

# QUINCY AND COLUMBIA POINT FERRY



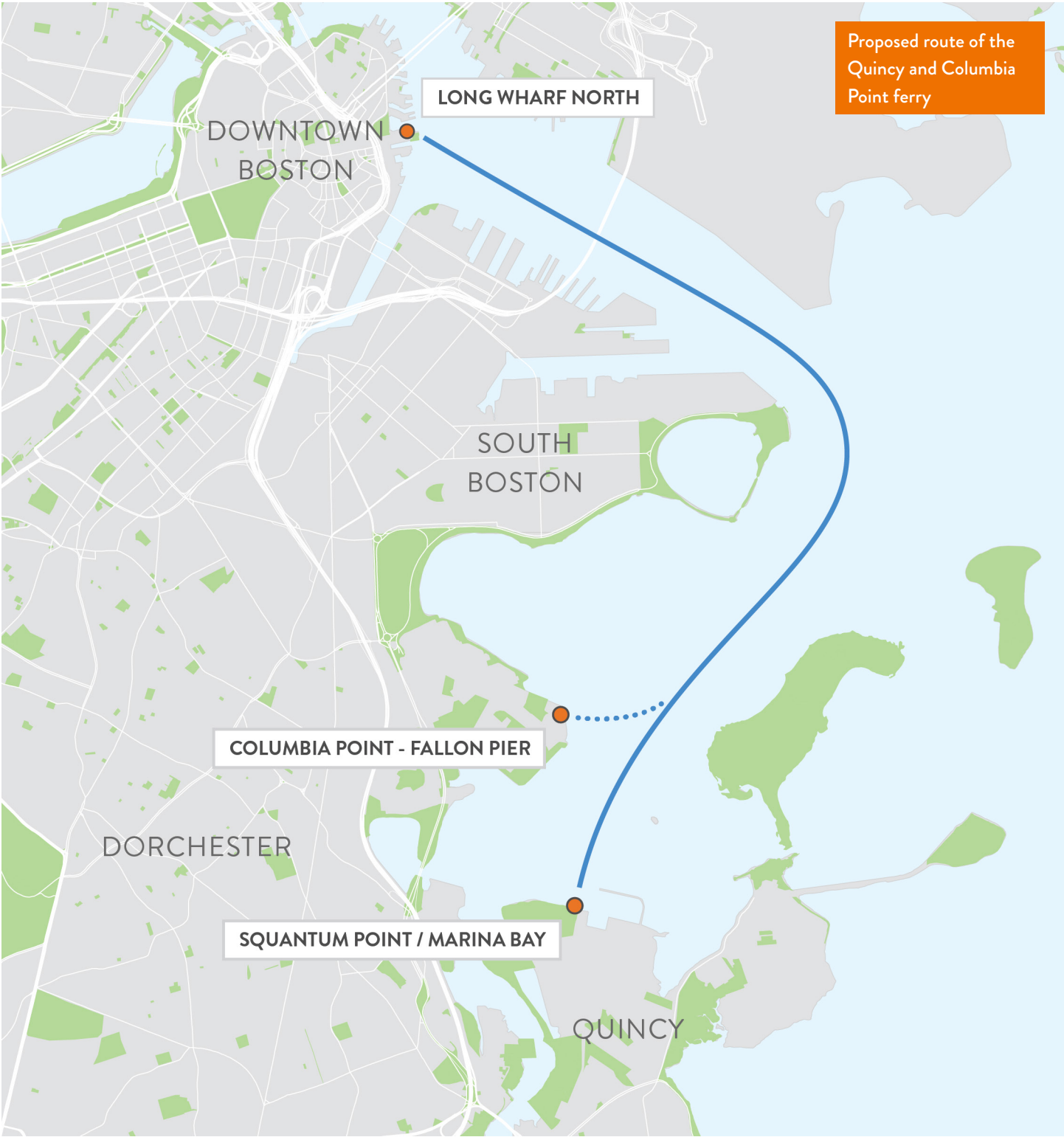
BUSINESS PLAN FOR NEW  
WATER TRANSPORTATION SERVICE



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## Quincy and Columbia Point Ferry

There is an opportunity to provide Quincy with direct ferry service to downtown Boston. With improvements to the docking facilities at the tip of Columbia Point, ferry service to the institutions on the peninsula can be included on the route as well. Recent development, especially along the waterfront, has and will continue to increase the transportation demand of these communities for residents and workers while new restaurants and institutions have also brought more people down to the Harbor.

This document provides a roadmap for initiating and maintaining a new service in Boston Harbor that connects Squantum Point and the adjacent Marina Bay development in Quincy with Long Wharf in downtown Boston and provide midday and weekend service to Fallon Pier at the end of Columbia Point in Dorchester. Marina Bay's residential population continues to grow and the marina itself is home to waterfront shops and restaurants. Columbia Point is home to multiple educational and cultural institutions that attract students, faculty, staff, and visitors. The proposed ferry service would provide all of these potential users with an important new transportation option.

Many ferry services have operated in Boston Harbor over the past four centuries. Some have been replaced by bridges, tunnels, trains, and buses. Other routes disappeared when ferries no longer served as an efficient travel alternative. Newer services have emerged and evolved to serve new areas with high demand. Quincy once had ferry service from the Fore River Shipyard and now has ferries departing four to six times per day from Columbia Point as part of a partnership with the Town of Winthrop.

This plan details how to establish regular, affordable ferry service and lays out the needed dock improvements, recommended route configuration, suggested vessels to lease, the projected ridership and fares, and four financial pro formas based on different combinations of these proposals.

The route would replace the existing seasonal service provided by the Town of Winthrop that is partially subsidized by mitigation funds while the Massachusetts Bay Transportation Authority (MBTA) makes repairs along the Red Line. It should be noted that the plans do not specify or require that the new service be operated by a state entity. Massachusetts Department of Transportation (MassDOT) and the Massachusetts Port Authority (Massport) were both among the funders of this study and hope to work in partnership with stakeholders and champions to support the implementation of this route.

Launching a new service or even adapting an existing service to better serve ferry customers requires strong business plans and the support of community members and business partners. This study has carefully developed economic models and cost estimates that provide a realistic framework for moving forward with the implementation of this service. In order for ferries to reach their full potential to offer economic and mobility benefits, the service must have public and private support when initiated and then it must attract and retain riders to sustain ridership growth over time.

By starting the conversation about new services with a strong data-driven business plan, it is the intention of the primary authors and stakeholders of this report—including Boston Harbor Now, MassDOT, and Massport—to provide an economically sustainable model for the development of new ferry service.<sup>1</sup> This plan's development was guided by stakeholder input, ridership and financial modeling, infrastructure analysis, and operational expertise designed to provide a common set of data points and assumptions that can be used by all of the parties involved in its implementation. It forecasts ridership, revenues, operating costs, and capital costs. MassDOT and the other funders of this study are committed to partnering with stakeholders who want to implement the new service and to ensuring that communities have reliable transportation options to meet their mobility needs.

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<sup>1</sup> A complete list of the study's funders can be found on page 69.

## Overview

The new proposed route from the South Shore would connect Squantum Point/Marina Bay in Quincy and Long Wharf in downtown Boston with off-peak service to Fallon Pier at Columbia Point in Dorchester.

For the purpose of this business plan, the modeling assumed that the ferries would operate on weekdays from 6:30 AM to 10:00 PM. During peak commute hours, from 6:30 AM to 9:00 AM and again from 3:30 PM to 6:30 PM, two vessels would depart from the Boston and Quincy terminals every 40 minutes. During the off-peak hours, the vessels would depart every 60 minutes to allow time for refueling. With the installation of ferry docking facilities at Fallon Pier, the vessels could make intermediate stops at Columbia Point during the off-peak period as well. There would also be weekend service with ferries departing every 60 minutes.

After defining the route and frequency, ridership assumptions and financial plans were developed for leased vessels operating on this route with both a \$6.50 and a \$10.00 fare. Two possible scenarios were studied based on these combinations. Each scenario includes capital costs for the docks, operational costs that vary by vessel, and operational revenue that varies based on fares and ridership. Across the different configurations, annual ridership with weekday and weekend service is projected to be between 190,000 and 412,000.

### Proposed Schedule

#### Weekday Service

6:30 AM – 9:00 AM - Every 40 minutes  
9:00 AM – 3:30 PM - Every 60 minutes  
3:30 PM – 6:30 PM - Every 40 minutes  
6:30 PM – 10:00 PM - Every 60 minutes

#### Weekend Service

6:30 AM – 10:00 PM - Every 60 minutes

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## Why Ferries

Boston Harbor has a long legacy of passenger ferries dating from the 1600's when vessels provided connections that were later replaced by bridges, tunnels, and trains. This plan builds on that history without trying to recreate it. Its purpose is to introduce a new ferry route in the next few years with a fresh perspective and clear contemporary reasons for expanding water transportation service in the harbor. The dramatic changes to the waterfront in Boston and Quincy over the recent decades—and not a legacy of ferry service—is why the implementation of this plan is essential now.

Providing effective, reliable, affordable, and accessible scheduled water transportation connections between Quincy, Columbia Point, and downtown Boston contributes a range of social benefits. Passengers have direct benefits, including quality of life improvements from a new mobility option. There are also indirect benefits to the broader transportation system, the environment, and economic development. The system will serve residents and workers, increase access to recreation and leisure destinations, and has the potential to provide resiliency and redundancy in case of an emergency.

For people living and working in the neighborhoods served by this new service, access to this ferry can improve their quality of life across multiple metrics. Some ferry passengers will have a faster trip door-to-door than on existing alternatives. Depending on parking fees and other transportation costs, ferry customers may have a lower out-of-pocket cost per trip. For some locations, the ferry trip may be more convenient—with fewer transfers, shorter waiting times, and a shorter walk at the ends of the trip—than existing transit options. The ferry is also likely to provide a very reliable trip since existing service has the best on-time performance of any mode in the MBTA's portfolio.

Ferry passengers typically report that they find water transportation to be more enjoyable and comfortable than

their alternatives. Whether it's the views, amenities, or experience of being out on the water, most passengers find something aesthetically pleasing and compelling about making a trip across the water and spending part of their trip walking to or along the waterfront. Coast Guard safety regulations, designed to ensure safe loading of vessels and safe operations at sea, also provide more space per person on board vessels than what is required for the safe operation of trains and buses.

When ferry docks are proximate to train stations, bus stops, and the terminals of other ferry routes, the entire system benefits from increased connectivity and attracts riders who want to have more options. A new ferry service also provides benefits to people who continue to rely on the trains, buses, and segments of roadways that ferry passengers are no longer using by reducing congestion. Given the relatively small passenger volumes even on thriving ferry routes, these indirect benefits are relatively modest.

By shifting from driving to ferry riding for some or all of their trip, passengers can reduce vehicle emissions; however, routes that primarily serve people who can walk or bike to the ferry terminal or who rely on other forms of transit may not reduce total carbon emissions. Emissions reductions are also dependent on the type of engine used to power the vessel. Still, moving any emissions from roadways in dense urban neighborhoods to the water may have a public health benefit.

Around the Boston region, the clean-up of the Harbor has led to an increase in waterfront development as new residential and commercial buildings have sprouted along the water. Providing ferry services to these growing neighborhoods and districts can increase property values and expand access to jobs, restaurants, and retail. While this kind of transit access can contribute to displacement, it can also serve to connect residents with direct access to jobs in areas that are hard to access now. New ferry routes can also provide additional connections to waterfront recreational opportunities including parks and cultural assets. These new services can allow additional visitors to more easily travel to these areas and may lead to an increase in leisure spending.

In the event of an emergency, each ferry system has unique challenges and opportunities to play a role in the response and recovery. Though ferries do not typically operate during storms, they can be a critical component in waterfront resilience once the flooding and wind have subsided. Rather than planning for any one threat and measuring the fleet's possible impact, Boston can look to examples from New York to San Francisco, where ferries have been used to solve transportation problems in the face of natural and man-made disasters.





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## Ferries in 2018

Ferry service in Greater Boston has been operated by a combination of public and private entities or in partnerships between them. The longest operating ferry within Boston Harbor is the Hingham service that began as a private ferry in 1975 before becoming part of the MBTA system in 1984. It has led to housing and commercial development in Hewitt's Cove, though it has taken several decades for those changes to unfold and for ridership to grow to current levels. Since then, new services have been established to serve Charlestown, Hull, Quincy, Salem, and Winthrop with different combinations of municipal, state, and private owners and operators. Over the last thirty years there have been periods of ferry service from the Fore River Shipyard in Quincy, Lewis Mall in East Boston, and Blossom Street Pier in Lynn.

### Existing Conditions

In the summer of 2018, there were five public ferry routes providing commuter and recreational service in Boston Harbor. The MBTA operates three year-round commuter services through contracts with Boston Harbor Cruises (BHC). The City of Salem also partners with BHC to provide seasonal ferry service between Salem and Boston. The Town of Winthrop owns and operates their own ferry that connects Winthrop with Central Wharf in Boston, Fan Pier in the Seaport, and Squantum Point in Quincy. There were also two privately run services that connect Boston and Provincetown operated by BHC and by Bay State Cruise Company (BSCC). There has been some ferry service from Lynn in recent years, but there was none in 2018.

Seven ferry routes provided access to the Boston Harbor Islands. Public ferries to six of the Boston Harbor Islands leave from gateways at Long Wharf North and from Hewitt's Cove in Hingham between mid-May and early October. There is also weekend service to Thompson Island from the EDIC

Pier on Boston's Reserved Channel from late May to early September.

In January 2019, a new ferry service began between Lovejoy Wharf next to North Station and Fan Pier in the Seaport. The service is operated by BSCC, managed by the Massachusetts Convention Center Authority (MCCA), and funded by major employers in the Seaport. The ferry replaced a consolidated shuttle service that was providing bus service from North Station that regularly got stuck in traffic. It will operate year-round during peak commuting hours—from 6:20 AM to 9:40 AM and from 3:20 PM to 7:00 PM. There are a limited number of seats open to the public for \$5.

There are also smaller water transportation services available that respond to a lack of existing ferry connections. A launch boat connected Pier Six restaurant in Charlestown with the Reel House restaurant in East Boston seasonally in 2017 and 2018. The Institute for Contemporary Art (ICA) initiated a seasonal water shuttle service in the summer of 2018 to connect the main museum building in the Seaport with a new venue in the East Boston Shipyard. Both services are expected to continue in 2019. In 2019, a new water transportation service is planned for Encore Boston Harbor Casino in Everett with service to downtown Boston and the Seaport.

## Year-round MBTA Ferry Services

	Hingham to Boston	Hingham to Hull to Logan to Boston	Long Wharf to Charlestown
Docks	Hewitt's Cove, Rowes Wharf	Hewitt's Cove, Pemberton Point, Logan Airport, Long Wharf North	Navy Yard Pier 4, Long Wharf Central
Seasonality	Operates year-round	Operates year-round	Operates year-round
Weekday roundtrips	18	19	39
Weekend roundtrips	N/A	14 (only available Memorial Day to Columbus Day)	17
One-way Fare*	\$9.25/ride	\$9.25/ride	\$3.50/ride
Monthly Pass	\$308	\$308	\$84.50
Ridership	827,397 (2016)	337,499 (2016)	317,355 (2016)
Farebox Recovery**	72% (2015)	74% (2015)	58% (2015)
Owner	MBTA leases vessels from BHC	MBTA owns vessels	MBTA leases vessels from BHC
Operator	Boston Harbor Cruises	Boston Harbor Cruises	Boston Harbor Cruises
Funding	MBTA and farebox	MBTA and farebox	MBTA and farebox
Travel Time	35 minutes	Varies, 23 to 55 minutes depending on stops	10 minutes
Notes		Summer stops on Georges Island	

\* Discounted fares are available for students, seniors, and people with disabilities.

\*\* The MBTA reported a combined farebox recovery rate of 71% for the three routes in FY2015.



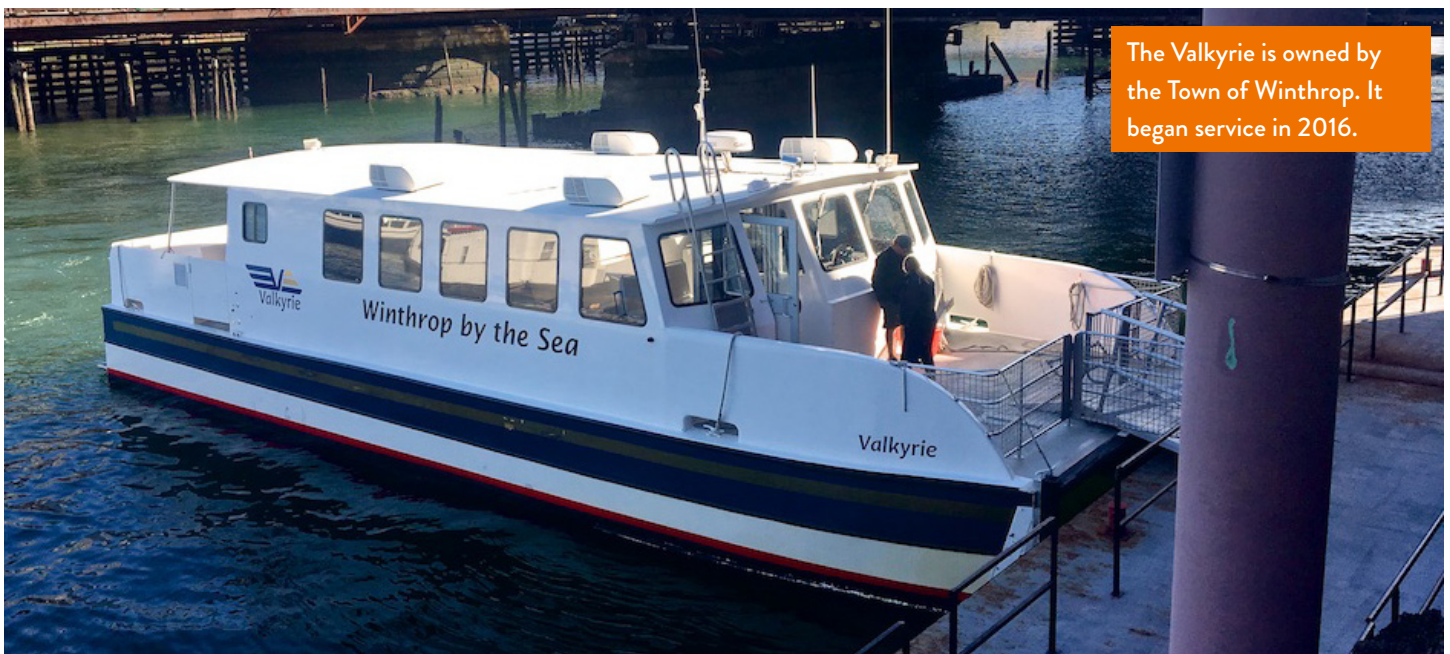
The Champion is one of the MBTA's newest vessels. It launched in 2017.

