



Waterfront Implementation Program

Flood Mitigation Project Update to Old Town Civic Association

June 8, 2022

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Department of Project Implementation, Director

A Variety of Flooding Sources in Old Town...

BACKFLOW

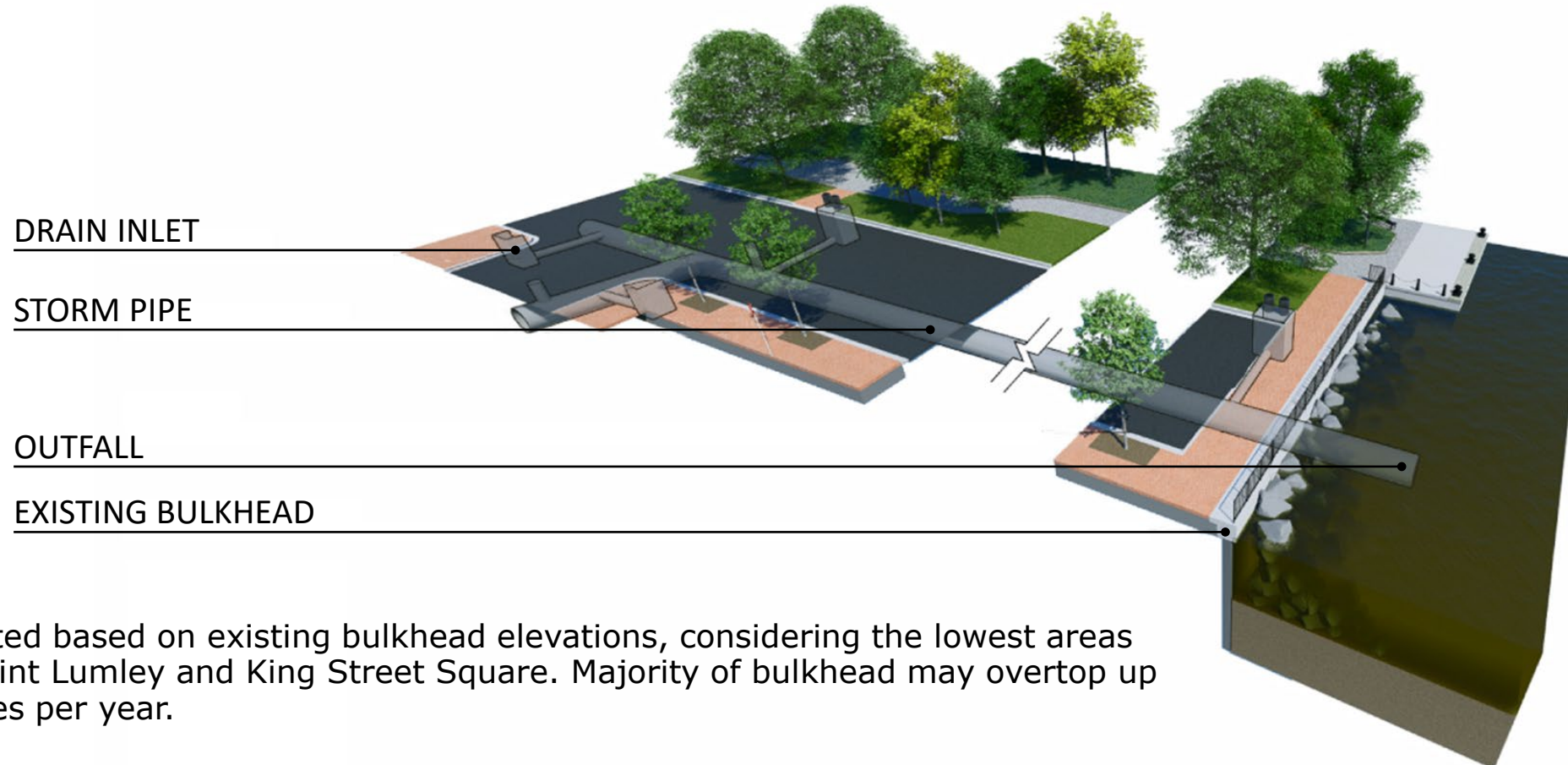
of River Outfalls
60+ times per year

OVERTOPPING

of Bulkhead
30 times per year*

INUNDATION

of Storm Sewers
10+ times per year



*Estimated based on existing bulkhead elevations, considering the lowest areas along Point Lumley and King Street Square. Majority of bulkhead may overtop up to 2 times per year.

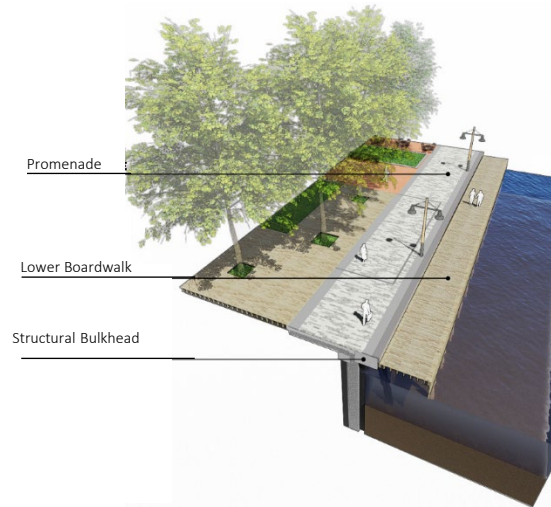
Requires an Integrated Solution to Mitigate Flooding

BACKFLOW of River Outfalls



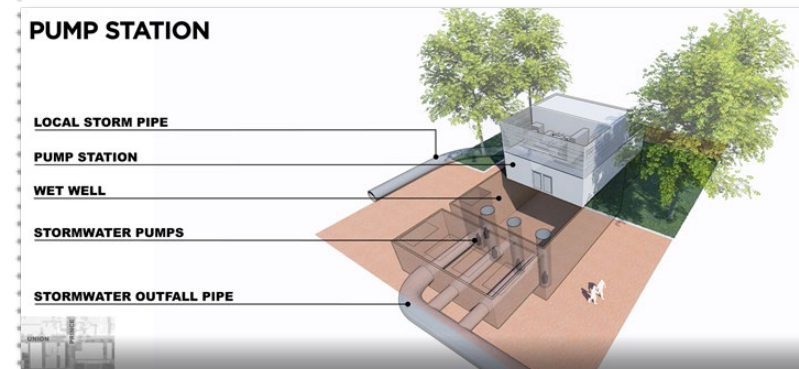
Requires backflow prevention on outfalls.

OVERTOPPING of Bulkhead



Requires a higher-level protecting storm surge barrier.

INUNDATION of Storm Sewers



Requires new/larger inlet structures, new/larger storm sewer pipes, and pumping.

