City of Boston Public Works Department
Long Island Bridge over Boston Harbor Bridge Superstructure Replacement

Navigation Impact Study Supplement

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Prepared by:
STV Incorporated
One Financial Center
3rd Floor
Boston, MA, 02111

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1. INTRODUCTION

The City of Boston Public Works Department (the City) has been working toward the replacement of the Long Island Bridge superstructure since 2014, as described in the Long Island Bridge Superstructure Replacement project permit submittals to the U.S. Coast Guard (USCG).

Following extensive coordination with the USCG from 2014 through 2019, the City formally filed a bridge permit application in February 2019 requesting an amendment to the 1950 federal bridge authorization to reconstruct the bridge superstructure with the same horizontal and vertical clearances at the navigable waterway. All design-related USCG comments on the application were received and fully addressed in 2019 and the final design for the bridge was completed. During this time period of 2014 to 2019, and through the design and coordination process, a Navigation Impact Study was not requested from the City of Boston.

However, in February of 2021 after the design of the bridge was completed and two years after the 2019 bridge application was submitted, the USCG requested the City conduct a Navigation Impact Study. The USCG further stipulated that the existing needs of navigation be defined by vessel transits occurring after the public safety early action effort of removing the bridge superstructure.

The City respectfully disagrees with this baseline for existing needs of navigation because at the time of the emergency removal, the City was already designing the replacement of the superstructure on the existing substructure and had communicated this intent to all applicable regulators. Based on review of the USCG's written policies and procedures, the City understands that a Navigation Impact Study is traditionally and typically required only for new bridges along new alignments or for projects including major changes to both super- and substructures. Nonetheless, the City has complied with the USCG request for a Navigation Impact Study.

Accordingly, the City prepared a navigation survey to identify the number of vessels transiting the bridge site in the past five years and having air drafts exceeding the vertical clearance afforded by the proposed replacement superstructure. The survey was distributed twice to over 400 email addresses including the Port Operators Group, the Massachusetts Bay Harbor Safety Committee (MBHSC), individual boat owners, and a wide variety of yacht clubs, marinas, and marine facilities in the project vicinity. Survey responses were received for 32 recreational vessels and additional information was obtained for commercial vessels through surveys and direct outreach. Information regarding these vessels is summarized in Sections 7 and 8 of the Navigation Impact Study. Although information was also provided by an individual yacht club and the MBHSC, the vessel transit data was found to be insufficient and sometimes contradictory. The individual yacht club and MBHSC data is documented and discussed in the Navigation Impact Study.

In June 2021, to supplement the survey information, the City installed a video camera to record vessel transits. The camera and recording system began reliably operating on June 16,

2021 and were left in operation through Labor Day, September 6, 2021. Video footage was reviewed, still photos were extracted each time a boat transited with a mast height near the tops of the piers, the tide level was reviewed, and a determination was made regarding whether or not the vessel would be able to pass when the replacement superstructure is installed. Each vessel passage was then categorized as "able to pass anytime" (not logged), "unable to pass at high tide," or "unable to pass anytime." Examples of extracted still photos with annotation are provided in the appendix and summaries are presented in the sections below.

As stated in the Navigation Impact Study, all vessels that could transit under the 1950 bridge superstructure will still be able to transit under the proposed bridge superstructure. The City of Boston understands that some vessels requiring more vertical clearance than will be afforded by the proposed bridge superstructure have enjoyed traversing the Long Island Bridge site since the emergency superstructure removal in 2015. However, this condition during the design and permitting process was never anticipated to be permanent. As described in Section 11 of the Navigation Impact Study, if needed, both sides of the bridge can be accessed by vessels via alternate routes. As the sole vehicular route to Long Island, the bridge serves the needs of land transportation while allowing for the reasonable needs of navigation.

2. SUMMARY OF VESSEL COUNT DATA

2.1 DATA SUMMARY

The following tables summarize the number of transits between June 16th and September 6th, 2021 by vessels that would potentially have been affected by the height of the original Long Island Bridge superstructure.