## Seasonal, Non-MBTA Ferry Services

	Salem to Boston	Winthrop to Quincy to Boston	Boston to Provincetown
Docks	Salem Ferry Terminal, Long Wharf North	Winthrop Ferry Dock, Squantum Point, Fan Pier, Central Wharf	Long Wharf South, World Trade Center West, MacMillan Pier
Seasonality	May – October 31	April – November	May – October
Weekday roundtrips	5	4 - 6	1 - 4
Weekend roundtrips	5	3 - 4	1 - 4
One-way Fare	\$25 (\$8 for commuters)*	8.50 (\$6 for commuters)	\$59 (\$88 roundtrip)
Ridership	61,185 (2016)	20,163 (2018)	
Farebox Recovery	91% (2016)**	58% (2016)	> 100%
Owner	City of Salem owns the vessel	Town of Winthrop	BHC and Bay State Cruises
Operator	Boston Harbor Cruises	Town of Winthrop	BHC and Bay State Cruises
Funding	City of Salem and farebox	Farebox with temporary MBTA support and additional funding	Farebox with market rate ticket pricing
Travel Time	55 minutes	Varies, 25 to 65 minutes depending on stops	90 minutes
Notes	Differentiated pricing for tourists subsidizes the cost for commuters	Saturday connections to Spectacle Island and some sunset cruises	

\* Discounted fares are available for students, seniors, and people with disabilities as well as for Salem residents and North Shore residents;

\*\* This farebox comes from BHC and includes ticket and galley revenues.



## Best Practices

Every region and local market has its own unique characteristics that shape the existing ferry system – weather, geography, governmental structures, demographics, and density of ridership. Access to connected roadways, reliable trains and buses, and safe routes to walk and bike all play a role in people being able to rely on and connect to ferry service as part of a transportation ecosystem. In a national evaluation of best practices conducted by the consultant team, the three greatest factors in developing a successful service were time and fare competitiveness, system integration, and sustainable funding.

Effective ferry services attract riders and compete with other travel options by providing an efficient and affordable alternative to other modes of transportation. Though driving may cost less than a ferry ticket, parking in downtown Boston often costs more. Potential passengers are more likely to choose a ferry when a new service can save them time, money, or both. The ferry must be competitive with other modes and draw from a sizable population of commuters who could take the ferry on a regular basis. Although there may be a sizable number of recreational riders who use a service, there must be a core group of people who form the base of the service’s ridership for it to be sustainable. Potential passengers will drive to a ferry terminal if the service provides them with a faster and more reliable service than driving all the way to their final destination. Other passengers make decisions about taking a ferry if the price is competitive with their other options or adds value to their trip.

Ferry services attract more passengers when they are coordinated with other modes and integrated with existing transportation systems. Ideally, ferry schedules are synchronized with transit connections at the ferry terminals to enable those passengers with farther to go to connect with trains, buses, or other ferries. The fare payment system should allow passengers to transfer or to make a choice on a daily basis about which mode of transit best suits their travel needs that day. One of the potential benefits of the new automated fare collection that is being developed for the MBTA is that more operators could choose to use the MBTA fare payment system even if not all of the services are part of the MBTA system. Comprehensive branding and wayfinding clearly identify departure locations and connections and provide clear user directions for new riders. Finally, the service should be incorporated into data systems including websites and smart phone apps so that the ferry is included as an option when planning a trip.

As with many public transit operations in the United States, few year-round passenger ferry services are sustained entirely by passenger fares. Securing stable funding, particularly through the initial years of a new service is crucial to establishing a reliable service that passengers can depend on. Consistent financial support from private and/or public sources ensures that the service can operate continuously as ridership grows. New services should be given a reasonable and clearly established time period in which to grow and mature before decisions are made about their viability. Many pilots measure the success of programs over the course of three to six months, but it can take more time—up to five years after initial implementation—to fully establish a ferry service. Once a service has matured, some additional forms of federal grants become available to support capital investment. If the pilot is well designed, the data sets will be large enough over the time frame to understand trends and adjust service accordingly. Knowing that ferry services will be financially supported for a longer period of time is crucial for justifying capital investment, including needed capital maintenance, and for securing high quality operators. This commitment in

### National Ferry Systems Studied

NYC Ferry (East River) - New York  
San Francisco Bay Ferry (WETA) - California  
Golden Gate Ferry - California  
Kitsap Ferry - Washington  
King County Marine Division - Washington

turn attracts passengers, while services with perennial funding deficits are unlikely to persist.

In evaluating ferry systems and services across the country, it is clear that successful ferry services have found the right service delivery model with an effective combination of public and private involvement in vessel ownership and operations. High quality ferry services are sustained by making informed decisions about providing the service and by thoughtfully determining the appropriate hours, days, and seasons of operation. Operational decisions maximize efficiency with thoughtful dock locations, simplified fare collection, and good systems for queuing. Additionally, many ferry services contribute to the resiliency of the transportation system by providing a regular alternative means of travel as well as by contributing to emergency response and recovery programs.

Ideal ferry services use sound environmental practices and strive in particular to be fuel efficient in order to reduce emissions and operating costs. Finally, when operated well, ferry services adhere to measurable performance standards that demonstrate high levels of on-time performance and trip reliability, efforts to optimize fuel consumption, reasonable operating costs per passenger, and responsiveness to ridership demand.

For a more detailed analysis of best practices, a separate report prepared in December 2017 can be read at [www.bostonharbornow.org/ferryplans/resources](http://www.bostonharbornow.org/ferryplans/resources).





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## Comprehensive Study Process

The Comprehensive Water Transportation Study process was designed to iteratively collect structured feedback from the public and pair it with rigorous data analysis and careful decision making. The three largest public engagement efforts were

- Three water transportation stakeholder workshops with 100 participants,
- A stated preference survey that collected 3,689 responses from residents of Greater Boston, and
- A water transportation open house that attracted 150 participants.

Regular updates were provided to MassDOT's Water Transportation Advisory Council (WTAC), which includes state and local elected officials, representatives of state agencies, and other organizations. Additionally, members of the team did smaller presentations to other interested stakeholder groups and shared information about water transportation and the study in advocacy forums.

### Collecting Ideas

At the beginning of the process, the Comprehensive Water Transportation Study was designed to cast the widest possible net for possible ferry routes to study. Water Transportation Stakeholder Workshops were held three communities—Salem, Quincy, and at the MassDOT headquarters in Boston. Though they were open to members of the public, invitations were sent to representatives of coastal communities, relevant state agencies, and community members with expertise in ferries and other forms of water transportation. A broad mix of participants from mayors and state-level elected officials to local advocates participated in the three workshops with more than 100 people attending in total.

Workshop participants were provided with existing

conditions information and a presentation on effective ferry operations and national best practices before taking part in two breakout sessions to discuss possible dock sites, routes, and selection criteria. Some of the sites discussed did not meet basic criteria for water depth and population density, but the thirty-five sites listed on the following page were discussed at the workshop and a dock assessment was completed for thirty of them. Sites marked with » had regularly scheduled ferry service within Boston Harbor or to Boston in the summer of 2017 when the workshops were conducted. Sites marked with " have a pier that could be used for ferry docking in April 2019, though some of these are subject to tides. The largest change has been the reconstruction of Lovejoy Wharf, completed in January 2019. The docking facilities fully accommodate bow-loading ferries that can fit under the North Washington Street Bridge.

During the second discussion about selection criteria and benefits, participants talked about how ferry service would affect potential users, the existing transit system, and the region more broadly. Ferries were considered particularly important for passengers when they provide a faster trip than other travel options, more consistent trip times compared with more congested alternatives, improved safety, and a pleasant transportation experience. Ferry services were seen as beneficial to the broader transit network when they provide direct access without transfers, when they have the potential to increase the total number of transit riders by providing potential customers with more choices, and when they provide a cost-effective way to fill in service gaps or absorb excess demand. Participants were optimistic that new ferry services could encourage and support waterfront development and redevelopment, provide system redundancy that could be particularly important during an emergency, reduce the number of drivers as they opt to take ferries thereby leading to emissions reductions, and provide health benefits for people who walk and bike to catch the ferry.

The most commonly recommended route was an inner harbor circulator.

For a more detailed report on the feedback provided at the stakeholder workshops, a separate document prepared in September 2017 can be read at [www.bostonharbornow.org/ferryplans/resources](http://www.bostonharbornow.org/ferryplans/resources).

### Forecasting Ridership

During August and September of 2017, a stated preference survey collected data on how people in Greater Boston make travel decisions. One team of surveyors rode the ferries in Boston Harbor with tablets collecting responses to the survey and another team passed out postcards with links to the survey at transit stations around the region. Postcards were also available on ferries and from partner organizations who were involved in the study. Email blasts, social media, and an advertisement in the Boston Globe were also used to promote the survey. A few hundred random participants were paid to take the survey. In total, over 3,500 validated survey responses were used to build a ridership demand model for possible ferry services.

The survey asked participants a series of demographic questions about their age and income. It then sorted them into current commuter ferry users, potential commuter ferry users, current island ferry users, or potential island ferry users depending on their home and work zip codes and their recent water transportation usage. The survey went on to ask questions about travel decisions, how people chose to spend money on their trips, and how much they would pay for different combinations of driving and transit. Although more than half of the non-paid participants responded to the survey as though it was a work commute, the survey included shopping, errands, appointments, leisure, visits to friends, and sightseeing as other trips.

### Dock Sites Proposed at Workshop

Municipality	Proposed Dock Locations
Gloucester	
Beverly	
Salem	Salem Ferry Terminal »
Lynn	Blossom Street Pier »
Winthrop	Winthrop Ferry Dock »
Chelsea	Mary O'Malley Park
Everett	Encore Boston Harbor
Boston	
- East Boston	Logan Airport Ferry Terminal » Lewis Mall Liberty Plaza
- Charlestown	Sullivan Square/Schrafts Navy Yard (Yard's End) Navy Yard/Pier 4 » Navy Yard Pier 1 ``
- North Station	Lovejoy Wharf ``
- Downtown	Long Wharf North + South » Central Wharf `` Rowes Wharf »
- Fort Point	Atlantic Wharf (South Station)
- Seaport	Federal Courthouse/ Moakley Fan Pier (ICA) » World Trade Center West » World Trade Center East `` Dry Dock #4 EDIC/Marine Industrial Park »
- Dorchester	Columbia Point at Fallon Pier UMass Boston at Fox Point
Quincy	Marina Bay/Squantum Point » Town River Fore River
Hingham	Hewitt's Cove »
Hull	Pemberton Point » Steamboat Wharf
Plymouth	
Provincetown	MacMillan Pier »

» Denotes location with ferry service in the summer of 2017

`` Denotes existing piers where ferries could dock in April 2019

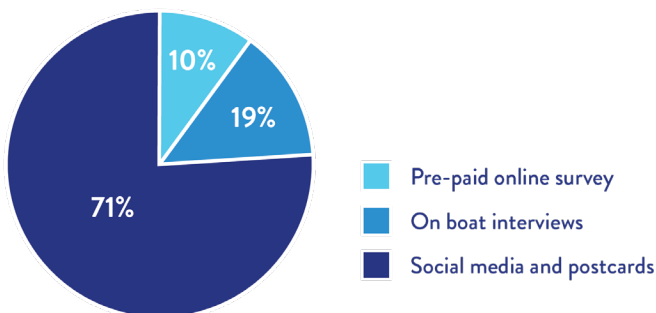


While the survey was being conducted, the team was also studying thirty dock sites that had been proposed during the stakeholder workshops. For each site, four types of data were collected:

- Geographic data about the area around the dock site and the multimodal options available to access it;
- Demographic data about the population around the dock site including the size of the population, the size of the labor force, where they work and how they get there, and other demographic traits including income that might affect people’s decisions to take a ferry;
- Development data about recent and planned construction that would impact the growth in demand for a ferry over the next five years; and
- Physical site conditions relating to the existing pier, ramp, and floats as well as any proposed or funded designs.

These analyses made it clear that some sites were stronger candidates than others for new service in the near term.

### Source of Stated Preference Survey Responses



### Narrowing the Dock List

In November of 2017, the thirty dock profiles were presented at an eight-hour open house at Rowes Wharf on the Boston waterfront. The public was invited via email and social media to attend and provide feedback. Participants were invited to read and provide feedback on the dock profiles as well as the previously prepared reports on the stakeholder workshops, existing conditions, and best practices and some of the data from the stated preference survey. One hundred fifty people attended the day-long event and most people shared some form of feedback from report edits to route suggestions to comments on the choices of which dock locations would be studied further.

With the criteria that all dock locations that qualified for further study needed to have the potential to attract robust ridership and be implemented within the next one to five years, the following sites were selected for further analysis.

The sites that were not selected showed a lack of readiness to host a successful service in the immediate future. These sites

- lacked indicators of robust ridership demand,
- required significant capital investment in dock construction or dredging, which also requires significant federal and state permitting time,
- did not have local partners ready to advance needed projects, and/or
- have or will have privately operated ferry service that does not require a new business plan from this particular study.

Most of the dock sites do have the potential for new or expanded service over the longer term and could be the focus of future examination. The two ferry services from Boston and the one from Plymouth will continue to provide connections to Provincetown.

The results of the Open House and the narrowed list of dock sites were presented in December to the Water Transportation Advisory Council and to the Seaport Economic Council of the Executive Office of Housing and Economic Development.



150 people participated in the Water Transportation Open House at Rowes Wharf in December 2017.

### Dock Sites Selected after Open House

Municipality	Proposed Dock Locations
Salem	Salem Ferry Terminal »
Lynn	Blossom Street Pier ``
Winthrop	Winthrop Ferry Dock »
Boston	
- East Boston	Logan Airport Ferry Terminal » Lewis Mall
- Charlestown	Navy Yard/Pier 4 »
- North Station	Lovejoy Wharf ``
- Downtown	Long Wharf North + South » Rowes Wharf »
- Seaport	Fan Pier (ICA) » World Trade Center East ``
- Dorchester	Columbia Point at Fallon Pier
Quincy	Squantum Point/Marina Bay »
Hingham	Hewitt's Cove »
Hull	Pemberton Point »

» Denotes location with ferry service in the summer of 2018  
 `` Denotes existing piers where ferries could dock in April 2019

### Selecting Routes

As the study continued through the winter of 2018, the scope of work required that a limited number of routes be studied sufficiently to develop business plans. It became clear that some routes were too advanced to benefit from the creation of more detailed business plans while others had the potential to grow or evolve without a more detailed analysis. Salem has robust seasonal service and was awarded a Federal Transit Administration (FTA) Passenger Ferry Grant for \$3,400,000 in the spring of 2018 to acquire a second vessel. Lynn has a business plan for ferry service that was completed by MassDOT in February 2017 that has yet to be implemented. Winthrop has a business plan, owns a vessel, and will launch its fourth year of service in April 2019. They continue to experiment with route configurations and pricing. The MBTA services to Hingham are growing ridership and there is potential to experiment with an additional stop in the Seaport in the future. The MBTA service to Hull is also growing and additional weekend service was added in the summer of 2018. A ferry service funded by Seaport

employers connecting Lovejoy Wharf next to North Station and Fan Pier launched in January 2019 after several years of careful planning.

Of the possible routes there were two that seemed to be the most promising options for new routes – a service that would connect a series of docks in the Inner Harbor and a new service that would provide a direct connection between Squantum Point in Quincy that could also serve Columbia Point. Each of these landings has seen new development and growth over the past decade that has increased the potential demand for ferry services. The findings of continued study of the docks, routes, vessels, and ridership for a potentially successful service between Squantum Point /Marina Bay and Long Wharf with off-peak stops at Fallon Pier can be found on the following pages. A comprehensive business plan for a new Inner Harbor Connector can be found in a separate report.

Multiple docks and configurations were considered for service to southern parts of Boston, to Quincy, and to the South Shore. Since Hingham and Hull already have service to downtown Boston, they were primarily being considered for expanded service to the Seaport. Given that such service expansions are relatively simple to implement and test and that the business plans in this process were supposed to focus on new service, further modeling and development was not done for a South Shore to Seaport service. The initial ridership forecasting illustrated that there was demand from Quincy and Dorchester.

In Quincy, Squantum Point/Marina Bay was the only site considered as part of this study due to the high levels of residential demand. Though there has previously been Quincy ferry service from the Fore River Shipyard near Weymouth, it lacked good proximity to residential density and was challenging to access. Additionally, the trip from the Fore River site took considerably longer than trips from Squantum Point/Marina Bay. Squantum Point/Marina Bay had the right combination of local development, existing infrastructure and strong initial results in the ridership modeling. Additionally, an ongoing roadway project is extending Commander Shea Boulevard to the landing, which will make access to the dock

and adjacent parking significantly easier by car.

On Columbia Point in Dorchester there were two sites considered near UMass Boston: Fallon Pier and Fox Point. In the initial ridership forecasting, both dock sites had similar levels of demand. However, Fallon Pier was selected for this route because of the physical limitations at Fox Point, which would have required substantial dredging to accommodate ferries. Fallon Pier, which also provides better proximity to tourist destinations, required only dock improvements.



