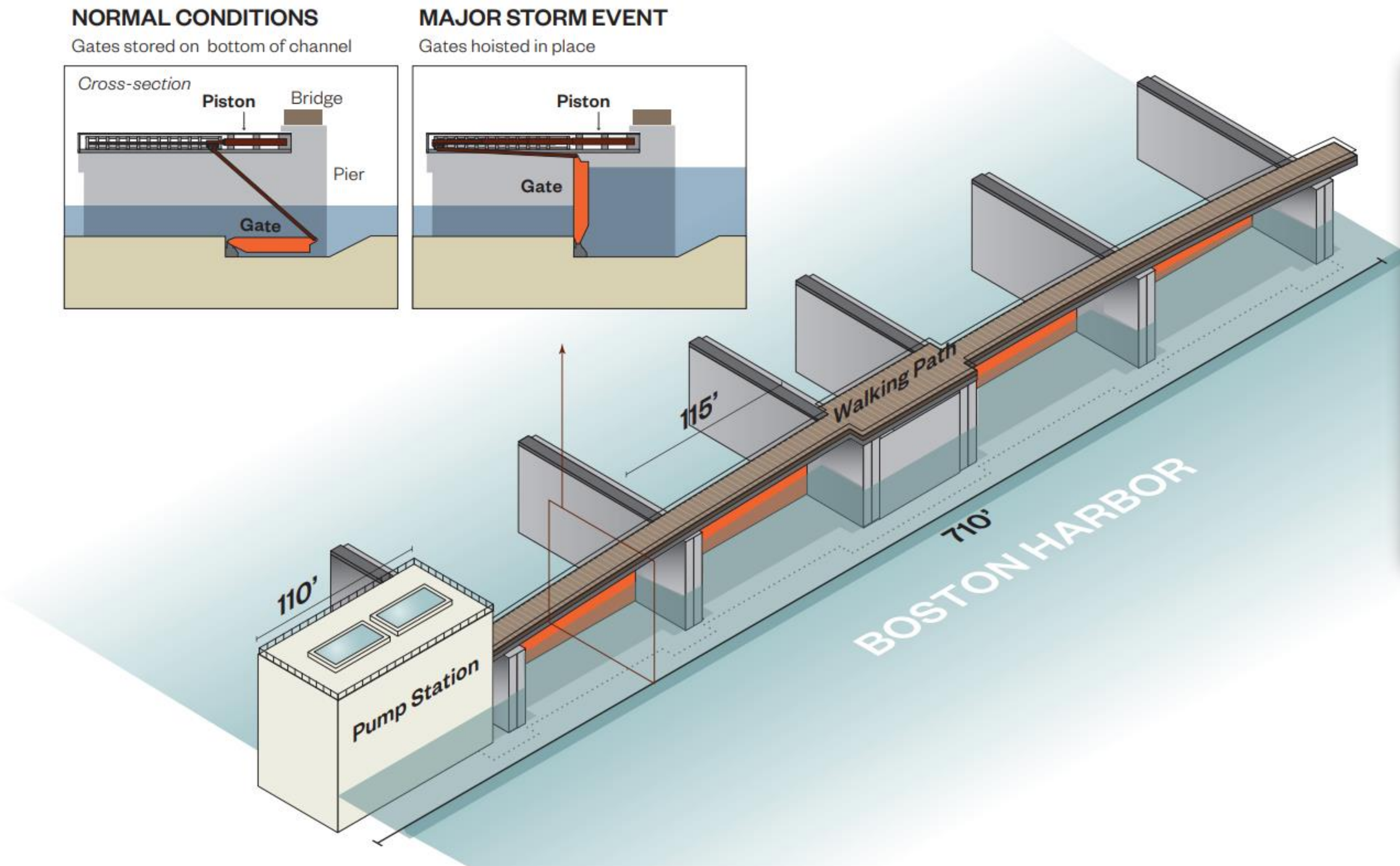
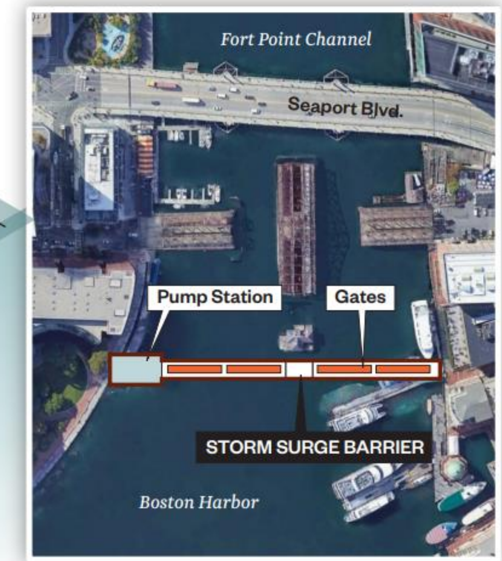
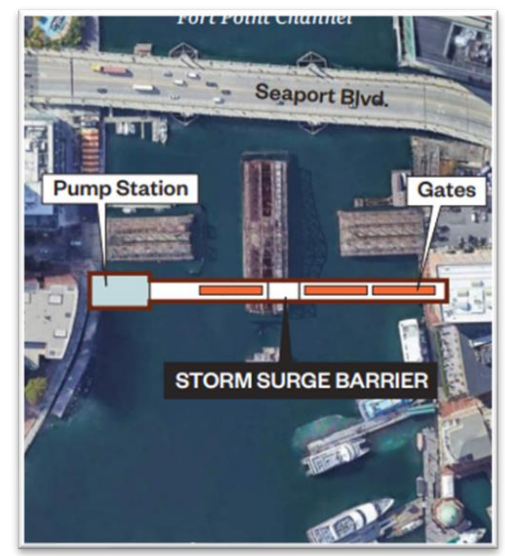
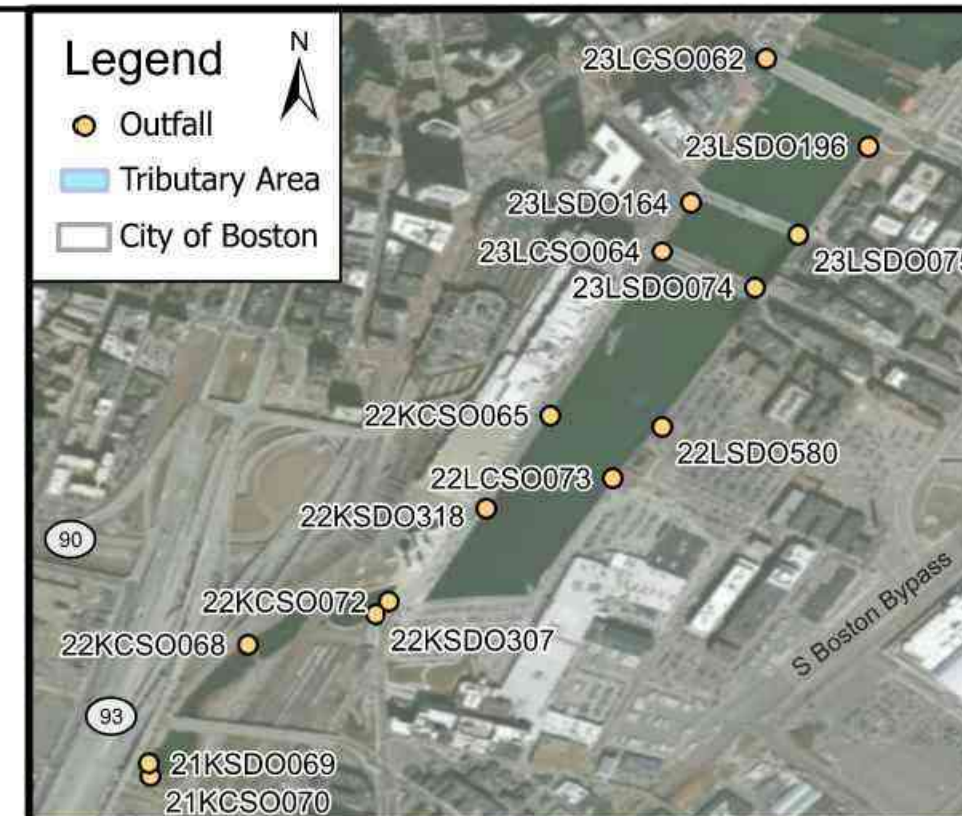
Fort Point Channel Storm Surge Barrier *Concept Overview*

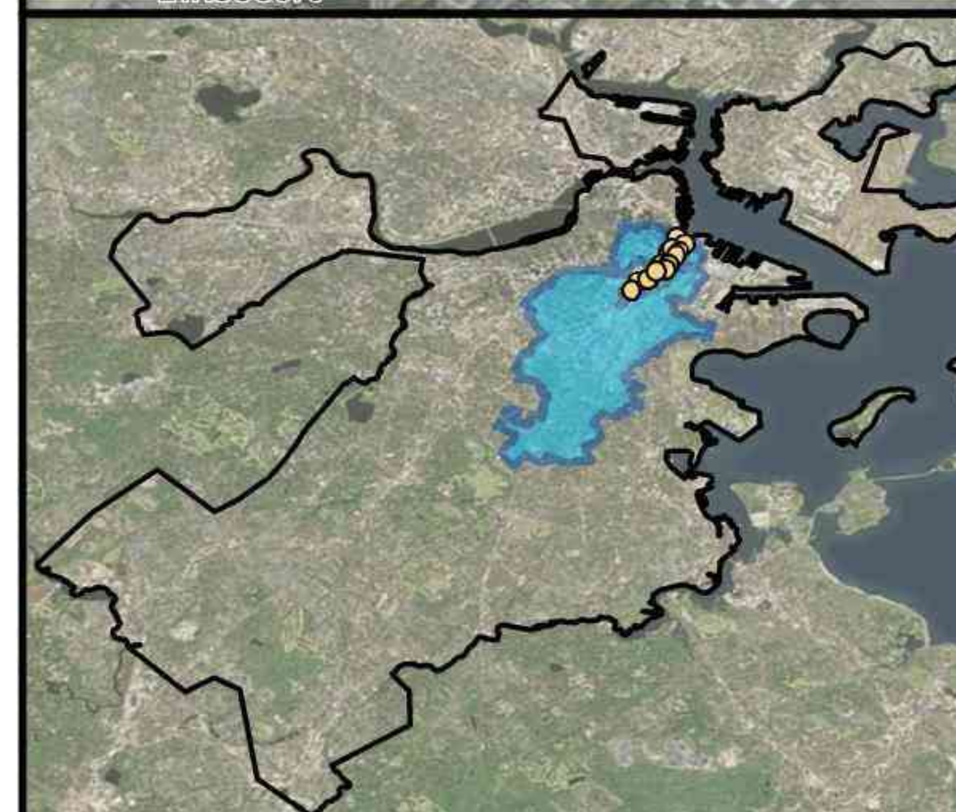






Alternative SSB location – concept in development





Conceptual Solution

The Fort Point Channel (FPC) Storm Surge Barrier (SSB) is a concept that utilizes that natural storage capacity of the Fort Point Channel, in combination with a pump station, to isolate outfalls from high sea levels. The storm surge barrier and navigable gate structure would remain open under typical conditions. In the open position, normal tidal flow into and out of the channel and marine traffic are not impeded. If a large storm event with high sea levels is expected, the gate structures could be closed at low tide, effectively isolating the FPC from higher sea levels. A pump station utilizing electric submersible pumps is incorporated with the SSB. The pump station can help prevent the FPC from overflowing or causing backups into combined sewer and stormwater conduits that drain into the channel.

Type: Storm Surge Barrier and Pump Station
Total Drainage Area: 2653 acres
Coastal Flood Vulnerable Drainage Area Protected: 842 acres

Concept Elements:

- Navigable storm surge barrier (vertical lift gate and submerged axis flap gate alternatives)
- 500 CFS pump station utilizing electric submersible pumps with formed suction inlets
- 160 MG storage capacity within the FPC basin currently with SSB closed low tide
- ~100 MG storage capacity within the FPC basin in 2070 with SSB closed at projected low tide

Coastal Stormwater Discharge Analysis
Fort Point Channel

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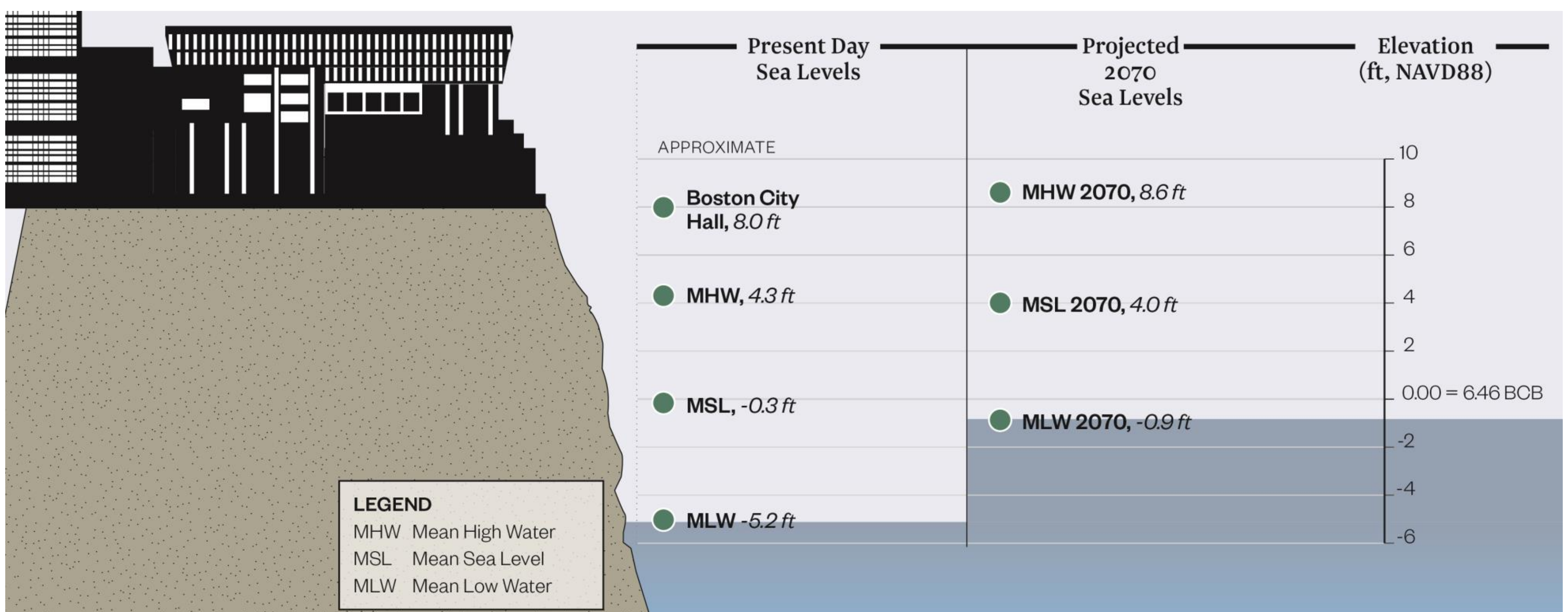
Assumptions

Sea Level Rise and Datum

The Fort Point Channel Storm Surge Barrier concept was designed for consistency with Climate Ready Boston (CRB) proposed adaptations and analyzed based on sea level rise (SLR) projections in the Massachusetts Coastal Flood Risk Model (MC-FRM). The SLR values applied in MC-FRM are consistent with the standards for the State of Massachusetts developed by Coastal Zone Management. The MC-FRM utilizes a “High” SLR scenario. This scenario is based on the relative SLR projections under Relative Concentration Pathway (RCP) 8.5 (a “worst case scenario” of increasing atmospheric carbon concentrations) and represents elevations that have a 99.5% probability of not being exceeded within the respective timeframes. In 2030, that amounts to an increase of 1.3 feet in Boston from a baseline condition (2008 centered tidal epoch), and in 2070 that amounts to an increase of 4.3 feet.

The concept developed in this project was analyzed using coastal conditions that include 2070 projected SLR and storm surge resulting from a 100-year tropical storm. The peak water surface elevation (WSE) predicted by the MC-FRM during these conditions is approximately 13.8 feet NAVD88 (varies by location). In mid 2022, the Greater Boston Research Advisory Group (BRAG) issued an updated report with new SLR projections. The report acknowledges that long term SLR projections are associated with significant uncertainty, and that updated projections include less SLR by 2100 (compared to earlier projections in the 2015 BRAG Report). According to the report, the likely range of SLR by 2070 under an RCP 8.5 scenario is 1.4 – 2.8 feet. Based on this information, projections from the MC-FRM that were utilized in this project are conservative and appropriate for long term planning purposes.

Unless otherwise noted, all elevations are based on the NAVD88 vertical datum. Elevations given in NAVD88 can be converted to Boston City Base (BCB) elevation by adding 6.46 feet.



Climate Ready Boston and Shoreline Protection

The Fort Point Channel Storm Surge Barrier concept was developed to maintain consistency with possible Climate Ready Boston (CRB) adaptations based on the latest available information at the time they were developed. As the CRB program continues to evolve, it is anticipated that proposed concepts will need to be adapted.

The concept was developed to be consistent with stated neighborhood design flood elevations. In the Fort Point Channel, where the stated design flood elevation is 15.5 feet, pumps and the storm surge barrier were designed to a minimum elevation of 15.5 feet.

At the time of this project, many CRB concepts were in early planning stages and not fully defined. **In consideration of this, it was assumed the shoreline protection around the City of Boston is 100% effective for all modeling evaluations.** This assumption eliminates overland coastal flooding from model predictions, allowing for isolation of flooding that results only from rainfall and stormwater that cannot be discharged due to high sea levels. It is important to recognize that additional flooding, beyond what is depicted herein, would be expected if 100% effective shoreline protection is not implemented.

Basis of Design

Storm Surge Barrier and Pump Station

The storage capacity of the FPC was estimated under present day and 2070 conditions based on 4.3 feet of sea level rise projected in the MC-FRM. The usable storage volume was calculated by developing a stage storage curve provided by BWSC and determining the volume between Mean Low Water (MLW) and the approximate upper rim elevation of the FPC (approximately 7.0 feet, NAVD88). For design and analysis purposes, a usable storage volume of 100 MG (2070 conditions) was assumed, based on previous bathymetric data provided by BWSC. Additional storage could be obtained by drawing down the water level (below the future low tide level) with the pumps. The present-day usable storage is approximately 160 MG. For the purpose of this analysis, it was assumed that the current-day mean low water is the lowest water surface elevation allowable within the channel; future geotechnical analysis may indicate that it is possible to pump to even lower water levels if needed.

The concept includes a storm surge barrier to isolate the Fort Point Channel with navigable gate structures. Two alternative navigable gate concepts were designed:

1. Vertical lift gate alternative: Lower cost alternative, but higher visual impacts (see sheet 5).

2. Submerged axis flap gate alternative: Higher cost alternative with minimal visual impacts (see sheet 6).

Rainfall and Coastal Conditions

The Commission currently utilizes a 10-year, 24-hour design storm to establish its target level of service. For the purpose of sizing new piping and evaluating storage capacity, a projected 2070 10-year, 24-hour design storm was developed. For consistency with Climate Ready Boston, performance of the FPC SSC concept was also evaluated with projected rainfall from a 100-year tropical event (developed during the Commission's Inundation Model Project, as shown in Table 2. The FPC SSB was evaluated using a 100-year return period coastal boundary condition. Data for this condition were obtained from the MC-FRM. For the purpose of evaluating the effectiveness of the concept, it was further assumed that complete shoreline protection was implemented, preventing flow of water between the FPC tributary area and Boston Harbor. Table 3 contains a summary of the coastal conditions that were analyzed.

