4 Affected Environment, Environmental Consequences, and Mitigation

4.4 Maritime Transportation, Traffic, and Safety

4.4.1 Introduction

This section assesses the potential effects of the Build and No Build Alternatives on the Cape Cod Canal Federal Navigation Project (FNP), including the waterway and the abutting lands. This section also assesses the construction-period effects on marine traffic—including commercial and recreational vessel traffic—and navigational safety and security, and it identifies measures to minimize effects. Supporting data is provided in **FEIS Appendix 4.4, Maritime Transportation, Traffic, and Safety**.

4.4.1.1 Regulatory Context

The U.S. Army Corps of Engineers (USACE) regulates navigation through the Cape Cod Canal (the canal), per 33 Code of Federal Regulations (CFR) 207.20, Navigation Regulations, Cape Cod Canal, Massachusetts; Use, Administration and Navigation.[1] This section was prepared using federal regulatory directives and guidance, including the following:

- U.S. Coast Guard's (USCG) Office of Bridge Programs, Bridge Permit Application Guide[2]
- USACE polices for altering a federally authorized civil works project pursuant to 33 United States Code (USC) 408[3]

According to 36 CFR 327, the regulations governing public use of Cape Cod Canal and other USACE water resource development projects, it is the policy of the Secretary of the Army, acting through the Chief of Engineers, to manage the natural, cultural, and developed resources of each project in the public interest by providing recreational opportunities while also protecting and enhancing the civil works projects. Since 1966, USACE has operated or leased lands with the FNP for recreational uses that do not conflict with its primary mission to supervise navigation and operate Cape Cod Canal in accordance with 33 CFR 207.20. **Section 4.17, Public Parks, Recreational Facilities, and Open Space**, and **Chapter 5, Final Section 4(f) Evaluation**, discuss the effects of the Build Alternative upon park and recreational facilities within the FNP.

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1 https://www.ecfr.gov/current/title-33/chapter-II/part-207/section-207.20

2 U.S. Coast Guard. 2025. https://www.dco.uscg.mil/Portals/9/CG_Bridge_Permit_App_Guide_Apr2025.pdf

3 U.S. Army Corps of Engineers. 2018. Engineering Circular 1165-2-220, Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects pursuant to 33 USC 408. September 10. https://www.publications.usace.army.mil/Portals/76/Publications/EngineerCirculars/EC_1165-2-220.pdf

4.4.1.2 Methodology and Study Area

This section was developed in consultation with USACE and USCG. Data on the Cape Cod Canal FNP, including information on marine traffic, were obtained from USACE New England District[4] and USACE's Major Rehabilitation Evaluation Report/Environmental Assessment (MRER/EA).[5] Data on historical freight and cargo vessels were obtained from USACE's Waterborne Commerce Statistics Center (WCSC).[6]

The Maritime Study Area consists of the 8.1-mile-long land cut of Cape Cod Canal and the adjacent lands of the Cape Cod Canal FNP and the marinas and major docking facilities, public boat ramps, and boat repair facilities within a 1-mile radius of the entrance to the canal land cut from Buzzards Bay and Cape Cod Bay (**Figure 4.4-3**). **Figure 4.4-1** and **Figure 4.4-2** present updated Study Area figures to include the refined Program Limits.

4.4.2 Affected Environment

4.4.2.1 Background and Setting

Cape Cod Canal is a sea-level 17.4-mile-long navigable waterway that offers the shortest deep-draft passage between New York City and Boston. It has an approach channel length of 9.3 miles and an 8.1-mile-long land cut connecting Buzzards Bay in the southwest and Cape Cod Bay in the northeast. It has an average width of 540 feet and a depth of 32 feet at mean low water.

The Massachusetts Bay Colony and later the Commonwealth of Massachusetts studied the potential for a canal between the heads of Cape Cod Bay and Buzzards Bay from the 1690s through much of the 19th century. After several failed attempts, in June 1889, the Massachusetts legislature granted a charter to the Boston, Cape Cod and New York Canal Company for construction of a canal. From 1909 to 1914, the canal was created by widening and deepening two inland rivers, located three miles apart: Monument River (which flows into Buzzards Bay) and Scusset River (which flows into Cape Cod Bay). The charter also included the requirement to provide ferries, bridges, or tunnels for passengers and vehicles, including highways that connect with the ferries, bridges, or tunnels. In 1918, Cape Cod Canal was deemed complete with a design depth of 25 feet, width of 200 to 300 feet and its seaward approaches, and 100 to 150 feet through its 7.7-mile-long land cut.[7]

The U.S. government assumed control over Cape Cod Canal in 1928, and between 1933 and 1940, USACE substantially improved the canal—including constructing Sagamore and Bourne Bridges—

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[4] U.S. Army Corps of Engineers. n.d. Cape Cod Canal Navigation Project. https://www.nae.usace.army.mil/Missions/Civil-Works/Navigation/Massachusetts/Cape-Cod-Canal/

[5] U.S. Army Corps of Engineers. n.d. Cape Cod Canal Bridges Major Rehabilitation Study Project Information. https://www.nae.usace.army.mil/Missions/Projects-Topics/Cape-Cod-Canal-Bridges-Major-Rehabilitation-Study/

[6] https://www.iwr.usace.army.mil/About/Technical-Centers/WCSC-Waterborne-Commerce-Statistics-Center/

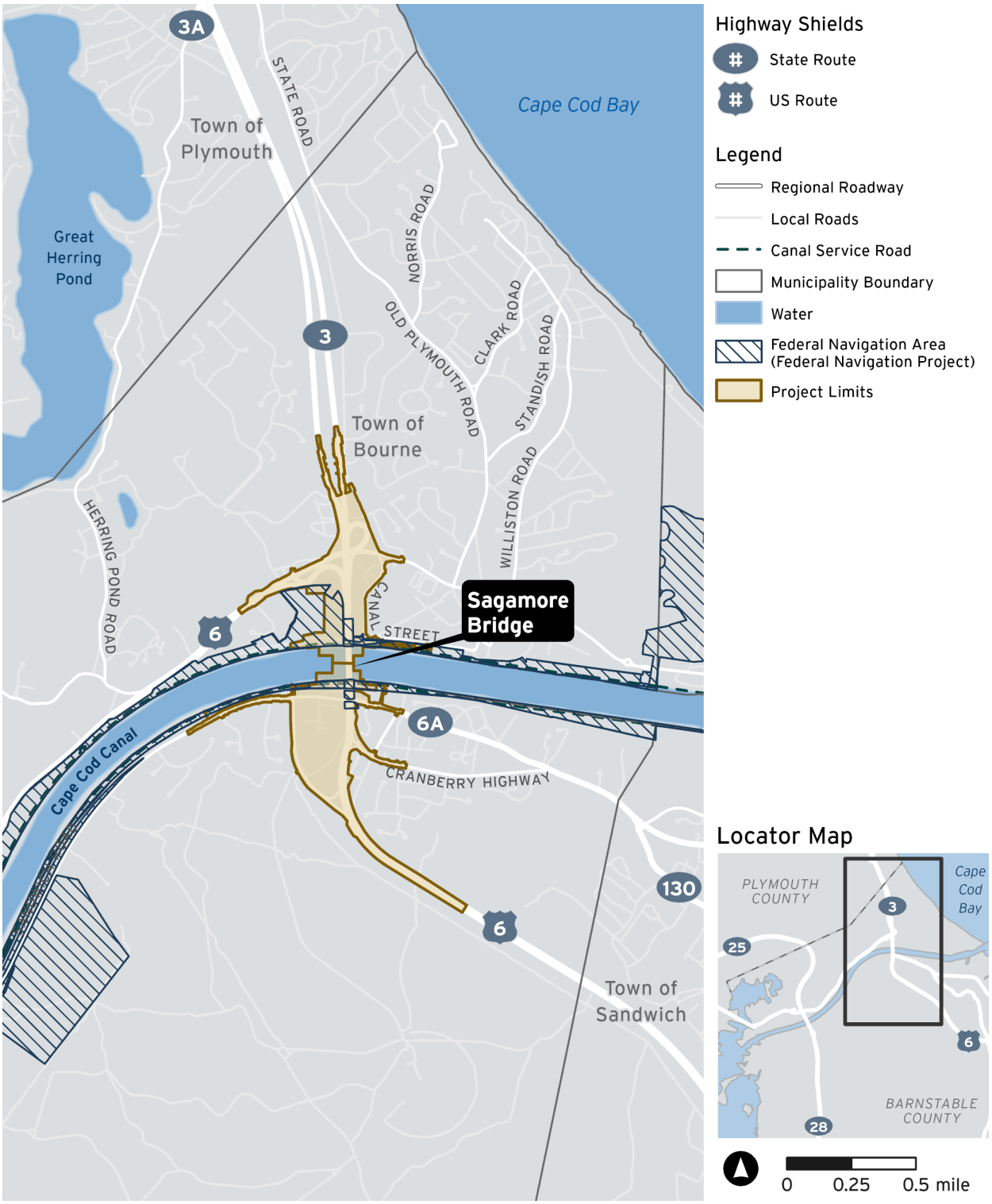
[7] U.S. Army Corps of Engineers. 2020. Cape Cod Canal Highway Bridges, MA, Major Rehabilitation Evaluation Report and Environmental Assessment. Appendix B:. Project History. March. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/MRERAppendicesA-B.pdf

through the Federal Emergency Administration of Public Works under the National Industrial Recovery Act.

