NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION IN PARTNERSHIP WITH THE
NEW YORK CITY DEPARTMENT OF PARKS & RECREATION AND THE
MAYOR'S OFFICE OF RECOVERY & RESILIENCY

EAST SIDE COASTAL RESILIENCY:

PROJECT AREA TWO FEASIBILITY STUDY AND DESIGN CRITERIA

NYC Mayor's Office of Recovery and Resiliency

NYC DDC Department of Design and Construction

NYC Parks

PROJECT ID. SANDRESM1

APRIL 8, 2015

Overview

East Side Coastal Resiliency Overview

Key Issues and Decisions

Challenges and Constraints

Review of Project Area Two Feasibility Study

Summary of Estimated Costs

Next Steps

East Side Coastal Resiliency Overview

EAST SIDE COASTAL RESILIENCY - STUDY AREA LOCATION MAP

PROJECT ID: SANDRESM1
Task No.1: Feasibility Study and Pre-Scoping Services for East Side Coastal Resiliency

East Side Coastal Resiliency
Project Goals

Design Flood Protection Measures which:

- Meet HUD *Rebuild by Design* funding requirements
- Increase Protection against Coastal Flooding and Sea Level Rise
- Create Vibrant Urban Spaces through Resiliency Investment
- Allow for Future Enhancements to the Protection System
- Increase Community Resiliency
- Improve Access to the Park and East River Waterfront
- Meet Project Capital Budget and Implementation requirements

Project Challenges

Storm Event Design Criteria (Surge and Rainfall)

Interceptor Flooding

MGP Contamination

Project Area One and Two Constraints

Cost/Budget Implications

Challenges and Constraints: Flood Event Design Criteria

Gain Consensus on Design Criteria for Project Areas One and Two

- 100-year surge (1% annual chance of occurrence) or 500-year surge (0.2% annual chance of occurrence) for Project Areas One and Two
- Sea Level Rise (SLR) in accordance with New York City Panel on Climate Change (NPCC) 2015 Report
  - 2050s or 2100 SLR
  - Low estimate, middle range, or high estimate projections
  - Address SLR with adaptability in design
- Wave Overtopping

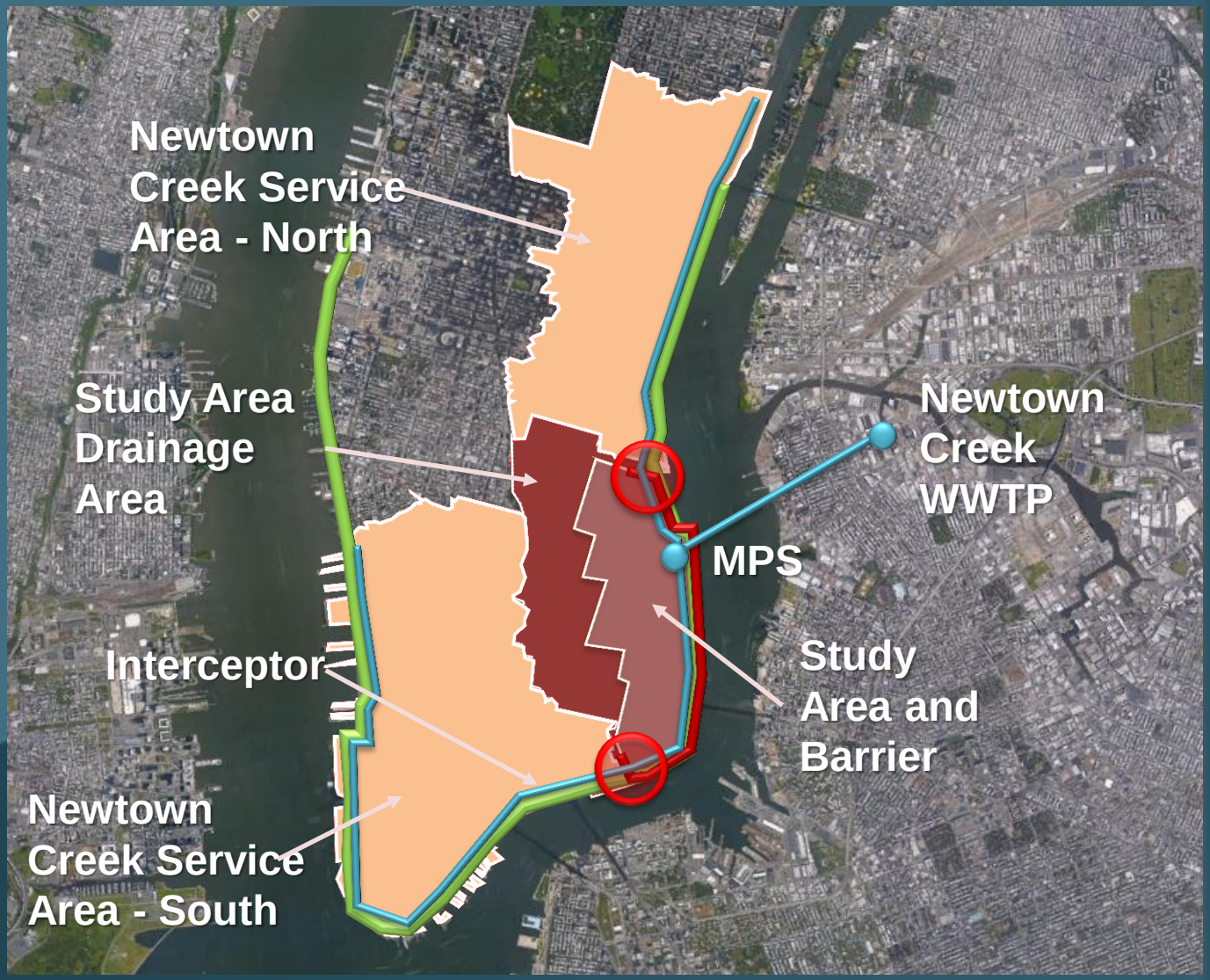
Challenges and Constraints: Study Area - Interior Drainage

Need Confirmation of Design Criteria:

- Return Rainfall Event

Meeting with DEP (4/16) to discuss:

- Out-of-Study-Area Flooding Mitigation Approach
- Pumping/ Conveyance Options
- Duration of Closure



Challenges and Constraints: MGP Contamination

MGP contamination anticipated from 20 feet below grade

Additional project cost to be reimbursed by Con Edison

Challenges and Constraints: MGP Contamination

MGP contamination anticipated from 5 to 10 feet below grade

Additional project cost to be reimbursed by Con Edison

Challenges and Constraints: Project Area One

Limited Viable Alignments for Protection Measures

Existing Park Features

Williamsburg Bridge Security

Emergency Access Road

Con Edison Transmission Line

Challenges and Constraints: Project Area Two

Con Edison East River Generating Station

Con Edison Transmission Line

Captain Patrick J. Brown Walk Platform

FDR Drive

Elevated FDR Drive

Stuyvesant Cove Park

Project Area Two Feasibility

Feasibility Study Purpose

- Build upon the "BIG U" *Rebuild by Design* Proposal and initiatives to develop understanding of feasibility of flood protection measures in Project Area Two

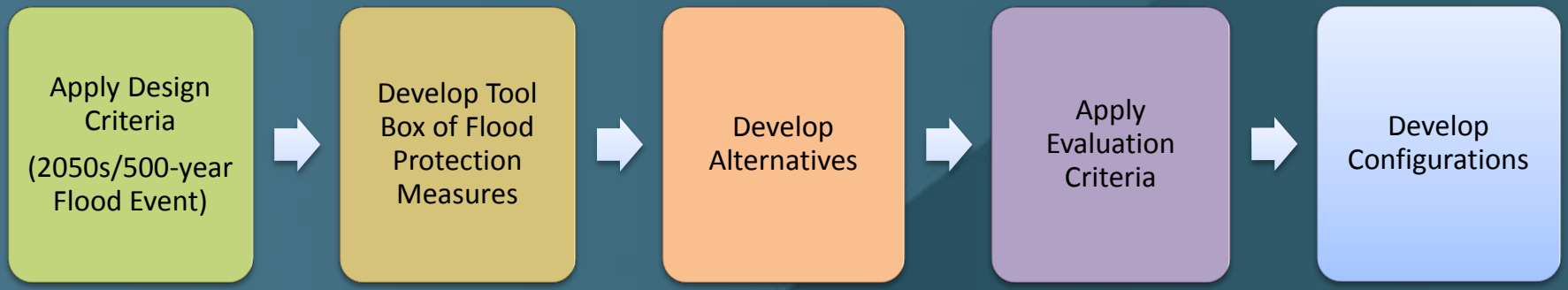
Feasibility Study Goal

- Develop at least one technically feasible alternative for providing flood protection for 2050s 500-year flood event within the available capital budget