1. Backflow: Backflow prevention can be considered an interim, immediate solution as well as a permanent solution part of the larger WFI Project. Images provided by Red Valve.

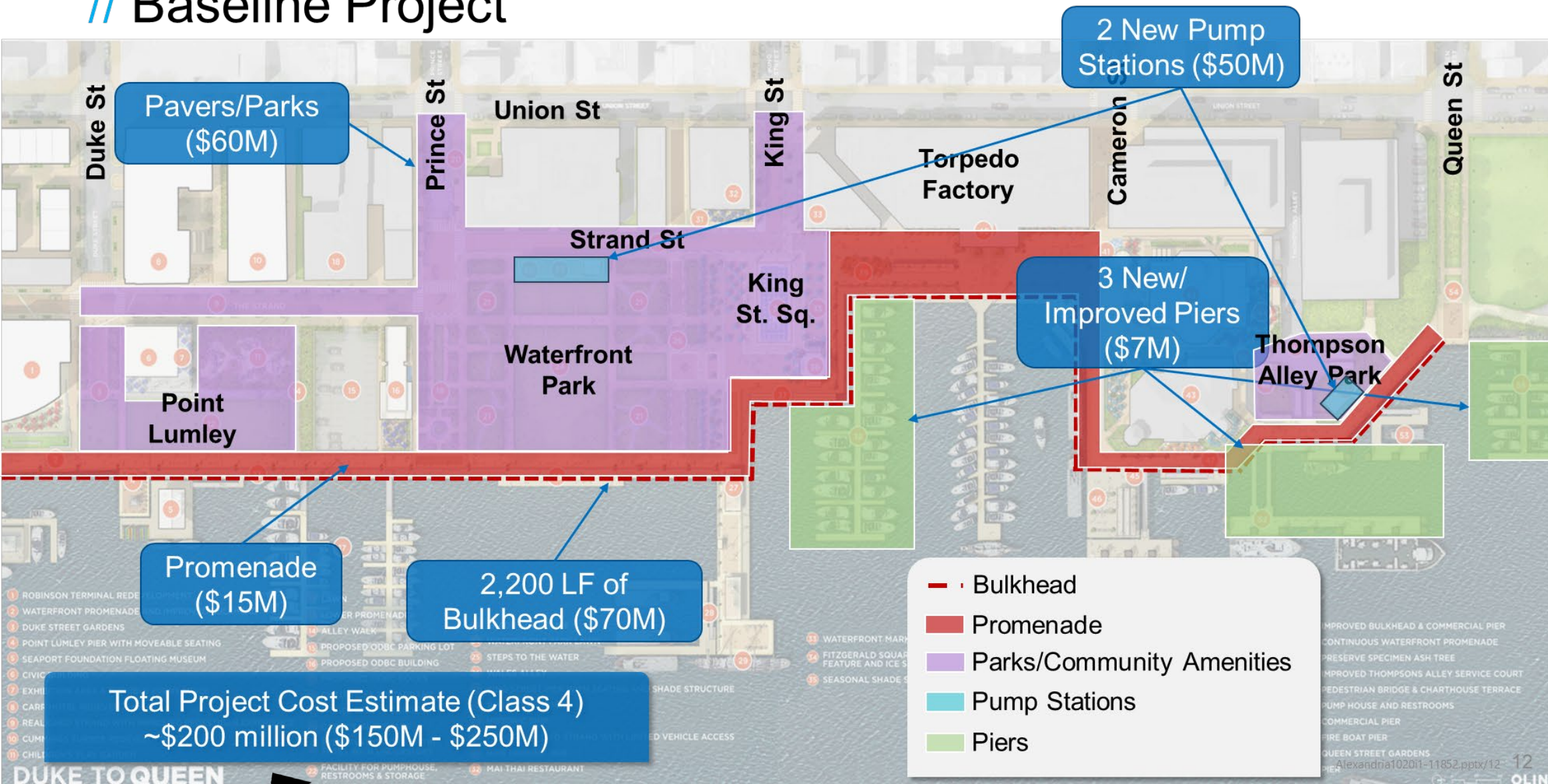
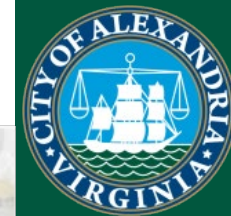
2. Overtopping: Storm surge protection can be provided (in part) by a bulkhead. The existing bulkhead can be rehabilitated and raised to the protected height and/or replaced and reconstruction to protected height. Storm surge protection can also be provided by other physical flood barriers. Image from March 19, 2019. White Paper Graphics (Olin).

3. Inundation: Image from April 15, 2019. Alexandria Waterfront Pump House / Pavilion Development (Olin)

Schematic Design Endorsed by Waterfront Commission & Council is discussed as the original “Baseline Project”