Table 1: Number of Summer 2021 Transits Potentially Impacted, by Month

Month or Portion of Month	Transits That Would Not Be Possible*	Transits That Would Be Tide-Dependent**
June (16th to 30th)	101	332
July	85	573
August	196	557
September (1st to 6th)	43	128
Total	425	1,590

Table 2: Number of Summer 2021 Transits Potentially Impacted, Total

Ability for Transit to Occur With Bridge Superstructure in Place	Number of Transits Logged
Anytime (<51.75' Vertical Clearance Needed)	Not Logged
Tide-Dependent (51.75'-61.24' Needed)**	1,590
Cannot Transit (>61.24' Needed)*	425
Total Number of Transits Logged	2,015

*These transits were not possible prior to the emergency superstructure removal in 2015
**This same condition was present prior to the emergency superstructure removal in 2015

The chart on the following page shows the number of transits per day in the two categories that were logged.

2.2 EMERGENCY OPERATIONS/MAINTENANCE VESSELS

No transits were logged for marine vessels for emergency operations, law enforcement, fire, rescue, or maintenance with air draft needs greater than the vertical clearance provided by the original Long Island Bridge superstructure.

2.3 RECREATIONAL NAVIGATION

The majority of transits logged for vessels with air draft needs greater than the vertical clearance provided by the original Long Island Bridge superstructure were recreational sail boats. As described in the Navigation Impact Study, because the bridge crosses open water in connecting to an island, it does not block access to any marine facility or location. Alternate routes can be used to get to either side of the bridge, or to reach other destinations in Boston Harbor.

2.4 COMMERCIAL NAVIGATION

The majority of the commercial navigation on Boston Harbor in the vicinity of the bridge is for MBTA ferry service and sightseeing tours. The MBTA vessels are the most frequent users of the crossing and were not logged because they could easily pass under the original Long Island Bridge superstructure. The following table provides the number of transits that were logged for commercial vessels with air draft needs greater than the vertical clearance provided by the original Long Island Bridge superstructure.

Table 3: Commercial Ferry and Sightseeing Waterway Usage (6/16/2021 – 9/6/2021)

Owner or Operator	Summer 2021 Transits
MBTA	Not Logged*
Boston Harbor Cruises/ City Experiences by Hornblower (including DCR ferries)	M/V Odyssey: 3 Transits M/V Spirit of Boston: 2 Transits
	Other Vessels: Not Logged*
Classic Harbor Line	S/V Adirondack III: 13 Transits M/V Northern Lights: Not Logged*
Boston Harbor Sailing Cruises	0 Transits
Bay State Cruise Company	M/V Provincetown II: 14 Transits Other Vessels: Not Logged*
Boatonian	Not Logged*
Massachusetts Bay Lines	Not Logged*
Come Sail Away Now	Not Logged*
UMass Boston M/V Columbia Point	Not Logged*
Sir Winston (Single Vessel, Private Events)	1 Transit

Notes: 1. M/V and S/V indicate Motor Vessel and Sailing Vessel, respectively
2. A * indicates that the vessel could sail beneath the superstructure and therefore its transits were not logged.

