Boston Children's Museum

Fort Point Channel Landmark District Commission

December 11th, 2025

BCM SASAKI VHB ARUP TT

Boston Children's Museum –
Fort Point Channel Landmark District Commission

December 11, 2025

Outline

1) Introduction on Resiliency
2) Larger Project Vision
3) Building Level Threat and Resilience Approach
4) Key Considerations
5) Preferred Strategy Evaluation – Design Approach
6) Dismissed Alternatives
7) Alignment with City of Boston schedule for efficiency and minimal disruption to the neighborhood
8) Next Steps
9) Appendix

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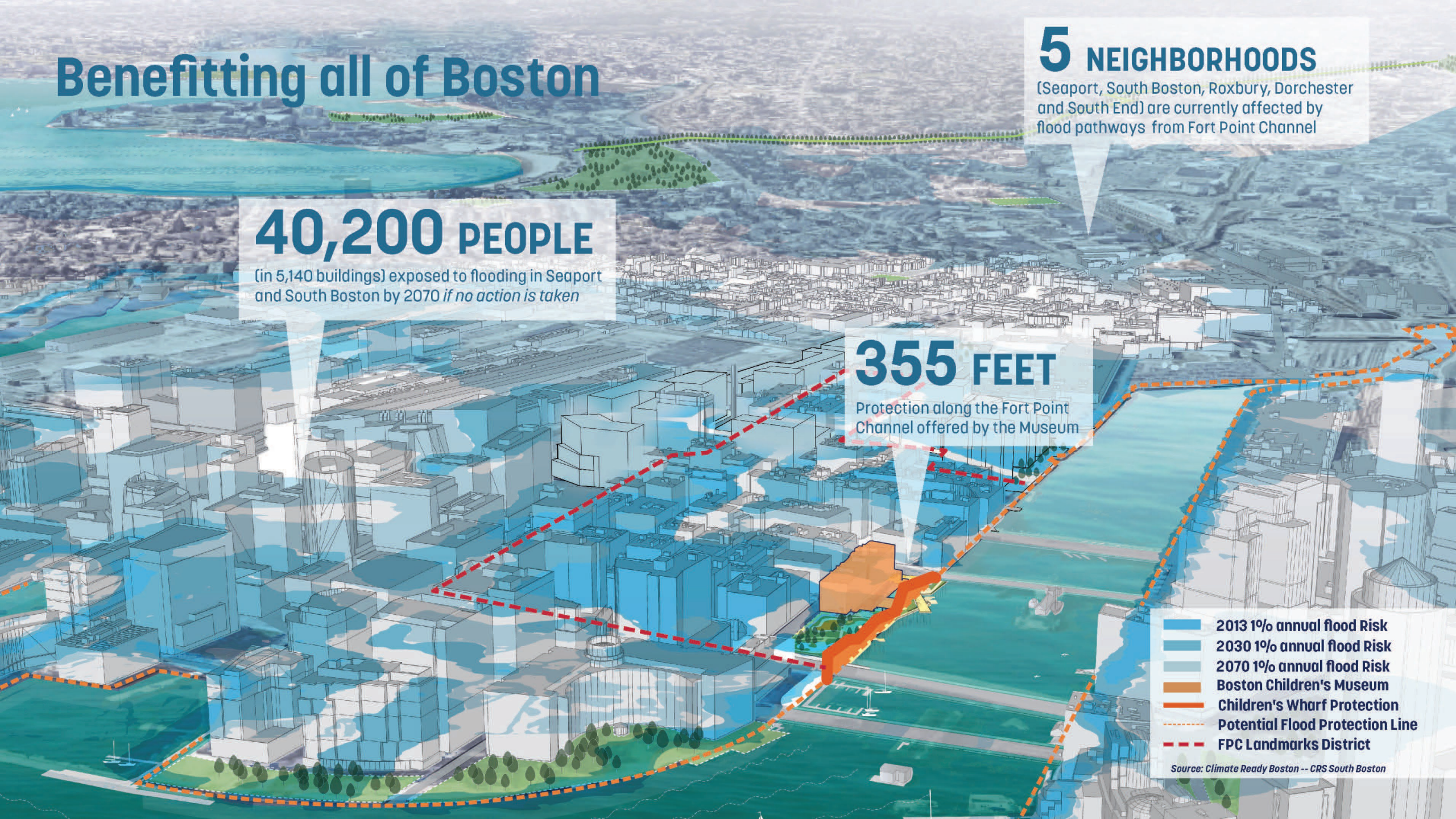
1. Introduction on Resiliency

WHY

Winter Storm Riley (March 2, 2018) brought high tide within 4" of the Museum's Plaza and flooded Sleeper Street, briefly turning the Museum into an island.

The Museum and the greater Seaport District are increasingly **AT RISK OF FLOODING** due to sea level rise and storm surge in the Fort Point Channel.


Benefitting all of Boston
5 NEIGHBORHOODS
(Seaport, South Boston, Roxbury, Dorchester and South End) are currently affected by flood pathways from Fort Point Channel
40,200 PEOPLE
(in 5,140 buildings) exposed to flooding in Seaport and South Boston by 2070 *if no action is taken*
355 FEET
Protection along the Fort Point Channel offered by the Museum
2013 1% annual flood Risk
2030 1% annual flood Risk
2070 1% annual flood Risk
Boston Children's Museum
Children's Wharf Protection
Potential Flood Protection Line
FPC Landmarks District
Source: Climate Ready Boston -- CRS South Boston

2. Larger Project Vision

2019 Masterplan + 2023 Building Level Resilience Assessment

Master Plan Guiding Principles

Activating our Waterfront

Creating a welcoming front yard for the Museum that accommodates a diversity of events, programs and experiences year-round.

Engaging our Children + Families

Inviting all visitors, whether young in years or young at heart, to immerse themselves in playful discovery at the water's edge.

Leading our Community's Resilience

Increasing the resilience of the Museum and surrounding district to the risks of sea level rise, climate change, and other socio-environmental challenges.

Tomorrow's Museum Wharf

ARUP

The Boston Children's Museum | 308 Congress Street, Boston, MA

Building-level Flood Resilience Assessment

Prepared by:
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Kara Slocum, PE
Derek Anderson, PE
Michelle Silverwood

Date Issued: March 10, 2023

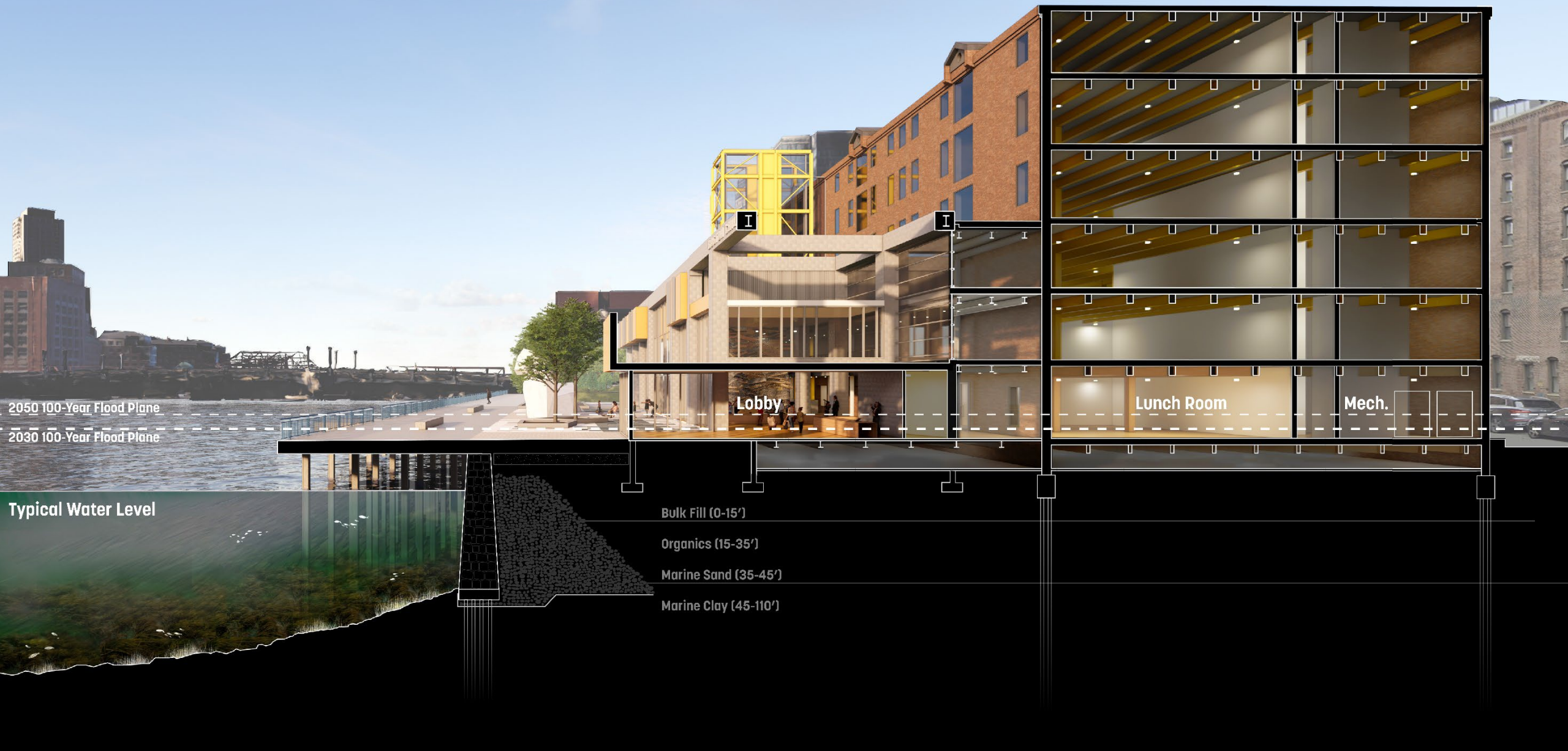
Today's Boston Children's Museum

The Future Boston Children's Museum

LEGEND

1. Congress Street Plaza
2. Milk Bottle Plaza
3. New Museum Entry / Admissions
4. Harborwalk Path
5. Terraced Garden
6. Floating Dock
7. Floating Wetland
8. Children's Wharf
9. Indoor- Outdoor Exhibit Space
10. 3-Seasons Pavilion
11. Water Hammock
12. Vertical Garden
13. School Group Meeting Area
14. Seating Terrace
15. Martin's Park (Existing)
16. Fenway Farms
17. Pollinator Garden
18. Event Space

Today


2050 100-Year Flood Plane
2030 100-Year Flood Plane
Typical Water Level
Lobby
Lunch Room
Mech.
Bulk Fill (0-15')
Organics (15-35')
Marine Sand (35-45')
Marine Clay (45-110')

