor, with the advice and consent of the council. The first appointment of the commissioner shall be for the term of one, two or three years, as the governor may determine. Thereafter the governor shall appoint the commissioner for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner. The commissioner shall receive such annual salary, not exceeding six thousand dollars, as the governor and council may determine.

Commissioner of correction, appointment, salary, etc.

Section 84. The commissioner shall be the executive and administrative head of the department. He shall perform all the duties prescribed by law for the director of prisons. He may, with the approval of the governor and council, appoint and remove two deputy commissioners, and with like approval, fix their compensation. The deputy commissioners shall perform such duties as the commissioner shall prescribe, and he may designate one of them to discharge the duties of the commissioner during his absence or disability.

Commissioner of correction, powers, duties, etc.

Deputy commissioners, appointment, duties, salaries, etc.

Section 85. The duties prescribed by law for the board of parole of the bureau of prisons shall hereafter be performed by a board to consist of a deputy commissioner designated by the commissioner, and two members to be appointed by the governor with the advice and consent of the council.

Board of parole, membership, duties, salaries, etc.

The first appointments of members shall be for terms of two and three years respectively. Thereafter as the terms expire the governor shall appoint the members for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove said members. The governor shall designate the chairman of said board. The deputy commissioner shall receive no additional compensation for his services on the said board. The two appointive members shall receive such annual salary, not exceeding two thousand dollars, as the governor and council may determine; but if one of said members is designated as chairman, he shall receive an annual salary not exceeding three thousand five hundred dollars. The said board shall be known as the board of parole, and shall be considered a board of the department of correction.

Governor to designate chairman.

Title of board.

Department of correction to manage state farm at Bridgewater, etc.

SECTION 86. The department shall manage the state farm at Bridgewater in the same manner, and the officers of the department shall exercise the same authority over the state farm and its inmates, as in the case of the other institutions under the supervision and control of said department.

15. *Department of Public Welfare.*

State board of charity and homestead commission abolished and succeeded by department of public welfare.

SECTION 87. The state board of charity, existing under authority of chapter eighty-four of the Revised Laws, and acts in amendment thereof and in addition thereto, and the homestead commission, existing under authority of chapter six hundred and seven of the acts of nineteen hundred and eleven, and acts in amendment thereof and in addition thereto, are hereby abolished. All the rights, powers, duties and obligations of said board and commission, except such as pertain to institutions now under the supervision or control of the state board of charity which are transferred to other departments by this act, are hereby transferred to and shall hereafter be exercised and performed by the department of public welfare established by this act. Except as aforesaid, the said department shall be the lawful successor of said board and said commission. The board of trustees of Massachusetts training schools as now organized and existing under authority of chapter five hundred and sixty-six of the acts of nineteen hundred and eleven, the board of trustees of the Massachusetts hospital school as now organized and existing under authority of chapter four hundred and forty-six of the acts of nineteen hundred and four, and

Trustees of Massachusetts training schools, trustees of Massachusetts hospital school and trustees of state infirmary and state farm transferred to acts in amendment thereof and in addition thereto, and the board of trustees of the state infirmary and state farm as now organized and existing under authority of chapter eighty-five of the Revised Laws, and acts in amendment thereof and in addition thereto, are hereby transferred to and shall hereafter serve in said department. The authority of the board of trustees last mentioned shall hereafter relate only to the state infirmary, and said board shall hereafter be known as the board of trustees of the state infirmary.

department of public welfare.

Authority of board of trustees of the state infirmary.

Section 88. The department of public welfare shall be under the supervision and control of a commissioner, to be known as the commissioner of public welfare, and an advisory board of six members, two of whom shall be women, all of whom shall be appointed by the governor, with the advice and consent of the council. The first appointment of the commissioner shall be for the term of one, two, three, four or five years, as the governor may determine. Of the members of the advisory board first appointed two shall be appointed for the term of one year, two for two years, and two for three years. Thereafter as the terms expire the governor shall appoint the commissioner for the term of five years, and the members of the board for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner or any member of the board.

Commissioner of public welfare and an advisory board, offices established.

Section 89. The commissioner shall be the executive and administrative head of the department. He shall have charge of the administration and enforcement of all laws which it is the duty of the department to administer and enforce, and shall organize the department in divisions, and supervise the same as hereinafter provided. He shall be, ex officio, a member of the advisory board, and shall receive such annual salary, not exceeding six thousand dollars, as the governor and council may determine.

Commissioner of public welfare, powers, duties, salary, etc.

Section 90. The commissioner and the advisory board shall exercise the functions of the homestead commission under chapter six hundred and seven of the acts of nineteen hundred and eleven, and acts in amendment thereof and in addition thereto. The board shall also assist the commissioner in the work of the department. It shall keep informed of the public interests with which the department is charged, and of the administration thereof, shall study and investigate questions arising in connection therewith, and shall consider, formulate and recommend such proposals as may seem

Commissioner and advisory board to exercise functions of homestead commission.

Advisory board, powers, duties, meetings, etc.

feasible for the furtherance of the work of the department and of the public welfare. It shall advise with the commissioner concerning the policies of the department, and shall make recommendations concerning the service or administration of any division thereof. The board shall meet at least once a month, and at such other times as it may determine by its rules, and when requested by the commissioner or by any three members. The members shall receive no compensation, but shall be reimbursed for their actual, necessary expenses incurred in the performance of their official duties.

Meetings.

Expenses allowed.

Divisions of department of public welfare, directors, etc.

SECTION 91. The department shall be organized in three divisions, — namely, a division of aid and relief, a division of child guardianship, and a division of juvenile training. There shall be a director for each division, who, under the supervision of the commissioners, shall perform the duties herein specified, and such as are otherwise prescribed by law. The division of aid and relief shall include the functions heretofore exercised by the division of state adult poor of the board of charity. The board of trustees of the state infirmary shall be placed in said division and considered a board thereof. It shall continue to exercise its functions as heretofore, but with respect only to the state infirmary. The division of child guardianship shall include the functions heretofore exercised by the division of state minor wards of the board of charity. The board of trustees of the Massachusetts hospital school shall be placed in said division and considered a board thereof, and shall continue to exercise its functions as heretofore. The division of juvenile training shall consist of the board of trustees of Massachusetts training schools as now organized and existing, together with the institutions and departments under its supervision and control. The said board shall continue to exercise its functions as heretofore, as a division of said department.

Division of aid and relief, functions, etc.

Division of child guardianship, functions, etc.

Division of juvenile training, functions, etc.

Director of aid and relief, appointment, duties, salary, etc.

SECTION 92. The director of aid and relief shall exercise, under the supervision and control of the commissioner, the functions of the division of state adult poor of the board of charity. He shall be appointed by the commissioner, with the approval of the governor and council, and may, with like approval, be removed by the commissioner. His compensation shall be fixed by the commissioner, with the approval of the governor and council. The director of child guardianship shall exercise, under the supervision and control of the commissioner, the functions of the division of state

Director of child guardianship, appointment, duties, salary, etc.

minor wards of the board of charity. He shall be appointed by the commissioner, with the approval of the governor and council, and may, with like approval, be removed by the commissioner. His compensation shall be fixed by the commissioner, with the approval of the governor and council. The director of juvenile training shall be a member of the board of trustees of Massachusetts training schools designated by the governor. He shall receive no compensation as such. His term shall be that of his appointment as trustee.

Director of juvenile training to be member of board of trustees of Massachusetts training schools.

Section 93. When so directed by the governor the commissioner and advisory board may assume and exercise the powers and perform the duties of the board of trustees of any institution under the supervision of or placed in the department, in any matter relative to the management and control thereof, except in case of trust funds vested in any board of trustees.

Commissioner of public welfare and advisory board may assume duties of trustees of certain institutions.

Section 94. The commissioner may prepare and present for the approval of the advisory board rules and regulations governing the conduct of the department and any action which may legally be taken under its authority, and such rules and regulations shall take effect upon approval by a majority of the board, and at such time as they by vote shall fix. Any person objecting to any such rule or regulation may submit his objection to the commissioner, in writing, who shall refer the same to the advisory board which may hear the said person and revise, amend or affirm the rule or regulation. At least once in each year the question of revising the rules and regulations of the department shall be brought before the advisory board by the commissioner at a regular meeting. Rules and regulations effective under the provisions of this section may be revised, amended or annulled in the same manner in which they were originally adopted.

Commissioner may prepare rules and regulations, etc.

Objections to, and revision of rules and regulations.

Annual revision of rules and regulations, etc.

Section 95. The commissioner may also, subject to the civil service law and rules, where they apply, appoint such officials, agents, clerks and other employees as the work of the department may require, designate their duties, except so far as they are otherwise defined by law, assign them to divisions, transfer and remove them, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, fix the compensation of the said persons. The appointments in the divisions of aid and relief and of child

Agents, clerks, etc., appointments, salaries, etc.

Directors, etc., to advise on certain appointments.

guardianship shall be made with the advice of the directors thereof; and the appointments in the institutions shall be in accordance with existing law.

16. *Department of Public Health.*

State department of health succeeded by department of public health.

SECTION 96. The department of public health shall consist of the state department of health as now organized and existing under authority of chapter seven hundred and ninety-two of the acts of nineteen hundred and fourteen, and acts in amendment thereof and in addition thereto. All provisions of law relating to the state department of health shall continue in full force and effect, except as is otherwise provided by this act. The board of trustees of hospitals for consumptives, existing under authority of chapter four hundred and seventy-four of the acts of nineteen hundred and seven, and acts in amendment thereof and in addition thereto, is hereby abolished. All the rights, powers, duties and obligations of said board are hereby transferred to and shall hereafter be exercised and performed by said department, which shall be the lawful successor of said board. The Penikese hospital, so-called, existing under authority of chapter four hundred and seventy-four of the acts of nineteen hundred and five, and acts in amendment thereof and in addition thereto, is hereby placed in said department.

Board of trustees of hospitals for consumptives abolished and succeeded by department of public health.

Penikese hospital placed in department of public health.

Commissioner of public health, office established, powers, etc.

SECTION 97. The commissioner of health shall hereafter be known as the commissioner of public health. He may, with the approval of the public health council, designate a director of a division of the department to act as deputy commissioner of public health and to perform the duties of the commissioner during his absence or disability, and such other duties as may be prescribed by the commissioner. Assistant directors of divisions and epidemiologists shall be exempt from the civil service law and the rules and regulations made thereunder. The powers of the commissioner of public health shall be as now provided by law for the commissioner of health, except as is otherwise provided by this act.

Designation of deputy, etc.

Certain exemptions from civil service law.

Division of sanatoria to be established, etc.

SECTION 98. The commissioner shall establish in the department of public health a division of sanatoria which shall include the institutions formerly under the supervision and control of the board of trustees of hospitals for consumptives. The commissioner may place the Penikese hospital, so-called, in the said division, and, with the approval of the governor and council, may appoint and remove a director to have charge of said division, and, with like approval, may fix his compensation.

17. *Department of Public Safety.*

District police force, board of boiler rules, board of elevator regulations, and office of fire prevention commissioner of metropolitan district abolished and succeeded by department of public safety.