Feasibility Outcome

- Three technically feasible configurations of alternatives were developed:
  - Lowest Cost
  - Highest Reliability
  - Greatest Urban Design Potential
- Cost Range $150 million to $230 million

Feasibility Scope and Approach



The Design Criteria is the First Critical Step that will Drive the Development of Alternatives and Costs in both Project Area One and Project Area Two

Feasibility Scope and Approach

Project Area Two Overview: Reach A through E

Feasibility Scope and Approach
Key Design Requirements

Apply Design Criteria

(2050s/500-Year Flood Event)

Feasibility Study design requirements include:

- Design for 2050s 500-year flood event
- Prevent surge from entering the system and control wave overtopping
- Analyze and develop alternatives to manage interior drainage
- Design resiliency into the system such that surge events exceeding design do not result in catastrophic failure

Basis of Design Elevation: Storm Surge and Hydraulics

Apply Design Criteria (2050s/500-Year Flood Event)

Sea Level Rise	2015	2050s			2100		
Surge Event		10th Percentile (8 in.)	50th Percentile (16 in.)	90th Percentile (30 in.)	10th Percentile (15 in.)	50th Percentile (36 in.)	90th Percentile (75 in.)
500-year	13.9ft	14.6ft	15.2ft	16.5ft	15.2ft	16.9ft	20.2ft
100-Year	10.9ft	11.6ft	12.2ft	13.4ft	12.2ft	13.9ft	17.2ft

Notes:

1. Sea Level Rise Projections taken from the NPCC 2015 Report.
2. All elevations shown in NAVD88 datum.
3. Elevations shown do not include wave overtopping which adds 1.5ft to 4ft to the elevation of the flood protection measures.

Basis of Design Elevation: Storm Surge and Hydraulics

Apply Design Criteria (2050s/500-Year Flood Event)

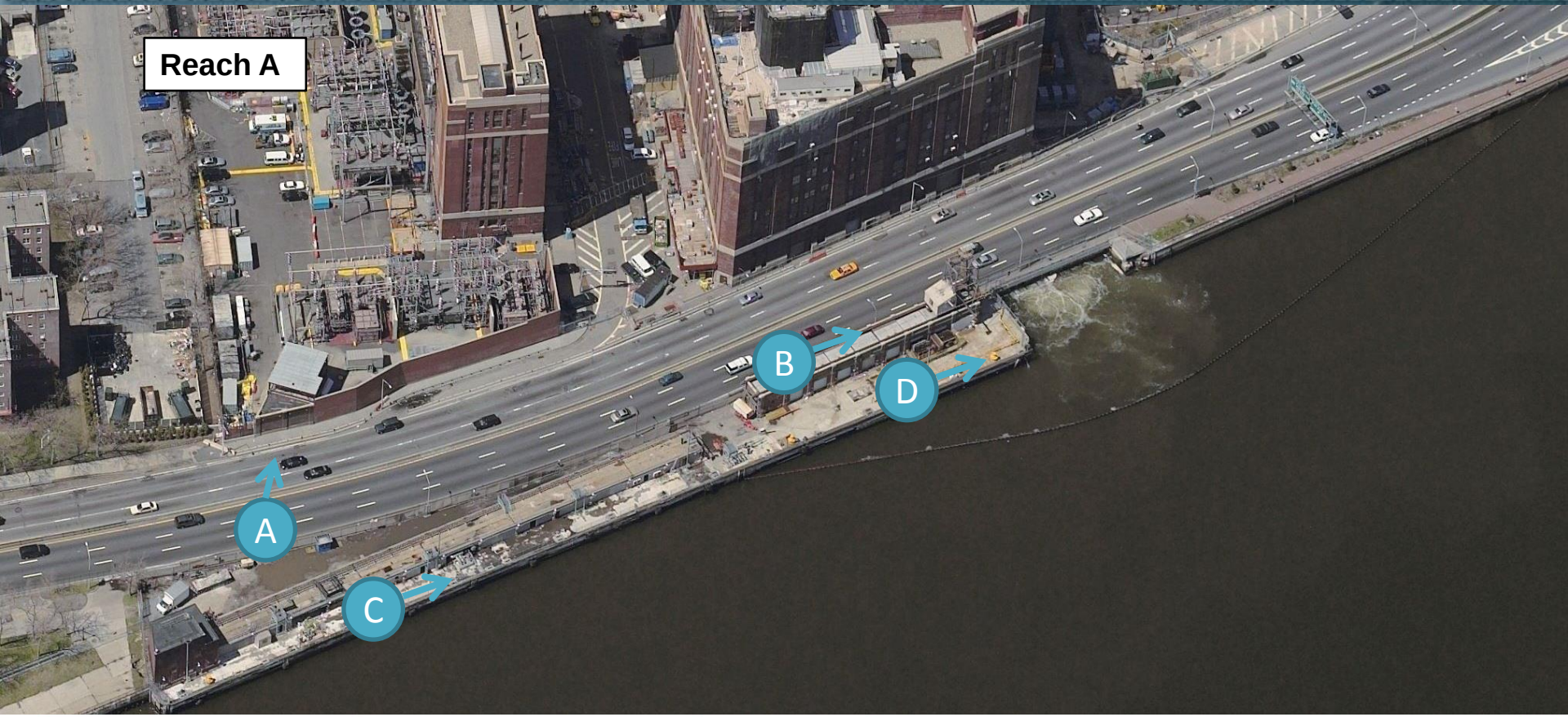
Feasibility Design Criteria Summary

- FEMA Preliminary FIRM 500-Year Flood Elevation = +13.9ft NAVD88
- NPCC 2050s 90th Percentile SLR = 30in.
  - 500 year Flood Elevation + SLR = +16.5ft NAVD88
- FEMA Preliminary FIRM Storm Induced Waves = 1.5ft to 4ft
  - 500-year Flood Elevation + SLR + Storm Induced Waves = +18ft to +21ft NAVD88
- Elevation used for Feasibility Study = +20.0ft NAVD88

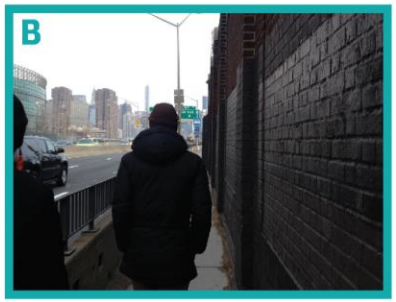
Project Area Two Feasibility Design Height (2050s/500-Year Flood Event) = +20.0ft NAVD88