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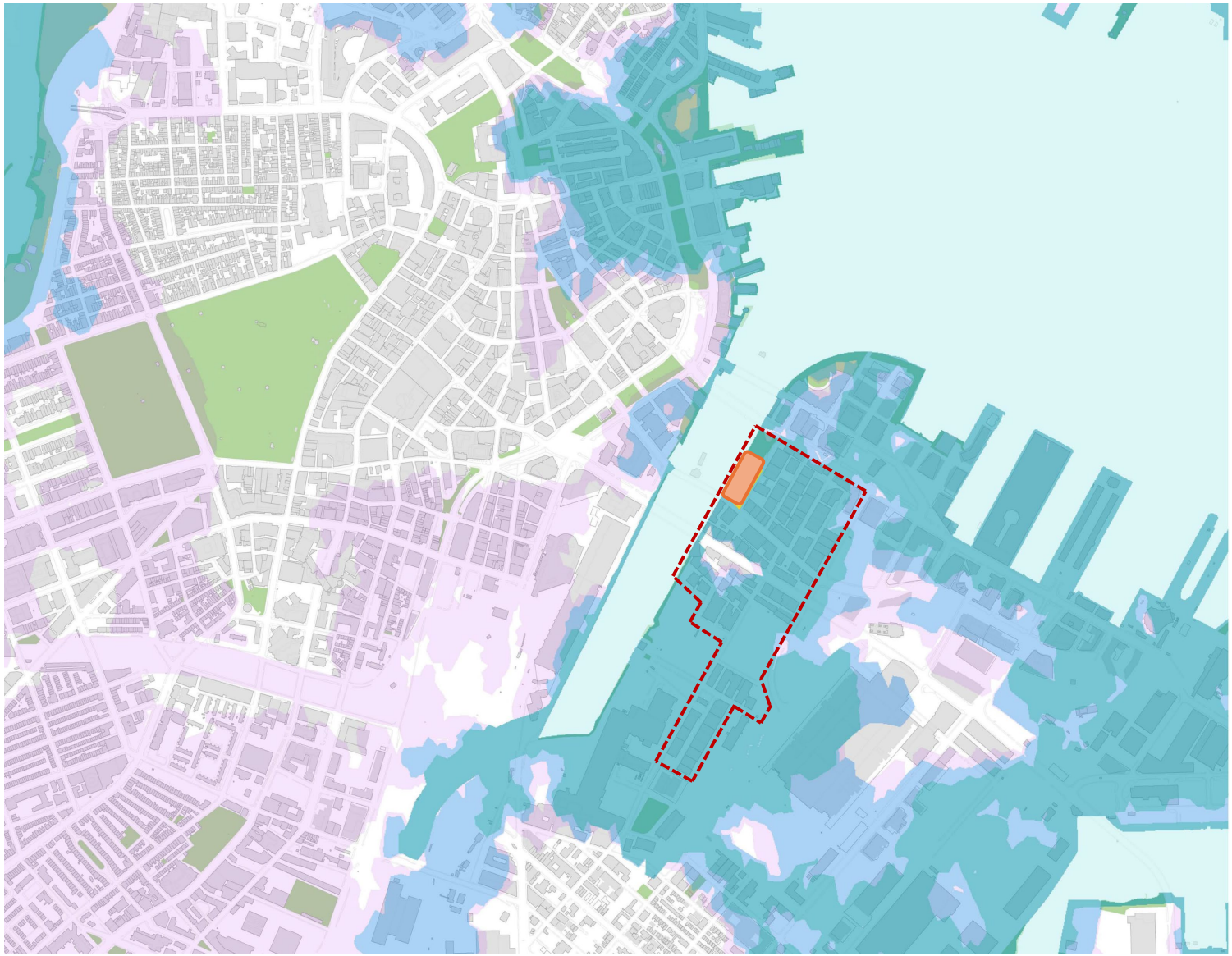
December 11, 2025

3. Building Level Threat and Resilience Approach

Flooding Metrics – Project



2030 - 100 YEAR STORM ELEVATION

2050 - 100 YEAR STORM ELEVATION

PROJECT DESIGN FLOOD ELEVATION (DFE) *

2070 - 100 YEAR STORM ELEVATION

Project Site

Fort Point Channel Landmark District

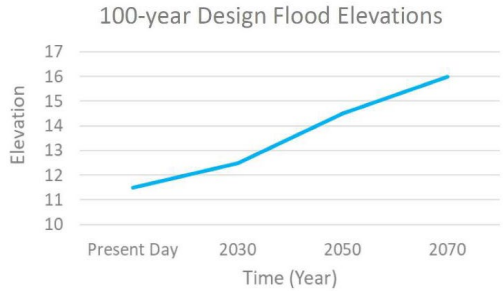
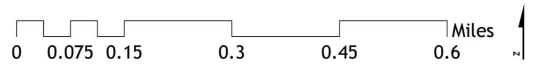


Figure 2. MC-FRM 100-year Design Flood Elevations



Comparison of 100-year Design Storms

Current City of Boston Zoning Requirements dictate that any new construction or significant improvement would be required to meet at least a **14.0' design flood elevation**. (Article 25-A)

District scale requirements would dictate an even higher elevation.

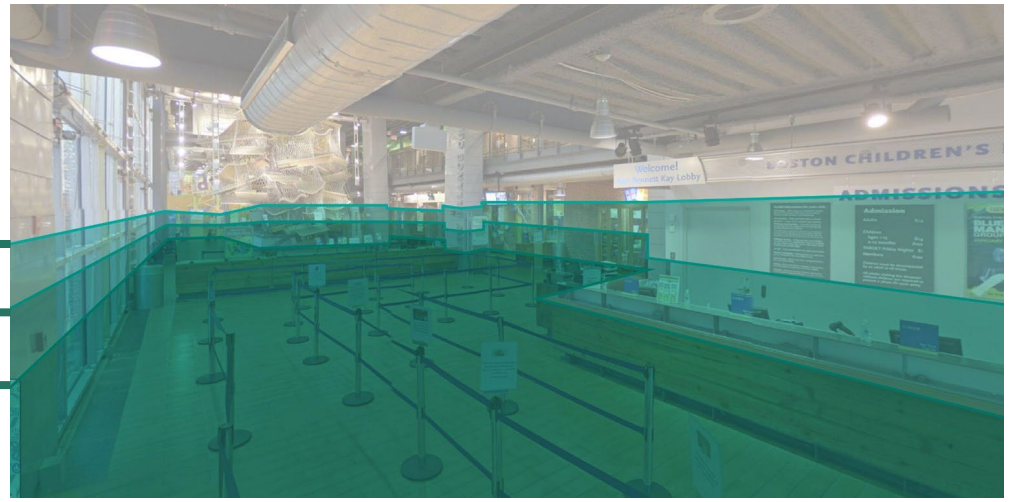
100-year Design Storm		
Year	**Elevation (NAVD88)***	**Probability of event occurring between now and 2070**
Present Day	11.5	> 40%
2030	12.5	> 33%
2050	14.5	> 18%
2070	16	1%

*Approximated from MC-FRM Model +1 ft freeboard

Master Plan Passive Solutions (12.5-ft)

Master Plan Passive + Deployable Solution (14.5-ft)

Master Plan Modular Design and Recommended Building Design Flood Elevation (16.1-ft)

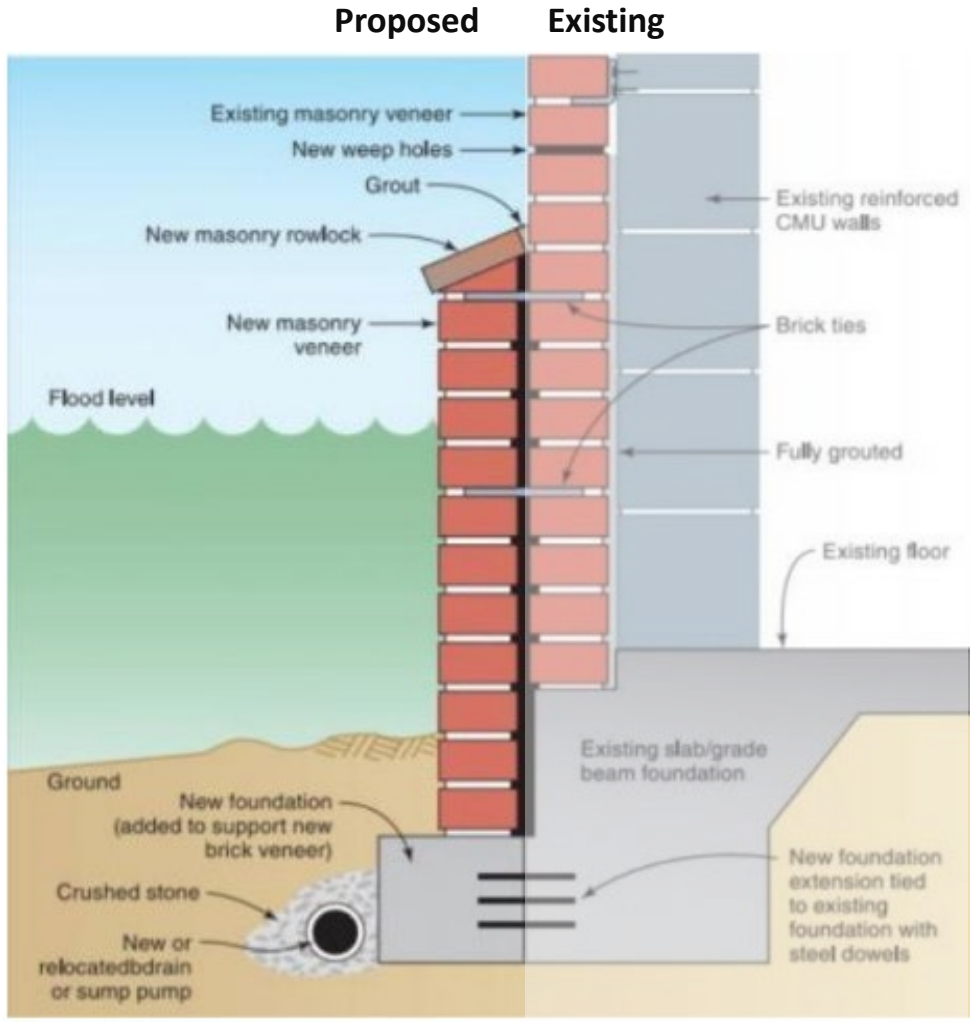


Phase 1: Protecting the historic walls

ARUP Official Recommended Dry Floodproofing Strategy as of the 2023 Resiliency Assessment Report

Excerpt from Building-Level Critical Resiliency Assessment for BCM (2023)

- Structural and Façade protection:
  - Structural recommendations for Strategy #2 can be found on pages 13 and 16 of the *"Building-Level Resilience Assessment Report", dated March 10, 2023*, as well as in Appendix B. The recommendations include:
    - Steel channel structural reinforcement at existing first floor masonry walls.
    - Structural reinforcement of the 2nd floor framing to account for increase load from relocated equipment. Assume 10 pounds per square foot (PSF) of steel reinforcement over area of equipment pad.
  - Install waterproof membrane over existing brick facade up to elevation 16-ft NAVD88 and extend to 1-ft below sidewalk.
  - Apply new brick veneer over waterproofing membrane and install a new underdrain at base of new veneer. See FEMA detail to further explain the approach:

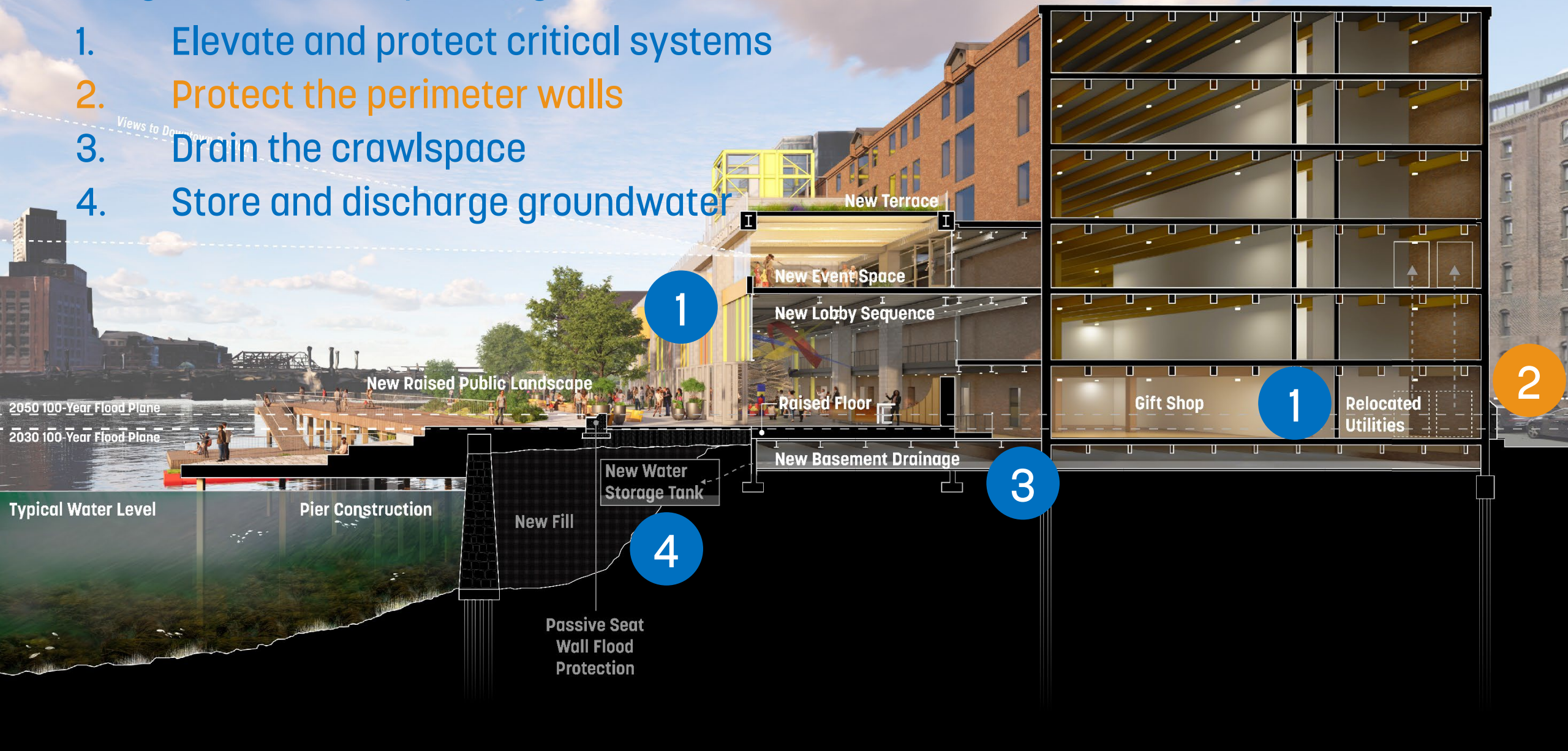


Representative Recommended Strategy as of 2023 Critical Resiliency Assessment Report, FEMA P-259 2012)