SECTION 99. The district police force, existing under authority of chapter one hundred and eight of the Revised Laws, and acts in amendment thereof and in addition thereto, and all offices, departments and divisions thereof; the board of boiler rules, existing under authority of chapter four hundred and sixty-five of the acts of nineteen hundred and seven; the board of elevator regulations authorized under authority of chapter eight hundred and six of the acts of nineteen hundred and thirteen; and the office of fire prevention commissioner of the metropolitan district, existing under authority of chapter seven hundred and ninety-five of the acts of nineteen hundred and fourteen, are hereby abolished. All the rights, powers, duties and obligations of the district police, said boards and said offices are hereby transferred to, and shall hereafter be exercised and performed by the department of public safety, established by this act, which shall be the lawful successor of the district police and of said boards and offices.

Commissioner of public safety, appointment, salary, etc.

SECTION 100. The department of public safety shall be under the supervision and control of a commissioner, to be known as the commissioner of public safety, who shall be appointed by the governor, with the advice and consent of the council. The first appointment shall be for the term of one, two, three, four or five years, as the governor may determine. Thereafter the governor shall appoint the commissioner for the term of five years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner. The commissioner shall receive such annual salary, not exceeding five thousand dollars, as the governor and council may determine.

Commissioner of public safety, powers, duties, etc.

SECTION 101. The commissioner shall be the executive and administrative head of the department. He shall have charge of the administration and enforcement of all laws, rules and regulations which it is the duty of the department to administer and enforce, and shall direct all inspections and investigations except as is otherwise provided herein. He shall organize the department in three divisions, namely, a division of state police under his own immediate charge,

Divisions of department of public safety, directors, etc.

a division of inspection under the charge of a director to be known as chief of inspections, and a division of fire prevention under the charge of a director to be known as state fire marshal. The state fire marshal and the chief of inspections shall be appointed by the governor, with the advice and consent of the council, for the term of three years, and may, with like approval, be removed. The directors shall receive such annual salary, not exceeding four thousand dollars, as the governor and council may determine. The commissioner may, subject to the civil service law and rules where they apply, appoint, transfer and remove officers, inspectors, experts, clerks and other assistants, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder, and to the approval of the governor and council where that is required by law may fix the compensation of the said persons.

State fire marshal and chief of inspections, appointment, salaries, etc.

Inspectors, clerks, etc., appointment, salaries, etc.

Division of state police, functions, etc.

Section 102. The division of state police shall except as is otherwise provided herein include the functions of the detective and fire inspection department of the district police. The commissioner shall have the powers and perform the duties of the chief of the district police.

Division of inspections, functions, etc.

Section 103. The division of inspections shall include the functions of the boiler inspection department of the district police, and of the building inspection department of the district police. The chief of inspections shall exercise the powers and perform the duties now provided by law for the deputy chief of the building inspection department of the district police and for the deputy chief of the boiler inspection department of the district police. Inspectors assigned to said division shall be designated as building inspectors or as boiler inspectors, and shall have the powers and perform the duties of inspectors of the building inspection department and of the boiler inspection department, respectively, of the district police.

Chief of inspections, powers, duties, etc.

Inspectors, designations, duties, etc.

Director in charge of fire prevention division, powers, duties, etc.

Section 104. The director in charge of the fire prevention division shall, under the supervision of the commissioner, perform the duties of the fire prevention commissioner for the metropolitan district, whose office is abolished hereby, and shall also have the powers and perform the duties of the district police and of the deputy chief of the detective and fire inspection department of the district police under the provisions of chapter four hundred and thirty-three of the acts of nineteen hundred and four, and acts in amendment thereof and in addition thereto, relative to the keeping and storing of inflammable fluids and combustible compounds and of the district police under the provisions of chapter thirty-two of the Revised Laws and acts in amendment thereof and in addition thereto. The said director shall submit to the commissioner rules and regulations under the said acts, and such rules and regulations shall take effect subject to the provisions of chapter three hundred and seven of the General Acts of nineteen hundred and seventeen, when approved by the commissioner and by the governor and council, and on such dates as they may fix.

Rules and regulations.

Section 105. The commissioner shall appoint a board of boiler rules which shall exercise the functions of the board of boiler rules as now provided by law. Said board shall consist of the chief of inspections, as chairman, and four other members whose qualifications and compensation shall be the same as those of the members of the board of boiler rules abolished by this act. The terms of office of the appointed members of said board shall be three years, except that when first appointed one of the members shall be appointed for one year, one for two years and two for three years. Such clerical and other assistants as may be required by said board shall be assigned to it by the commissioner.

Board of boiler rules, appointment, functions, etc.

Section 106. The commissioner shall, as occasion requires, appoint a board of elevator regulations which shall exercise the functions of the board of elevator regulations as now provided by law. Said board shall consist of the chief of inspections as chairman, a consulting engineer, the building commissioner of the city of Boston, an inspector of buildings of some city other than Boston, a representative of a liability insurance company licensed to write such insurance in the commonwealth, a representative of elevator manufacturers and an experienced elevator constructor. They shall serve without compensation, but their necessary expenses shall be paid by the department. Such clerical and other assistants as may be required by said board shall be assigned to them by the commissioner.

Board of elevator regulations, appointment, functions, etc.

Expenses.

Section 107. The commissioner may, when public exigency requires, with the approval of the governor, call upon the metropolitan district commission, hereby established, for assistance in performing the duties imposed upon him by law; and the said commission shall, when so called upon, assign to duty under said commissioner such of the police force under its control as it and the commissioner shall determine.

Commissioner of public safety may have assistance of metropolitan district commission.

Officers and inspectors with powers of officers and inspectors of district police, appointment, number, etc.

SECTION 108. The commissioner may appoint officers and inspectors who shall have the same powers now conferred by law upon officers and inspectors of the district police. The number of such officers and inspectors shall not, at first, exceed the number of officers in the detective and fire inspection department of the district police and of inspectors in the service of the building inspection and boiler inspection departments of the district police and in the service of the fire prevention commissioner of the metropolitan district, and shall not thereafter be increased without the approval of the governor and council. The provisions of sections six and seven of chapter one hundred and eight of the Revised Laws shall, so far as they are applicable, apply to officers and inspectors appointed under the provisions of this section.

Certain provisions of law applicable.

Persons affected by an order of department of public safety may appeal, etc.

SECTION 109. Any person affected by an order of the department or of a division or office thereof, may, within such time as the commissioner may fix, which shall not be less than ten days after notice of such order, appeal to the commissioner, who shall thereupon grant a hearing, and after such hearing may amend, suspend or revoke such order. Any person aggrieved by an order approved by the commissioner may appeal to the superior court: *provided*, such appeal is taken within fifteen days from the date when such order is approved. The superior court shall have jurisdiction in equity upon such appeal to annul such order if found to exceed the authority of the department, and upon petition of the commissioner to enforce all valid orders issued by the department. Nothing herein contained shall be construed to deprive any person of the right to pursue any other lawful remedy.

Appeal to superior court.

Proviso.

Superior court jurisdiction, etc.

Additional appointments by commissioner of public safety may be authorized by governor, etc.

SECTION 110. Whenever the governor shall deem it necessary to provide more effectively for the protection of persons and property, and for the maintenance of law and order in the commonwealth, he may authorize the commissioner of public safety to make additional appointments, not exceeding one hundred in number, to the police division of said department, together with such other employees as the governor may deem necessary for the proper administration thereof. The appointment of the additional officers shall be temporary until the general court has authorized their permanent addition to the department. The commissioner may, subject to the approval of the governor, make rules and regulations for the said additional force, including mat-

Rules and regulations.

ters pertaining to their discipline, organization and government, compensation and equipment, and means of swift transportation.

18. *Department of Public Works.*

SECTION 111. The Massachusetts highway commission, existing under authority of chapter three hundred and forty-four of the General Acts of nineteen hundred and seventeen and acts in amendment thereof and in addition thereto, and the commission on waterways and public lands existing under authority of chapter two hundred and eighty-eight of the General Acts of nineteen hundred and sixteen, are hereby abolished. All the rights, powers, duties and obligations of said commissions are hereby transferred to and shall hereafter be exercised and performed by the department of public works established by this act, which shall be the lawful successor of said commissions.

Massachusetts highway commission and commission on waterways and public lands abolished and succeeded by department of public works.

SECTION 112. The department of public works shall be under the supervision and control of a commissioner, to be known as commissioner of public works, and four associate commissioners, all of whom shall be appointed by the governor, with the advice and consent of the council. The commissioner shall be appointed for the term of three years. Of the associate commissioners first appointed, two shall be appointed for the term of one year and two for the term of two years. Thereafter as the terms expire the governor shall appoint the commissioner and the associate commissioners for the term of three years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner or any of the associate commissioners. The commissioner shall receive such annual salary, not exceeding seven thousand five hundred dollars, and the associate commissioners such annual salaries not exceeding six thousand dollars, as the governor and council may determine.

Commissioner of public works and associate commissioners, appointment, salaries, etc.

SECTION 113. The department shall be organized in two divisions, namely, a division of highways and a division of waterways and public lands. The said divisions shall have, exercise and perform, the rights, powers, duties and obligations, respectively, of the Massachusetts highway commission and the commission on waterways and public lands, except as is otherwise provided herein. The governor shall, at the time of making the first appointments under the preceding section, designate two of the associate commissioners

Division of highways and division of waterways and public lands, powers, duties, etc.

to have charge of the division of highways and two to have charge of the division of waterways and public lands. Thereafter, whenever a change in the associate commissioners occurs, the governor may make a new designation. The commissioner shall be entitled to act as a member of both divisions, and when present shall act as chairman of the division. The concurrence of two members shall be necessary in any official act of either division.

Commissioner of public works, powers, duties, etc.

SECTION 114. The commissioner shall be the executive and administrative head of the department. He shall approve all contracts made by either division, and may require any of the expenditures of either division to be submitted to him for approval. He may, subject to the civil service law and rules, where they apply, appoint, assign to divisions, transfer and remove such officials and employees as the work of the department may require, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and the rules and regulations made thereunder, and to the approval of the governor and council where that is required by law, fix the compensation of the said persons.

Officials, employees, etc., employment, salaries, etc.

Registrar of motor vehicles, appointment, powers, duties, salary, etc.

SECTION 115. The commissioner shall appoint, and may remove, subject to the approval of the governor and council, an official to be known as registrar of motor vehicles, and may, with like approval, fix his compensation. The registrar of motor vehicles shall have, exercise and perform all the rights, powers, duties and obligations of the Massachusetts highway commission relative to motor vehicles and to the operation thereof, as defined by chapter five hundred and thirty-four of the acts of nineteen hundred and nine, and acts in amendment thereof and in addition thereto. Any person aggrieved by a regulation, ruling or decision of said registrar may, within ten days thereafter, appeal from such regulation, ruling or decision to the commissioners of the division of highways who may, after a hearing, order such regulation, ruling or decision to be affirmed, modified or annulled.

Appeal from regulations, etc., of registrar.

Rules and regulations of department of public works, drafting of, approval, etc.

SECTION 116. All rules and regulations under provisions of existing law within the jurisdiction of the division of highways, the division of waterways and public lands or the registrar of motor vehicles shall be drafted by the commissioners having charge of said divisions or by said registrar, shall be submitted to the commissioner and associate commissioners sitting as a board, and shall take effect, subject to the provisions of chapter three hundred and seven of the General Acts of nineteen hundred and seventeen, when approved by them, and at such time as they shall designate. Said board shall also have power to make all needful rules and regulations for carrying out the provisions of this act relating to the said department.

