



# Waterfront Implementation Project

## Waterfront Commission Flood Mitigation Subcommittee – Work session

January 6, 2022

Terry Suehr, PE, DBIA, PMP

Department of Project Implementation, Director

Matthew Landes, PLA, CCM, ISA

Department of Project Implementation, Division Chief / Waterfront Program Manager



# Agenda

- Quick recap of alternatives previously presented
- Modeling results of Cost Option 2
- Funding opportunities
- Request for input on prioritization of project elements if or when additional funding becomes available
- Discussion/Feedback
- Next steps

# Feedback Requested

- Prioritization for any potential additional funding:
- Position(s) on resiliency approach (underground storage):
  - Waterfront Park
  - Founders Park
- Subcommittee Recommendations – action items
- Next steps for broader Waterfront Commission
  - Next meeting January 18, 2022

# Recap Project Alternatives

# // Cost Based Option – 1- \$100m Budget

Mitigates Rainfall Flooding;

**Deferred River flooding, Shoreline, and most Park Improvements**

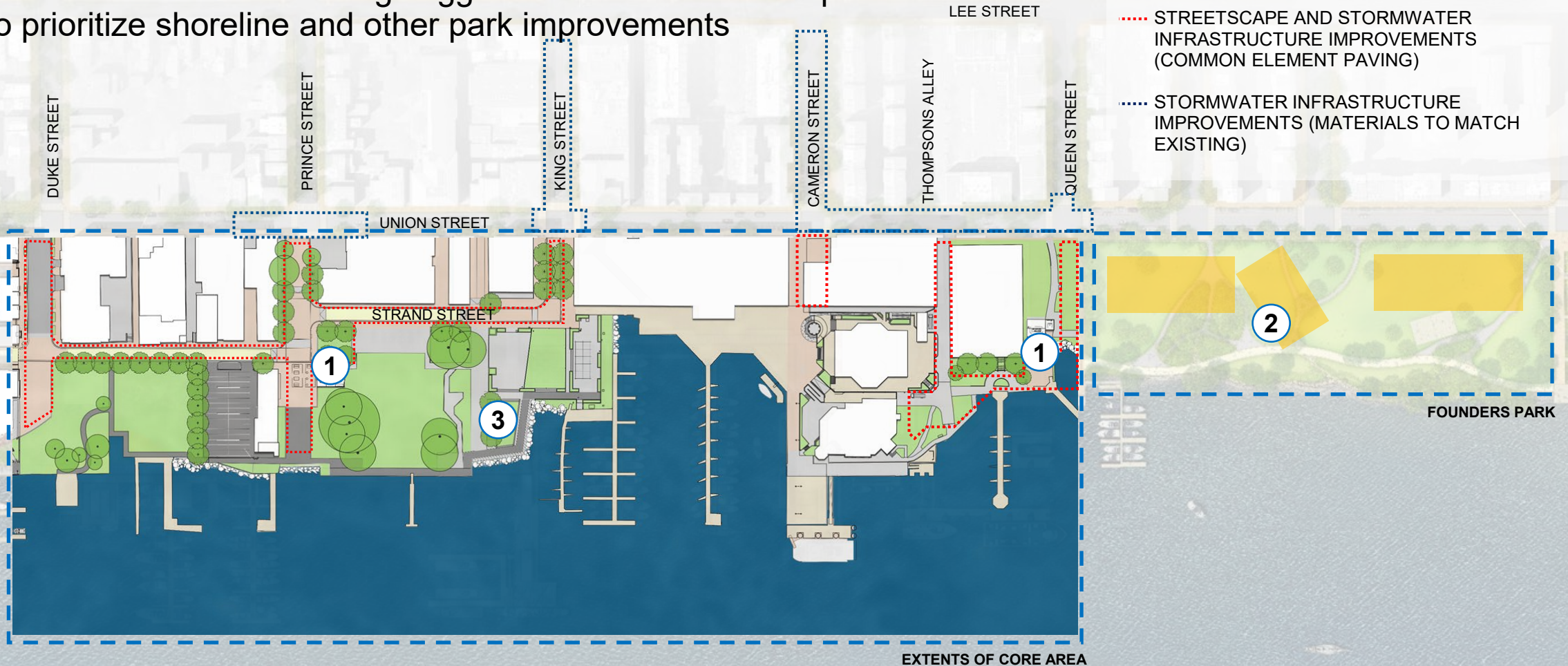
Feedback from last meeting suggested to defer Street Improvements to prioritize shoreline and other park improvements

## LEGEND

- 1 PUMP STATION
- 2 UNDERGROUND STORMWATER DETENTION CHAMBERS
- 3 RETAIN WATERFRONT PARK AT KING STREET

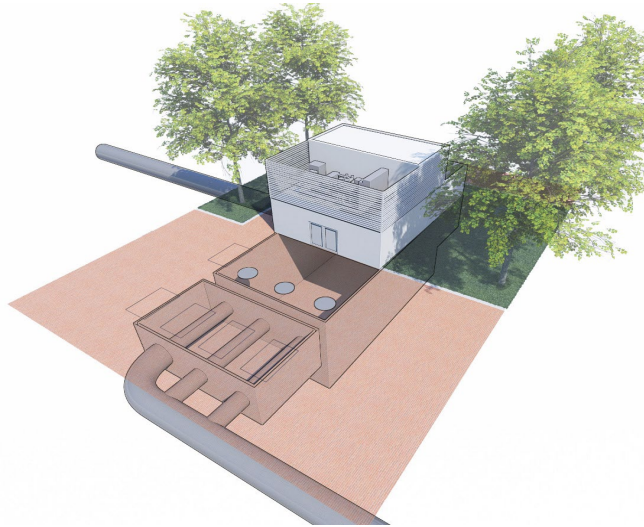
..... STREETScape AND STORMWATER INFRASTRUCTURE IMPROVEMENTS (COMMON ELEMENT PAVING)

..... STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)





# // Project Elements



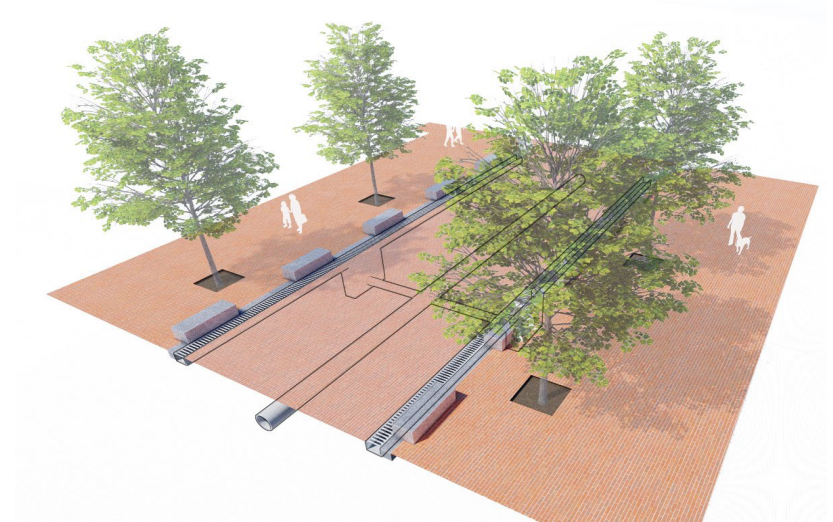
## PUMP STATIONS

- Utilitarian structure housing stormwater pumps and associated mechanical and electrical equipment
- No city storage or amenity space
- Thompsons Alley PS capacity reduced by 95%



## UNDERGROUND DETENTION

Stormwater storage chambers sited under existing parkspaces



## STREETSCAPE AND STORMWATER INFRASTRUCTURE IMPROVEMENTS

- New and upsized stormwater inlets and conveyance pipes
- Common elements paving proposed for streets within the core area only. All others to match existing materials