Phase 1 Scope

Integrated Resiliency Strategies

1. Elevate and protect critical systems
2. Protect the perimeter walls
3. Drain the crawlspace
4. Store and discharge groundwater



4. Key Considerations

Key Considerations for a Long-Term Solution

- Necessary level of protection to ensure operations
  - Keeping the museum, an institution that serves the public, running
- Least impact on historic context of FPCLD, including appearance and materials
- Exterior vs. Interior
  - Balancing operational, economic, and visual impacts of the waterproofing solution on the museum
- Minimizing the public right-of-way encroachment
  - Property line delineation
- Integrated Initiatives
  - All phase 1 components work together to keep the museum dry
- Construction Timeline Alignment

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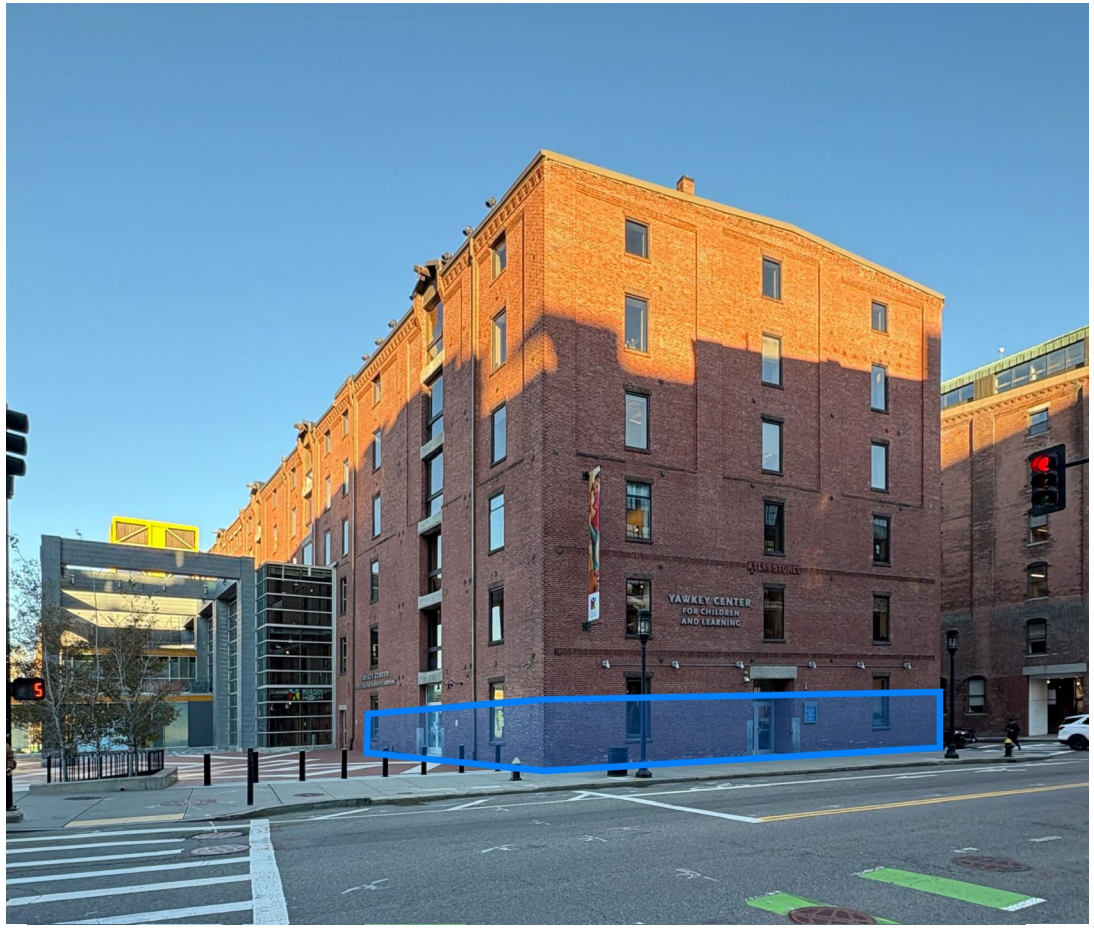
5. Preferred Strategy Evaluation – Design Approach

Proposed Strategy – Extents of Treatment



Congress St Towards Atrium

Corner of Congress and Sleeper St

Proposed Strategy – Extents of Treatment

Sleeper St at Loading Dock

Boardwalk Side at Group Entry

Existing Wall Analysis – Material Inventory

Sleeper Steet Façade

Historic Building Material Inventory

- Shorter Level 6 Windows
- Large Hoistway Openings
- Star Shaped Cast Iron Tie Rods
- Metal Drainage Pipe
- Granite Trim
- Brownstone Trim
- Red Brick
- Painted CMU Block Infill
- Composite Infill Panels and Louvers
- Stainless Steel Fire Department Connections

Proposed Strategy – General Approach

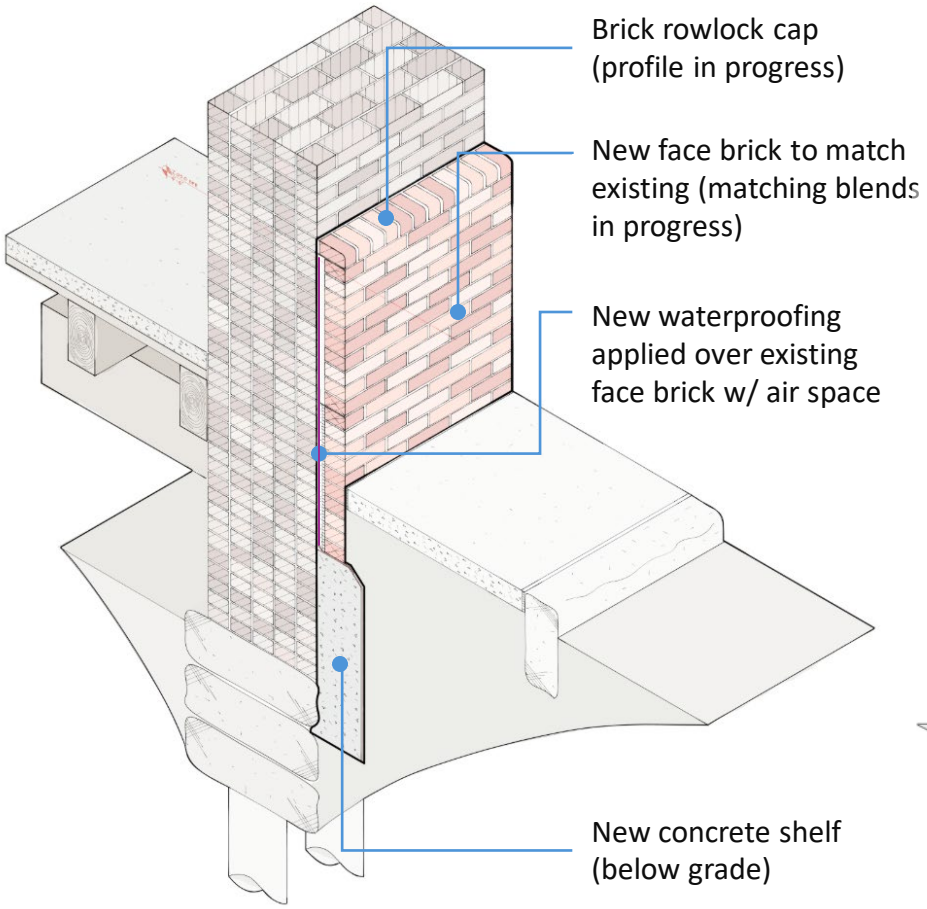
Existing Condition

Proposed Approach

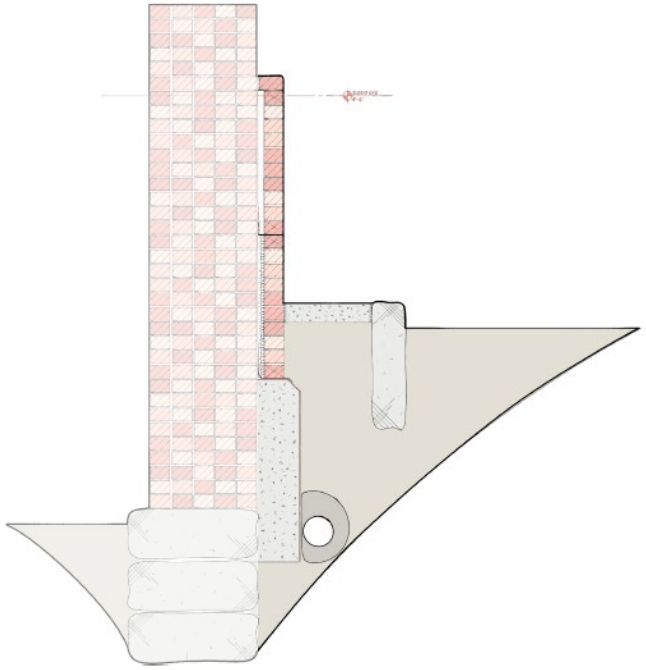
- Add waterproofing over existing brick, add new cladding to DFE
- Provide fittings for stop logs at openings.

