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 identifies measures to minimize effects.

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]

4.4.1.2 Methodology and Study Area

This section was developed in consultation with the USACE and the USCG. Data on the Cape Cod Canal FNP, including information on marine traffic, were obtained from the USACE New England District[4] and the USACE's Major Rehabilitation Evaluation Report/Environmental Assessment (MRER/EA).[5] Data on historical freight and cargo vessels were obtained from the 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 (**Figure 4.4-1** and **Figure 4.4-2**) and the marinas and major docking

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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 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/

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**).

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, the USACE substantially improved the canal—including constructing Sagamore and Bourne Bridges—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. The 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]

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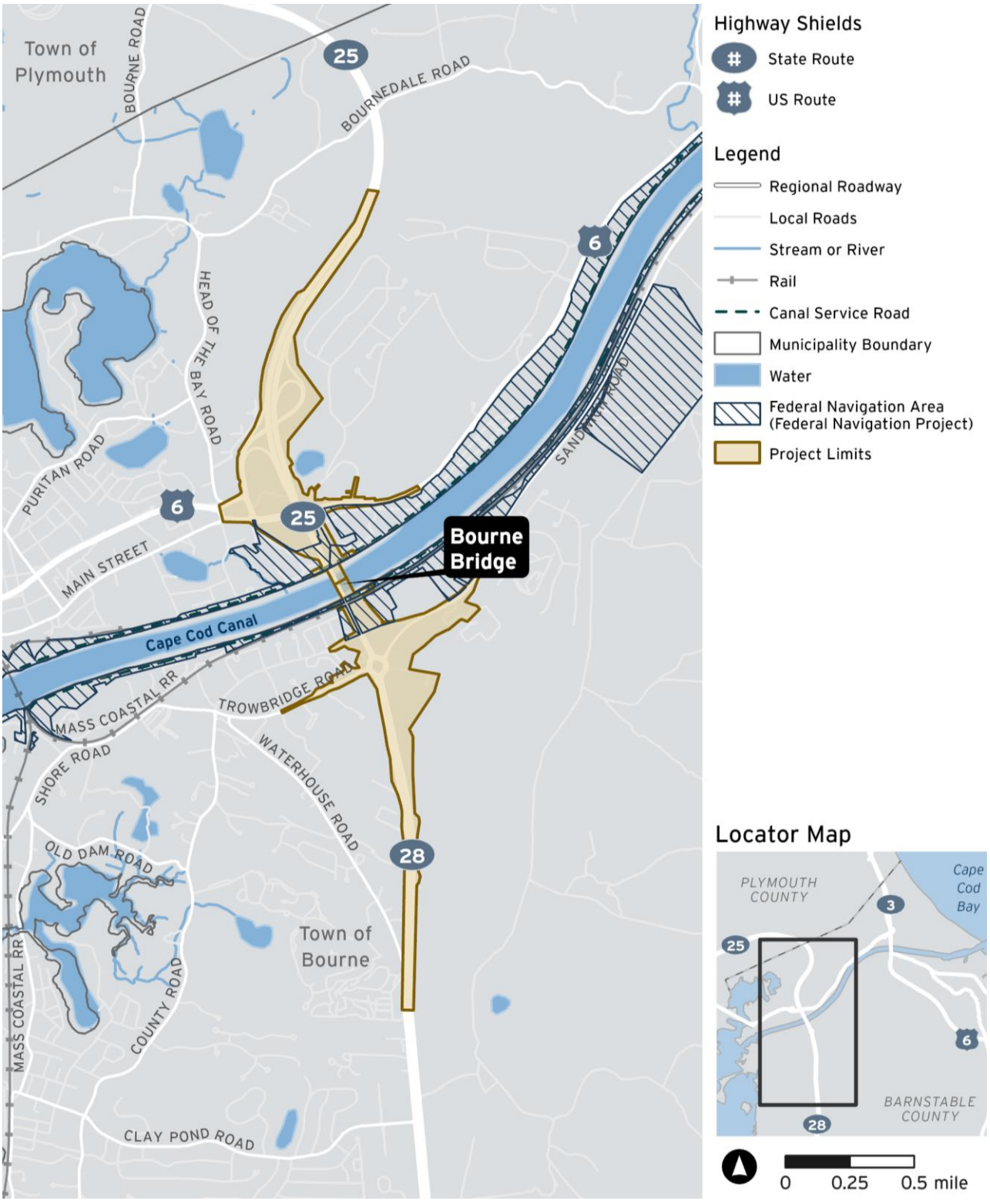
[7] U.S. Army Corps of Engineers. 2020. Cape Cod Canal Highway Bridges, MA, Major Rehabilitation Evaluation Report and Environmental Assessment. Appendix B:. Project History. March. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/MRERAppendicesA-B.pdf