Cape Cod Canal is part of the Atlantic Intracoastal Waterway that extends from Boston, Massachusetts, to Key West, Florida, connecting the eastern New England ports and those of southern New England, New York, and points farther south along the Atlantic coast. USACE's MRER/EA notes that traveling via the Atlantic Intracoastal Waterway between Cape Cod Bay and Buzzards Bay saves commercial and recreational vessels between 65 and 150 miles versus traveling by the open Atlantic Ocean side of Cape Cod. Additionally, the shorter, less costly, inshore route is better protected and less risky than travel via the open ocean route.[8]

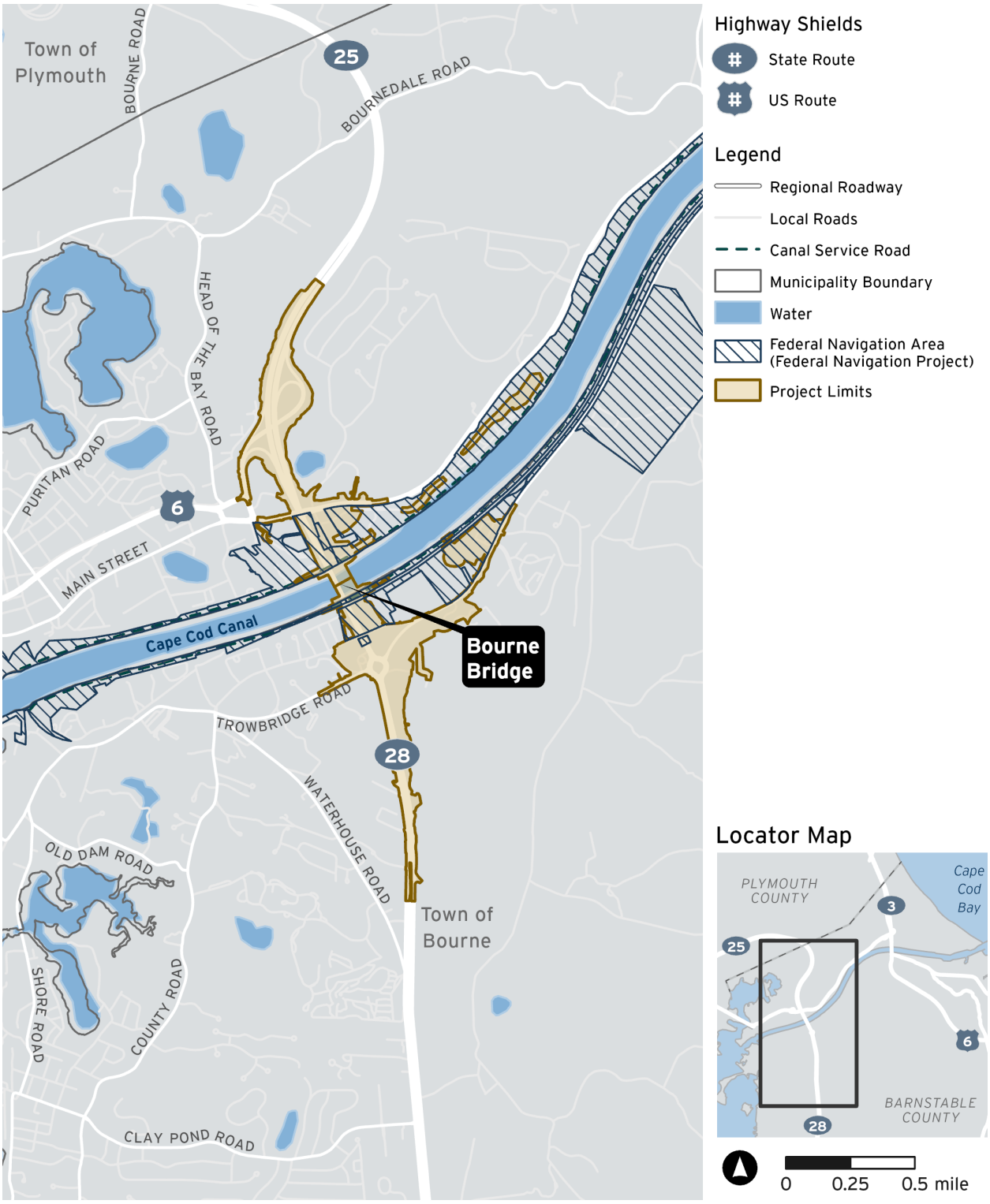
[8] U.S. Army Corps of Engineers. 2022. Cape Cod Canal Highway Bridges, MA, Major Rehabilitation Evaluation Report and Environmental Assessment. March. page EA-7. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/FinalMRERDocument.pdf.

Figure 4.4-1. Maritime Study Area: Sagamore Bridge



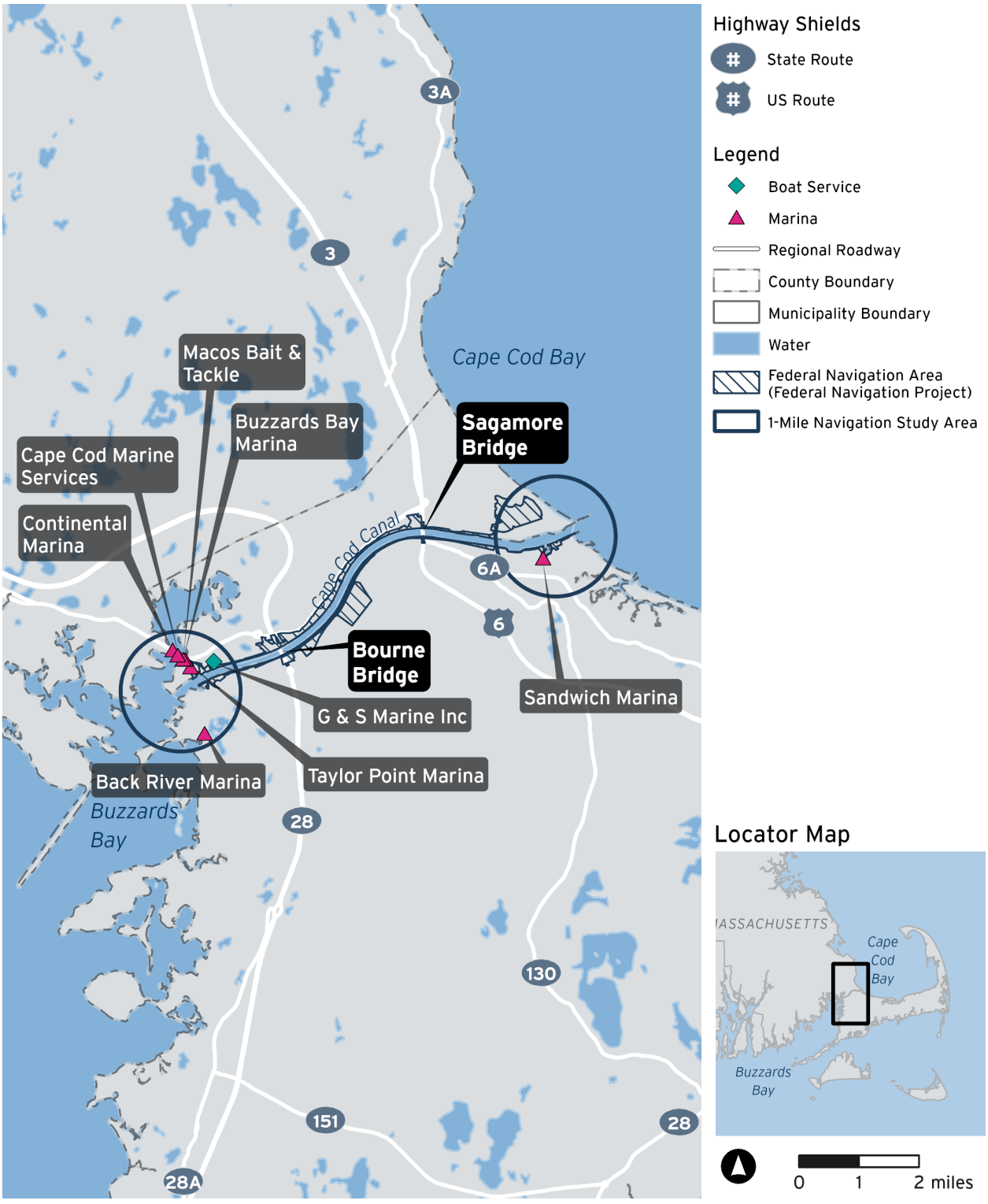
Source: Massachusetts Department of Transportation, 2025