Cladding Strategy

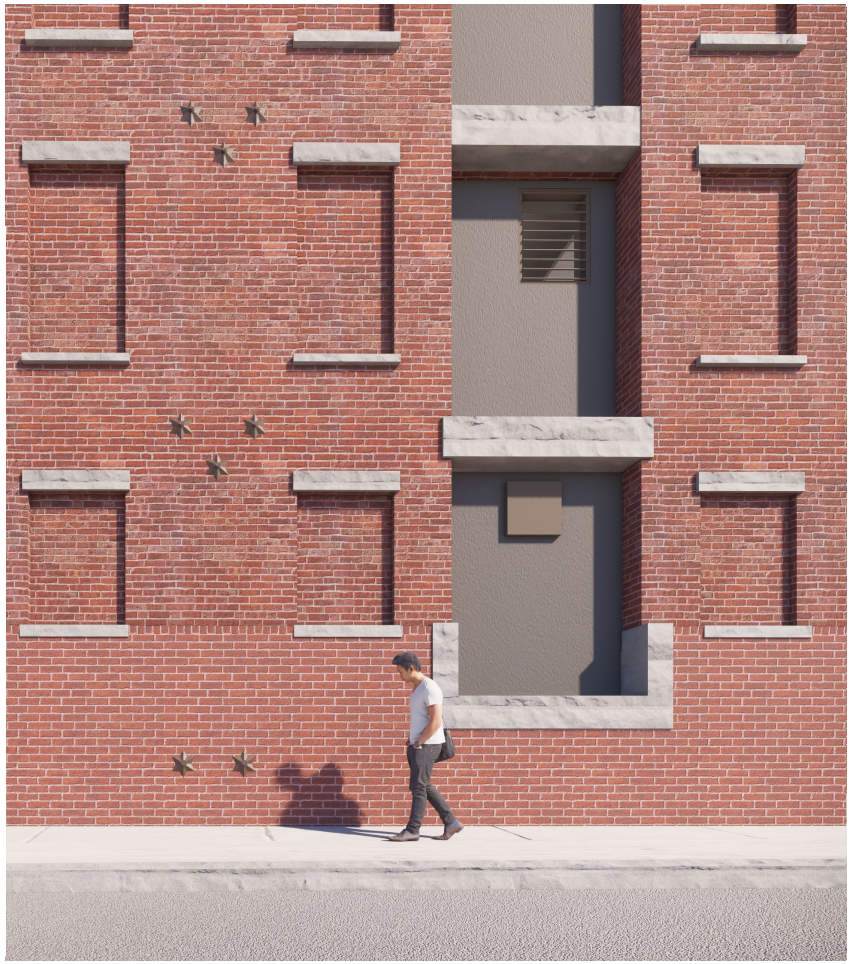
Single Wythe Brick



Conceptual Axonometric



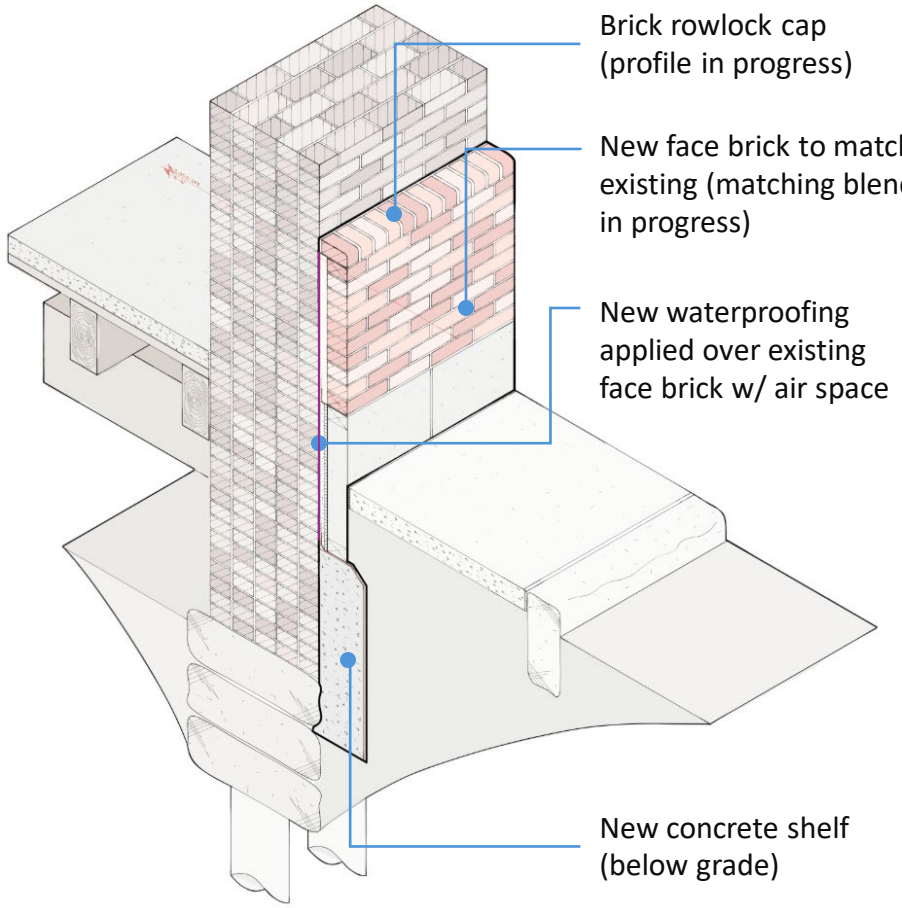
Conceptual Section

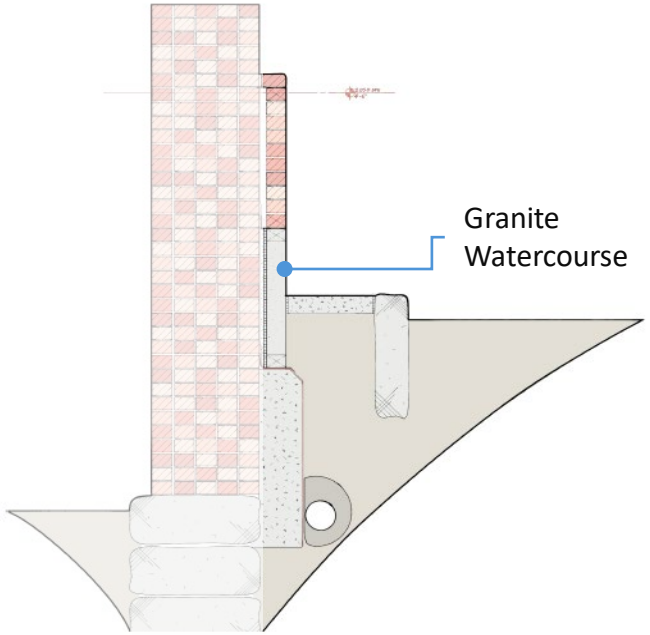


Rendered Elevational View

Cladding Strategy

Single Wythe with Granite Watercourse (Preferred)





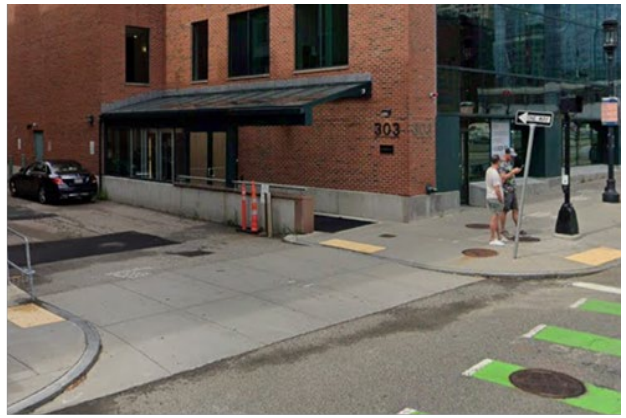
Conceptual Section

Rendered Elevational View

Cladding Strategy – Granite Watercourse Precedent

Single Wythe with Granite Watercourse (Preferred)

313 Congress St (Across the street)

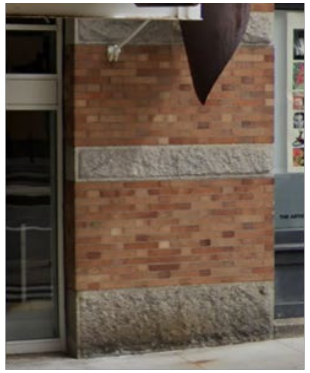


303 Congress St (Across the street)

Granite Base of 2006 Addition

269 Summer St

263 Summer St



300 Congress St

Today's corrosion and damage to base bricks on Congress St

Proposed Strategy – View From Congress St and Sleeper St

Existing

Proposed

Proposed Strategy – View From Congress St Towards Museum

Existing

Proposed

Proposed Strategy – View From Sleeper St Toward Loading Area

Existing

Proposed

Proposed Strategy – View From Boardwalk Towards Group Entry

Existing

Proposed

6. Dismissed Alternatives

Relying on existing brick walls to keep water out

Vetting Other External Potential Strategies (2025)

Leakage Rate Basis of Design:

- Based on 2011 testing conducted by David Perkes, AIA from Mississippi State University
- Cavity wall test box size: 3’ x 3’ x 4’
- After 22 hours, interior water depth was observed to be 36”
- Calculated leakage rate: 0.75 cft/hr/sft

Volume of flood water anticipated to enter Boston Children’s Museum during 8-hour duration flood event: 174,000 gallons, equivalent to the volume of nine average in-ground swimming pools.

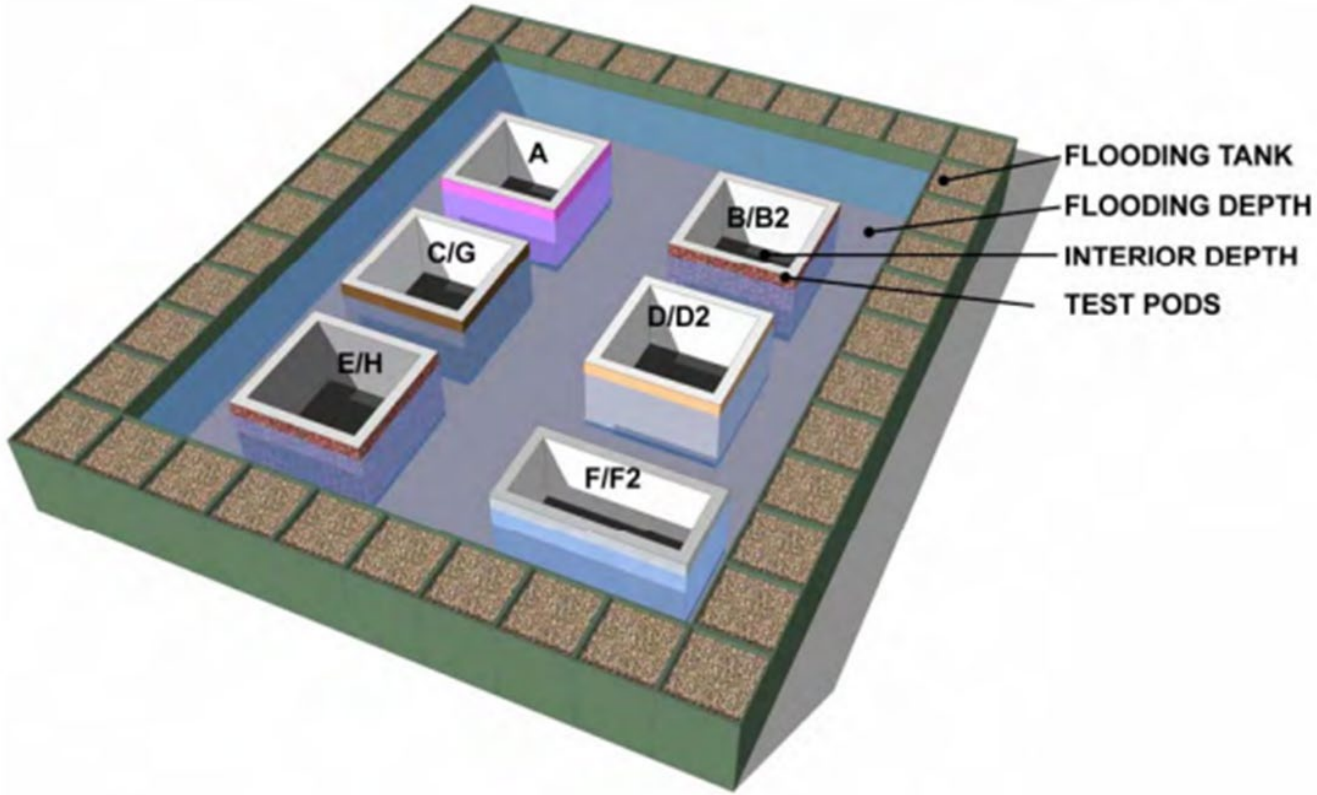


Image: 2011 MSU Test Set up

Test Pod B included brick cavity wall system similar to Boston Children’s Museum wall construction

Protecting the historic walls
Other strategies considered

Passive Dry Floodproofing

Raise Building Above Flood Elevation

- Open foundations

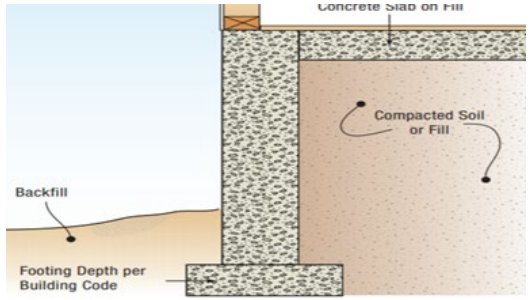
Not compatible with museum operations & substantial planning & cost

- Closed foundations

Included

- Soil fill

Not compatible with museum operations & substantial planning & cost



Floodwalls and Levees

- Earthen levees

Included on west side of building; inadequate space along Sleeper & Congress Streets