[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

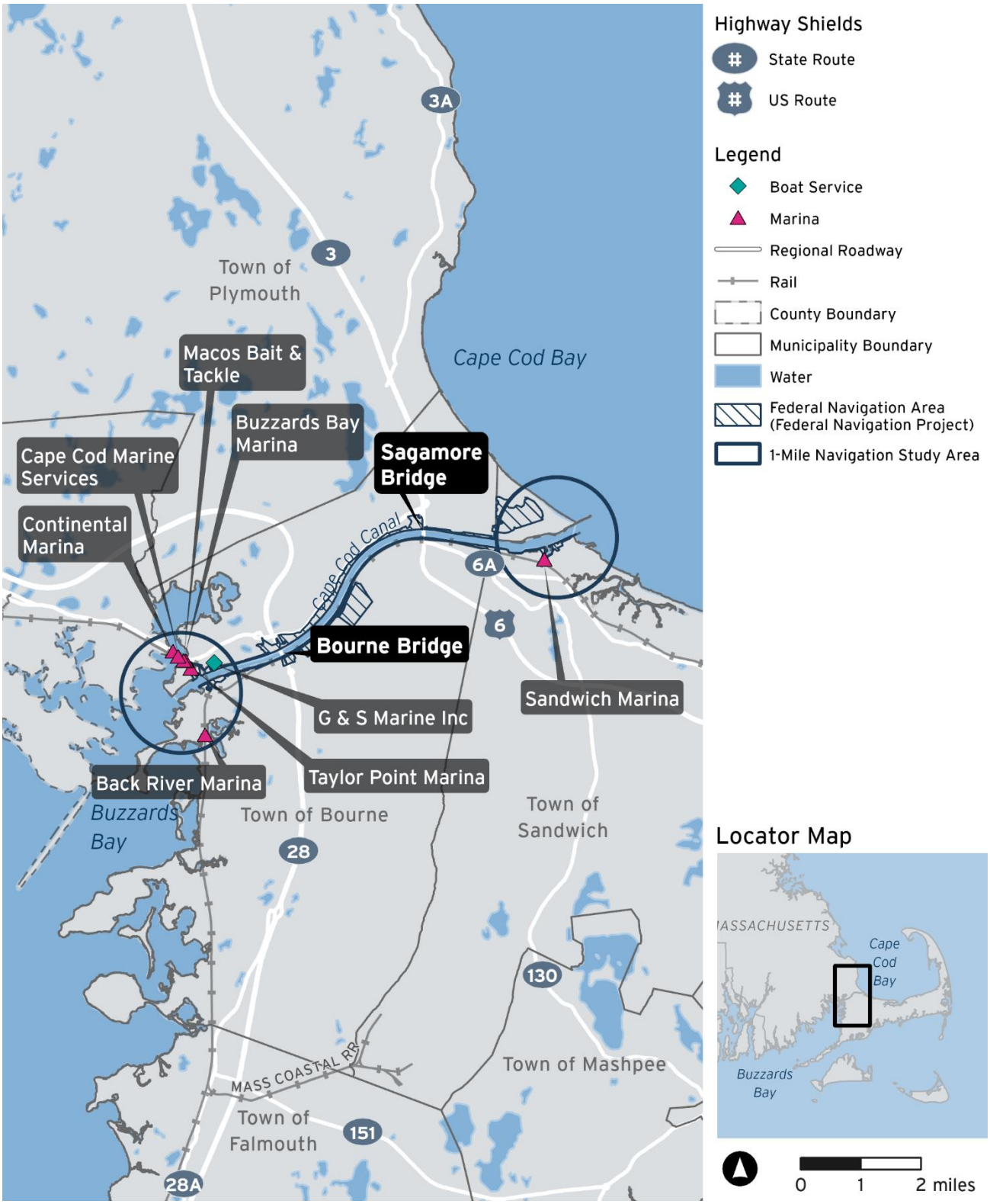
Source: Massachusetts Department of Transportation, 2024