Figure 4.4-2. Maritime Study Area: Bourne Bridge



Source: Massachusetts Department of Transportation, 2025

Figure 4.4-3. Maritime Study Area: Marine-Support Facilities



Source: Massachusetts Department of Transportation, 2024

The canal provides a minimum federally authorized channel width of 480 feet—the widest sea-level canal on the eastern seaboard—and an authorized (minimum) depth of 32 feet below mean low low water. Transit through the canal is toll free. Both Sagamore and Bourne Bridges provide a vertical clearance of 135 feet above mean high water (mean high water is almost 1.5 feet higher at Sagamore Bridge than Bourne Bridge) and a minimum horizontal clearance of 500 feet.[9]

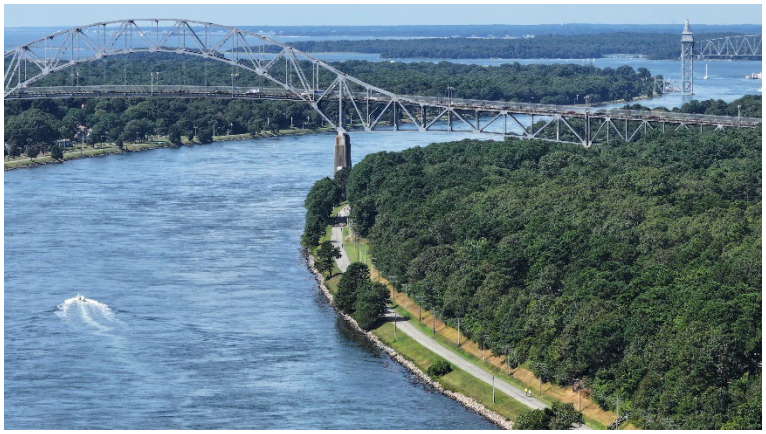
Because engineers of the first canal followed the Monument and Scusset Rivers and natural terrain to find the easiest path connecting Cape Cod Bay and Buzzards Bay, the channel is not straight. Two significant bends in the canal make sight lines difficult for large vessels with limited turning capabilities (refer to **Exhibit 4.4-1** and **Exhibit 4.4-2**).

Figure 4.4-4 provides the National Oceanic and Atmospheric Administration (NOAA) nautical chart showing the entirety of the 17.4-mile-long waterway, the 9.3-mile-long approach channel, and the location of the existing bridges on the 8.1-mile-long land cut of the canal. The 32-foot-deep approach channel extends from the vicinity of Cleveland Ledge in Buzzards Bay to the canal itself. The approach channel is 700 feet wide from Cleveland Ledge to Wings Neck in Pocasset (Cleveland Ledge Channel), then narrows to 500 feet wide from Wings Neck to the canal (Hog Island Channel).

Exhibit 4.4-1. View of Cape Cod Canal, facing east toward Sagamore Bridge, September 2023

Source: Massachusetts Department of Transportation, 2023

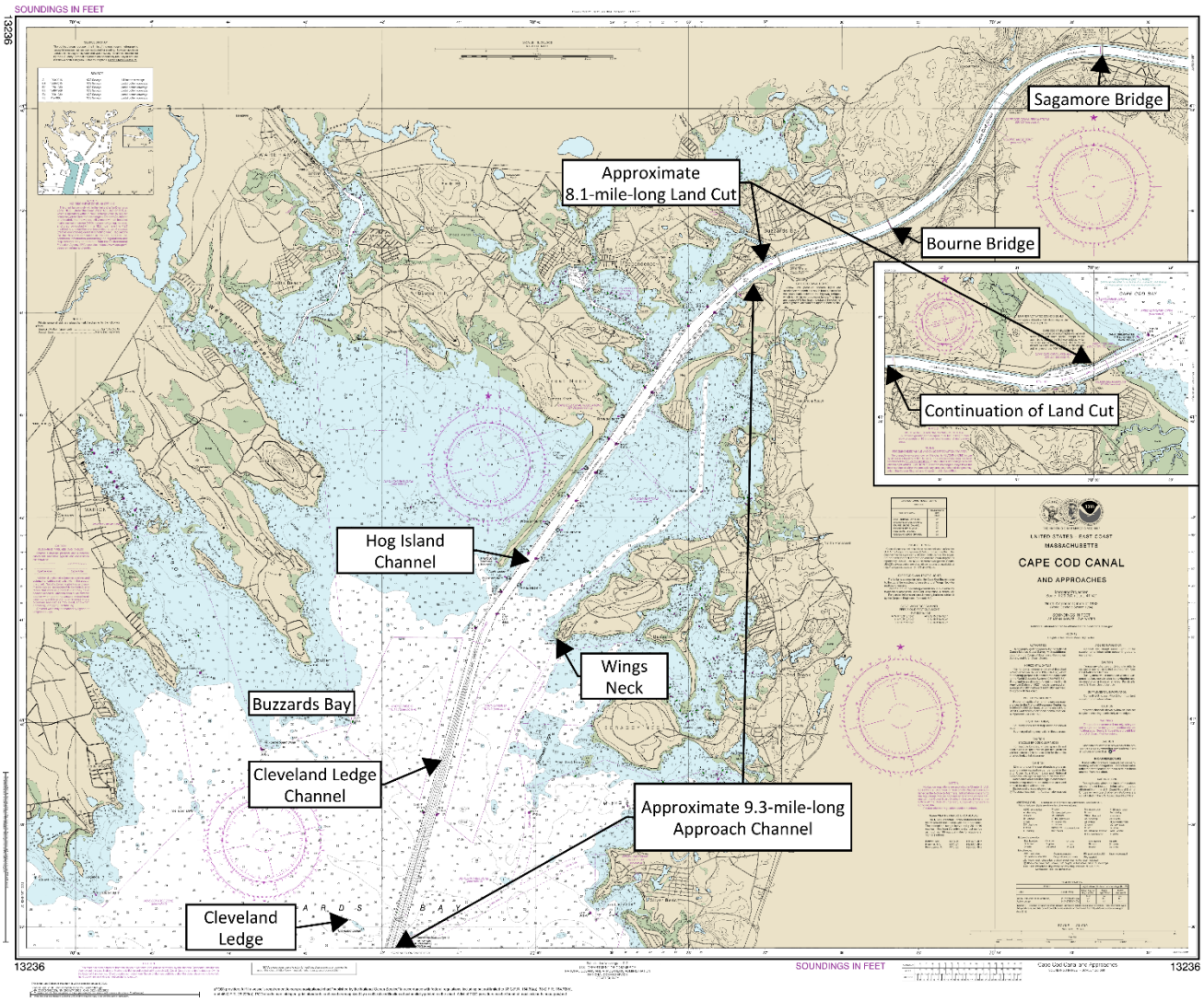
Exhibit 4.4-2. View of Cape Cod Canal, facing west toward Bourne Bridge and Buzzards Bay Railroad Bridge, September 2023



Source: Massachusetts Department of Transportation, 2023

[9] U.S. Army Corps of Engineers. 2022. Cape Cod Canal Highway Bridges, MA, Major Rehabilitation Evaluation Report and Environmental Assessment. March. page EA-15. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/FinalMRERDocument.pdf

Figure 4.4-4. Cape Cod Canal, National Oceanic and Atmospheric Administration Nautical Chart



Source: National Oceanic and Atmospheric Administration, 2025

4.4.2.2 Cape Cod Canal Features and Uses

USACE New England District is responsible for operating and managing the federally authorized Cape Cod Canal FNP, which includes the 17.4-mile-long waterway and existing Sagamore and Bourne Bridges, Buzzards Bay Railroad Bridge, and the 1,150-acre adjoining federal property. Buzzards Bay Railroad Bridge, a vertical lift bridge, was built simultaneously with the highway bridges and has the same clearances as the two highway bridges.[10] To support navigation, USACE maintains two service roads parallel to the canal, consisting of the 6.5-mile south Canal Service Road and 7-mile north Canal Service Road.