19. *Department of Public Utilities.*

SECTION 117. The public service commission, existing under authority of chapter seven hundred and eighty-four of the acts of nineteen hundred and thirteen, and chapter two hundred and eighty-three of the General Acts of nineteen hundred and eighteen, and the board of gas and electric light commissioners, existing under authority of chapter seven hundred and forty-two of the acts of nineteen hundred and fourteen, are hereby abolished. All the rights, powers, duties and obligations of said commission and said board are hereby transferred to and shall hereafter be exercised and performed by the department of public utilities established by this act, which shall be the lawful successor of said commission and said board.

Public service commission and board of gas and electric light commissioners abolished and succeeded by department of public utilities.

SECTION 118. The department of public utilities shall be under the supervision and control of a commission of five members, who shall be appointed by the governor, with the advice and consent of the council. Of the commissioners first appointed under this act, one shall be appointed for a term of one year, one for a term of two years, one for a term of three years, one for a term of four years and one for a term of five years. Thereafter the governor shall appoint the commissioners for terms of five years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove any commissioner. The governor shall designate one of said commissioners as chairman. The chairman of the commission shall receive such annual salary, not exceeding eight thousand dollars, and each of the other commissioners such annual salary not exceeding seven thousand dollars, as the governor and council may determine.

Commission of five members to control department of public utilities, appointment, salaries, etc.

Governor to designate chairman.

SECTION 119. The chairman shall have and exercise supervision and control over all the affairs of the commission. He shall preside at all hearings at which he is present, and shall designate a commissioner to act as chairman in his absence. He shall not, except as is otherwise provided herein, be charged with any administrative functions. In

Chairman of commission, powers, duties, etc.

order to promote efficiency in administration he shall from time to time make such division or redivision of the work of the department among the commissioners as he may deem expedient. All the commissioners shall, if so directed by the chairman, participate in the hearing and decision of any matter coming before the commission. In the hearing of all matters other than those of formal or administrative character coming before the commission, at least two commissioners shall participate and in the decision of all such matters at least three commissioners shall participate. In every case the concurrence of a majority of the commissioners participating therein shall be necessary to a decision. With the consent of all parties concerned in a matter coming before the commission, the hearing may be held by a single commissioner.

Holding of hearings, etc.

Certain corporations to become subject to jurisdiction of department of public utilities, etc.

SECTION 120. The different classes of corporations now subject to the jurisdiction of the public service commission and the board of gas and electric light commissioners, respectively, and which under the provisions of this act will become subject to the jurisdiction of the department of public utilities, shall continue to be subject to the provisions of law applicable to them, respectively, and to such provisions as are applicable to all of them alike. This act shall not be deemed to affect the said provisions except as to their administration.

Parties aggrieved by rulings may secure a review thereof, etc.

SECTION 121. When so requested by any party interested, the commission, or any member or members acting for the commission, shall rule upon any question of substantive law properly arising in the course of any proceeding before the commission or any member or members thereof, and any party in interest aggrieved by such ruling may object thereto, and may secure a review thereof as hereinafter provided. Any failure or refusal of the commission, or of any member or members thereof acting for the commission, to rule upon such a question at the request of any party in interest as aforesaid within ten days after such request, shall be taken and recorded as a ruling adverse to the party requesting the ruling. The supreme judicial court shall have jurisdiction in equity to review, modify, amend or annul any ruling or order of the commission, or of any member or members representing the commission, in the manner, to the extent, and subject to the conditions set forth in section twenty-seven of chapter seven hundred and eighty-four of the acts of nineteen hundred and thirteen. The supreme judicial court shall also have jurisdiction, upon the application of

Supreme judicial court to have jurisdiction, etc.

the commission, to enforce the provisions of this act relating to the department, and all valid orders of the commission.

Section 122. The general court, in making annual appropriations for the department, shall designate what portions thereof shall be used for salaries of employees and expenses in the department in connection with the functions now performed by the board of gas and electric light commissioners. The portions thus designated, including one half the sum annually appropriated for the salaries of the commissioners, shall be apportioned by the tax commissioner in the manner specified in section one hundred and thirty-six of chapter seven hundred and forty-two of the acts of nineteen hundred and fourteen and acts in amendment thereof and in addition thereto, relative to the assessment of appropriations for the board of gas and electric light commissioners.

Annual appropriations for department of public utilities, certain designations to be made therein, and apportioned by the tax commissioner, etc.

PART IV.

20. The Metropolitan District Commission.

Section 123. The metropolitan park commission, existing under authority of chapter four hundred and seven of the acts of eighteen hundred and ninety-three, and acts in amendment thereof and in addition thereto, and the metropolitan water and sewerage board, existing under authority of chapter one hundred and sixty-eight of the acts of nineteen hundred and one, and acts in amendment thereof and in addition thereto, are hereby abolished. All the rights, powers, duties and obligations of said boards are hereby transferred to and shall hereafter be exercised and performed by the metropolitan district commission established by this act, which shall be the lawful successor of said commission and board.

Metropolitan park commission and metropolitan water and sewerage board abolished and succeeded by metropolitan district commission.

Section 124. The metropolitan district commission shall be under the supervision and control of a commissioner and four associate commissioners, all of whom shall be appointed by the governor, with the advice and consent of the council. They shall at the time of their appointment be resident within the district of which the department has jurisdiction, and at least one shall be a resident of the city of Boston. The commissioner shall be appointed for the term of five years. Of the associate commissioners first appointed, one shall be appointed for the term of one year, one for two years, one for three years, and one for four years. Thereafter as the terms expire the governor shall appoint the

Commissioner and associate commissioners to control metropolitan district commission, appointment, etc.

commissioners for the term of five years, shall fill any vacancy for the unexpired term, and may, with the consent of the council, remove the commissioner or any associate commissioner.

Commissioner, powers, duties, salary, etc.

SECTION 125. The commissioner shall be the executive and administrative head of the commission, and shall organize the commission in divisions and supervise the same as hereinafter provided. He shall receive such annual salary, not exceeding six thousand dollars, and the associate commissioners such annual salary, not exceeding one thousand dollars, as the governor and council may determine.

Associate commissioners, salaries.

Divisions of metropolitan district commission, directors, etc.

SECTION 126. The commission shall be organized in such divisions as the commissioner may from time to time determine, and the commissioner may, with the approval of the governor and council, appoint and remove a director of each division to have charge of the work of the division. The compensation of directors shall be fixed by the commissioners, with the approval of the governor and council. The commissioners may also appoint a secretary and engineering chiefs, and, subject to the civil service law and rules, where they apply, appoint a purchasing agent, engineers, inspectors, officers and members of the police force, clerks and such other officers and employees as the work of the commission may require; may assign them to divisions, transfer and remove them, and, subject to the provisions of chapter two hundred and twenty-eight of the General Acts of nineteen hundred and eighteen, and to the approval of the governor and council, where that is required by law, fix the compensation of the said persons.

Secretary and engineering chiefs, purchasing agent, police force, engineers, inspectors, clerks, etc., appointment, salaries, etc.

Power and authority over public property transferred to control of metropolitan district commission.

SECTION 127. The commission shall have and exercise over the public property hereby transferred to its charge and control from the metropolitan water and sewerage board, in addition to the power and authority of said board, all the power and authority which the metropolitan park commission has over open spaces for exercise and recreation under chapter four hundred and seven of the acts of eighteen hundred and ninety-three, and acts in amendment thereof and in addition thereto, so far as such power and authority may be exercised consistently with the purposes for which the metropolitan water and sewerage systems were created and are maintained.

Police appointed by metropolitan district commission, powers, etc.

SECTION 128. The police appointed or employed by the commission shall have within the metropolitan parks district, and within the cities and towns outside said district wherein any of the property of the metropolitan water and sewerage districts is situated, all the powers of police officers and constables of cities and towns of this commonwealth, except the power of serving and executing civil process, and when on duty may carry such weapons as the said commission shall authorize.

Section 129. The expense of maintenance of the metropolitan parks, boulevard, water and sewerage systems under the department shall be paid by the metropolitan parks, boulevard, water and sewerage districts, respectively, in the manner now provided by law: *provided, however*, that the expense each year of the salaries of the commissioners, and such other expense of maintenance of the general office and otherwise as they shall determine are not clearly or wholly incurred in the maintenance work of any one of said systems or districts, shall be paid as follows: — one fourth as the expense of maintenance of reservations under chapter four hundred and seven of the acts of eighteen hundred and ninety-three; one fourth as the expense of maintenance of boulevards under chapter two hundred and twenty-eight of the acts of eighteen hundred and ninety-four; one fourth as the expense of maintenance of the metropolitan water system; and one fourth as the expense of maintenance of the metropolitan sewerage system. Expense of maintenance of metropolitan parks, boulevard, water and sewerage systems, payment, etc. Proviso.

PART V.

Section 130. So much of this act as authorizes appointments by the governor and council shall take effect on the fifteenth day of November, nineteen hundred and nineteen. So much as relates to each department shall take effect upon the appointment and qualification of the officers having the supervision and control thereof, but not before the first day of December, nineteen hundred and nineteen. All other provisions thereof shall take effect on the first day of December, nineteen hundred and nineteen. Time of taking effect.

Approved July 23, 1919.

An Act to regulate the sale and cold storage of fresh food fish. *Chap.351*

Be it enacted, etc., as follows:

Section 1. All fresh food fish shall be graded before it is offered for sale or placed in cold storage. There shall be Sale and cold storage of fresh food fish ford on land to be acquired by said commission and may expend for such purpose a sum not to exceed five hundred thousand dollars.

SECTION 2. For the purpose set forth in section one the sum of five hundred thousand dollars is hereby transferred from funds made available by item 9027–01 of section two of chapter five hundred and seventeen of the acts of nineteen hundred and sixty-one, provided, however, that the city of Medford shall make available to the metropolitan district commission any funds received by it from the commonwealth for the taking by eminent domain of Gillis Stadium in said city.

Approved June 11, 1962.

Chap. 550. AN ACT AUTHORIZING THE METROPOLITAN DISTRICT COMMISSION TO CONSTRUCT, MAINTAIN AND OPERATE A DAM ACROSS THE CHARLES RIVER.

Be it enacted, etc., as follows:

SECTION 1. The metropolitan district commission, hereinafter called the commission, is hereby authorized and directed to construct, maintain and operate a dam with locks, a drawbridge if needed, works and appurtenances across the estuary of the Charles river at or in the vicinity of the abandoned Warren Avenue bridge in the city of Boston.

SECTION 2. The word "basin", as defined in section two of chapter five hundred and twenty-four of the acts of nineteen hundred and nine, shall include the waters and lands lying between the present Charles River dam and the dam to be constructed under this act.

SECTION 3. The commission, for the purposes of this act, may, on behalf of the commonwealth, take by eminent domain under chapter seventy-nine of the General Laws, or acquire by purchase or otherwise, any lands, waters, water rights, rights of way, easements or other property or interest in property, and shall have all the rights, powers and duties and be subject to the limitations of sections thirty-two, thirty-three and thirty-five of chapter ninety-two of the General Laws, and all other applicable provisions of said chapter ninety-two; provided, however, that the city of Boston shall grant to said commission the right to enter upon any public land or way and to construct, maintain and operate such facilities as may be necessary, without recourse to damages therefor; and provided, further, that the commission may accept grants of properties, rights or monies and enter into agreements, in form approved by the attorney general, with any department, commission or agency of the commonwealth or any railroad or other public franchise holder or agency as provided by said chapter ninety-two.