Table 2: Rainfall Conditions

Scenario	Purpose	Rainfall Depth (in)	Peak Intensity (in/hr)
Present Day, 10-year, 24-hr design storm	Baseline Conditions	5.15	3.32
Projected 2070, 10-year, 24-hr design storm	Design Conditions	6.18	4.08
100-year Tropical Storm	Damage Analysis	9.58	0.84

Table 3: Coastal Conditions

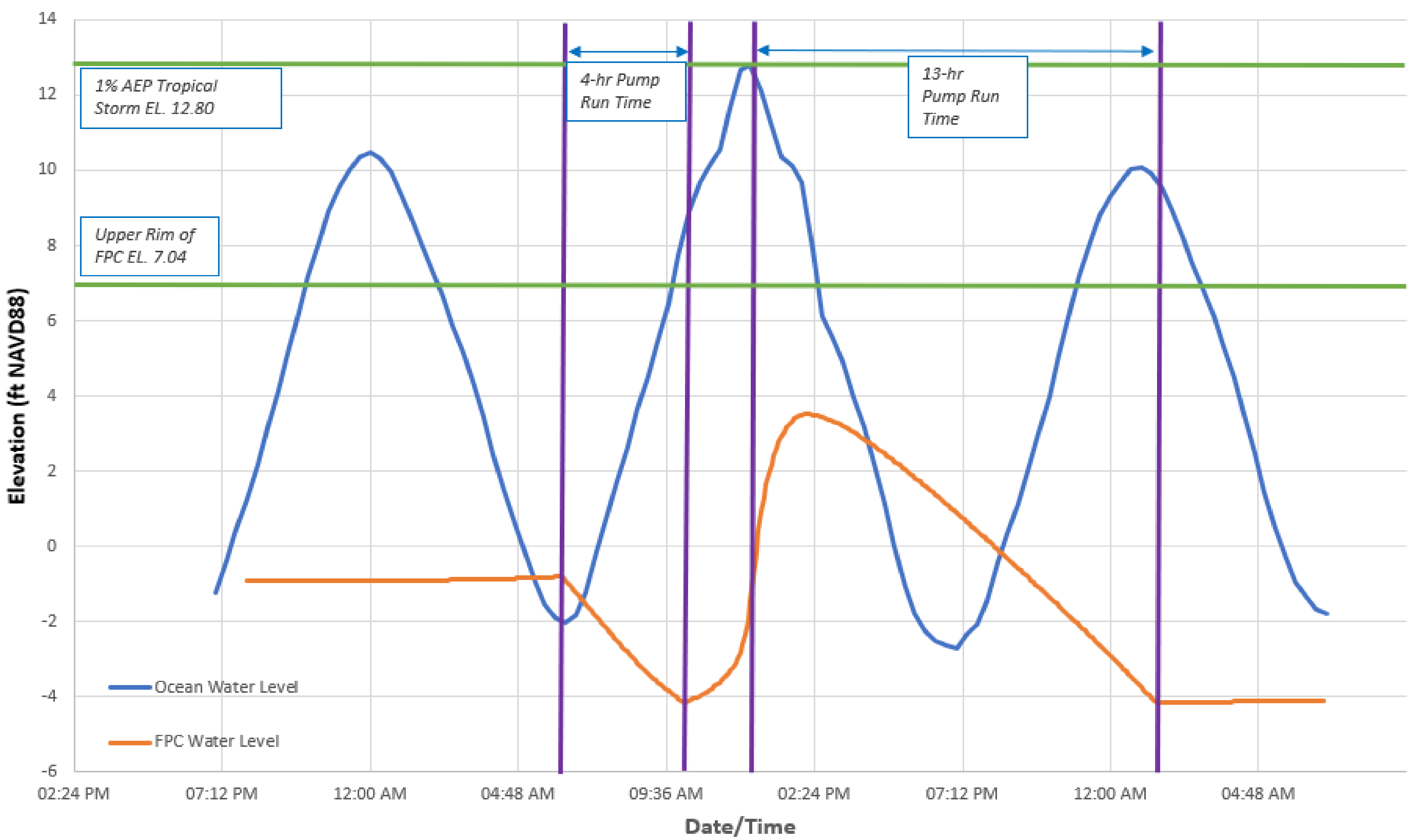
Scenario	Purpose	Peak Water Surface Elevation (ft, NAVD88)	Source
Present Day	Baseline Conditions	3.7	BWSC Existing Model (April 2016 Tide Cycle)
2070,100-year Tropical Storm	Damage Analysis	13.8	MC-FRM

Basis of Design

Pump Station

An analysis was conducted to determine required pumping capacity by simulating the 10-year, 24-hour design storm with 100-year tropical storm surge under 2070 conditions. The model was used to characterize the Hydraulic Grade Line (HGL) in tributary pipelines under existing conditions and evaluate different size pumps under the conditions described above. It was found that 500 CFS of pumping capacity is sufficient to maintain a WSE of 3.7 or less within the FPC during these conditions as shown in Figure 1.

Figure 1: Water Surface Elevation in FPC with 500 CFS Pumping Capacity
(2070 Projected 10-year, 24-hour Design Storm with 100-year Storm Surge)

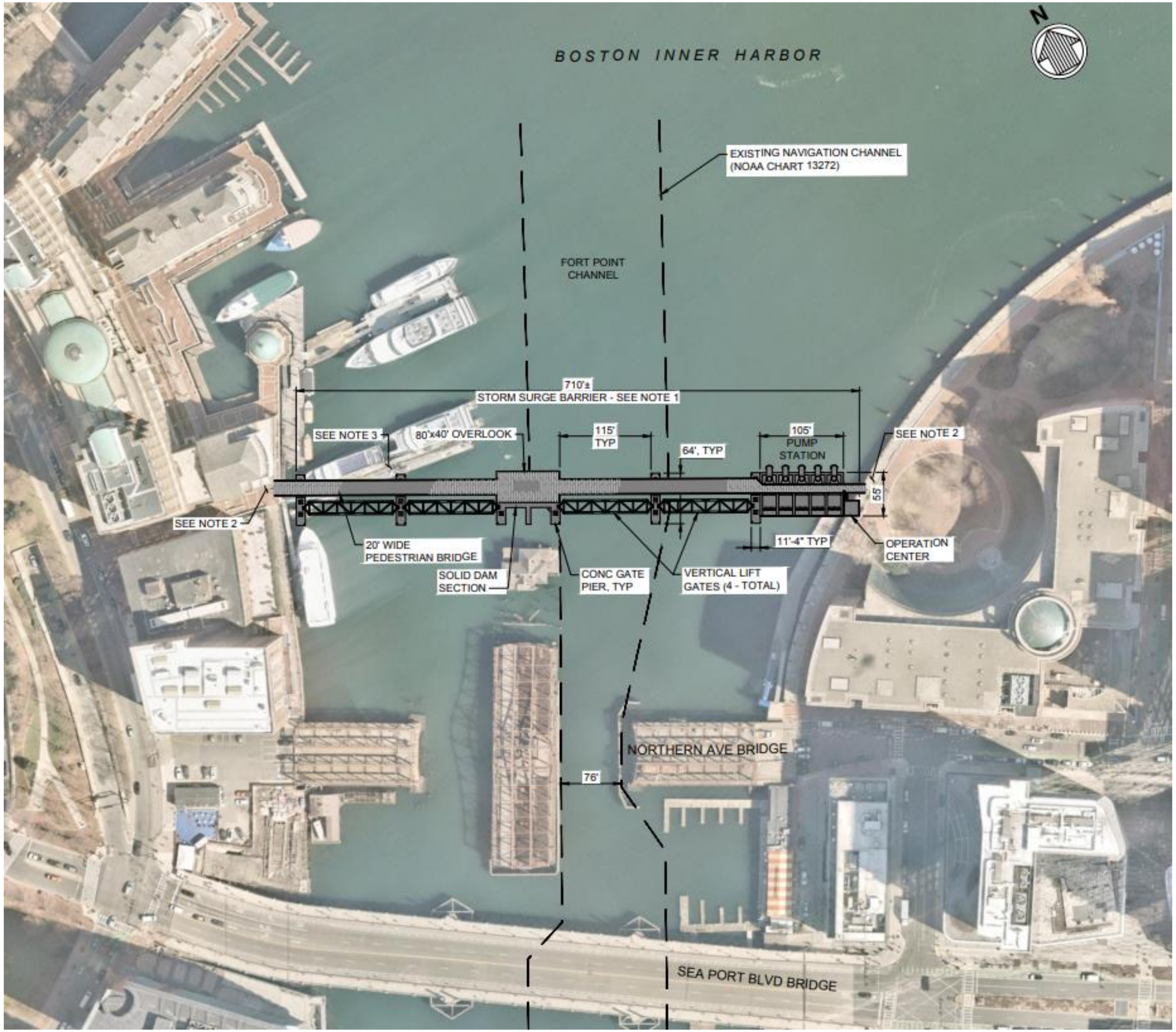


For the purpose of this evaluation, it was assumed that SSB gates were closed at low tide before the storm event and that the pumps were run to draw down the water level from the projected 2070 MLW elevation to the current MLW elevation to maximize storage. It was further assumed that gates remained closed throughout the storm event. During an actual storm event it may be possible to open the SSB gates when the exterior tide level drops below the water level in the basin.

Pumps were sized based on the SSB (and surrounding CRB flood barriers) having a crest elevation of 15.5 feet NAVD88 (for consistency with CRB), with a discharge centerline at 17.0 feet NAVD88. The pump station utilizes 3 duty and 2 standby pumps, each with a capacity of approximately 167 CFS and static head range of 21 feet (low water level) to 4 feet (high-high water level, basin overflowing).The area of the pump station is 5,700 ft^2.

Several alternatives for the FPC pump station were analyzed including use of diesel engine driven pumps, electric submersible pumps, electric non-submersible pumps, and construction of an offsite station. The concept herein utilizes electric submersible pumps with a temporary offsite emergency power supply on the basis of minimized visual impacts and minimized permitting challenges.

Storm Surge Barrier and Navigation Gates

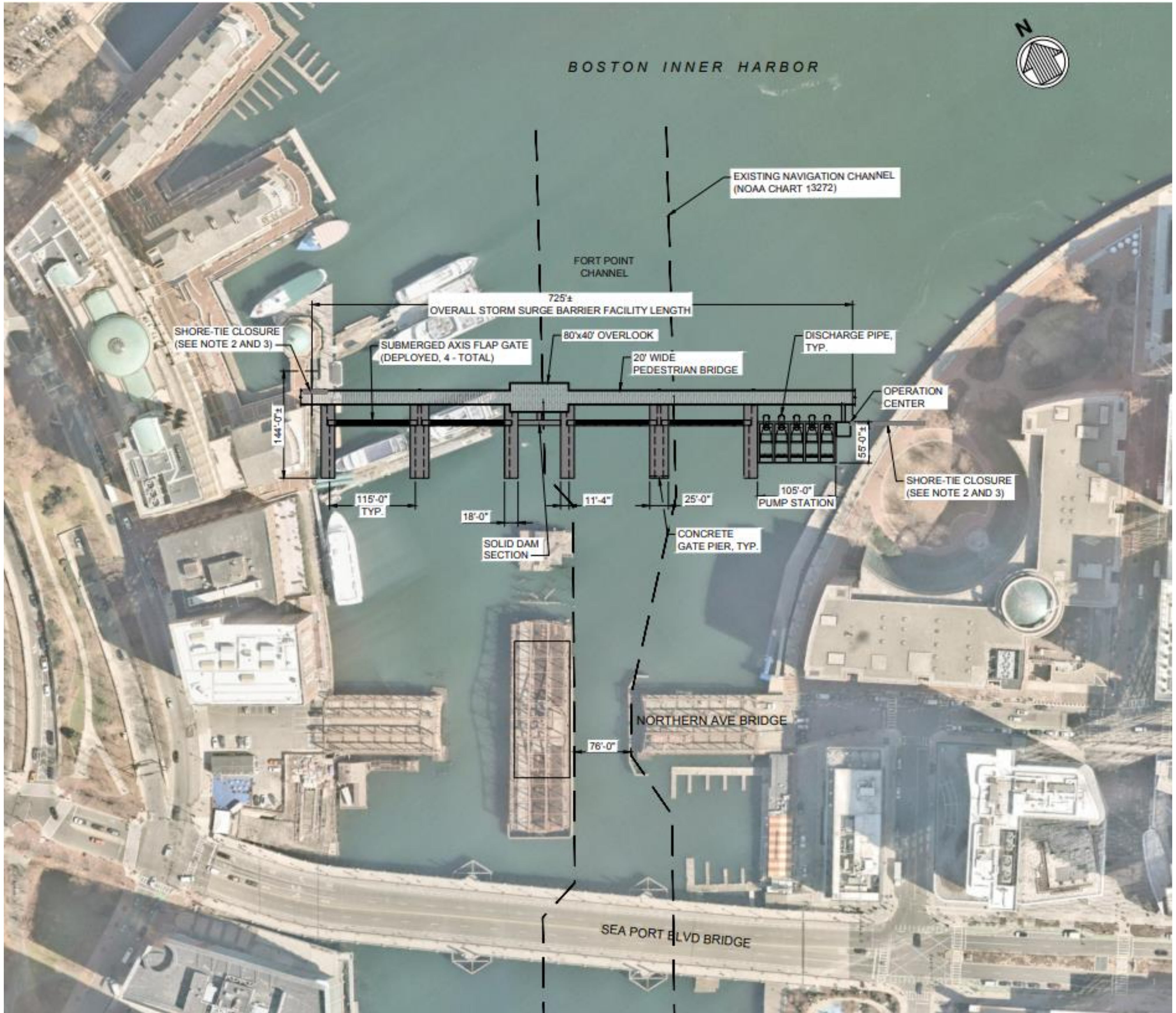


Vertical Lift Gate Alternative

The vertical lift gate alternative utilizes four 115' wide gate sections that are stowed in the air (above the storm surge barrier superstructure) when in the open position. A navigable passage is provided in addition to three auxiliary flow gates. When open, the storm surge barrier does not impede existing navigation. The gates can be lowered into the "closed" position ahead of an extreme storm event to isolate the FPC.

The vertical lift gate alternative is associated with high visual impacts and lower cost compared with the submerged axis flap gate alternative.

Storm Surge Barrier and Navigation Gates



Submerged Axis Flap Gate Alternative

The submerged axis flap gate alternative utilizes four 115' wide gate sections that are stored on the channel bottom recessed in a reinforced concrete pier foundation/sill. A navigable passage is provided in addition to three auxiliary flow gates. When open, the storm surge barrier does not impede existing navigation. The gates can be lifted into the "closed" position with telescoping hydraulic drive cylinders and trolley attached to the gate arm before an extreme storm event to isolate the FPC.

The submerged axis flap gate offers minimized viewshed impacts compared to the vertical lift gate alternative, but is associated with a greater O&M burden, additional complexity, and higher cost.

Flood Modeling and Damage Analysis

Figure 2: Estimated Replacement Cost

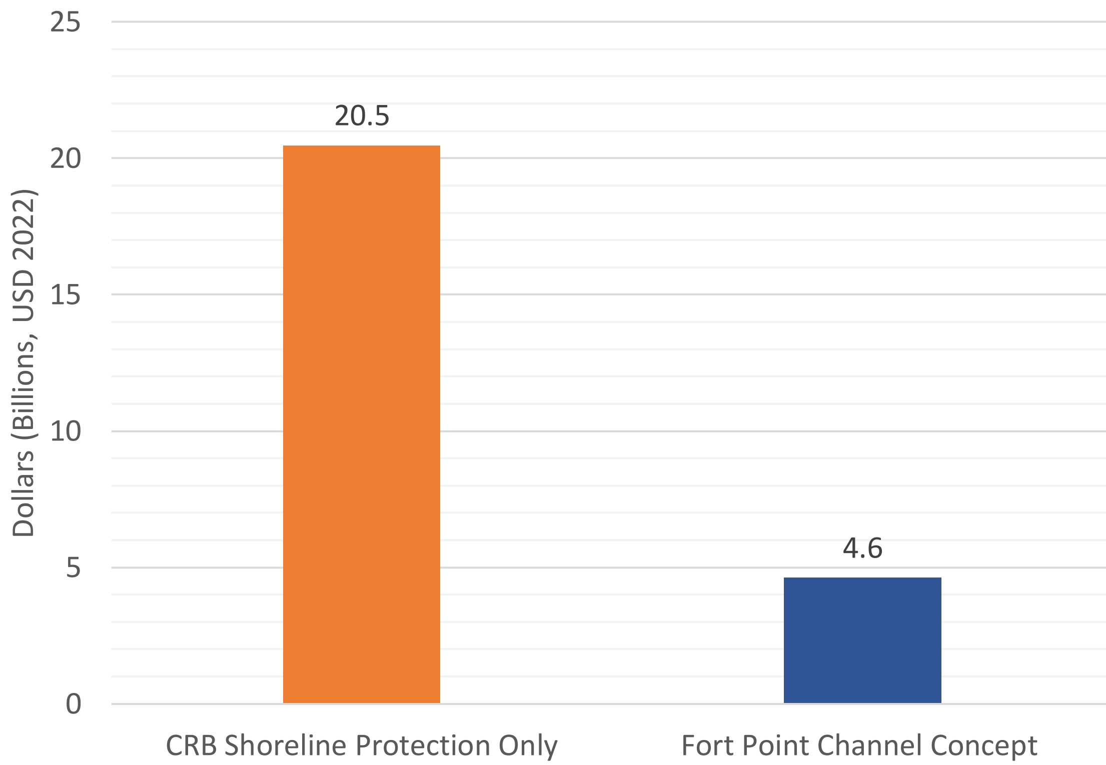


Figure 3: Loss of GDP

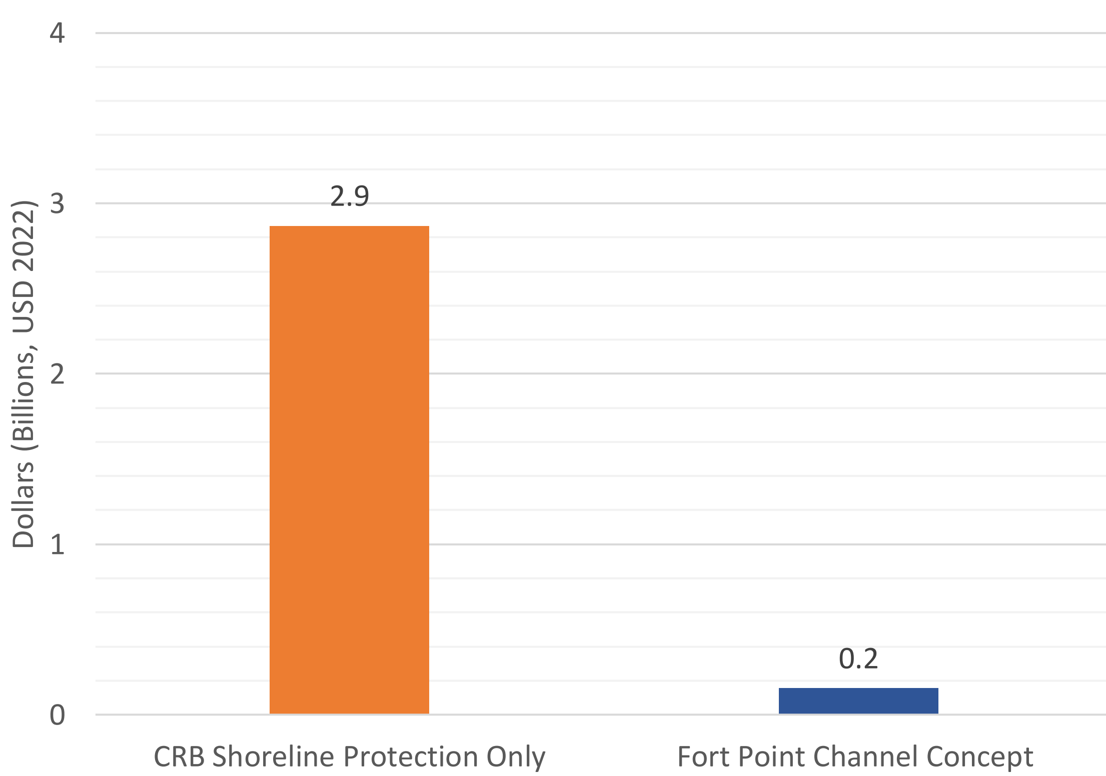
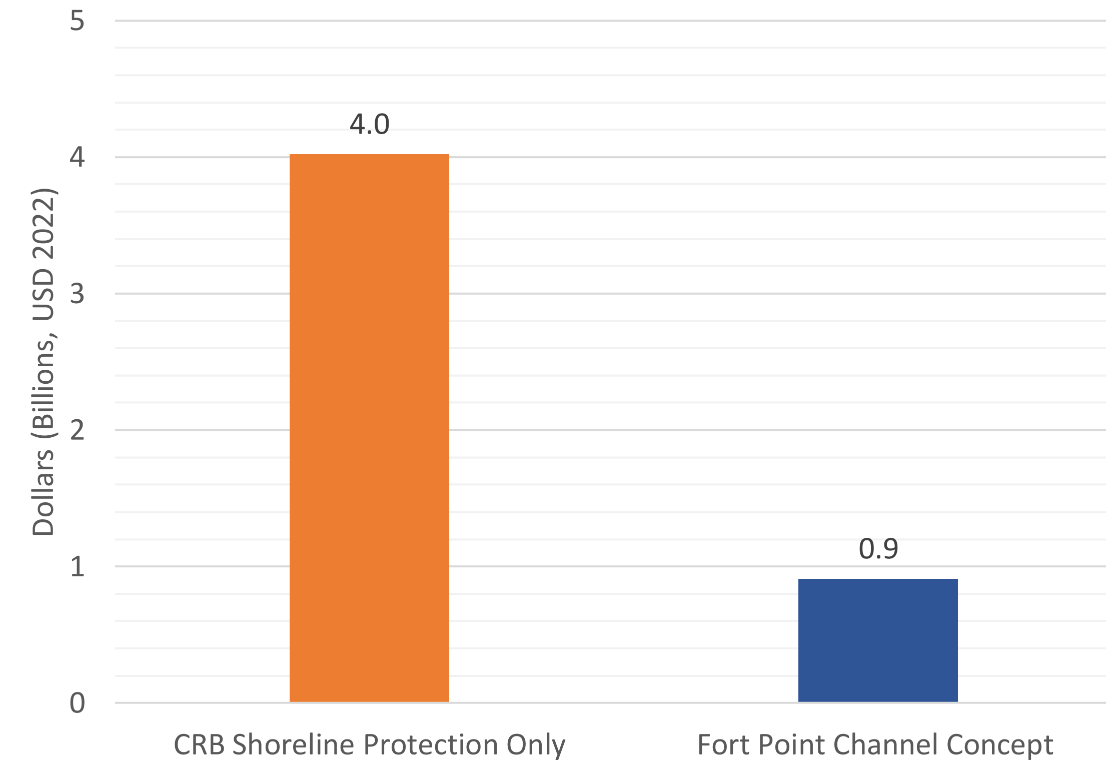


Figure 4: Physical Damage



The flood reduction benefits of the FPC SSB concept were evaluated using the Commission's 2D Inundation Model by simulating a 100-year tropical storm event with 2070 SLR and storm surge. The figures on the following page depict the peak flooding that was predicted in the drainage area tributary to the FPC with shoreline protection only and with the FPC SSB and tide gates on all vulnerable BWSC owned outfalls. An analysis of economic losses/physical impacts from flooding under both scenarios was performed by risQ Inc.

