

# Mitigating Sunshine Flooding in the City by the Sea

Newport, Rhode Island

May 2022

Andrew Smith, PE





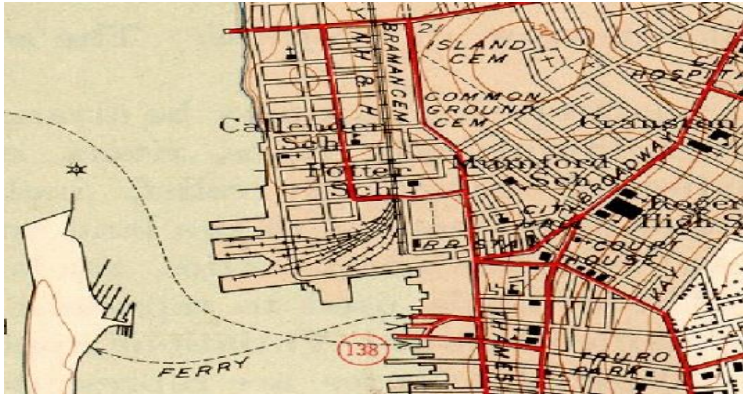




# Background



1894



1944



1777

# Background

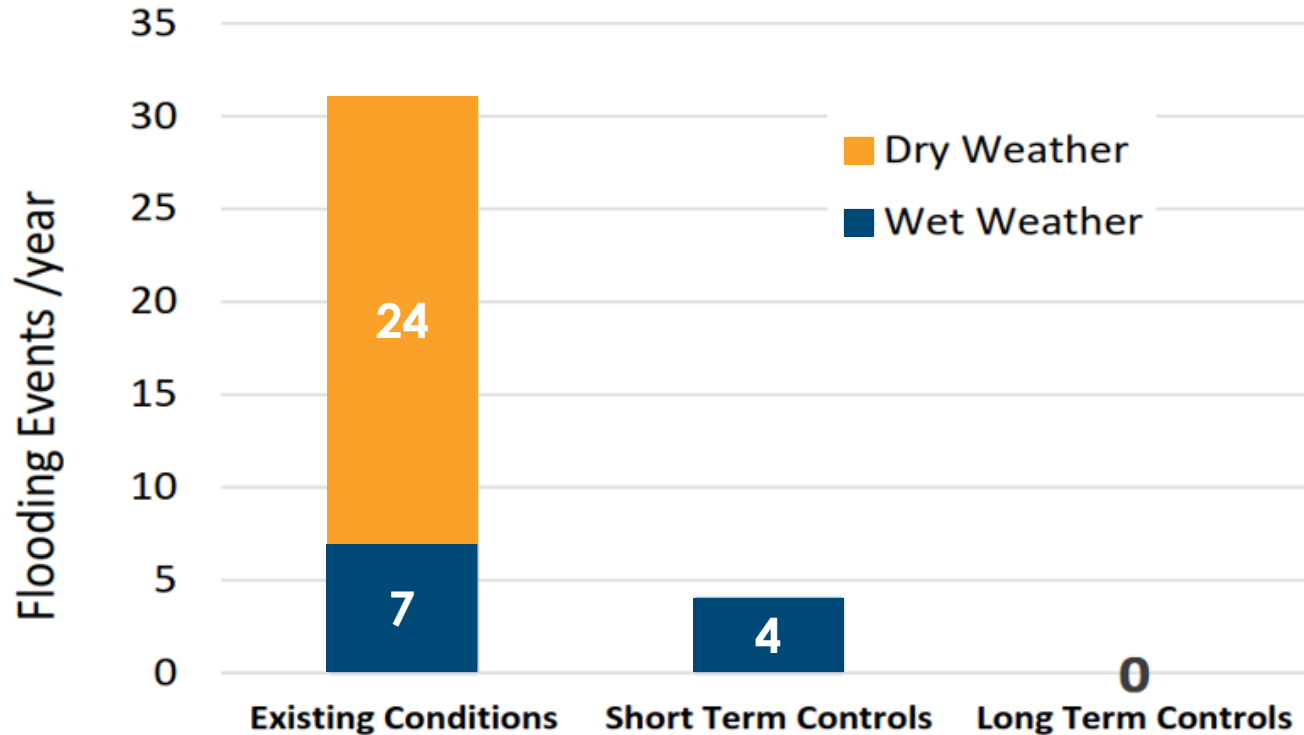


Figure ES-2. Bridge Street Study Area Short-term and Long-term Controls Performance  
*Flooding events during a typical year (2013) compared with existing conditions*