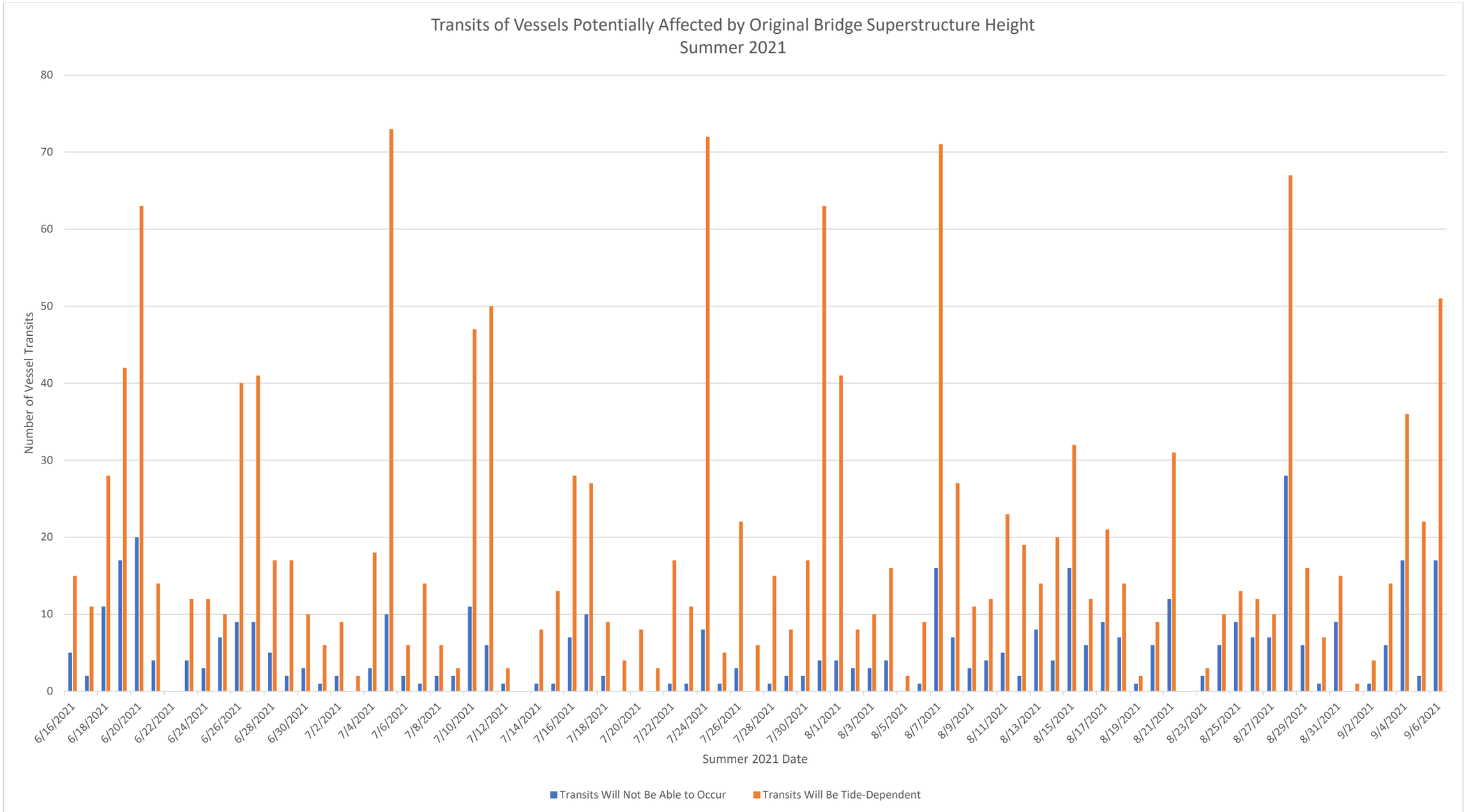


Chart 1: Summer 2021 Recorded Vessel Transits by Date

In addition to the values in Table 3 above, five barges with cranes were logged. The equipment as loaded would not have been able to transit the bridge site under the reinstalled bridge superstructure; however, it was not possible for reviewers to determine if the equipment could have been lowered to allow for passage. The charts on the following pages provide additional detail.

2.5 DATA COLLECTION METHODOLOGY

The City of Boston collected vessel transit data during the summer of 2021 using video footage for the purpose of roughly comparing the information obtained in the Navigation Impact Study survey results. The intent was to validate results where possible so that areas of uncertainty could be minimized. Although originally only intended as internal due diligence, the City provided the data to the USCG following a formal request in September 2021.

A video camera was utilized to record activity in the navigable waterway at the bridge site. Waterway activity was logged between June 16 and September 6, 2021. Annotated examples of still photos extracted from the video footage can be found in Appendix 1. The video footage and still photos were reviewed by an STV employee to determine if the vessel's ability to transit would likely be impacted by the proposed reinstallation of the bridge superstructure. The method of data collection utilized was for this purpose only and does not allow for the determination of recreational boat name/ownership, mooring location, exact mast height, draft requirements, or intended destination. Larger commercial vessels were identified separately due to their unique physical characteristics and were individually logged if they required more air draft than the reinstalled superstructure would provide, as summarized in Section 2.4 above. The direction of travel was not logged.