Reach A - Con Edison East River Complex
East 13th Street to East 15th Street

Develop Alternatives

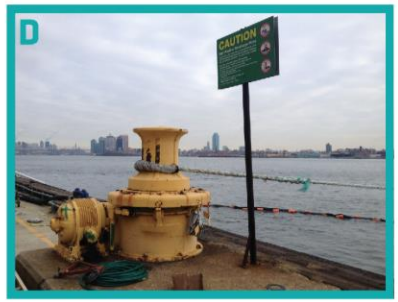


FDR



30" NARROWS ALONG CON-ED HEAD HOUSE

CON-ED RECEIVING PIER



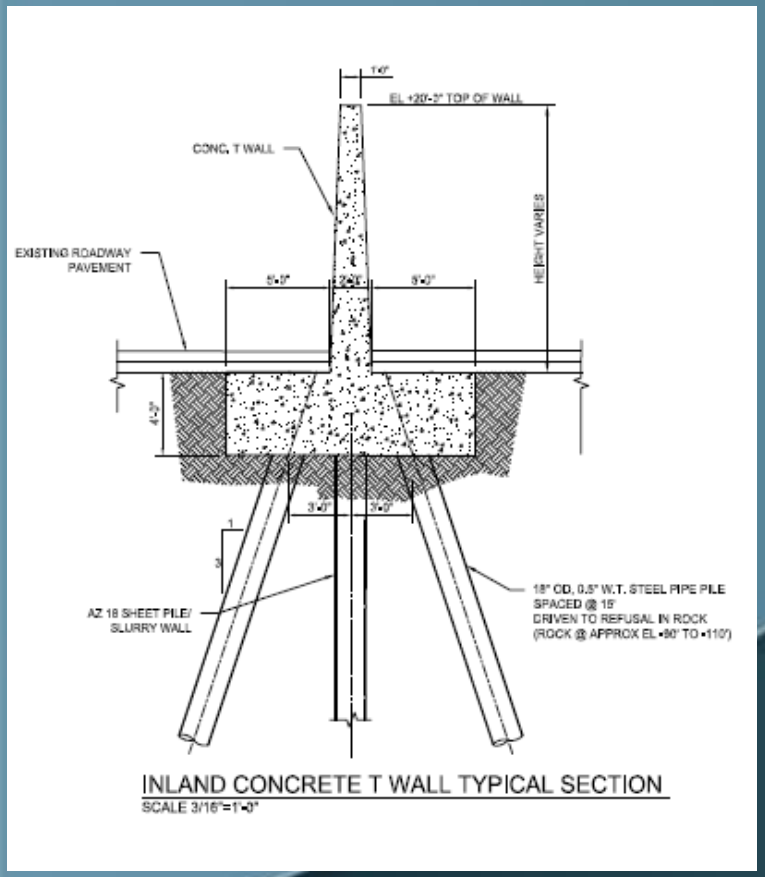
DISTANT VIEWS TO U.N. AND EAST RIVER

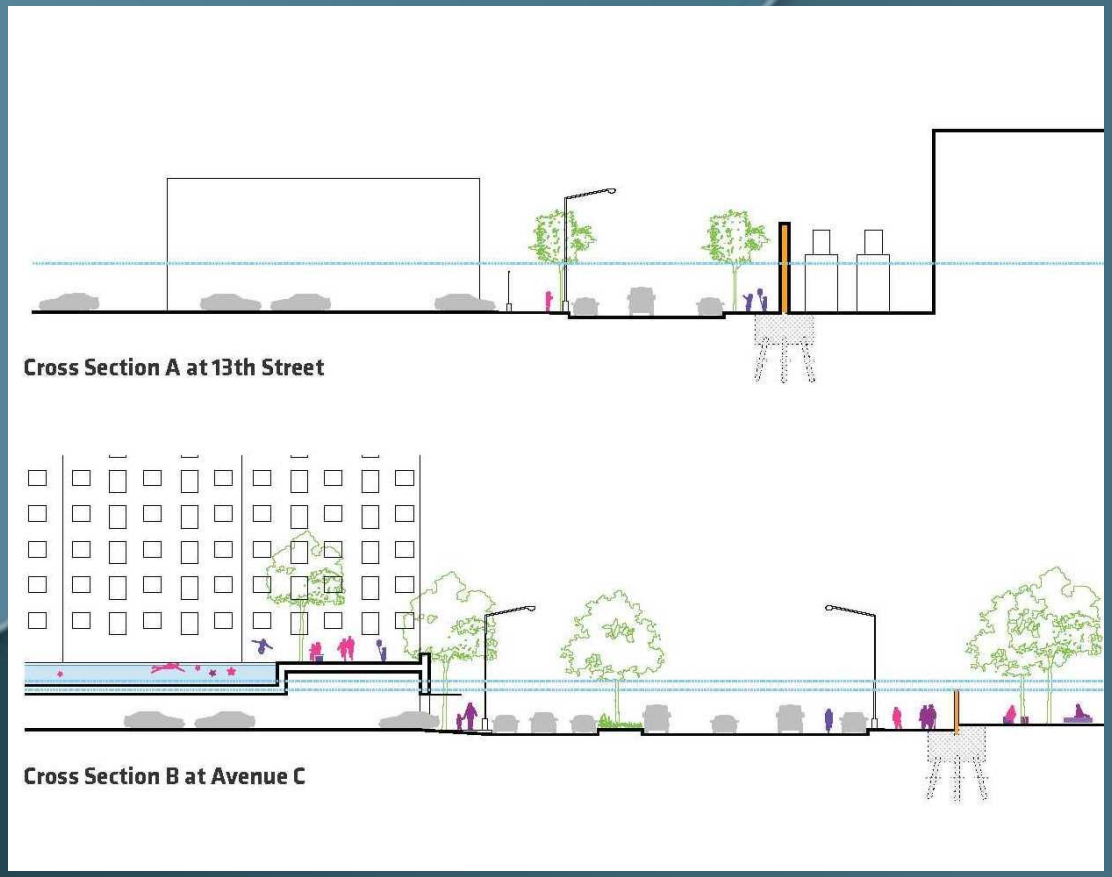
Reach A - Con Edison East River Complex Preliminary Alignments