## Dock Locations and Conditions

Boston Harbor has a variety of docking locations ranging from marinas to water taxi stops to potential ferry docks. Eight dock locations south of the Inner Harbor were included in the initial dock survey. Two of them—Fox Point and Steamboat Wharf—were eliminated from further study due to water depth limitations. Provincetown has a successful recreational service, but initial analysis showed a lack of potential for commuter service due to the size of the market area working in Boston. Plymouth similarly lacked sufficient commuter demand. Four of the dock locations were studied further in the ridership analysis. The two sites—Hewitt’s Cove and Pemberton Point—have existing MBTA service that will continue to operate, and the former has FTA funding to improve it, but neither is included in this business plan. Two dock locations were selected for this business plan: Squantum Point/Marina Bay and Fallon Pier at Columbia Point.

### Dock Locations Selected for the Route

These docks are proposed as part of the new southern route to downtown Boston. More information on each of these dock locations and Long Wharf is available in the sections that follow.

Dock	Location	Current Conditions
Squantum Point/Marina Bay	Quincy	Existing Winthrop ferry service
Fallon Pier at Columbia Point	Dorchester	Existing pier but not floats or ramps; needs dock improvements to accommodate ferries
Long Wharf	Downtown Boston	Existing MBTA and Salem ferry service at Long Wharf North and Central; existing service to Quincy and Winthrop docks nearby on the south side of the Aquarium

### Potential Dock Locations Not Selected for the Route

Each of these dock locations was considered for new South Shore service; however, with existing MBTA service from these locations and no demand to connect to Quincy, they were not included in this business plan. The MBTA may explore future service from these docks to the Seaport. More information on each of these dock locations can be found in their respective dock reports.

Dock	Location	Limitations
Hewitt’s Cove	Hingham	Two existing MBTA services depart from Hingham. One goes to Rowes Wharf and the other goes to Long Wharf with some stops at Logan Airport, Hull, and Georges Island, depending on the schedule and season. The MBTA was awarded a \$6,050,000 grant from the FTA Passenger Ferry Grant Program to improve this dock facility and make it fully ADA accessible. In the future, there may be additional service from this location.
Pemberton Point	Hull	Existing MBTA service connects Hull to Long Wharf, Logan Airport, and Hingham. The service expanded its summer weekend trips in the summer of 2018 and may provide connections to new destinations in the future.

### Other Proposed Dock Locations

These dock locations were part of the first phase of the study but were not investigated in the design of a new route due to current levels of ridership demand or to dock and dredging conditions. More information about the Plymouth and Provincetown dock locations was compiled for separate dock reports.

Dock	Location	Limitations
Fox Point at UMass Boston	Dorchester	The existing dock accommodates low draft vessels with shallow hulls but cannot accommodate ferries without substantial dredging.
Steamboat Wharf	Hull	There is insufficient demand and existing pier in disrepair. Dredging is also needed.
Plymouth Dock	Plymouth	There is insufficient demand for recreational or commuter service
MacMillan Pier	Provincetown	Two private operators provide recreational service from Boston to Cape Cod using this facility. There is insufficient demand for a commuter service.



### **Squantum Point/Marina Bay (Quincy)** 42.301321, -71.032033

The pier at Squantum Point is owned by the Massachusetts Department of Conservation and Recreation (DCR) along with the adjacent 900-space parking lot and the surrounding parkland. The area was once a World War II airfield that became the staging grounds for the construction of the Deer Island Wastewater Treatment Plant, which is when the pier was initially built for moving supplies and staff to Deer Island. The property was transferred from the Massachusetts Water Resources Authority (MWRA) to the Metropolitan District Commission (now DCR) when construction was completed. Squantum Point Park now primarily attracts dog walkers.

Next to the pier and the park is Marina Bay, a mostly residential development with some office properties as well as restaurants and a marina. The active marina attracts boaters from across the region, and most of the restaurants offer outdoor dining along the boardwalk that rings the protected

cove. The recently completed Meriel Marina Bay apartments are the closest buildings to the ferry pier and have added 352 residential units and 20,000 square-feet of retail space to the area in the past year.

The City of Quincy has worked with the Town of Winthrop to provide ferry service from the Squantum Point pier since 2016. The ferry takes passengers to Central Wharf next to the New England Aquarium in downtown Boston, to Fan Pier in the Seaport, and to Winthrop's town dock. On summer Saturdays, there is also service to Spectacle Island.

In partnership with DCR and MassDOT, the pier and floats have been recently upgraded, and the new ferry service has been promoted as an alternative to some of the Red Line station closures and construction projects.

Squantum Point ferry terminal float officially accommodates two side-loading vessels, though the Winthrop ferry is small enough to do bow-loading there. A dock design commissioned by Quincy better accommodates larger ferries with a new configuration that would allow for more

## Existing Infrastructure Conditions

Landing site	Squantum Point Park
Existing landing	Yes
Docking conditions	Inadequate for year round service. Ramp is in poor condition. Fixed wooden pier requires a survey and is likely to need repairs.
ADA Access	No
Channel access / turning basin	Yes
Dredging required	No
Berthing capacity	Two side-load berths at 90 ft.
Wave exposure	Moderate, Dorchester Bay
Existing pier/bulkhead	Floater with finger pier connection
Existing float	Yes
Publicly owned property	Yes, DCR
Rider amenities	Minimal outdoor seating and a covered waiting area, some nearby restaurants

## Multi-modal Access

Pedestrian access	Yes, extensive sidewalks and paths within the Marina Bay development but not from the rest of Quincy
Bicycle access	Yes (see “Pedestrian access” above)
Bicycle parking	No
Transit access	Limited, there is a shuttle to the Red Line during some construction phases. The 211 bus route stops at East Squantum Street 0.8 miles away. The nearest T station is North Quincy, 2 miles away.
Parking	900 public parking spaces in the DCR lot at Squantum Point (\$5/day)

bow-loading and some vessel storage.

People driving to the ferry terminal currently travel on the private roads of Marina Bay, but a planned extension of Commander Shea Boulevard will provide direct vehicular access from Route 3A and improved access from Interstate 93. Bicycle and pedestrian access along the waterfront is easy from the development; however, it is more challenging from other neighborhoods.

The pier at the landing has a medium height freeboard, but it may be susceptible to future sea level rise as well as storm surge in extreme weather events. Depending on the type of storm, the ferry site is suitable for waterfront evacuation in case of flooding as long as the pier is accessible.





**Fallon Pier at Columbia Point (Dorchester)**  
42.315549, -71.032608

The eastern end of Columbia Point is home to several major cultural destinations: The John F. Kennedy Presidential Library and Museum, the Edward M. Kennedy Institute for the United States Senate, and the Massachusetts Archives and Commonwealth Museum. Although the site lacks ferry service today, these institutions are tourist destinations that are disconnected from downtown Boston and have limited parking, making them ideal candidates for recreational ferry service. A ferry service here could also provide connections to the UMass Boston campus from Quincy and, with growth and expansion, it may even attract riders from more of Columbia Point and the area’s new developments.

The existing structure at Fallon Pier on Columbia Point is owned by DCR, built on land owned by the Federal Government via the National Archives and Records Administration (NARA) and managed by UMass Boston.

There is no scheduled service to the pier and the landing lacks floats and ramps.

In the past, there has been some charter boat boarding, often in conjunction with the JFK Library or with UMass Boston. The most recent infrastructure improvement was diagonal dredging to the Marina Bay Channel.

The bulkheads surrounding the site are at an elevation where they can withstand most tides now and in the future, but the Columbia Point land elevation is subject to sea level rise and storm event flooding. The connecting channel to the pier from the Marina Bay Channel crosses tidal flats and will continue to require periodic dredging.

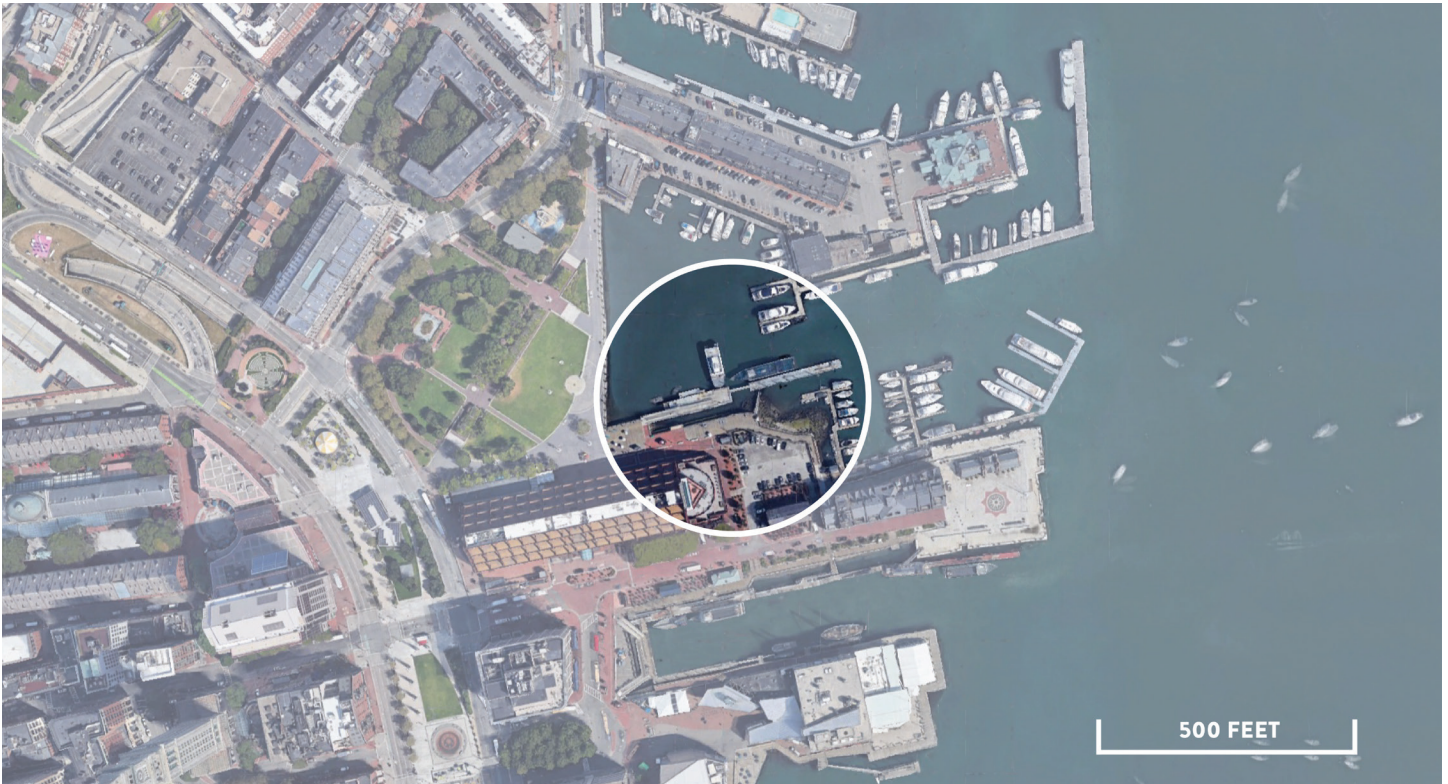
The ferry site is suitable for evacuation of low lying neighboring buildings in case of flooding as long as the pier is accessible.

## Existing Infrastructure Conditions

Landing site	JFK Library
Existing landing	Yes
Docking conditions	Moderate exposure, good channel connection
ADA Access	No
Channel access / turning basin	Yes
Dredging required	No
Berthing capacity	No floats. One 50-foot side-loading berth with fender piles allows larger vessels to dock periodically on the side of the fixed pier.
Wave exposure	Moderate
Existing pier/bulkhead	Yes
Existing float	No
Publicly owned property	Yes, DCR and NARA
Rider amenities	None

## Multi-modal Access

Pedestrian access	Yes, Harborwalk and some sidewalks
Bicycle access	Yes, Harborwalk and bike lanes
Bicycle parking	Yes
Transit access	Yes, the 8 and 16 bus routes stop 0.2 miles from the landing site. There are Red Line and Commuter Rail trains that stop at JFK/UMass station 1.1 miles from the landing site.
Parking	Yes, limited surface parking



### Long Wharf North and Central (Downtown/North End) 42.360904, -71.049512

Once stretching into Boston Harbor for more than a third of a mile, historic filling has brought the city out to Long Wharf. This downtown hub for water transportation is also the departure point for numerous boat tours including whale watches and Codzilla. It is home to the Marriott Long Wharf, the Chart House restaurant, and two outdoor bars. It's also next door to the New England Aquarium with 1.4 million visitors each year, five minutes from Faneuil Hall Marketplace with 18 million annual visitors, and adjacent to the North End neighborhood with more than 10,000 residents. Cut off from the downtown for decades by the elevated Central Artery, Long Wharf's western end now runs along the Rose Kennedy Greenway while half of its northern edge is bordered by Christopher Columbus Park. Both green spaces have substantial programming and provide a place for rest and relaxation.

Long Wharf North has two berthing locations that provide

commuter and recreational ferry services. One berth offers year-round MBTA service to Hingham, Hull, and Logan Airport. The other berth offers seasonal ferry service to Salem and to six islands in the Boston Harbor Islands National and State Park. The docking locations are within a three-minute walk of the Blue Line at Aquarium Station. The MBTA service to Charlestown docks at a berth between Long Wharf South and the New England Aquarium, referred to here as "Long Wharf Central."

All of Long Wharf is owned by the Boston Planning and Development Agency (BPDA) who holds leases for each dock as well as the Water Boat Marina. The ownership documents are all held in the BPDA's legally registered name, the Boston Redevelopment Authority.

While berthing capacity is sufficient for the existing services, the narrow channel constrains vessel access during the peak of seasonal operations as the adjacent marinas fill up for the summer and a higher number of ferries arrive and depart at greater frequency.

## Existing Infrastructure Conditions

Landing site	Christopher Columbus Park and Harborwalk
Existing landing	Two berths
Docking conditions	All floats and piles are “mid-life” at 15 to 20 years old
ADA Access	Yes
Channel access / turning basin	Yes
Dredging required	Maintenance dredging in Columbus Park basin
Berthing capacity	West berth at 120 ft. accommodates side-loading and bow-loading; east berth at 180 ft. accommodates side-loading
Wave exposure	Minimal, Inner Harbor
Existing pier/bulkhead	Yes
Existing float	Yes, owned by the MBTA
Publicly owned property	Yes, owned by the BPDA
Rider amenities	Ticket booth and outdoor benches on the pier; covered waiting area on the MBTA float; waiting area, restrooms, and drinking fountains at Marriott Long Wharf; numerous restaurants around wharves

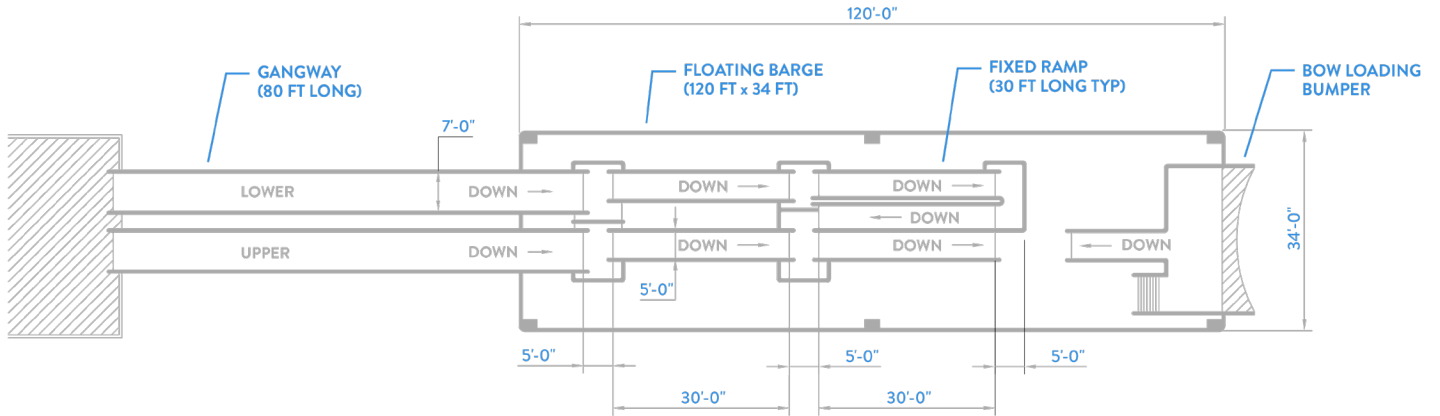
## Multi-modal Access

Pedestrian access	Yes, there are sidewalks around the site and connections from the Harborwalk
Bicycle access	Yes, bike lanes on Atlantic Avenue and other streets that run parallel to the Rose Kennedy Greenway and a cycle track along Atlantic and Commercial Streets in the North End
Bicycle parking	Yes, bike racks are along Atlantic Avenue in Christopher Columbus Park and next to the Aquarium T station. A Bluebikes bike share station is on the south side of the Marriott.
Transit access	Aquarium station on the Blue Line is less than 0.2 miles from the dock. State Street station on the Orange Line is 0.4 miles from the dock, and Haymarket station on the Green and Orange Lines is 0.5 miles from the dock. The 4, 352, and 354 bus routes all stop within 0.1 miles of the landing site; however, these buses do not provide frequent service. The 92 and 93 bus routes stop at State. The 15, 29, 57, 92, 93, 111, 117, 325, and 326 buses stop at Haymarket.
Parking	Yes, several private garages including paid parking at Harbor Garage

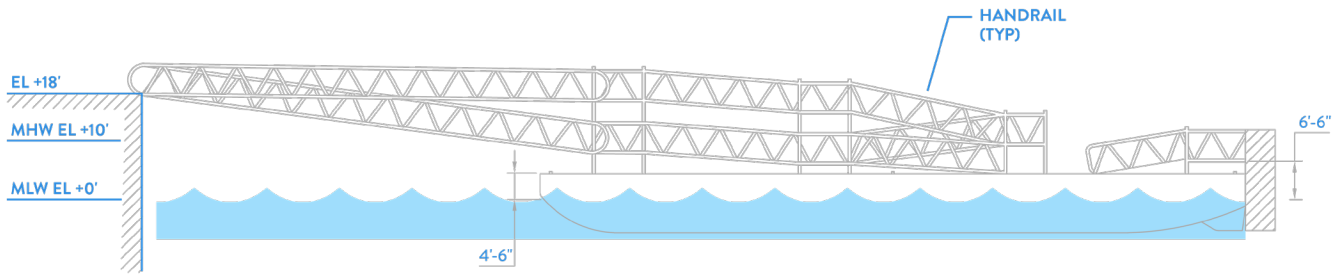
The berths are linked to Christopher Columbus Park and the Harborwalk, which can be prone to storm flooding and sea level rise. Depending on the type of storm, the ferry site is well protected and suitable to provide evacuation for local buildings in case of flooding due to storm events, but it may require higher Harborwalk access connections. There was significant flooding around this section of the waterfront during the nor’easters on January 4 and March 2, 2018.