The camera utilized to record the vessel transits was focused on the bridge continuously. At first, continuous video recordings were reviewed by an STV employee. The camera also had a time lapse feature set to take a snapshot photo of the same view as the video recordings every minute between 5:00 AM and 9:00 PM. The video footage logged an alert any time the camera detected movement. Once it was confirmed that the motion sensing feature was reliable, the videos with alerts were used for the logging exercise with the time lapse snapshots used for verification.

After darkness fell, which was generally about an hour past sunset each night, it became very difficult to see the pier bolster heights and therefore to determine relative vessel heights. Some of the commercial vessels use the bridge for harbor cruises at night and are distinguishable based on vessel lighting (for example, the Provincetown II has a string of lights set up in a triangular pattern on the top deck), so the nighttime footage was reviewed to identify any distinguishable commercial vessels and to identify any transits of recreational vessels with high mast lights on nights when the pier bolsters could be seen. It is possible that some nighttime transits of tall recreational vessels were not logged if the vessel did not have a mast light on when transiting the bridge, if the light was not at the top of the mast

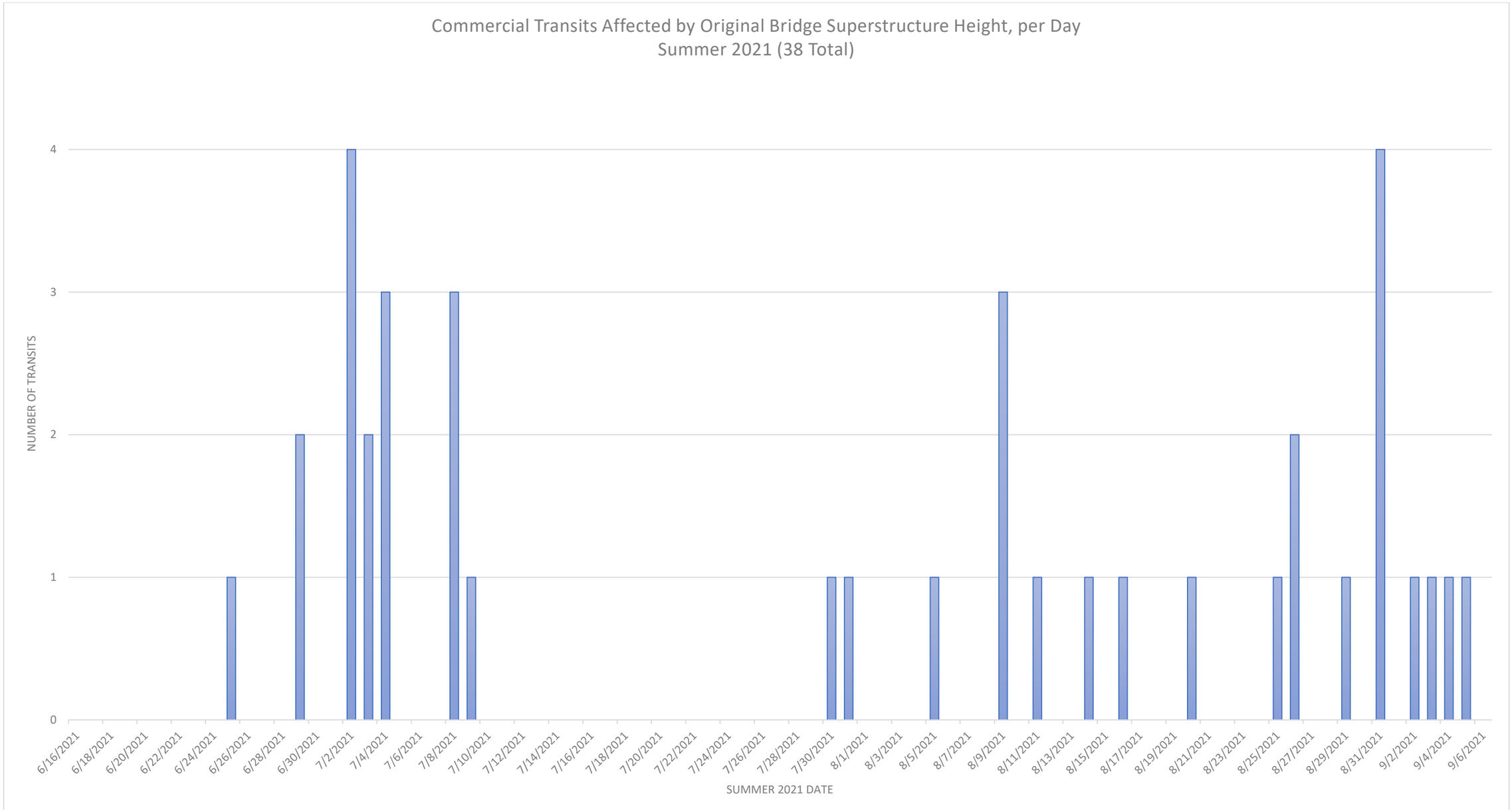


Chart 2: Summer 2021 Recorded Commercial Vessel Transits by Date

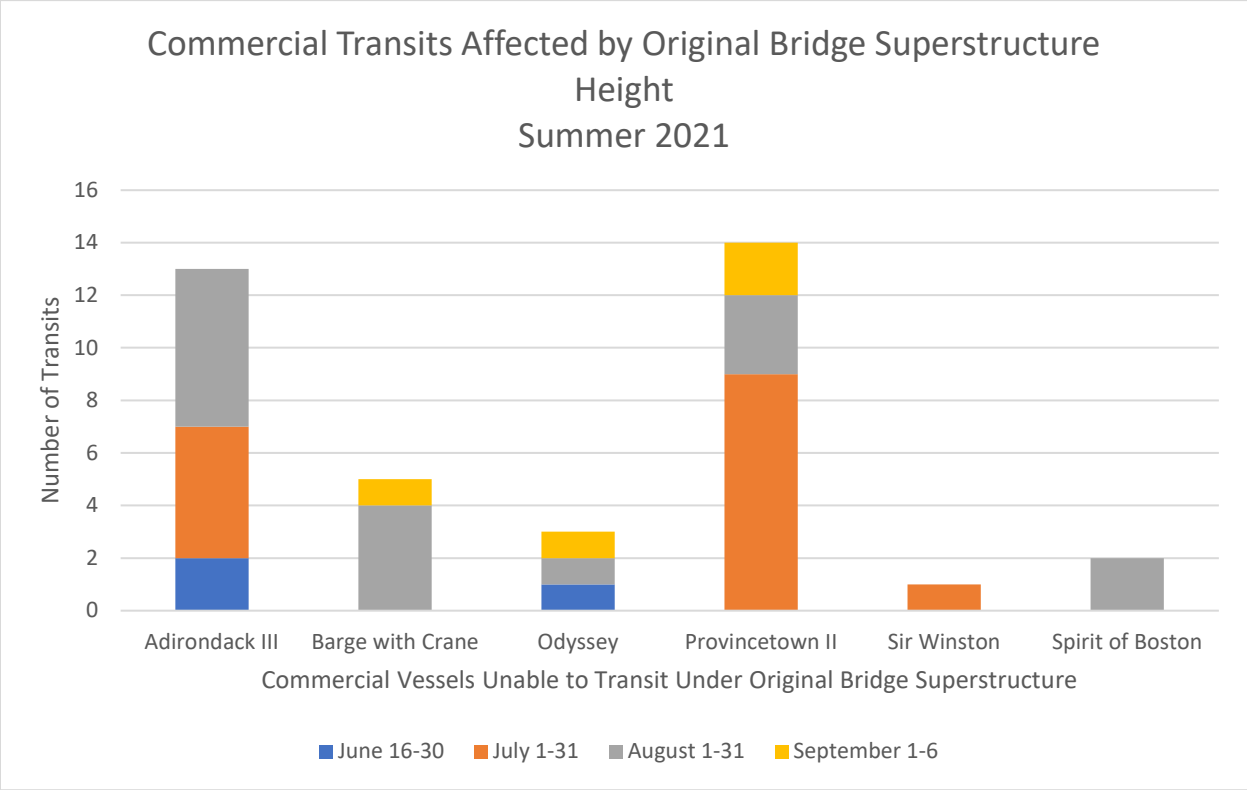


Chart 3: Summer 2021 Recorded Commercial Vessel Transits by Vessel (Where Available)

thereby making the vessel appear shorter, or if it was a dark night when it was not possible to see the top of the bolsters for vessel height comparison purposes.