Develop Alternatives

Reach A - Con Edison East River Complex Concrete T-Wall

Develop Alternatives

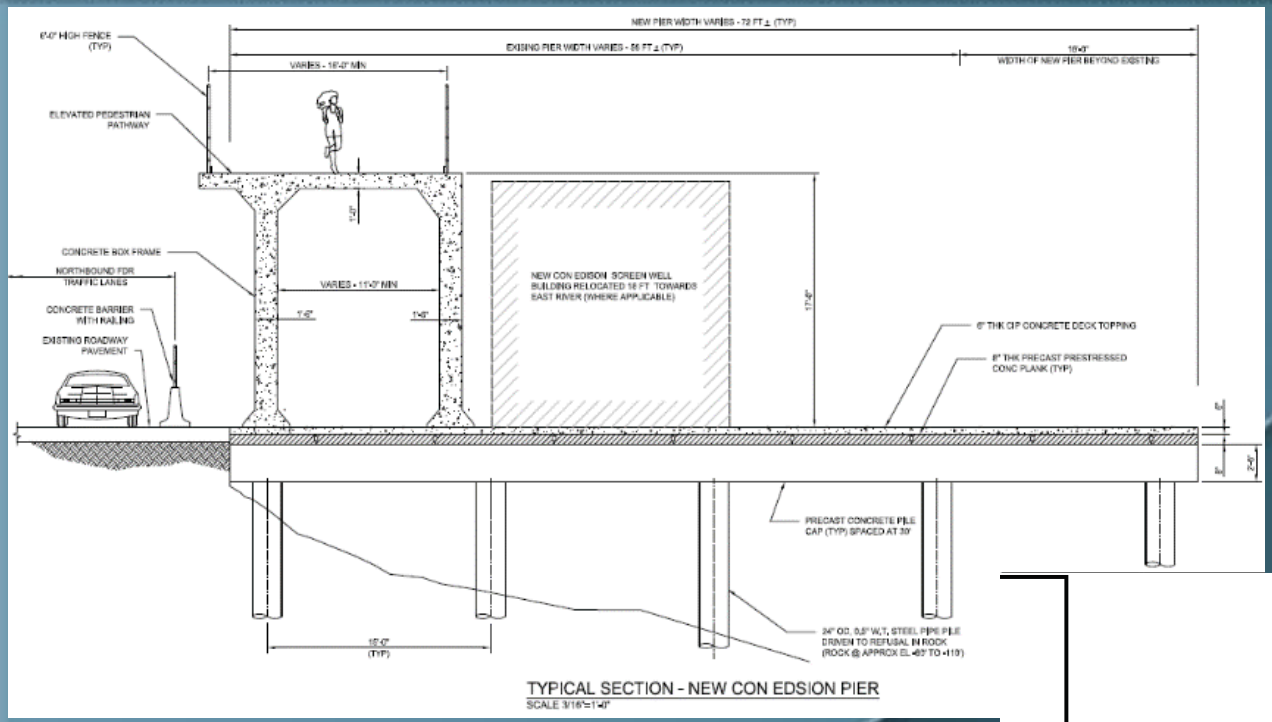




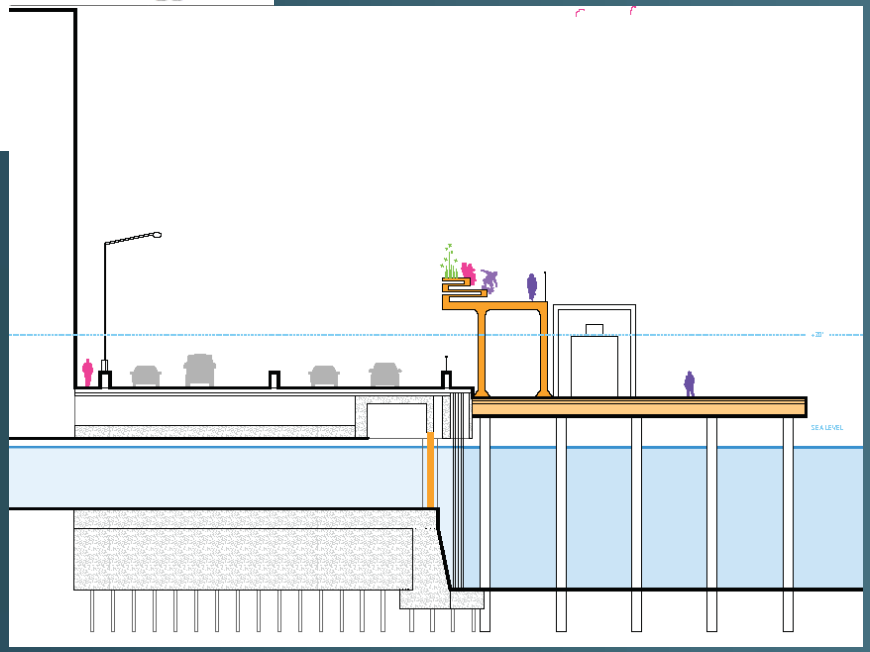
Reach A
Alternative 1

Reach A - Con Edison East River Complex
New Con Edison Pier

Develop Alternatives



Reach A
Alternative 2



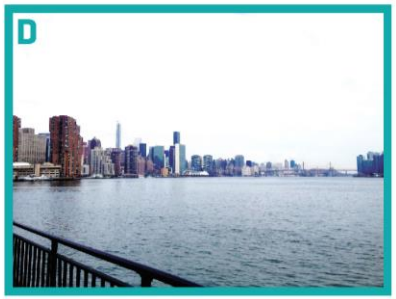
Reach B - Captain Patrick J. Brown Walk
East 15th Street to East 18th Street