- Glass floodwalls

Inadequate space

- Concrete structures

Inadequate space

Protecting the historic walls
Other strategies considered

Passive Dry Floodproofing

<u>Automatically-deployed flood barriers</u>

- Hinged flood gates

Inadequate space, long term risk

- Flip-up barriers

Inadequate space, long term risk

- Drop-down flood doors

Not applicable

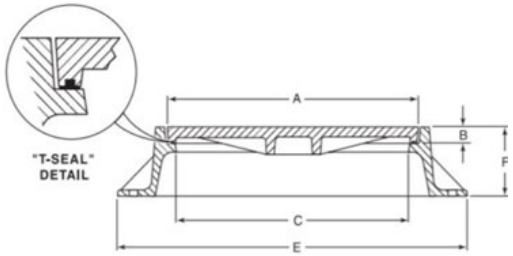
<u>Backflow valves and pressure covers</u>

- Backflow valves for pipes

Included

- Pressure manhole covers

Not applicable



- Backflow valves for drains

Not applicable

Protecting the historic walls
Other strategies considered

Passive Dry Floodproofing

Sealants and Membranes

- Waterproof membranes

Included

- Waterproof sealants

Undesirable impact on appearance of building & long term risk

- Conduit seals

Included

Stormwater Storage

- Surface ponds

Inadequate space

- Subsurface storage

Included

- Bioretention areas

Inadequate space

Protecting the historic walls
Other strategies considered

Deployable Dry Floodproofing

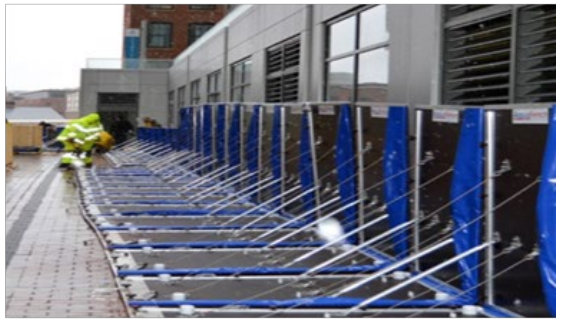
Flood Barriers

- Inflatable flood barriers

Inadequate space, significant deployment time, long term risk

- Modular flood barriers

Inadequate space, significant deployment time, long term risk



- Membrane barriers

Inadequate space, significant deployment time, long term risk

Flood Shields

- Door barriers

Included

- Window panels

Included

- Log barriers

Inadequate space, significant deployment time, long term risk

Protecting the historic walls
Other strategies considered

Wet Floodproofing

Building Modifications

- Open crawlspaces

Not compatible with museum operations & substantial planning and cost

- Raised equipment

Not compatible with museum operations & substantial planning and cost

- Durable/resilient materials

Included

Pumps and Drains Systems

- Permanent sump pumps

Included

- Portable sump pumps

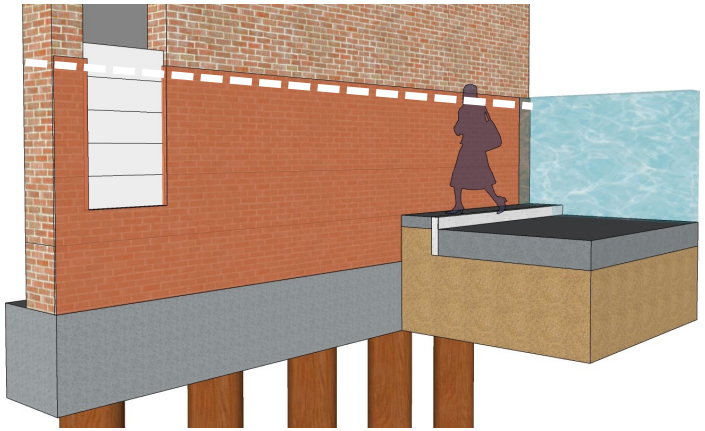
Included

- Floor drains

Included

Protecting the historic walls

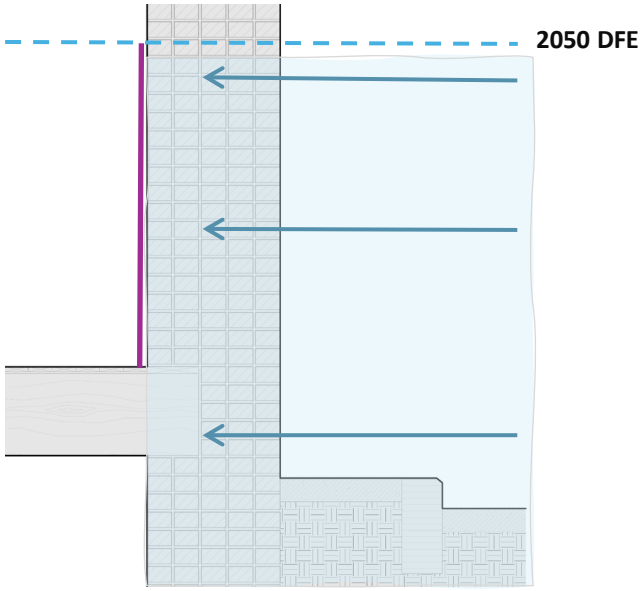
Vetting Other External Potential Strategies



Strategy 1 – waterproofing applied to face of exterior brick.

- Least invasive
- Least effective
- Changes character
- Shorter maintenance cycle

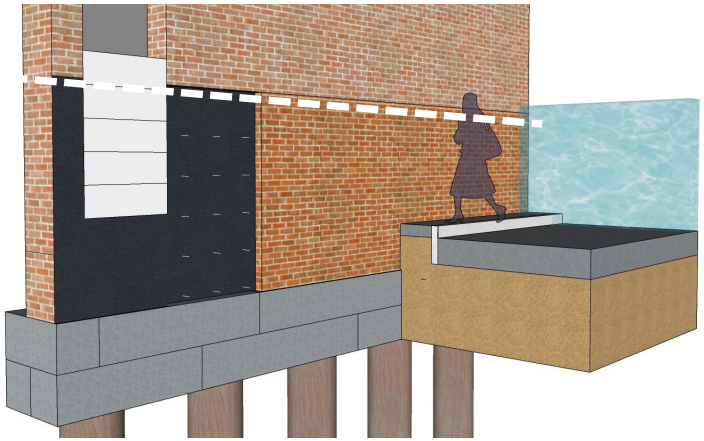
Determined to be an inadequate solution due to the **poor external appearance** coupled with **durability** and **performance concerns** from leaving the membrane exposed



Strategy 2 – Negative Side Waterproofing

- Most invasive
- Least effective

Determined to be an inadequate solution due to insufficient protection of the existing structure and potential for future issues + extensive and cost prohibitive demolition required

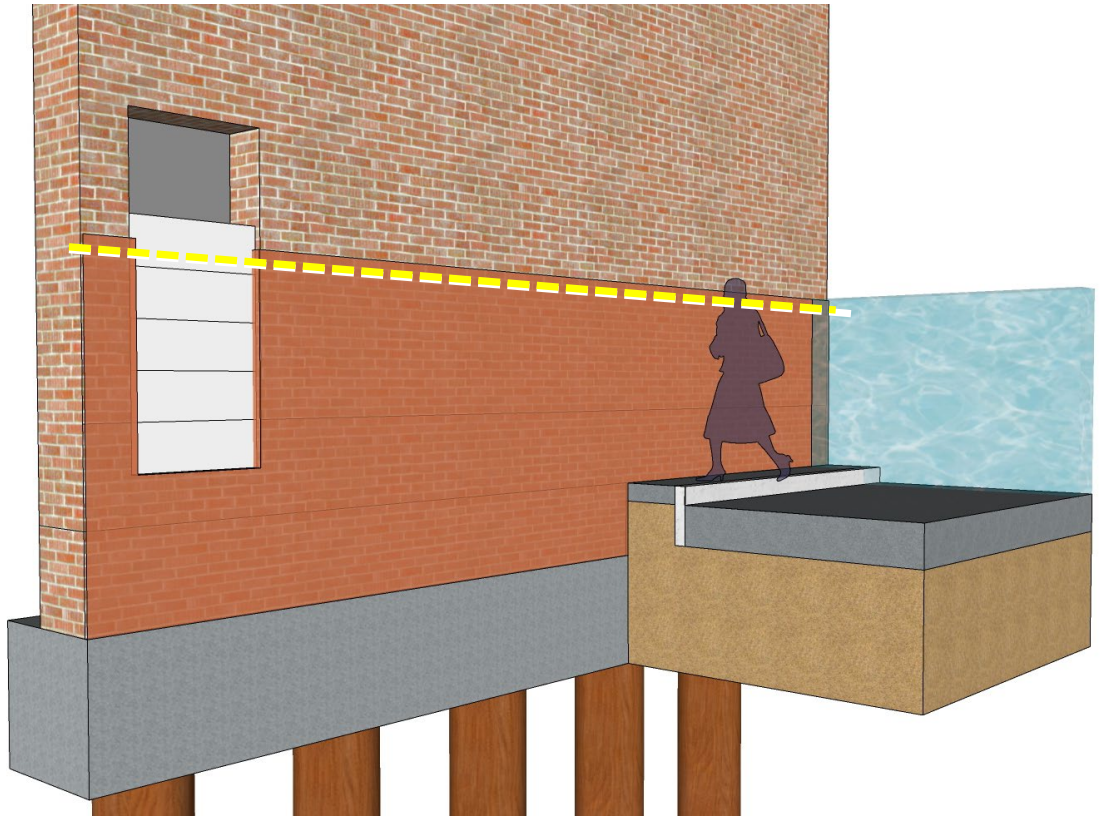


Strategy 3 – remove outer layer of existing brick, waterproof, install new brick

- Technically challenging
- Flush appearance
- Invasive, requires excavation of sidewalk
- Rise of freeze/thaw damage

Determined to be **structurally infeasible** by Thornton Tomasetti combined with extreme **technical challenges** around installation.

Protecting the historic walls
Dismissed Strategy 1



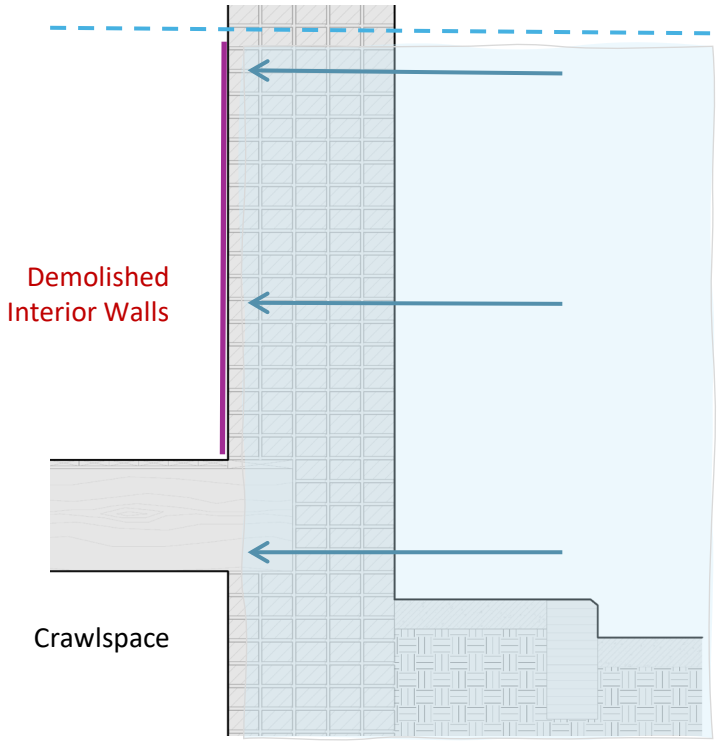
Strategy 1

- Apply opaque/semi-opaque fluid-applied waterproofing to face of exterior brick up to DFE.
- Provide fittings for stop logs at openings.