## Drainage Investigation & Flooding Analysis

- Existing Conditions – 31 flooding events, 24 dry weather, and 7 wet weather
- Short Term Controls in place – 4 wet weather flooding events
- Long Term Controls in place – 0 flooding events



# Background

## Short Term Controls: Minimize Dry Weather Flooding



- Low tide – no flooding expected
- 5-year Return Period
- Flooding occurs at King Tides, rain or shine

Figure B-7. Bridge Street Outfall Tide Gates – King Tide

Comparison between existing conditions and outfall tide gates for the 10/27/2011 King Tide of 5.9 ft (MLLW), no rain

# Tide Gate Selection



## Flap Gate

- Prone to debris and marine growth preventing the flap from seating properly
- Difficult to maintain at submerged outfall
- Higher headloss than alternative
- Prone to corrosion in marine environment

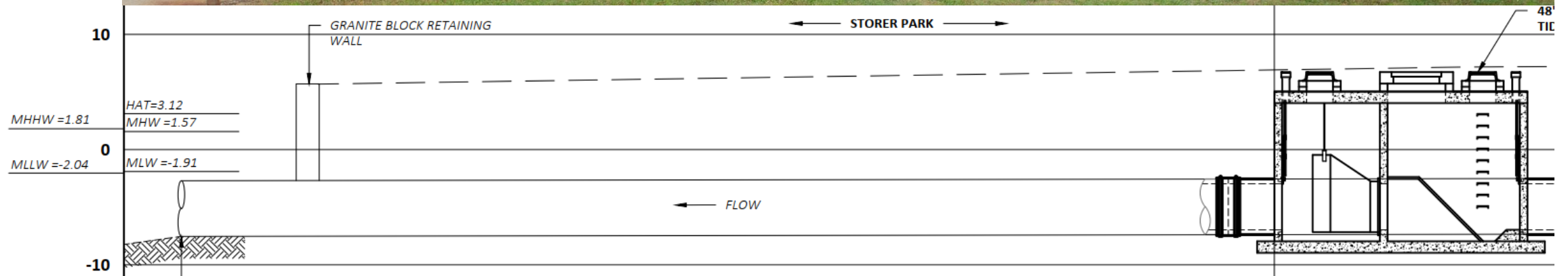


## Tideflex Duck Bill Type Check Valve

- Less prone to debris and marine growth problems
- Check valve allows the valve to compress around trapped debris
- Low headloss compared to traditional gates
- Not affected by rust or corrosion

# Hydraulic Analysis

Wright-Pierce developed a model to analyze selected tidegate





# Hydraulic Analysis



## Model Results

- **Dry weather flooding eliminated for all tide levels**
- **Mean Low Water, system has capacity for 5-year design storm**
- **Mean Water, system has capacity for 1-year design storm**
- **Mean High Water, some flooding may occur**