Model predictions indicate that the FPC SSB concept reduces physical damage by **$3.1 billion**, avoids **$15.9 billion** in rebuilding costs, and mitigates a GPD loss of **$2.7 billion** during a 100-year tropical storm event in 2070 compared to shoreline protection only.

Note: replacement values include the total value of impacted buildings in flooded areas (e.g., impacted buildings are fully replaced), whereas physical damage includes estimated costs to repair flood damage based on predicted flood depths and building characteristics. The values shown are the average of minimum and maximum calculated losses. Refer to the Project's Final Report for more information.

2070 SLR + 100yr Tropical Storm + Storm Surge

CRB Shoreline Protection Only

2070 SLR + 100yr Tropical Storm + Storm Surge

FPC SSB and Pump Station and Tide Gates

Legend

- Flood Depth > 4 in and < 1 ft
- Flood Depth > 1 ft and < 2 ft
- Flood Depth > 2 ft
- Drainage Area Analyzed

Simulation Parameters

Storm Type	100yr Tropical Storm
Rainfall Depth	9.6 inches
Peak WSE 2070 SLR + 100yr Surge	13.8 feet NAVD88

Coastal Stormwater Discharge Analysis
Fort Point Channel

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Cost Estimate and FEMA BRIC Considerations

Capital Cost Estimate

A construction cost estimate for the FPC SSB and pump station concept was developed for planning purposes. Assumptions made for the cost estimate include 15-year escalation to the mid-point of construction and the inclusion of a 50% design contingency. Installation and labor costs for the portable generator as well as hookup costs to existing electrical services were not included in this estimate.

Table 4: Fort Point Channel Pump Station Cost Estimate Subtotals

Remaining Design Development & Construction Administration (*assumed 20% of total less design contingency*)	$4,524,000
Direct Construction Costs	$8,968,000
Indirect Construction Costs	$1,794,000
Mark-Up *(Including 50% design contingency)*	$22,760,000
Total	**$38,045,000**

Table 5: Fort Point Channel Marine Work Alternatives Cost Estimate Subtotals

	Submerged Axis Flap Gate	Submerged Axis Flap Gate – South Location	Vertical Lift Gate
Remaining Design Development & BWSC Construction Administration	$60,553,000	$49,851,000	$36,350,000
Direct & Indirect Construction Costs Total (Marked-up)*	$329,465,000	$271,236,000	$197,328,000
Escalation (15 Years)	$240,119,000	$197,682,000	$143,867,000
Design Contingency (35%)	$136,506,000	$112,381,000	$81,788,000
Total	**$766,643,000**	**$631,150,000**	**$459,333,000**
* Marked-up cost includes contractor overhead, profit, fees, bond, insurance.			

Social Vulnerability and FEMA BRIC Funding

FEMA BRIC funding prioritizes disadvantaged communities. Table 6 contains a summary of several indicators for the Fort Point Channel tributary area that could be used help characterize the community for future FEMA funding applications and prioritization of projects that benefit disadvantaged communities.

Table 6: Fort Point Channel Tributary Area Social Vulnerability Indicators

Low Income & Persistent Poverty	
Per Capita Income	$58,326
Below Poverty Line	23%
High Housing Cost Burden	
Stressed Renters (>40% rent-to-income)	34%
Households With Food Insecurity	14%
Racial and Ethnic Segregation	
Asian Population	13%
Black Population	30%
Latino Population	20%
White Population	41%
Employment	
Adults Age 25+ Without High School (or equivalent) Degree	16%
Unemployment Rate (Age 16+)	8%

Data provided by risQ inc. from the US census and American Community Survey

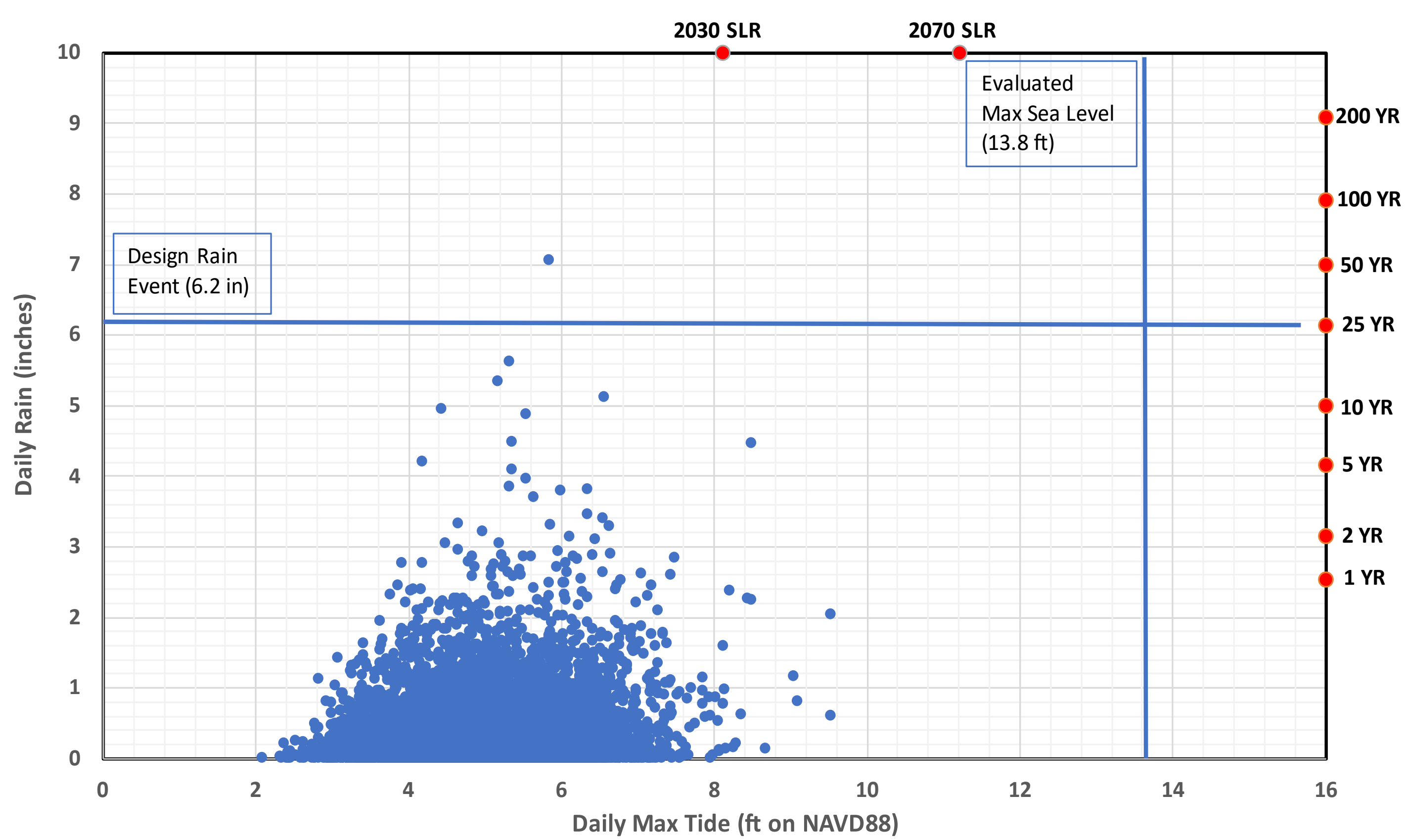
Adaptability and Implementation

Adaptability

Figure 5 below depicts historical daily rainfall totals and tide levels. As shown in this figure, the conditions that were used to design and analyze the FPC concept are conservative and represent more extreme conditions than have occurred historically. It is important to note that the design storm generates higher intensity rainfall than is typically associated with tropical and nor'easter storm events. As such, it is likely that the FPC pump station is sufficiently large to discharge flows from most future rain events. Regardless, the following measures could be implemented to adapt the concept to more severe conditions (additional SLR, more intense rainfall, etc.) in the future:

- Convert a standby pump to a duty pump for additional capacity
- Increase the size of each FPC pump unit
- Redirect additional vulnerable outfalls to discharge into the FPC behind the SSB

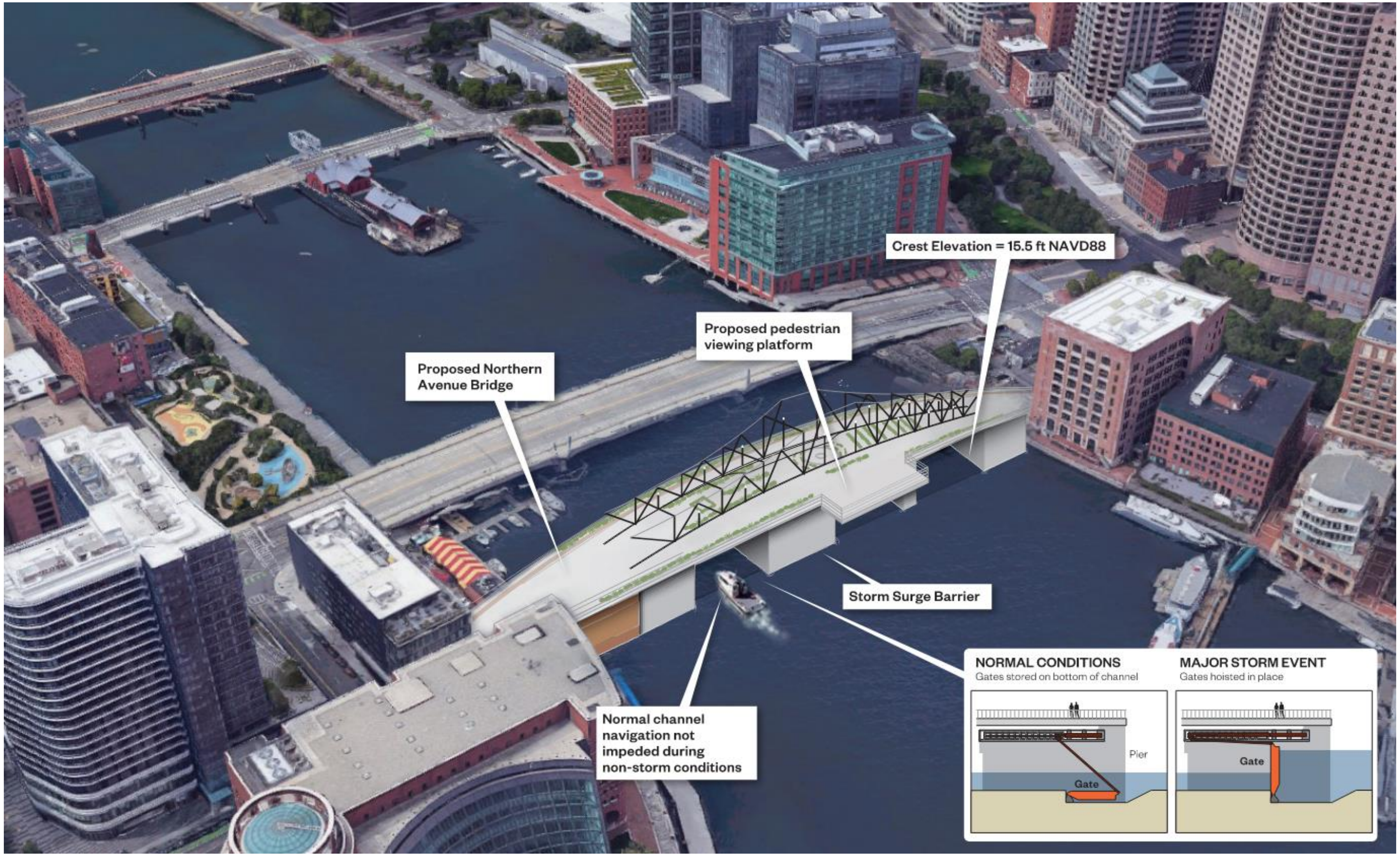
Figure 5: Design and Analysis Conditions vs. Historical Tide and Rainfall



Implementation Considerations

- Coordination with CRB (and other relevant stakeholders) to construct adequate shoreline protection to prevent flanking of the SSB.
- Shoreline elevation projects along the interior of the FPC should still be evaluated since the FBC SSB is not designed to isolate the basin from "day-to-day" high tide levels.
- A thorough permitting evaluation of the FPC SSB should be conducted. Although the SSB concept was developed to maximize tidal exchange between the FPC and Boston Harbor, a thorough environmental impact assessment should be conducted to evaluate possible impacts of constructing a SSB.
- Coordination with the Northern Avenue Bridge replacement team could facilitate integration of these structures. Construction of an "integrated" structure could reduce construction costs, minimize viewshed impacts, and provide additional public amenities.
- The FPC SSB pump station uses a temporary backup power supply; as such, it is important to coordinate availability of backup power several days before an anticipated extreme storm event
- Deauthorization of the federally authorized navigation channel would be a significant undertaking. It is recommended that future development of this concept preserve the existing navigation function.
- Additional outfalls could be redirected to discharge behind the FPC SSB and pump station to mitigate the effect of higher sea levels – this would increase the regional utility and benefits of the concept in the future
- 2D modeling was conducted to evaluate the incremental benefit of adding tide gates to all BWSC owned outfalls that discharge into the FPC in addition to shoreline elevation. It was found that additional tide gates have a substantial flood reduction benefit compared to shoreline elevation alone. Installation of tide gates on all BWSC owned outfalls could be considered as an interim measure before construction of the SSB and pump station.
- At a further stage of the design process, consideration should be given to mitigating the possible hazard caused by the high-flow discharges of the pump station to small boats, swimmers, and other harbor users.

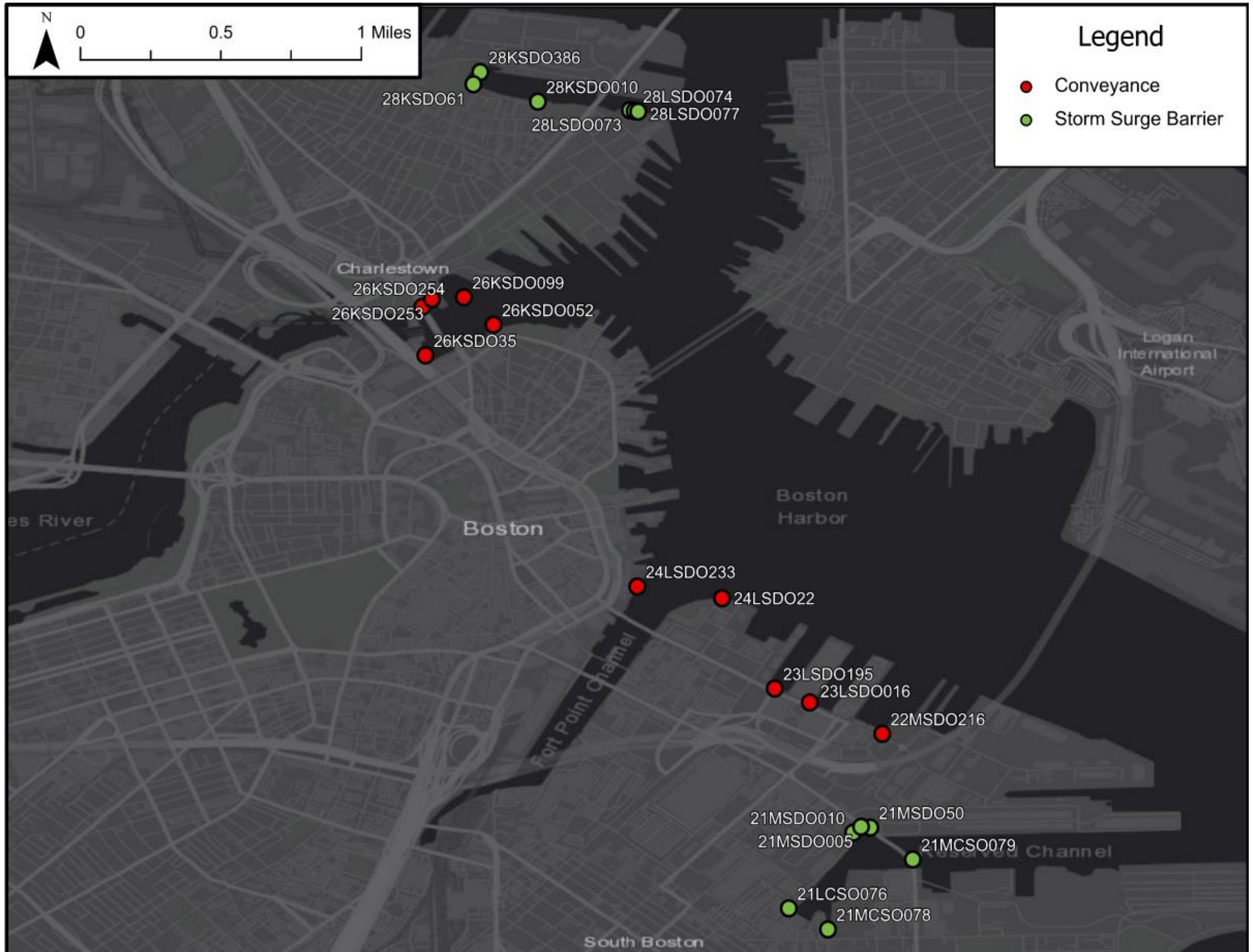
Storm Surge Barrier *Northern Avenue Bridge Integrated Alternative*



Conceptual Solution – Alternate Location

The above graphic depicts an alternate concept for the FPC SSB that is integrated with the planned Northern Avenue Bridge Replacement. The mechanical systems are similar to the other concepts shown previously. This alternate location combines planned renovations to the Northern Avenue Pedestrian Bridge with the FPC SSB into one project. This alternative mitigates the viewshed impact of the SSB on the planned viewing platform of the bridge. Although this concept has not been advanced to the design stage at this time, and it is anticipated that both structures would need to be significantly redesigned, integration of these structures would reduce construction impacts from separate projects. In addition, an integrated project would offer an opportunity for Boston and the Commission to implement an iconic adaption project, with multiple community benefits, that could catalyze funding and coordination for further adaptation efforts.

Replicability and Implementation Timeline



Summary of Similar Concepts

Number of Outfalls: 22

Vulnerable Area: 573 acres

The map on this sheet depicts other vulnerable outfalls that could utilize elements of the FPC SSB solution including the following:

- Several outfalls along the South Boston Waterfront could be consolidated with a new conduit and redirected to a new outfall behind the FPC SSB.
- Outfalls near the Charles River Dam could be consolidated with new conduits and redirected to new outfalls behind the dam.
- Outfalls at the “back” of the Reserved Channel (west of Summer Street) could be protected with a SSB.
- Outfalls within the Little Mystic Channel could be protected with a SSB.

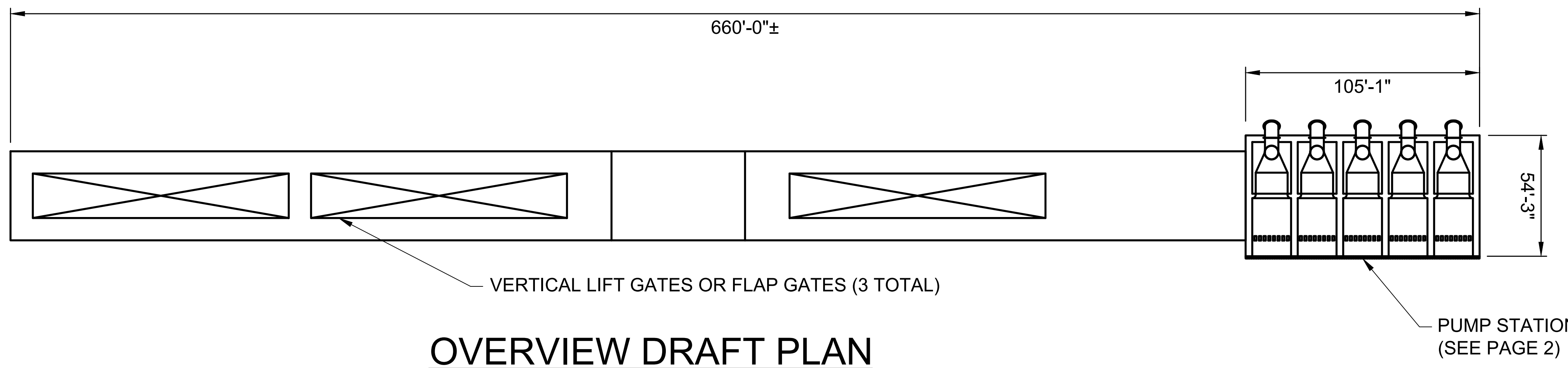
Additional information about these outfalls can be found in the Commission’s Coastal Stormwater Discharge Analysis Implementation Timeline.