Figure 4.4-2. Maritime Study Area: Bourne Bridge



Source: Massachusetts Department of Transportation, 2024

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 west toward Sagamore Bridge, September 2023

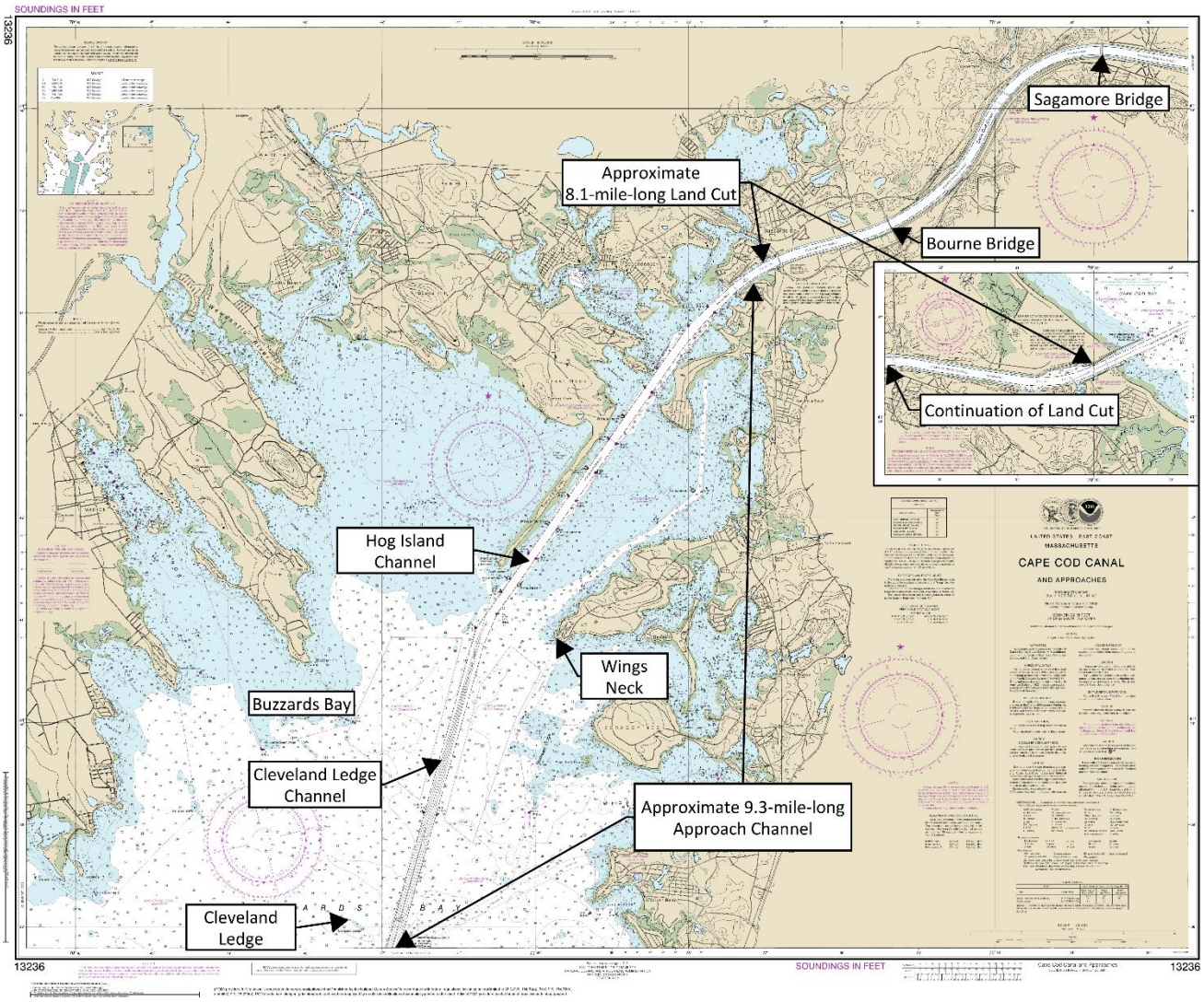
Source: Massachusetts Department of Transportation, 2023