# // Cost Based Option – 1 – (as funds available)

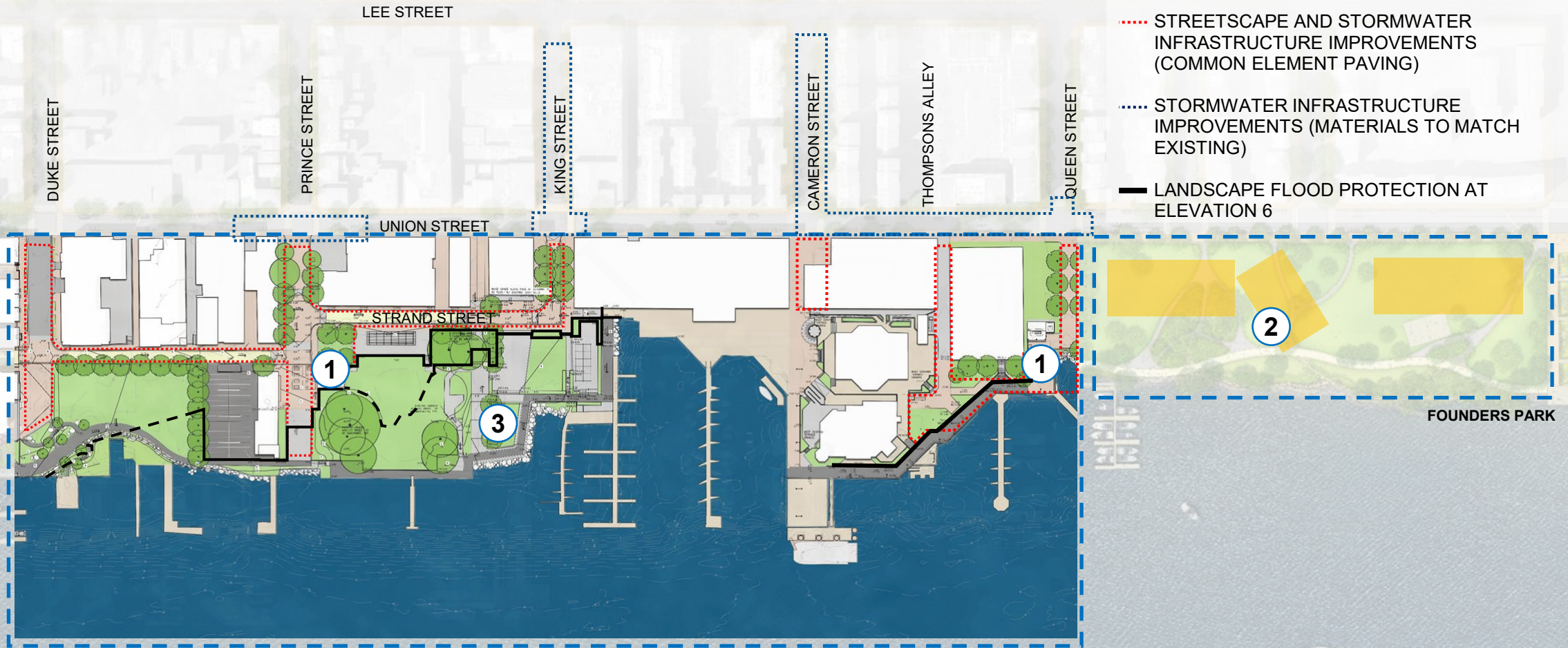
## Add-On A: Landscape Based Flood Protection (Strand)

Positive reception to alternative shoreline at Point Lumley

### LEGEND

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- ..... STREETScape AND STORMWATER INFRASTRUCTURE IMPROVEMENTS (COMMON ELEMENT PAVING)
- ..... STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)
- LANDSCAPE FLOOD PROTECTION AT ELEVATION 6



EXTENTS OF CORE AREA



# // Cost Based Option - 1 – (as funds available)

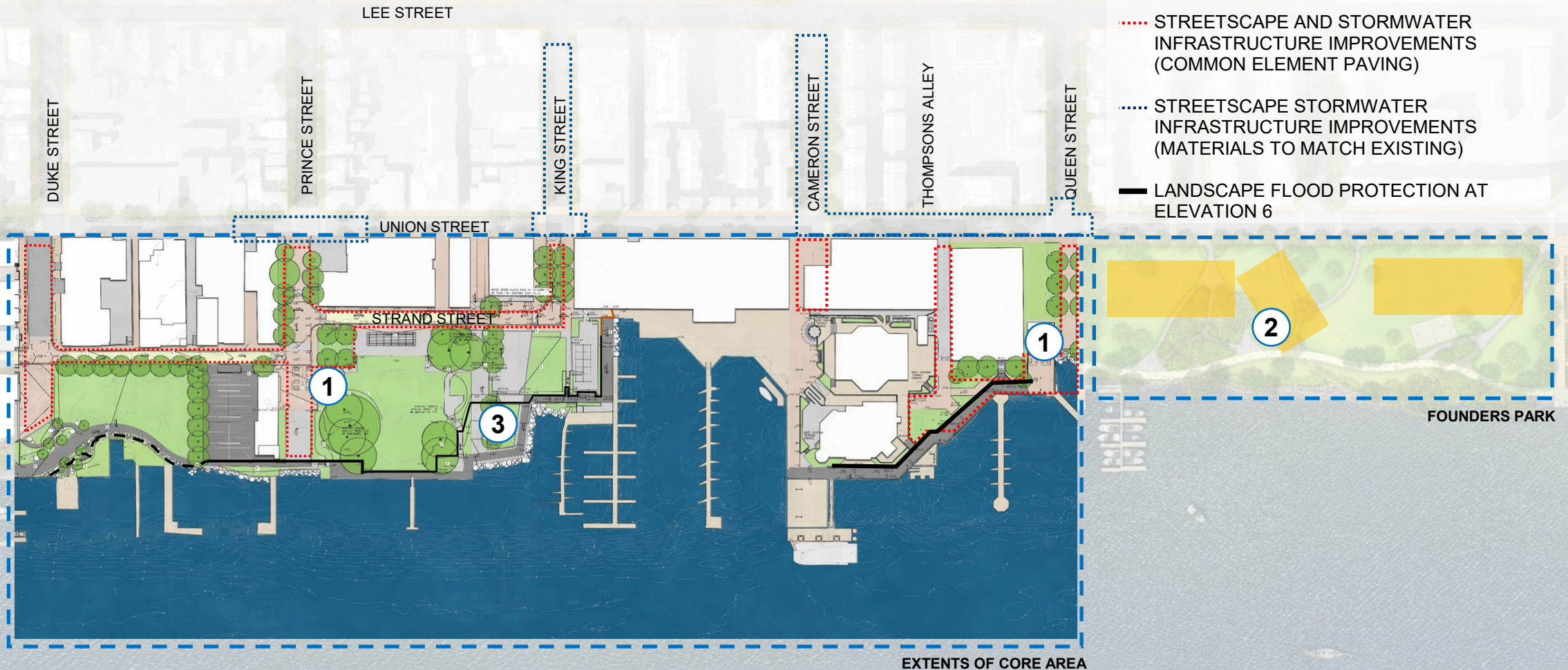
## Add-On B: Landscape Based Flood Protection (River)

LANDSCAPE ELEMENTS PROVIDE 6' ELEVATION FLOOD PROTECTION

### LEGEND

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- ..... STREETScape AND STORMWATER INFRASTRUCTURE IMPROVEMENTS (COMMON ELEMENT PAVING)
- ..... STREETScape STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)
- LANDSCAPE FLOOD PROTECTION AT ELEVATION 6



**Positive reception of promenade alignment and alternative shoreline protection at Point Lumley**



# // Cost Based Option – 2

Prioritizes Southern Project Area Improvements;  
Defers Majority of Cameron to Queen Improvements