// Baseline Project



Exceeds Current Funding in CIP

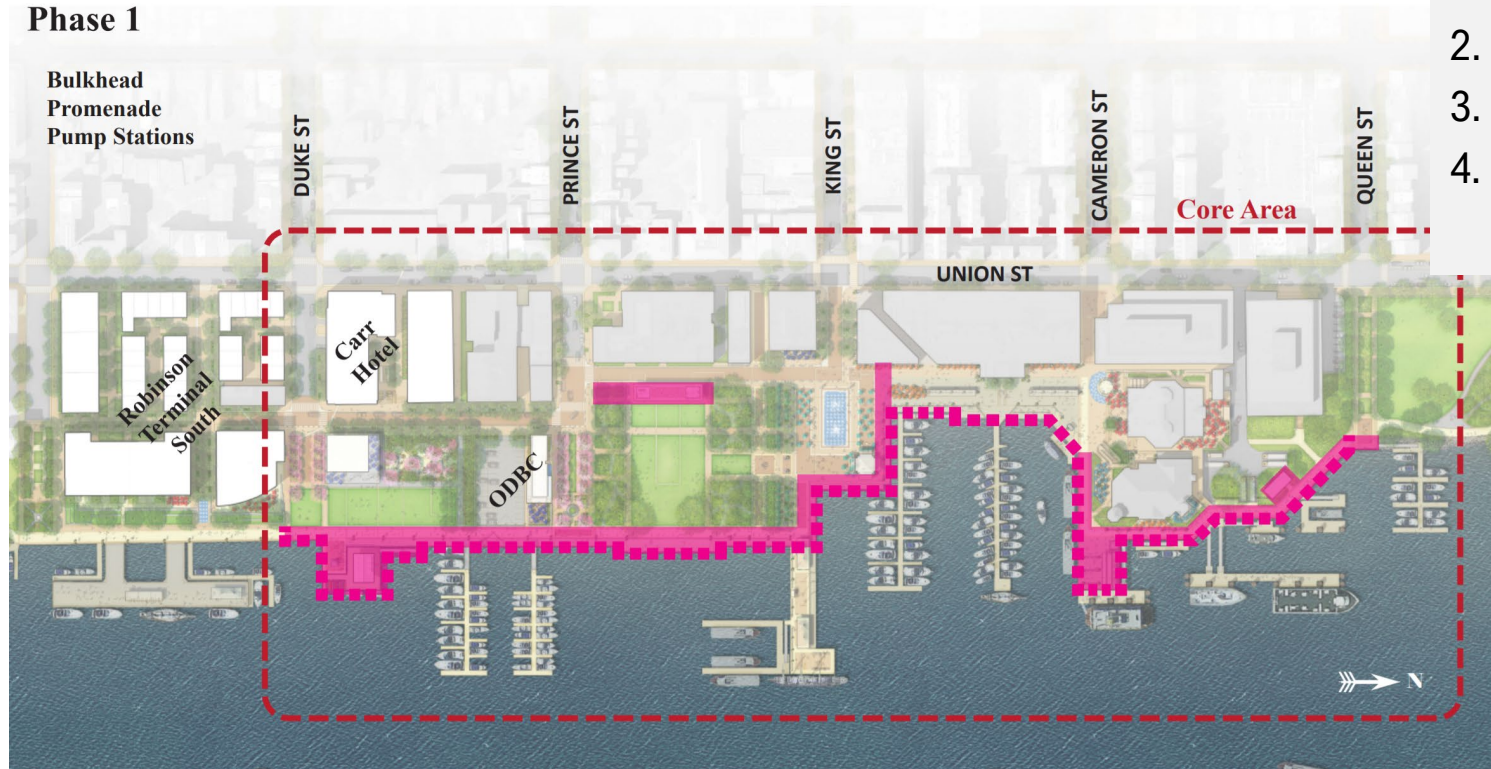
\$102M + \$3.24M

FEMA BRIC Grant – application pending :

\$50M

Phasing Plan and Budget adopted by Council (2015)

Phase 1



Reflects community priorities:

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

Option A

Flood Mitigation & Promenade Priority

Current Project Alternative

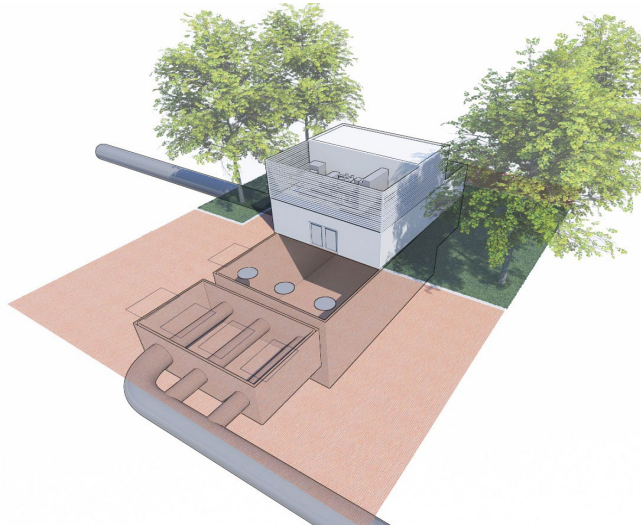
Goals and Objectives

- Mitigate stormwater flooding:
 - New civil infrastructure (inlets, pipes, storage, pumps, etc.):
 - Size based on a conservative baseline storm
 - Reasonably account for climate change projections through 2100
 - Eliminate capacity issues
- Eliminate backflow of Potomac River into streets
- Address most frequent overtopping of bulkhead/shoreline – but not all
- Policy and Regulatory Compliance
- Deliver on goals of Waterfront Small Area Plan / Public Amenity
- Replace aging/failed bulkhead/shoreline (where feasible and affordable)

// Project Elements to address:

BACKFLOW
of River Outfalls

INUNDATION
of Storm Sewers



2x PUMP STATIONS

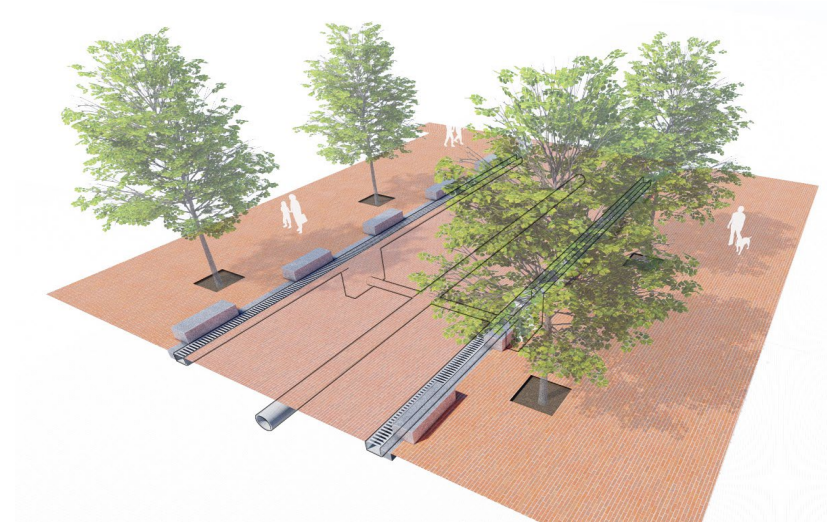
- Utilitarian structure housing stormwater pumps and associated mechanical and electrical equipment
- No city storage or amenity space
- Thompsons Alley PS capacity reduced by 95%