Challenges

- Significant detriment to appearance
- Loss of natural brick expression at street level
- Membrane left exposed and subject to damage

Protecting the historic walls
Dismissed Strategy 2



Extents of Interior Wall Demolition

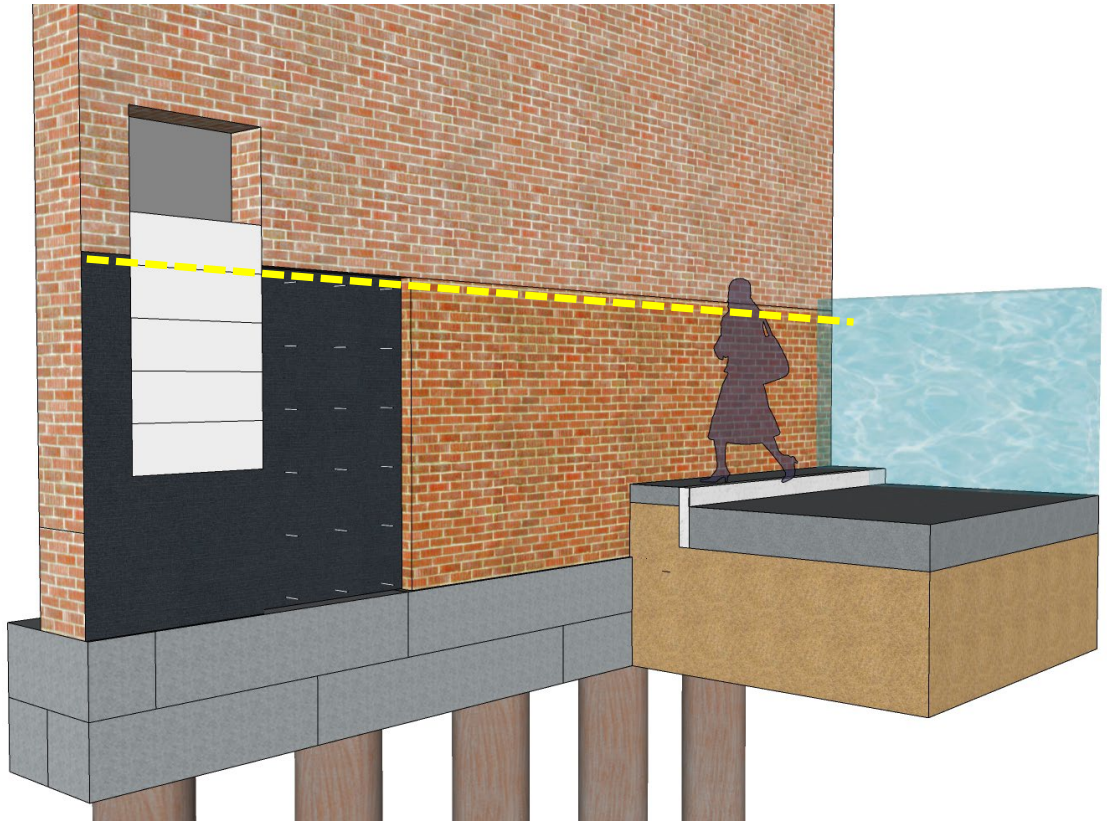
Strategy 2

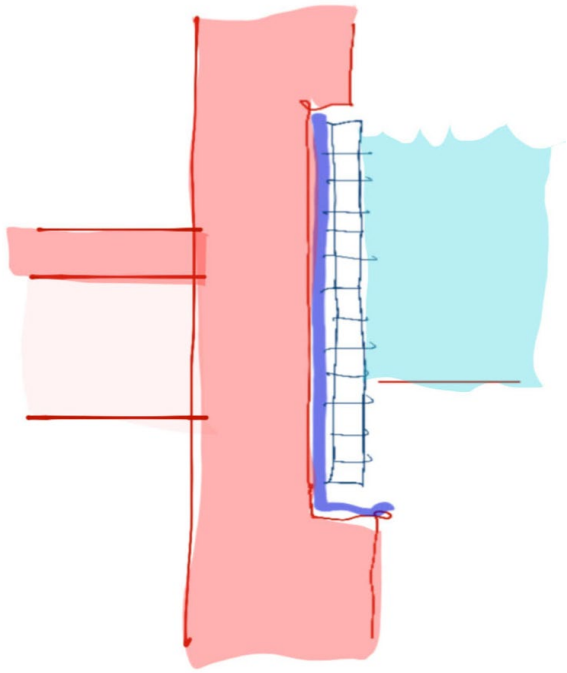
- Demolish all interior walls to apply a continuous new waterproofing membrane from the inside

Challenges

- Not feasible to maintain waterproofing continuity around timber floor structure
- Requires extensive demolition of all the interior walls along sleeper street to apply membrane to the interior
- Seawater exposure to the existing structural brick and timber beams degrades structural their integrity
- Water seepage into crawlspace is likely

Protecting the historic walls
Dismissed Strategy 3





Challenges

- Determined to induce torsional forces within the load-bearing masonry, and thus structurally infeasible
- Flush solution creates risk of freeze/thaw due to lack of drainage plane behind replaced brick

Strategy 3

- Remove outer wythe of brick, waterproof, and install new brick flush with existing façade
- Provide fittings for stop logs at openings.

7. Alignment with City of Boston's Schedule

SLEEPER STREET DESIGN COMPARISON

PREVIOUS DESIGN

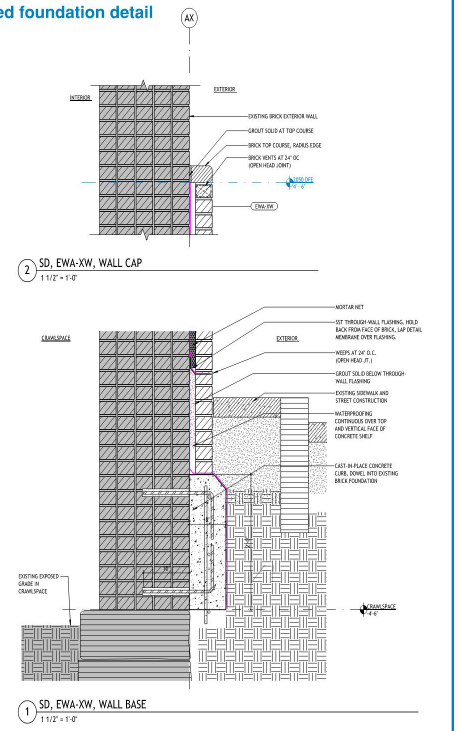
SIDEWALK WIDTH	5 feet on west side, 7 feet on east side
RAISED CROSSWALKS	2 provided
SPEED HUMPS	3 provided
BIKE LANE WIDTH	No bike lane provided
ON-STREET PARKING SPACES	20 provided
CIRCULATION PATTERN	Two-way

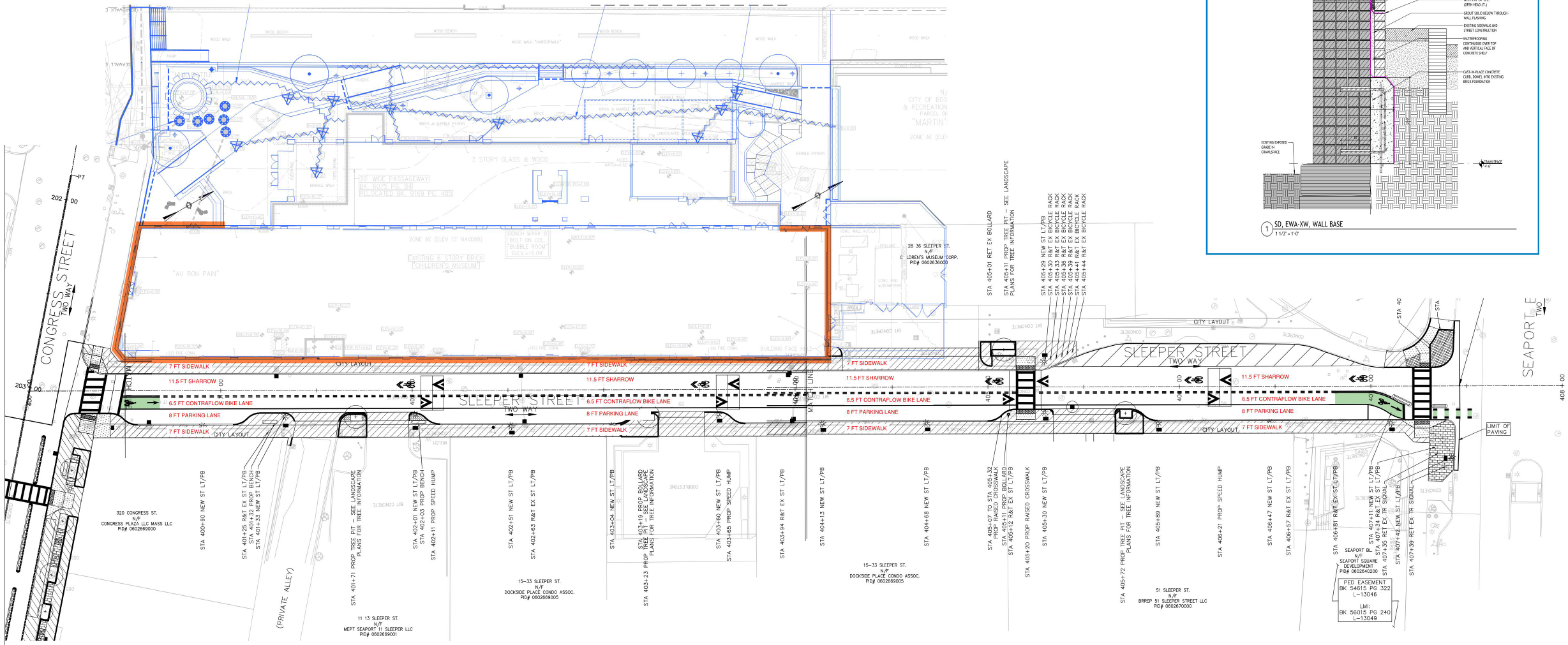
Sleeper Street City of Boston

Early Coordination

Extent of new brick shelf + waterproofing

Proposed foundation detail





UPCOMING PROCESS

NEXT STEPS

- **January - February 2025** — Continuing Stakeholder Engagement
- **March 2025** — Complete Design, Public Improvement Commission
- **April 2025** — Construction Advertising
- **Late Summer 2025** — Construction Start (precise phasing TBD)

Permits approval?

April 2026
Tentative start of Construction at Sleeper Street

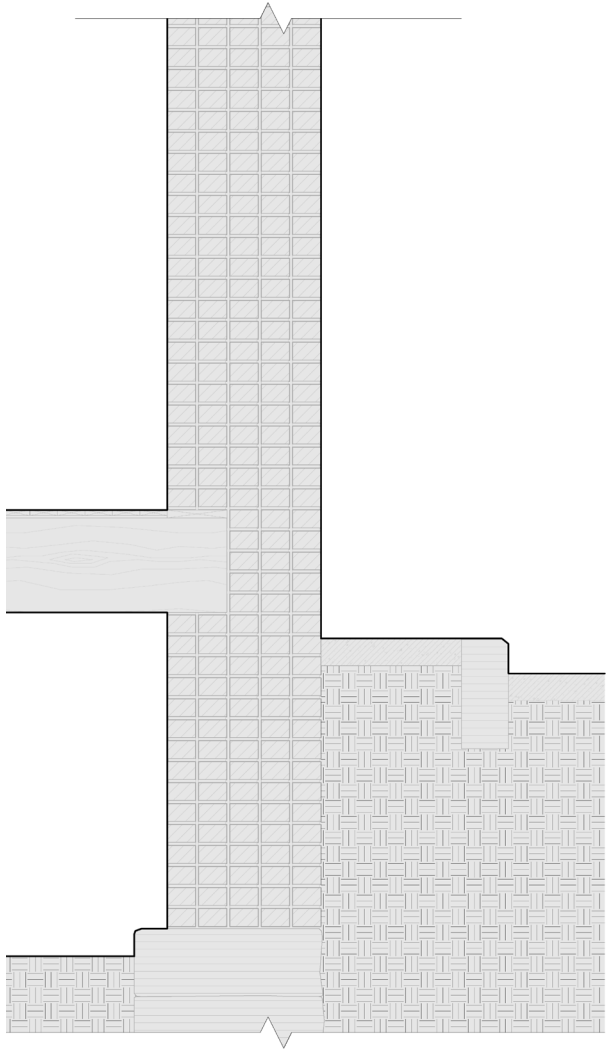
  - *Access to all residences and businesses will be maintained during the entire construction period.*
  - *A full construction management and traffic management plan will be prepared by the selected contractor.*
  - *Pre-construction notification will be provided to the community.*
  - *Construction updates will be provided throughout the duration of the work.*

- **Spring 2028** — Construction End
  - *Substantial completion by the end of 2027 expected.*