**Does not achieve stormwater management/flood mitigation as desired**



## LEGEND

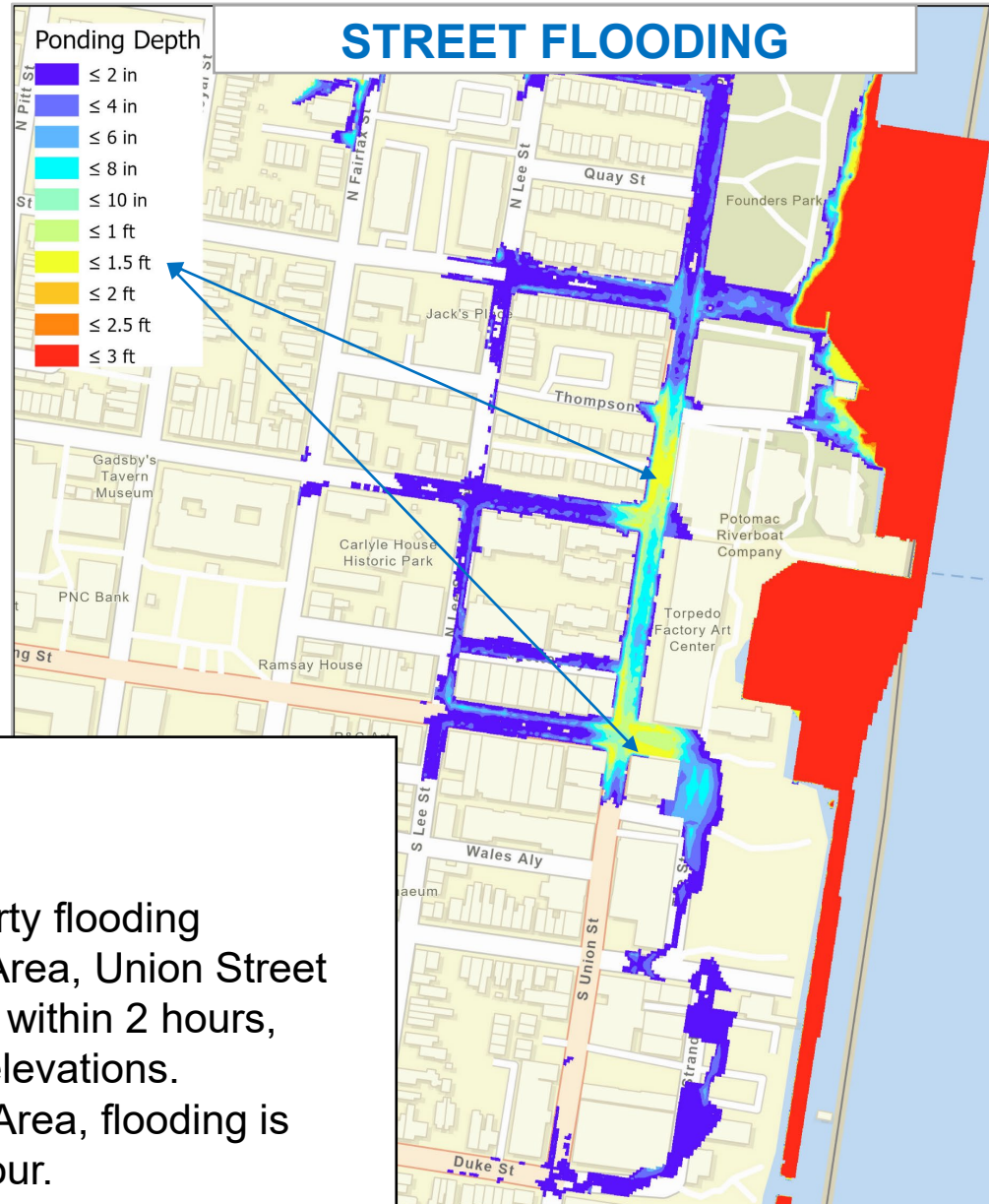
- 1 PUMP STATION
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- ..... STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)
- FLOOD PROTECTION AT ELEVATION 6 WITH PROMENADE
- ★ DEPLOYABLE FLOOD BARRIER

EXTENTS OF CORE AREA

# Challenges with Cost Based Option 2



# Design Storm Resultant Flooding with Southern Improvements Only



## Key Results

- Roadway and property flooding
- In Northern Project Area, Union Street flooding is managed within 2 hours, depending on river elevations.
- In Southern Project Area, flooding is managed within 1 hour.