Develop Alternatives

CON-ED PARKING LOT

FDR DRIVE

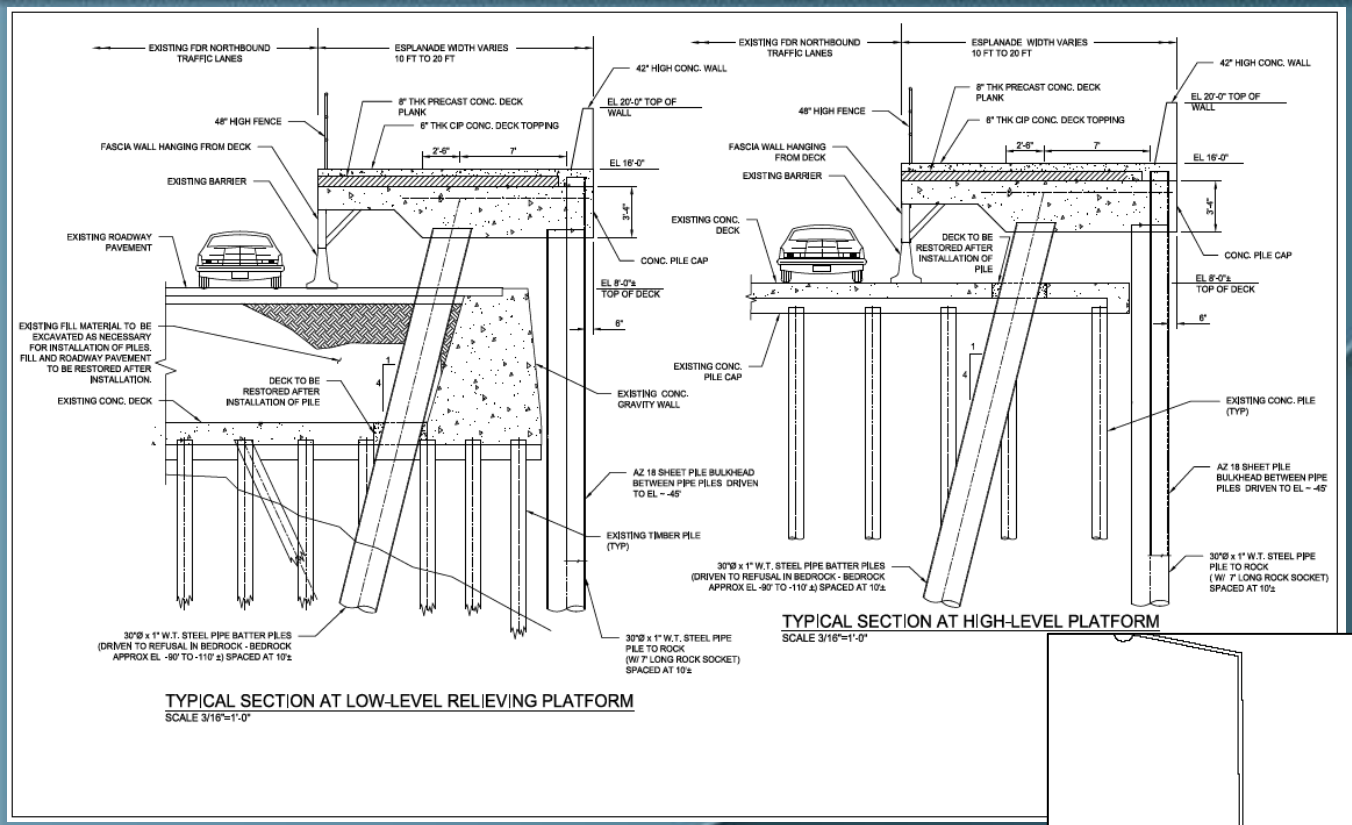
CAPT. PATRICK J BROWN WALK



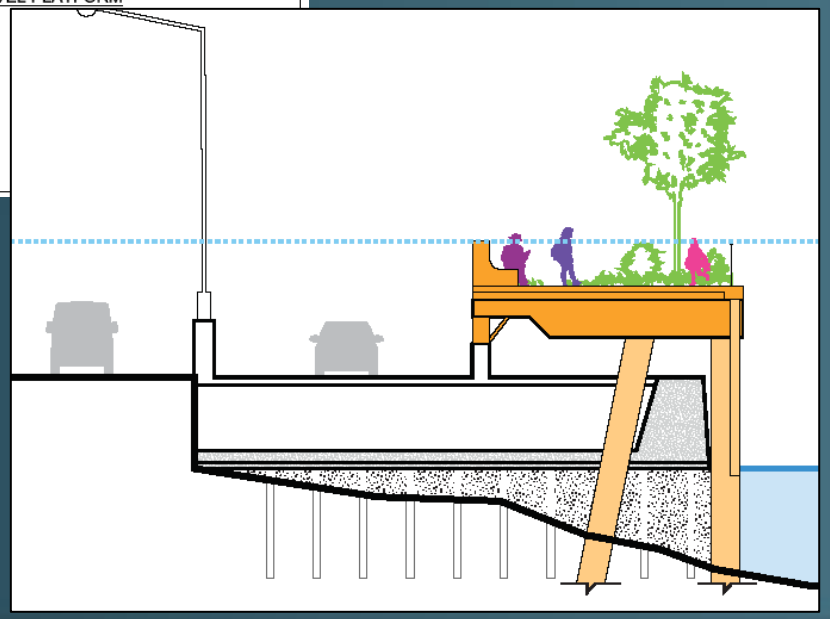
DISTANT VIEWS TO U.N. AND EAST RIVER

Reach B - Captain Patrick J. Brown Walk Pile Supported Flood Wall

Develop Alternatives

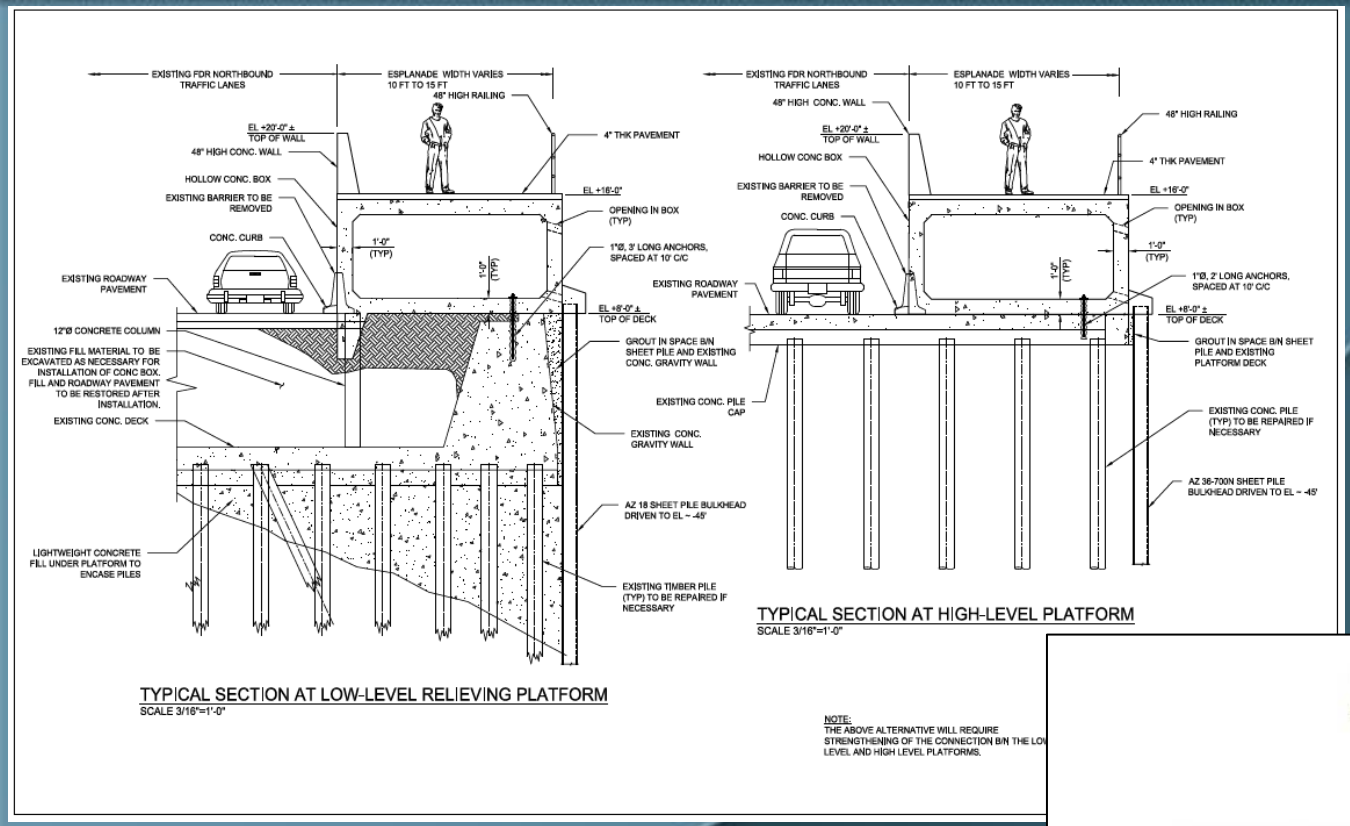


Reach B
Alternative 1

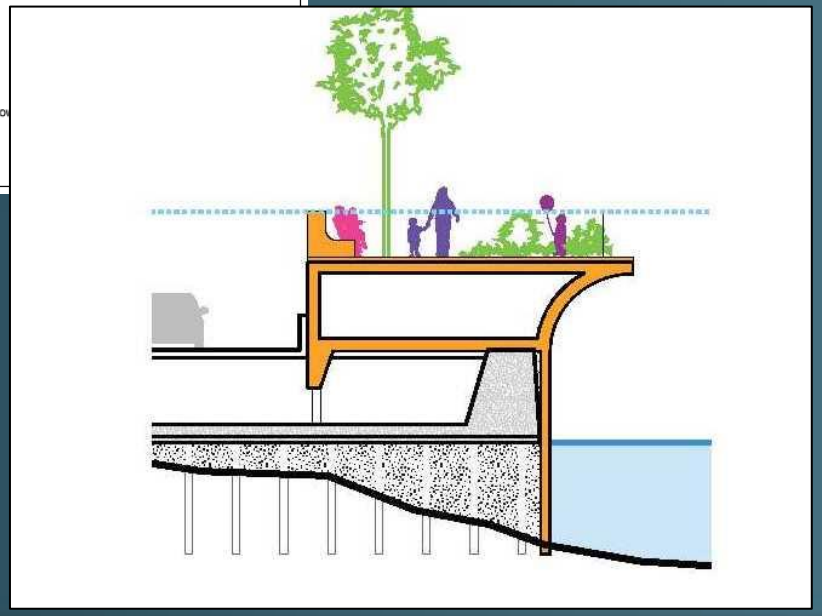


Reach B - Captain Patrick J. Brown Walk Concrete Box Structure

Develop Alternatives