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

The 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] Additional canal features of the FNP managed by the 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 the USACE implements under 33 CFR 207.20(b). The 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. The 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. The 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

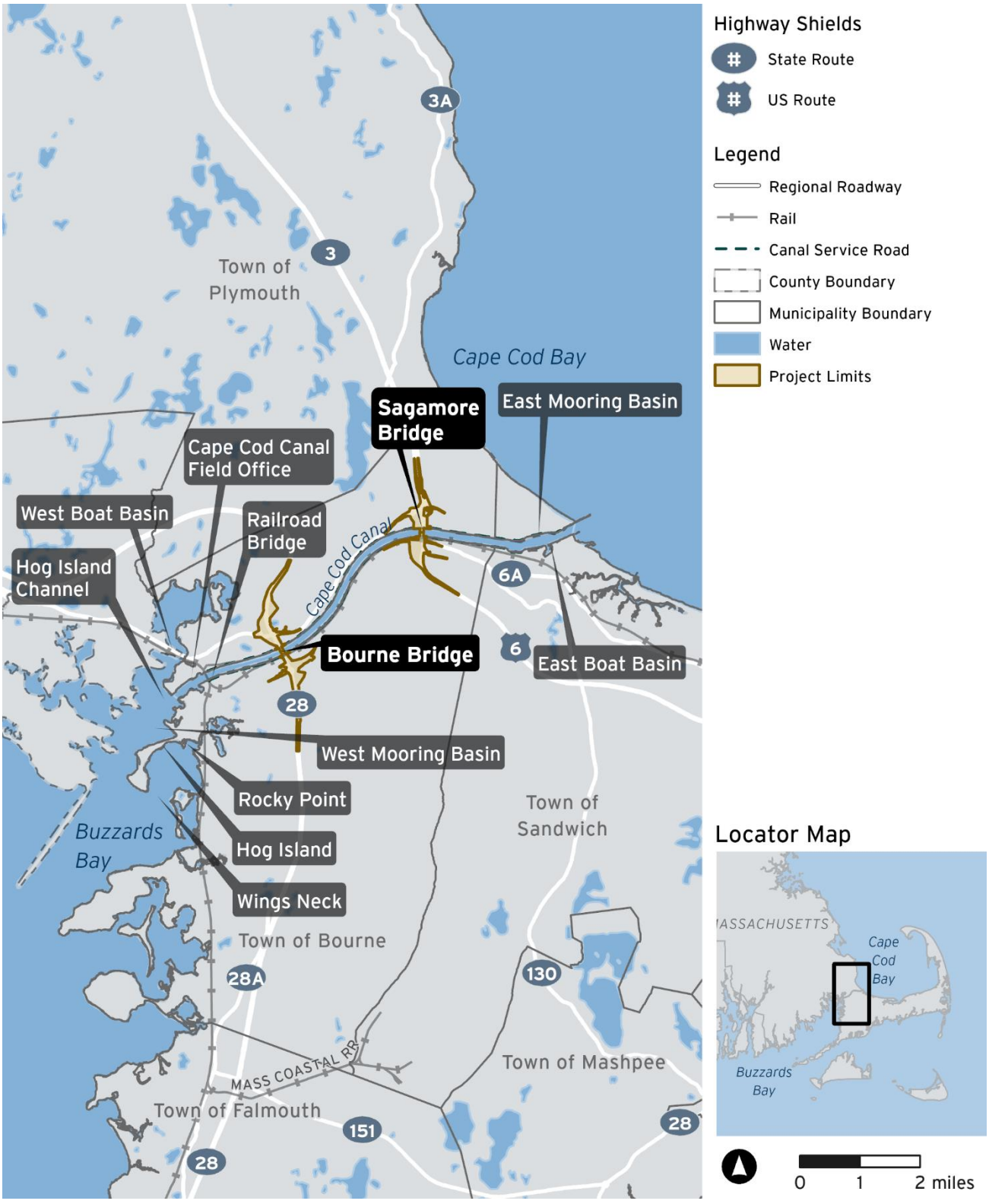
[10] U.S. Army Corps of Engineers. 2007. Cape Cod Canal Navigation Project map. April 20.