# King and Union: *Maximum Ponding Depth*



## Legend

July 2018 Storm\*   
*Flooding recedes in < 2 hours*

Design Storm   
*Flooding recedes in < 4 hours*

1-L Soda Bottle is  
1-foot tall

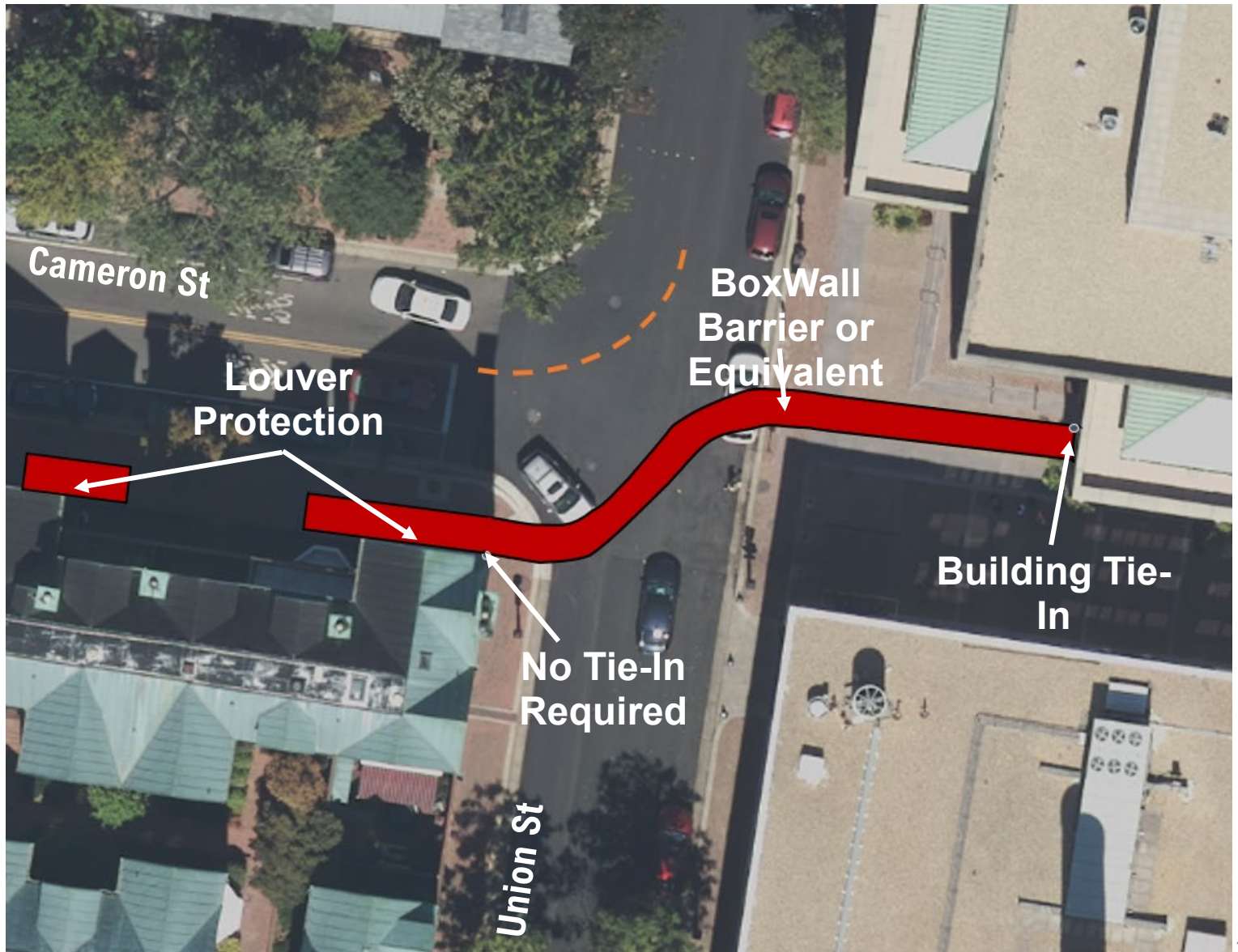




# Union/Cameron St Deployable Barrier

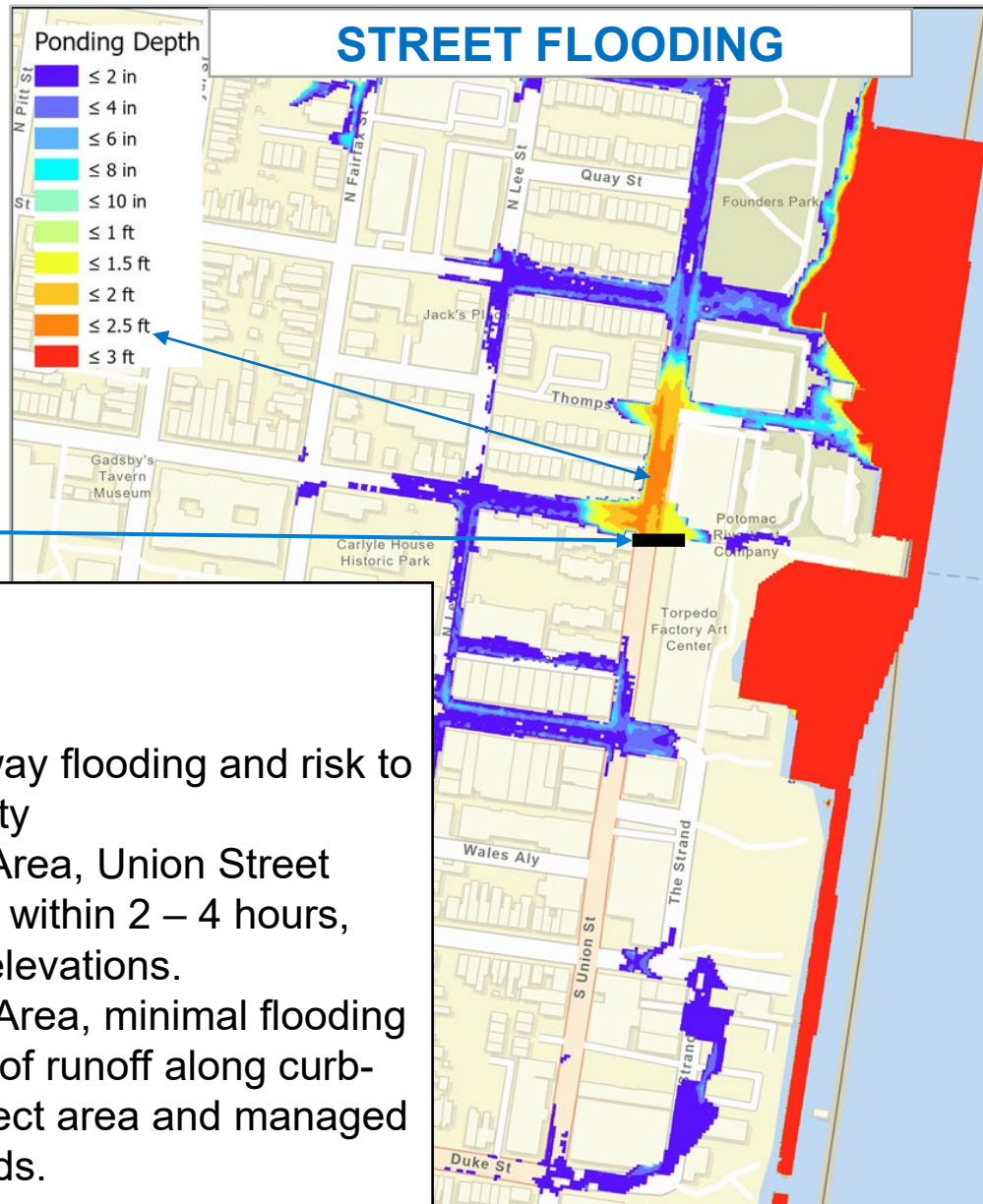
Intended to prevent “spillover” to King/Union and Strand St

- Vertical protection is 39"
- Footing extends 5' from wall base
- Preserve emergency vehicle access to Marina; block pedestrian access to Marina from Cameron St





# Design Storm Resultant Flooding with Cameron / Union Deployable



## Key Results

- Unacceptable roadway flooding and risk to personal/real property
- In Northern Project Area, Union Street flooding is managed within 2 – 4 hours, depending on river elevations.
- In Southern Project Area, minimal flooding impact with up to 4" of runoff along curb-line in southern project area and managed < 1hr after storm ends.



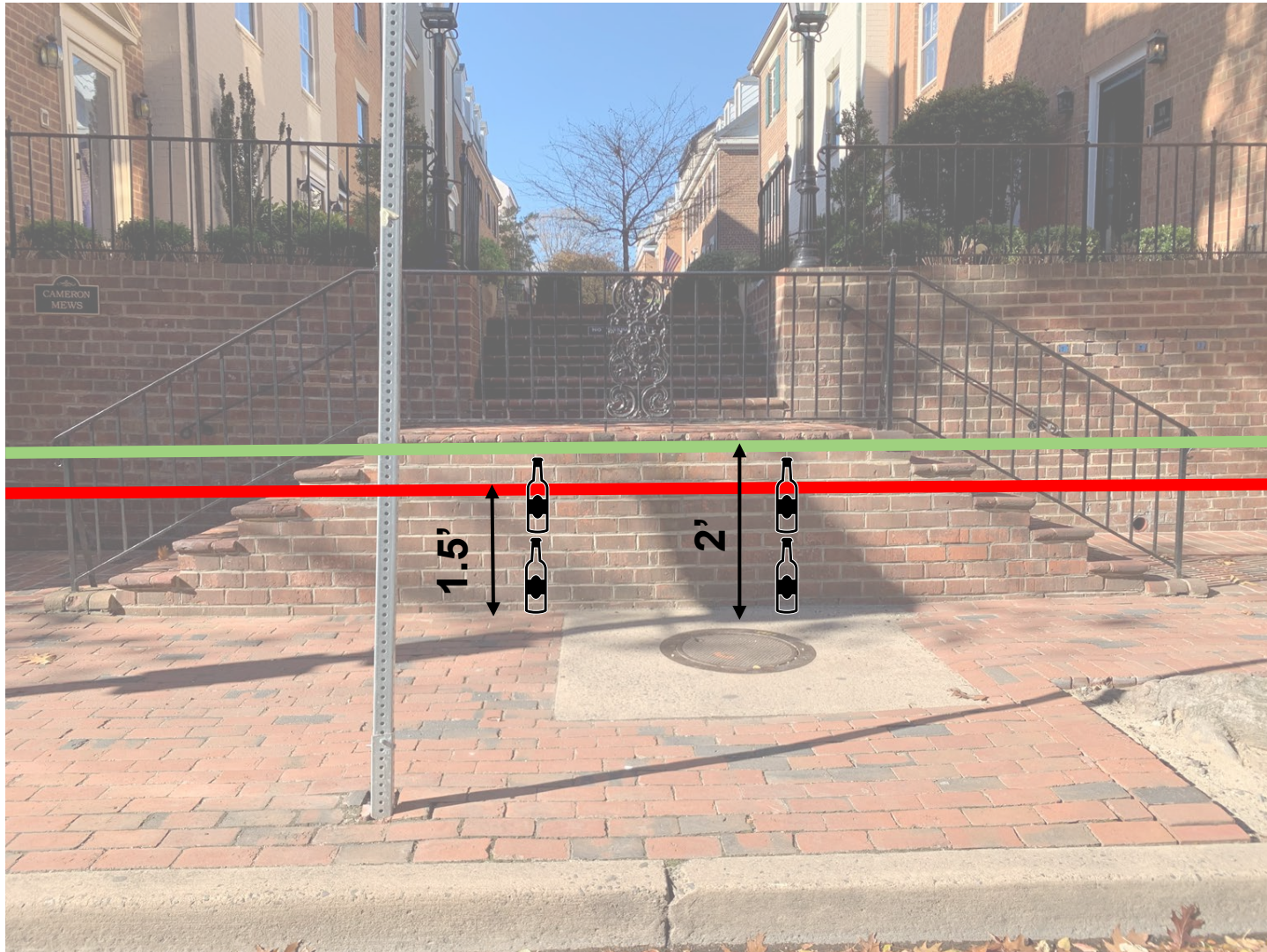
# Union Street Facing North: *Maximum Ponding Depth*

Legend	
Design Storm	<span style="display: inline-block; width: 20px; height: 10px; background-color: #90EE90; border: 1px solid black;"></span>
July 2018 Storm	<span style="display: inline-block; width: 20px; height: 10px; background-color: #FF0000; border: 1px solid black;"></span>