Reach B
Alternative 2



Reaches C/D – Elevated FDR Drive Stuyvesant Cove Park to East 23rd Street

Develop Alternatives

AVENUE C

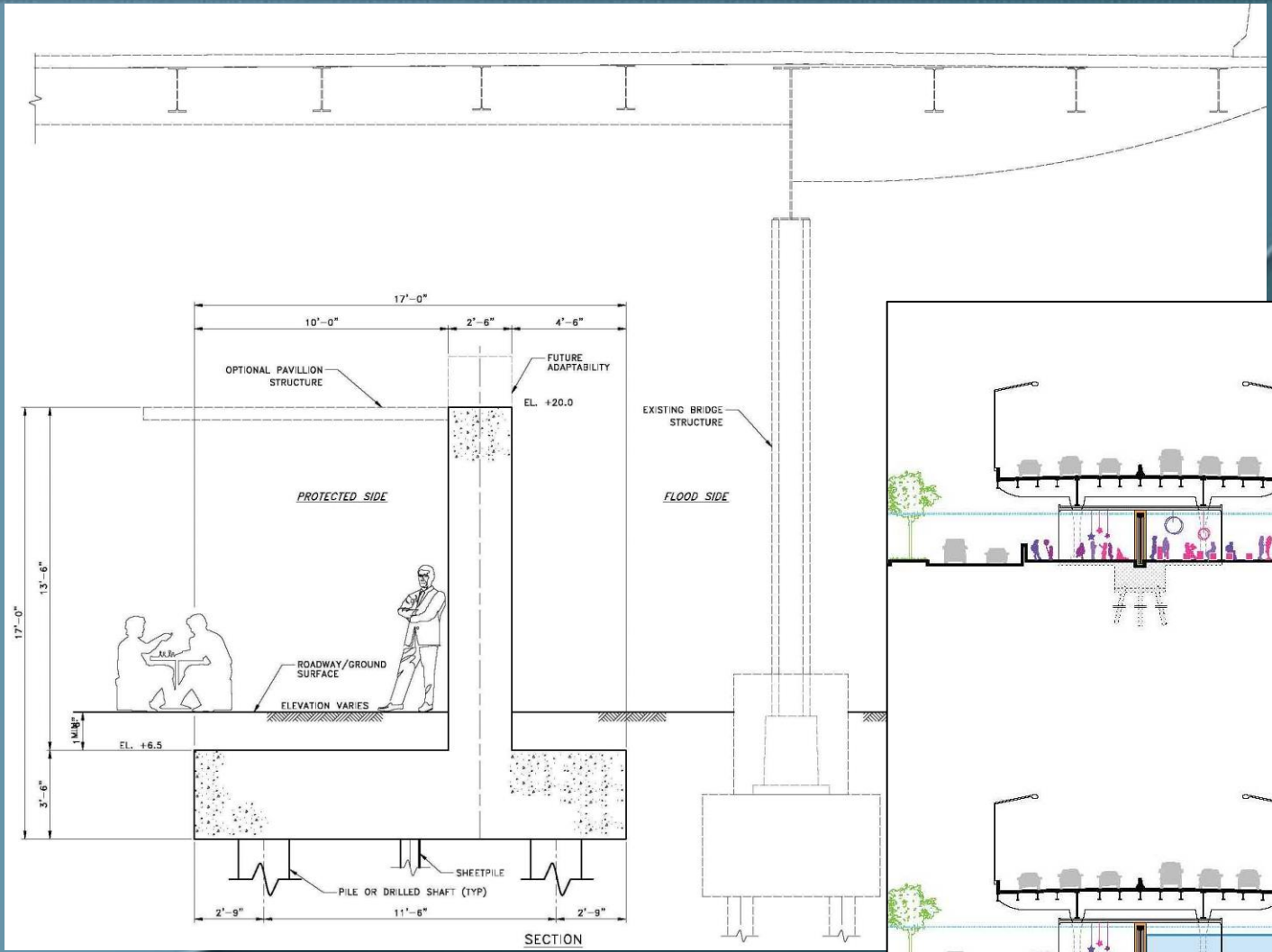
UNDER-FDR

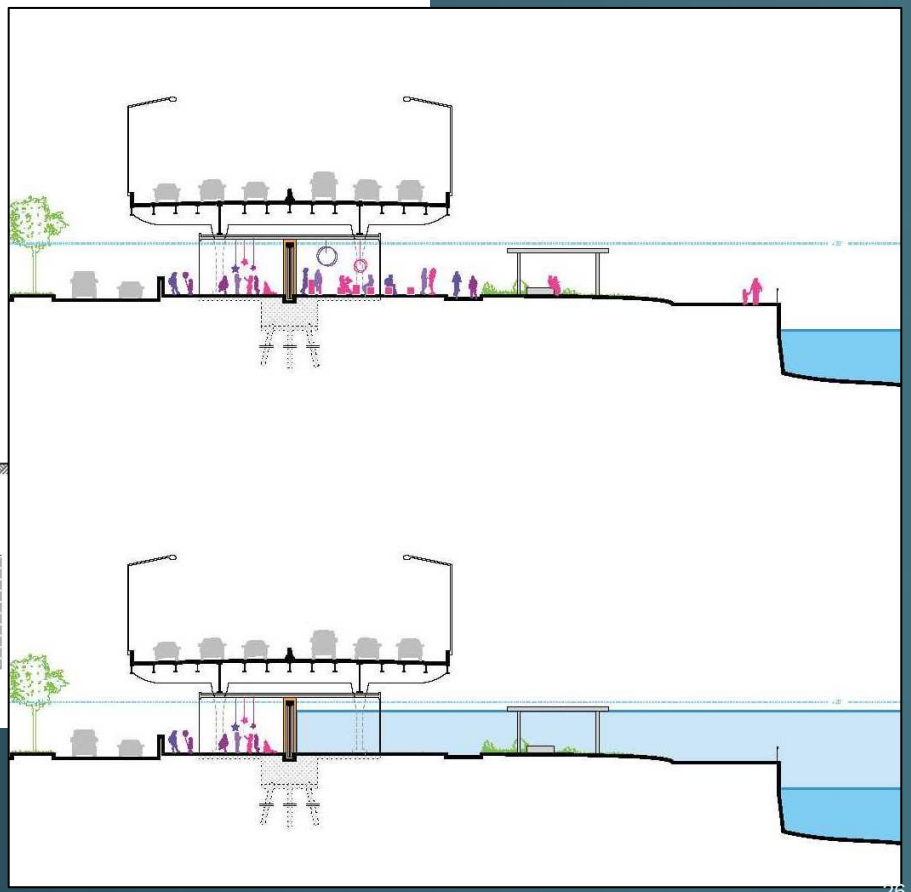
BIKE PATH

STUYVESANT COVE PARK

Reaches C/D – Elevated FDR Drive T-Wall / Pavilions

Develop Alternatives

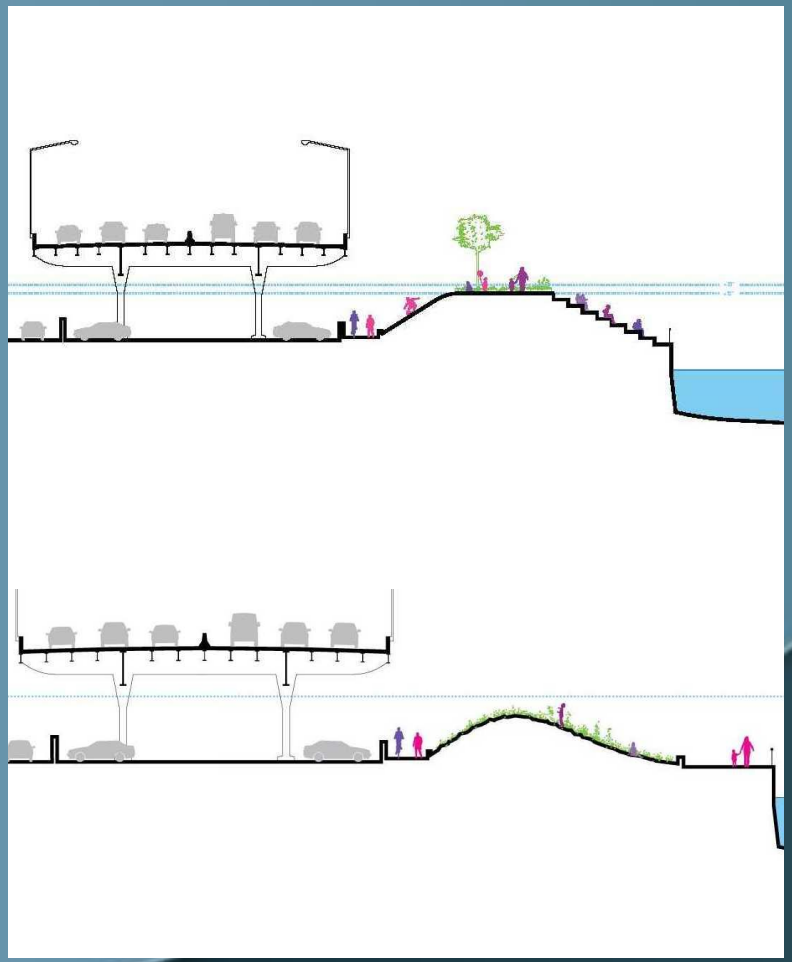


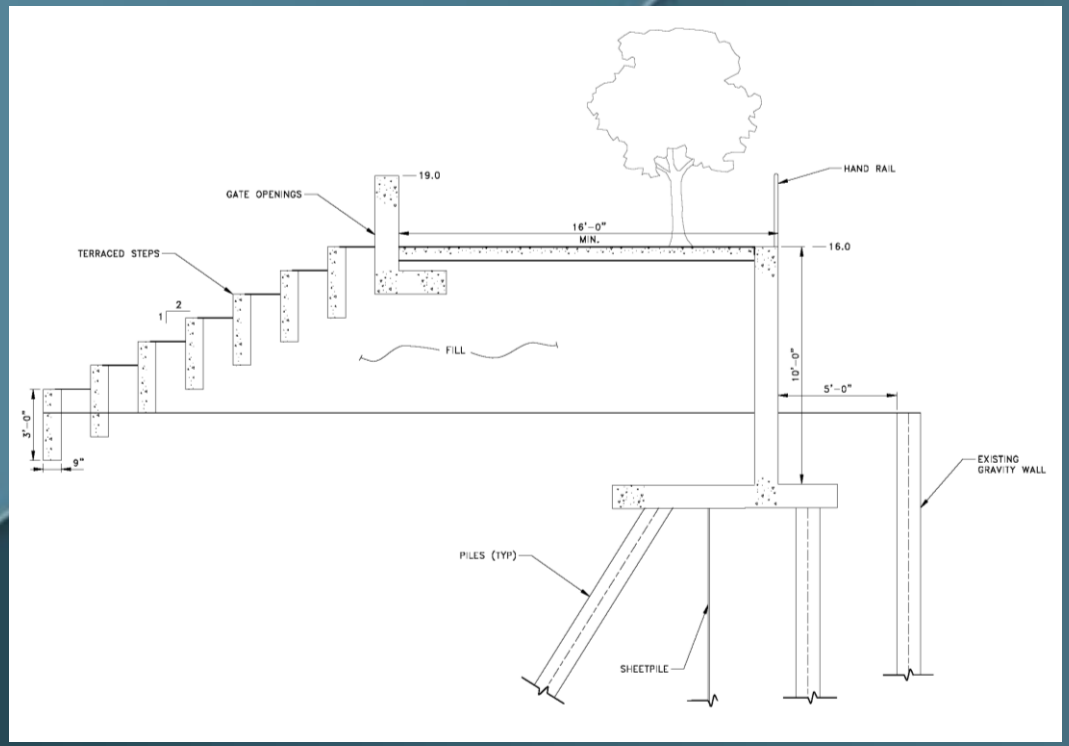


Reach C/D
Alternative 1

Reaches C/D – Elevated FDR Drive Elevated Park