The tops of the pier bolsters were utilized to approximate the height of a vessel that would be able to transit under the bridge superstructure at any given transit time. Based on the proposed bridge superstructure replacement design, the lowest portion of the bridge superstructure above the navigable waterway would be over 9.75 feet above the tops of the existing bolsters (see Appendix 2). This approach, which conservatively assumes a significantly higher air draft than was utilized in the Navigation Impact Study, is appropriate for this exercise because it allowed reviewers to make a physical comparison between the vessel mast heights and the pier bolsters in each image without extrapolation. These comparisons were also made in the context of the wind, wave, and wake conditions at the time of each transit, so those conditions are considered in the data.

For each identified vessel transit, a snapshot was obtained and the video surrounding the transit time was reviewed to confirm the mast height. The height of the vessel was evaluated to determine how it compared to the pier bolsters on either side of the navigation span, and the tide level was reviewed based on both the time of transit and the water level at the pier bases. This information was then used to categorize each vessel transit as “able to pass

anytime" (not logged), "unable to pass at high tide," or "unable to pass anytime" (see Appendix 1 for examples).

For each vessel that was determined to be "unable to pass at high tide" or "unable to pass anytime," the vessel was recorded in a log that included the time of transit, the type of vessel (sailboat, cruise liner, barge, etc.), and the name of the vessel if it was a known commercial vessel; in addition to the log, a still photo of each vessel transit was saved with the date and time of transit. After the initial review and logging was complete, a separate reviewer confirmed the data using the time lapse photos, which were reviewed to confirm the logged data and to determine if any vessels of interest transited the bridge without setting off the alert.

The fully confirmed data is presented in Sections 2.1 through 2.4 above.

3. CONCLUSION

The replacement of the Long Island Bridge superstructure as proposed will not generate any additional permanent navigational impacts when compared to the originally permitted bridge superstructure, which was in place at the start of the project and should form the basis for any existing conditions evaluation. There is an alternate route around Long Island for any vessels in the area that are too tall to transit under the bridge. The City of Boston understands that some of these taller vessels have enjoyed traversing the bridge site since the emergency superstructure removal in 2015, but this condition was never anticipated to be permanent. If needed, both sides of the bridge can be accessed by vessels via alternate routes. Replacement of the superstructure does not block vessel access to any marine facility or location.

As the sole vehicular route to Long Island, the proposed Long Island Bridge superstructure replacement serves the needs of land transportation while allowing for the reasonable needs of navigation.

APPENDIX 1 – SAMPLE ANNOTATED CAMERA VIEWS

Views of piers at high/low tides

Example showing low tide
(8/9/21 at 6:35 am, 0.0 ft tide)

Example showing high tide
(8/9/21 at 12:48 pm, 9.4 ft tide)