SECTION 4. The commission may, on behalf of the commonwealth, make application for and use such federal funds or assistance or both as it may obtain for the planning or construction of the said dam or any part of the total project.

SECTION 5. To meet the expenditure necessary in carrying out the provisions of this act, the state treasurer shall, upon request of the governor and council, issue and sell at public or private sale bonds of the commonwealth, registered or with interest coupons attached, as he may deem best, to an amount to be specified by the governor and council from time to time, but not exceeding in the aggregate, the sum of five million dollars. Funds provided in this act are to be in addition to the amount appropriated in chapter six hundred and forty-six of the acts of nineteen hundred and fifty-seven. All bonds issued by the commonwealth, as aforesaid, shall be designated on their face, Charles River Basin Improvement Loan, Act of 1962, and shall be on the serial payment plan for such maximum term of years, not exceeding thirty years, as the governor may recommend to the general court pursuant to section 3 of Article LXII of the Amendments to the Constitution of the Commonwealth, the maturities thereof to be so arranged that the amounts payable in the several years of the period of amortization other than the final year, shall be as nearly equal as in the opinion of the state treasurer it is practicable to make them. Said bonds shall bear interest semi-annually at such rate as the state treasurer, with the approval of the governor, shall fix. The initial maturities of such bonds shall be payable not later than one year from the date of issue thereof and the entire issue not later than June thirtieth, nineteen hundred and ninety-five. All interest payments and payments on account of principal on such obligations shall be paid from the metropolitan district park funds, to be assessed by methods fixed by law.

SECTION 6. This act shall take effect upon its passage.

Approved June 11, 1962.

Chap. 551. AN ACT RELATIVE TO THE ANTICIPATORY REPAYMENT OF CERTAIN NOTES SECURED BY A MORTGAGE OF REAL ESTATE.

Be it enacted, etc., as follows:

SECTION 1. Chapter 183 of the General Laws is hereby amended by adding at the end the following section: —

Section 56. Any mortgage note secured by a first lien on a dwelling house of three or less separate households occupied or to be occupied in whole or in part by the mortgagor shall be subject to the condition that, if, upon the bona fide sale of such dwelling house by the mortgagor the note be paid before the date fixed for payment, (a) any additional amount required to be paid in such event shall be an amount which shall not be in excess of the greater of three months' interest or the balance of the first year's interest, and (b) no such additional amount shall be charged when such anticipatory payment upon such sale shall be made after the expiration of thirty-six months from the date of the note. The provisions of this section limiting the amount of such additional payments shall not apply in the event of refinancing of such loans or to mortgage loans insured by the Federal Housing Administrator or guaranteed by the Administrator of Veterans' Affairs. No provision hereof shall prevent any note from being a negotiable instrument under the Uniform Commercial Code.

SECTION 2. The provisions of this act shall not apply to any mortgage note executed prior to the effective date of this act.

Approved June 11, 1962.

SECTION 12. All sums expended either pursuant to, or for which reimbursement is made under, this act, for the purpose of acquiring, constructing or altering public transportation passenger vehicles or facility, shall be expended in accordance with the provisions of 42 U.S.C. 12141 to 42 U.S.C. 12150, inclusive.

Approved July 24, 2003.

Chapter 41. AN ACT RELATIVE TO THE FUNCTIONS OF CERTAIN STATE AGENCIES.

Whereas, The deferred operation of this act would tend to defeat its purpose, which is relative to the functions of certain state agencies, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

SECTION 1. (a) Notwithstanding any general or special law to the contrary, this section shall facilitate the orderly transfer of the employees, proceedings, rules and regulations, property and legal obligations of the following functions of state government from the transferor agency to the transferee agency, defined as follows:

(1) the functions of the department of food and agriculture, as the transferor agency, to the department of agricultural resources, as the transferee agency;

(2) the functions of the metropolitan district commission, as the transferor agency, to the division of urban parks and recreation in the department of conservation and recreation, as the transferee agency;

(3) the functions of the department of environmental management, as the transferor agency, to the department of conservation and recreation, as the transferee agency;

(4) the functions of the division of environmental law enforcement in the department of fisheries, wildlife and environmental law enforcement, as the transferor agency, to the office of environmental law enforcement in the executive office of environmental affairs, as the transferee agency;

(5) the functions of the division of forests and parks in the department of environmental management, as the transferor agency, to the division of state parks and recreation in the department of conservation and recreation, as the transferee agency;

(6) the functions of the department of fisheries, wildlife and environmental law enforcement, as the transferor agency, to the department of fish and game, as the transferee agency;

(7) the functions of the division of watershed management in the metropolitan district commission, as the transferor agency, to the division of water supply protection, as the transferee agency;

(8) the functions of the division of water resources in the department of environmental management, as the transferor agency, to the division of water supply protection, as the transferee agency;

(9) the functions of the office of administrative appeals in the department of environmental protection, as the transferor agency, to the office of administrative appeals in the executive office of environmental affairs, as the transferee agency;

(10) the functions of the division of employment and training, as transferor agency, to the division of workforce development, excluding the oversight of the unemployment insurance fund and the medical security trust fund;

(11) the functions of the division of medical assistance pursuant to section 352 of chapter 26 of the acts of 2003, as the transferor agency, to the office of elder services, as the transferee agency; and

(12) the functions of the division of health care finance and policy pursuant to chapter 348 of chapter 26 of the acts of 2003, as the transferor agency, to the executive office of health and human services.

(b) Subject to appropriation, the employees of each transferor agency, including those who immediately before the effective date of this act hold permanent appointment in positions classified under chapter 31 of the General Laws or have tenure in their positions as provided by section 9A of chapter 30 of the General Laws or do not hold such tenure, or hold confidential positions, are hereby transferred to the respective transferee agency, without interruption of service within the meaning of said section 9A of said chapter 31, without impairment of seniority, retirement or other rights of the employee, and without reduction in compensation or salary grade, notwithstanding any change in title or duties resulting from such reorganization, and without loss of accrued rights to holidays, sick leave, vacation and benefits, and without change in union representation or certified collective bargaining unit as certified by the state labor relations commission or in local union representation or affiliation. Any collective bargaining agreement in effect immediately before the transfer date shall continue in effect and the terms and conditions of employment therein shall continue as if the employees had not been so transferred. The reorganization shall not impair the civil service status of any such reassigned employee who immediately before the effective date of this act either holds a permanent appointment in a position classified under chapter 31 of the General Laws or has tenure in a position by reason of section 9A of chapter 30 of the General Laws.

Notwithstanding any general or special law to the contrary, all such employees shall continue to retain their right to collectively bargain pursuant to chapter 150E of the General Laws and shall be considered employees for the purposes of said chapter 150E.

Nothing in this section shall be construed to confer upon any employee any right not held immediately before the date of said transfer, or to prohibit any reduction of salary grade, transfer, reassignment, suspension discharge layoff or abolition of position not prohibited before such date.

(c) All petitions, requests, investigations and other proceedings appropriately and duly brought before each transferor agency or duly begun by each transferor agency and pending before it before the effective date of this act, shall continue unabated and remain in force, but shall be assumed and completed by the respective transferee agency.

(d) All orders, rules and regulations duly made and all approvals duly granted by each transferor agency, which are in force immediately before the effective date of this act, shall continue in force and shall thereafter be enforced, until superseded, revised, rescinded or canceled, in accordance with law, by the respective transferee agency.

(e) All books, papers, records, documents, equipment, buildings, facilities, cash and other property, both personal and real, including all such property held in trust, which immediately before the effective date of this act are in the custody of each transferor agency shall be transferred to the respective transferee agency.

(f) All duly existing contracts, leases and obligations of each transferor agency shall continue in effect but shall be assumed by the respective transferee agency. No existing right or remedy of any character shall be lost, impaired or affected by this act.

SECTION 2. This act shall take effect as of July 1, 2003.

Approved July 24, 2003.

Chapter 42. AN ACT RELATIVE TO QUALITY HEALTH CARE.

Whereas, The deferred operation of this act would tend to defeat its purpose, which is to provide forthwith for nursing facility Medicaid rates for fiscal year 2004, therefore it is hereby declared to be an emergency law, necessary for the immediate preservation of the public convenience.

Be it enacted, etc., as follows:

SECTION 1. Notwithstanding any general or special law to the contrary, in fiscal year 2004, the division of health care finance and policy shall establish nursing facility Medicaid rates, payable out of the Health Care Quality Improvement Trust Fund, established under section 2EEE of chapter 29 of the General Laws, effective July 1, 2003 through June 30, 2004 that cumulatively total $288,500,000 more than the annual payment rates established by the division under the rates in effect as of June 30, 2002. The division shall adjust per diem rates to reflect any reductions in medicaid utilization. Payments from the fund shall be allocated in the following manner in fiscal year 2004:

(1) effective July 1, 2003, an annual amount of $99,000,000 in the aggregate to fund the use of 2000 base year cost information for rate determination purposes;

(2) effective July 1, 2003, an annual amount of $122,500,000 for enhanced payment rates to nursing homes;

Appendix K
Environmental Justice

ENVIRONMENTAL JUSTICE

1. Introduction

1.1. Summary

As part of the National Environmental Policy Act (NEPA) review of the Draw One Bridge Replacement Project (the "Proposed Project"), MBTA must comply with Federal and State laws, rules, and regulations to make diligent efforts to involve Environmental Justice (EJ) populations. The most recent Federal guidance on environmental justice, Executive Order (EO) 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023),[1] defines "environmental justice" to mean:

> *the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment so that people:*
>
> > *(i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and*
> >
> > *(ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.*

This document describes the presence of such identified minority, low-income, and Limited English Proficiency (LEP) populations living near the Proposed Project, including their racial characteristics, and provides tools and techniques for outreach to and engagement with these populations throughout the NEPA review of the Proposed Project. MBTA's goals are to:

- Provide members of Environmental Justice (EJ) populations with information about the Project and opportunities to provide input during the NEPA process;
- Solicit review of and comments on the Proposed Project from EJ populations, including comments regarding proposed mitigation measures;
- Consider the views of and input from EJ populations in the assessment and identification of any potential disproportionately adverse effects on such populations, as well as proposed measures to mitigate such effects; and
- Provide opportunities to meaningfully engage LEP populations, as necessary.

[1] https://www.whitehouse.gov/briefing-room/presidential-actions/2023/04/21/executive-order-on-revitalizing-our-nations-commitment-to-environmental-justice-for-all/

1.2. Project Background

The Massachusetts Bay Transportation Authority (MBTA) proposes to replace the Draw One Bridge, which carries Amtrak passenger and MBTA commuter rail traffic over the Charles River in the cities of Boston and Cambridge, Massachusetts. The existing two two-track bascule bridge spans still in use, as well as the supporting infrastructure of the two disused spans, would be replaced with three two-track, standalone vertical lift bridge structures within the footprint of the existing bridge (the new bridge structures would carry six tracks, rather than four). The Proposed Project would also replace the Boston and Main Railroad (B&MRR) Signal Tower A and modify the Massachusetts Department of Conservation and Recreation (DCR)-owned North Bank Bridge, which crosses the MBTA Right-of-Way (ROW) north of the Draw One Bridge. The existing signal system and switch heaters associated with the Draw One Bridge would be replaced, and a new drainage system would be provided. The existing Draw One Bridge and Signal Tower A, both of which are eligible for listing in the National Register of Historic Places (NHRP), would be demolished.