Develop Alternatives

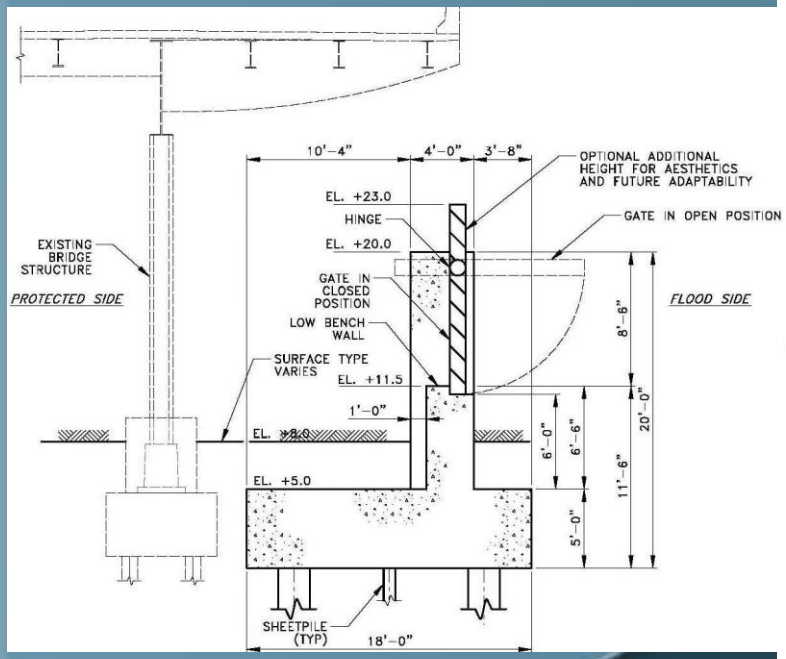




Reach C
Alternative 2

Reaches C/D – Elevated FDR Drive Swing Down Gates

Develop Alternatives



Reach C/D
Alternative 3

Reach E - East 23rd Street

Develop Alternatives

23RD STREET LOOKING WEST

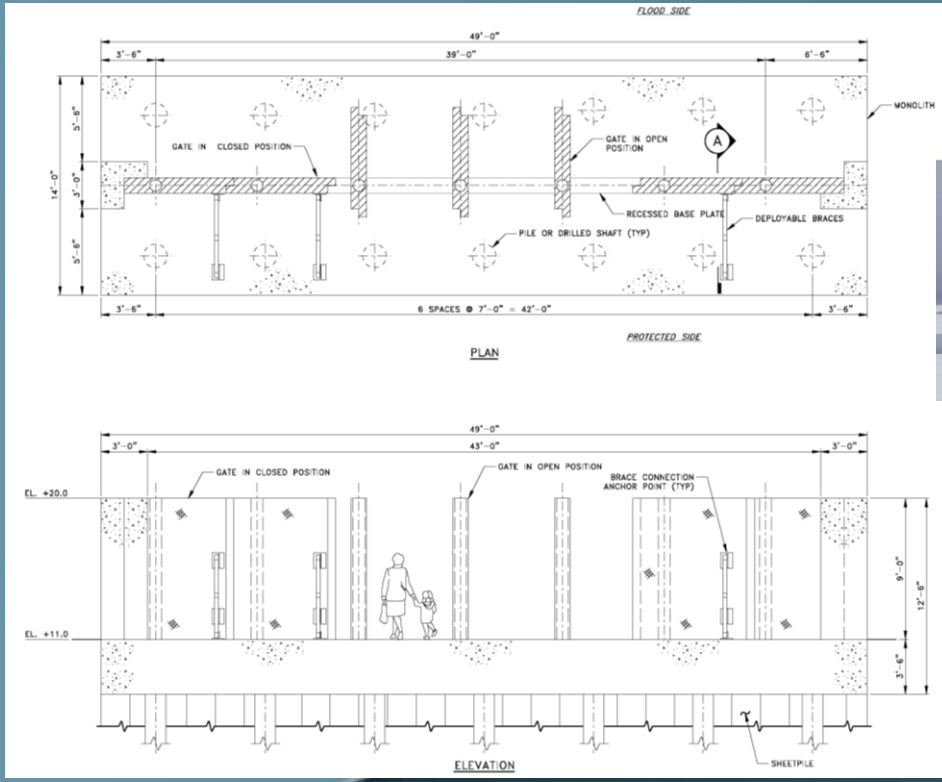
HISTORIC ASSER-LEVY PUBLIC BATHHOUSE

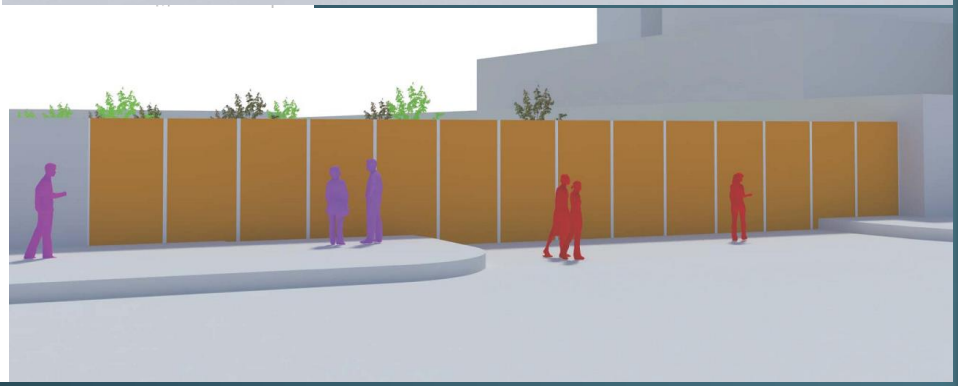
ASSER-LEVY PARK FROM ACROSS 23RD STREET

ASSER LEVY POOL, SUMMER