# Cameron Mews Residences: *Maximum Ponding Depth*



## Legend

July 2018 Storm\*   
Flooding recedes in < 2 hours

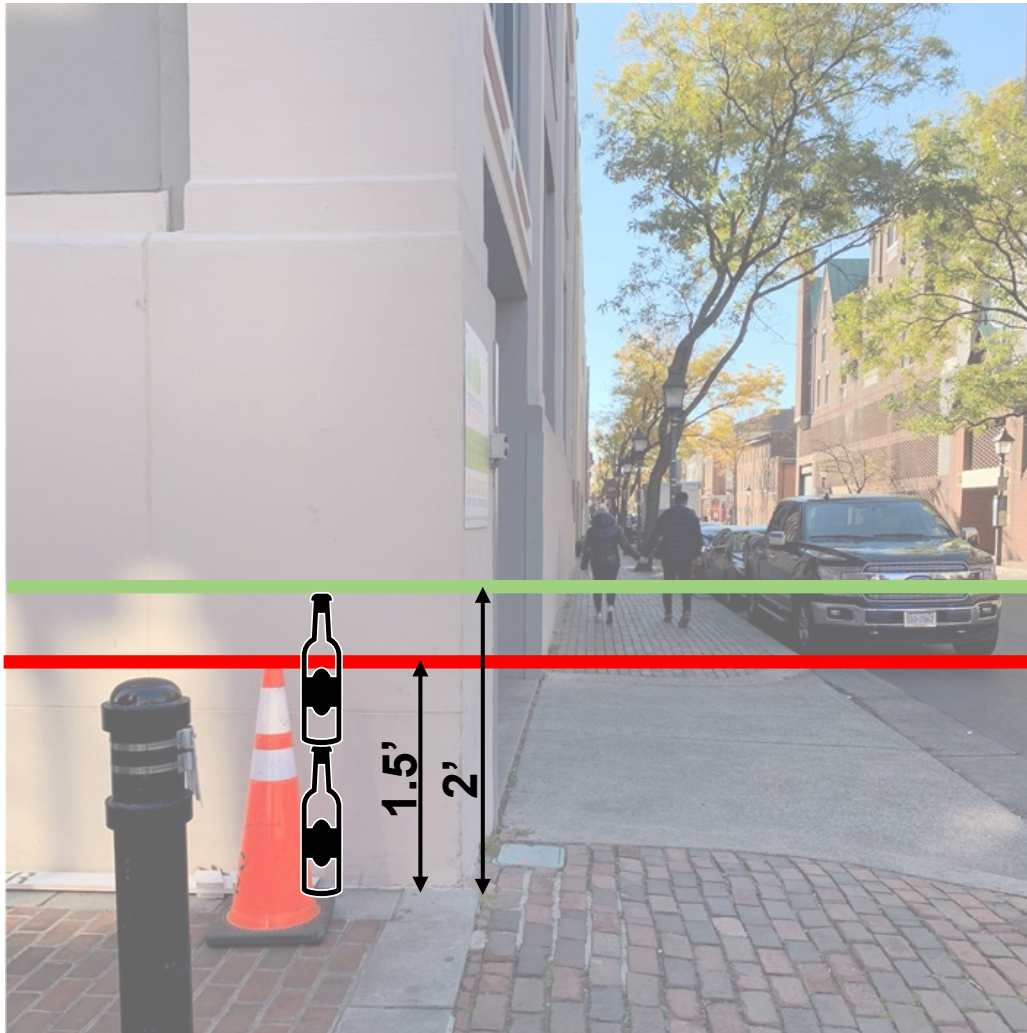
Design Storm   
Flooding recedes in < 4 hours

1-L Soda Bottle is  
1-foot tall





# Torpedo Factory Loading Dock: *Maximum Ponding Depth*



## Legend

July 2018 Storm\*   
*Flooding recedes in < 2 hours*

Design Storm   
*Flooding recedes in < 4 hours*

1-L Soda Bottle is   
1-foot tall

# Funding Opportunities



# CIP Funding

- **\$102M approved through FY24**
  - For design and construction of Phase 1
- **FY23 CIP budget for FY25-FY31 under development**
  - For subsequent phases of implementation
  - Could include additional resiliency improvements to Phase1 project area, if deferred
  - **February 15, 2022 - Budget presented to Council**
  - **May 4, 2022 – Budget adopted**

# External Funding Opportunities

- **Virginia Community Flood Preparedness Fund (DCR)**
  - Fund established to provide support for regions/localities to reduce impacts of flooding
  - **\$3.24 million awarded December 27, 2021!**
- **Building Resilient Infrastructure and Communities (BRIC) Grant (FEMA)**
  - Hazard mitigation program for projects that build resilient communities and reduce risks from hazards.
  - **Grant application submitted for \$50 Million**
  - **Award notification is expected July 2022**
- **USACE Coastal Storm Risk Management Feasibility Study**
  - USACE/MWCOG Study which could lead to Federal cost-share dollars
  - **Potential for 65% Federal – 35% Local funding cost share –**
  - **USACE contracts design and construction**
  - **May demonstrate eligibility for other small USACE funding opportunities - TBD**
- **Rosenbaum Family Bequest**



# Project Element Prioritization

# Scoping to Budget

<b>ITEMS ESTIMATED TO BE WITHIN BUDGET:</b>	<b>\$</b>		<b>ITEMS ESTIMATED TO BE WITHIN BUDGET:</b>	<b>\$</b>
UTILITIES - PUMP STATION #1	\$\$\$\$\$		UTILITIES - PUMP STATION #1	\$\$\$\$
UTILITIES - PUMP STATION #2	\$\$\$\$\$		UTILITIES - PUMP STATION #2	\$\$\$\$
UTILITIES - STORM SEWER	\$\$\$\$		UTILITIES - STORM SEWER	\$\$\$
UTILITIES - DRY	\$\$\$		UTILITIES - DRY	\$\$\$
UTILITIES - WET	\$\$		UTILITIES - WET	\$\$
RESTORATION OF PARKS	\$\$\$		RESTORATION OF PARKS	\$\$\$
RESTORATION OF ROW	\$\$		RESTORATION OF ROW	\$\$
			STRUCTURAL BULKHEAD	\$\$\$
			PROMENADE	\$\$
			KING STREET SQUARE IMPROVEMENTS	\$\$\$
TOTAL DIRECT COSTS	\$\$\$\$\$\$\$			
<b>PRIORITIZED ITEMS NOT CURRENTLY WITHIN BUDGET:</b>	<b>\$</b>			
STRUCTURAL BULKHEAD	\$\$\$\$\$		TOTAL DIRECT COSTS	\$\$\$\$\$\$\$
PROMENADE	\$\$\$			
KING STREET SQUARE IMPROVEMENTS	\$\$\$		<b>PRIORITIZED ITEMS NOT CURRENTLY WITHIN BUDGET:</b>	<b>\$</b>
WATERFRONT PARK IMPROVEMENTS	\$\$		WATERFRONT PARK IMPROVEMENTS	\$\$
MARINA IMPROVEMENTS	\$\$\$		MARINA IMPROVEMENTS	\$\$\$
POINT LUMLEY IMPROVEMENTS	\$\$		POINT LUMLEY IMPROVEMENTS	\$\$
KING STREET PIER	\$\$\$		KING STREET PIER	\$\$\$
ADDITIONAL PIERS	\$\$\$		ADDITIONAL PIERS	\$\$\$
TOTAL ADDITIONAL COST	\$\$\$\$\$\$\$		TOTAL ADDITIONAL COST	\$\$\$\$\$\$\$



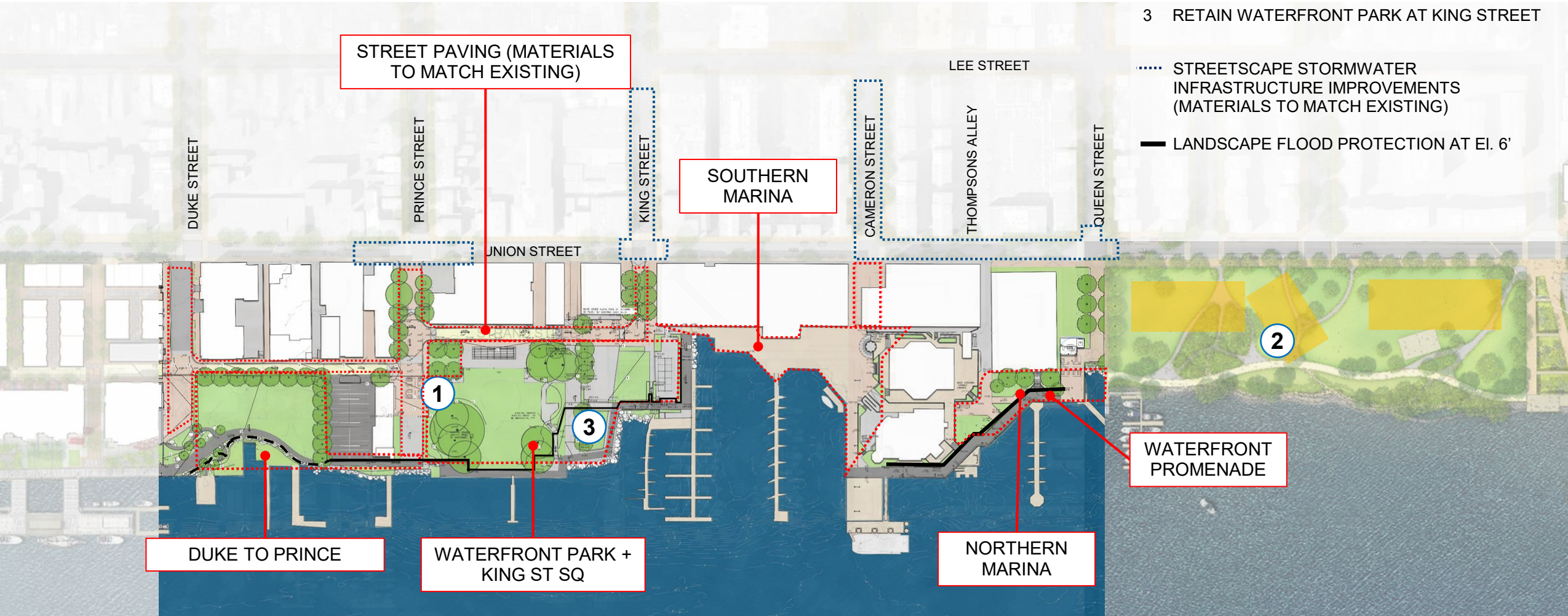
If additional CIP/external funding becomes available or if through Design-Builder innovation, value engineering, cost reduction more scope could be delivered (or cost savings could be realized by taxpayers)