# BOSTON HARBOR FERRY LANDING CONCEPT TYPICAL BARGE & RAMP SYSTEM



**PLAN**



**ELEVATION**

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## Dock Improvement

### Recommendations

Each ferry dock has its own unique needs and challenges, but a few components are standard across the ferry dock sites for this route:

- A fixed and immovable pier attached to the land,
- A float where the passengers board and disembark from the ferry that moves up and down with the tides, and
- An ADA accessible gangway from the pier to the float.

Conceptual site designs were developed for each ferry terminal site that include these elements. Some newer docks require few changes while others require substantial upgrades to effectively service a future system.

Each conceptual site design is a sketch plan in order to develop cost estimates. A more substantial design process would be required to prepare shovel-ready final designs. The final dock designs may have different loading configurations, and additional modifications, such as float dimensions, fixed ramps, movable ramps, and other features, which are specified. Once vessels are selected, the float should be designed to accommodate the proper freeboard height for landing. Fendering should also be designed to meet the bow-loading or side-loading needs of the selected vessels.

The conceptual designs include both recommended and comprehensive configurations. In the short term, streamlined improvements to the existing infrastructure at some sites could support the initial pilot years of the ferry service. For permanent service, the recommended ferry terminals would have a set of barges, gangways, and ramps that could accommodate ADA compliant access with Boston Harbor's average daily tidal change of 10 feet and year-round weather conditions. The terminals would also include a protected waiting shelter, bow-loading fenders to accommodate vessels with more than side-loading capability, and a few custom site

elements to improve access on land.

A set of additional features are included in the comprehensive design proposals. These features would be used to develop a consistent brand for the system and would include Intelligent Transportation Systems (ITS) with digital arrival times and schedules, terminal identity signage including gate numbers landside and dockside, safety equipment like emergency call buttons and life ring ladders, ticket vending machines if needed, and covered bicycle storage. Further conditions surveys and site-specific elements may also be included with features like covered walkways or wave protection, where appropriate.

In the future, the ferry system has the potential to offer a uniform design feel and brand for all of Boston Harbor's ferries in order to emphasize that each terminal and vessel is part of a transit network. In establishing this comprehensive and coordinated design, even existing MBTA, Winthrop, and Salem services could be upgraded to include these features.

### Key Dock Terminology

**DRAFT** - the vertical distance between the waterline and the bottom of the vessel's hull or keel. This distance plus an additional 1 to 2 feet is the benchmark for determining the minimum water depth where a vessel can navigate safely.

**FENDERING** - bumpers that provide a barrier between the edge of the dock and the vessel by absorbing kinetic energy.

**FLOAT** - the part of the dock that can move up and down with the tide where the vessel docks to load and unload passengers.

**FREEBOARD HEIGHT** - the vertical distance between the waterline and the deck of a float or the deck of a vessel.

**PIER** - the part of the dock that is a fixed structure. It provides access from land to the ramps and float.



### Squamant Point/Marina Bay (Quincy)

Squamant Point’s ferry terminal is currently designed only for seasonal operations and best accommodates side-loading vessels. The facility is not currently ADA accessible as the interim steps that have been taken to make the float and ramps operable do not have sufficient length to accommodate wheelchairs at all tide levels.

The City of Quincy has hired the firm Tighe and Bond to design a customized ferry landing barge, ramps, and gangways as well as modifications to the fixed pier. Four floating docks would be replaced with one large ADA accessible floating barge, and the timber pier superstructure would be replaced. The probable cost of the present design is \$5,115,000.

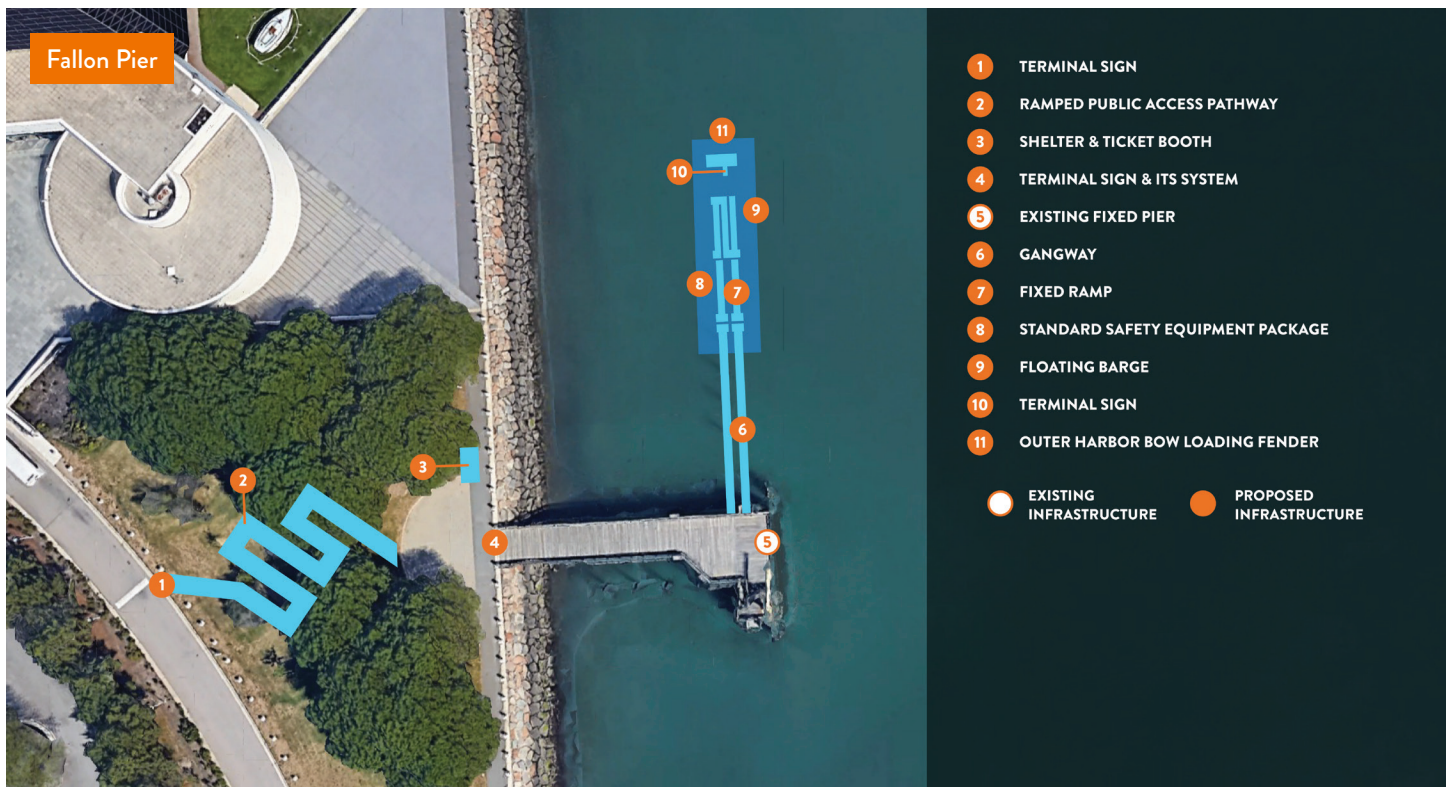
The cost estimate included here has more generic planning levels costs that are not based on what Tighe and Bond have proposed. The total cost estimate for a recommended terminal design at this location is approximately \$4,710,000, which includes the addition of a bow-loading fender.

A more substantial improvement would include a

comprehensive conditions survey and a covered walkway on the fixed pier. Additional comprehensive features include Intelligent Transportation Systems along with terminal and gate signs; safety equipment (including emergency call buttons, life rings, ladders, and signage); ticketing facilities; and bike racks. The combined cost for these features would likely cost an additional \$730,000.

Estimated Dock Improvement Costs	
Recommended improvements	\$4,710,000
Comprehensive improvements	\$730,000
<b>TOTAL</b>	<b>\$5,440,000</b>





### Fallon Pier at Columbia Point (Dorchester)

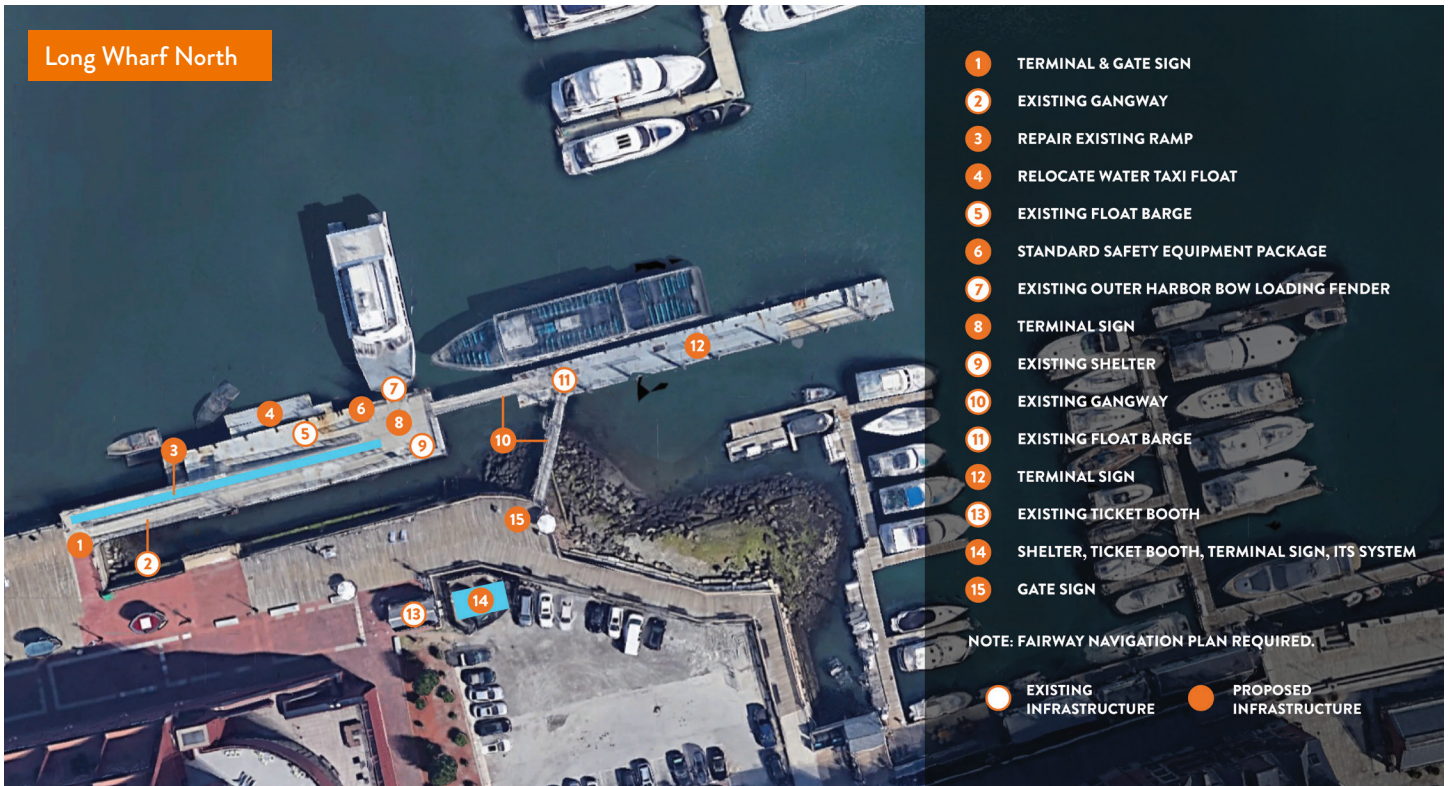
There is only a fixed pier at the Fallon Pier facility today. There are no floats, ramps, or gangways.

To develop a recommended ferry terminal, a new barge, fixed ramps, and gangways are needed along with a bow-loading fender that can accommodate outer harbor vessels. A landside ADA connection is also needed since the present access between the museums and the Harborwalk involves a wide flight of stairs. A passenger shelter is also included in the cost estimates. The design and construction of these features is estimated to cost \$4,920,000.

The installation of the comprehensive features could cost an additional \$140,000. These features include Intelligent Transportation Systems along with terminal and gate signs; safety equipment (including emergency call buttons, life rings, ladders, and signage); ticketing facilities; and bike racks close to the dock.

The Seaport Economic Council awarded a \$150,000 grant in February 2019 for continued design work at this site.

Estimated Dock Improvement Costs	
Recommended improvements	\$4,920,000
Comprehensive improvements	\$140,000
<b>TOTAL</b>	<b>\$5,060,000</b>



### Long Wharf North (Downtown/North End)

On Long Wharf North, the facilities are all designed for year-round operations. The commuter ferry dock on the west float accommodates bow-loading and side-loading vessels. The facilities are ADA accessible and Massachusetts Architectural Access Board (MAAB) compliant from land to dock as well as from dock to vessel.

Though there is currently a staffed ticket booth for buying tickets to Salem and the Harbor Islands and a small covered shelter to wait on the float where the MBTA boat docks, better passenger amenities are recommended. A suggested \$200,000 in upgrades would include an improved passenger waiting area on land. To expand capacity, a private water taxi float on the western edge should be relocated.

The installation of the comprehensive features would likely cost an additional \$160,000. These features include Intelligent Transportation Systems along with terminal and gate signs; safety equipment (including emergency call

buttons, life rings, ladders and signage); and additional bike racks.

There is a broader vision for the Chart House parking lot on Long Wharf that is also owned by the BPDA. The Downtown Municipal Harbor Plan, released in the spring of 2018, outlines a basic vision for a waterfront park and a water transportation gateway on this site in the future.

Estimated Dock Improvement Costs	
Recommended improvements	\$200,000
Comprehensive improvements	\$160,000
<b>TOTAL</b>	<b>\$360,000</b>





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## Route Configuration and Schedule

When all twelve of the short-listed potential dock locations were first analyzed using the ridership model assuming the same price and frequency of service, Squantum Point jumped out as the most promising new route. Despite the four Red Line stops in Quincy, ferry service from Squantum Point is easily accessible from Route 3A, particularly with the completion of a new roadway connector via Commander Shea Boulevard extension; offers ample parking; and provides connectivity with parts of downtown Boston that are not proximate to Red Line stations. Arriving by ferry at Long Wharf, passengers can connect to the Blue Line and other ferry services.

Whether someone is looking at the view of Marina Bay from the Harborwalk by Fallon Pier or studying an aerial map, it's clear that Squantum Point and Columbia Point are less than a mile apart (4,960 feet), making Fallon Pier a logical stop on a Squantum Point Route. However, the shallow water in Dorchester Bay near the mouth of the Neponset River makes navigation more challenging. Typical ferries traveling between the Squantum Point pier and Fallon Pier must travel down dredged channels that make the route about 75% longer (8,615 feet). This additional trip distance combined with restricted speeds makes Columbia Point a less desirable interim stop during peak commuting hours, particularly since ferry trips with more stops attract fewer passengers.

Conveniently, the most likely riders of a ferry to Columbia Point are tourists visiting the JFK Library, Edward Kennedy Institute, and the Massachusetts Archives, who are most likely to ride the ferry during midday or off-peak periods. Much like the Salem service, where commuters and visitors have distinctly different needs, this dichotomy allows the service to adjust throughout the day to meet different kinds of demand. This kind of demand is much more challenging to model since it does not conform to typical commuting patterns, is not tied to residential locations, and recreational riders have different

price sensitivities. Although it is difficult to model ridership on a route with midday stops at Columbia Point and the travel demand models show a slight decline with the additional stop, there is consensus that a stop at Fallon Pier would attract meaningful ridership, particularly in the summer.

With speed limits at both ends of the route, the total route length, and the time required to unload and load ferries, the total round trip block time for each vessel is 80 minutes. With two ferries operating on the route, trips would depart from each terminal every 40 minutes for a 27 to 30-minute trip depending on the vessels' design and power.