[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

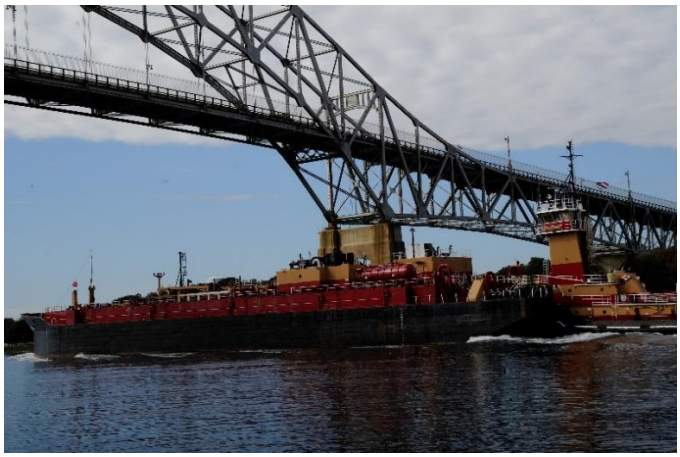


Source: Massachusetts Department of Transportation, 2024

4.4.2.4 Marine Traffic

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. The 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

According to the MRER/EA, canal traffic in 2018 totaled more than 21,700 vessels. The USACE reports vessels according to length:

- Vessels 65 feet or more in length, consisting of tankers, cargos, barges, fishing vessels, yachts, military vessels (and other types), totaled more than 7,400.
- Vessels under 65 feet in length, including fishing vessels and pleasure craft (among others), totaled more than 14,000.[15]

The USACE reports that the largest ships transiting the canal are typically about 600 feet long.[16]

4.4.2.5 Freight and Cargo Vessel Transits

The 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.[17] **Table 4.4-1** presents the total commodities transiting the canal from 2016 through 2022 (the most recently reported year) in thousands of short tons.

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[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

[15] U.S. Army Corps of Engineers. 2022. Cape Cod Canal Highway Bridges, MA. Major Rehabilitation Evaluation Report, Final Appendix D, Economics. March. page D-42. https://www.nae.usace.army.mil/Portals/74/docs/Topics/Cape%20Cod%20Canal%20Bridges/Reports/MRERAppendicesC-D.pdf

[16] 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/

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

Table 4.4-1. Commodities Transiting Cape Cod Canal (thousand short tons, rounded), 2016-2022

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

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, 5-Year Cargo Report, 2017 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2017/region/1/location/171); 5-Year Cargo Report, 2022 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2022/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.[18] 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. Current freight commodity characteristics are similar to CY 2019. In CY 2022, of the total 1,956,000 short tons of commodities, petroleum products represented almost 76%; the remaining commodities consisted of chemicals and related products, crude materials, and primary manufactured goods. In contrast to CY 2019, however, in CY 2022, domestic freight represented 100% of all commodities transiting Cape Cod Canal.

Per 33 CFR 207.20(f), Navigation Regulations, Cape Cod Canal, Massachusetts; Use, Administration and Navigation (Dangerous Cargoes),[19] vessels carrying petroleum and other potentially hazardous cargo 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 4.4-2** presents the total number of cargo vessel trips and **Table 4.4-3** and **Table 4.4-4** identify the types of vessel trips transiting the canal from 2016 through 2022, 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,[20] 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

[18] U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, 5-Year Cargo Report, 2019. 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.