[10] U.S. Army Corps of Engineers. 2007. Cape Cod Canal Navigation Project map. April 20.

Additional canal features of the FNP managed by USACE include the following (**Figure 4.4-5**):[11]

- Two mooring basins, consisting of the 3,300-foot-long West Mooring Basin at the head of Buzzards Bay on the east side of Hog Island Channel, and the 2,500-foot-long East Mooring Basin on the north side of the canal just inside the canal's entrance from Cape Cod Bay.
- A 600-foot-long jetty and a 3,000-foot-long breakwater, both at the entrance to the canal from Cape Cod Bay.
- A dike between Hog Island and Rocky Point in Bourne.
- Two basins for small boats, consisting of the 1-acre West Boat Basin, west of the railroad bridge, immediately adjacent to the Canal Field Office, and the 2.3-acre East Boat Basin, on the south side of the canal opposite the East Mooring Basin.

4.4.2.3 Cape Cod Canal Navigation and Operating Rules

Congress established the current operating rules for the canal, which USACE implements under 33 CFR 207.20(b). USACE staffs a marine traffic control office 24 hours a day, seven days a week, from the traffic control center at the Canal Administrative Office. USACE uses an integrated marine traffic control system to monitor all ship traffic in the canal and communicate directly with ships transiting the waterway, as well as a system of continuously operating traffic lights for vessels 65 feet long and over. USACE has a fleet of two 38-foot patrol boats and two 25-foot SAFE boats;[12] patrolling is staffed and operational 16 hours a day.

Powered vessels with a maximum boat length of 825 feet, maximum boat draft of 32 feet, and maximum boat air draft of 135 feet are authorized to use the canal (**Exhibit 4.4-3**).[13] Sailing vessels are required to have and use auxiliary power when transiting the canal.

Exhibit 4.4-3. View of Sagamore Bridge, facing west, November 2022

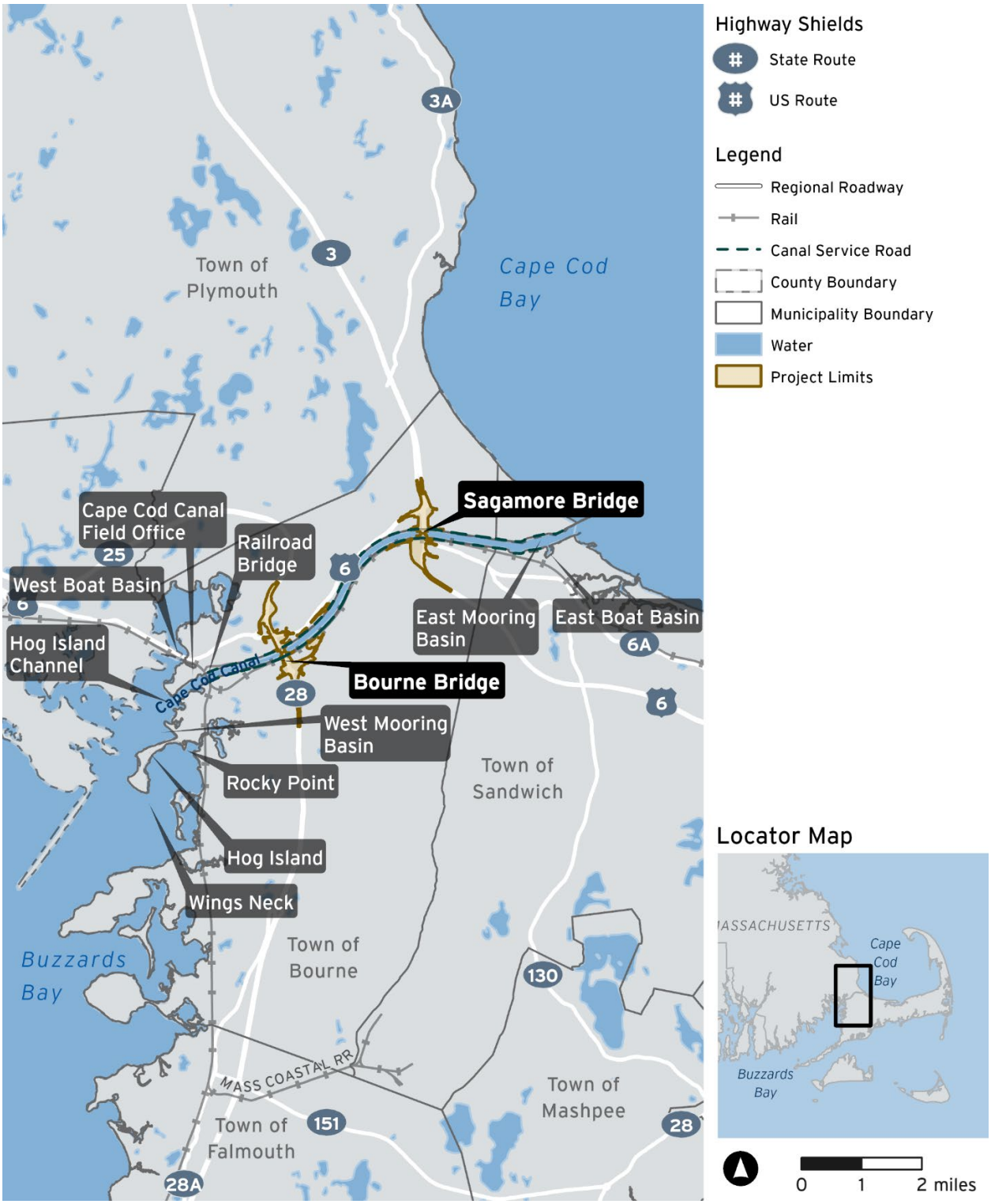
Source: Massachusetts Department of Transportation, 2022

[11] U.S. Army Corps of Engineers. n.d. Cape Cod Canal Navigation Project. https://www.nae.usace.army.mil/Missions/Civil-Works/Navigation/Massachusetts/Cape-Cod-Canal//

[12] SAFE = Secure All-Around Flotation Equipped.

[13] Vessels greater than 825 feet long or taller than 135 feet high above the waterline are not permitted to enter the canal due to potential navigational safety and bridge-strike concerns. Vessels 65 feet long and over, and/or more than 28 feet deep, are required to obtain clearance from and/or consult with the U.S. Army Corps of Engineers' (USACE) Marine Traffic Controller before entering the canal.

Figure 4.4-5. Features of the Cape Cod Canal Federal Navigation Project

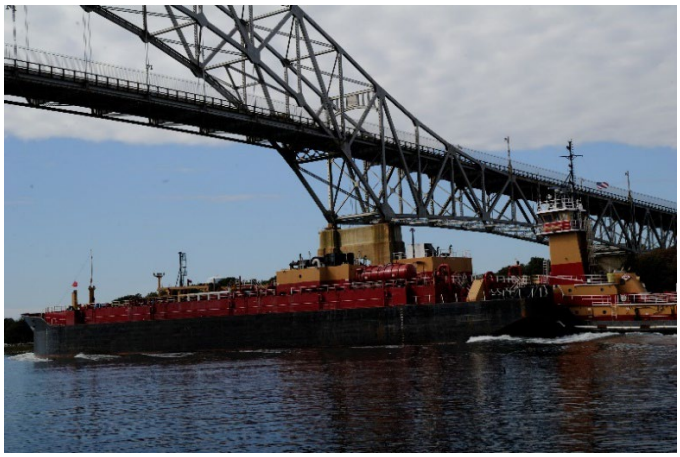


Source: Massachusetts Department of Transportation, 2025

4.4.2.4 Marine

The canal is an economically important navigation channel that provides passage for a wide variety of navigation. The largest commercial vessels that transit the eastern seaboard, such as large oil tankers and container ships, typically have drafts too deep to use the canal. However, other large civilian, military, and commercial vessels with drafts of 32 feet or less (**Exhibit 4.4-4**) use the canal on a regular basis. USACE's MRER/EA indicates that many of the automobile carriers and cruise ships (the largest ships to use the canal) have designs that include 135-foot clearances.[14]

Exhibit 4.4-4. View of Tanker at Bourne Bridge, November 2022



Source: Massachusetts Department of Transportation, 2022

Table 4.4-1 presents a summary of canal traffic from calendar year (CY) 2018 through CY 2024, the most recently recorded year, as reported by USACE's Cape Cod Canal Field Office traffic controllers. USACE records vessel traffic in Cape Cod Canal according to vessel length. Vessels of 65 feet or more in length consist of tankers, cargos, barges, fishing vessels, yachts, military vessels (and other types). Vessels under 65 feet in length consist of fishing vessels and pleasure craft (among others).