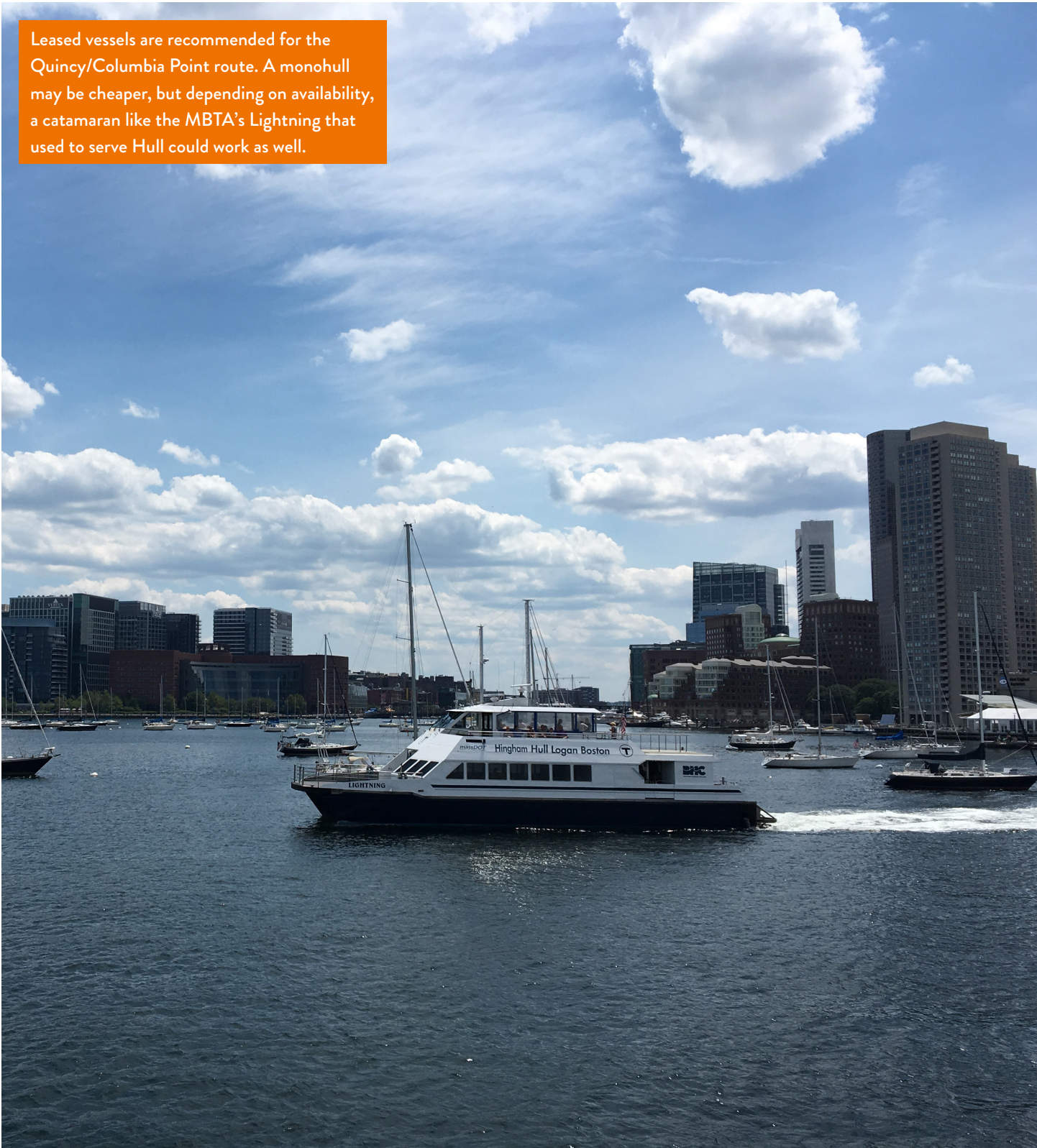
The total distance on direct trips from Squantum Point to Long Wharf is 5.44 nautical miles, and 3.42 miles of the route is subject to speed restrictions of five or ten knots. On the 27-minute trip, the vessel can only travel at 28 knots for about four minutes. A vessel with less power may not reach these top speeds, which would in turn lengthen trip time, but it would lower the rate of fuel consumption.

During peak commuting hours, the ferry service would connect Squantum Point and Long Wharf with 40-minute headways. Demand during the peak period is sensitive to trip duration, so it is important that service be direct. Adding a peak stop at Columbia Point is unlikely to pick up enough passengers to offset the loss of ridership from the longer ride.

During off-peak hours, the ferry would have 60-minute headways. This less frequent service can accommodate refueling and other schedule alternations. Once the terminal at Fallon Pier has been improved, the 60-minute headways allow for off-peak service to Columbia Point in both directions. During the middle of the day, Quincy riders are less time sensitive and most visitors to the JFK Library and other Columbia Point destinations are similarly undeterred by slightly longer trips.

A possible stop in the Seaport was also analyzed for this route; however, it had as much negative impact on ridership during peak hours as a Columbia Point stop. With the availability of the Inner Harbor Connector, passengers from Quincy who want to continue on to the Seaport will be able to transfer and would ideally be able to do so on a single ticket.

Leased vessels are recommended for the Quincy/Columbia Point route. A monohull may be cheaper, but depending on availability, a catamaran like the MBTA's Lightning that used to serve Hull could work as well.



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## Vessel Recommendations

The projected ridership, fare structure, capital costs, operating costs, and recommendations were developed with the assumption that the route would be served by two leased diesel vessels, called “vessels of opportunity.” This option allows for available capital dollars to be focused on improving docks and other land-side infrastructure while the vessels are leased annually.

### Estimated Vessel Costs (2019 dollars)

Two vessels of opportunity	\$474,000/annual lease
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The routes and schedules took into account both travel time, the length of time the vessel is in motion, and headway, the time between departures that allows for travel time, unloading, and loading. With two vessels, 40-minute headways during the peak are attainable and allow for reliable, on-time performance.

### Vessel Design and Power

When looking for vessels to lease, the shape and size of the available ferries depend on some key considerations including passenger volumes and the need for speed.

Ferries on this route could be served by catamarans or by vessels with a single hull. Monohulls may be more affordable because they can be less expensive to build and may cost less to lease. If a dock is configured for a bow-loading catamaran, a monohull configuration should allow for stern loading. A stern-loading vessel should have bow thrusters to make it easier to back into the terminal. The vessel should also have side-loading capability, and any loading configuration should allow for ADA accessibility.

If a monohull vessel is selected, ferries should be as long as possible to reduce resistance. Locating all passengers on one deck allows for faster unloading. This design also lowers the center of gravity and reduces the total weight. It can also contribute to lower construction costs which may correspond

to lower leasing costs.

With more vessels and shorter headways, ridership increases but the passenger capacity of each trip declines. With three or four ferries, the peak vessel capacity would be between 73 and 83 passengers. With just two ferries, the peak vessel capacity would be between 100 and 110 passengers. In order to accommodate passengers at the times with the highest demand, a passenger capacity of 120 is recommended. Due to US Coast Guard regulation thresholds, the likely vessels available would accommodate 149 passengers. Vessels larger than this, even if available, would be operated at a significantly higher expense due to the need for more crew and fuel.

To fully minimize the transit time, the vessels should be able to reach peak speeds of 24-knots to travel through the section of the route without speed restrictions as quickly as possible, especially if the peak commuting period is longer than 150 minutes and justifies the need for an additional trip in that time. If top speeds are reduced by 10 knots, that would only have a minor effect on the schedule but it would have a major effect on power, because power varies as a cube of speed if all other things are equal. Using a somewhat slower boat requires significantly less power and correspondingly reduced capital cost, fuel consumption, and emissions.

The vessels of opportunity depend on what is available to lease and may be monohulls or catamarans, which travel more efficiently at top speeds. However, catamarans are more expensive to build and there are not enough segments of this route that require top speeds to justify the additional cost. If vessels are purchased for this route, monohulls are recommended as outlined in the “Recommended Vessel Design Specifications” on the following page.

Recommended Vessel Design Specifications	
Configuration	Monohull, single deck, semi-planing
Construction	Aluminum or Fiberglass
Certification	46 Code of Federal Regulations Subchapter T
Passenger Capacity	120 people
Crew	3 maximum
Design Speed	16 knots
Length Overall	104 feet
Length, Waterline	104 feet
Breadth	14 feet
Draft	3.0 feet
Deadweight	25,000 pounds
Displacement, Full Load	125,000 pounds, 1,953 ft <sup>3</sup> sea water
Prismatic Coefficient	0.66
Residuary Resistance	3,739 pounds
Wetted Surface	1,150 square feet
Friction Resistance	1,900 pounds
Propulsive Coefficient	0.5
Power Required	554 horsepower (413.2 kW)
Power Plant	Geared diesel 2 x 350 horsepower diesel engine 2 x 25 kW diesel generator 50 horsepower bow thruster
Seating	Fabric on aluminum frame, one per passenger
Toilet Facilities	2 unisex
Food Service	Drinking fountain
Climate Control	Heat/AC
ADA compliance	Yes

### Cost Estimates

If two ideal vessels were constructed for this service, Construction of the ideal ferry fleet could be done one vessel at a time or as a two-vessel fleet. Cost estimates are divided into shipyard costs and non-shipyard costs, which include contract design development, bid support and contracting, inspection and design review, contract management, training, spare parts and special tools, and post-delivery support. There would be about a quarter million dollar savings in combined shipyard and non-shipyard costs if the two vessels are built as a single order.

Shipyard Costs	Total Cost	Cost per Vessel
Single ferry	\$3,800,000	\$3,800,000
Two ferry fleet	\$7,400,000	\$3,700,000

Non-shipyard Costs	Total Cost	Cost per Vessel
Single ferry	\$1,000,000	\$1,000,000
Two ferry fleet	\$1,100,000	\$550,000

Not including the time needed for soliciting and awarding a bid, the shipyard construction period for one ferry should take about 12 months. The second vessel could be staggered by three months with both ferries completed in 15 months.



## Zero Emissions Alternative

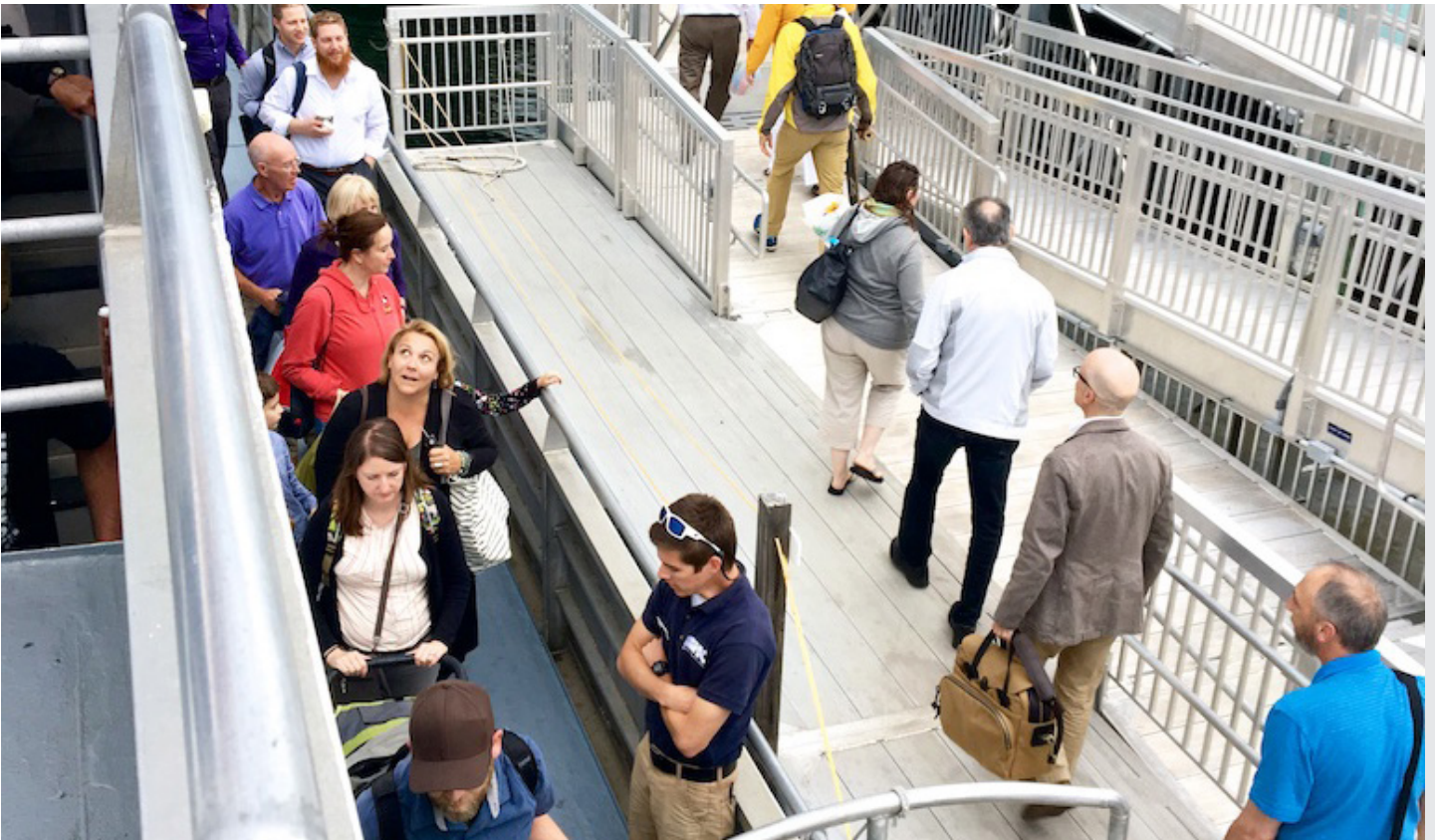
By optimizing the speed and power of the leased vessels serving the Quincy to Boston route, the ferries can minimize their emissions. Finding an optimal speed should not significantly affect the reliability or headways on the service, and having engine power that matches the optimal speed consumes less fuel. Implementing a zero-emissions service here is more challenging.

The length of the route and the relatively short time spent at the terminals makes a battery-powered all-electric zero-emission ferry impractical on this route.

There is a zero-emission fuel cell option, which creates its own electric power from hydrogen fuel, that could be a viable alternative. Fuel cells oxidize the fuel to produce power with only nitrogen and water as emissions. These fuel cells are commercially available and with a group of three 200kW fuel cells joined together, a ferry on this route could have adequate power. Powering these fuel cells would require a refueling station with compressed or liquefied hydrogen at one of the stops, likely at Squantum Point. There are a spectrum of options and considerations in developing the actual design for a particular service, but a fuel cell vessel could require up to twice the capital cost of a conventionally powered diesel vessel.

Since leasing vessels for this route is more financially sustainable than purchasing diesel vessels, the more expensive fuel cell vessels and the increased cost for the necessary dock improvements would make the zero-emissions option financially challenging to implement and sustain.

Passengers disembark from existing ferries to the Harbor Islands and Salem.



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## Ridership and Fares

Although the Quincy and Columbia Point business plan does not specify an operator of the service, and it may or may not be part of the MBTA system, the current fares and ridership provided a way to ground the projections and modeling of the future route with real data from an existing service. The existing MBTA ferry service connecting Hingham and Hull to Long Wharf and Rowes Wharf in Boston costs \$9.25 for a standard one-way ticket. In 2016, these services carried a combined 1,164,896 passengers. The Hingham to Rowes Wharf service carries an average of 2,890 passengers each weekday. The route connecting Hingham and Hull with Logan and Long Wharf has an average weekday ridership of 1,010 passengers and seasonally carries an average of 1,360 passengers on Saturdays and 930 passengers on Sundays from Memorial Day weekend to Columbus Day weekend.

Two different fares were included in the study for the purpose of modeling ridership on the Quincy and Columbia Point route to test how much price impacts the number of passengers projected to use the service on each segment of the route. The stated preference survey provided data that could be used in a ridership model to determine the revenue-maximizing fare—the price per ticket at which the willingness to pay and the number of passengers willing to pay that fare combines to generate the largest possible value. For this route, the revenue-maximizing fare was calculated at approximately \$6.50. For comparison, a \$10 fare was also studied. This is in line with, though slightly higher than, the current price of a one-way ticket on the MBTA’s South Shore service.

The ridership model created for the Quincy and Columbia Point route assumes that there are two leased vessels with 40-minute headways during peak commuting hours. Two different scenarios were evaluated to study how price affects

## Ferry Fare Structure

As of April 2019, the MBTA F1 and F2H services have discounted fares for local seniors and students who are part of the CharlieCard system, and children under 12 travel for free with paying adults. Monthly ferry passes on the mTicket app (\$298) and monthly ferry passes on CharlieCards that include zone 5 commuter rail access (\$308) provide access to this ferry route at no additional charge.

On July 1, 2019, fares will increase, though reduced fares will not change. The standard fare for the MBTA F1 and F2 services will be \$9.75 and monthly CharlieCards will be \$329. Passengers currently pay a roundtrip \$18.50 fare when traveling to Logan Airport, and that fare will be \$9.75 in line with other one-way trips.

Ideally, the future fare structure would be interoperable with the MBTA’s fare system in order to enable passengers to connect between transit services efficiently and affordably and thereby attract more riders, but this has not been broken out in the analysis.

the projected ridership. While the ridership model outputs look like very precise data, they are meant to provide ballpark estimates of how each segment of the route would perform on an average day or year during the early years of the service’s operation. They are best used as comparisons with other scenarios as the price and quality of service change. The scenarios below have modeled ridership volumes for 2019 in order to facilitate this comparison between possible fare and vessel combinations. Recognizing that the Quincy service would have a later start year and the Columbia Point addition may take longer to implement, the 20-year financial plans in the Appendix are based on each scenario’s anticipated start year.

The ridership projections in the tables on the following page do not include the connection between Squantum Point and Fallon Pier because the potential ridership between these two neighborhoods is not accurately captured in the ridership model. The modeling is based on publicly available

journey-to-work data between neighborhoods and known ratios of commuting trips to non-commuting trips. Since a very small number of commuters travel between this part of Quincy and Columbia Point today, the model did not show significant ferry ridership between the two neighborhoods. The Red Line also provides a transit alternative. The ferry

has the potential to attract some leisure riders, and with substantial parking facilities at Squantum Point, this location can be leveraged as an off-site parking location for the museums and university on Columbia Point.

The tables below show the projected ridership volumes in 2019 that include weekday and weekend service.