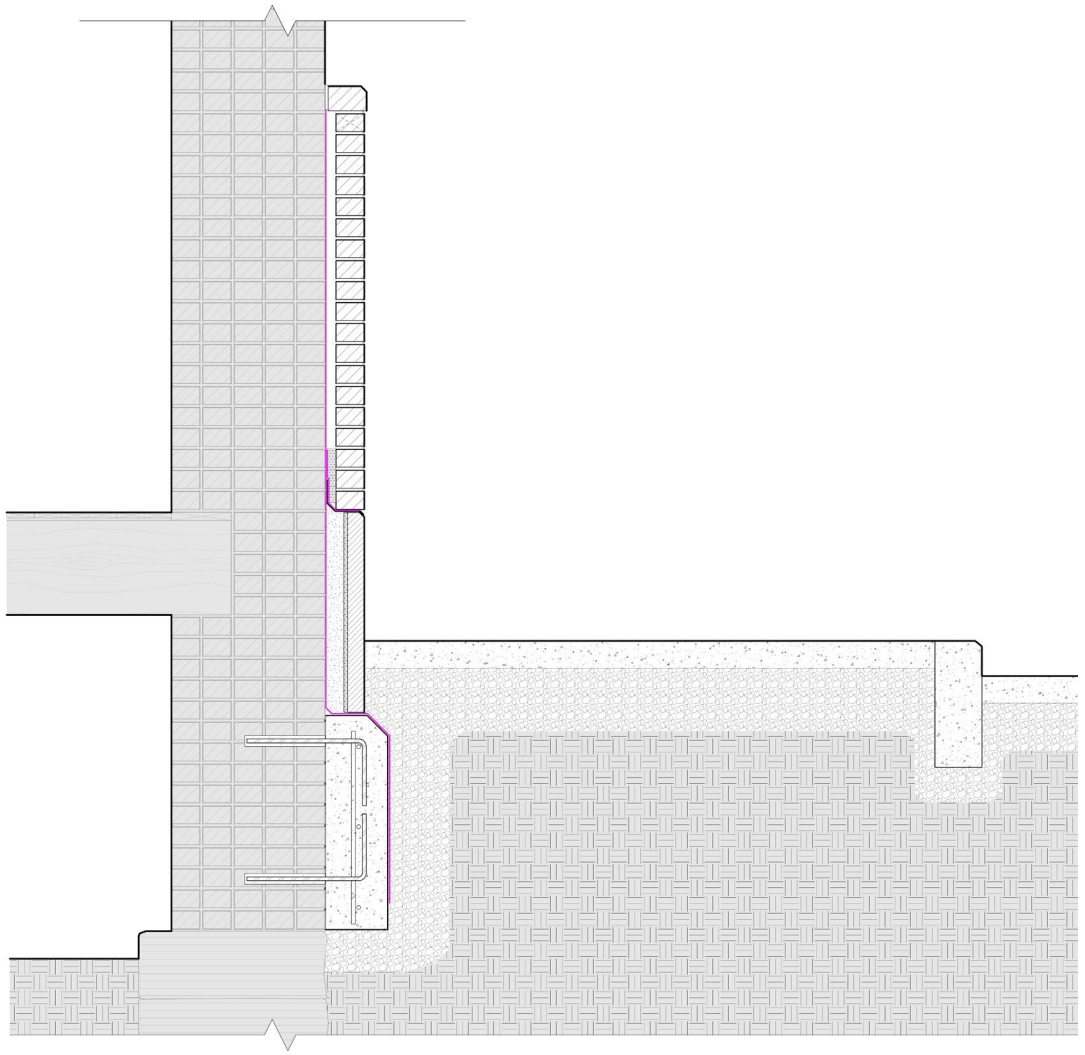
8. Next Steps

9. Appendix

Proposed Strategy – General Approach



Existing Condition



Proposed Approach

- Add waterproofing over existing brick, add new cladding to DFE
- Provide fittings for stop logs at openings.

Phase 1: Protecting the historic walls

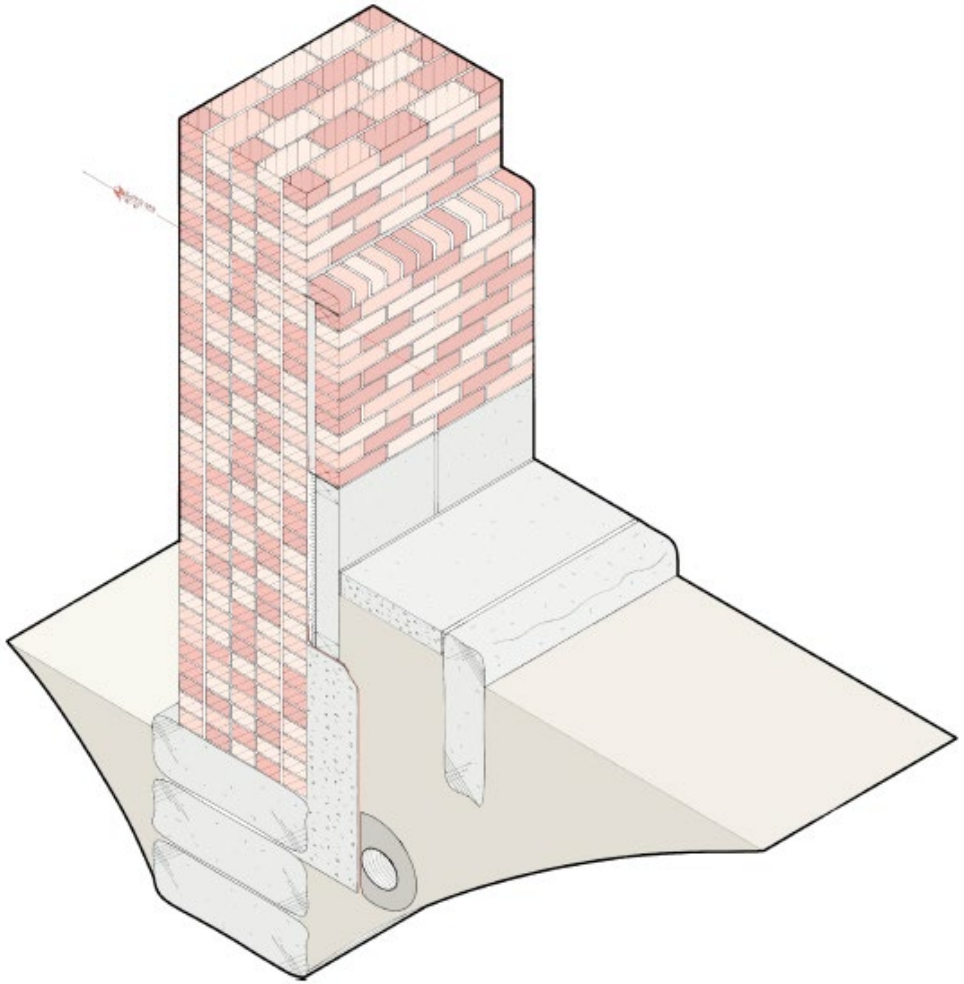
Wall Design Development – Material Approaches

Finalized Approach

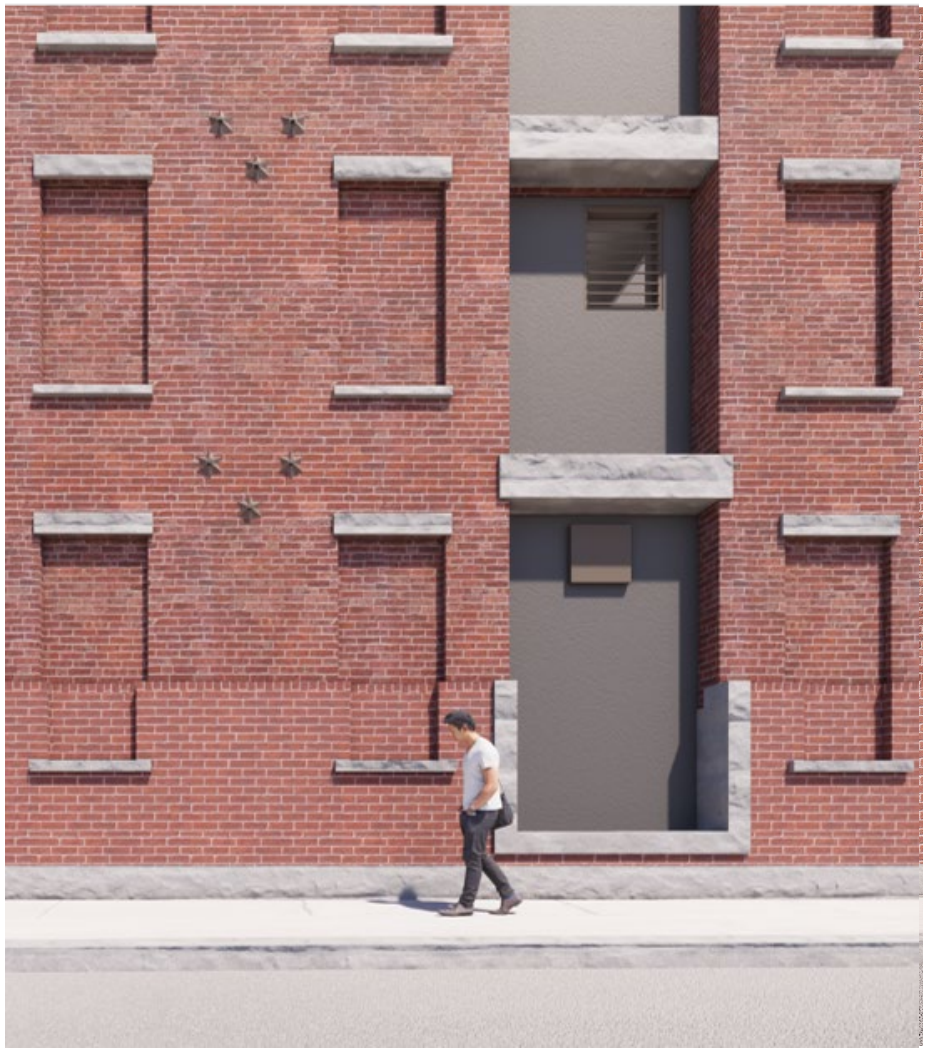
Description

Pros:

Cons:



Conceptual Section



Rendered Elevational View

Phase 1: Protecting the historic walls

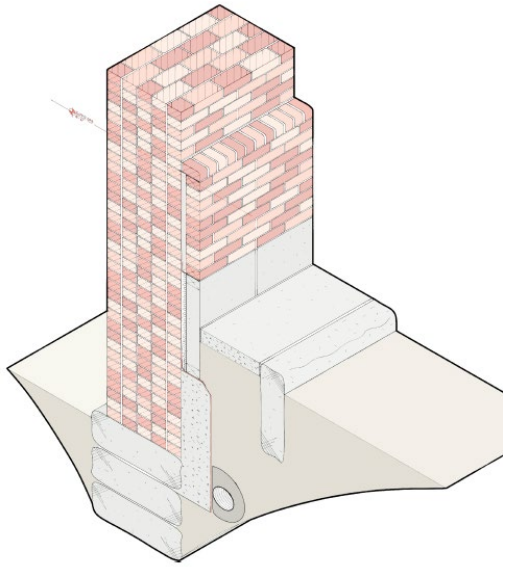
Wall Design Development – Material Approaches