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

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

- 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.[21]

Table 4.4-2. Cargo Vessel Trips through Cape Cod Canal, 2016-2022

Trip Types	2016	2017	2018	2019	2020	2021	2022
Upbound rts north of canal)	1,080	1,70	536	51	388	7	293
Downboun (ports south of canal)	756	1,16	112	16	77	3	249
otal	**1,836**	**2,86**	**648**	**67**	**465**	**10**	**542**

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, 5-Year Trips Report, 2017 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2017/region/1/location/171); 5-Year Trips Reports, 2022 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2022/region/1/location/171)

Table 4.4-3. Cargo Vessel Type Upbound Trips through Cape Cod Canal, 2016-2022

Vessel Type	2016	2017	2018	2019	2020	2021	2022
Towboat -Propelled)	30	308	75	38	68	2	36
Self-PropDry Cargo	86	265	27	43	50	0	0
Non-Self-Prpelled Dry Cargo	48	72	7	32	24	3	15
Non-Self-Prpelled Tanker Liquid Barg	62	984	394	348	15	2	242
Self-Propanker	24	72	33	50	96	0	0
otal	**1,08**	**1,701**	**53**	**511**	**38**	**7**	**293**

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, 5-Year Trips Report, 2017 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2017/region/1/location/171); 5-Year Trips Reports, 2022 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2022/region/1/location/171)

[21] 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.

Table 4.4-4. Cargo Vessel Type Downbound Trips through Cape Cod Canal, 2016-2022

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

Source: U.S. Army Corps of Engineers, Institute for Water Resources, Waterborne Commerce Statistics Center, Cape Cod Canal, 5-Year Trips Report, 2017 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2017/region/1/location/171); 5-Year Trips Reports, 2022 (https://ndc.ops.usace.army.mil/wcsc/webpub/#/report-landing/year/2022/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. The 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).[22]

4.4.2.6 Cape Cod Canal Maintenance

Since its original direction in March 1928 under the Rivers and Harbors Act of 1927, the USACE has operated and improved the canal.[23] Due to the strong tidal current and shifting shoals, the USACE conducts maintenance dredging every five to seven years to restore the canal to its authorized dimensions.[24] In 2015–2016, approximately 130,000 cubic yards of material were dredged, and the

[22] 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.

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

[24] 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). The 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 the USACE to maintain a safe channel.

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.[25]

The 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.[26] The 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. The 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 4.4-5 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**).

Table 4.4-5. 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

[25] 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

[26] 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

Facility	Facility Type	Location	Amenities/Services
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 the 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, the 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 the 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, the 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. The 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, the 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

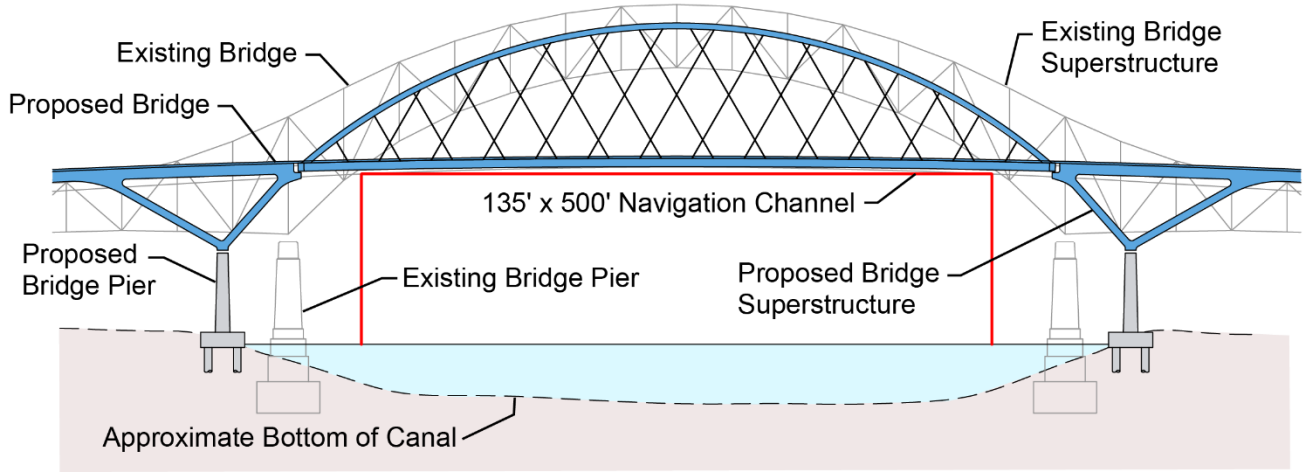
This section describes the potential operational and construction-period effects of the Build Alternative on the canal federal navigation channel, including vessel traffic.