UNDERGROUND DETENTION

Stormwater storage chambers sited under existing park spaces

Receiving community opposition



STREETSCAPE AND STORMWATER INFRASTRUCTURE IMPROVEMENTS

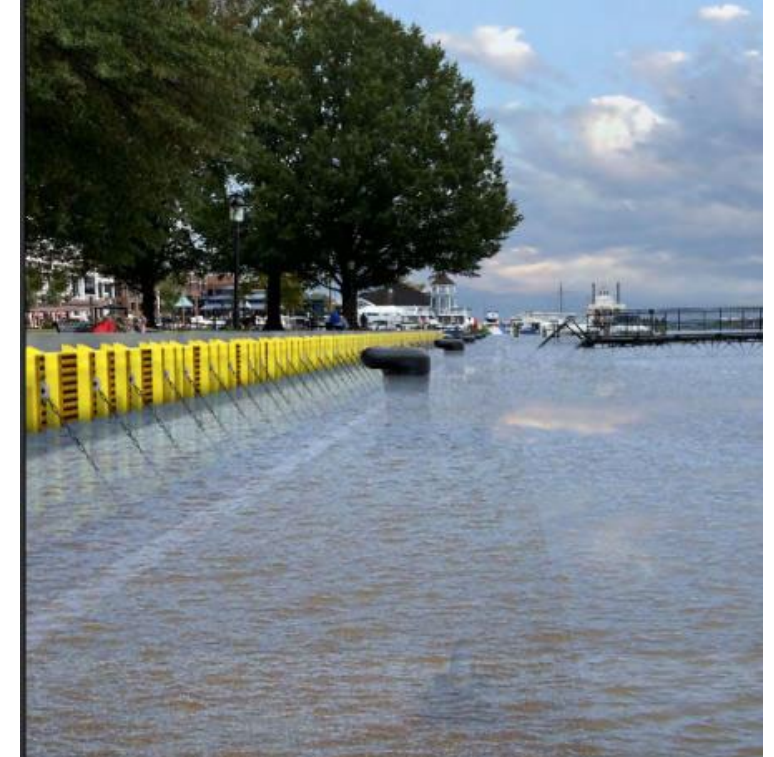
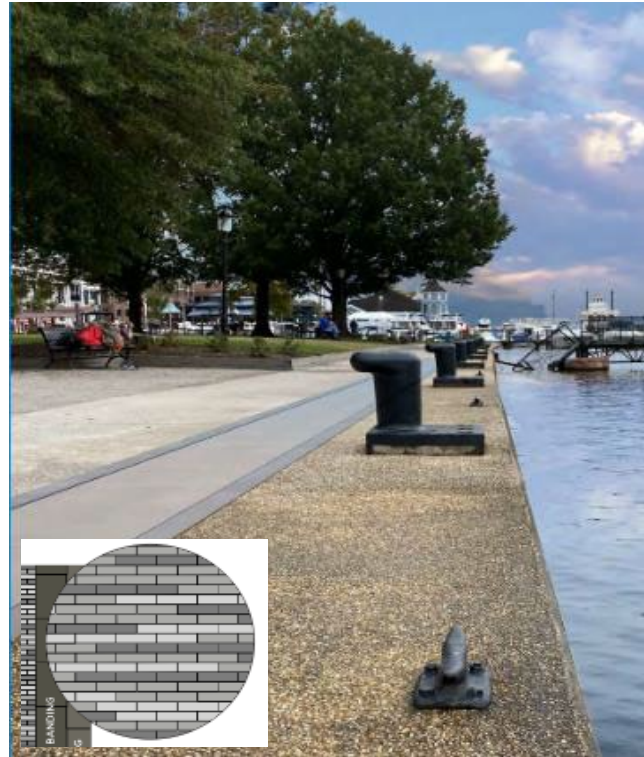
- New and upsized stormwater inlets and conveyance pipes
- Common elements paving for streets and promenade de-prioritized by community

// Project Elements to address: **OVERTOPPING** of Bulkhead



LANDSCAPE-BASED FLOOD PROTECTION

- Stabilized bulkhead
- Landscape seat walls or planters as flood barriers
- Alternative paving and finish materials likely required based on escalating costs



DEPLOYABLE BARRIERS COULD BE ADDED IN FUTURE, AS FUNDING IS AVAILABLE

- Hidden when not needed
- Maintains experience and connection to water
- Prevents visual disruption when not needed

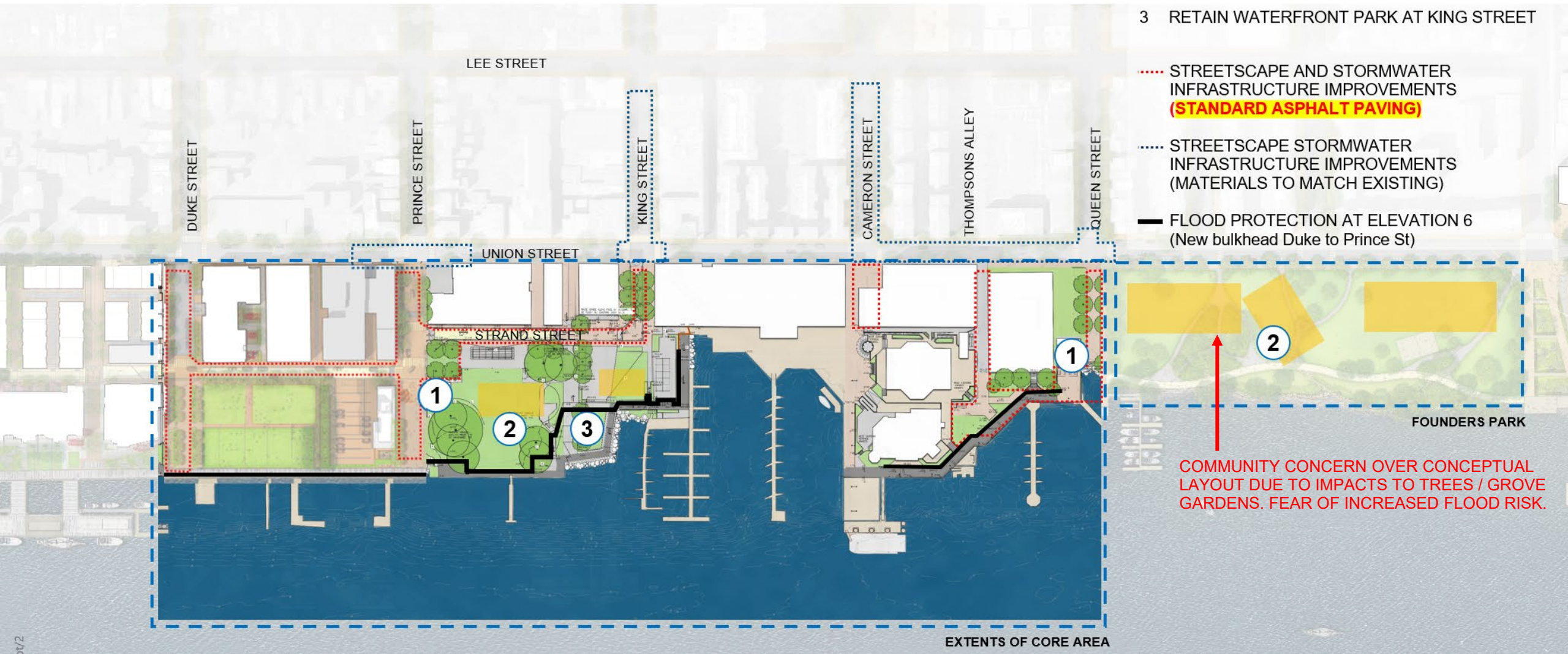
// Phase 1 – Scope to \$100M Budget

Hybrid Bulkhead & Landscape Based Flood Protection

LEGEND

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

- 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)