### Ridership Model with \$6.50 fare and Two Vessels of Opportunity (2019)

Ridership	Annual	Daily	AM Peak	PM Peak	Other
Squantum Point - Downtown	373,880	1,438	515	515	409
Squantum Point – Fallon Pier	--	--	--	--	--
Fallon Pier - Downtown	38,320	147	--	--	147
<b>TOTAL</b>	<b>412,200</b>	<b>1,585</b>	<b>515</b>	<b>515</b>	<b>556</b>

### Ridership Model with \$10.00 fare and Two Vessels of Opportunity (2019)

Ridership	Annual	Daily	AM Peak	PM Peak	Other
Squantum Point - Downtown	178,620	687	274	274	139
Squantum Point – Fallon Pier	--	--	--	--	--
Fallon Pier - Downtown	11,270	43	--	--	43
<b>TOTAL</b>	<b>189,890</b>	<b>730</b>	<b>274</b>	<b>274</b>	<b>182</b>

### Multi-modal Sensitivity Testing

The proposed ferry service is part of a much larger transportation system that impacts how people make choices about how and when to travel based not only on the price and frequency of the ferry but also on the levels of congestion on roadways and the conditions on their other transit options. For the Quincy service during commuting hours, and to a lesser extent the service to Columbia Point, the reliability of the Red Line and the traffic on I-93 have significant impacts on projected ridership.

Since many ferry passengers are likely to drive to Squantum Point, roadway congestion affects travel times to downtown Boston and to the ferry terminal. Yet while congestion may add time to the trip to the ferry terminal, it makes a more noticeable impact on longer trips all the way into downtown Boston. With a \$6.50 fare, a 10% increase

in travel times by private vehicle, ferry ridership and the corresponding revenue on the service increased by 3%. By contrast, a 10% decrease in travel times for private vehicles, though less likely, would result in a 2% decline in ferry ridership. At a \$10 fare level, a 10% change in vehicle travel time on roadways that made traffic better or worse would lead to a 1% decline in ridership. At that price point, a longer trip to the ferry terminal is a deterrent for using the service and a faster trip to Boston pulls riders away from the service.

All of these projected changes in ridership are small enough to have a negligible (less than 1 percentage point change) effect on the farebox recovery ratio of this route.

## Projected Change in Ridership with Changes in Roadway Congestion

Ridership	Baseline daily ridership 2019	+10% roadway travel time	-10% roadway travel time
\$6.50 fare + Two Vessels of Opportunity	1,585	1,625 (+3%)	1,559 (-2%)
\$10 fare + Two Vessels of Opportunity	730	722 (-1%)	720 (-1%)

On this route, the ferry provides an alternative to other transit choices rather than a connection. As a result, declines in transit performance in general are projected to attract new riders to the ferry service while improvements in transit performance make other options, which may cost less or come more frequently, more appealing.

For this model, a 20% increase in transit travel time (worse service) is projected to result in a 19% increase in ridership

and revenue with a \$6.50 fare and a 25% increase with a \$10 fare. This translates into a 13 to 14% increase in the farebox recovery ratio. With a 20% decrease in transit travel time (improved service), the model projects a 15% decrease in ridership and revenue at the \$6.50 fare and a 28% decline with a \$10 fare. This would result in a 10% and 16% decrease in the farebox recovery ratio for the \$6.50 and \$10 fares, respectively.

## Projected Change in Ridership with Changes in Transit Service

Ridership	Baseline daily ridership 2019	+20% transit time	-20% transit time
\$6.50 fare + Two Vessels of Opportunity	1,585	1,885 (+19%)	1,341 (-15%)
\$10 fare + Two Vessels of Opportunity	730	916 (+25%)	526 (-28%)

The relationship between the Red Line's performance and the ferry's ability to attract riders is more complicated. Significant improvements are in the works for the Red Line including a new fleet of trains and substantive signal upgrades. This is likely to improve the travel time for those who rely on the Red Line and reduce the demand for this ferry service. Continued economic development and housing production that is exceeding projections by the Metropolitan Area Planning Council is likely to support ridership growth for both the train and the ferry, but relative to the baseline service, the Red Line improvements lead to a decline in ridership in this

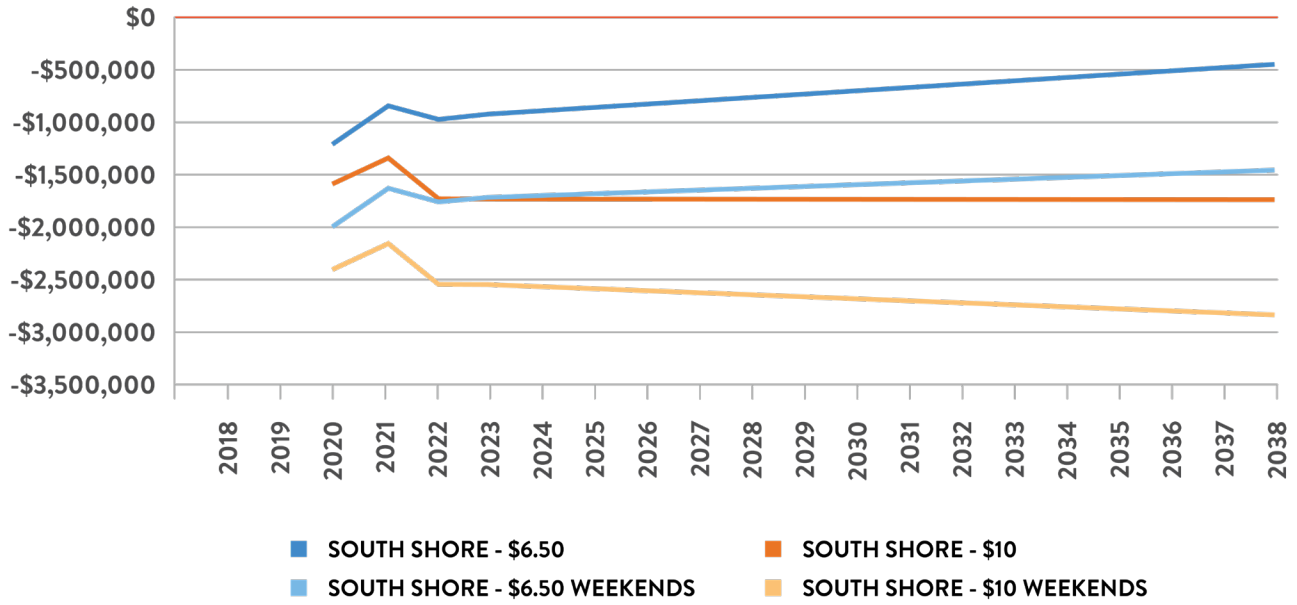
model.

If the combination of Red Line improvements results in travel time reductions of 25%, this is projected to lead to a 23% decline in ridership and revenue for the \$6.50 fare. This would also reduce the farebox recovery ratio down to 53%, which is substantially below that of the other South Shore ferry services today. For the \$10 fare, this decline in travel time for Red Line passengers would decrease ridership and revenue on the ferry by 38% and the farebox recovery ratio would fall to 35%.

## Projected Change in Ridership with Changes in Red Line Service

Ridership	Baseline daily ridership 2019	-25% transit time
\$6.50 fare + Two Vessels of Opportunity	1,585	1,220 (-23%)
\$10 fare + Two Vessels of Opportunity	730	456 (-38%)

## ANNUAL SYSTEM NET OPERATING REVENUE



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## Finances

The financial plan considers a wide range of transportation service costs, including the fixed costs of the capital investments, and the variable operating costs, which include fuel and labor. These variable costs depend on the type of vessels used in the fleet and the projected ridership demand, which is dependent on fare levels, service quality, time competitiveness of the route, and access to the ferry. This financial plan takes into account both fare levels and uses 2019 dollar values as a baseline. In order to compare the possible options and the impact of different fares on the pro formas, there are two projected scenarios modeled here:

- Vessels of opportunity with a \$6.50 fare, and
- Vessels of opportunity with a \$10 fare.

The scenarios compare different route characteristics to build a more complete and comprehensive financial picture. For the purpose of modeling for this report, service start-up was assumed to be in 2020 since it relies on leased vessels and does not require the purchase of new vessels.

### Overview

Like many transit systems, the new Quincy and Columbia Point service is projected to have an operating shortfall. Whether it is operated by the public sector, the private sector, or as a public-private partnership, an operating subsidy would be needed to sustain the service at any of the price points studied based on the projected ridership.

The standard metric for the financial performance of transit routes is farebox recovery. In 2015, the farebox recovery for the three routes operated by the MBTA ranged between 58% and 74%. The projected farebox recovery with a \$6.50 fare and the leased vessels described is 69%. With a \$10 fare, the

projected farebox recovery is 56.5%

### Pro Forma

The financial pro forma that follows incorporates projected operating revenues and expenses in addition to the required capital investments for year-round service seven days a week. The 2019 pro forma laid out below is a one-year snapshot that is best for comparing the operational costs and

revenues of the scenarios. A complete 20-year pro forma for both scenarios can be found in the appendix. In the full pro formas, the first year of service is assumed to be 2020 for the Squantum Point service and 2022 for the Columbia Point service. The capital investment needs in the last row are identified only for the first few years of service.

### One Year Pro Forma (2019)

Operations	\$6.50 fare Weekdays only	\$6.50 fare with Weekends	\$10 fare Weekdays only	\$10 fare with Weekends
Operating Revenue				
Fare	2,092,000	2,251,000	1,713,000	1,843,000
Other Operating	167,000	180,000	137,000	147,000
<b>Total Operating Revenue</b>	<b>2,259,000</b>	<b>2,431,000</b>	<b>1,850,000</b>	<b>1,990,000</b>
Operating Expenses				
Vessel				
Crew Labor	744,000	1,060,000	744,000	1,060,000
Fuel	907,000	1,236,000	907,000	1,236,000
Maintenance	291,000	354,000	291,000	354,000
Insurance	230,000	230,000	230,000	230,000
Lease	474,000	556,000	474,000	556,000
Other	37,000	50,000	37,000	50,000
<i>Subtotal</i>	<i>2,683,000</i>	<i>3,486,000</i>	<i>2,683,000</i>	<i>3,486,000</i>
Shoreside				
Insurance	3,000	3,000	3,000	3,000
Miscellaneous Facility	110,000	110,000	110,000	110,000
<i>Subtotal</i>	<i>113,000</i>	<i>113,000</i>	<i>113,000</i>	<i>113,000</i>
Management and Support	354,000	452,000	354,000	452,000
<b>Total Operating Expense</b>	<b>3,150,000</b>	<b>4,051,000</b>	<b>3,150,000</b>	<b>4,051,000</b>
<b>Net Operating Expense</b>	<b>(-891,000)</b>	<b>(-1,620,000)</b>	<b>(-1,300,000)</b>	<b>(-2,061,000)</b>
Farebox Recovery	71.7%	60.2%	58.7%	49.1%
<b>Total Capital Investment Required</b>	<b>9,945,000</b>	<b>9,945,000</b>	<b>9,945,000</b>	<b>9,945,000</b>



## Assumptions

### Escalation Rates

The financial plan has a 20-year planning horizon and both revenue and expenses were assumed to escalate over time. The Consumer Price Index (CPI) was used to inflate all of the future operating costs except for fuel. The CPI was also used to adjust operating revenue to maintain 2018 constant dollar levels throughout the projections. Additionally, the US Energy Information Administration (EIA) annual energy outlook for the New England region was used to predict diesel fuel prices over time. It is notable that these fuel costs were projected to grow more slowly over time than the CPI. As a result, operating revenues for the routes are expected to increase over time.

### Operating Revenue

Initial fares were assumed to be at 2018 level dollars and were inflated in subsequent years to remain a constant dollar fare. The potential for fare increases to respond to inflation and growing demand was not taken into account. Based on previous experience, the fare actualization rate was assumed to be 80%—discounts for seniors, students, and others mean that not all of the riders will be paying full fare. It was also assumed that the first year's ridership is only about 88% of what is forecasted as awareness of the system builds and operational issues are hammered out. In later years, growth in ridership due to changing demographics is anticipated and incorporated into the revenue forecast.

Other operating revenue primarily comes from onboard sales at the galley. These are estimated at 10% of the fare revenue. This is comparable to the current level of sales on the existing Hingham route.

### Operating Expenses

The Champion and the Glory are the newest vessels in the existing MBTA fleet. These catamarans went into service in October of 2017 and May of 2018, respectively, and were used as representative vessels for establishing the estimated

costs of vessel operations based on their engineering and design specifications.

On each vessel used on this route, there is assumed to be a captain, a senior deckhand, and a deckhand/purser in accordance with typical crewing requirements for vessels of this size and current US Coast Guard requirements. Wage rates were set to reflect current Boston-area wage levels for marine jobs. A weighted rate factor averages 37% and incorporates payroll taxes, industrial and health insurance, paid time off, and some level of premium pay for experienced staff. For the purposes of the pro forma, wages for experienced captains on vessels of this size were set at \$25.00 per hour with a weighted rate of \$33.18. Wages for senior deckhands were set at \$19.00 per hour with a weighted rate of \$26.72. Wages for deckhands/pursers were set at \$14.00 per hour with a weighted rate of \$21.34, slightly higher than the rate in the Inner Harbor.

The initial price for fuel is based on the rate paid by the Commonwealth of Massachusetts in the summer of 2018 under its statewide contract fuel-purchasing program. The actual fuel prices are likely to be different depending on who ultimately operates the service. The US EIA fuel price index described above was used to adjust the price over time. Fuel consumption rates for the leased vessels were based on the specifications of the Champion and the Glory using the operating speeds anticipated for this route. It is possible that some of the vessels leased for the service will not be designed for the route's speeds or passenger volumes, which would result in inefficient fuel consumption.

For the leased vessels, industry algorithms were used to estimate the maintenance and rebuild/replacement expenses using the Champion and the Glory as representative vessels.

Insurance costs included the vessels' hulls and machinery as well as protection and indemnity. They are estimated based on the cost of the vessels and the crew size.

Establishing an estimated cost for the vessel leases is difficult since the market is relatively small. There has not been an inventory completed specifically for potential vessels in the Boston area, though the two vessels that

previously served the Hull route—the Lightning and the Cloud—could potentially be part of the leased vessel fleet. A 2017 nationwide inquiry by a passenger ferry operator in another part of the country revealed that very few vessels were available for lease anywhere in the United States. Vessel lease costs were therefore estimated using a recent representative lease agreement adjusted for the size of the vessels required for the route. The total lease costs include lifecycle maintenance costs.

Other operating costs include consumables, communications, uniforms, etc. These were estimated using a percentage of the direct operating costs not including the cost of the vessel leases.

In addition to the vessel expenses, there are shoreside operating expenses. These include insurance, routine maintenance, cleaning, minor repairs, and utilities. They have been estimated based on other operators' experiences locally and in the Pacific Northwest.

Management and support costs came from a survey of other ferry operators. Based on their experience, and to normalize for fuel and vessel capital costs, management and support was estimated as 25% of the direct vessel operating cost not including the cost of fuel or vessel leases.

### **Capital Expenses**

The capital expenses for this pro forma include the cost of the dock improvements, but there are no vessel costs because the vessels are being leased. Though long-term leases could be considered capital expenses, the Federal Transit Administration considers all lease expenses to be operating expenses. Detailed descriptions of these cost estimates can be found in the preceding sections on dock improvement and vessel recommendations.

The capital costs used in the complete pro formas are based on the table below; however, the costs have been split over

multiple years after 2019 when the costs are estimated to be incurred. To account for this, inflation was applied in line with the escalation rates noted earlier in this section.

## Funding Opportunities

To close the gap between operating revenue and expenses and to fund the necessary capital investments, there are a range of funding sources that could be considered. These include public subsidies, private subsidies, public/private financing partnerships, grants, and additional revenue from concessions, advertising, and charters.

Across the country, public subsidies for ferry services take a variety of forms. There are four standard sources of public support:

- A local general fund allocation. This is used to subsidize the operating costs and cover capital investments for the new NYC Ferry system. Funds come from the City's operating budget and are dispensed through the Economic Development Corporation (NYC EDC).
- A sales or property tax. These are used to subsidize ferry service in Washington State. In Kitsap County, voters approved a 0.3% sales tax for passenger ferry purposes in November 2016. In King County the county-owned ferry service levies a \$.0125 per \$1,000 property tax.
- A portion of a bridge or road toll. The San Francisco Bay Ferry and the Philadelphia area's Delaware River Authority ferries are supported by tolls.
- A transportation district. This model is used by the Casco Bay Ferries that depart from Portland, Maine. Major capital investments rely on federal funding with the local matching funds coming from an allocation within a voter-approved statewide transportation bond package, revenue collected from parking garage fees, and Casco Bay Line's capital reserve account funded through non-farebox operating revenues, including group tours and charters.

Private subsidies provide another form of non-farebox revenue. They may take the form of sponsorships, which often fund pilots or the initial years of a new service. In San Francisco Bay and the Puget Sound in Washington State, private developers have enhanced the marketability of a property and large employers gave improved access and transportation options for their workforce by supporting ferry services. Sponsorships can also be provided along with water transportation service to a special event or to advertise for an upcoming event. No examples of long term private support for a public ferry service were identified, but the corporate sponsorship of municipally owned bike share systems may provide a model.

Public/private partnerships (P3s) are an option for financing that may be used for securing capital if new vessels are constructed for this route. Although this type of arrangement is not commonly used for the procurement of trains or buses, it may be a possibility for a ferry fleet of this size. With a P3, the private partner(s) can take on some of the risk and the debt does not contribute to the debt limit restrictions of the public partner. This type of arrangement is complex and typically comes at a higher cost than traditional bond financing. It would also require a concession term long enough to amortize the investment by the private entity.

Federal, state, and local grants are typically focused on funding capital improvements and may be secured to maintain existing dock infrastructure, to build new dock infrastructure, or to procure vessels. Grant revenues can vary in availability, applicability, and funding allotment. Most grants are highly competitive, and they cannot be guaranteed as a source of funding in the early phases of a planning process. Securing grants typically requires a state agency or municipality to be the primary applicant. Finding and applying for relevant grants would require having the right staff expertise.