4.4.4.1 Operational Impacts

The operation of the replacement bridges would not affect the waterway, nor would it alter the federally authorized 480-foot navigational channel. MassDOT developed the design of the replacement bridges in cooperation with the USACE to improve the navigability and the 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.[27]

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



Source: Massachusetts Department of Transportation, 2025

In accordance with the USCG's Preliminary Navigation 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

[27] 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/

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.

4.4.4.2 Construction Impacts

MassDOT developed the Program construction approach in coordination with a construction specialist. **Appendix 3.2, Construction Approach Technical Report**, provides details. 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.

MassDOT estimates that construction of each replacement bridge and demolition of each existing bridge would take approximately 8 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. Except for six short-term closures, replacement bridge construction and existing bridge demolition would be outside of the navigation channel and would not affect ongoing navigation.

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. 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.

Construction of each new delta frame would require approximately one year. Each new 616-foot-long bridge arch would be constructed off-site, floated on barges to the bridge site, and lifted into place by cable jacks mounted on the previously constructed delta frames. 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. The deconstructed bridge arches would be lowered onto barges and floated out of the canal to an off-site construction/staging area.

No temporary construction works associated with new bridge construction or existing bridge demolition would encroach into the navigation channel or close the canal for 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 near the edge of the canal and would not affect navigation. The existing piers, located in the waterway and outside the navigation channel, would be surrounded by containment cells for demolition. MassDOT proposes to remove the existing piers to the mudline; the exact depth of removal would be determined as design advances. Some demolished materials could be lifted away by crane, and some could be reduced to rubble in the containment cell and then removed by clamshell; demolition materials would be disposed off-site.

Construction of new elements farther from the canal, such as the proposed approach spans, would occur from cranes located either on work trestles or 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.

Dredging would be necessary to ensure an appropriate draft for construction support vessels, and post-construction efforts would be needed to restore the canal bottom profile for final riprap

installation. However, this work would take place outside of the navigation channel and would not affect navigation.

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, a minimum navigational width of 350 feet would be maintained for vessel passage.

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 arch and float-out of the deconstructed bridge arch. 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 cannot be halted or paused. MassDOT would coordinate all canal closures and, as applicable, canal encroachments, with the USACE and USCG for advance notifications to mariners.

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 the USCG for advance notifications to mariners, MassDOT does not anticipate adverse effects to navigation due to the Program.

4.4.4.3 Federal and State 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,[28] MassDOT will apply to the USACE for Section 408 review and permission for anticipated temporary and permanent alteration[29] of the waterway and abutting lands of the Cape Cod Canal FNP. The primary determinations of the 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

[28] 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.

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

the public interest." On March 21, 2025, MassDOT formally initiated the Section 408 process with USACE (**Appendix 4.4, Attachment 1**).

MassDOT is working with the USACE to define potential effects of the replacement bridges, including the construction staging areas and the permanent incorporation of the USACE's land holdings within the replacement bridge footprints, to ensure the ability of the FNP to function as authorized. Additionally, MassDOT's request for Section 408 permission will demonstrate that the use of the Civil Works project will be protective of the public interest, including the following:

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

As needed, MassDOT will identify measures to ensure the USACE's ability to fulfill its mission of the FNP during and after construction.

General Bridge Act of 1946

Pursuant to the General Bridge Act of 1946 (33 USC 525), and in compliance with the USCG Office of Bridge Programs Bridge Permit Application Guide,[30] MassDOT will apply to the USCG for individual bridge permits for the replacement Sagamore and Bourne Bridges.

The First Coast Guard District issued a Preliminary Navigation Clearance Determination dated March 11, 2025, to MassDOT and USACE (**Appendix 4.4, Attachment 2**). 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]

4.4.5 Mitigation

4.4.5.1 Operations-Related Mitigation

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

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[30] 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.

[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.

4.4.5.2 Construction-Related Mitigation

MassDOT would coordinate construction and demolition activities with the USACE Marine Operations Section and the USCG First 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 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, the 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.