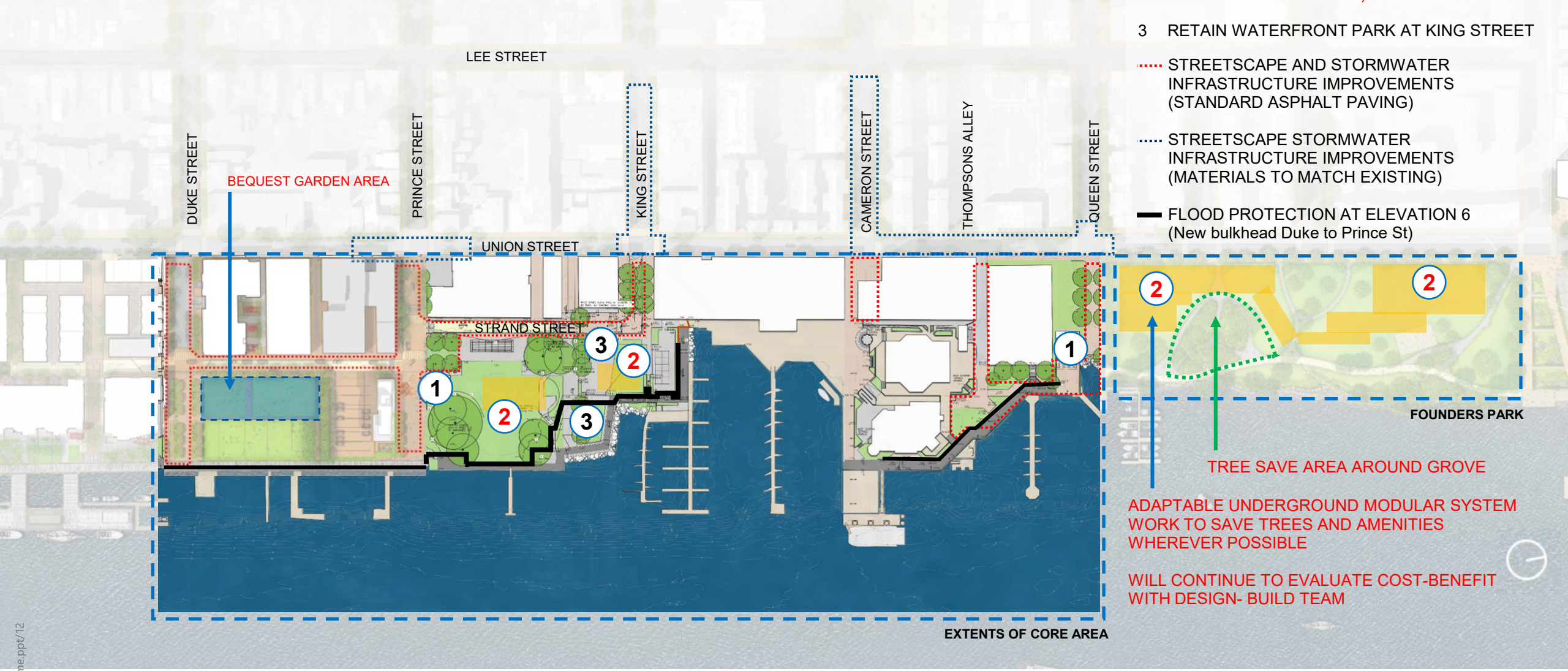


// Phase 1 – Scope to \$100M Budget

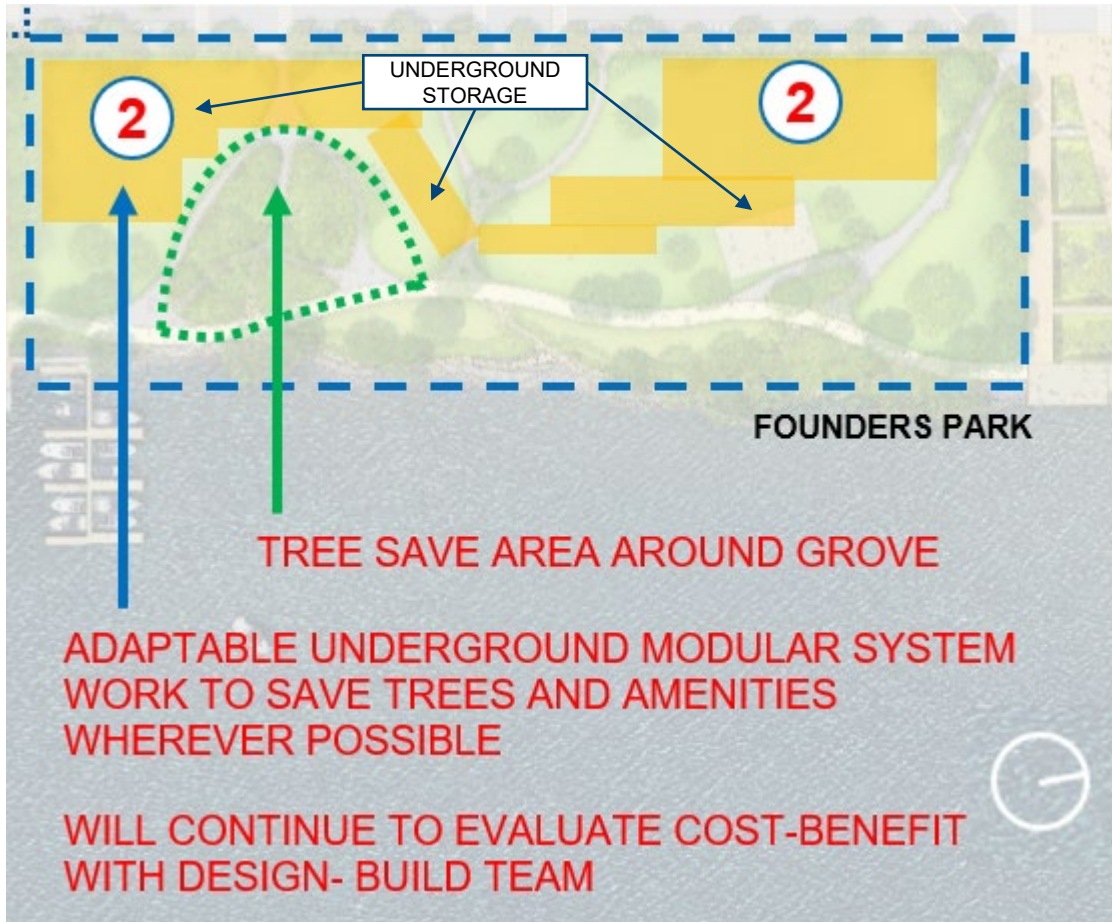
Hybrid Bulkhead & Landscape Based Flood Protection