Table 4.4-1. Summary of Canal Vessel Traffic, 2018–2024

Vessels (in length)	2018	2019	2020	2021	2022	2023	2024
Vessels 65 feet or longer	7,459	4,886	5,078	5,719	5,738	5,709	5,525
Vessels under 65 feet long	14,318	14,149	0	1,435	6,207	7,055	3,569
Total reported vessels	**21,777**	**19,035**	**5,078**	**7,154**	**11,945**	**12,764**	**9,094**

Source: Department of the Army, New England Division, Corps of Engineers, Cape Cod Canal Field Office, Vessel Report for All, Calendar Years 2018 through 2024.

While the total number of vessels through Cape Cod Canal has decreased since the 2018 volume reported in USACE's MRER/EA, the decrease is largely due to a decline in fishing vessels and pleasure craft (vessels under 65 feet in length) using the canal. The number of larger commercial and industrial vessels (vessels over 65 feet in length) using the canal has generally been consistent since 2020.

[14] U.S. Army Corps of Engineers. 2022. Cape Cod Canal Highway Bridges, MA. Major Rehabilitation Evaluation Report/Environmental Assessment. March. page EA-8. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/FinalMRERDocument.pdf

USACE reports that the largest ships transiting the canal are typically about 600 feet long.[15]

4.4.2.5 Freight and Cargo Vessel Transits

USACE's WCSC provides statistics on foreign and domestic waterborne commerce moved on waters of the United States, defined as ports, harbors, waterways, and canals.[16] **Table 4.4-2** presents the total commodities transiting the canal from 2016 through 2023 (the most recently reported year) in thousands of short tons.

Table 4.4-2. Commodities Transiting Cape Cod Canal (thousand short tons, rounded), 2016-2023

Commodities	2016	2017	2018	2019	2020	2021	2022	2023
Domestic	6,375	5,446	5,600	5,969	1,492	17	1,956	4,192
Foreign	500	627	398	746	531	801	0	330
Total	**6,875**	**6,073**	**5,998**	**6,715**	**2,023**	**818**	**1,956**	**4,522**

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, WCSC - U.S. Army Corps of Engineers (2019). https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2019/region/1/location/171; WCSC - U.S. Army Corps of Engineers (2023) https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2023/region/1/location/171

In calendar year (CY) 2019, the most recent pre-COVID-19 pandemic year, the WCSC reported that all foreign and domestic freight traffic through the canal totaled approximately 6,715,000 short tons.[17] Domestic freight represented almost 89% of this total and foreign freight accounted for approximately 11% of the total. Most commodities consisted of petroleum and petroleum products (e.g., gasoline, kerosene, fuel oils), followed by chemicals and related products. Recent freight commodity characteristics are similar to those in CY 2019. In CY 2023, domestic freight represented almost 93% and foreign freight accounted for close to 7% of the total 5,522,222 short tons. Petroleum and petroleum products accounted for slightly more than 79%, with chemicals and related products representing the second largest cargo type, at approximately 16% of the total. While the total freight traffic in CY 2023 was less than pre-pandemic levels, freight traffic substantially increased since the low total in CY 2021.

Per 33 CFR 207.20(f), Navigation Regulations, Cape Cod Canal, Massachusetts; Use, Administration and Navigation (Dangerous Cargoes),[18] vessels carrying petroleum and other potentially hazardous cargo

[15] Hinkle, J. 2021. "Could a ship get stuck sideways in the Cape cod Canal? It's unlikely but yes." Cape Cod Times. March 27. https://www.capecodtimes.com/story/news/2021/03/27/could-ship-get-stuck-sideways-cape-cod-canal-ever-given-suez/7016039002/

[16] https://www.iwr.usace.army.mil/About/Technical-Centers/WCSC-Waterborne-Commerce-Statistics-Center-2/

[17] U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2019/region/1/location/171. Calendar Year 2019 is the most recent pre-COVID-19 pandemic year with a 5-year Cargo Report and 5-year Trips Report.

[18] https://www.ecfr.gov/current/title-33/chapter-II/part-207/section-207.20.

must comply with specific restrictions, including notifying the Marine Traffic Controller prior to entering the canal and transiting only during daylight hours.

As reported by the WCSC, **Table 4.4-3** presents the total number of cargo vessel trips and **Table 4.4-4** and **Table 4.4-5** identify the types of vessel trips transiting the canal from 2016 through 2023 by upbound destinations (to ports north of the canal) and downbound destinations (to ports south of the canal). The WCSC classifies vessel types by self-propelled (with engine) and non-self-propelled (towed) vessels,[19] consisting of the following:

- Towboats, including pushboats and tugboats
- Self-propelled dry cargo vessels, including, but not limited to, general cargo freighters, bulk carriers, containerships, vehicle carriers, passenger vessels, ferries, and excursion/sightseeing vessels
- Self-propelled tankers, including petroleum carriers, chemical carriers, liquid bulk tankers, and liquid gas carriers
- Non-self-propelled dry cargo vessels, including, but not limited to, open and covered hopper barges, open and covered dry cargo barges, and container barges
- Non-self-propelled tanker, consisting of liquid cargo barges

As indicated in the tables, liquid barge tankers represented the largest percentage of cargo vessels transiting the canal.[20]

Table 4.4-3. Cargo Vessel Trips through Cape Cod Canal, 2016-2023

Trip Types	2016	2017	2018	2019	2020	2021	2022	2023
Upbound (ports north of canal)	1,080	1,701	536	511	388	7	293	666
Downbound (ports south of canal)	756	1,160	112	164	77	3	249	489
Total	**1,836**	**2,861**	**648**	**675**	**465**	**10**	**542**	**1,155**

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, WCSC - U.S. Army Corps of Engineers (2019). https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2019/region/1/location/171; WCSC - U.S. Army Corps of Engineers (2023). https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2023/region/1/location/171

Table 4.4-4. Cargo Vessel Type Upbound Trips through Cape Cod Canal, 2016-2023

Vessel Type	2016	2017	2018	2019	2020	2021	2022	2023
Towboat (Self-Propelled)	300	308	75	38	68	2	36	82

[19] Waterborne Commerce Statistics Center vessel types. https://www.iwr.usace.army.mil/Portals/70/Data%20Dictionary.pdf

[20] U.S. Army Corps of Engineers. Institute for Water Resources. Waterborne Commerce of the United States, Calendar Year 2022. Part 1 – Waterways and Harbors Atlantic Coast. IWR-WCUS-22-1.

Vessel Type	2016	2017	2018	2019	2020	2021	2022	2023
Self-Propelled Dry Cargo	86	265	27	43	50	0	0	42
Non-Self-Propelled Dry Cargo	48	72	7	32	24	3	15	11
Non-Self-Propelled Tanker Liquid Barge	622	984	394	348	150	2	242	495
Self-Propelled Tanker	24	72	33	50	96	0	0	36
Total	**1,080**	**1,701**	**536**	**511**	**388**	**7**	**293**	**666**

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, WCSC - U.S. Army Corps of Engineers (2019). https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2019/region/1/location/171; WCSC - U.S. Army Corps of Engineers (2023). https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2023/region/1/location/171

Table 4.4-5. Cargo Vessel Type Downbound Trips through Cape Cod Canal, 2016-2023

Vessel Type	2016	2017	2018	2019	2020	2021	2022	2023
Towboat (Self-Propelled)	180	162	23	15	0	0	19	47
Self-Propelled Dry Cargo	65	198	4	8	8	0	0	26
Non-Self-Propelled Dry Cargo	33	50	10	21	12	2	14	18
Non-Self-Propelled Tanker Liquid Barge	470	706	60	90	8	1	215	383
Self-Propelled Tanker	8	44	15	30	49	0	1	15
Total	**756**	**1,160**	**112**	**164**	**77**	**3**	**249**	**489**