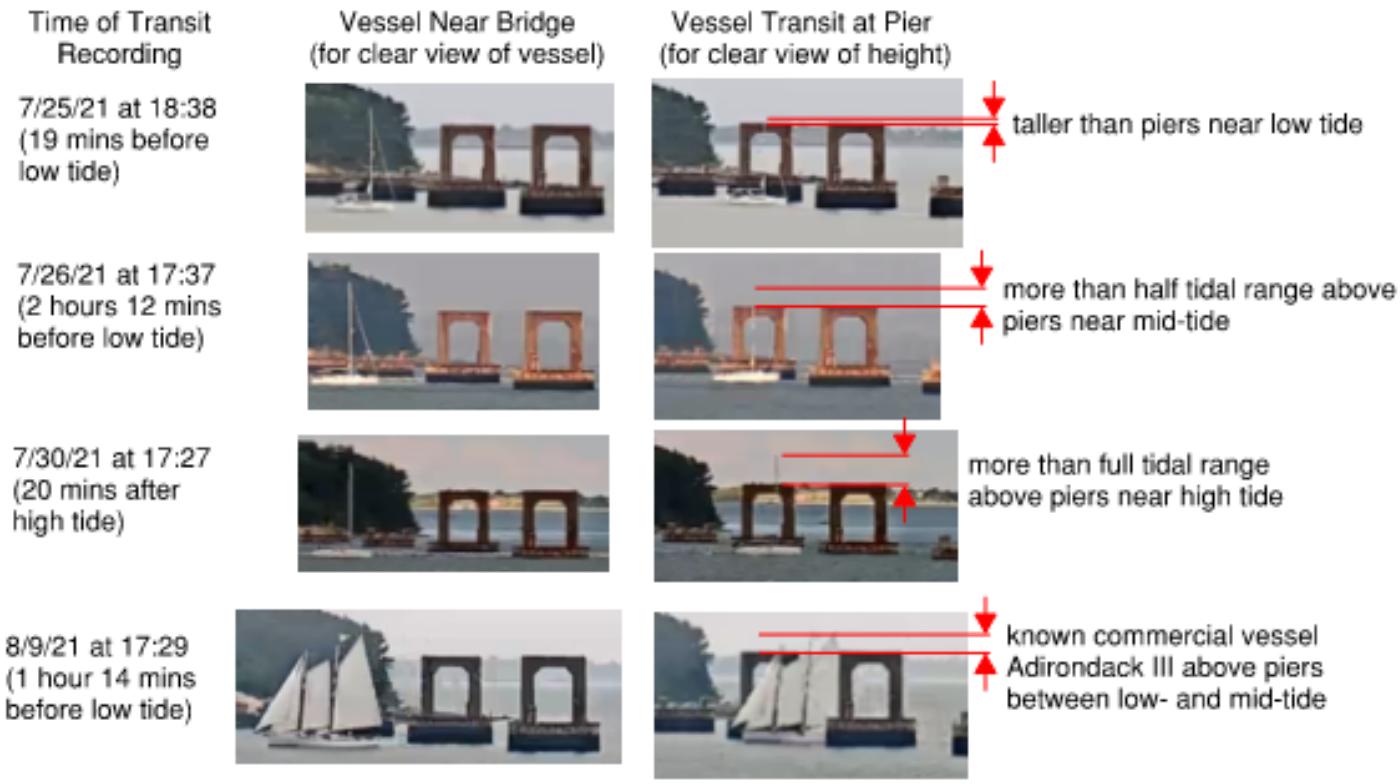
Approximate bottom of steel elevation
Top of pier bolster

Approximate high tide elevation
Approximate low tide elevation

Example of transit not logged

Extracted still photo of M/V Northern Lights transiting the bridge site 5 minutes after high tide. Note that the top of the antenna is visibly below the top of the pier.

Examples of transits that would not be possible with original superstructure:



Examples of transits that would be tide-dependent with original superstructure:

Time of Transit Recording	Vessel Near Bridge (for clear view of vessel)	Vessel Transit at Pier (for clear view of height)	
7/26/21 at 19:32 (17 mins after low tide)			less than full tidal range below piers near low tide
7/29/21 at 12:51 (2 hours 55 mins after low tide)			less than half tidal range above piers near mid-tide
7/28/21 at 15:26 (2 mins before high tide)			less than full tidal range above piers near high tide

APPENDIX 2 – EXISTING PIER BOLSTER HEIGHT SKETCH