ATTACHMENT A
FORT POINT CHANNEL PUMP STATION CONCEPTUAL DESIGN DRAWINGS

Fort Point Channel Pump Station

NOTES

1. FOR WATER SURFACE ELEVATIONS REFER TO OPERATIONAL TABLE.
2. ALL ELEVATIONS USE THE NAVD88 VERTICAL DATUM UNLESS OTHERWISE STATED.
3. CONCEPTUAL DRAWING, NOT FOR CONSTRUCTION.



OVERVIEW DRAFT PLAN

SCALE: NTS

COASTAL STORMWATER DISCHARGE ANALYSIS

Boston Water and Sewer Commission

Hazen

A-1

November 2022

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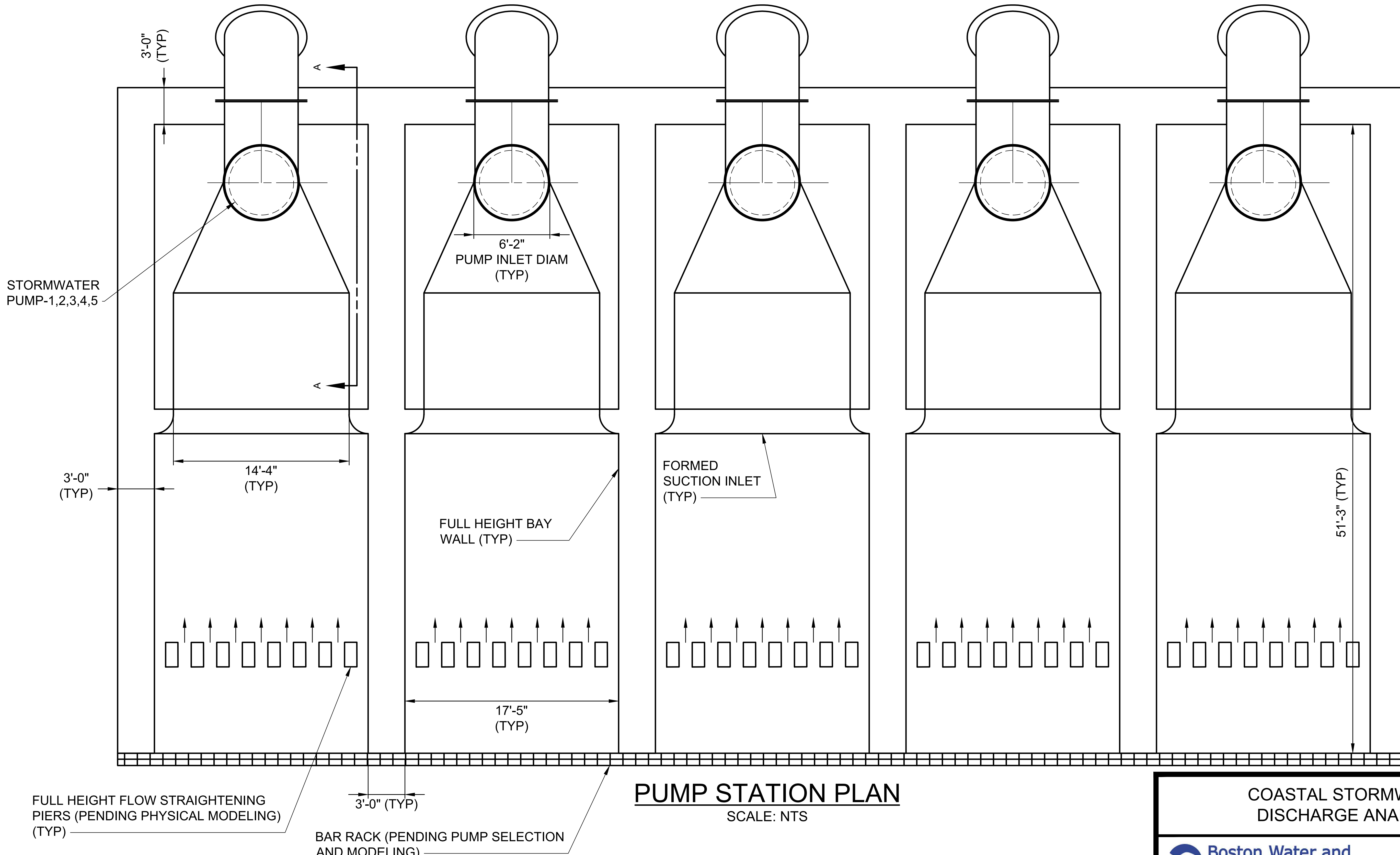
Fort Point Channel Pump Station



PUMP STATION PLAN

SCALE: NTS

COASTAL STORMWATER DISCHARGE ANALYSIS

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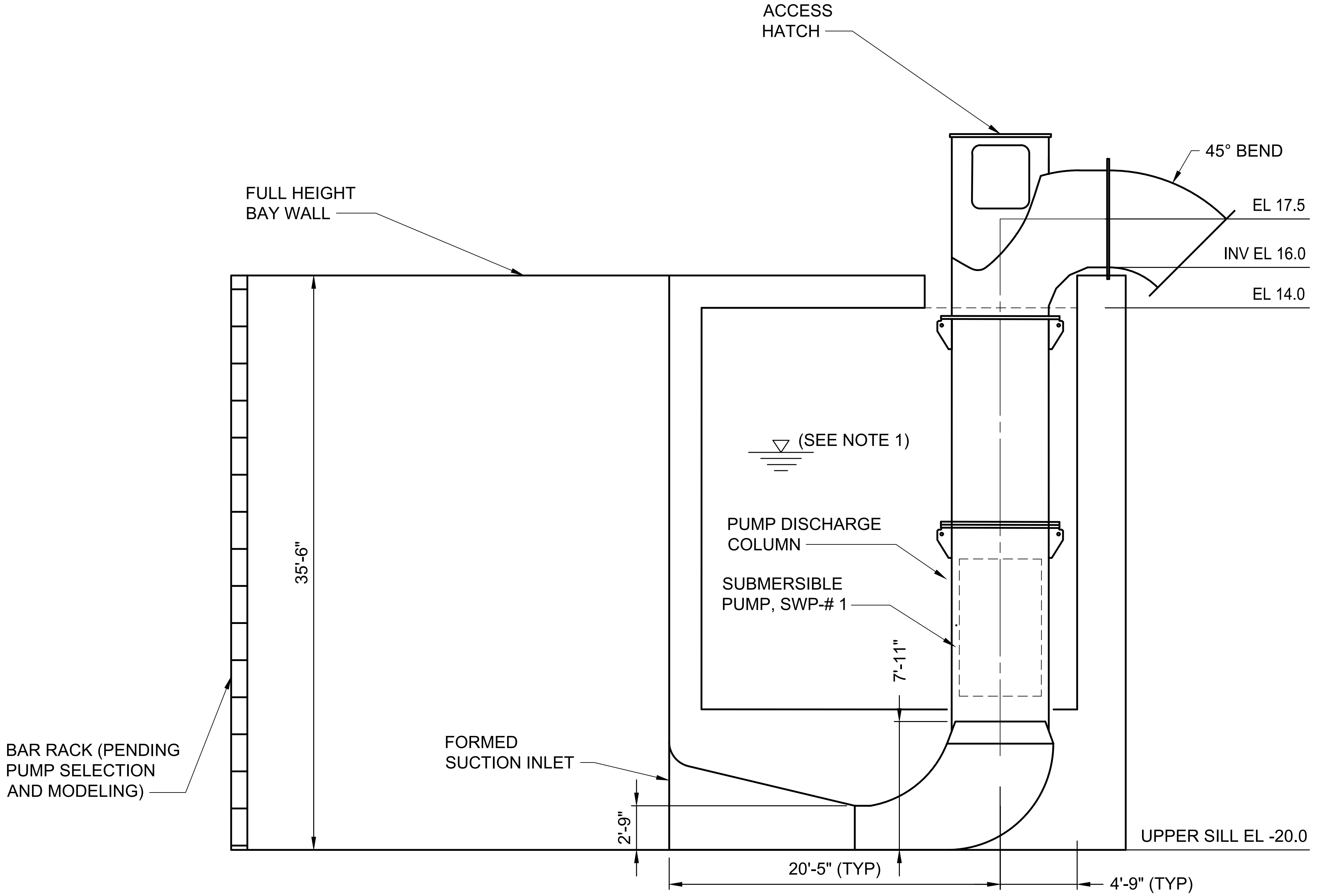
A-2

November 2022

Fort Point Channel Pump Station



SECTION

SCALE: NTS

NOTES

1. FOR WATER SURFACE ELEVATIONS REFER TO OPERATIONAL TABLE.
2. ALL ELEVATIONS USE THE NAVD88 VERTICAL DATUM UNLESS OTHERWISE STATED.
3. CONCEPTUAL DRAWING, NOT FOR CONSTRUCTION.

STORMWATER PUMP-1,2,3,4,5 OPERATIONAL PARAMETERS	
FLOW RATE, CFS	167
STATIC HEAD RANGE, FT	3.5 - 23.0
DESIGN FLOOD ELEVATION, FT	15.5

STORMWATER PUMP-1,2,3,4,5 OPERATIONAL WSE TABLE

NOTE	OPERATION	ELEVATION, FT
A	HIGH LEVEL ALARM	13
B	LAG PUMP ON	5.0
C	LEAD PUMP ON	-2.6
D	LEAD PUMP OFF	-3.6
E	LOW LOW ALARM	-4.6
G	MIN PUMP SUBMERGENCE	-5.6

COASTAL STORMWATER DISCHARGE ANALYSIS

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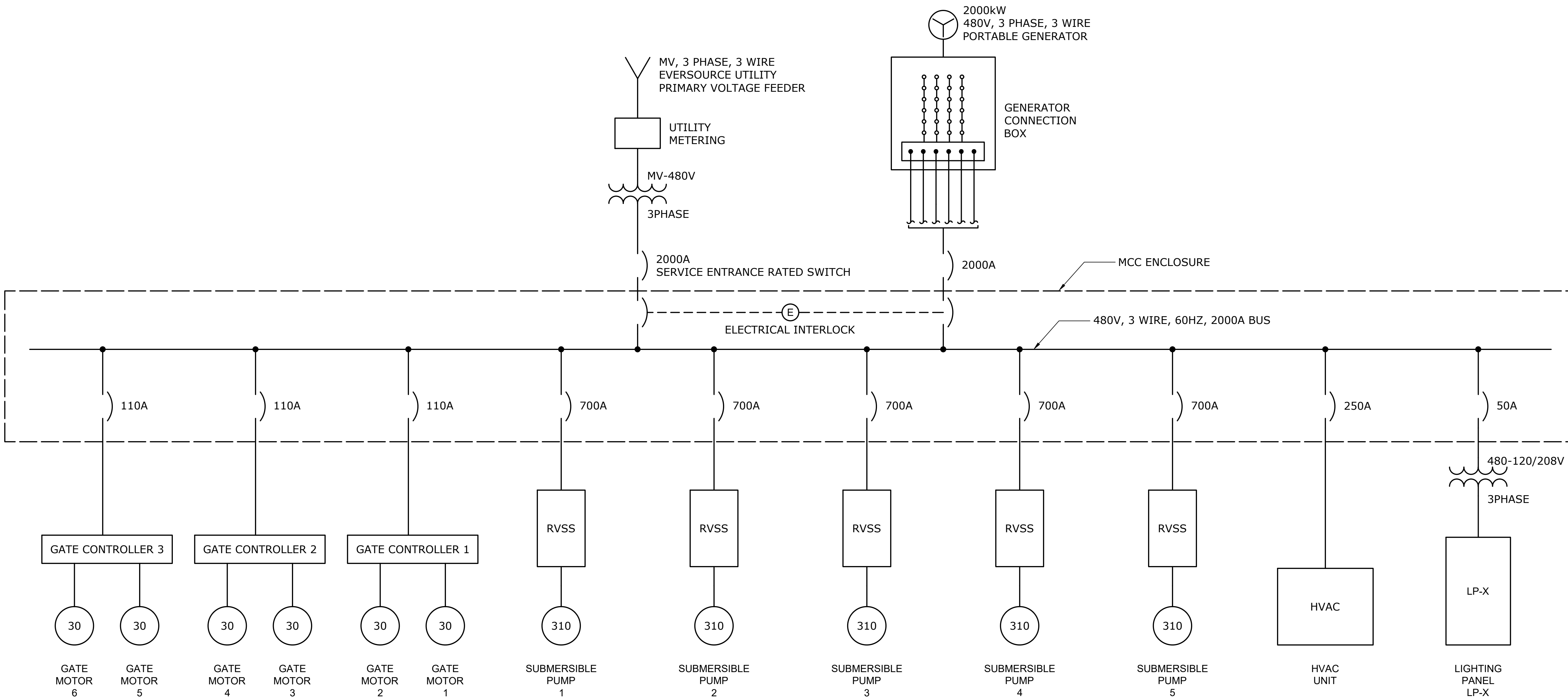
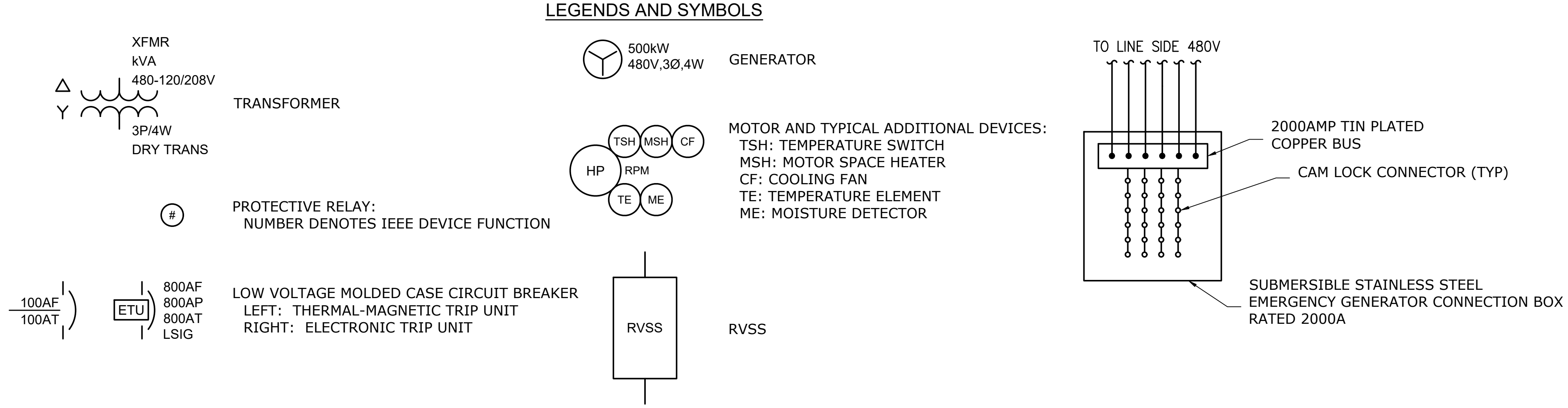
A-3

November 2022

FPC SSB Pump Station Three Gate Alternative



LEGENDS AND SYMBOLS



ELECTRICAL
FLOOD WATER PUMP STATION
PROPOSED SINGLE LINE DIAGRAM

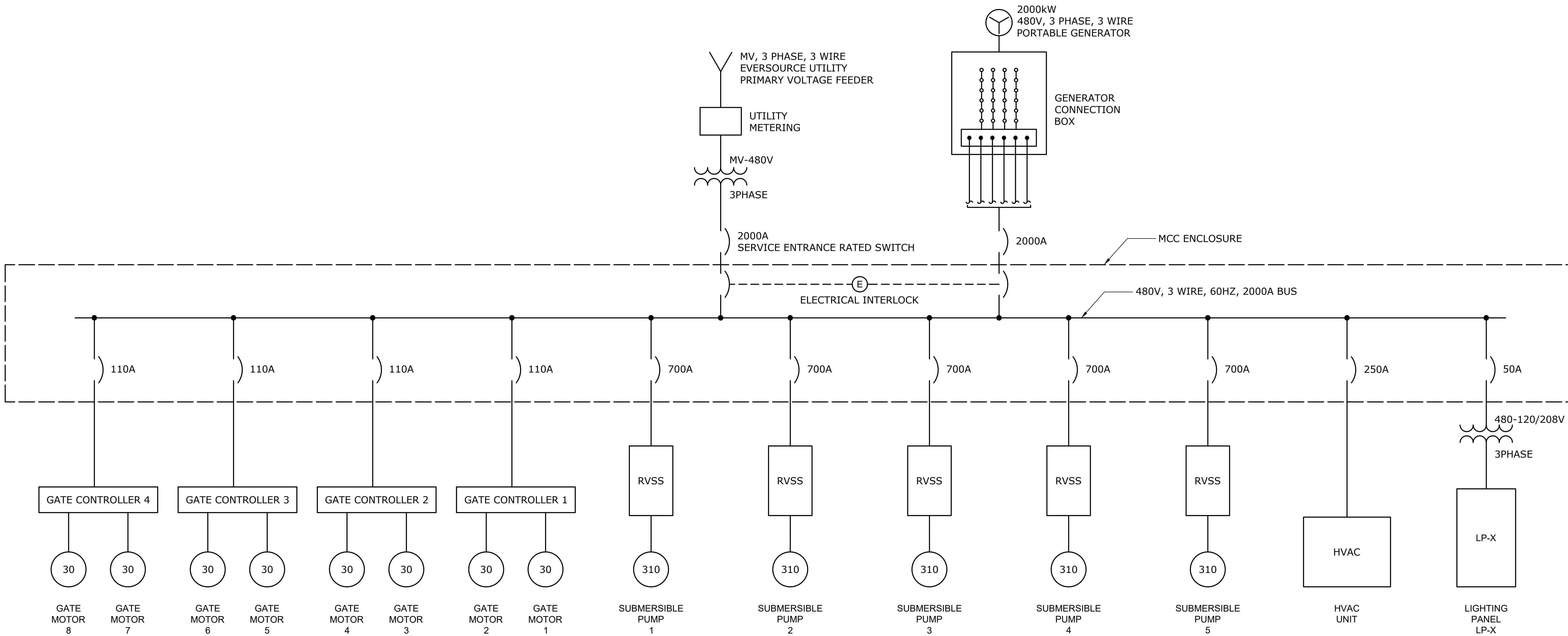
COASTAL STORMWATER
DISCHARGE ANALYSIS

Boston Water and Sewer Commission

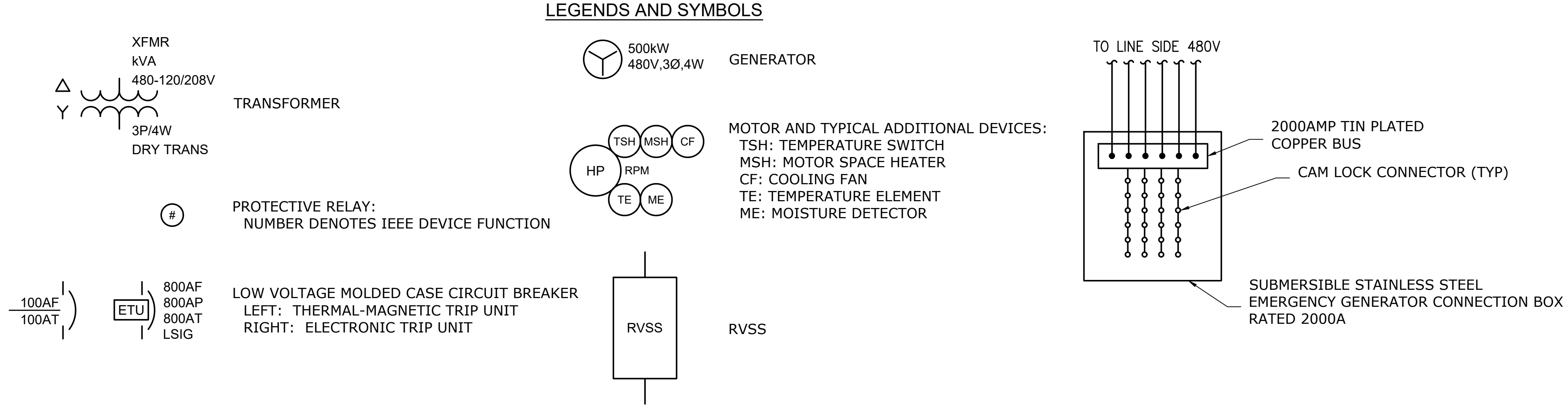
Hazen

A-4	November 2022

FPC SSB Pump Station Four Gate Alternative



LEGENDS AND SYMBOLS



ELECTRICAL
FLOOD WATER PUMP STATION
PROPOSED SINGLE LINE DIAGRAM

COASTAL STORMWATER DISCHARGE ANALYSIS	
Boston Water and Sewer Commission	Hazen
A-5	November 2022