LEGEND

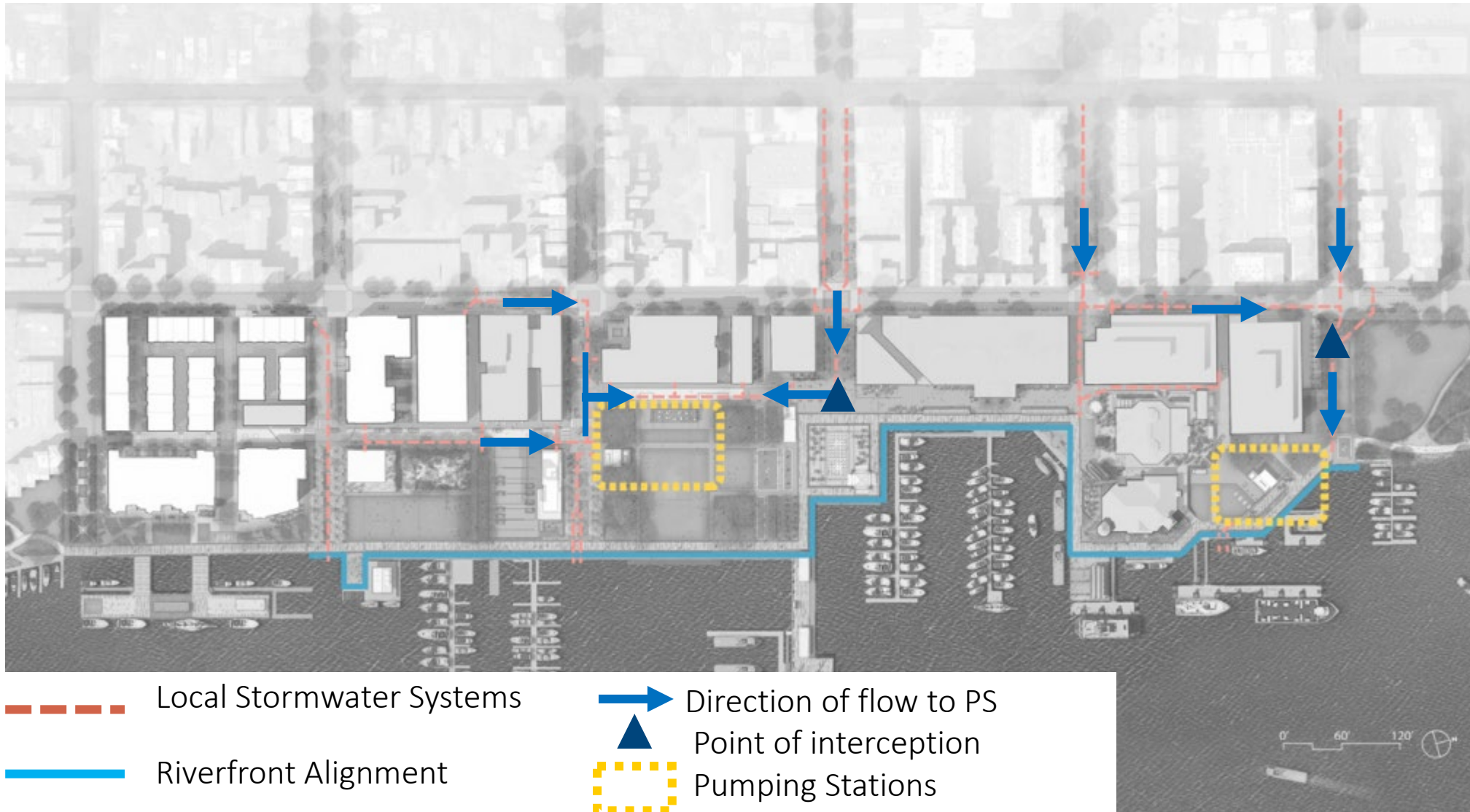
- 1 PUMP STATION
- 2 POTENTIAL UNDERGROUND STORMWATER DETENTION CHAMBERS (**FURTHER EVALUATION REQUIRED**)
- 3 RETAIN WATERFRONT PARK AT KING STREET
- STREETScape AND STORMWATER INFRASTRUCTURE IMPROVEMENTS (STANDARD ASPHALT PAVING)
- STREETScape STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)
- FLOOD PROTECTION AT ELEVATION 6 (New bulkhead Duke to Prince St)



If used, Underground stormwater chambers could offer an opportunity to attenuate stormwater and restore park to existing condition



Park spaces are an opportunity to manage water differently through delay and store strategies



SOURCE: April 4, 2019. Alexandria Waterfront Proposed Flood Mitigation Components Graphics (Olin)

Phase 1 – Cost Breakdown of included elements:

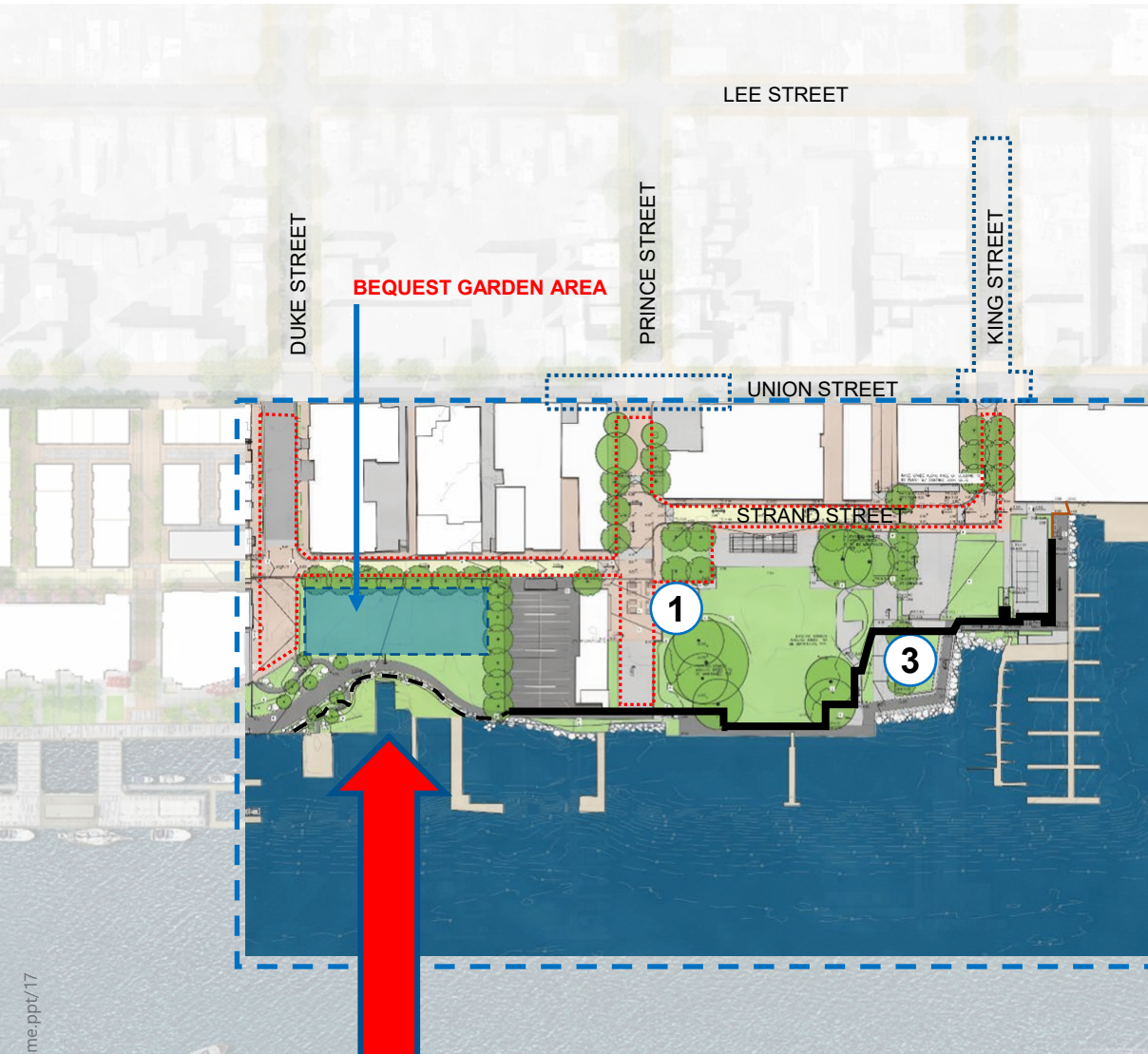
Community Priorities	Estimated Total Cost	Project Elements
Flood Mitigation <ul style="list-style-type: none"> Storm Sewer Upgrades Pump Stations Riverine Protection 	\$20M \$55M \$18M	<ul style="list-style-type: none"> Interim tide gate at King and Prince Street New and upsized inlets and stormwater piping Two stormwater pumping stations Underground stormwater detention chambers 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
Riverfront Promenade	\$2M	<ul style="list-style-type: none"> 10-20ft wide promenade from Duke to Queen St with a lower-cost finished material (asphalt, or crushed stone)
Plaza at the foot of King Street	\$2M	<ul style="list-style-type: none"> Material upgrades to make permanent park Actual improvements worth ~\$600K
Park Improvements	<\$1M \$2M	<ul style="list-style-type: none"> Restore all streets with asphalt pavement Waterfront Park and Founders Park restoration
Total Estimated Project Cost	\$100M	AACE Cost 4 - Low: \$80M - High: \$120M

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.

Potential Alternatives: Options for additional investigation

// Phase 1 – Point Lumley Shoreline Alternate Hybrid Shoreline & Landscape Based Flood Protection



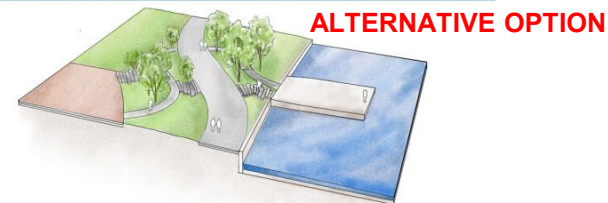
****NO NEGATIVE IMPACT OR ADDITIONAL RISK TO PROPOSED BEQUEST AREA ****

LEGEND

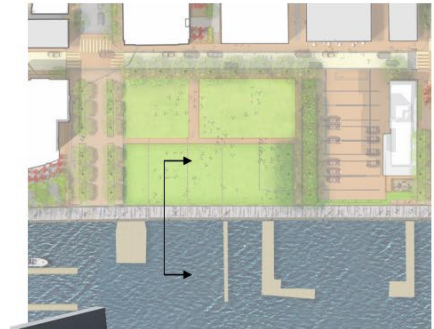
- 1 PUMP STATION
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- STREETScape STORMWATER INFRASTRUCTURE IMPROVEMENTS (MATERIALS TO MATCH EXISTING)
- FLOOD PROTECTION AT ELEVATION 6 (Stabilized Shoreline-no bulkhead Duke to Prince St)