## Federal Funding and Grants

The Federal Highway Administration (FHWA) uses the biennial National Census of Ferry Boat Operators to gather data on existing ferry services and then allocate funds across the country with the MAP-21 (now FAST ACT) Ferry Boat Formula Program (FBP). Each eligible state's Department of Transportation can use these funds for the construction or maintenance of vessels, docks, and waiting areas. The allocation of funds is based on the number of passengers carried by the system and the total route nautical miles serviced as well as the number of vessels carried, a category that does not apply to the ferries operating in Boston. These funds can be used to cover up to 80% of the costs of a capital project.

The Federal Transit Administration (FTA) uses the National Transit Database (NTD) to collect data on transit authorities and provide grants through the Urbanized Area Formula Program. Any ferry service that provides same-day commuter transportation is eligible for formula funding based on route miles and ridership. The FTA also disburses discretionary funding through the competitive Passenger Ferry Grant Program. Both programs provide capital funds to transit agencies and state departments of transportation to match up to 80% of project costs.

## State Funding and Grants

Twice each year, the Seaport Economic Council (SEC) awards competitive grants of up to \$1 million for capital expenses, though most grants are typically smaller. The flexible funding is designed to support cities, towns, and other state agencies with projects that stimulate the marine economy and expand jobs. Five types of grants are available, and three types may be applicable to the projects needed to implement new ferry services: Innovation Grants, Local Maritime Economic Development Planning Grants, and Supportive Coastal Infrastructure Project Grants.

Each SEC grant requires matching funds that cover 20 percent of the project funding request. These matching funds can come from "the municipality, federal grants, private funds, or contributions by partner organizations." Additional information on the application process and requirements can be found at [www.mass.gov/seaport-economic-council-programs-and-grants](http://www.mass.gov/seaport-economic-council-programs-and-grants).

The Massachusetts Department of Environmental Protection (DEP) has recently created an Expendable Trust to facilitate the disbursement of funds acquired through Chapter 91 Licenses for the purposes enhancing public access to the Boston Harbor waterfront and expanding water transportation to, from, or within Boston Harbor. DEP anticipates creating a process to direct funds to fulfill the purposes articulated in applicable Chapter 91 licenses. The process will include opportunities for interested parties to propose projects for potential capital and operating funding.

DEP intends to disseminate information on how this process will be structured in the spring of 2019. Various elements of this business plan may be eligible for funding including dock construction and maintenance, vessel acquisition, and potentially other costs involved in launching a new service.

Beyond the farebox, revenues can be generated with concessions, advertising, and charters. These can generate different levels of funding depending on how many passengers are served, whether those passengers are commuters or tourists, the length of the route, and the visibility of the vessels. The capital funding source of the vessels and dock facilities can also limit which of these activities are allowable.

Concessions are the most common source of on-board non-farebox revenue. Also known as the “galley,” ferries may sell food and beverages as well as newspapers and novelty items. For this route’s financial plans, the galley revenue assumptions were based on comparable existing routes and then scaled to match the route’s length in time and distance.

Advertising is a common form of revenue on many forms of transit, but it is often most effective on routes with particularly high ridership. Advertisers may be more interested in advertising on trains or even buses than on ferries, particularly in smaller markets. Larger advertising campaigns prefer to be the only sponsor at one time and to have a large area where an eye-catching ad can be displayed. Smaller, low-cost advertising for local realtors and organizations may want to have smaller spaces or areas for ads. A conscious policy decision should be made about how much space in the vessel should be dedicated to advertising.

Charters are another way to utilize existing assets and earn revenue when the vessel is not needed for transit service. To succeed, there must be clear policies on when a charter can occur, and all contracts must ensure that regular ferry service takes priority over charter opportunities. It has been most successful in larger systems where a back-up vessel serves charter contracts and is available when the primary boats in the ferry system are out of service. The Town of Winthrop’s ferry has been used for midday charters and for evening wine and sunset cruises after the commuter service finishes its route.

Not all ferry services have a back-up vessel or the kind of limited commuter service to make this viable. Additionally, vessels procured or maintained with FTA funding have to follow strict rules of use. The FTA outlines the regulations for operating chartered service in circular C 5010.1D, Chapter IV, Section 2, Subsection (i). They define incidental use as the “limited non-transit purposes due to transit operating circumstances” and describe when it is appropriate for a transit agency to raise additional revenues to support the system in this way. The guidelines further note that non-profit uses are permitted, if not encouraged, but none of the additional income can be used as a match for the original grant.



## Emissions Impact

Like many forms of mass transit, ferries are assumed to reduce congestion and emissions. This study included an analysis of the extent to which the proposed route would be effective at meeting those goals. Using the data from the stated preference survey and the ridership models, the team projected the likely change in environmental impacts resulting from implementing each of the possible scenarios.

This route requires most passengers to drive to the ferry dock, so only residents of Marina Bay and other nearby neighborhoods will forgo driving completely. Still, many people could choose to drive only to the terminal rather than driving all the way into Boston. Some passengers are currently taking the Red Line and would not be giving up driving to make this trip. The number of passengers projected to stop driving, the annual reduction in car trips, and the total reduction in vehicle miles traveled (VMT) is outlined below and is dependent on the fare. The VMT reduction also includes ferry passengers who drive to the terminal but are now driving shorter distances. The ratio of person trips to auto trips diverted is based on an average car occupancy factor of 1.67.

### Daily and Annual Car Trip Diversion + Car Trip and VMT Reduction

Scenarios	Daily person trips diverted from cars	Annual person trips diverted from cars	Annual car trip reduction	Annual VMT reduction
\$10 fare	266	69,160	41,413	171,059
\$6.50 fare	601	156,260	93,569	368,491

Based on average passenger vehicle emissions rates outlined by the EPA in their 2008 document *Average Annual Emissions and Fuel Consumption for Gasoline-Fueled Passenger Cars and Light Trucks*, the annual volume of pollutants removed by diverted trips was calculated.

### Annual Volume of Pollution Reduction (short tons)

Scenarios	NO <sub>x</sub>	THC	CO	PM 10	VOC (HC)	CO <sub>2</sub>
\$10 fare	0.13	0.20	1.77	0.00	0.19	69.47
\$6.50 fare	0.30	0.46	4.00	0.00	0.44	156.95

There are many options for leased ferries that have a range of emissions. All marine diesel engines constructed after 2004 must meet EPA Tier III or Tier IV emissions requirements depending on the vessel classification. Individual vessels leased for the fleet are projected to have the annual emissions below. Marine engines do not have required total hydrocarbon (THC) emissions standards while automobile engines do not have sulfur oxide (SOx) emissions requirements, so these cannot be directly compared.

**Annual Volume of Pollution Emitted from One Tier III Conventionally Powered Ferry (short tons)**

	NO <sub>x</sub>	CO	PM 10	VOC (HC)	SO <sub>x</sub>	CO <sub>2</sub>
Leased Vessels	8.32	1.9	0.12	0.2	0.04	1,269

Since the volume of nitrous oxide (NO<sub>x</sub>) and carbon dioxide (CO<sub>2</sub>) emissions from a single ferry outweighs the savings of the entire route, there are not clear-cut environmental benefits to implementing ferries, particularly from a climate standpoint. There is also an increase in PM<sub>10</sub>, particulate matter 10 micrometers or less in diameter. Nevertheless, the ferries do lead to a reduction in carbon monoxide (CO) and volatile organic compounds (VOX)/hydrocarbons (HC). There may also be public health benefits when the emissions source from vehicles operating in a dense urban environment is moved to ferries operating over the water. This pattern is consistent with the existing conditions on many passenger ferry fleets. It is typical for new ferry systems to result in a net increase in emissions, particularly when only some of the passengers are switching from auto trips while others are merely changing their preferred type of transit away from buses and trains.







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## Implementation

This plan has been compiled to serve as a roadmap for implementing a new ferry route between Quincy's Squantum Point and Long Wharf in downtown Boston with connections to Columbia Point. With ridership projections and farebox recovery ratios comparable to existing South Shore ferry service, this route could have comparable financial sustainability to the MBTA routes from Hingham and Hull. Working in partnership, state and city agencies, private developers, non-profits, and others have the potential to effectively collaborate to ensure that this service is fully implemented.

Though it focuses primarily on outlining an ideal service, there are many steps that must be taken to achieve this vision and many stakeholders must come together to realize it. Service to both Squantum Point and Columbia Point is dependent on dock improvements.

Work is being done by Quincy to secure funding for the construction of an improved dock at Squantum Point with completed designs, including an application for federal funding to make the dock site fully accessible. While Quincy could continue their current partnership with Winthrop, they also need to determine if and when they should pilot more robust, direct service to downtown Boston. Meanwhile, organizations on Columbia Point have been awarded a grant to design the future docking facility with its ramps and floats as well as accessible paths for Fallon Pier. Additional funding must be secured for its construction. The capital support for a new dock may come from state and federal ferry grants or a public-private partnership. Finally, as the system expands, docking at Long Wharf is likely to grow increasingly complex and additional planning will be needed to accommodate additional ferries.

At present, there is no state agency or operator designated for implementation of this route. Boston Harbor Now plans to remain involved in facilitating the implementation of this

route. MassDOT and Massport are interested in partnering with other state agencies, municipalities, and the private sector to realize this vision. With the formation of a working group with Quincy and Columbia Point stakeholders to oversee the process of initiating and sustaining this service, the following issues need to be resolved in order to fully develop this new system:

- Determine how existing service provided by the Winthrop ferry will be altered or affected.
- Establish pilot service with clear benchmarks for defining it as permanent service.
- Find and lease the appropriate vessels for the service.
- Determine the level of improvements needed at each dock location to initiate the service and which features will be installed at a later time.
- Secure capital funding for dock improvements and vessel construction as needed.
- Address gaps in operating funding.
- Develop a governance structure for the new service.

It should also be noted that Long Wharf is currently a flood pathway during major storm events and will be increasingly vulnerable to sea level rise and other climate change impacts. The City of Boston's Climate Ready Downtown and North End planning process is underway, and Boston Harbor Now will work with the Climate Ready team to convene stakeholders who can contribute to developing appropriate design concepts that address these environmental impacts with resilient solutions while also improving the functionality of Long Wharf's maritime features and preserving its history.



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## Appendix

The following pages provide detailed twenty-year pro formas for each of the scenarios.

All four of the pro formas have a 2019 base year for comparison with service initiation from Squantum Point in 2020 and from Columbia Point in 2022.

Weekend and weekday only service is compared. Weekday only service makes more sense prior to the addition of Columbia Point. With service to Fallon Pier and the nearby museums and institutions, weekend service has the potential to out-perform the projections and should at least be piloted.

## Twenty Year Pro Forma : \$6.50 Fare Weekdays Only - Highest Farebox Recovery

Operations	2019	2020	2021	2022	2023	2024	2025	2026	2027
Operating Revenue	Base Year	Service Initiation Squantum		Service Initiation Columbia					
Fare	2,092,000	1,899,000	2,225,000	2,242,000	2,337,000	2,416,000	2,500,000	2,587,000	2,677,000
Other Operating	167,000	152,000	178,000	179,000	187,000	193,000	200,000	207,000	214,000
<b>Total Operating Revenue</b>	<b>2,259,000</b>	<b>2,051,000</b>	<b>2,403,000</b>	<b>2,421,000</b>	<b>2,524,000</b>	<b>2,609,000</b>	<b>2,700,000</b>	<b>2,794,000</b>	<b>2,891,000</b>
Operating Expenses									
Vessel									
Crew Labor	744,000	762,000	780,000	797,000	814,000	834,000	854,000	876,000	898,000
Fuel	907,000	952,000	968,000	983,000	996,000	1,007,000	1,010,000	1,022,000	1,034,000
Maintenance	291,000	298,000	305,000	311,000	318,000	326,000	334,000	342,000	351,000
Insurance	230,000	236,000	242,000	247,000	252,000	258,000	265,000	271,000	278,000
Lease	474,000	486,000	497,000	508,000	519,000	532,000	545,000	558,000	572,000
Other	37,000	38,000	39,000	40,000	41,000	41,000	42,000	44,000	45,000
<i>Total Vessel Operating</i>	<i>2,683,000</i>	<i>2,772,000</i>	<i>2,831,000</i>	<i>2,886,000</i>	<i>2,940,000</i>	<i>2,998,000</i>	<i>3,050,000</i>	<i>3,113,000</i>	<i>3,178,000</i>
Shoreside									
Insurance	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Miscellaneous Facility	110,000	113,000	116,000	118,000	121,000	124,000	127,000	130,000	133,000
<i>Total Shoreside</i>	<i>113,000</i>	<i>116,000</i>	<i>119,000</i>	<i>121,000</i>	<i>124,000</i>	<i>127,000</i>	<i>130,000</i>	<i>133,000</i>	<i>136,000</i>
Management and Support	354,000	362,000	371,000	379,000	387,000	397,000	406,000	416,000	427,000
<b>Total Operating Expense</b>	<b>3,150,000</b>	<b>3,250,000</b>	<b>3,321,000</b>	<b>3,386,000</b>	<b>3,451,000</b>	<b>3,522,000</b>	<b>3,586,000</b>	<b>3,662,000</b>	<b>3,741,000</b>
<b>Net Operating Income</b>	<b>-891,000</b>	<b>-1,199,000</b>	<b>-918,000</b>	<b>-965,000</b>	<b>-927,000</b>	<b>-913,000</b>	<b>-886,000</b>	<b>-868,000</b>	<b>-850,000</b>

Capital	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capital Funding									
Grants									
State & Local									
<b>Total Capital Revenue</b>									
Capital Expenditures									
Vessel									
Construction	0	0	0	0	0	0	0	0	0
<i>Total Vessel Capital</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Shoreside									
Improvements	4,104,000	4,141,000	1,700,000	0	0	0	0	0	0
Major Maintenance									
<i>Total Shoreside Capital</i>	<i>4,104,000</i>	<i>4,141,000</i>	<i>1,700,000</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<b>Total Capital Expenditures</b>	<b>4,104,000</b>	<b>4,141,000</b>	<b>1,700,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Net Operating &amp; Capital Funding</b>	<b>-4,995,000</b>	<b>-5,340,000</b>	<b>-2,618,000</b>	<b>-965,000</b>	<b>-927,000</b>	<b>-913,000</b>	<b>-886,000</b>	<b>-868,000</b>	<b>-850,000</b>

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
2,771,000	2,870,000	2,970,000	3,073,000	3,178,000	3,287,000	3,400,000	3,516,000	3,637,000	3,762,000	3,889,000
222,000	230,000	238,000	246,000	254,000	263,000	272,000	281,000	291,000	301,000	311,000
2,993,000	3,100,000	3,208,000	3,319,000	3,432,000	3,550,000	3,672,000	3,797,000	3,928,000	4,063,000	4,200,000
920,000	944,000	967,000	991,000	1,015,000	1,040,000	1,065,000	1,091,000	1,118,000	1,145,000	1,172,000
1,046,000	1,055,000	1,069,000	1,074,000	1,085,000	1,097,000	1,103,000	1,107,000	1,126,000	1,131,000	1,140,000
360,000	369,000	378,000	387,000	397,000	406,000	416,000	426,000	437,000	447,000	458,000
285,000	292,000	300,000	307,000	315,000	322,000	330,000	338,000	346,000	355,000	363,000
587,000	602,000	617,000	632,000	647,000	663,000	679,000	696,000	713,000	730,000	747,000
46,000	47,000	48,000	49,000	50,000	52,000	53,000	54,000	56,000	57,000	58,000
3,244,000	3,309,000	3,379,000	3,440,000	3,509,000	3,580,000	3,646,000	3,712,000	3,796,000	3,865,000	3,938,000
3,000	3,000	3,000	3,000	3,000	4,000	4,000	4,000	4,000	4,000	4,000
137,000	140,000	144,000	147,000	151,000	154,000	158,000	162,000	166,000	170,000	174,000
140,000	143,000	147,000	150,000	154,000	158,000	162,000	166,000	170,000	174,000	178,000
438,000	449,000	460,000	471,000	483,000	494,000	507,000	519,000	532,000	544,000	558,000
3,822,000	3,901,000	3,986,000	4,061,000	4,146,000	4,232,000	4,315,000	4,397,000	4,498,000	4,583,000	4,674,000
<b>-829,000</b>	<b>-801,000</b>	<b>-778,000</b>	<b>-742,000</b>	<b>-714,000</b>	<b>-682,000</b>	<b>-643,000</b>	<b>-600,000</b>	<b>-570,000</b>	<b>-520,000</b>	<b>-474,000</b>

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
<b>-829,000</b>	<b>-801,000</b>	<b>-778,000</b>	<b>-742,000</b>	<b>-714,000</b>	<b>-682,000</b>	<b>-643,000</b>	<b>-600,000</b>	<b>-570,000</b>	<b>-520,000</b>	<b>-474,000</b>