# // Project areas for Prioritization

## LEGEND

- 1 PUMP STATION
- 2 UNDERGROUND STORMWATER DETENTION CHAMBERS
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- ..... STREETScape STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)
- LANDSCAPE FLOOD PROTECTION AT EL. 6'

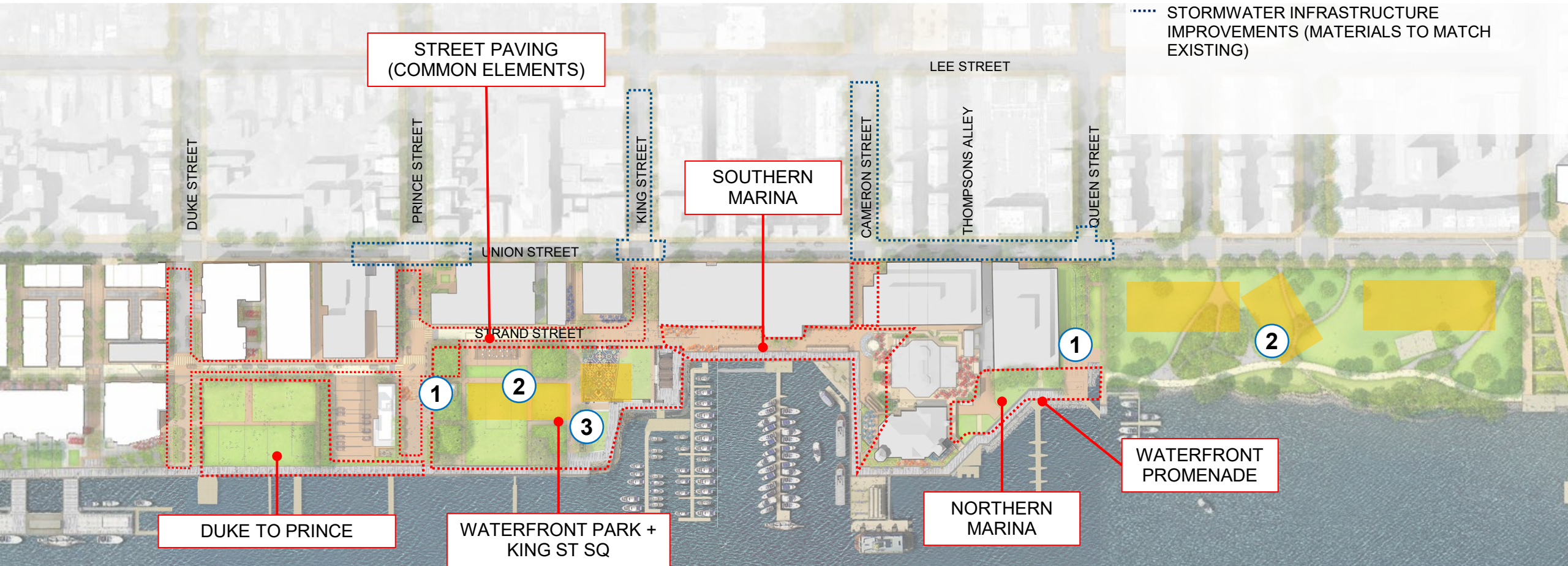




# // Project areas for Prioritization

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# Phase 1 Cost Breakdown

Community Priorities	Estimated Total Cost	Project Elements
Flood Mitigation <ul style="list-style-type: none"> <li>Storm Sewer Upgrades</li> <li>Pump Stations</li> <li>Riverine Protection</li> </ul>	\$20M <b>\$55M</b> \$18M	<ul style="list-style-type: none"> <li>Interim tide gate at King and Prince Street</li> <li>New and upsized inlets and stormwater piping</li> <li>Two stormwater pumping stations</li> <li><b>Underground stormwater detention chambers</b></li> <li>New bulkhead from Duke to Prince; ha-ha wall in Waterfront Park + King St Square and Cameron to Queen St; no upgrades to Torpedo Factory</li> </ul>
Riverfront Promenade	\$2M	<ul style="list-style-type: none"> <li>10-20ft wide <b>promenade from Duke to Queen St with a lower-cost finished material (asphalt, or crushed stone)</b></li> </ul>
Plaza at the foot of King Street	\$2M	<ul style="list-style-type: none"> <li>Material upgrades to make permanent park</li> <li>Actual improvements worth ~\$600K</li> </ul>
Park Improvements	<\$1M \$2M	<ul style="list-style-type: none"> <li>Restore all streets with asphalt pavement</li> <li>Waterfront Park and Founders Park restoration</li> </ul>
<b>Total Estimated Project Cost</b>	<b>\$100M</b>	<b>AACE Cost 4 - Low: \$80M - High: \$120M</b>

Notes:

- Subsurface conditions under parks are unknown and ongoing field investigations will inform the Class 3 Cost Estimate at the next iteration.
- Evaluation, review, and cost estimating for the riverine protection option is contingent upon ongoing field investigations.

# // Phase 1

## Hybrid Bulkhead & Landscape Based Flood Protection

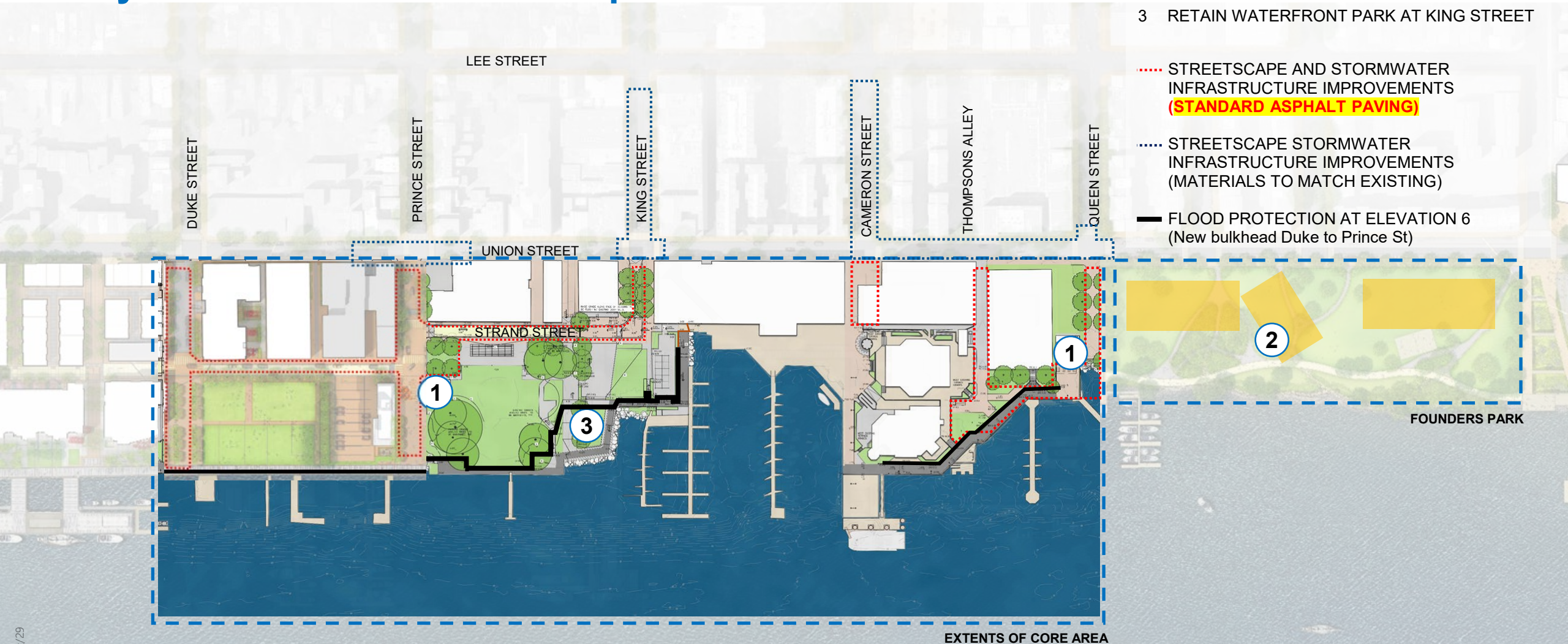
### LEGEND

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- 2 UNDERGROUND STORMWATER DETENTION CHAMBERS
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..... STREETScape AND STORMWATER INFRASTRUCTURE IMPROVEMENTS (STANDARD ASPHALT PAVING)