2. Methodology

2.1. Federal and State Requirements

2.1.1. Federal Regulations and Guidance

Both EO 14096 and EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994),[2] require specific and meaningful engagement with members of environmental justice communities as part of the environmental review process.

EO 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*,[3] EO 14008, *Tackling the Climate Crisis at Home and Abroad*,[4] and the implementation guidance document M-21-28[5] were issued in January 2021 as part of the Biden administration's goal to advance racial equity. These executive orders and the guidance document establish a whole-of-government approach to advancing environmental justice. EO 14008 also establishes the Justice40 initiative, which includes the goal that 40 percent of Federal investments flow to disadvantaged communities. EO 13985 refers to equity for underserved communities, and EO 14008 uses the term disadvantaged communities. While the individuals and communities that fall under the definition of EJ populations would also fall under the definition of "disadvantaged communities" or "underserved communities," these terms are much broader, expanding the focus of environmental justice to include a larger swath of the general population.

[2] https://www.federalregister.gov/documents/1994/02/16/94-3685/federal-actions-to-address-environmental-justice-in-minority-populations-and-low-income-populations
[3] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/
[4] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/
[5] https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf

The Council on Environmental Quality (CEQ) has developed guidance to assist federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed (*Environmental Justice Guidance under the National Environmental Policy Act* [December 1997]). Federal agencies are permitted to supplement this guidance with more specific procedures tailored to their particular programs or activities, as USDOT has done.[6]

Consistent with Federal guidance, this analysis involved four basic steps:

1. Identify the area where the Proposed Project may cause adverse impacts (i.e., the study area);
2. Compile race and ethnicity and income data for the census block groups in the study area and identify minority and low-income populations;
3. Identify the Proposed Project's potential adverse impacts on minority and low-income populations; and
4. Evaluate the Proposed Project's potential adverse effects on minority and low-income populations relative to its effects on non-minority and non-low-income populations to determine whether it would result in any disproportionate adverse effects on minority or low-income populations.

2.1.2. State Regulations and Guidance

MBTA has also considered the defined environmental justice principles and populations outlined in the Massachusetts Environmental Policy Act's (MEPA) Public Involvement Protocol for Environmental Justice Populations (MEPA EJ Public Involvement Protocol),[7] which was developed under the requirements outlined in former Massachusetts Governor Charlie Baker's *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*[8] and the resulting *Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs.*[9]

The MEPA EJ Public Involvement Protocol defines the public involvement requirements for all MEPA projects. It requires the identification of EJ populations relative to the project location, characteristics of those EJ populations (e.g., racial demographics, income, language spoken at home, etc.), and likely effects of the project on EJ populations. As described further in Section 3, "Identification of Environmental Justice Communities," this analysis relies on the precise definition of environmental justice communities provided in State guidance rather than the more ambiguous framework outlined in Federal regulations.

It also notes that best practice for providing EJ populations ample opportunity to meaningfully engage in MEPA project reviews requires taking early steps to provide public involvement opportunities. This includes providing advance notification of the project to community-based organizations and tribes, employing outreach and community engagement strategies tailored to the specifics of the project (e.g., dissemination of a written project summary with translation into relevant languages, making project

[6] FTA guidance includes FTA Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients* (August 15, 2012), and FTA Circular 4702.1B, *Title VI Requirements and Guidelines for Federal Transit Administration Recipients* (October 1, 2012).
[7] https://www.mass.gov/doc/final-mepa-public-involvement-protocol-for-environmental-justice-populations-effective-date-of-january-1-2022/download
[8] https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8
[9] https://www.mass.gov/doc/environmental-justice-policy6242021-update/download

information available through a website or other electronic means, hosting focused community meetings organized by topic, neighborhood, or interest group, etc.).

2.2. Study Area and Data Sources

The study area for environmental justice encompasses the area that could be affected by the Proposed Project and considers the area where potential impacts resulting from construction and operation of the Proposed Project could occur. The study area for environmental justice follows the quarter-mile study area used for the analyses of land use and socioeconomic conditions. This study area is appropriate for capturing all surrounding areas where people residing, working, or visiting may be expected to experience any potential adverse environmental effects associated with Project construction, or from within which they might experience (e.g., view) permanent changes to the environment with full implementation of the Proposed Project. It also includes areas served by community resources such as parks and open space that could themselves be affected by the Proposed Project, either during construction or operations.

Data from both EJScreen,[10] the Environmental Protection Agency's (EPA) environmental justice mapping and screening tool to identify potential EJ communities, and the Massachusetts Bureau of Geographic Information (MassGIS) EJ Maps Viewer[11] are used to inform the appropriateness of outreach techniques given their different categorizations of potential EJ populations, as described further below.

3. Identification of Environmental Justice Communities

FTA's 2012 Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients*, specifies that an EJ analysis begins with determining whether minority and/or low-income populations will experience potential environmental or heath impacts from a proposed project. Minorities are defined to include persons who are American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, and Native Hawaiian and other Pacific Islander. In addition, minority populations may include persons who identified themselves as being either "some other race" or "two or more races" in response to the Census questionnaire. Low-income means a person whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines. Figure J-1, "EPA EJScreen Socioeconomic Indicators," identifies Census block groups that, compared with the country as a whole, are within the 50th percentile for people or color and/or the 50th percentile for low-income populations (i.e., where the household income is less than or equal to twice the Federal poverty level).

However, FTA also encourages the use of local poverty thresholds or a percentage of median income for the area, provided that the threshold is at least as inclusive as the HHS poverty guidelines. The Massachusetts guidance for defining environmental justice communities differs slightly from the Federal definition; because the State guidance is both more stringent (i.e., prescribes thresholds for a Census blocks group to qualify as an environmental justice community rather than allowing for more flexible interpretation) and provides a broader definition (e.g., includes consideration of LEP populations), it requires consideration of potential impacts to a larger segment of the population.

[10] https://www.epa.gov/ejscreen
[11] https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations

As such, State criteria for EJ populations is also considered. In accordance with guidance developed by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), an environmental justice population is defined as a Census block group that includes one or more of the following demographic characteristics:[12]

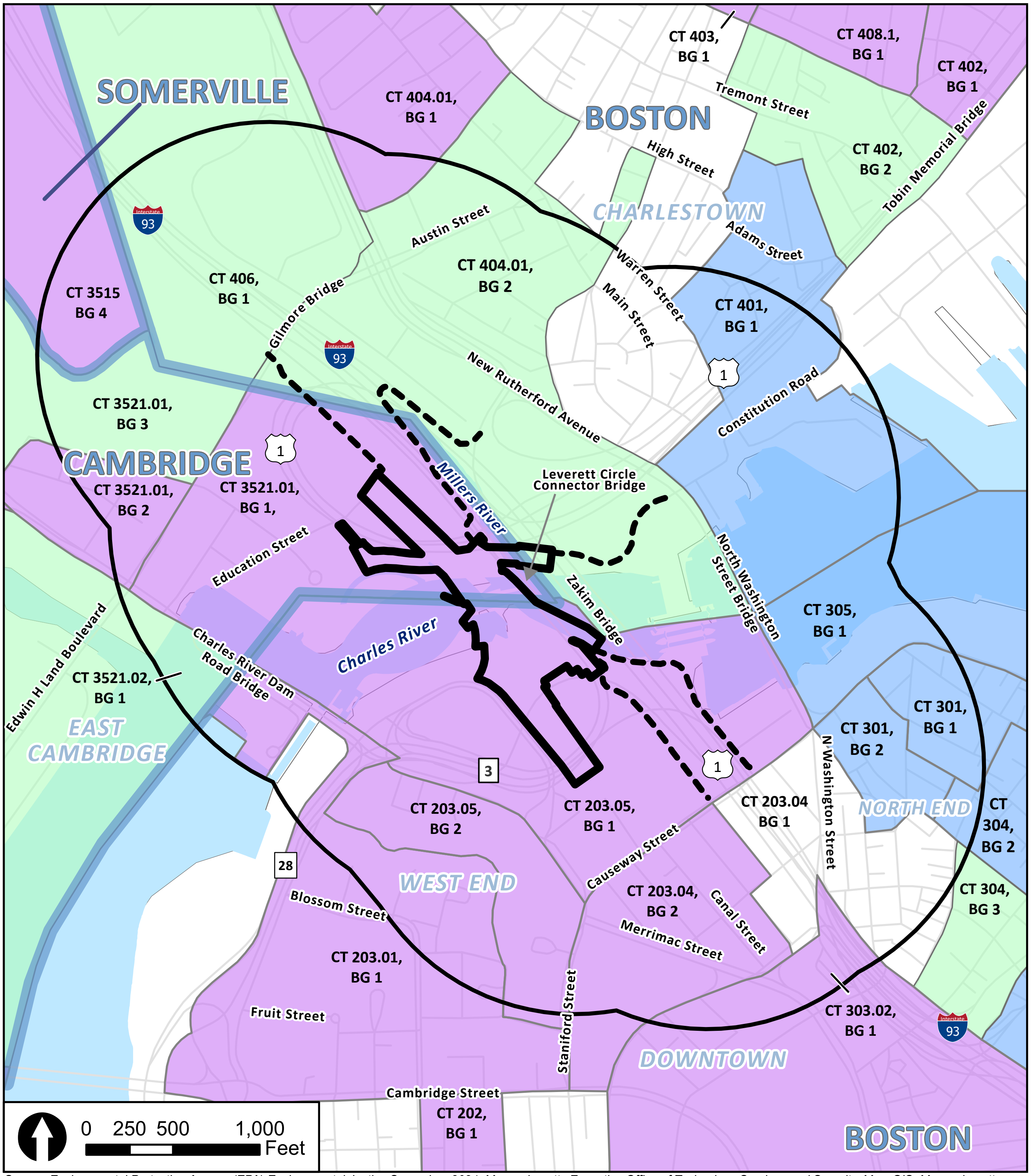
- **Income:** The annual median household income is not more than 65 percent of the statewide annual median household income;
- **Minority:** Minorities (i.e., individuals who identify themselves as Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white) comprise 40 percent or more of the population;
- **Minority and Income:** Minorities comprise 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income; or
- **English Language Isolation:** 25 percent or more of households lack English language proficiency.

Figure J-2, "EEA EJ Populations (2020)," presents the Census block groups that meet State criteria, per the MassGIS EJ Maps Viewer, which uses data from the 2020 U.S. Census and American Community Survey (ACS) 5-Year Estimates for years 2016-2020. Figure J-3, "EEA EJ Populations (2020)," presents the same information, though using the most recently available ACS 5-Year estimates for years 2018-2022.

The Project Limits touch both the City of Cambridge and the City of Boston and are located entirely in an area that can be considered an EJ community based on State guidance. All block groups in the portion of the study area within the City of Cambridge are considered environmental justice communities. Within the City of Boston, environmental justice communities comprise those extending southeast of the Project Limits into Downtown Boston. EPA's EJScreen tool also identifies potential environmental justice communities along the eastern edge of the study area. Therefore, any adverse effects from the construction or operation of the Proposed Project would occur in an environmental justice community.

Table J-1, "Study Area Demographic Profile," and Table J-2, "Race by Block Group," provide detailed demographic data for the Census block groups within the study area; blue highlighted rows with bolded text indicate Census block groups that have been identified as EJ communities per EPA's EJScreen and/or MassGIS' EJ Maps Viewer.