ATTACHMENT B
FORT POINT CHANNEL STORM SURGE BARRIER CONCEPTUAL DESIGN DRAWINGS
VERTICAL LIFT GATE ALTERNATIVE

A1 FIG-1 PLAN - STORM SURGE BARRIER - VERTICAL LIFT GATE ALTERNATE

SCALE: 1" = 80'

NOTES:

1. THE CONCEPT PLAN VIEWS SHOW PORTIONS OF STORM SURGE BARRIER STRUCTURE THAT PROJECT ABOVE DAILY HIGH WATER LINE. SEE S-400 SERIES SHEETS FOR MULTIVIEWS AND DETAILS ASSOCIATED WITH BELOW WATER AND CHANNEL BED FEATURES (FOUNDATION, SCOUR PROTECTION).
2. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.
3. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

PLAN - STORM SURGE BARRIER VERTICAL LIFT GATE ALTERNATE

moffatt & nichol

MOFFATT & NICHOL
180 WELLS AVE, SUITE #302
NEWTON, MA 02459

Designed by: NBJ		Date: 2022-11-21	Rev. -
Dwn by: M&N BAL	Ckd by: JCS	M&N Project No. 11167	
Reviewed by: MK		Drawing code:	
Submitted by: MOFFATT & NICHOL		Drawing Scale: Plot scale: 1:1 (D SHEET)	

SEAL

Sheet Reference No.
S-101
INDEX: 1 OF 10

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\1116700S-101 ; Plotted: 11/21/2022 3:44 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 10/26/2022 8:28 PM by CMOYAIGLESIAS

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

A1
S-102

PLAN - STORM SURGE BARRIER - VERTICAL LIFT GATE - PHASE 1

SCALE: 1" = 80'

NOTES - PHASE 1:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.
2. CONTRACTOR SHALL DREDGE TEMPORARY NAVIGATION CHANNEL AND PROVIDE TEMPORARY NAVIGATION AIDS PRIOR TO CONSTRUCTING PHASE 1 TEMPORARY COFFERDAM.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY -
CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

PLAN - STORM SURGE BARRIER
VERTICAL LIFT GATE - PHASE 1

moffatt & nichol
MOFFATT & NICHOL
180 WELLS AVE, SUITE #302
NEWTON, MA 02459

Designed by: NBJ	Date: 2022-11-21	Rev. -
Dwn by: M&N BAL	Ckd by: JCS	M&N Project No. 11167
Reviewed by: MK	Drawing code:	
Submitted by: MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1:1 (D SHEET)

SEAL

Sheet
Reference No.
S-102
INDEX: 2 OF 10

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\1116700S-102 ; Plotted: 11/21/2022 3:44 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 10/24/2022 9:48 PM by CMOYAIGLESIAS

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

NOTES - PHASE 2:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.

2. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

A1 / S-103 — PLAN - STORM SURGE BARRIER - VERTICAL LIFT GATE - PHASE 2
SCALE: 1" = 80'

80' 0' 80' 160'
SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

PLAN - STORM SURGE BARRIER
VERTICAL LIFT GATE - PHASE 2

Designed by: NBJ		Date: 2022-11-21 / Rev.: -
Dwn by: M&N BAL	Ckd by: JCS	M&N Project No. 11167
Reviewed by: MK		Drawing code:
Submitted by: MOFFATT & NICHOL		Drawing Scale: / Plot scale: 1:1 (D SHEET)

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NEWTON, MA 02459

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Sheet Reference No.
S-103
INDEX: 3 OF 10

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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

A1 / S-104 PLAN - STORM SURGE BARRIER - VERTICAL LIFT GATE - PHASE 3

SCALE: 1" = 80'

NOTES - PHASE 3:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.
2. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

PLAN - STORM SURGE BARRIER
VERTICAL LIFT GATE - PHASE 3

Designed by: NBJ		Date: 2022-11-21	Rev. -
Dwn by: M&N BAL	Ckd by: JCS	M&N Project No. 11167	
Reviewed by: MK		Drawing code:	
Submitted by: MOFFATT & NICHOL		Drawing Scale:	Plot scale: 1:1 (D SHEET)

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NEWTON, MA 02459

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Sheet Reference No.
S-104
INDEX: 4 OF 10

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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

A1 S-105 PLAN - STORM SURGE BARRIER - VERTICAL LIFT GATE - PHASE 4

SCALE: 1" = 80'

NOTES - PHASE 4:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.
2. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

PLAN - STORM SURGE BARRIER
VERTICAL LIFT GATE - PHASE 4

moffatt & nichol

MOFFATT & NICHOL
180 WELLS AVE, SUITE #302
NEWTON, MA 02459

Designed by: NBJ		Date: 2022-11-21	Rev. -
Dwn by: M&N BAL	Ckd by: JCS	M&N Project No. 11167	
Reviewed by: MK		Drawing code:	
Submitted by: MOFFATT & NICHOL		Drawing Scale: Plot scale: 1:1 (D SHEET)	

SEAL

Sheet Reference No.
S-105
INDEX: 5 OF 10

A1 / S-105 PLAN - STORM SURGE BARRIER - VERTICAL LIFT GATE - PHASE 5
SCALE: 1" = 80'

NOTES - PHASE 5:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.
2. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

80' 0' 80' 160'
SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

PLAN - STORM SURGE BARRIER
VERTICAL LIFT GATE - PHASE 5

Date: 2022-11-21 | Rev: -
Designed by: NBJ
Dwn by: M&N BAL | Ckd by: JCS | M&N Project No. 11167
Reviewed by: MK | Drawing code:
Submitted by: MOFFATT & NICHOL | Drawing Scale: | Plot scale: 1:1 (D SHEET)

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NEWTON, MA 02459

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Sheet Reference No.
S-106
INDEX: 6 OF 10

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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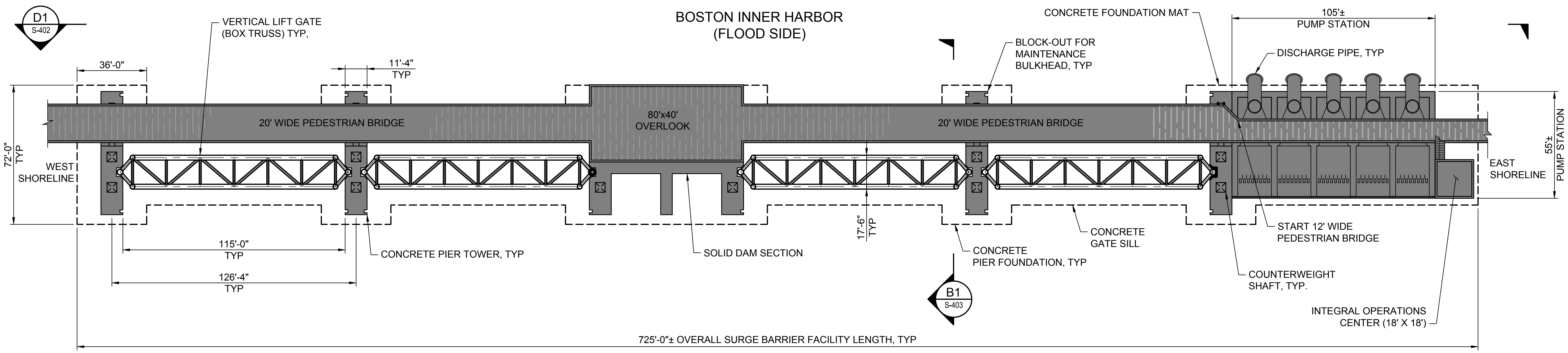
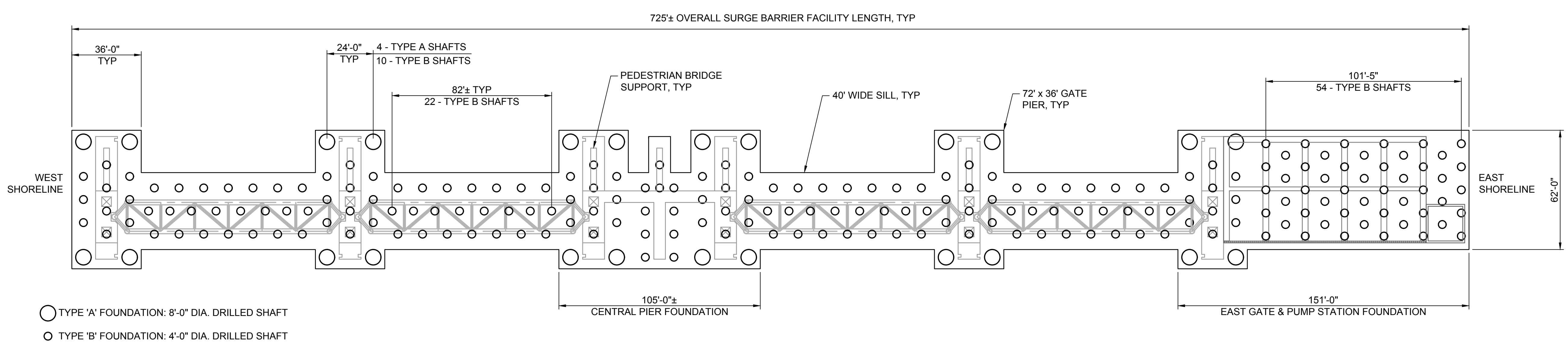


D1 S-401 PLAN - TOP SURFACE - VERTICAL LIFT GATE STORM SURGE BARRIER
SCALE: 1" = 30'



B1 S-401 PLAN - FOUNDATION - VERTICAL LIFT GATE STORM SURGE BARRIER
SCALE: 1" = 30"

30' 0' 30' 60'
SCALE: 1"=30'

PRELIMINARY -
CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

DETAIL - VERTICAL LIFT GATE SURGE BARRIER

Date: 2022-11-21 | Rev: -
M&N Project No. 11167
Designed by: NBJ
Drw by: M&N BAL | Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL
Drawing code:
Drawing Scale:
Plot scale: 1:1 (D SHEET)

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moffatt & nichol

SEAL

Sheet
Reference No.
S-401
INDEX: 7 OF 10

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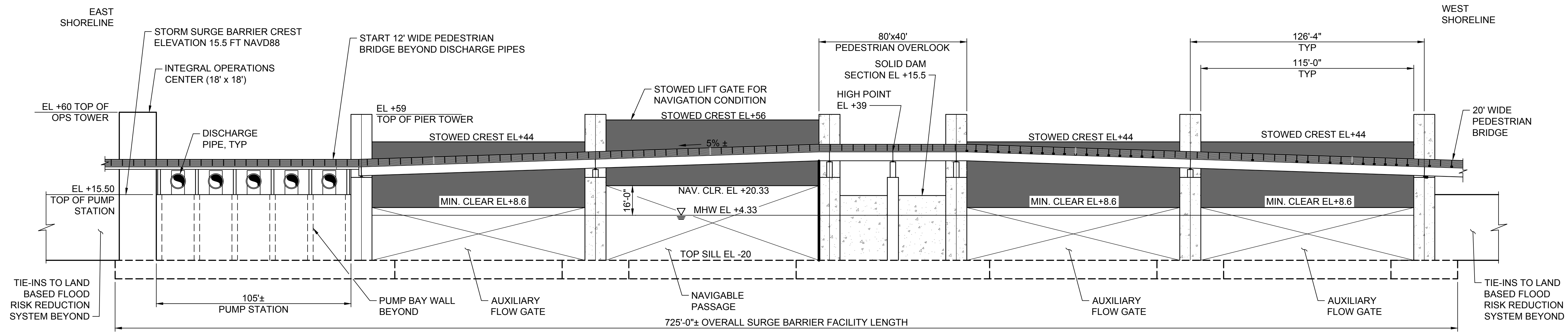
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



D1 / S-401 **ELEVATION - VERTICAL LIFT GATE STORM SURGE BARRIER - LOOKING TOWARDS FPC**
SCALE: 1" = 30'

NOTE:

1. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.

30' 0' 30' 60'
SCALE: 1"=30'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

ELEVATION - VERTICAL LIFT GATE SURGE BARRIER - LOOKING TOWARD FP

Designed by: NBJ | Dwn by: M&N BAL | Ckd by: JCS | Reviewed by: MK | Submitted by: MOFFATT & NICHOL
Date: 2022-11-21 | Rev: - | M&N Project No. 11167 | Drawing code: | Drawing Scale: | Plot scale: 1:1 (D SHEET)

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SEAL

Sheet Reference No.
S-402
INDEX: 8 OF 10

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\11167\00S-402 ; Plotted: 11/21/2022 9:02 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 10/26/2022 6:32 PM by CMOYAIGLESIAS

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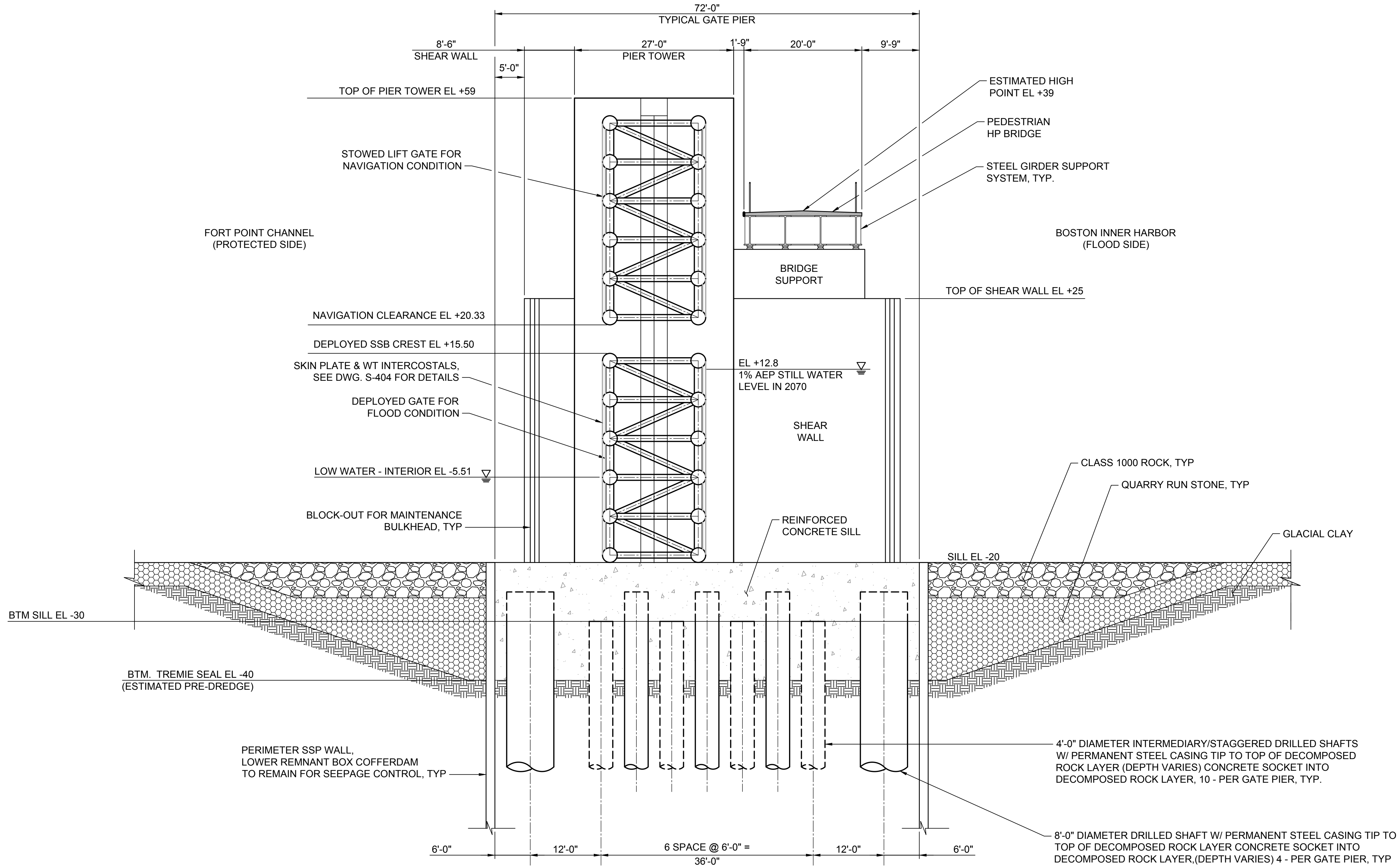

B1 / S-403 SECTION - VERTICAL LIFT GATE PIER
SCALE: 1" = 10'

10'-0" 0'-0" 10'-0" 20'-0"
SCALE: 1"=10'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-28-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

DETAIL - VERTICAL LIFT GATE

Date: 2022-11-21 Rev: -
M&N Project No.: 11167
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
Designed by: NBJ
Dwn by: M&N BAL Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL

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NEWTON, MA 02459

SEAL

Sheet Reference No.
S-403
INDEX: 9 OF 10

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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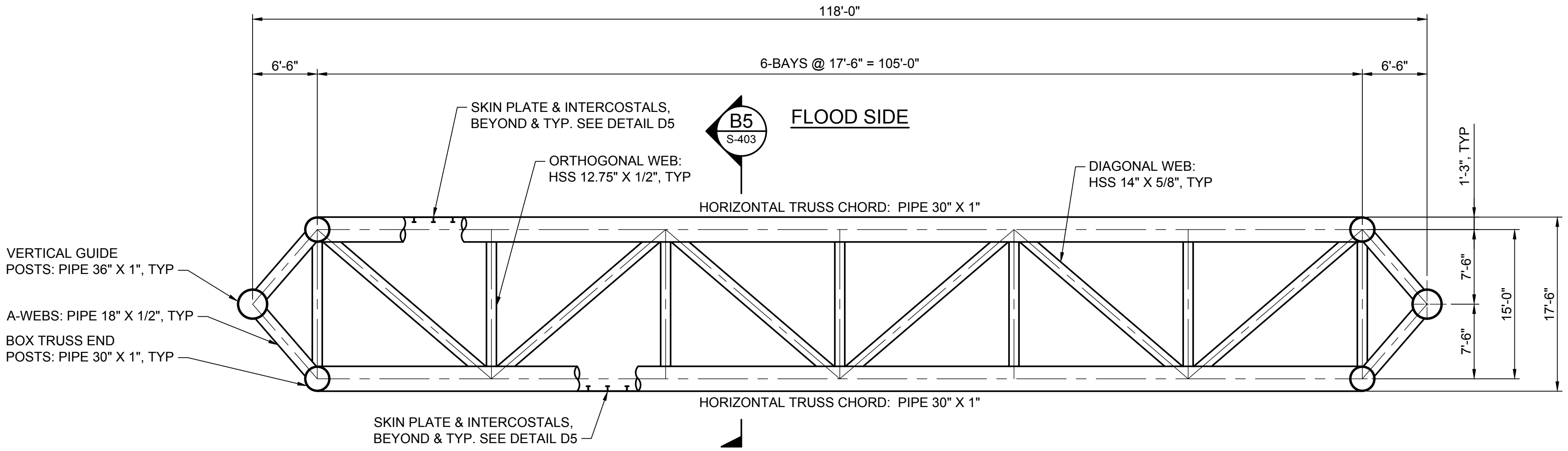
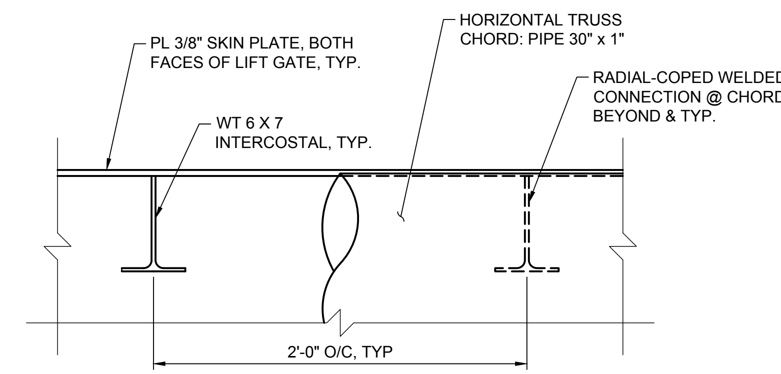
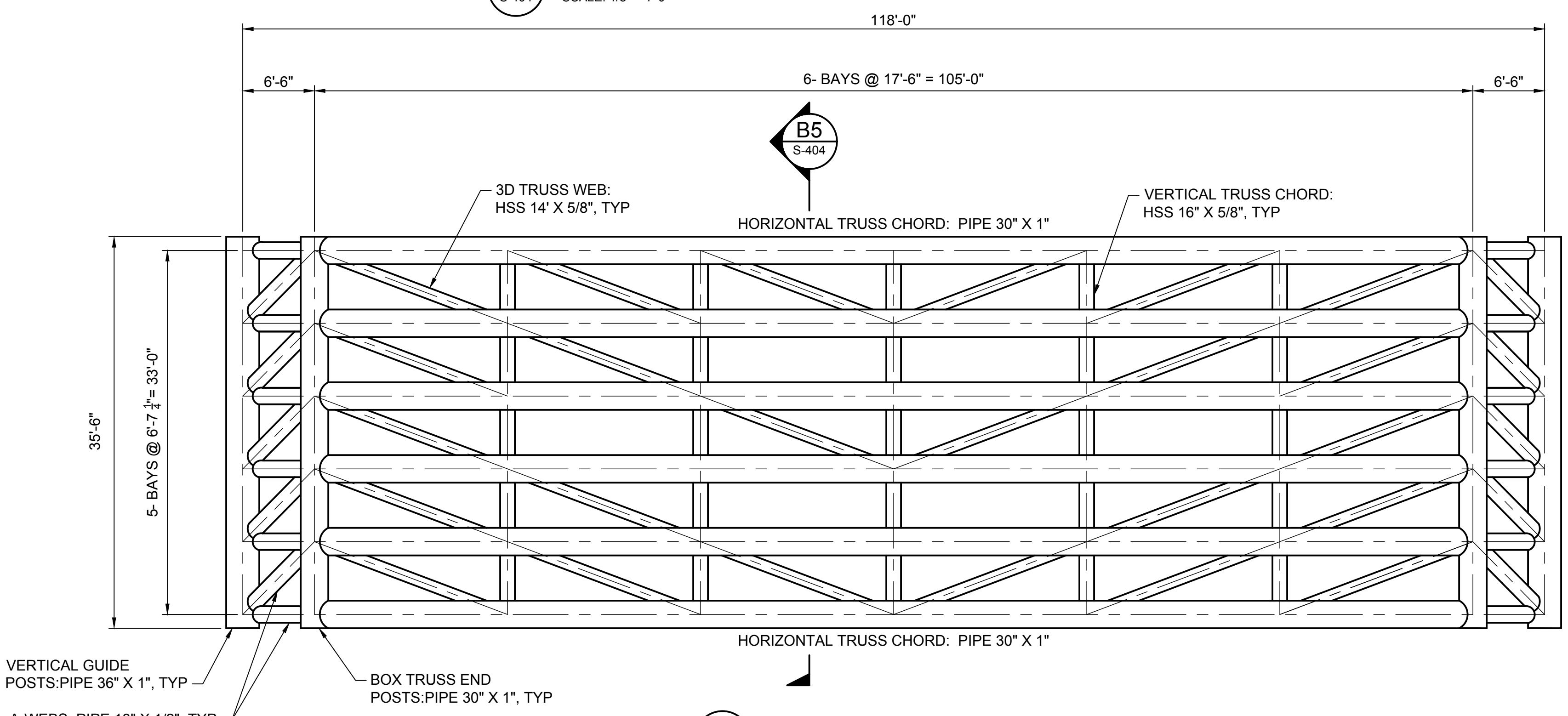