..... STREETScape STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)

— FLOOD PROTECTION AT ELEVATION 6 (New bulkhead Duke to Prince St)



EXTENTS OF CORE AREA



# Request input on prioritization of project elements (if or when additional funding becomes available)

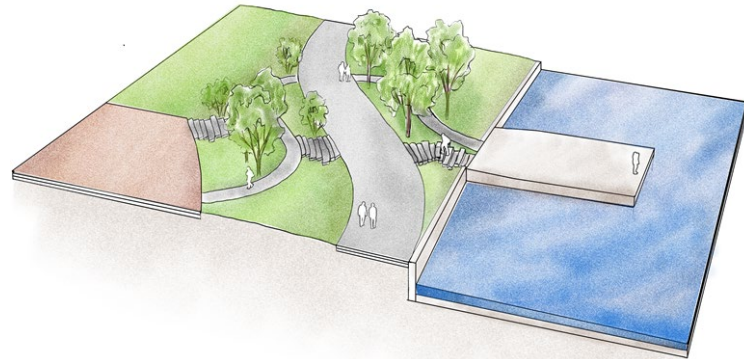
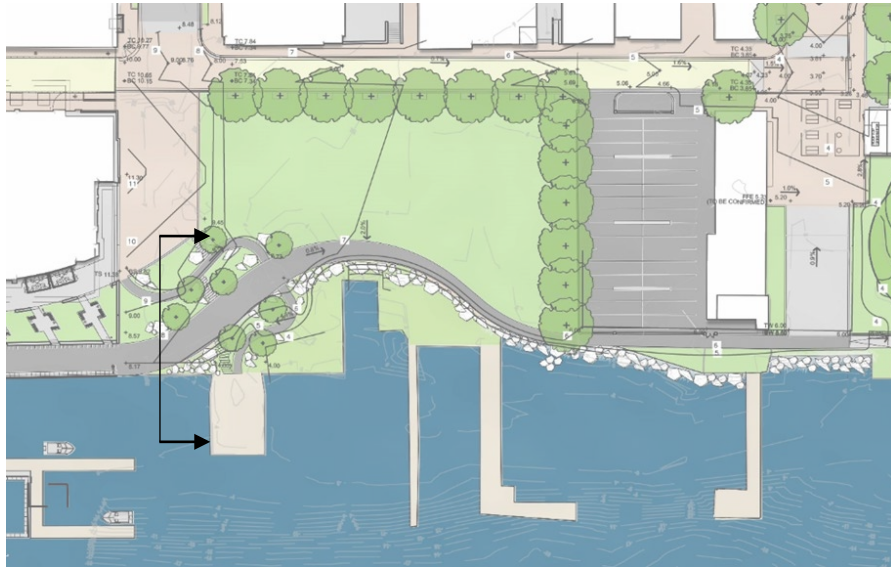
Priority	Area	Elements	Total Estimated Cost
	King St Sq + Waterfront Park	<ul style="list-style-type: none"> <li>• <b>Restore</b> King St Sq and Waterfront Park</li> <li>• Promenade (alt. material)</li> <li>• Ha-Ha Wall + SS</li> </ul>	\$6M
		<ul style="list-style-type: none"> <li>• <b>Improve</b> King St Sq</li> <li>• <b>Improve</b> Waterfront Park</li> <li>• Promenade</li> <li>• Ha-Ha Wall + SS</li> </ul>	\$17M
	Duke to Prince St	<ul style="list-style-type: none"> <li>• Improve Point Lumley</li> <li>• Promenade (<b>adjusted/inland, alt. material</b>)</li> <li>• <b>Ha-Ha Wall + SS</b></li> </ul>	\$7M
		<ul style="list-style-type: none"> <li>• Improve Point Lumley</li> <li>• Promenade (<b>alignment per Baseline</b>)</li> <li>• <b>New Bulkhead</b></li> </ul>	\$28M
	Northern Marina	<ul style="list-style-type: none"> <li>• Promenade</li> <li>• Ha- Ha Wall (no new bulkhead)</li> <li>• Thompsons Alley Park</li> </ul>	\$5M
	Southern Marina (Torpedo Factory Frontage)	<ul style="list-style-type: none"> <li>• Improve Torpedo Factory</li> <li>• Promenade</li> <li>• New Bulkhead</li> </ul>	\$20M
	Strand St + Street Ends	<ul style="list-style-type: none"> <li>• Street Pavers per Common Elements</li> </ul>	\$18M
	Waterfront	Promenade Paving per Common Elements	
		- King Street Sq + Waterfront Park	\$4M
		- Duke to Prince St	\$3M
		- Northern Marina	\$3M
		- Southern Marina	\$3M

**Notes:**

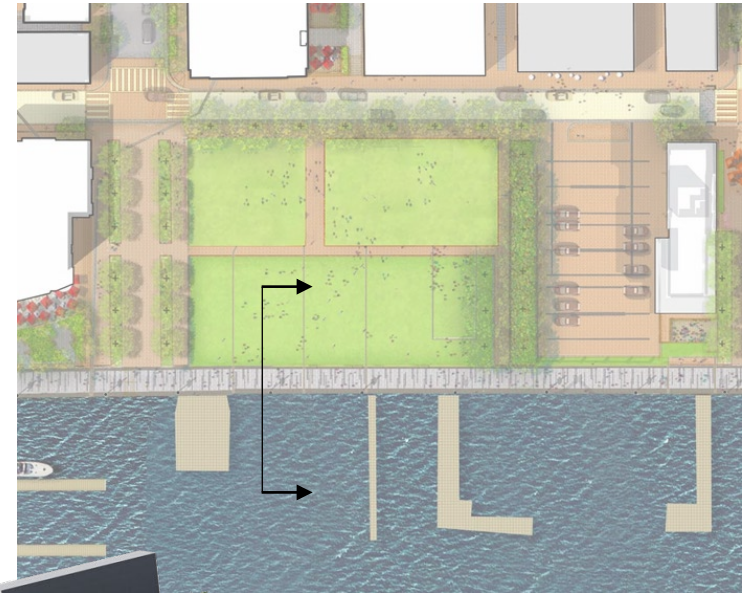
1. Evaluation, review, and cost estimating for two riverine protection options are contingent upon ongoing field investigations.
2. King St Square Improvements are per the Baseline Project except for a splash pad.
3. All costs assume that existing King St Sq shoreline is maintained and stabilized.