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, WCSC - U.S. Army Corps of Engineers (2019) https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2019/region/1/location/171; WCSC - U.S. Army Corps of Engineers (2023) https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2023/region/1/location/171

Even with the current physical and operating constraints of the canal, and the decline in freight traffic and commodities after the COVID-19 pandemic, Cape Cod Canal moves substantial volumes of cargo, and the use of the canal provides substantial transportation cost savings over having to transit the entire length of Cape Cod. The MRER/EA calculates that the canal presents annual waterborne transportation cost savings of about $1.7 million annually for U.S. flag cargo vessels transiting the canal over having to circumnavigate the entirety of Cape Cod. This was estimated to be a lower-bound estimate of the navigation benefits provided by the canal. USACE estimates that the economic value derived from other vessel trips, including foreign vessel trips, would result in an additional

$0.47 million of waterborne transportation cost savings, for a total combined cost savings of $2.17 million annually (in 2020 dollars).[21]

4.4.2.6 Cape Cod Canal Maintenance

Since its original direction in March 1928 under the Rivers and Harbors Act of 1927, USACE has operated and improved the canal.[22] Due to the strong tidal current and shifting shoals, USACE conducts maintenance dredging every five to seven years to restore the canal to its authorized dimensions.[23] In 2015–2016, approximately 130,000 cubic yards of material were dredged, and the material was pumped directly on the 2,500-foot-long Town Neck Beach in the town of Sandwich as a mitigation measure to address the substantial erosion along the downdrift shoreline in the town.[24]

USACE issued a Public Notice in February 2023 to remove approximately 150,000 cubic yards of material within the 17.4-mile-long channel and the West and East Mooring Basins, including (but not limited to) areas adjacent to both sides of Sagamore Bridge.[25] USACE proposed to conduct dredging between October 1 and March 15 to protect threatened and endangered species, eelgrass fields, and shellfish spawning seasons. The maintenance dredging event was completed between October and December 2023; it removed 73,426 cubic yards of sandy material and beneficially placed it on Town Neck Beach in the town of Sandwich. USACE expects the next cycle of maintenance to be undertaken in five to seven years as funds are appropriated by Congress.

4.4.2.7 Marinas and Marine Services in the Maritime Study Area

Table 4.4-6 lists the marinas and marine services that are within a 1-mile radius of the land cut of the canal from Buzzards Bay and Cape Cod Bay, in geographic order starting from Cape Cod Bay moving west to Buzzards Bay, including docks and boat repair businesses (**Figure 4.4-3**).

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[21] U.S. Army Corps of Engineers (USACE). 2022. Cape Cod Canal Highway Bridges, MA. Major Rehabilitation Evaluation Report, Final Appendix D, Economics. March. pages D-47 through D-48. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/MRERAppendicesC-D.pdf.

[22] Public Law 70-560, The Rivers and Harbors Act. 1927. https://www.iwr.usace.army.mil/Library/IWR-Library/308-Reports-Program-Series/

[23] Buzzards Bay (to the southwest) and Cape Cod Bay (to the northeast) have very different tidal cycles and ranges. The current in the canal changes direction every six hours, with a maximum velocity of 5.2 miles per hour (6 knots). USACE notes that the extremely strong tidal currents and shifting shoals that form throughout the canal create hazardous conditions for deep-draft vessels using the canal, leading to the need for regular dredging by USACE to maintain a safe channel.

[24] USACE, New England District. 2016. "Cape Cod Canal Dredging, Town Neck Beach sand placement complete," Yankee Engineer, Building Strong. January. Volume 49, No. 4. https://www.nae.usace.army.mil/Portals/74/docs/YankeeEngineer/2016/January2016.pdf?ver=2016-02-03-091033-813

[25] USACE, New England District. 2023. 30-Day Public Notice: Maintenance Dredging of the Cape Cod Canal Federal Navigation Project, Bourne and Sandwich, Massachusetts. February 10. https://www.nae.usace.army.mil/Portals/74/docs/PublicServices/PublicNotice/2023/CCC-Dredging-FinalPN-2023.pdf?ver=PguTCOB66maesDqo55pDRw%3D%3D

Table 4.4-6. Marinas and Marine-Support Facilities within 1 Mile of the Cape Cod Canal Land Cut

Facility	Facility Type	Location	Amenities/Services
Sandwich Marina[1]	Public Marina	12 Freezer Road, Sandwich	140 recreational seasonal slips; 42 commercial slips; 24 transient slips. Fuel dock, boat ramp, pump-out facilities, boat storage, public facilities/restrooms
G & S Marine Inc.[2]	Boat sales and services	134 Main Street, Buzzards Bay	Boat sales and service
Buzzards Bay Marina[3]	Marina	2 Main Street, Bourne	Pending
Cape Cod Marine Services[4]	Private Marina	3251 Cranberry Highway, Buzzards Bay	35 slips, dock, boat storage
Continental Marina[5]	Private Marina	3236 Cranberry Highway, Buzzards Bay	47 slips, dock
Taylor Point Marina[6]	Municipal Marina	1 Academy Drive, Buzzards Bay	148 slips, fuel dock, boat ramp, pump-out facilities
Back River Marina[7]	Private Marina	266-284 Shore Road, Buzzards Bay	Docks, boat repair, boat rental

Sources: [1] https://sandwichmarina.com/; [2] https://www.gandsmarine.com/;
[3] https://buzzardsbaymarina.com/index.html;
[4] https://marinas.com/view/marina/vgcz2ww_Cape_Cod_Marine_Properties_Wareham_MA_United_States;
[5] https://marinas.com/view/marina/63c33q_Continental_Marina_Buzzards_Bay_MA_United_States;
[6] https://www.townofbourne.com/natural-resources/pages/marinas;
[7] https://www.seamagazine.com/locations/ramp-back-river-marina-buzzards-bay-massachusetts-24981

Of the seven facilities, Sandwich Marina is the only facility within FNP property. Located in the East Boat Basin, the marina is leased by USACE to the Town of Sandwich and operated by the Sandwich Harbormaster. Taylor Point Marina, owned and operated by the Town of Bourne, is just outside of the canal land cut east of the head of Buzzards Bay.

4.4.3 No Build Alternative

In the No Build Alternative, Sagamore and Bourne Bridges would retain their current configuration, alignment, and vertical clearance of 135 feet above mean high water and a 500-foot horizontal clearance at the two bridges. The existing piers would remain just outside the authorized 480-foot navigation channel but within the navigable waterway.

By retaining the current location of the bridge piers, the No Build Alternative would not improve navigation safety. In the MRER/EA, USACE indicated the need to consider horizontal clearance relative to navigational safety and deferred the final decision regarding the location of the piers to a future development phase. While USACE acknowledged that the likelihood of allisions from large vessels with

the existing piers is low, due to the distance from the channel to the shallow adjacent waters, the MRER/EA nevertheless recommended the landward relocation of the replacement bridge piers.

Because the No Build Alternative would not incorporate considerations for fluctuations in relative sea level, over time, it is expected that the canal would not be able to accommodate the largest vessels currently using the canal, such as automobile carriers and cruise ships that require a clearance of 135 feet. To access northern New England ports, these large vessels would need to circumnavigate the entirety of Cape Cod (approximately 60 nautical miles), increasing transportation costs.

In addition to transportation cost savings, the MRER reports that use of the canal increases navigation safety, noting that prior to its construction, shipwrecks occurred along the route around the Cape due to fog, shoals, and exposure to bad weather.

In the MRER/EA, USACE determined that the "Fix as Fails" Base Condition, which is consistent with the Program's No Build Alternative, could adversely affect navigation due to channel closures. USACE noted that substructure deterioration (such as localized concrete defects on vertical surfaces of piers or degradation of concrete under bearings on the piers) could require channel closures or result in delays to marine vessels to stage equipment. Further, USACE noted that a bridge collapse or other major failure would likely close the canal for some period of time (from weeks to months).