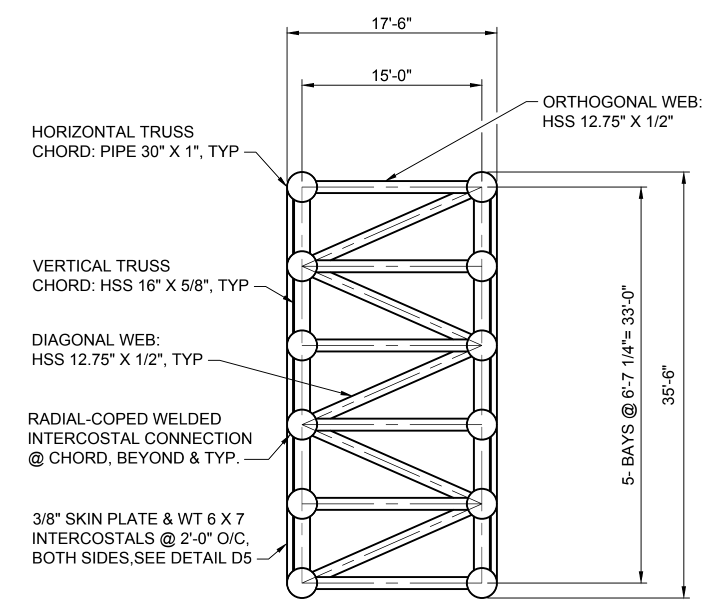
D1 S-404 PLAN - VERTICAL LIFT GATE - TYPICAL HORIZONTAL TRUSS SECTION
SCALE: 1/8" = 1'-0"



D5 S-404 DETAIL - INTERCOSTAL & SKIN PLATE
N.T.S.



B1 S-404 ELEVATION - VERTICAL LIFT GATE
SCALE: 1/8" = 1'-0"



B5 S-403 SECTION - VERTICAL LIFT GATE
SCALE: 1/8" = 1'-0"

8'-0" 0'-0" 8'-0" 16'-0"
SCALE: 1/8"=1'-0"

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC LIFT GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
VERTICAL LIFT GATE CONCEPT DESIGN
BOSTON, MA

MULTI VIEWS - VERTICAL LIFT GATE SURGE BARRIER

Date: 2022-11-21 | Rev: -
M&N Project No. 11167
Drawing code:
Drawing Scale: | Plot scale: 1:1 (D SHEET)
Designed by: NBJ
Dwn by: M&N BAL | Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL

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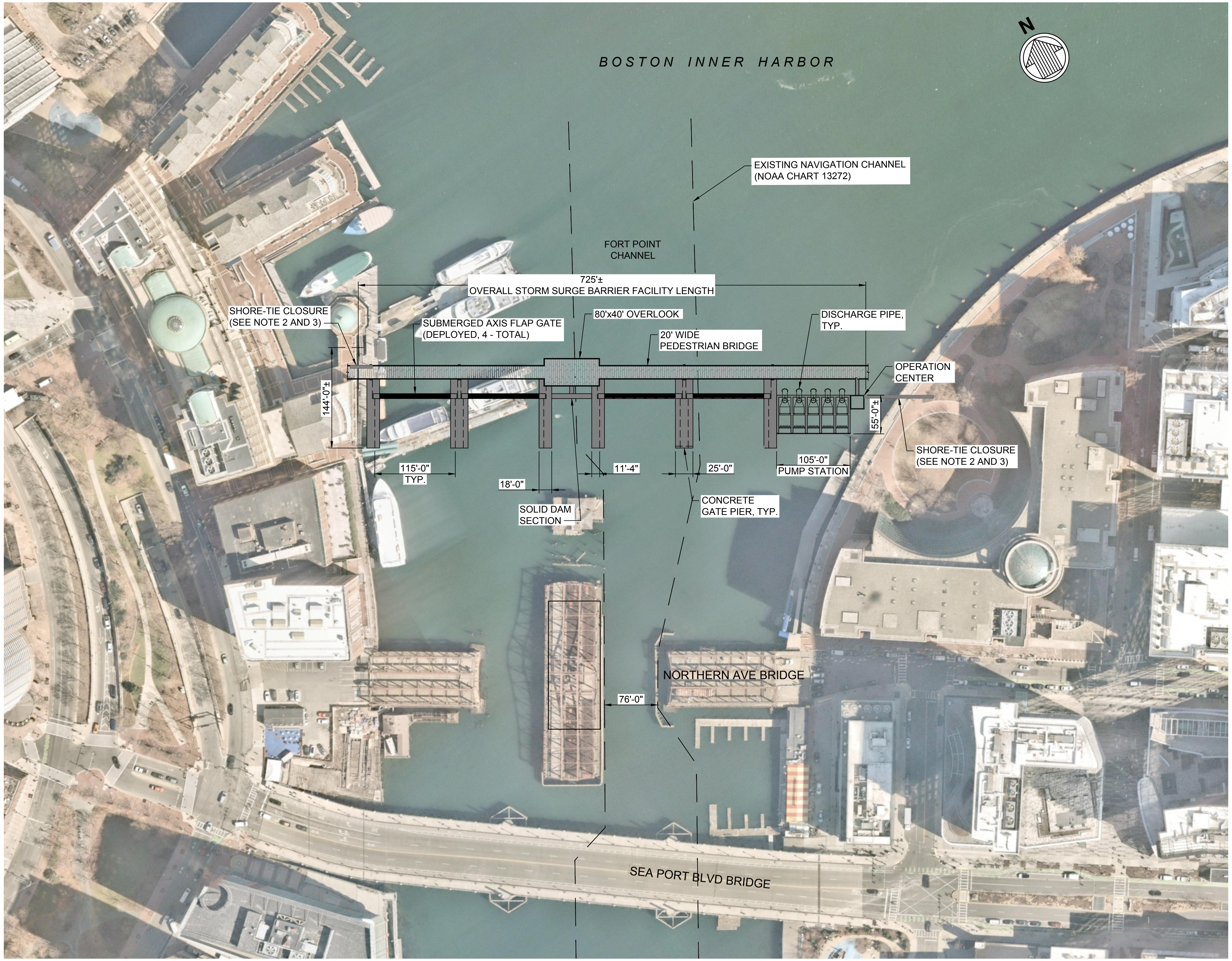
SEAL

Sheet Reference No.
S-404
INDEX: 10 OF 10

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

ATTACHMENT C
FORT POINT CHANNEL STORM SURGE BARRIER CONCEPTUAL DESIGN DRAWINGS
SUBMERGED AXIS FLAP GATE ALTERNATIVE



A1 S-101 PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE ALTERNATE

SCALE: 1" = 80'

NOTES:

1. THE CONCEPT PLAN VIEWS SHOWS PORTIONS OF STORM SURGE BARRIER STRUCTURE THAT PROJECT ABOVE DAILY HIGH WATER LINE. SEE S-400 SERIES SHEETS FOR MULTIVIEWS AND DETAILS ASSOCIATED WITH BELOW WATER AND CHANNEL BED FEATURES (FOUNDATION, SCOUR PROTECTION).
2. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.
3. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE ALTERNATE

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Designed by: NBJ
Dwn by: CMI
Ckd by: JCS
Date: 2022-11-21
M&N Project No.: 11167
Rev.: -
Reviewed by: MK
Drawing code:
Submitted by: MOFFATT & NICHOL
Drawing Scale:
Plot scale: 1:1 (D SHEET)

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Sheet Reference No.
S-101
INDEX: 1 OF 7

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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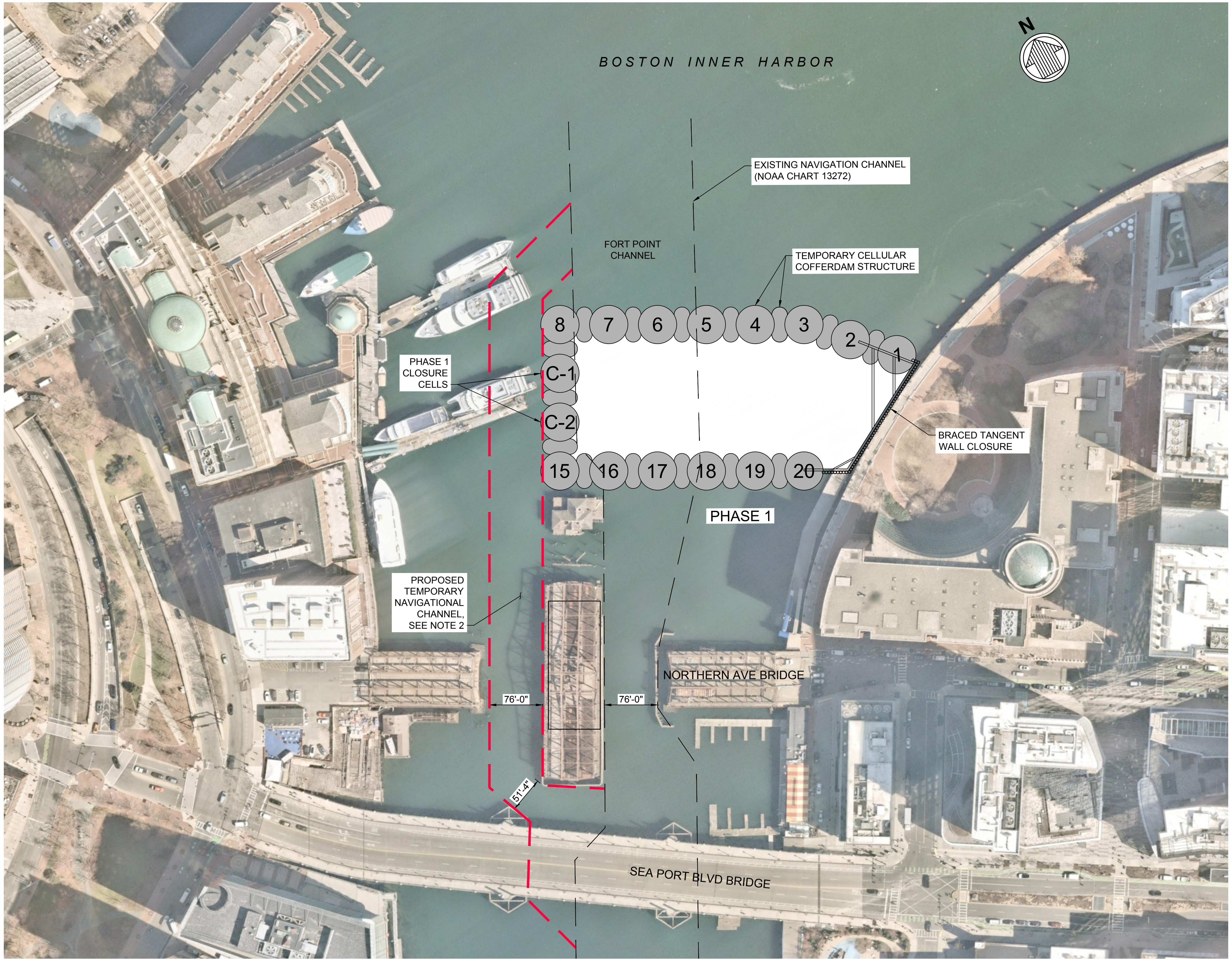

A1 S-102 PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE ALTERNATE - PHASE 1

SCALE: 1" = 80'

NOTES - PHASE 1:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.

2. CONTRACTOR SHALL DREDGE TEMPORARY NAVIGATION CHANNEL AND PROVIDE TEMPORARY NAVIGATION AIDS PRIOR TO CONSTRUCTING PHASE 1 COFFERDAM.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

PLAN - STORM SURGE BARRIER SUBMERGED AXIS FLAP GATE - PHASE 1

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Designed by: NBJ
Dwn by: CMI
Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL
Date: 2022-11-21
Rev. -
M&N Project No. 11167
Drawing code:
Drawing Scale:
Plot scale: 1:1 (D SHEET)

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Sheet Reference No.
S-102
INDEX: 2 OF 7

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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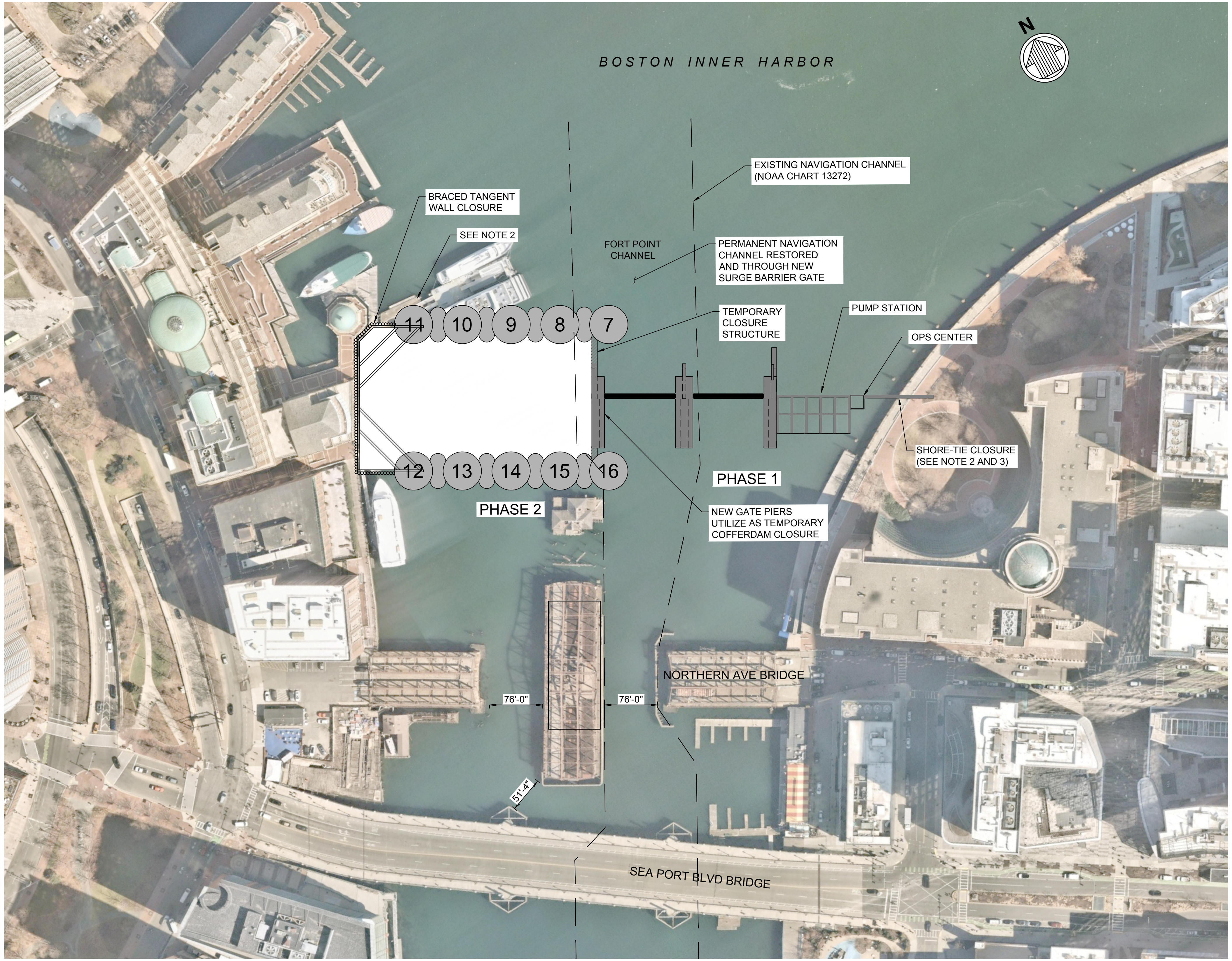

A1 / S-103 — PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE ALTERNATE - PHASE 2

SCALE: 1" = 80'

NOTES - PHASE 2:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.
2. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.
3. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN .