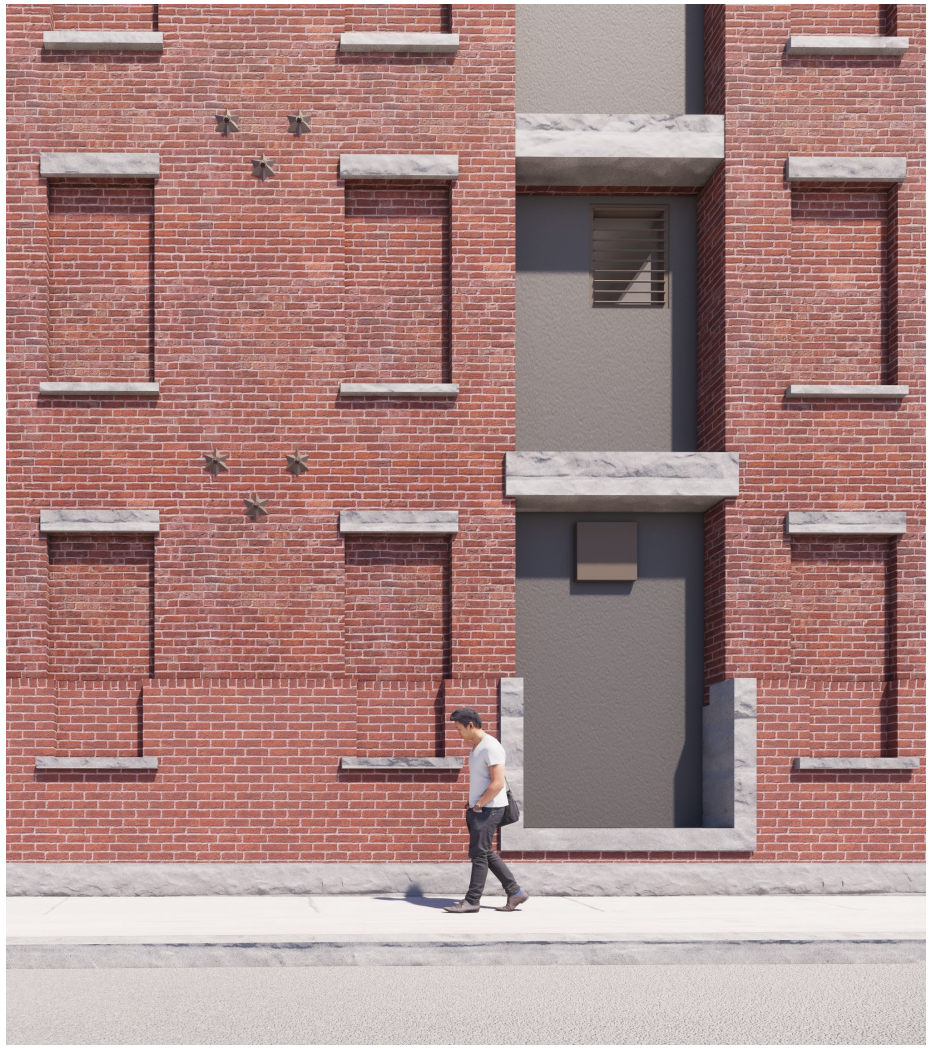
Finalized Approach

Description

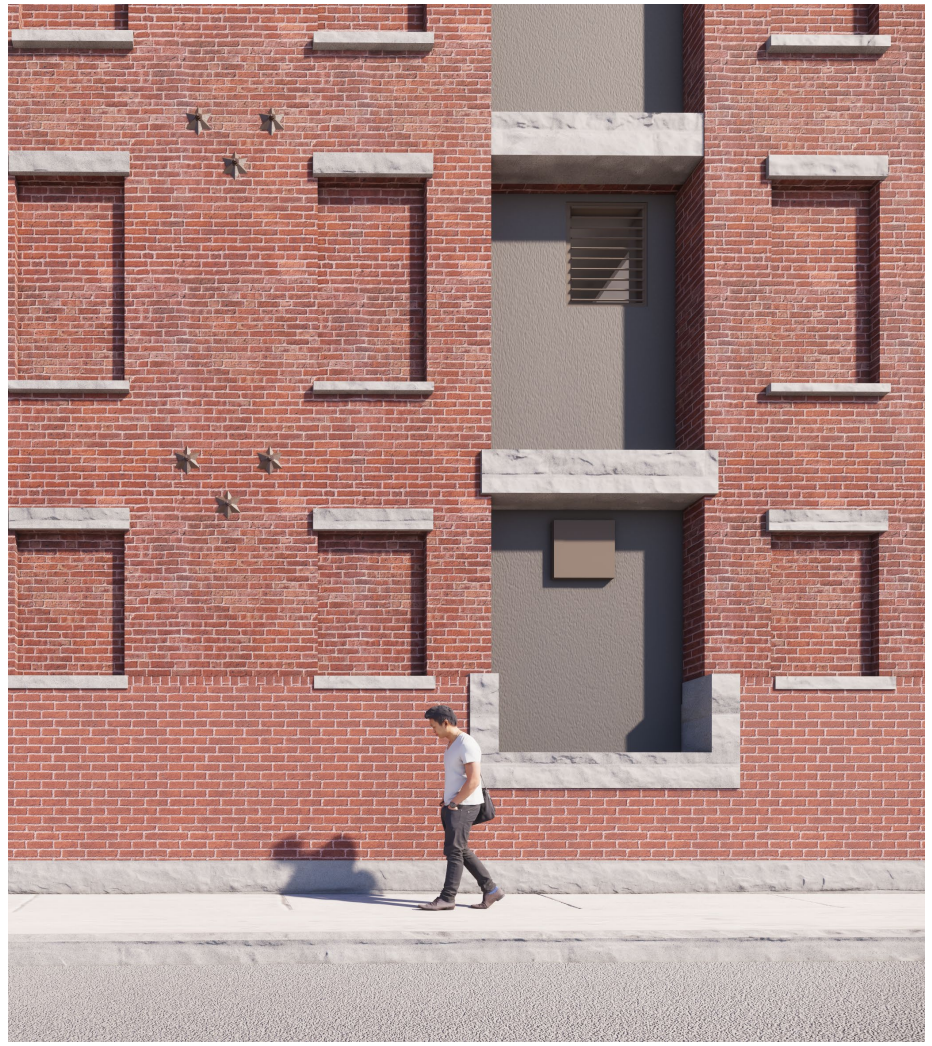
Pros:

Cons:





Option A



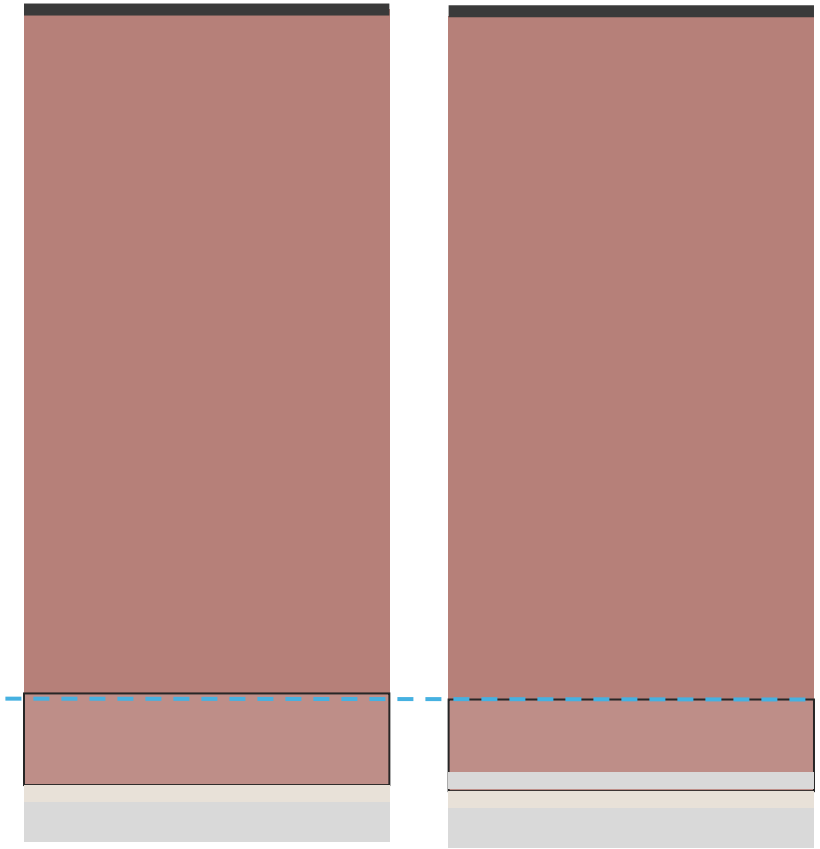
Option B

Phase 1: Protecting the historic walls

Wall Design Development – Material Approaches

Sleeper Steet Façade

Conceptual Approaches Currently Being Evaluated

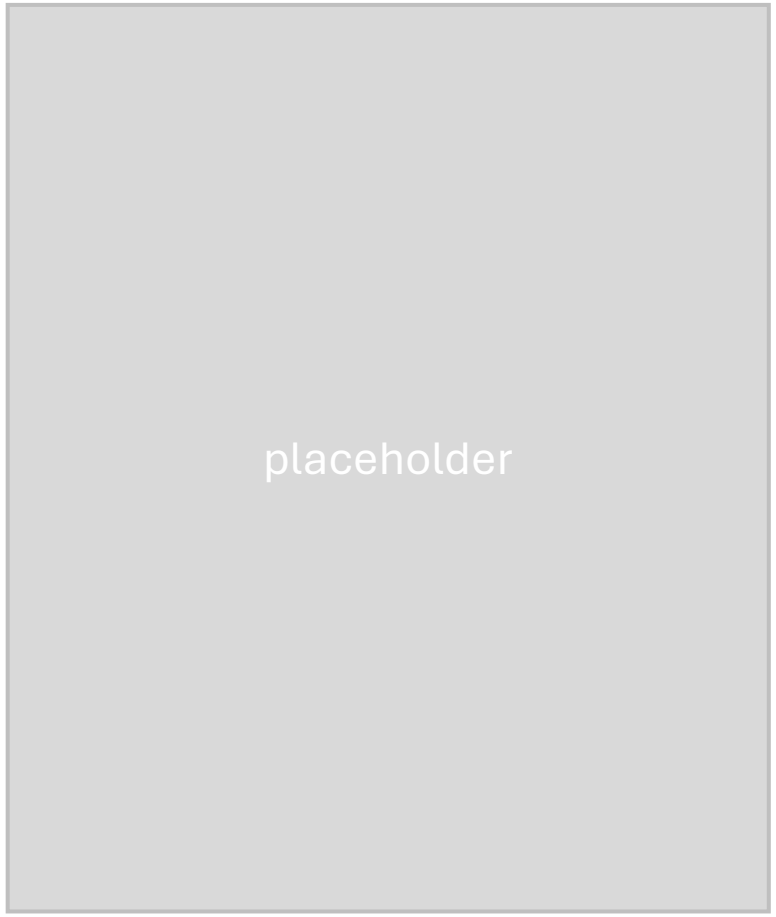


Brick Base

Brick With Stone Trim

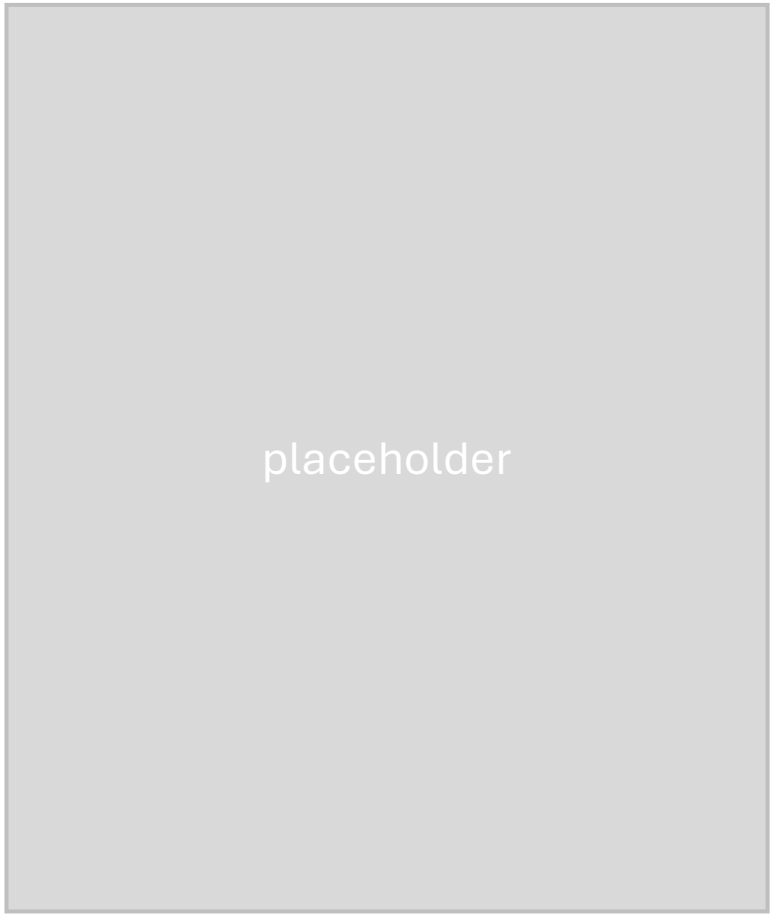
Phase 1: Protecting the historic walls

Wall Design Development – Material Approaches



Corner Detail

Window Opening Transition



Door Opening Transition