# Duke to Prince Strategies – Point Lumley

LANDSCAPE  
\$7M



BULKHEAD  
\$28M

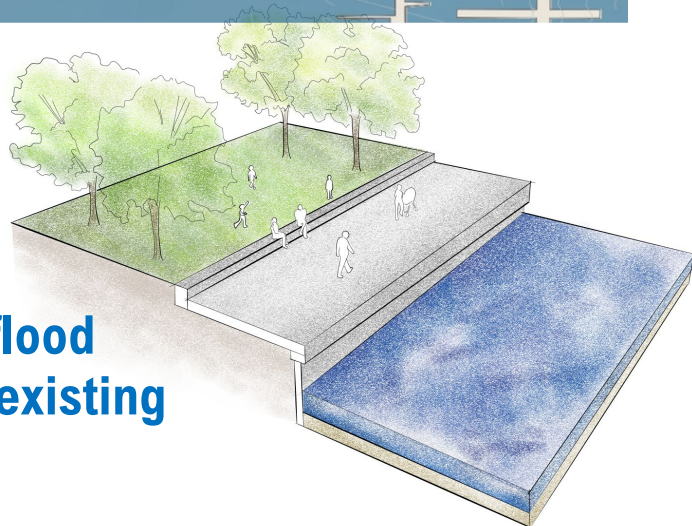
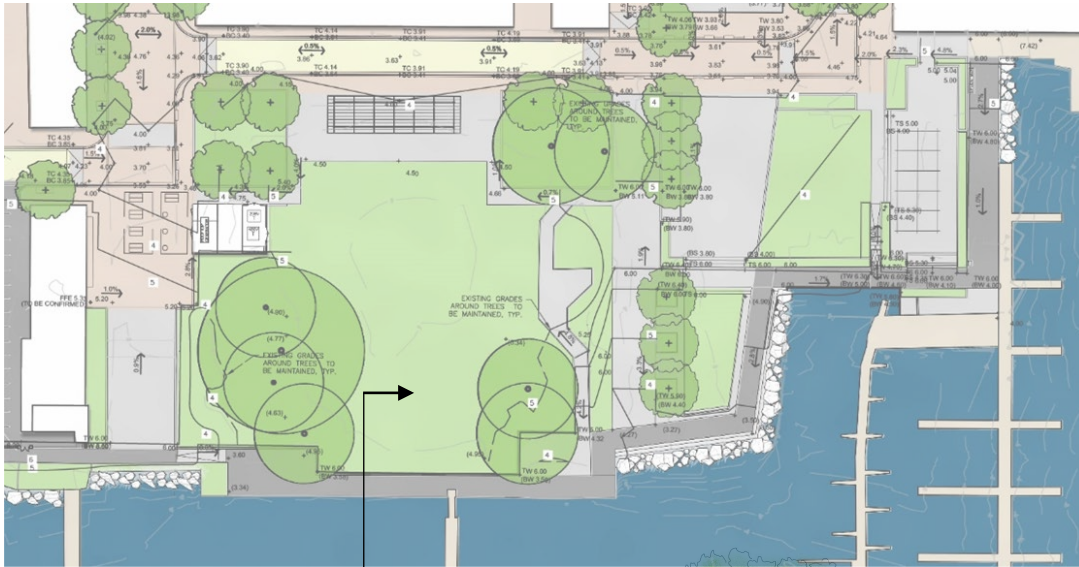


- Included but not shown:**
- Hardscape + landscape allowances
  - Baseline Plan furnishings



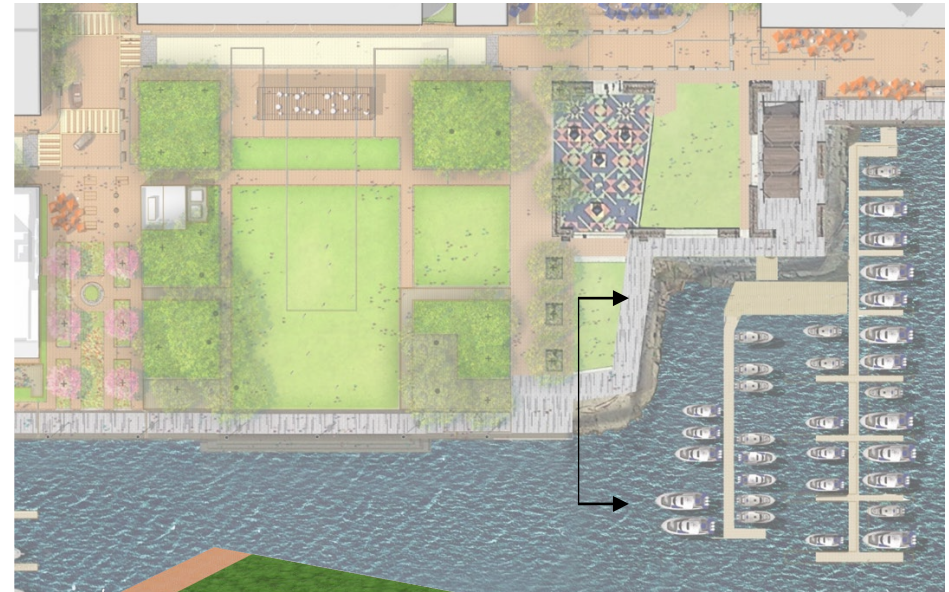
# Prince to King - Waterfront Park & King St Square Strategies

**RESTORE**  
**\$6M**



**Landscape-based flood protection (re-use existing bulkhead)**

**IMPROVE**  
**\$17M**



**Included but not shown:**  
- Hardscape + landscape allowances  
- Baseline Plan furnishings

RIP RAP STABILIZATION OF PROMENADE EDGE

# Resiliency and Green Building Approach

Based on some concerns by community about impacts to the park, requesting feedback on underground storage approach to meeting intent and requirements of the Green Building Policy and goals for resiliency.

Grouping Options in Budget	Total Estimated Cost	Benefits
Baseline	\$40M	<ul style="list-style-type: none"><li>• Only grey infrastructure</li><li>• No water quality benefits</li></ul>
Added Sustainability/ Resiliency	\$55M	<ul style="list-style-type: none"><li>• Grey + greener solutions</li><li>• Water quality benefits</li></ul>

- Considering a more resilient approach means to consider water management differently to **prioritize delay and store strategies. Also provides water quality compliance on site.**
- The difference in cost is not significant when considering the level of cost estimating at a -15% to +25% accuracy as well as conservatism exercised in the \$55M estimated based on subsurface unknowns.
- City recommends evaluation of cost-benefit and alternatives with Design-Build team
- Hybrid/resiliency option considered a critical element of grant competitiveness



# Increasing our stormwater storage capacity is an investment in more resilient infrastructure

- **Less reliance on pumping** at peak times with a more flexible operating schedule
  - Mechanical equipment and moving components always vulnerable for failure
  - Minimize potential failure mechanisms and number of failure points
- Pumping at lower rate for a longer duration **reduces peak energy demand**
- Stormwater chambers are **more sustainable and resilient measures for reducing risk and increasing reliability**
  - Founders Park stormwater chambers fill by gravity
  - Store the entire volume from design storm
  - Attenuate the peak flow - northern Pump Station (No. 2 in Thompsons Alley) is sized for dewatering (reduction in pump size and operating/replacement costs)

Note: Regardless of pump sizing, the stormwater pumping station will have similar noise abatement.

# Ongoing Investigations

- By mid-March, we will have more clarity on subsurface conditions and risk.
  - Geotechnical
  - Geo-archaeological
  - Environmental
- Environmental Ph. II
  - Sampling/testing: Nov. '21 – Jan. '22
  - Data Reporting: Feb '22



# // Stakeholder Engagement Plan

- In 2014, City Council endorsed the Waterfront Plan:
  - Set Budget (\$102M)
  - Set Priorities
- In first quarter 2022, we'd like to go back to City Council with Flood Mitigation Subcommittee and Waterfront Commission's endorsement on:
  - Priorities
    - Recognizing that we cannot achieve all priorities with current funding, have community priorities changed?
    - Request guidance on prioritization of project areas and project elements
    - Request letter of budget support, if so moved

## **Community priorities:**

1. Flood mitigation
2. Riverfront promenade
3. Plaza at the foot of King Street
4. Park improvements

# Next Steps

- **Field investigations**
  - Survey work completed
  - Geotechnical testing and structural analysis
  - Environmental Site Assess. Ph2 – Field work complete – labs due by Feb 2022
- **Focus on Project Prioritization**
  - Community feedback
  - Field investigation data reports and engineering design recommendations
- **City CIP Budget**
- **External funding opportunities**
  - FEMA – VDEM Building Resilient Infrastructure and Communities (BRIC) Program – Submitted on November 10<sup>th</sup>
  - DCR - Virginia Community Flood Preparedness Fund – Submitted on November 5<sup>th</sup>
- **Next Sub-Committee Meeting – TBD if needed/desired prior to**
- **Waterfront Commission – January 18, 2022 & February 15, 2022**
- **Council Engagement – February 2022 – May 2022 (budget development / adoption)**
- **Commence development of procurement document package**
- **Advertise Design Build Contract in late Summer 2022**



# Open Discussion

# Feedback Requested

- Prioritization for any potential additional funding:
  - Recommendation received to de-prioritize Strand St Pavers
    - Recommend next priority be riverine flood protection
    - Or Point Lumley Park? (or other?)
  - Prioritization of remaining areas?
    - Waterfront Park or Point Lumley for improvements?
    - Point Lumley - Baseline alignment of bulkhead? Or Alternative hybrid-shoreline?
  - Priority for Common Elements for promenade?
- Position(s) on resiliency approach (underground storage):
  - Waterfront Park
  - Founders Park
- Follow up meeting needed prior to Waterfront Commission on January 18<sup>th</sup>?
- Letter of support?