4.4.4 Build Alternative

This section describes the potential operational and construction-period effects of the Build Alternative on the waterway and federal navigation channel, including vessel traffic. Additionally, it identifies the requirements associated with transferring ownership of the bridges to the Commonwealth of Massachusetts. MassDOT is coordinating with USACE on the operational and construction-period effects of the Build Alternative through the Section 408 permit process, as identified in **Section 4.4.4.3.**

4.4.4.1 Operational Effects

Effects to Navigation

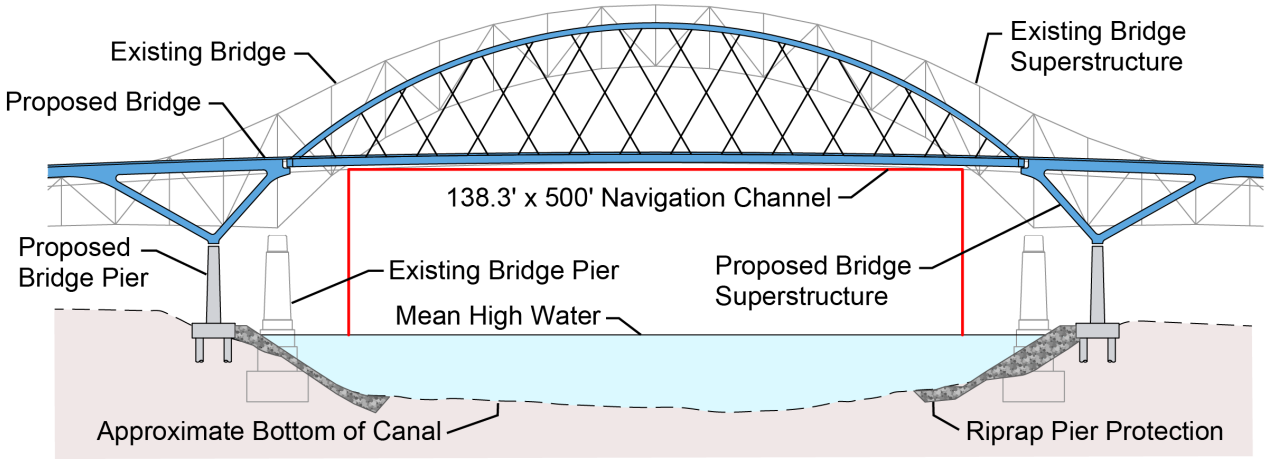
The operation of the replacement bridges would not affect the waterway, nor would it alter the 500-foot navigation clearance or the federally authorized 480-foot navigational channel. MassDOT developed the design of the replacement bridges in accordance with USCG's directives and in cooperation with USACE to improve the navigability of and navigational safety in the canal.

In the Build Alternative, the location of the bridge piers and superstructure further outside of the navigation channel and within the riprap slope (within and above the intertidal zone) would effectively increase the navigational opening, thereby improving navigational safety. By locating the proposed piers along the shoreline, the Build Alternative would reduce the risk of vessel allisions, as large vessels (with drafts of 20 feet or greater) would run aground before directly striking the pier. **Figure 4.4-6** presents a schematic of vessel impact risk mitigation that would be incorporated into the Build Alternative. Further, the bridge piers and superstructure would be designed to meet current American

Association of State Highway and Transportation Officials (AASHTO) provisions for appropriate vessel impact loads.[26]

After completing bridge construction and existing bridge demolition, existing riprap would be restored and expanded as a permanent riprap pier protection system on the three waterward sides of the pier bases supporting the main arch span. MassDOT is designing the riprap pier protection system to absorb potential vessel impacts, including direct impacts of the vessel's bow or prow to the foundation or substructure and/or the vessel's mast or deck house to the delta legs or superstructure. **Figure 4.4-6** presents an updated schematic of the enhanced vessel impact risk mitigation that would be incorporated into the Build Alternative.

Figure 4.4-6. Vessel Impact Risk Mitigation of the Build Alternative



Source: Massachusetts Department of Transportation, 2025

The pier protection system would not impact the federal navigation channel. The riprap boundary would be outside of the 500-foot navigation clearance and federal navigation channel, except for the base of the riprap footprint. Riprap extending into the 500-foot navigation clearance (and 480-foot navigation channel boundary) would be at a lower elevation than the allowable dredge overdepth, so it would not affect USACE's Civil Works Project or mariners traveling within the approved navigation limits.

In accordance with USCG's Preliminary Navigation Clearance Determination, in the Build Alternative, the replacement bridge deck elevation would account for fluctuations in relative sea level to maintain the existing 135-foot vertical clearance above mean high water (MHW), for a total vertical clearance of 138.3 feet above MHW. This proposed vertical clearance would not affect the maximum vessel class types and sizes that currently transit the canal for the expected design life of the replacement bridges.

[26] American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications, 10th Edition/2024 https://aashtojournal.transportation.org/aashto-issues-10th-lrfd-bridge-design-spec-edition/

Effects to Floodplain and Hydraulics

At both the Sagamore and Bourne Bridge sites, the new bridge piers and riprap pier protection would impact coastal floodplain. However, the relocation of the existing bridge piers to a more landward location would minimize impacts to the 100-year flood zone. Similarly, the placement of riprap for bridge pier protection would not increase the flood zone elevation. Further, the replacement bridges would not increase the velocity of moving water, redirect it, or channelize flow, but they would allow water to spread laterally and landward. **Section 4.9, Wetlands and Floodplains**, provides additional information on anticipated effects to floodplains.

MassDOT updated its hydraulics and scour analysis for both bridges to incorporate the proposed riprap pier protection system. For both replacement bridges, MassDOT determined that the foundations and pier protection systems would be designed to remain stable during the maximum scour design and check events. Therefore, it would be unlikely that the replacement Sagamore or Bourne Bridges would be affected by scour. Further, MassDOT's analysis indicates that the riprap pier protection system is not expected to result in an increased potential for shoaling at the two bridge sites beyond existing conditions. **Section 4.21, Adaptation and Resiliency,** provides additional information on the hydraulics and scour analysis.

Effects to Ownership, Operations, and Maintenance

In accordance with the Memorandum of Understanding, the disposal of the Sagamore and Bourne Highway Bridge assets, currently owned by USACE, and construction of the new bridges, owned by the Commonwealth of Massachusetts, would require a revision of 33 CFR 207.20, specifically Paragraph (p), Bridges over the canal, which states that the (federal) "government owns, operates, and maintains all bridges across the canal which includes one railroad bridge and two highway bridges." Following implementation of the bridge replacement projects, Paragraph (p) would be revised to indicate that the Commonwealth of Massachusetts owns, operates, and maintains the Sagamore Highway Bridge and the Bourne Highway Bridge as part of the Commonwealth's transportation system; and, as such, the highway bridges are regulated in accordance with MassDOT Highway Division's engineering directives, manuals, and publications governing the design, construction, and maintenance of the Commonwealth's surface transportation system.

Updates to USACE's Cape Cod Canal FNP Operations and Maintenance Manual would be required to: 1) delete existing references to ownership, operations, and maintenance responsibilities of the existing Sagamore and Bourne Bridges; and 2) identify MassDOT as the owner of the replacement bridges and shared use paths, responsible for their operations, maintenance, repair, rehabilitation and replacement.

4.4.4.2 Construction Effects

MassDOT developed the Program construction approach in coordination with a construction specialist. **Appendix 3.2, Construction Approach Technical Report**, provides details of the major in-water work activities, consisting of installation and removal of temporary work structures, new bridge construction, existing bridge demolition, and installation of the pier protection system. Additionally, dredge and fill would be required for these major activities. The approach and durations of activities

could vary based on the design-build team's construction means and methods or based on contract packaging, however.

Estimated Duration of In-Water Work

MassDOT estimates that construction of each replacement bridge and demolition of each existing bridge would take approximately eight to 10 years, with in-water work occurring over multiple phases. Construction in the north and south quadrants of each bridge site is anticipated to occur concurrently. Construction of the in-water temporary works, drilled shafts, and substructures at the canal delta piers would require approximately two years for each new span. Construction of each new delta frame would require approximately one year. Demolition of the existing bridge approach spans would require nine months per bridge and demolition of the existing piers within cofferdams would require six months per bridge.

Estimated Effects to Navigation Channel and Navigation Support

To the greatest extent practicable, encroachment into the navigation channel would be minimized throughout the duration of construction and demolition activities. Except for six short-term closures of Cape Cod Canal required for floating in the new center spans and floating out the existing spans, replacement bridge construction and existing bridge demolition would be outside of the navigation channel and would not affect ongoing navigation. MassDOT plans to construct the delta frames either from cranes on work trestles (platforms) over the water near the shore or from cranes on land near the shoreline; the construction platforms would not affect navigation. The new piers would be located within and above the intertidal zone of the canal and well outside the navigation channel. They would be constructed within cofferdams from temporary work platforms (construction trestles) close to the canal banks and would not affect navigation. Construction of new elements farther from the canal, such as the proposed approach spans, would occur from cranes located either on work trestles or on land at the shoreline and would not directly affect navigation. Similarly, the portions of the existing structure beyond the canal zone could be demolished without directly affecting navigation. Dredge and fill required for the installation and removal of temporary work structures, new bridge construction, and existing bridge demolition and removal would take place outside of the navigation channel and would not affect navigation. It is anticipated that the dredging and fill equipment used to install the riprap pier protection system would encroach temporarily into the navigation channel.