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

PLAN - STORM SURGE BARRIER SUBMERGED AXIS FLAP GATE - PHASE 2

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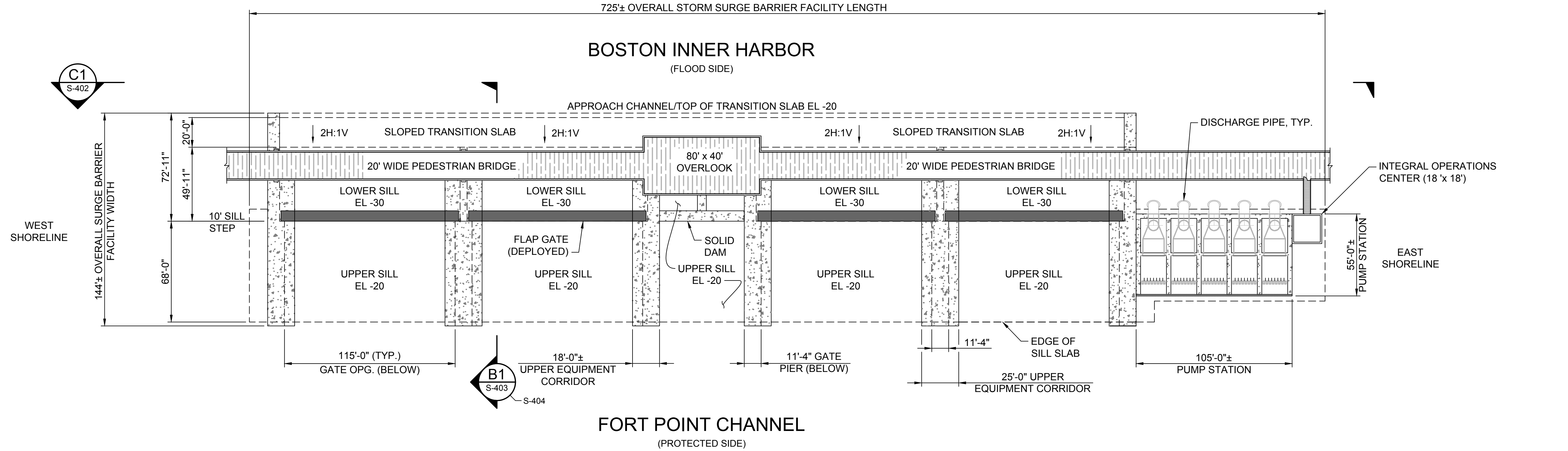
Designed by: NBJ
Dwn by: CMI
Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL
Date: 2022-11-21
Rev. -
M&N Project No. 11167
Drawing code:
Drawing Scale:
Plot scale: 1:1 (D SHEET)

SEAL

Sheet Reference No.
S-103
INDEX: 3 OF 7

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\Flap Gate\1116701S-103 ; Plotted: 11/21/2022 2:51 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 10/26/2022 8:59 PM by CMOYAIGLESIAS

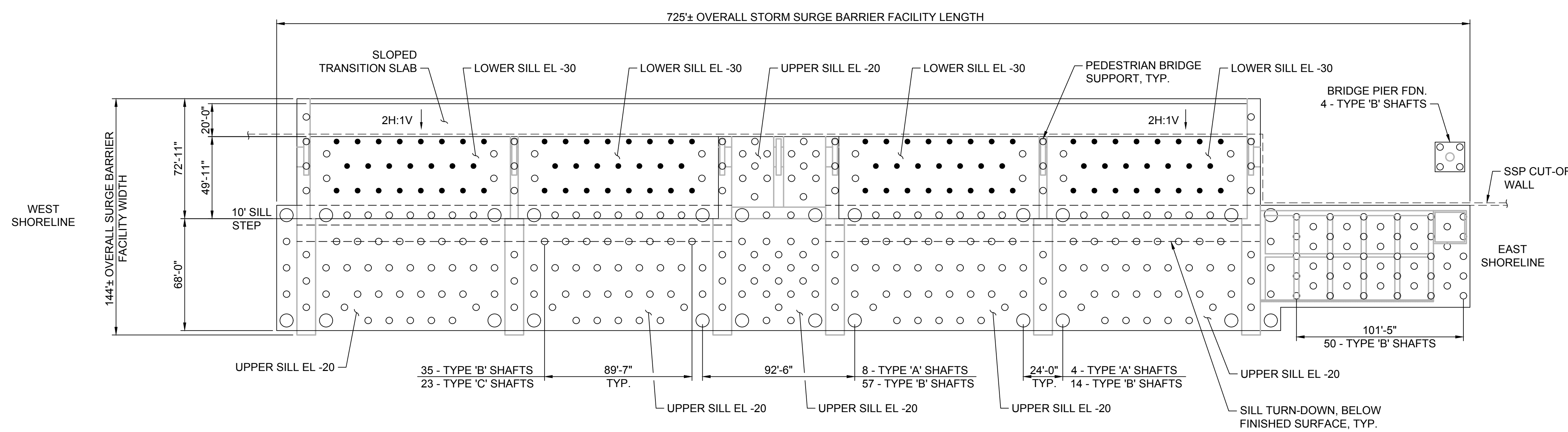
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



C1
S-401

PLAN - TOP SURFACE - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER

SCALE: 1" = 40'



○ : TYPE 'A' FOUNDATION: 8'-0" DIA. DRILLED SHAFT

○ : TYPE 'B' FOUNDATION: 4'-0" DIA. DRILLED SHAFT

● : TYPE 'C' FOUNDATION: 3'-0" DIA. DRILLED SHAFT

40'-0" 0'-0" 40'-0" 80'-0"

SCALE: 1"=40'

A1
S-401

PLAN - FOUNDATION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER

SCALE: 1" = 40'

PRELIMINARY - CONCEPT LEVEL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

PLAN VIEWS - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE

Designed by: NBJ | Dwn by: CMI | Chkd by: JCS | Date: 2022-11-21 | Rev: -
M&N Project No.: 11167
Drawing code:
Reviewed by: MK
Submitted by: MOFFATT & NICHOL
Drawing Scale:
Plot scale: 1:1 (D SHEET)

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MOFFATT & NICHOL
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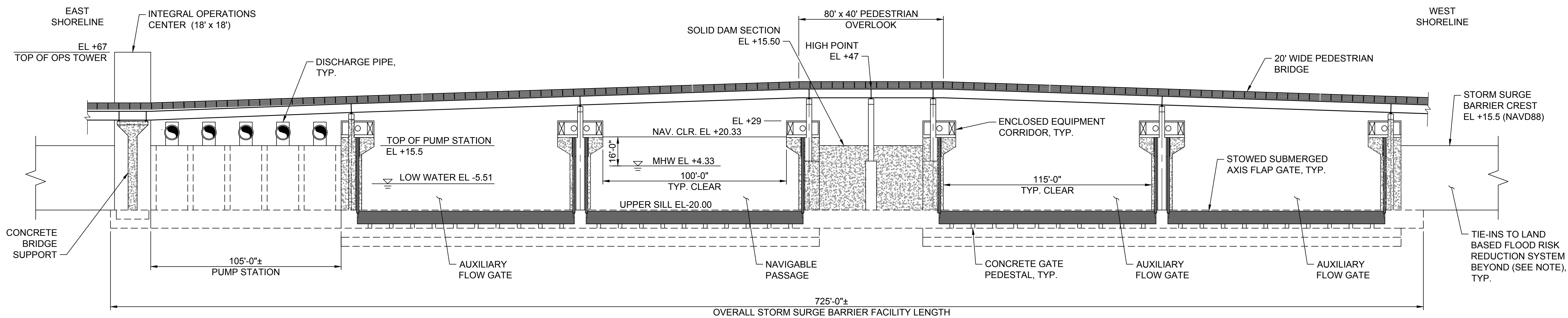
NEWTON, MA 02459

SEAL

Sheet Reference No.
S-401
INDEX: 4 OF 7

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\Flap Gate\11167\01S-401 ; Plotted: 11/21/2022 2:51 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 10/26/2022 8:54 PM by CMOYAIGLESIAS



C1 / S-401 ELEVATION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER - LOOKING TOWARDS FPC (GATES IN STOWED POSITION)

SCALE: 1 = 30

NOTE:

1. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.

30'-0" 0'-0" 30'-0" 60'-0"

SCALE: 1"=30'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

ELEVATION - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE

Date: 2022-11-21 | Rev: -
M&N Project No.: 11167
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
Designed by: NBJ
Dwn by: CMI | Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL

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NEWTON, MA 02459

SEAL

Sheet Reference No.
S-402
INDEX: 5 OF 7

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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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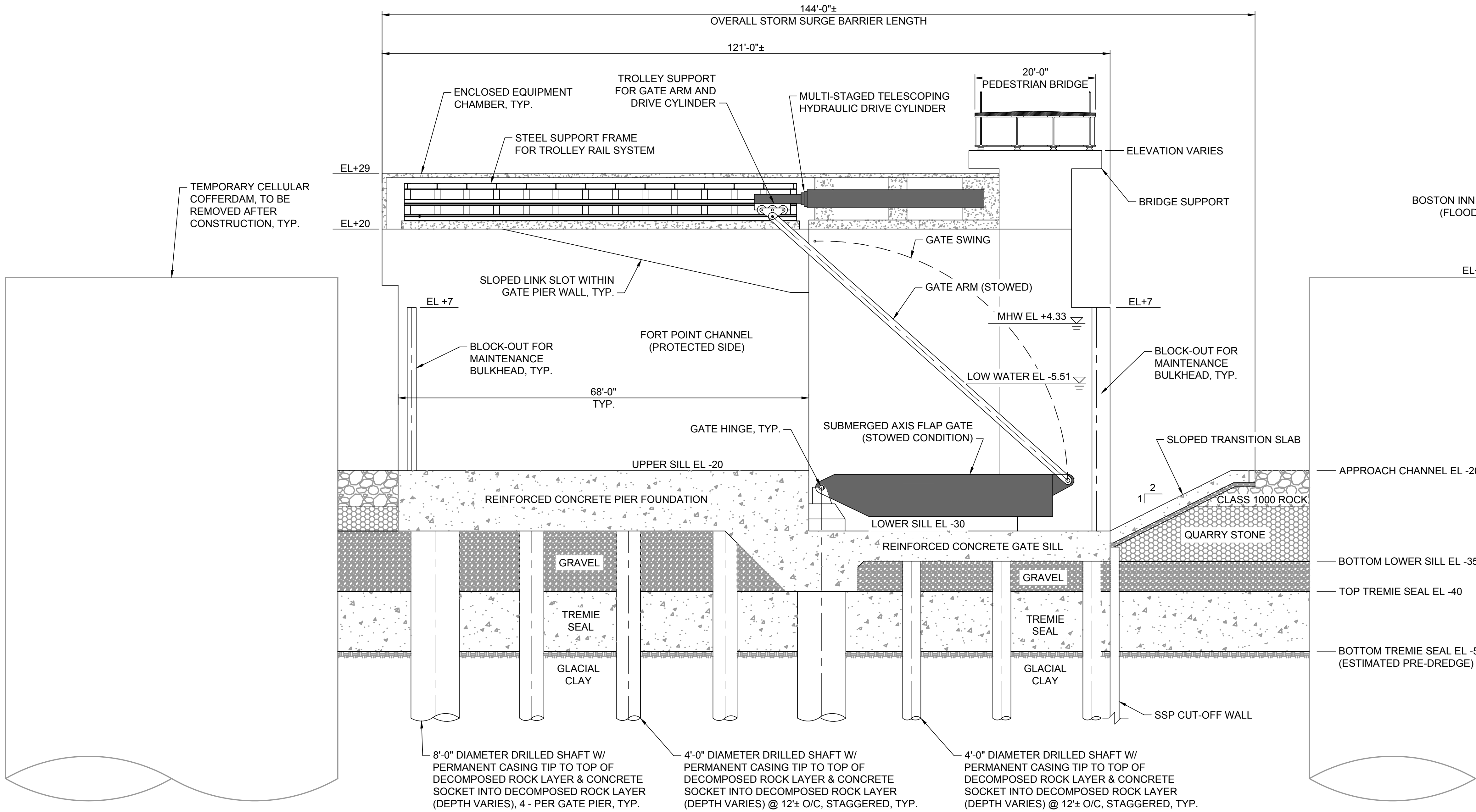

B1 S-401 SECTION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER (STOWED)
SCALE: 1" = 10'

10'-0" 0'-0" 10'-0" 20'-0"
SCALE: 1"=10'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

SECTION - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE (STOWED)

Designed by: NBJ	Date: 2022-11-21	Rev: -
Dwn by: CMI	Ckd by: JCS	M&N Project No.: 11167
Reviewed by: MK	Drawing code:	
Submitted by: MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1:1 (D SHEET)

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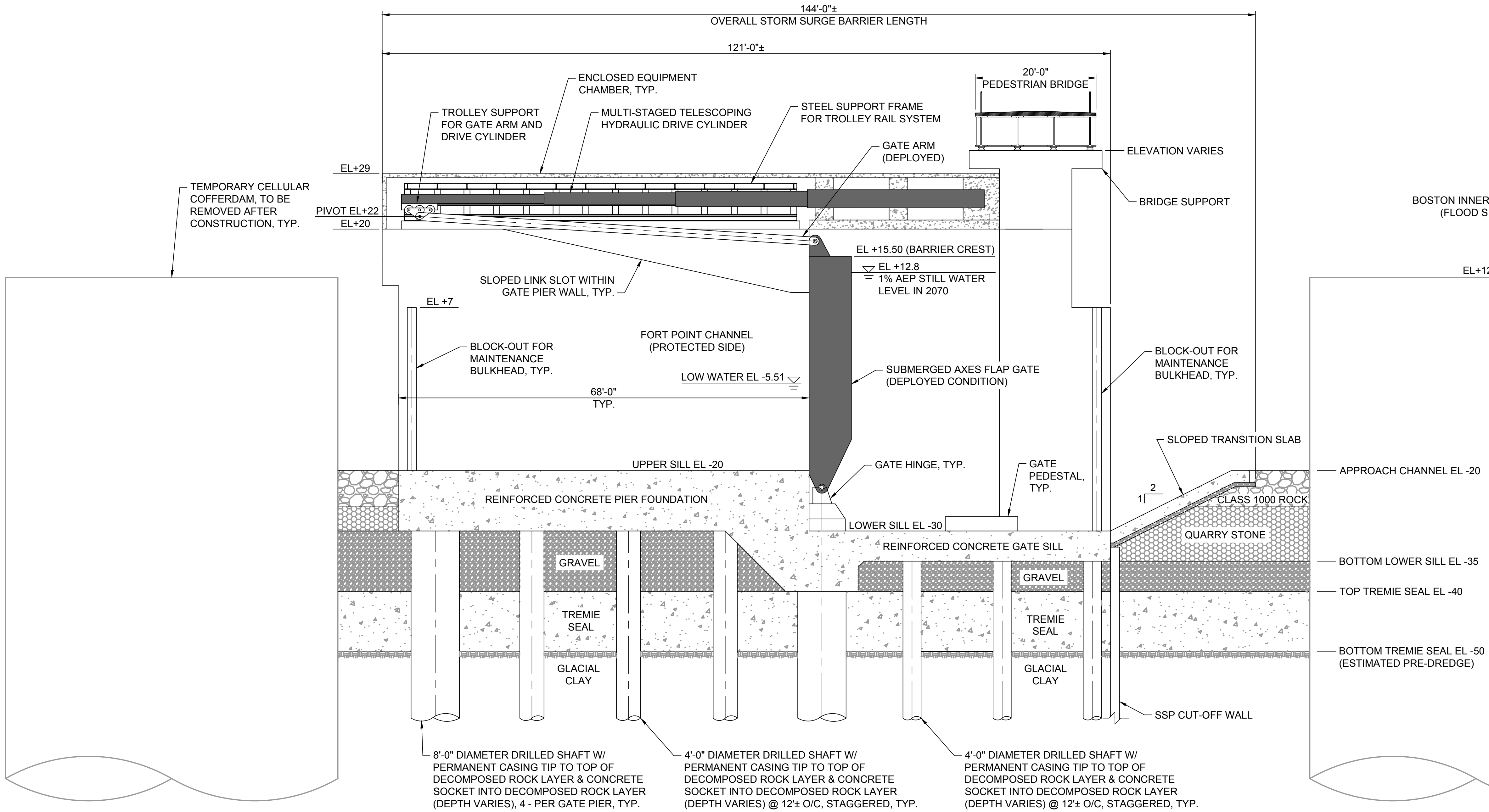
NEWTON, MA 02459

SEAL

Sheet Reference No.
S-403
INDEX: 6 OF 7

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



B1 / S-401 SECTION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER (DEPLOYED)

SCALE: 1" = 10'

10'-0" 0'-0" 10'-0" 20'-0"

SCALE: 1"=10'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr
02	FPC FLAP GATE DRAFT - CLIENT REVIEW	11-21-2022	MK
01	FPC FLAP GATE DRAFT - CLIENT REVIEW	10-26-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE CONCEPT
BOSTON, MA

SECTION - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE (DEPLOYED)

Designed by: NBJ | Dwn by: CMI | Ckd by: JCS | Reviewed by: MK | Submitted by: MOFFATT & NICHOL
Date: 2022-11-21 | Rev: - | M&N Project No.: 11167 | Drawing code: | Drawing Scale: | Plot scale: 1:1 (D SHEET)

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moffatt & nichol

SEAL

Sheet Reference No.
S-404
INDEX: 7 OF 7

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

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A1
S-101

PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE

SCALE: 1" = 80'

NOTES:

1. THE CONCEPT PLAN VIEWS SHOWS PORTIONS OF THE STORM SURGE BARRIER STRUCTURE THAT PROJECT ABOVE DAILY HIGH WATER LINE. SEE S-400 SERIES SHEETS FOR MULTIVIEWS AND DETAILS ASSOCIATED WITH BELOW WATER AND CHANNEL BED FEATURES (FOUNDATION, SCOUR PROTECTION).
2. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.
3. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY -
CONCEPT LEVEL

Mark	Description	Date	Appr.
01	FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW	12-15-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE

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NEWTON, MA 02459

Designed by: NBJ
Dwn by: CMI
Ckd by: JCS
Date: 2022-12-15
Rev. -
M&N Project No. 11167
Reviewed by: MK
Drawing code:
Submitted by: MOFFATT & NICHOL
Drawing Scale:
Plot scale: 1:1 (D SHEET)

SEAL

Sheet
Reference No.
S-101
INDEX: 1 OF 7

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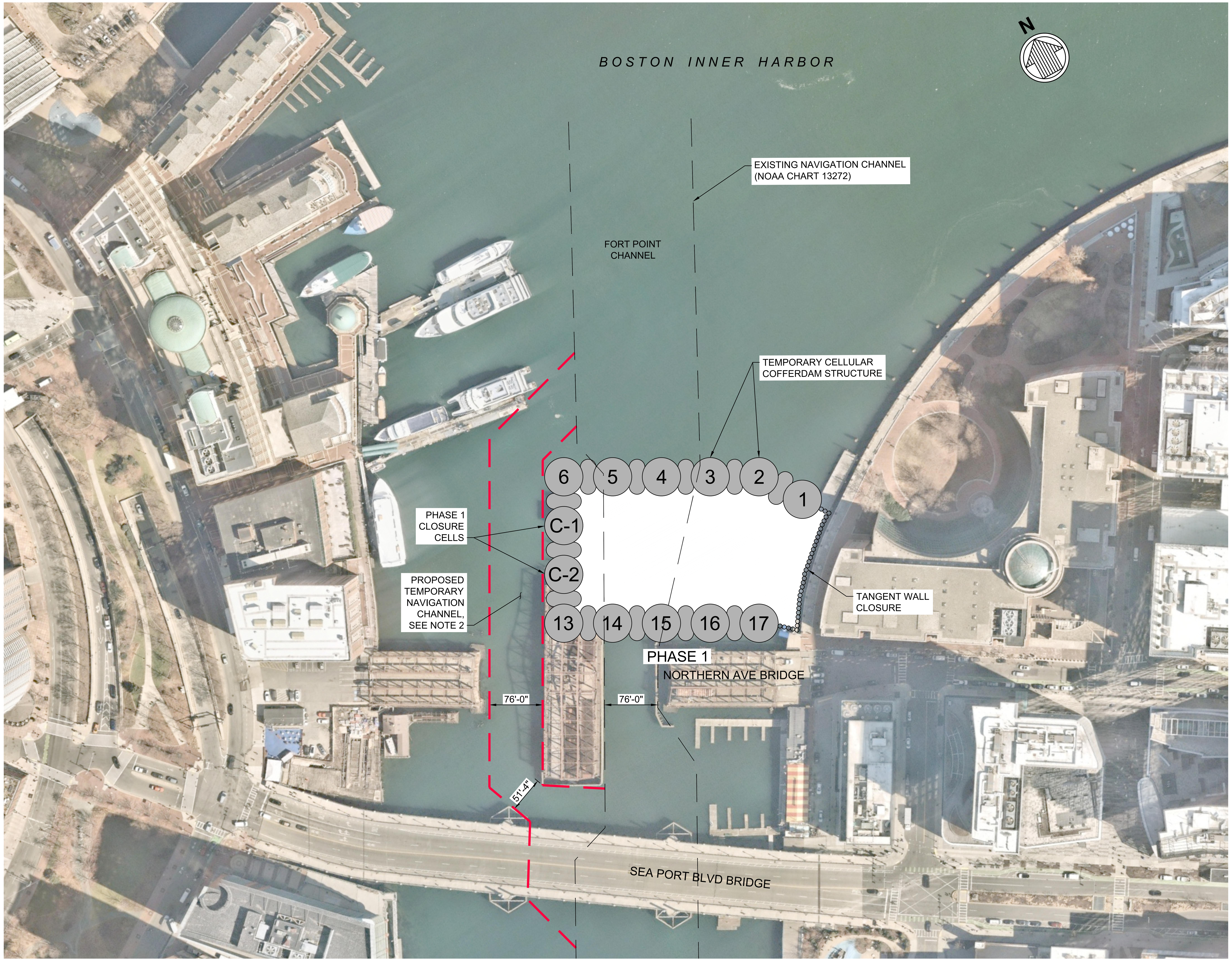
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



A1
S-102

PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE - PHASE 1

SCALE: 1" = 80'

NOTES - PHASE 1:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE STORM SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.

2. CONTRACTOR SHALL DREDGE TEMPORARY NAVIGATION CHANNEL AND PROVIDE TEMPORARY NAVIGATION AIDS PRIOR TO CONSTRUCTING PHASE 1 COFFERDAM.