## Twenty Year Pro Forma : \$6.50 Fare with Weekends

Operations	2019	2020	2021	2022	2023	2024	2025	2026	2027
Operating Revenue	Base Year	Service Initiation Squantum		Service Initiation Columbia					
Fare	2,251,000	2,044,000	2,394,000	2,393,000	2,514,000	2,600,000	2,690,000	2,783,000	2,880,000
Other Operating	180,000	163,000	191,000	191,000	201,000	208,000	215,000	223,000	230,000
<b>Total Operating Revenue</b>	<b>2,431,000</b>	<b>2,207,000</b>	<b>2,585,000</b>	<b>2,584,000</b>	<b>2,715,000</b>	<b>2,808,000</b>	<b>2,905,000</b>	<b>3,006,000</b>	<b>3,110,000</b>
Operating Expenses									
Vessel									
Crew Labor	1,060,000	1,085,000	1,111,000	1,135,000	1,160,000	1,188,000	1,218,000	1,248,000	1,279,000
Fuel	1,236,000	1,297,000	1,318,000	1,339,000	1,357,000	1,371,000	1,376,000	1,392,000	1,409,000
Maintenance	354,000	362,000	371,000	379,000	387,000	397,000	407,000	417,000	427,000
Insurance	230,000	236,000	242,000	247,000	252,000	258,000	265,000	271,000	278,000
Lease	556,000	569,000	583,000	595,000	609,000	623,000	639,000	655,000	671,000
Other	50,000	52,000	53,000	54,000	55,000	57,000	58,000	59,000	61,000
<i>Total Vessel Operating</i>	<i>3,486,000</i>	<i>3,601,000</i>	<i>3,678,000</i>	<i>3,749,000</i>	<i>3,820,000</i>	<i>3,894,000</i>	<i>3,963,000</i>	<i>4,042,000</i>	<i>4,125,000</i>
Shoreside									
Insurance	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Miscellaneous Facility	110,000	113,000	116,000	118,000	121,000	124,000	127,000	130,000	133,000
<i>Total Shoreside</i>	<i>113,000</i>	<i>116,000</i>	<i>119,000</i>	<i>121,000</i>	<i>124,000</i>	<i>127,000</i>	<i>130,000</i>	<i>133,000</i>	<i>136,000</i>
Management and Support	452,000	463,000	474,000	484,000	495,000	507,000	519,000	532,000	545,000
<b>Total Operating Expense</b>	<b>4,051,000</b>	<b>4,180,000</b>	<b>4,271,000</b>	<b>4,354,000</b>	<b>4,439,000</b>	<b>4,528,000</b>	<b>4,612,000</b>	<b>4,707,000</b>	<b>4,806,000</b>
<b>Net Operating Income</b>	<b>-1,620,000</b>	<b>-1,973,000</b>	<b>-1,686,000</b>	<b>6,938,000</b>	<b>-1,724,000</b>	<b>-1,720,000</b>	<b>-1,707,000</b>	<b>-1,701,000</b>	<b>-1,696,000</b>

Capital	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capital Funding									
Grants									
State & Local									
<b>Total Capital Revenue</b>									
Capital Expenditures									
Vessel									
Construction	0	0	0	0	0	0	0	0	0
<i>Total Vessel Capital</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Shoreside									
Improvements	4,104,000	4,141,000	1,700,000	0	0	0	0	0	0
Major Maintenance									
<i>Total Shoreside Capital</i>	<i>4,104,000</i>	<i>4,141,000</i>	<i>1,700,000</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<b>Total Capital Expenditures</b>	<b>4,104,000</b>	<b>4,141,000</b>	<b>1,700,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Net Operating &amp; Capital Funding</b>	<b>-5,724,000</b>	<b>-6,114,000</b>	<b>-3,386,000</b>	<b>6,938,000</b>	<b>-1,724,000</b>	<b>-1,720,000</b>	<b>-1,707,000</b>	<b>-1,701,000</b>	<b>-1,696,000</b>



2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
2,982,000	3,088,000	3,196,000	3,306,000	3,419,000	3,536,000	3,658,000	3,784,000	3,913,000	4,047,000	4,185,000
238,000	247,000	256,000	264,000	273,000	283,000	293,000	303,000	313,000	324,000	335,000
3,220,000	3,335,000	3,452,000	3,570,000	3,692,000	3,819,000	3,951,000	4,087,000	4,226,000	4,371,000	4,520,000
1,311,000	1,345,000	1,378,000	1,412,000	1,446,000	1,482,000	1,518,000	1,555,000	1,593,000	1,631,000	1,671,000
1,425,000	1,437,000	1,457,000	1,463,000	1,478,000	1,495,000	1,502,000	1,509,000	1,534,000	1,541,000	1,553,000
438,000	449,000	460,000	472,000	483,000	495,000	507,000	519,000	532,000	545,000	558,000
285,000	292,000	300,000	307,000	315,000	322,000	330,000	338,000	346,000	355,000	363,000
688,000	705,000	723,000	741,000	759,000	777,000	796,000	816,000	835,000	856,000	876,000
62,000	64,000	66,000	67,000	69,000	71,000	72,000	74,000	76,000	78,000	80,000
4,209,000	4,292,000	4,384,000	4,462,000	4,550,000	4,642,000	4,725,000	4,811,000	4,916,000	5,006,000	5,101,000
3,000	3,000	3,000	3,000	3,000	4,000	4,000	4,000	4,000	4,000	4,000
137,000	140,000	144,000	147,000	151,000	154,000	158,000	162,000	166,000	170,000	174,000
140,000	143,000	147,000	150,000	154,000	158,000	162,000	166,000	170,000	174,000	178,000
559,000	573,000	588,000	602,000	617,000	632,000	647,000	663,000	679,000	696,000	712,000
4,908,000	5,008,000	5,119,000	5,214,000	5,321,000	5,432,000	5,534,000	5,640,000	5,765,000	5,876,000	5,991,000
<b>-1,688,000</b>	<b>-1,673,000</b>	<b>-1,667,000</b>	<b>-1,644,000</b>	<b>-1,629,000</b>	<b>-1,613,000</b>	<b>-1,583,000</b>	<b>-1,553,000</b>	<b>-1,539,000</b>	<b>-1,505,000</b>	<b>-1,471,000</b>

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
<b>-1,688,000</b>	<b>-1,673,000</b>	<b>-1,667,000</b>	<b>-1,644,000</b>	<b>-1,629,000</b>	<b>-1,613,000</b>	<b>-1,583,000</b>	<b>-1,553,000</b>	<b>-1,539,000</b>	<b>-1,505,000</b>	<b>-1,471,000</b>

## Twenty Year Pro Forma : \$10.00 Fare Weekdays Only

Operations	2019	2020	2021	2022	2023	2024	2025	2026	2027
Operating Revenue	Base Year	Service Initiation Squantum		Service Initiation Columbia					
Fare	1,713,000	1,555,000	1,821,000	1,574,000	1,634,000	1,689,000	1,748,000	1,808,000	1,872,000
Other Operating	137,000	124,000	146,000	126,000	131,000	135,000	140,000	145,000	150,000
<b>Total Operating Revenue</b>	<b>1,850,000</b>	<b>1,679,000</b>	<b>1,967,000</b>	<b>1,700,000</b>	<b>1,765,000</b>	<b>1,824,000</b>	<b>1,888,000</b>	<b>1,953,000</b>	<b>2,022,000</b>
Operating Expenses									
Vessel									
Crew Labor	744,000	762,000	780,000	797,000	814,000	834,000	854,000	876,000	898,000
Fuel	907,000	952,000	968,000	983,000	996,000	1,007,000	1,010,000	1,022,000	1,034,000
Maintenance	291,000	298,000	305,000	311,000	318,000	326,000	334,000	342,000	351,000
Insurance	230,000	236,000	242,000	247,000	252,000	258,000	265,000	271,000	278,000
Lease	474,000	486,000	497,000	508,000	519,000	532,000	545,000	558,000	572,000
Other	37,000	38,000	39,000	40,000	41,000	41,000	42,000	44,000	45,000
<b>Total Vessel Operating</b>	<b>2,683,000</b>	<b>2,772,000</b>	<b>2,831,000</b>	<b>2,886,000</b>	<b>2,940,000</b>	<b>2,998,000</b>	<b>3,050,000</b>	<b>3,113,000</b>	<b>3,178,000</b>
Shoreside									
Insurance	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Miscellaneous Facility	110,000	113,000	116,000	118,000	121,000	124,000	127,000	130,000	133,000
<b>Total Shoreside</b>	<b>113,000</b>	<b>116,000</b>	<b>119,000</b>	<b>121,000</b>	<b>124,000</b>	<b>127,000</b>	<b>130,000</b>	<b>133,000</b>	<b>136,000</b>
Management and Support	354,000	362,000	371,000	379,000	387,000	397,000	406,000	416,000	427,000
<b>Total Operating Expense</b>	<b>3,150,000</b>	<b>3,250,000</b>	<b>3,321,000</b>	<b>3,386,000</b>	<b>3,451,000</b>	<b>3,522,000</b>	<b>3,586,000</b>	<b>3,662,000</b>	<b>3,741,000</b>
<b>Net Operating Income</b>	<b>-1,300,000</b>	<b>-1,571,000</b>	<b>-1,354,000</b>	<b>-1,686,000</b>	<b>-1,686,000</b>	<b>-1,698,000</b>	<b>-1,698,000</b>	<b>-1,709,000</b>	<b>-1,719,000</b>

Capital	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capital Funding									
Grants									
State & Local									
<b>Total Capital Revenue</b>									
Capital Expenditures									
Vessel									
Construction	0	0	0	0	0	0	0	0	0
<b>Total Vessel Capital</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Shoreside									
Improvements	4,104,000	4,141,000	1,700,000	0	0	0	0	0	0
Major Maintenance									
<b>Total Shoreside Capital</b>	<b>4,104,000</b>	<b>4,141,000</b>	<b>1,700,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Capital Expenditures</b>	<b>4,104,000</b>	<b>4,141,000</b>	<b>1,700,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Net Operating &amp; Capital Funding</b>	<b>-5,404,000</b>	<b>-5,712,000</b>	<b>-3,054,000</b>	<b>-1,686,000</b>	<b>-1,686,000</b>	<b>-1,698,000</b>	<b>-1,698,000</b>	<b>-1,709,000</b>	<b>-1,719,000</b>

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
1,937,000	2,006,000	2,077,000	2,148,000	2,222,000	2,298,000	2,377,000	2,458,000	2,543,000	2,630,000	2,719,000
155,000	160,000	166,000	172,000	178,000	184,000	190,000	197,000	203,000	210,000	217,000
2,092,000	2,166,000	2,243,000	2,320,000	2,400,000	2,482,000	2,567,000	2,655,000	2,746,000	2,840,000	2,936,000
920,000	944,000	967,000	991,000	1,015,000	1,040,000	1,065,000	1,091,000	1,118,000	1,145,000	1,172,000
1,046,000	1,055,000	1,069,000	1,074,000	1,085,000	1,097,000	1,103,000	1,107,000	1,126,000	1,131,000	1,140,000
360,000	369,000	378,000	387,000	397,000	406,000	416,000	426,000	437,000	447,000	458,000
285,000	292,000	300,000	307,000	315,000	322,000	330,000	338,000	346,000	355,000	363,000
587,000	602,000	617,000	632,000	647,000	663,000	679,000	696,000	713,000	730,000	747,000
46,000	47,000	48,000	49,000	50,000	52,000	53,000	54,000	56,000	57,000	58,000
3,244,000	3,309,000	3,379,000	3,440,000	3,509,000	3,580,000	3,646,000	3,712,000	3,796,000	3,865,000	3,938,000
3,000	3,000	3,000	3,000	3,000	4,000	4,000	4,000	4,000	4,000	4,000
137,000	140,000	144,000	147,000	151,000	154,000	158,000	162,000	166,000	170,000	174,000
140,000	143,000	147,000	150,000	154,000	158,000	162,000	166,000	170,000	174,000	178,000
438,000	449,000	460,000	471,000	483,000	494,000	507,000	519,000	532,000	544,000	558,000
3,822,000	3,901,000	3,986,000	4,061,000	4,146,000	4,232,000	4,315,000	4,397,000	4,498,000	4,583,000	4,674,000
-1,730,000	-1,735,000	-1,743,000	-1,741,000	-1,746,000	-1,750,000	-1,748,000	-1,742,000	-1,752,000	-1,743,000	-1,738,000

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
-1,730,000	-1,735,000	-1,743,000	-1,741,000	-1,746,000	-1,750,000	-1,748,000	-1,742,000	-1,752,000	-1,743,000	-1,738,000

## Twenty Year Pro Forma : \$10.00 Fare with Weekends

Operations	2019	2020	2021	2022	2023	2024	2025	2026	2027
Operating Revenue	Base Year	Service Initiation Squantum		Service Initiation Columbia					
Fare	1,843,000	1,673,000	1,960,000	1,680,000	1,758,000	1,817,000	1,880,000	1,946,000	2,014,000
Other Operating	147,000	134,000	157,000	134,000	141,000	145,000	150,000	156,000	161,000
<b>Total Operating Revenue</b>	<b>1,990,000</b>	<b>1,807,000</b>	<b>2,117,000</b>	<b>1,814,000</b>	<b>1,899,000</b>	<b>1,962,000</b>	<b>2,030,000</b>	<b>2,102,000</b>	<b>2,175,000</b>
Operating Expenses									
Vessel									
Crew Labor	1,060,000	1,085,000	1,111,000	1,135,000	1,160,000	1,188,000	1,218,000	1,248,000	1,279,000
Fuel	1,236,000	1,297,000	1,318,000	1,339,000	1,357,000	1,371,000	1,376,000	1,392,000	1,409,000
Maintenance	354,000	362,000	371,000	379,000	387,000	397,000	407,000	417,000	427,000
Insurance	230,000	236,000	242,000	247,000	252,000	258,000	265,000	271,000	278,000
Lease	556,000	569,000	583,000	595,000	609,000	623,000	639,000	655,000	671,000
Other	50,000	52,000	53,000	54,000	55,000	57,000	58,000	59,000	61,000
<b>Total Vessel Operating</b>	<b>3,486,000</b>	<b>3,601,000</b>	<b>3,678,000</b>	<b>3,749,000</b>	<b>3,820,000</b>	<b>3,894,000</b>	<b>3,963,000</b>	<b>4,042,000</b>	<b>4,125,000</b>
Shoreside									
Insurance	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Miscellaneous Facility	110,000	113,000	116,000	118,000	121,000	124,000	127,000	130,000	133,000
<b>Total Shoreside</b>	<b>113,000</b>	<b>116,000</b>	<b>119,000</b>	<b>121,000</b>	<b>124,000</b>	<b>127,000</b>	<b>130,000</b>	<b>133,000</b>	<b>136,000</b>
Management and Support	452,000	463,000	474,000	484,000	495,000	507,000	519,000	532,000	545,000
<b>Total Operating Expense</b>	<b>4,051,000</b>	<b>4,180,000</b>	<b>4,271,000</b>	<b>4,354,000</b>	<b>4,439,000</b>	<b>4,528,000</b>	<b>4,612,000</b>	<b>4,707,000</b>	<b>4,806,000</b>
<b>Net Operating Income</b>	<b>-2,061,000</b>	<b>-2,373,000</b>	<b>-2,154,000</b>	<b>-2,540,000</b>	<b>-2,540,000</b>	<b>-2,566,000</b>	<b>-2,582,000</b>	<b>-2,605,000</b>	<b>-2,631,000</b>

Capital	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capital Funding									
Grants									
State & Local									
<b>Total Capital Revenue</b>									
Capital Expenditures									
Vessel									
Construction	0	0	0	0	0	0	0	0	0
<b>Total Vessel Capital</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Shoreside									
Improvements	4,104,000	4,141,000	1,700,000	0	0	0	0	0	0
Major Maintenance									
<b>Total Shoreside Capital</b>	<b>4,104,000</b>	<b>4,141,000</b>	<b>1,700,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total Capital Expenditures</b>	<b>4,104,000</b>	<b>4,141,000</b>	<b>1,700,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Net Operating &amp; Capital Funding</b>	<b>-6,165,000</b>	<b>-6,514,000</b>	<b>-3,854,000</b>	<b>-2,540,000</b>	<b>-2,540,000</b>	<b>-2,566,000</b>	<b>-2,582,000</b>	<b>-2,605,000</b>	<b>-2,631,000</b>

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
2,085,000	2,159,000	2,234,000	2,311,000	2,390,000	2,472,000	2,557,000	2,645,000	2,736,000	2,830,000	2,926,000
167,000	173,000	179,000	185,000	191,000	198,000	205,000	212,000	219,000	226,000	234,000
2,252,000	2,332,000	2,413,000	2,496,000	2,581,000	2,670,000	2,762,000	2,857,000	2,955,000	3,056,000	3,160,000
1,311,000	1,345,000	1,378,000	1,412,000	1,446,000	1,482,000	1,518,000	1,555,000	1,593,000	1,631,000	1,671,000
1,425,000	1,437,000	1,457,000	1,463,000	1,478,000	1,495,000	1,502,000	1,509,000	1,534,000	1,541,000	1,553,000
438,000	449,000	460,000	472,000	483,000	495,000	507,000	519,000	532,000	545,000	558,000
285,000	292,000	300,000	307,000	315,000	322,000	330,000	338,000	346,000	355,000	363,000
688,000	705,000	723,000	741,000	759,000	777,000	796,000	816,000	835,000	856,000	876,000
62,000	64,000	66,000	67,000	69,000	71,000	72,000	74,000	76,000	78,000	80,000
4,209,000	4,292,000	4,384,000	4,462,000	4,550,000	4,642,000	4,725,000	4,811,000	4,916,000	5,006,000	5,101,000
3,000	3,000	3,000	3,000	3,000	4,000	4,000	4,000	4,000	4,000	4,000
137,000	140,000	144,000	147,000	151,000	154,000	158,000	162,000	166,000	170,000	174,000
140,000	143,000	147,000	150,000	154,000	158,000	162,000	166,000	170,000	174,000	178,000
559,000	573,000	588,000	602,000	617,000	632,000	647,000	663,000	679,000	696,000	712,000
4,908,000	5,008,000	5,119,000	5,214,000	5,321,000	5,432,000	5,534,000	5,640,000	5,765,000	5,876,000	5,991,000
<b>-2,656,000</b>	<b>-2,676,000</b>	<b>-2,706,000</b>	<b>-2,718,000</b>	<b>-2,740,000</b>	<b>-2,762,000</b>	<b>-2,772,000</b>	<b>-2,783,000</b>	<b>-2,810,000</b>	<b>-2,820,000</b>	<b>-2,831,000</b>

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
<b>-2,656,000</b>	<b>-2,676,000</b>	<b>-2,706,000</b>	<b>-2,718,000</b>	<b>-2,740,000</b>	<b>-2,762,000</b>	<b>-2,772,000</b>	<b>-2,783,000</b>	<b>-2,810,000</b>	<b>-2,820,000</b>	<b>-2,831,000</b>



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*Cabot Family  
Charitable Trust*



## Consultant Team

Led by: Steer (formerly Steer Davies Gleave)

Elliott Bay Design Group

KPFF

Moffatt and Nichol

Norris and Norris

Progressions

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# BOSTON HARBOR NOW



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