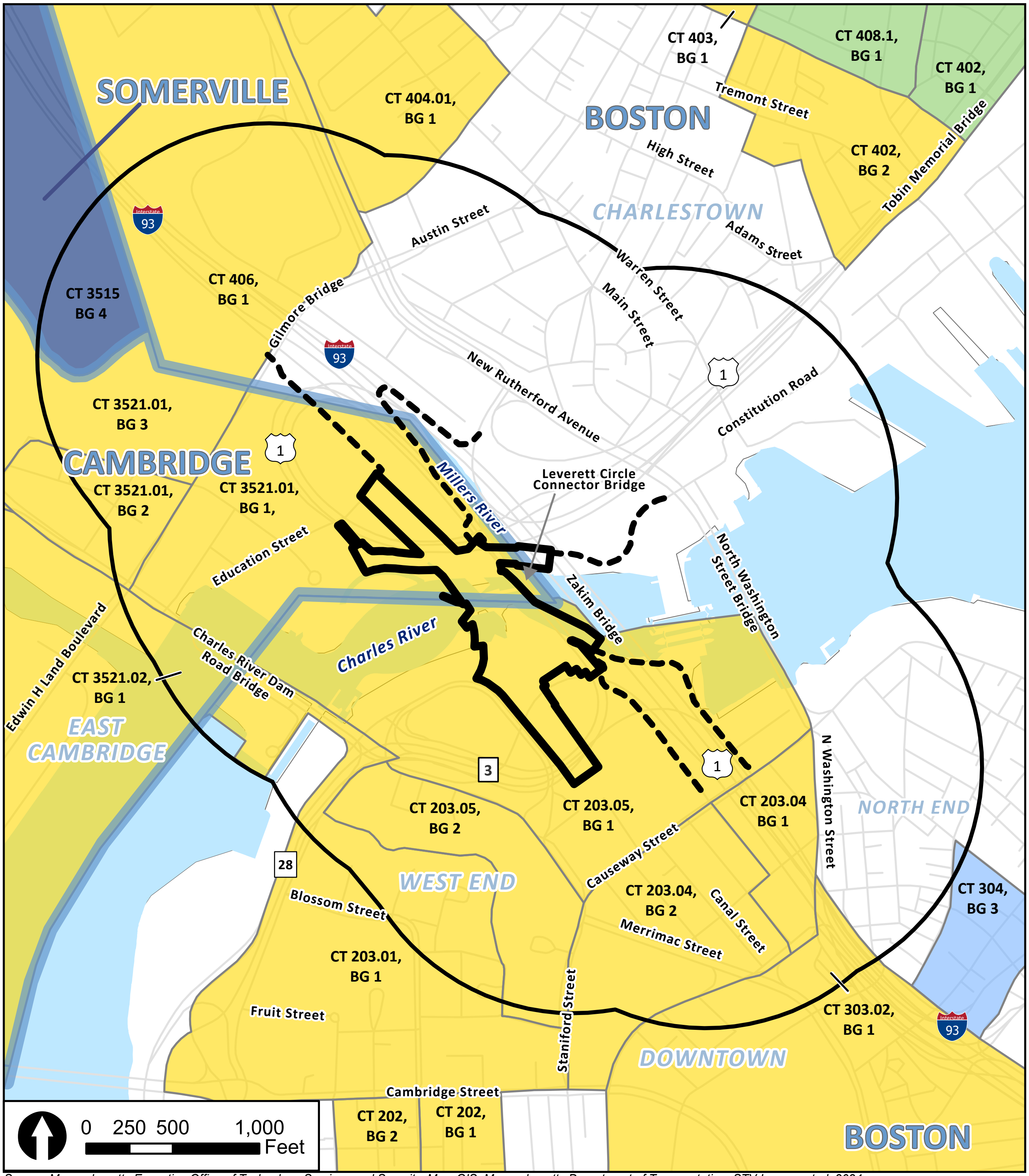
[12] The Massachusetts Executive Office of Energy and Environmental Affairs can also designate a geographic portion of a neighborhood as an EJ population.



Source: Environmental Protection Agency (EPA) Environmental Justice Screening, 2024; Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

	Environmental Justice Population Criteria
Project Limits	50th Percentile People of Color
Construction Access	50th Percentile Low Income
1/4-Mile Study Area	50th Percentile Both People of Color and Low Income
Municipal Boundaries	

Figure J-1
EPA EJScreen Socioeconomic Indicators



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits
Construction Access
1/4-Mile Study Area
Municipal Boundaries

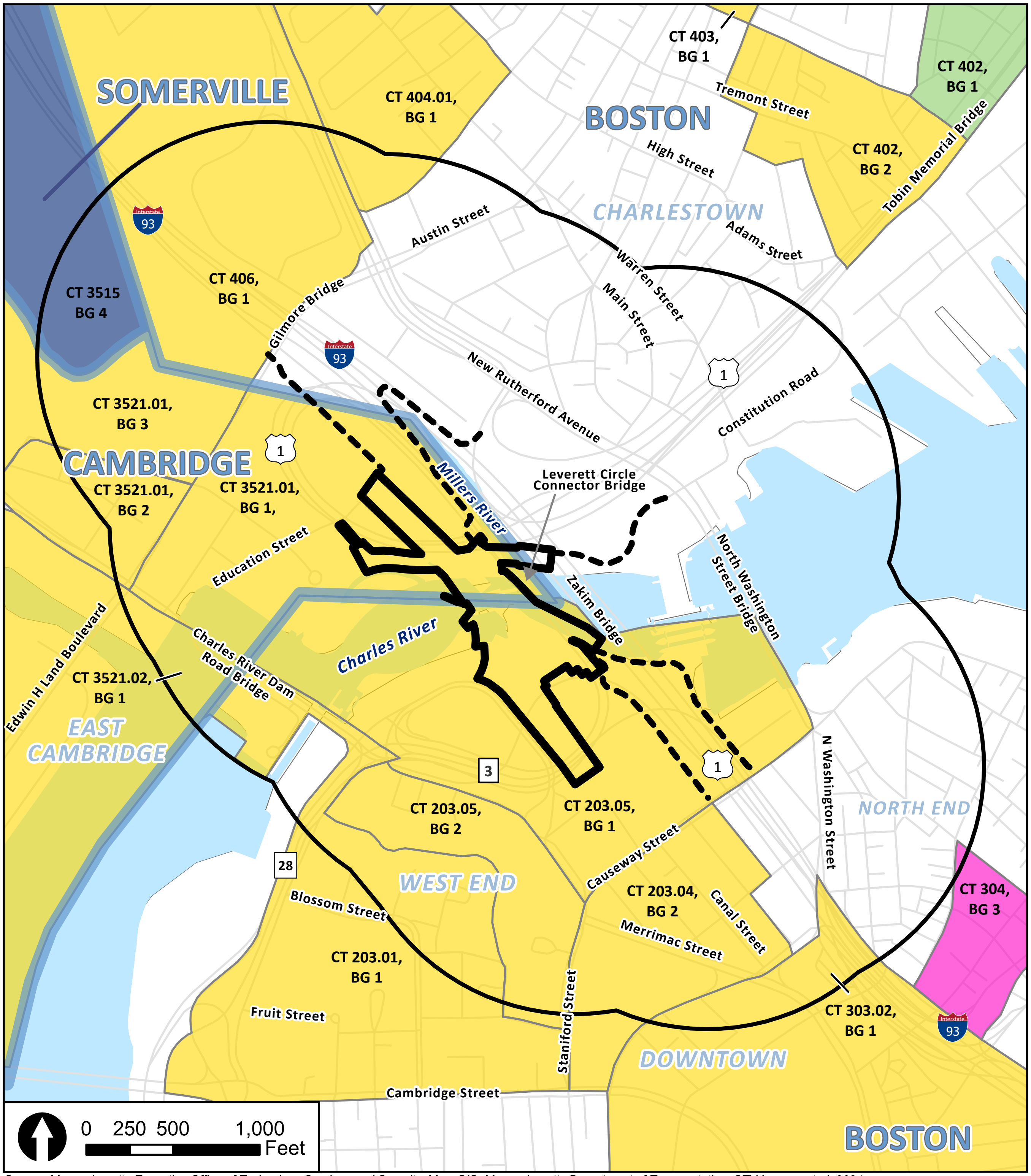
Environmental Justice Population Criteria

Minority
Minority and Income
English Isolation
Minority, Income and English Isolation

Figure J-2

EEA EJ Populations (2020)

MBTA Draw One Bridge Replacement Project



Source: Massachusetts Executive Office of Technology Services and Security, MassGIS; Massachusetts Department of Transportation; STV Incorporated, 2024.

Project Limits	**Environmental Justice Population Criteria**	
Construction Access	Minority	Minority and English Isolation
1/4-Mile Study Area	Minority and Income	Minority, Income and English Isolation
Municipal Boundaries		

Figure J-3

EEA EJ Populations (2022)

Table J-1: Study Area Demographic Profile

Geography	% Minority	% Hispanic/Latino	% LEP	Languages Spoken by at Least 5% of LEP Population	Median Household Income	% Households Below Poverty Rate	% Low Income (< $60k)
Census Tract 3515, Block Group 4	**68.5%**	**0.0%**	**47.5%**	**Spanish, Portuguese, Indo-European**	**$11,860**	**64.3%**	**94.8%**
Census Tract 3521.01, Block Group 1	**56.9%**	**14.7%**	**14.6%**	**Spanish, Portuguese**	**$79,013**	**16.7%**	**36.9%**
Census Tract 3521.01, Block Group 2	**53.3%**	**14.2%**	**8.1%**		**$89,688**	**24.4%**	**36.0%**
Census Tract 3521.01, Block Group 3	**52.1%**	**7.6%**	**16.4%**		**$72,467**	**8.9%**	**37.5%**
Census Tract 3521.02, Block Group 1	**37.7%**	**11.6%**	**4.8%**		**$196,500**	**10.7%**	**16.2%**
Census Tract 203.01, Block Group 1	**40.4%**	**14.9%**	**7.9%**	**Chinese**	**$106,593**	**15.6%**	**28.4%**
Census Tract 203.04, Block Group 1*	**23.2%**	**11.4%**	**5.4%**		**$177,632**	**11.7%**	**14.7%**
Census Tract 203.04, Block Group 2	**37.5%**	**6.9%**	**1.7%**	**Spanish**	**$201,625**	**3.1%**	**18.3%**
Census Tract 203.05, Block Group 1	**53.6%**	**24.5%**	**10.8%**	**Spanish**	**$128,810**	**8.9%**	**22.3%**
Census Tract 203.05, Block Group 2	**25.6%**	**7.0%**	**9.7%**		**$106,538**	**21.5%**	**34.7%**
Census Tract 301, Block Group 1**	**21.7%**	**15.8%**	**3.4%**		**$87,614**	**16.6%**	**33.6%**
Census Tract 301, Block Group 2**	**12.0%**	**10.2%**	**1.0%**		**$108,625**	**13.4%**	**23.9%**
Census Tract 302, Block Group 1	17.4%	3.6%	7.5%		$109,103	7.1%	16.0%
Census Tract 302, Block Group 2	11.4%	6.8%	3.7%		$113,152	6.8%	22.0%
Census Tract 303.02, Block Group 1	**33.3%**	**6.1%**	**3.9%**		**$137,778**	**7.3%**	**16.6%**
Census Tract 304, Block Group 2**	**7.9%**	**4.9%**	**3.3%**		**$95,577**	**4.2%**	**17.6%**
Census Tract 304, Block Group 3	**26.6%**	**3.9%**	**24.9%**		**$79,813**	**9.1%**	**21.6%**
Census Tract 305, Block Group 1**	**8.2%**	**0.2%**	**8.5%**		**$194,583**	**19.8%**	**33.2%**
Census Tract 401, Block Group 1**	**13.9%**	**6.2%**	**9.8%**		**$162,415**	**10.6%**	**26.0%**
Census Tract 401, Block Group 2	21.8%	0.3%	0.1%		$177,552	10.7%	22.0%
Census Tract 404.01, Block Group 1	**25.7%**	**9.0%**	**8.7%**	**Chinese**	**$108,333**	**6.8%**	**35.3%**
Census Tract 404.01, Block Group 2**	**23.9%**	**0.0%**	**2.8%**		**$164,896**	**5.0%**	**13.4%**
Census Tract 406, Block Group 1	**30.4%**	**6.9%**	**3.0%**		**$133,672**	**2.3%**	**25.5%**
Census Tract 9815.01, Block Group 1	N/A	N/A	N/A		N/A	N/A	N/A

Table J-1: Study Area Demographic Profile (cont.)