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
01	FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW	12-15-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

PLAN - STORM SURGE BARRIER SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE - PHASE 1

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Designed by: NBJ
Dwn by: CMI
Ckd by: JCS
Date: 2022-12-15
Rev. -
M&N Project No. 11167
Reviewed by: MK
Drawing code:
Submitted by: MOFFATT & NICHOL
Drawing Scale:
Plot scale: 1:1 (D SHEET)

SEAL

Sheet Reference No.
S-102
INDEX: 2 OF 7

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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

A1 / S-103 PLAN - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE - PHASE 2

SCALE: 1" = 80'

NOTES - PHASE 2:

1. THIS CONCEPT PHASING PLAN REPRESENTS ONE POSSIBLE CONFIGURATION THE CONTRACTOR COULD UTILIZE TO ESTABLISH IN-THE-DRY CONDITIONS TO CONSTRUCT THE SILL, PIERS, GATES, AND BALANCE OF SUPERSTRUCTURE. ACTUAL PHASING PROGRESSION, EXTENTS, AND INTERFACES SHALL BE DETERMINED BY THE FINAL DESIGN OF THE STORM SURGE BARRIER AND CONTRACTOR'S COFFERDAM SYSTEM.
2. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.
3. EXISTING SHORELINE STRUCTURES AND OBSTRUCTIONS TO BE REMOVED SHALL BE DETERMINED DURING DETAILED DESIGN .

80' 0' 80' 160'

SCALE: 1"=80'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
01	FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW	12-15-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

PLAN - STORM SURGE BARRIER SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE - PHASE 2

Designed by: NBJ		Date: 2022-12-15	Rev. -
Dwn by: CMI	Ckd by: JCS	M&N Project No. 11167	
Reviewed by: MK		Drawing code:	
Submitted by: MOFFATT & NICHOL		Drawing Scale: Plot scale: 1:1 (D SHEET)	

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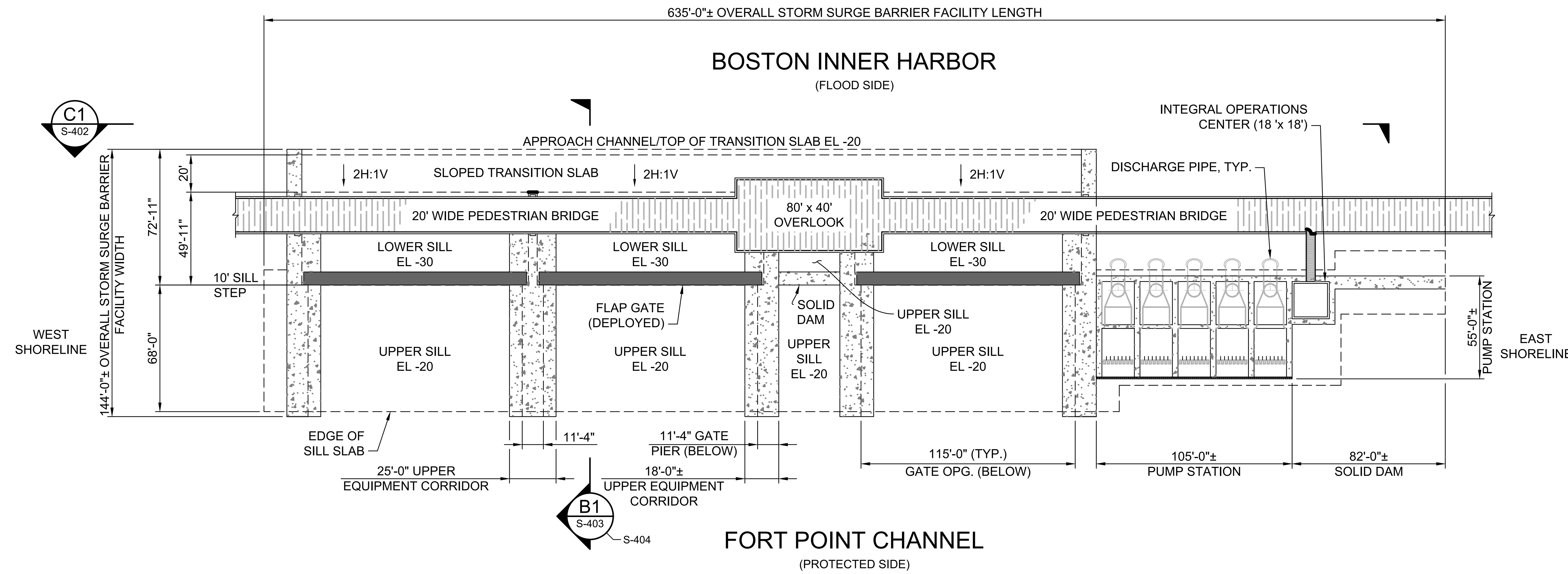
NEWTON, MA 02459

SEAL

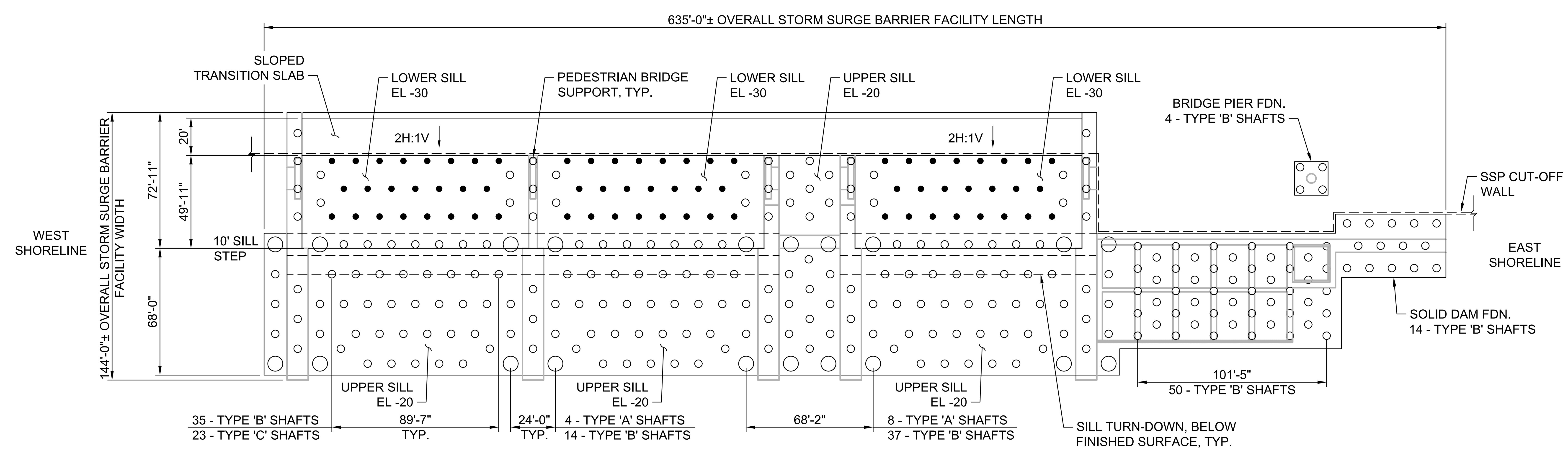
Sheet Reference No.
S-103

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



C1 S-401 PLAN - TOP SURFACE - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER - SOUTH LOCATION ALTERNATE

SCALE: 1" = 40'



○ : TYPE 'A' FOUNDATION: 8'-0" DIA. DRILLED SHAFT

○ : TYPE 'B' FOUNDATION: 4'-0" DIA. DRILLED SHAFT

● : TYPE 'C' FOUNDATION: 3'-0" DIA. DRILLED SHAFT

A1 S-401 PLAN - FOUNDATION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER - SOUTH LOCATION ALTERNATE

SCALE: 1" = 40'

40'-0" 0'-0" 40'-0" 80'-0"

SCALE: 1"=40'

PRELIMINARY - CONCEPT LEVEL

01 | FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW | 12-15-2022 | MK

Mark | Description | Date | Appr.

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

PLAN VIEWS - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE

Date: 2022-12-15 | Rev: -
M&N Project No. 11167
Drawing code:
Drawing Scale: 1:1 (D SHEET) Plot scale:
Designed by: NBJ | Dwn by: CMI | Ckd by: JCS
Reviewed by: MK
Submitted by: MOFFATT & NICHOL

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moffatt & nichol

SEAL

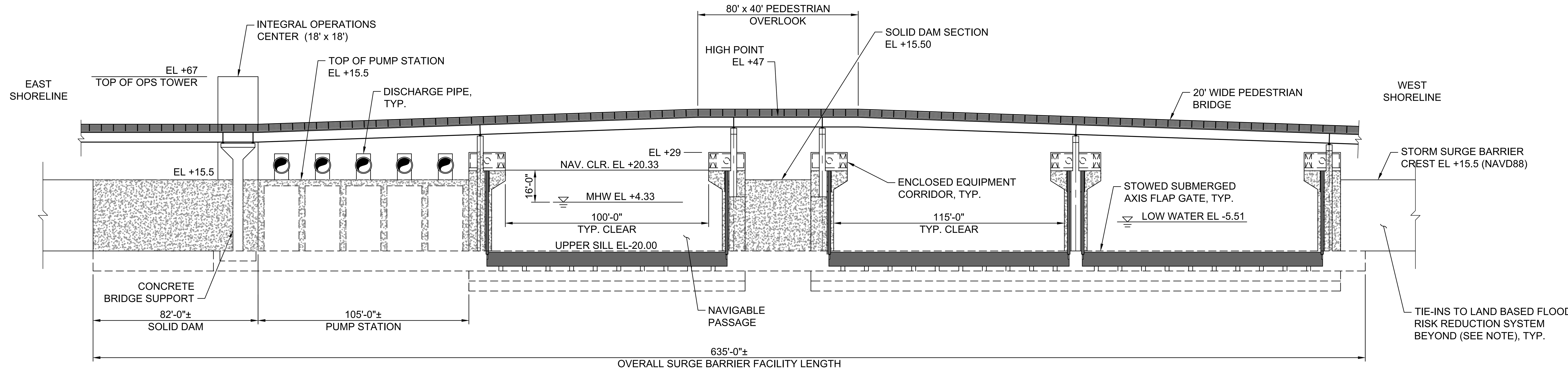
Sheet Reference No.

S-401

INDEX: 4 OF 7

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\Flap Gate\ALT 2\11167\01S-401 ; Plotted: 12/15/2022 3:21 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 12/15/2022 3:19 PM by CMOYAIGLESIAS

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



C1 / S-401 ELEVATION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER - SOUTH LOCATION ALTERNATE - LOOKING TOWARDS FPC (GATES IN STOWED POSITION)

SCALE: 1 = 30

NOTE:

1. SHORELINE INTERFACES, TRANSITIONS, AND TIE-INS SHALL BE DETERMINED DURING DETAILED DESIGN.

30'-0" 0'-0" 30'-0" 60'-0"

SCALE: 1"=30'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
01	FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW	12-15-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

ELEVATION - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE

Rev.: -	Date: 2022-12-15	Designed by: NBJ	
M&N Project No.: 11167	Dwn by: CMI	Ckd by: JCS	
Drawing code:	Reviewed by: MK		
Drawing Scale:	Plot scale: 1:1 (D SHEET)	Submitted by: MOFFATT & NICHOL	

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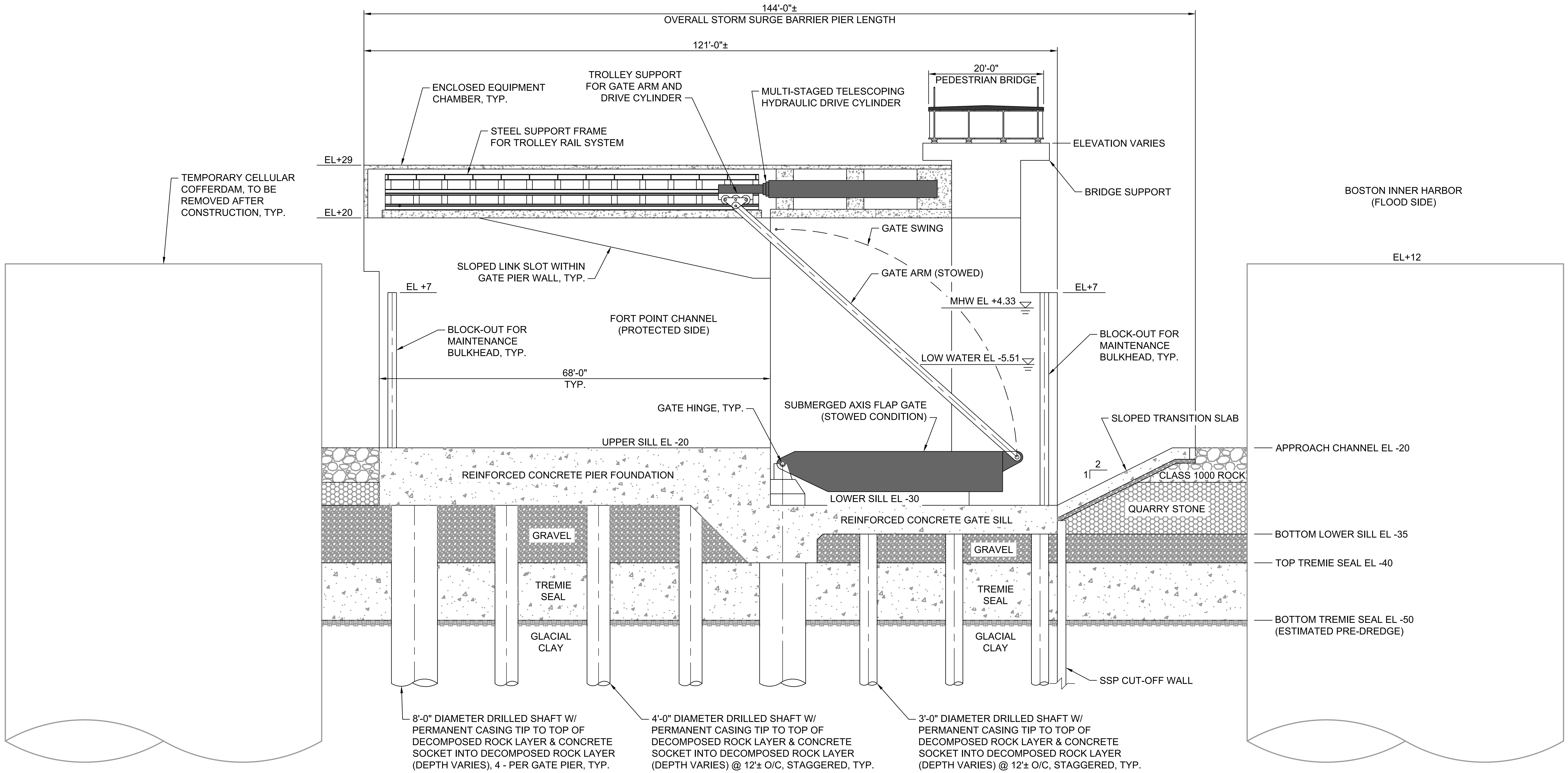
moffatt & nichol

SEAL

Sheet Reference No.
S-402
INDEX: 5 OF 7

File: Q:\BOS\Projects\11167 BWSC\500_CADD_Active_Exhibits\Flap Gate\ALT 2\11167\01S-402 ; Plotted: 12/15/2022 3:21 PM by MOYA IGLESIAS, CRISTIAN ; Saved: 12/15/2022 3:19 PM by CMOYAIGLESIAS

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



B1 / S-401 — SECTION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER (STOWED) - SOUTH LOCATION ALTERNATE

SCALE: 1" = 10'

10'-0" 0'-0" 10'-0" 20'-0"

SCALE: 1"=10'

PRELIMINARY - CONCEPT LEVEL

Mark	Description	Date	Appr.
01	FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW	12-15-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

SECTION - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE (STOWED)

Designed by: NBJ | Dwn by: CMI | Ckd by: JCS | Date: 2022-12-15 | M&N Project No.: 11167 | Rev.: - | Reviewed by: MK | Drawing code: | Submitted by: MOFFATT & NICHOL | Drawing Scale: | Plot scale: 1:1 (D SHEET)

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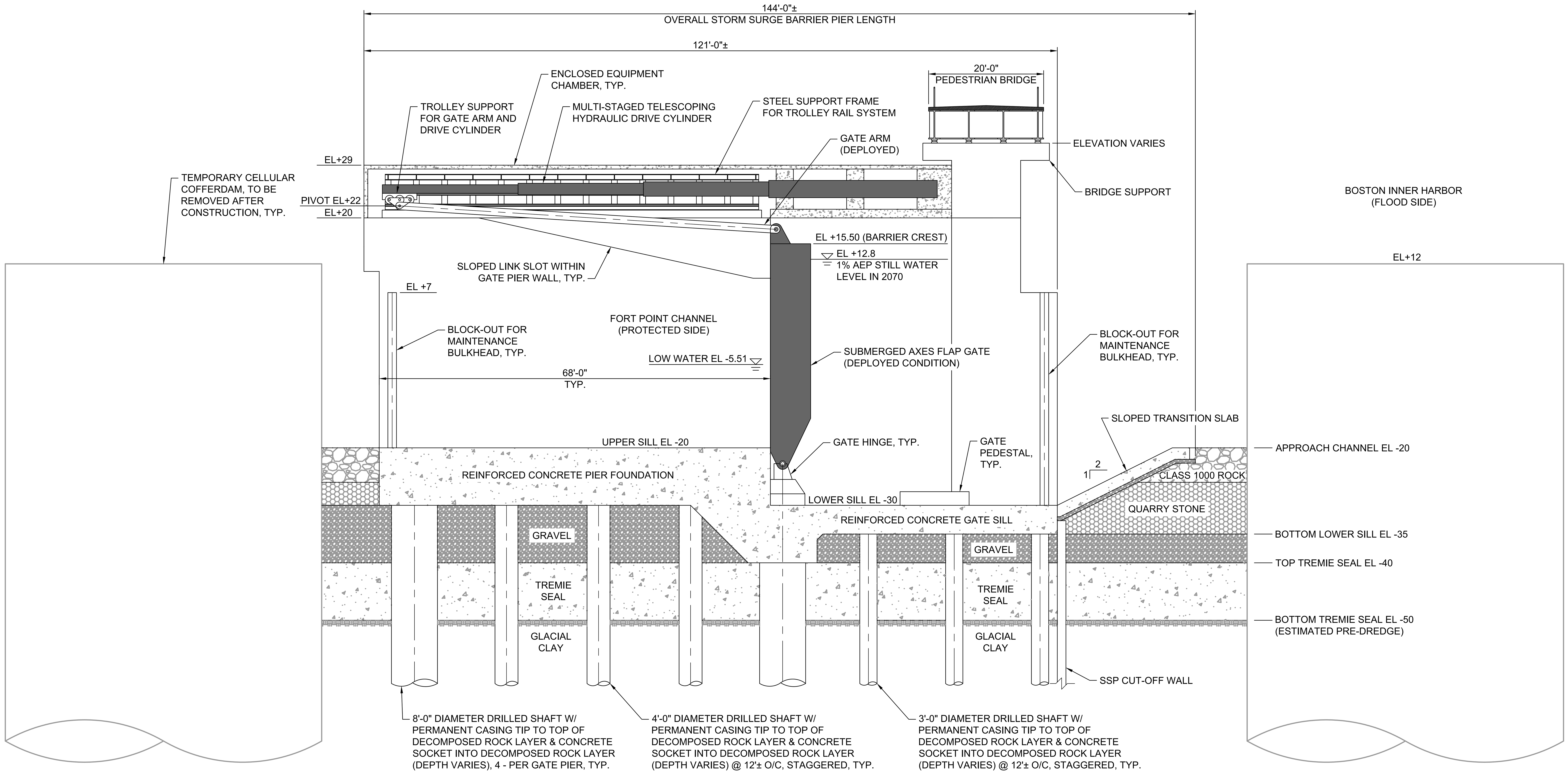
SEAL

Sheet Reference No.
S-403
INDEX: 6 OF 7

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



B1 S-401 SECTION - SUBMERGED AXIS FLAP GATE STORM SURGE BARRIER (DEPLOYED) - SOUTH LOCATION ALTERNATE

SCALE: 1" = 10'

10'-0" 0'-0" 10'-0" 20'-0"

SCALE: 1"=10'

PRELIMINARY - CONCEPT LEVEL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
01	FPC FLAP GATE (SOUTH) DRAFT - CLIENT REVIEW	12-15-2022	MK

BOSTON WATER AND SEWER COMMISSION
FORT POINT CHANNEL STORM SURGE BARRIER
SUBMERGED AXIS FLAP GATE - 3 GATE CONCEPT
BOSTON, MA

SECTION - STORM SURGE BARRIER - SUBMERGED AXIS FLAP GATE - SOUTH LOCATION ALTERNATE (DEPLOYED)

Designed by: NBJ | Dwn by: CMI | Ckd by: JCS | Date: 2022-12-15 | Rev: - | M&N Project No.: 11167 | Drawing code: | Reviewed by: MK | Submitted by: MOFFATT & NICHOL | Drawing Scale: 1:1 (D SHEET) | Plot scale:

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SEAL

Sheet Reference No.
S-404
INDEX: 7 OF 7

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