Duke to Prince Strategies – Point Lumley

LANDSCAPE \$7M



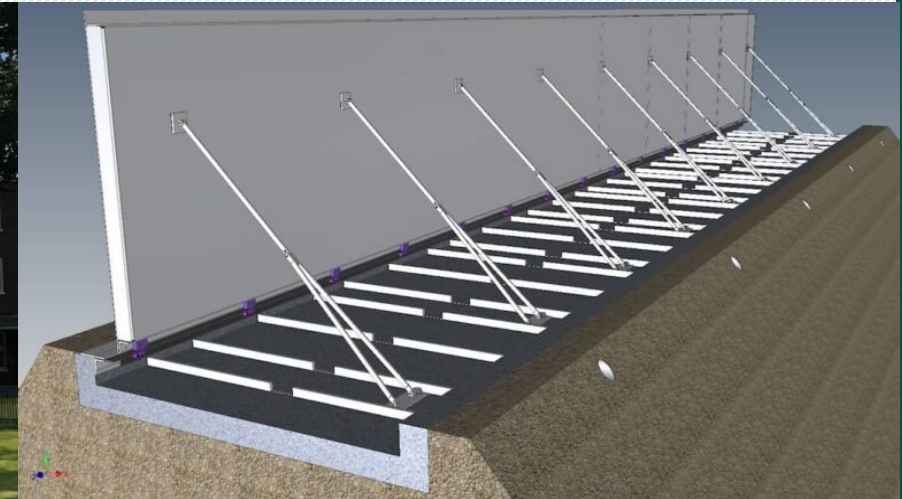
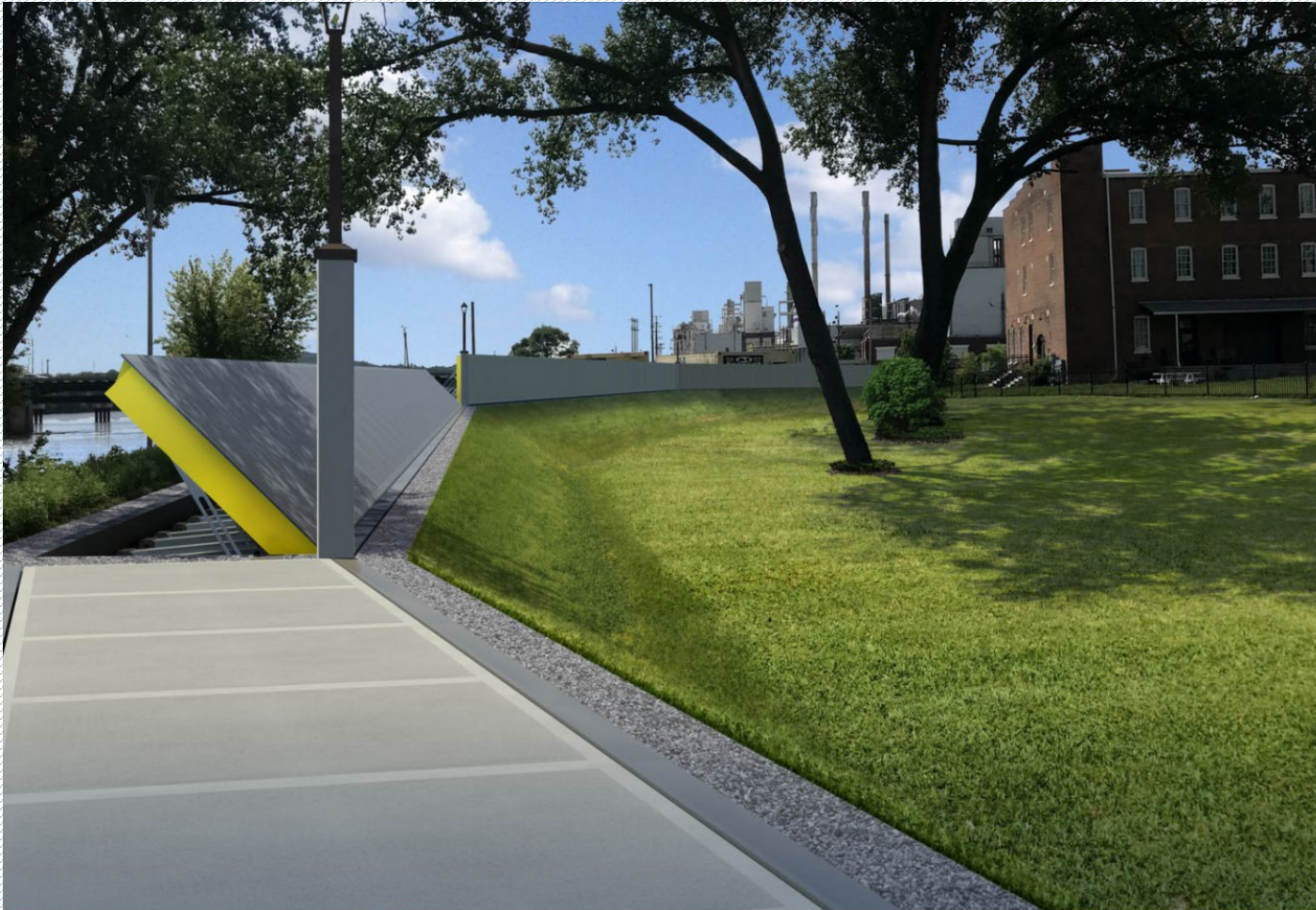
BULKHEAD \$28M



Included but not shown:

- Hardscape + landscape allowances
- Baseline Plan furnishings

Flood Gates

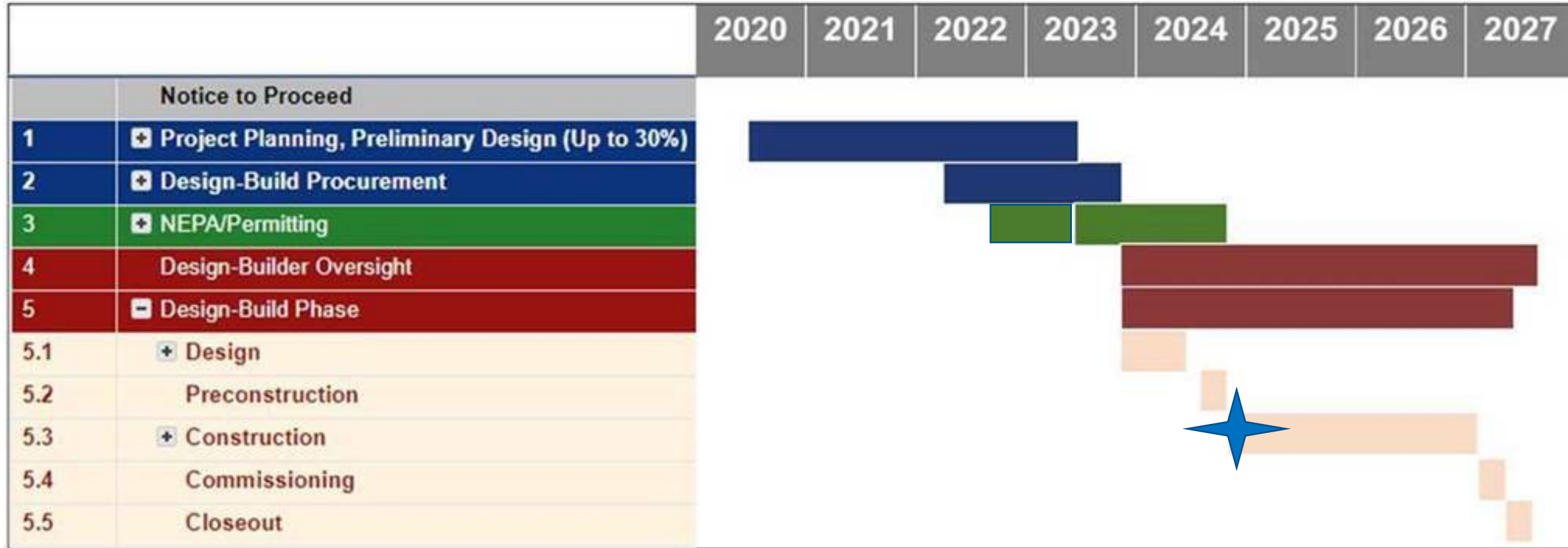


To install product along the entire bulkhead, material cost is **ESTIMATED** to be ~\$5M for a 3.5-ft self-deploying wall.

Milestone Summary

- Finalize Procurement Plan – June 10
- Industry outreach – Meeting with potential Vendors - June 6 – 24
- Development of procurement documents (RFQ / RFP) – June-August
- **FEMA notice of BRIC Grant Awards anticipated – July 2022**
- NEPA jurisdictional determination (post BRIC award)
- **Advertise Design-Build Contract – late August/September 2022**
- Commence NEPA, as applicable per regulator guidance (EA / EIS)
- **Award Design-Build Contract / Start design – Summer/Fall 2023**
- Design complete late 2024 (could be impacted by regulatory and grantor reviews)
- Construction late 2024/early 2025 – likely after City's annual birthday celebration

Timeline



Construction will commence AFTER City's 275th birthday celebration

Discussion