Geography		% Minority	% Hispanic/Latino	% LEP	Languages Spoken by at Least 5% of LEP Population	Median Household Income	% Households Below Poverty Rate	% Low Income (< $60k)
Study Area	City of Cambridge	24.1%	7.7%	6.4%	-	$133,017	10.0%	23.6%
	City of Boston	53.7%	9.6%	18.3%	-	$89,906	25.0%	44.3%
City of Cambridge		44.0%	8.7%	8.3%	-	$121,539	11.5%	26.7%
City of Boston		55.8%	19.6%	16.1%	-	$89,212	17.9%	37.8%
Suffolk County		56.2%	23.5%	18.5%	-	$87,669	17.6%	37.9%
Middlesex County		31.7%	8.4%	9.6%	-	$121,304	8.2%	25.3%
Massachusetts		31.1%	12.6%	9.6%	-	$96,505	10.8%	32.7%

Notes:
** MassGIS' EJ Maps Viewer identified Census Tract 203.04, Block Group 1 as an EJ population based on data from the 2020 U.S. Census and American Community Survey (ACS) 5-Year Estimates for years 2016-2020 for meeting the State's minority criteria; ACS 5-Year Estimates for years 2018-2022 did not identify this block group at an EJ population. However, in an effort to be conservative, it is included in the analysis presented herein.*
*** EPA's EJScreen tool identified Census Tract 301, Block Groups 1 and 2, Census Tract 304, Block Group 2, Census Tract 305, Block Group 1, Census Tract 401, Block Group 1, and Census Tract 404.01, Block Group 2 as potential EJ communities given that they are in the 50th percentile for low income; MassGIS' EJ Maps Viewer did not identify these block groups as an EJ population. However, in an effort to be conservative, they are included in the analysis presented herein.*

Source: ACS 5-Year Estimates, 2018-2022

Table J-2: Race by Block Group

Geography	White		Black or African American		American Indian and Alaska Native		Asian		Native Hawaiian/ Pacific Islander		Some Other Race		Two or More Races		Total Non-White	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Census Tract 3515, Block Group 4	**81**	**31.5%**	**22**	**8.6%**	**0**	**0.0%**	**61**	**23.7%**	**0**	**0.0%**	**62**	**24.1%**	**31**	**12.1%**	**176**	**68.5%**
Census Tract 3521.01, Block Group 1	**361**	**54.0%**	**53**	**7.9%**	**0**	**0.0%**	**229**	**34.3%**	**0**	**0.0%**	**5**	**0.7%**	**20**	**3.0%**	**307**	**46.0%**
Census Tract 3521.01, Block Group 2	**795**	**55.5%**	**57**	**4.0%**	**0**	**0.0%**	**376**	**26.3%**	**0**	**0.0%**	**34**	**2.4%**	**170**	**11.9%**	**637**	**44.5%**
Census Tract 3521.01, Block Group 3	**594**	**51.9%**	**65**	**5.7%**	**0**	**0.0%**	**417**	**36.4%**	**0**	**0.0%**	**0**	**0.0%**	**69**	**6.0%**	**551**	**48.1%**
Census Tract 3521.02, Block Group 1	**868**	**68.7%**	**47**	**3.7%**	**0**	**0.0%**	**242**	**19.1%**	**0**	**0.0%**	**10**	**0.8%**	**97**	**7.7%**	**396**	**31.3%**
Census Tract 203.01, Block Group 1	**1,451**	**61.6%**	**82**	**3.5%**	**1**	**0.0%**	**369**	**15.7%**	**0**	**0.0%**	**140**	**5.9%**	**313**	**13.3%**	**905**	**38.4%**
Census Tract 203.04, Block Group 1*	**673**	**80.4%**	**9**	**1.1%**	**0**	**0.0%**	**40**	**4.8%**	**0**	**0.0%**	**73**	**8.7%**	**42**	**5.0%**	**164**	**19.6%**
Census Tract 203.04, Block Group 2	**246**	**67.8%**	**26**	**7.2%**	**0**	**0.0%**	**10**	**2.8%**	**0**	**0.0%**	**0**	**0.0%**	**81**	**22.3%**	**117**	**32.2%**
Census Tract 203.05, Block Group 1	**643**	**46.4%**	**169**	**12.2%**	**0**	**0.0%**	**231**	**16.7%**	**0**	**0.0%**	**259**	**18.7%**	**84**	**6.1%**	**743**	**53.6%**
Census Tract 203.05, Block Group 2	**1,996**	**77.8%**	**38**	**1.5%**	**0**	**0.0%**	**234**	**9.1%**	**0**	**0.0%**	**39**	**1.5%**	**257**	**10.0%**	**568**	**22.2%**
Census Tract 301, Block Group 1**	**1,061**	**85.2%**	**0**	**0.0%**	**0**	**0.0%**	**73**	**5.9%**	**0**	**0.0%**	**108**	**8.7%**	**3**	**0.2%**	**184**	**14.8%**
Census Tract 301, Block Group 2**	**916**	**97.1%**	**0**	**0.0%**	**8**	**0.8%**	**9**	**1.0%**	**0**	**0.0%**	**0**	**0.0%**	**10**	**1.1%**	**27**	**2.9%**
Census Tract 302, Block Group 1	759	84.5%	27	3.0%	0	0.0%	87	9.7%	0	0.0%	9	1.0%	16	1.8%	139	15.5%
Census Tract 302, Block Group 2	622	89.8%	9	1.3%	0	0.0%	23	3.3%	0	0.0%	0	0.0%	39	5.6%	71	10.2%
Census Tract 303.02, Block Group 1	**1,638**	**68.9%**	**230**	**9.7%**	**0**	**0.0%**	**232**	**9.8%**	**0**	**0.0%**	**108**	**4.5%**	**169**	**7.1%**	**739**	**31.1%**
Census Tract 304, Block Group 2**	**892**	**93.9%**	**28**	**2.9%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**30**	**3.2%**	**0**	**0.0%**	**58**	**6.1%**
Census Tract 304, Block Group 3	**662**	**76.1%**	**174**	**20.0%**	**0**	**0.0%**	**12**	**1.4%**	**0**	**0.0%**	**20**	**2.3%**	**2**	**0.2%**	**208**	**23.9%**
Census Tract 305, Block Group 1**	**524**	**91.8%**	**0**	**0.0%**	**0**	**0.0%**	**46**	**8.1%**	**0**	**0.0%**	**0**	**0.0%**	**1**	**0.2%**	**47**	**8.2%**
Census Tract 401, Block Group 1 **	**887**	**89.1%**	**0**	**0.0%**	**0**	**0.0%**	**72**	**7.2%**	**0**	**0.0%**	**0**	**0.0%**	**37**	**3.7%**	**109**	**10.9%**
Census Tract 401, Block Group 2	1,247	78.2%	0	0.0%	0	0.0%	120	7.5%	0	0.0%	0	0.0%	228	14.3%	348	21.8%
Census Tract 404.01, Block Group 1	**1,679**	**79.0%**	**40**	**1.9%**	**2**	**0.1%**	**310**	**14.6%**	**0**	**0.0%**	**17**	**0.8%**	**76**	**3.6%**	**445**	**21.0%**
Census Tract 404.01, Block Group 2**	**569**	**76.1%**	**32**	**4.3%**	**0**	**0.0%**	**5**	**0.7%**	**0**	**0.0%**	**0**	**0.0%**	**142**	**19.0%**	**179**	**23.9%**
Census Tract 406, Block Group 1	**1,266**	**70.1%**	**191**	**10.6%**	**0**	**0.0%**	**198**	**11.0%**	**0**	**0.0%**	**86**	**4.8%**	**64**	**3.5%**	**539**	**29.9%**
Census Tract 9815.01, Block Group 1	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A	0	N/A

Table J-2: Race by Block Group (cont.)

Geography		White		Black or African American		American Indian and Alaska Native		Asian		Native Hawaiian/ Pacific Islander		Some Other Race		Two or More Races		Total Non-White	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Study Area	City of Cambridge	17,731	76.0%	1,055	4.5%	11	0.0%	2,071	8.9%	0	0.0%	889	3.8%	1,564	6.7%	5,590	24.0%
	City of Boston	2,699	56.6%	244	5.1%	0	0.0%	1,325	27.8%	0	0.0%	111	2.3%	387	8.1%	2,067	43.4%
City of Cambridge		69,984	59.3%	12,704	10.8%	179	0.2%	22,720	19.3%	130	0.1%	2,651	2.2%	9,594	8.1%	47,978	40.7%
City of Boston		323,655	48.6%	150,002	22.5%	2,286	0.3%	64,387	9.7%	544	0.1%	45,360	6.8%	79,711	12.0%	342,290	51.4%
Suffolk County		387,745	49.4%	155,625	19.8%	2,916	0.4%	69,412	8.8%	544	0.1%	59,052	7.5%	110,149	14.0%	397,698	50.6%
Middlesex County		1,154,437	71.1%	81,837	5.0%	2,753	0.2%	210,784	13.0%	751	0.0%	59,686	3.7%	112,861	7.0%	468,672	28.9%
Massachusetts		5,075,525	72.7%	498,785	7.1%	14,740	0.2%	487,600	7.0%	2,766	0.0%	347,501	5.0%	557,288	8.0%	1,908,680	27.3%

Notes:
** MassGIS' EJ Maps Viewer identified Census Tract 203.04, Block Group 1 as an EJ population based on data from the 2020 U.S. Census and ACS 5-Year Estimates for years 2016-2020 for meeting the State's minority criteria; ACS 5-Year Estimates for years 2018-2022 did not identify this block group at an EJ population. However, in an effort to be conservative, it is included in the analysis presented herein.*
*** EPA's EJScreen tool identified Census Tract 301, Block Groups 1 and 2, Census Tract 304, Block Group 2, Census Tract 305, Block Group 1, Census Tract 401, Block Group 1, and Census Tract 404.01, Block Group 2 as potential EJ communities given that they are in the 50th percentile for low income; MassGIS' EJ Maps Viewer did not identify these block groups as an EJ population. However, in an effort to be conservative, they are included in the analysis presented herein.*

Source: ACS 5-Year Estimates, 2018-2022.