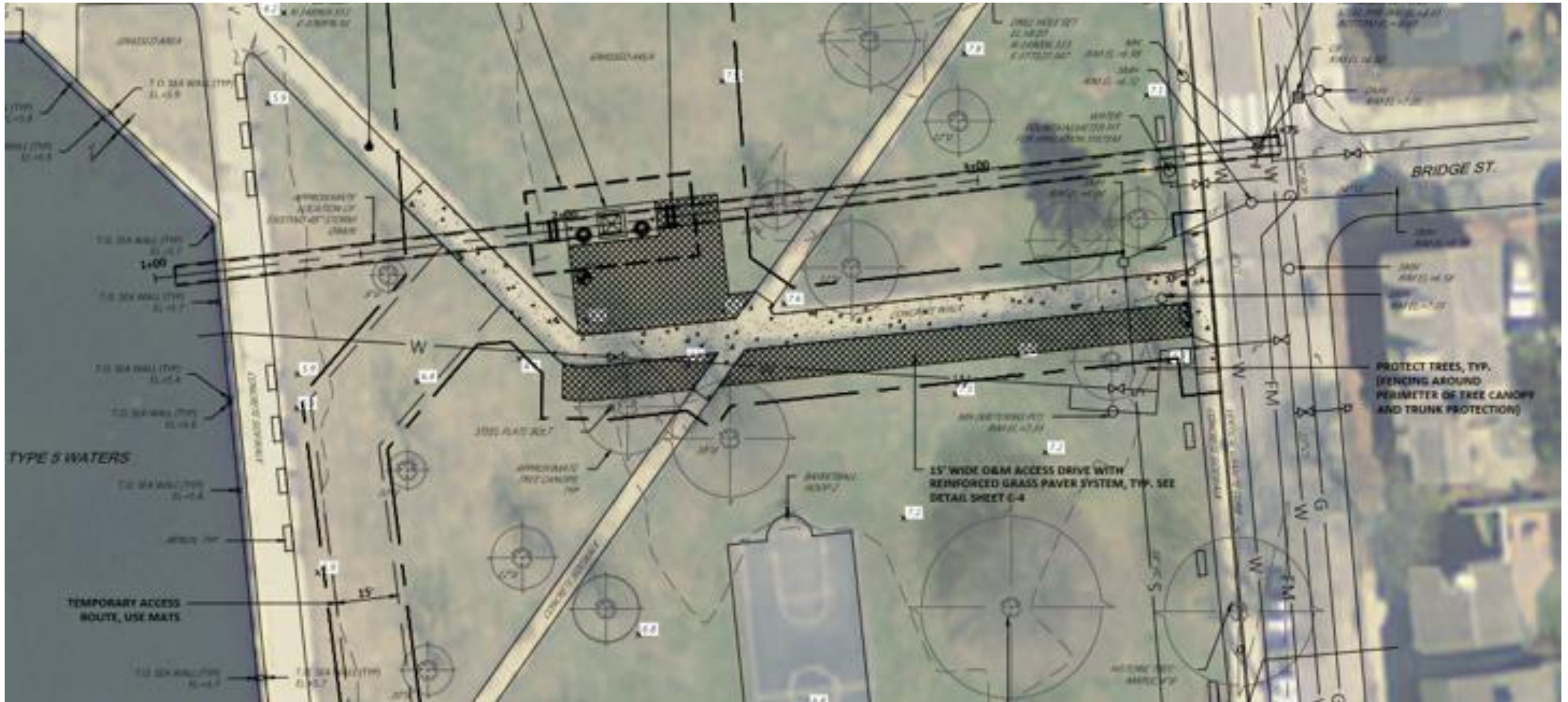


# Project Location: Storer Park



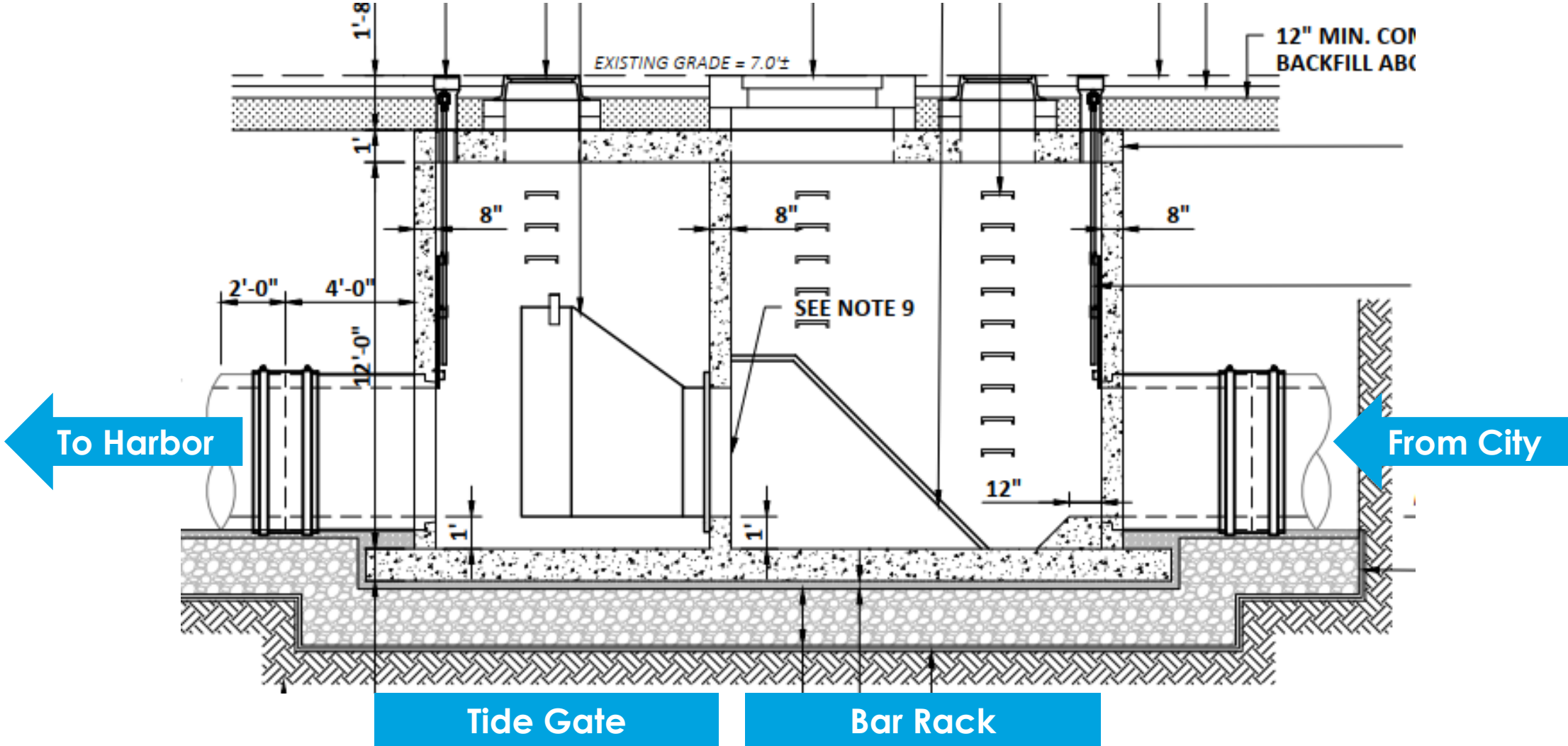


# Site Design



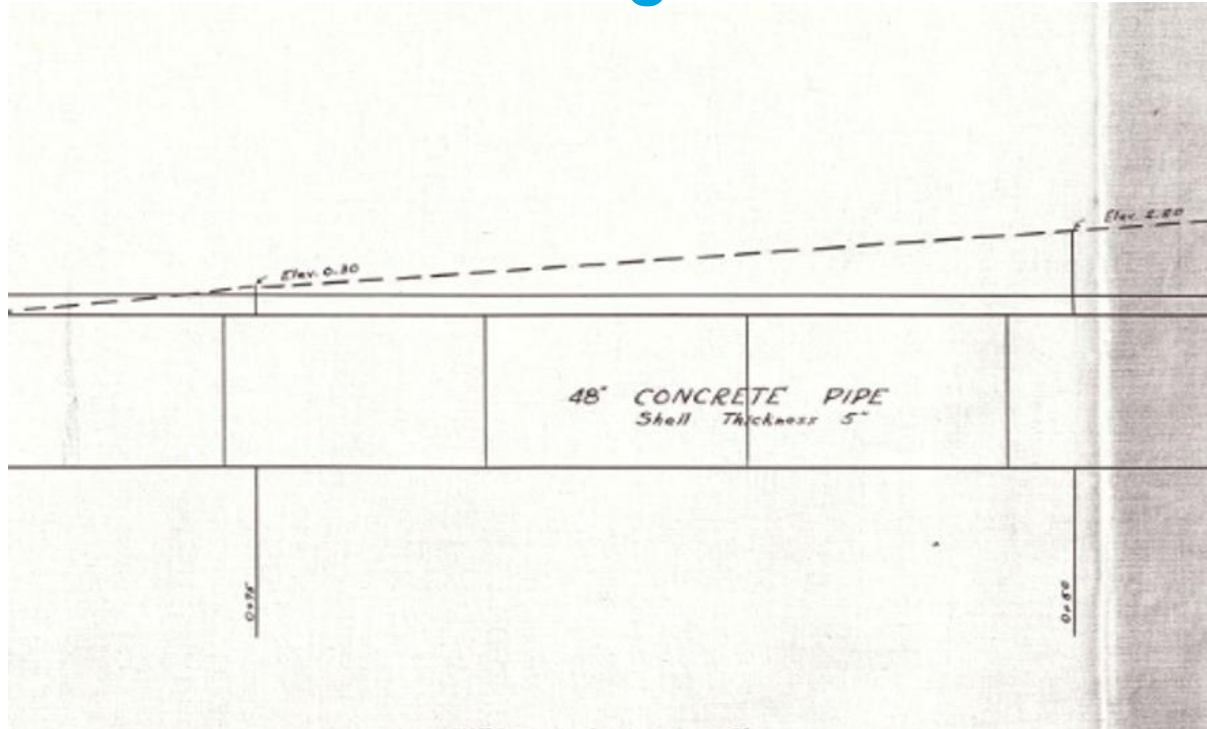


# Design



# Construction: Excavation & Dewatering

## 1932 Record Drawing





# Construction: Excavation & Dewatering





# Construction: Setting the Vault



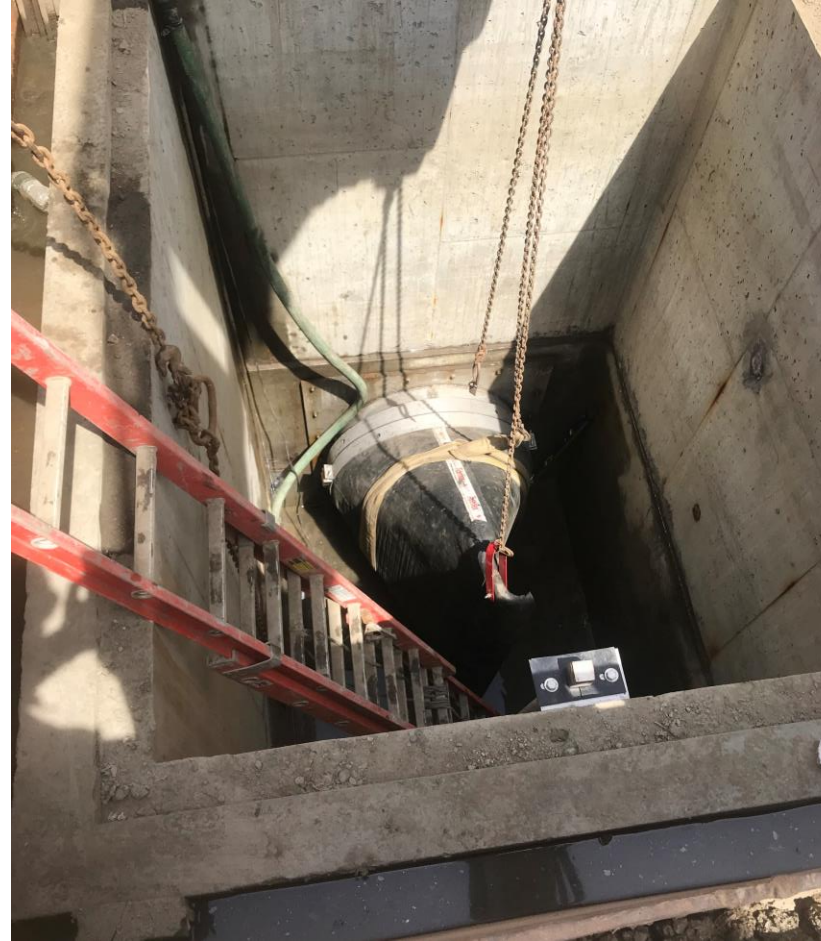


# Construction: Connecting the 48" Drain



- Spool pieces were installed and parged and the top section was set

# Construction: Slide Gates, Tide Gates & Bar Rack



- Slide Gates were installed toward end of very long day
- Once the gates were in place, the plugs were removed, and gates closed
- The vault had to be dewatered, again then the “Duckbill” was installed on a thimble



# Construction: Testing the Duckbill



Downstream Side



Upstream Side



# Construction: Site Restoration





# Construction: Site Restoration



- The remainder of the site was hydroseeded
- Only evidence of the vault is the stainless-steel hatch cover set at grade



# Conclusion & Lessons Learned

## Narragansett Bay & Watershed Restoration Bond Fund



- No reports of “King Tide” Sunshine Flooding since project completion, fall of 2019
- Minimized impact to park
- Maintenance access
- Added water quality measures to design to meet funding requirements
- Project cost: \$781,35000
- Grant allocation: \$425,000





## CONTACT INFORMATION

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# THANK YOU

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# Design





# Conclusion

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- No reports of “King Tide” Sunshine Flooding has occurred since completion of installation in the fall of 2019
- Contract duration was 3 months of vault construction from May 2019 to July 2019
- Project completed in October 2019 when site restoration was completed
- Re-inspection in June 2020 revealed an accumulation of organic debris on bar screen, and algae growth and sea life in the tide gate chamber

**Contractor – D’Alessandro Corp., Avon, MA**

**Project cost – \$781,35000**

**Grant Allocation – \$425,000**