In-water work requiring closure of the navigation channel would be limited to six short-term, full canal closures associated with the float-in of the new bridge arches (two per bridge site) and float-out of the deconstructed bridge arch (one per bridge site). Four canal closures (each lasting approximately three to five days) would be required for the float-in of the new bridge arches. Two canal closures (each lasting approximately three to five days) would be required for the float-out of the existing bridge arches. Once started, the float-in and float-out operations could not be halted or paused.

To minimize impacts and limit channel encroachments, MassDOT would coordinate in-water construction activities with USACE's Cape Cod Canal Field Office and USCG's Northeast District. Aids to navigation would include advance Notices to Mariners, on-site signs, and lighting.

The Program's vessels would increase marine traffic in the canal. As indicated in **Appendix 3.2 Construction Approach Technical Report**, as many as 16 vessels, consisting of work barges, delivery barges, tugboats, and support launches, could be used on each side of the canal (Sagamore North and South; Bourne North and South) during daily marine-based construction activities, including installing and removing temporary works, and assisting in construction of some permanent works. In many cases, the work vessels could be located outside the 500-foot navigation channel; however, there are instances where the work barges and associated vessels would encroach into the navigation channel. Each instance of encroachment would require coordination with the USACE Marine Traffic Controller. However, even with the minor encroachment by construction support vessels, MassDOT anticipates that a minimum navigational width of 350 feet would be maintained for vessel passage.

Because the canal would be available for navigation for nearly the entirety of the construction period (with only six short-term closures), and through planned coordination with the USACE Marine Traffic Controller and USCG for advance notifications to mariners, MassDOT does not anticipate adverse effects to navigation due to the Program.

Due to safety concerns during the proposed bridge and mainline construction, portions of the Canal Service Roads on both sides of each bridge would be closed. The duration of closures would depend on the proximity to the main span structure construction zones and the contractor's means and methods. Throughout construction, MassDOT would coordinate anticipated closures with USACE to avoid and minimize effects to navigation support.

Restoration of the Canal

Following the completion of new bridge construction and existing bridge demolition and removal, the temporary work structures would be removed. To the maximum extent possible, the shoreline riprap and canal side slopes would be restored to pre-existing conditions, and the pier protection system at the bridge sites would be installed. Waterward of the restored shoreline riprap and outside the riprap pier protection boundary, the impacted resource areas would be allowed to restore naturally.

MassDOT would confirm the extent of shoreline riprap and canal restoration in coordination with USACE. Following installation of the riprap, a hydrographic survey would be conducted to confirm that the dredging and installation of the pier protection system were completed in conformance with the allowable and permitted project footprints and depths.

4.4.4.3 Federal Approvals and Permits

Section 14 of the Rivers and Harbors Act

In accordance with Section 14 of the Rivers and Harbors Act (33 USC 408), and in compliance with USACE's Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408,[27] MassDOT has applied to USACE for Section 408 review and permission for anticipated temporary and permanent alteration[28] of the waterway and abutting lands of the Cape Cod Canal FNP for the Sagamore Bridge Project (Phase 1 of the Program). MassDOT's application for Section 408 permission for the Bourne Bridge Project will follow.

The primary determinations of USACE in a Section 408 review focus on whether the use of the FNP would affect the "usefulness of the project" or be "injurious to the public interest." On March 21, 2024, MassDOT formally initiated the Section 408 process with USACE. On February 5, 2026, USACE approved MassDOT's design of the riprap pier protection system, including the results of the hydraulics analysis of the riprap design. **Appendix 4.4, Attachment 1**, provides these and other initial determinations.

For both the Sagamore and Bourne Bridge projects, MassDOT is working with USACE to define the potential effects of the replacement bridges, including construction staging areas and the long-term incorporation of USACE's land holdings within the replacement bridge footprints (including footprints of the shared use paths, as applicable) as part of the system of state highways, to ensure the ability of the FNP to function as authorized.

Additionally, in its Request for Section 408 permission, MassDOT is charged with demonstrating that the use of the Civil Works project will be protective of the public interest, including, but not limited to, the following:

- Navigability
- Economic resources
- Shore erosion
- Wildlife, habitat, and the environment
- Water quality
- Flood hazards and floodplains
- Recreational resources
- Historic resources

Through the Section 408 permitting process, USACE would confirm MassDOT's use of FNP lands abutting the replacement bridge sites for state highway layout highway and Program-related

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[27] U.S. Army Corps of Engineers. 2018. Engineering Circular (EC) 1165-2-220, Department of the Army, U.S. Army Corps of Engineers, Water Resource Policies and Authorities. Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 United States Code 408. September 10. Note that the use of EC 1165-2-220 was extended per Memorandum, November 14, 2023.

[28] Alteration refers to any action that builds upon, alters, improves, moves, obstructs, occupies, or uses an existing USACE project.

operations and maintenance, including ensuring USACE's ability to fulfill its navigation mission during and after construction.

General Bridge Act of 1946

Pursuant to the General Bridge Act of 1946 (33 USC 525), and in compliance with USCG's Office of Bridge Programs Bridge Permit Application Guide,[29] MassDOT has applied to USCG for an individual bridge permit for the Sagamore Bridge Project. Like the Section 408 Request, an application to USCG for the Bourne Bridge Project will follow.

The First Coast Guard District[30] issued a Preliminary Navigation Clearance Determination dated March 11, 2025, to MassDOT and USACE. The determination stated that the replacement Sagamore and Bourne Bridges should provide at least 138.3 feet of vertical clearance (above MHW) and at least 500 feet of horizontal clearance to not unreasonably obstruct the free navigation of the waters over which the bridges are constructed.[31] Following the Preliminary Navigation Clearance Determination on March 11, 2025, the Northeast Coast Guard District issued further clarification to MassDOT on November 24, 2025, stating that a separate Navigation Impact Report is not required with its bridge permit applications. **Appendix 4.4, Attachment 2** provides these initial determinations.

USACE and USCG Joint Public Notice

On May 6, 2025, USACE and USCG issued a joint public notice to announce a 30-day comment period to solicit comments on the proposed Sagamore Bridge Project and MassDOT's applications to USACE for a Section 408 permission and a permit pursuant to Section 404 of the Clean Water Act, and to USCG for a Bridge Permit. **Appendix 4.4, Attachment 3** provides the public notice.

4.4.5 Mitigation

4.4.5.1 Operations-Related Mitigation

Because the Build Alternative would improve navigability and maintain and improve existing marine transportation conditions within the canal, permanent mitigation measures would not be required.

4.4.5.2 Construction-Related Mitigation

MassDOT would coordinate construction and demolition activities with USACE's Marine Operations Section and USCG's Northeast Coast Guard District. Through the construction period, the Marine Operations Section would monitor vessel traffic for potential impacts, provide marine traffic control, and enforce restrictions as needed, and support construction site safety. As required by USACE and USCG, temporary aids to navigation — including navigation lighting, notices to mariners, channel

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[29] U.S. Coast Guard. Bridge Permit Application Guide, COMDTPUB P16591.3E, March 2025. https://www.dco.uscg.mil/Portals/9/CG_Bridge_Permit_Application_Guide_Mar2025.pdf.

[30] Subsequent to this determination, the First Coast Guard District was renamed the Northeast Coast Guard District.

[31] Gregory P. Hitchen, Bridge Program Manager, U.S. Coast Guard, First Coast Guard District, to Jenifer Thalhauser, Navigation Section Chief, U.S. Army Corps of Engineers, New England District. Re: Preliminary Navigation Clearance Determination for Cape Cod Bridges Program, March 11, 2025.

closure signs, stop/slow signs, advance warning signs, and lateral guidance — would be used to assist vessels during construction.

During construction, MassDOT would advise the public of in-water construction work through the Program website and would maintain communications with the Town of Bourne Harbormaster, USCG, and USACE, including notifications of channel closures. As needed, MassDOT would meet with marinas and marine-related uses within the Study Area to advise them of channel closures.

Additionally, MassDOT is coordinating specific construction-related mitigation with USACE through the Section 408 permitting process.