4. Engagement with EJ Populations

4.1. Our Public Process

Public involvement is key to informing MBTA projects and decisions. MBTA's 2023 Public Engagement Plan[13] outlines the following public engagement principles that agency representatives and those working in concert with the MBTA on transportation projects and initiatives will strive to achieve:

- **Strong Community Partnerships:** MBTA shall develop collaborative working partnerships with community members, community and advocacy organizations, and municipalities to build trust, avenues for regular communication, and ongoing engagement.
- **Strategic and Continuous Outreach:** Concerted effort must be given to encouraging participation through early, accessible, and ongoing strategic outreach to the public that MBTA serves. This includes using a variety of tools and mechanisms to reach the riders who are most likely to be impacted by proposed changes.
- **Accessibility, Equity, and Inclusion:** All public participation and engagement activities should promote inclusion and equity with specific strategies that encourage participation from diverse members of the community. Every effort should be made to ensure that participation opportunities are physically, geographically, temporally, linguistically, and culturally accessible. Public engagement processes should include, as appropriate to a project or those impacted, a range of socioeconomic, ethnic, environmental, and cultural perspectives and include people with low-incomes, people of color, people with disabilities, people with limited English proficiency, young people and older adults, and other traditionally underserved communities.
- **Respectful and Solution-Oriented Dialogue:** MBTA welcomes constructive contributions by members of the public and encourages the respect and inclusion of all points of view. When there are conflicting opinions, conversations should be structured to allow for compromise, when possible, while staying solution-focused to respond to community concerns.
- **Transparent Process:** The decision-making processes and level of input for any event or community process should be clear, open, and understandable. Plans and projects must be clearly described, including the potential effect of public input, so that the public understands what is being proposed and how to get involved.

MBTA seeks to engage the public about its policies, planning, and projects. The level of complexity for each project and the impact on the community guide the structure and process of public engagement. Simple projects may require less extensive engagement, while some projects may require outreach over the life of the project. Further, MBTA recognizes that its riders have different time constraints and strives to provide multiple ways to ensure rider voices are heard.

The most common types of public engagement that MBTA uses are in-person and virtual public meetings, including public hearings, as well as community meetings, open houses and breakout sessions, stakeholder meetings, station pop-ups, virtual community drop-in sessions, and one-on-one interactions. MBTA also deploys street outreach teams, intercept and periodic surveys, and interviews or question-and-answer sessions at stations or bus stops. While MBTA is committed to in-person public engagement,

[13] https://cdn.mbta.com/sites/default/files/2023-06/2023-06-Public-Engagement-Plan-English.pdf

virtual public engagement methods have been proven to make participation more accessible and convenient for the public and are a key public engagement strategy at MBTA.

4.2. Inclusive Engagement Strategies

MBTA is committed to fostering equitable engagement with EJ populations – communities often underrepresented in decision-making processes – including low-income residents, communities of color, and individuals with LEP. This aligns with MEPA requirements, the Title VI Civil Rights Act, and MBTA's broader goals for accessibility, transparency, and inclusion through MBTA's 2023 Public Engagement Plan.

4.2.1. Guiding Principles for Engagement

MBTA maintains the following guiding principles to facilitate meaningful public engagement:

- **Proactive Communication:** Engage EJ populations early and maintain consistent outreach throughout the project lifecycle.
- **Accessibility:** Ensure all outreach is linguistically, culturally, and geographically accessible, adhering to Title VI and Americans with Disabilities Act (ADA) guidelines.
- **Transparency:** Provide clear, timely, and accurate updates about the project and its impacts.
- **Stakeholder-Centered Design:** Collaborate with community organizations, municipalities, and advocacy groups to ensure equitable participation.

4.2.2. Tools and Techniques for Engagement

Consistent Communication
To ensure open and effective lines of communication, MBTA:

- Disseminates regular **design update bulletins** with information about construction schedules, disruptions, and mitigation plans.
- Uses an electronic stakeholder database to distribute updates and project alerts. This database includes community organizations, officials, community advocates and individuals from EJ and LEP populations.
- Leverages outreach channels such as email, social media, press releases, and printed materials to ensure information reaches diverse audiences.

Stakeholder Meetings
MBTA coordinates meetings with relevant stakeholders as needed. These sessions may include, and are not limited to:

- Elected officials, community boards, and neighborhood associations.
- Advocacy groups for EJ populations, LEP communities, and ADA representatives.
- Business owners, residents, and civic organizations near the project area.

These meetings include targeted discussions to identify and address EJ community concerns. To maximize attendance, notifications are distributed using culturally relevant methods, including multicultural media and flyers posted in high-traffic areas in EJ communities.

Multilingual Outreach

MBTA recognizes language barriers as a significant factor in engagement. To address this:

- All project materials, including flyers, emails, and meeting notices, are translated into relevant languages such as Spanish, Chinese, Portuguese, Haitian Creole, Amharic, Bangla, and Vietnamese, with additional languages available upon request.
- Real-time interpretation and translated materials are provided at public meetings.
- Ethnic media platforms are utilized to increase awareness within linguistically diverse communities.

Digital and Traditional Outreach

- **Digital Tools:** Utilize project websites, social media platforms (Facebook, Instagram, X), and email newsletters to share updates; use targeted ads to engage specific demographics.
- **Traditional Methods:** Distribute flyers, posters, and printed materials in community hubs, libraries, and transit stations to reach residents without internet access.
- **Project Email and Hotline:** Establish a dedicated email address and hotline for inquiries, ensuring public access to timely responses.

Accessible Public Meetings

Public meetings are designed to accommodate EJ populations and underserved communities by:

- Holding meetings in ADA-compliant venues accessible by public transit.
- Scheduling flexibly, including evenings and weekends, to suit diverse schedules.
- Conducting meetings with virtual options featuring closed captioning, sign language interpretation, and real-time language services.

Ongoing Communication and Feedback Mechanisms

- **Community Partnerships:** Collaborate with local groups, such as La Colaborativa, GreenRoots, and Charles River Conservancy, to co-design outreach strategies.
- **Information Sharing:** Make all public materials available online and in accessible formats. Meeting minutes, presentations, and feedback summaries are shared promptly.
- **Feedback Loops:** MBTA responds to community input through newsletters and regular updates, demonstrating how feedback shapes project decisions.

4.3. Draw One Bridge Replacement Project

Outreach activities for the Proposed Project will continue to be conducted in alignment with MBTA's 2023 Public Engagement Plan and the policies for inclusive and ongoing engagement described above. MBTA has implemented targeted engagement strategies for the Draw One Bridge Replacement project, including:

- Collaborations with local advocacy groups to host bilingual focus groups and workshops.
- Distribution of multilingual materials in partnership with local organizations and ethnic media.
- Proactive engagement with elected officials and municipal agencies to address concerns raised by EJ populations.

Past Events:

- Public Meeting | Draw One Bridge Replacement (Virtual)
  - June 6, 2024, 6:00 PM
- Public Meeting | Draw One Bridge Replacement (Virtual)
  - Virtual, Boston, MA

Future Events:

- Public Hearing | Draw One Bridge Replacement (Virtual)
  - January 2, 2025, 6:00 PM
  - The event website and project website will include an electronic comment form for submitting written comments and requesting additional project information.
- Community Meeting | Draw One Bridge Replacement (In Person Open House)
  - January 3, 2025, 6:00 PM at a community organization within an EJ community, to be determined.
  - The event website and project website will include an electronic comment form for submitting written comments and requesting additional project information.

5. Summary of Effects Potentially Relevant to EJ Communities

The assessment of the Proposed Project's potential effects to EJ communities focuses on those who live or work in areas that may experience direct or indirect Project impacts (e.g., related to air quality, noise, traffic, and bicycle and pedestrian facilities), those who are reliant on community services (e.g., emergency or medical services), those who may use local community resources (e.g., parks and recreational resources), and those who are served by regional public transit, including MBTA and Amtrak service into North Station.

As described in Table 8, "Summary of Potential Project Impacts and Benefits and Proposed Measures to Avoid, Minimize, or Mitigate," of the NEPA Environmental Assessment (EA), the Proposed Project would not introduce new residents or employees to the study area, nor would it directly affect existing community facilities or emergency or medical services in the study area. The Proposed Project would require two permanent easements and five temporary (construction) easements and may result in minor and temporary construction-period impacts with respect to community facilities and services, parks and recreational resources, pedestrian and bicycle facilities, rail transportation and transit, and noise and vibration. Any of these construction-period impacts, however, would be minor and temporary, not significant or permanent, and mitigation measures would be implemented, as appropriate (see Table 8). For example, measures required by code and best management practices would be employed to minimize or avoid any potential adverse effects related to air quality and noise and vibration during construction periods.

While slight modifications to the North Bank Bridge, affecting landings in North Point Park and Paul Revere Park, would be required to accommodate and tie into the new rail infrastructure, the Proposed Project would not impede access to these parks. North Bank Bridge would experience multiple closures of the pedestrian bridge of up to two weeks, totaling one month; these closures would take place over a six-month period. Temporary closures of the North Bank Park, pedestrian walkways, and bicycle paths, as well as detours, would be coordinated with DCR and the local community.

The Proposed Project would require the acquisition of an extremely small portion of the South Bank Park site for the installation of a new manhole in approximately the same location as an existing manhole, but this would not represent a direct or indirect significant impact to the future South Bank Park. The Proposed Project would also require the permanent removal of public sidewalks along the east and west sides of the existing Draw One Bridge south trestles, but these sidewalks terminate before the navigable Charles River channel and do not provide access to pedestrian or bicycle facilities north of the river, so this would not represent a significant impact to pedestrian and bicycle resources.

Indirect and cumulative effects of the Proposed Project are also assessed to consider the combination of potential Project effects that may not be, in and of themselves, significant. The Proposed Project would not result in increased train frequency, capacity, or ridership, nor would it induce development, result in indirect effects related to population or employment increases, or create new permanent jobs. Further, the Proposed Project, considered together with other recently completed or reasonably foreseeable projects in the area, would not result in any cumulative effects beyond contributing to safe and efficient transportation access in the study area. MBTA will coordinate the construction of the Proposed Project and other planned projects in the vicinity to ensure that there are no interruptions or significant impact to MBTA commuter rail or Amtrak service and to avoid disruption to each construction program.

Overall, the Proposed Project, including the new Draw One Bridge and Signal Tower A, would return rail infrastructure over the Charles River to a state of good repair and enhance the reliability and safety of passenger and commuter rail for people, including those in EJ communities, living and working in or visiting greater Boston and the New England coast.

6. Determination: No Disproportionate Adverse Effects on EJ Communities

As defined in FTA's guidance, a disproportionately adverse effect on an environmental justice population is an adverse effect that is predominantly borne by a minority and/or low-income population, or will be appreciably greater for the minority and/or low-income population than for the non-minority and/or non-low-income population. Effects that may occur as a result of a proposed action may be considered in the context of associated mitigation measures and offsetting benefits when determining whether disproportionately high and adverse effects may be likely to occur.

The Proposed Project would not disproportionately affect EJ communities. The Proposed Project would replace an existing bridge on an existing rail corridor and would represent an overall benefit to the entire community. It is important to the region's continued economic prosperity. The improved safety and reliability of the Draw One Bridge would benefit environmental justice communities, which comprise a substantial portion of the local community. The long-term benefits of the Proposed Project would accrue not only to the local environmental justice communities working, living near, or commuting to/from North Station, but also to environmental justice communities throughout the region that depend on the regional rail accessibility provided by the Draw One Bridge and the regional economic benefits accruing from its continued usage.