Reach E - East 23rd Street Vertical Fin Gates

Develop Alternatives

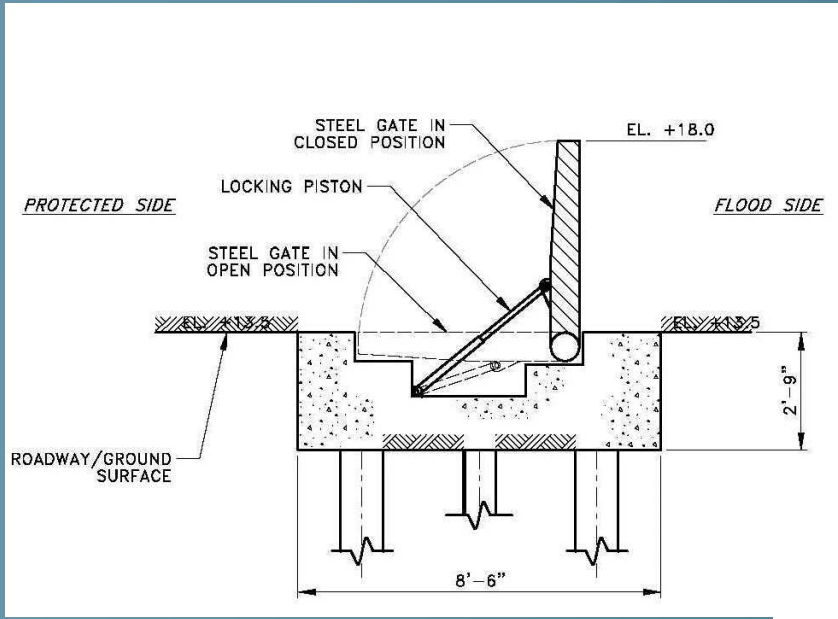




Reach E
Alternative 1

Reaches E - East 23rd Street Crest (Flip-Up) Gates

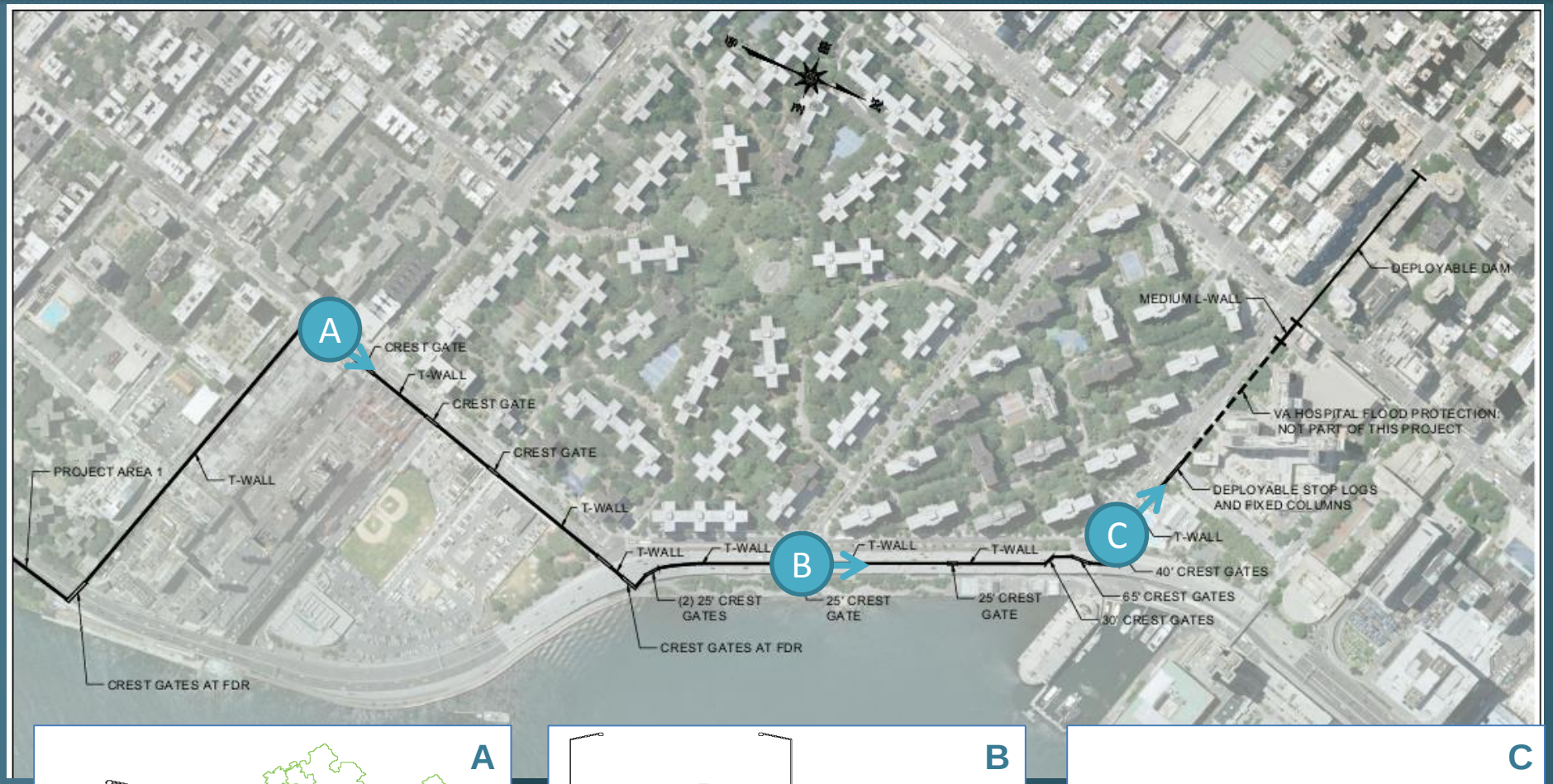
Develop Alternatives

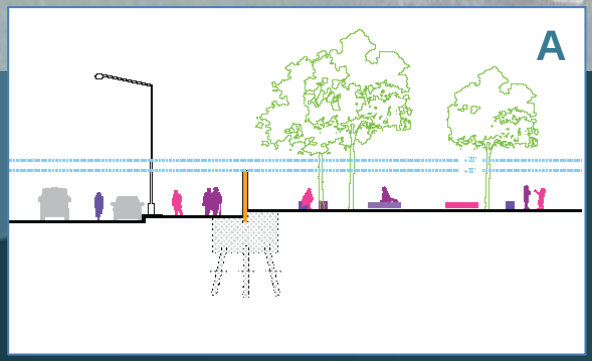


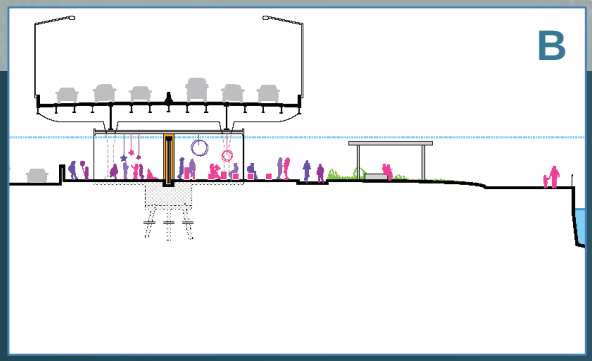
Reach E
Alternative 2

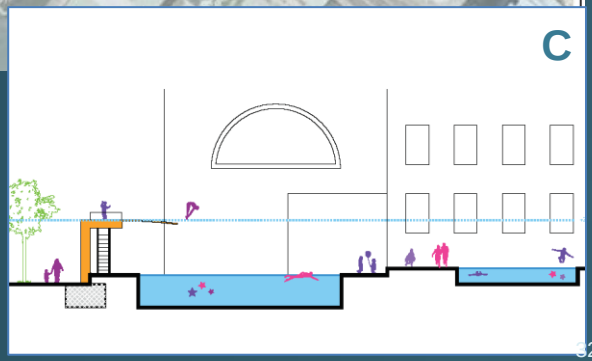
Configuration 1 - Lowest Cost

Develop Configurations



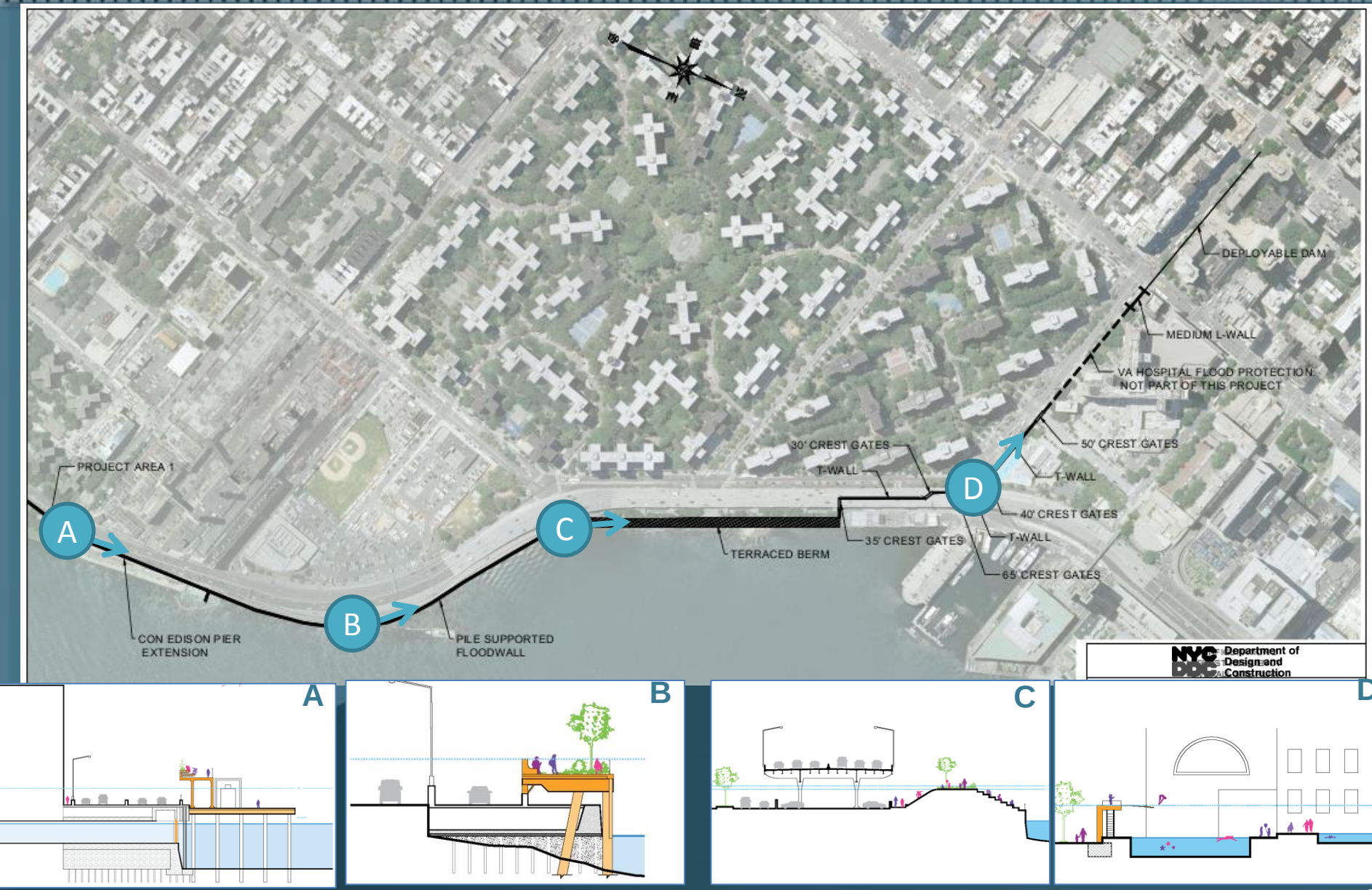






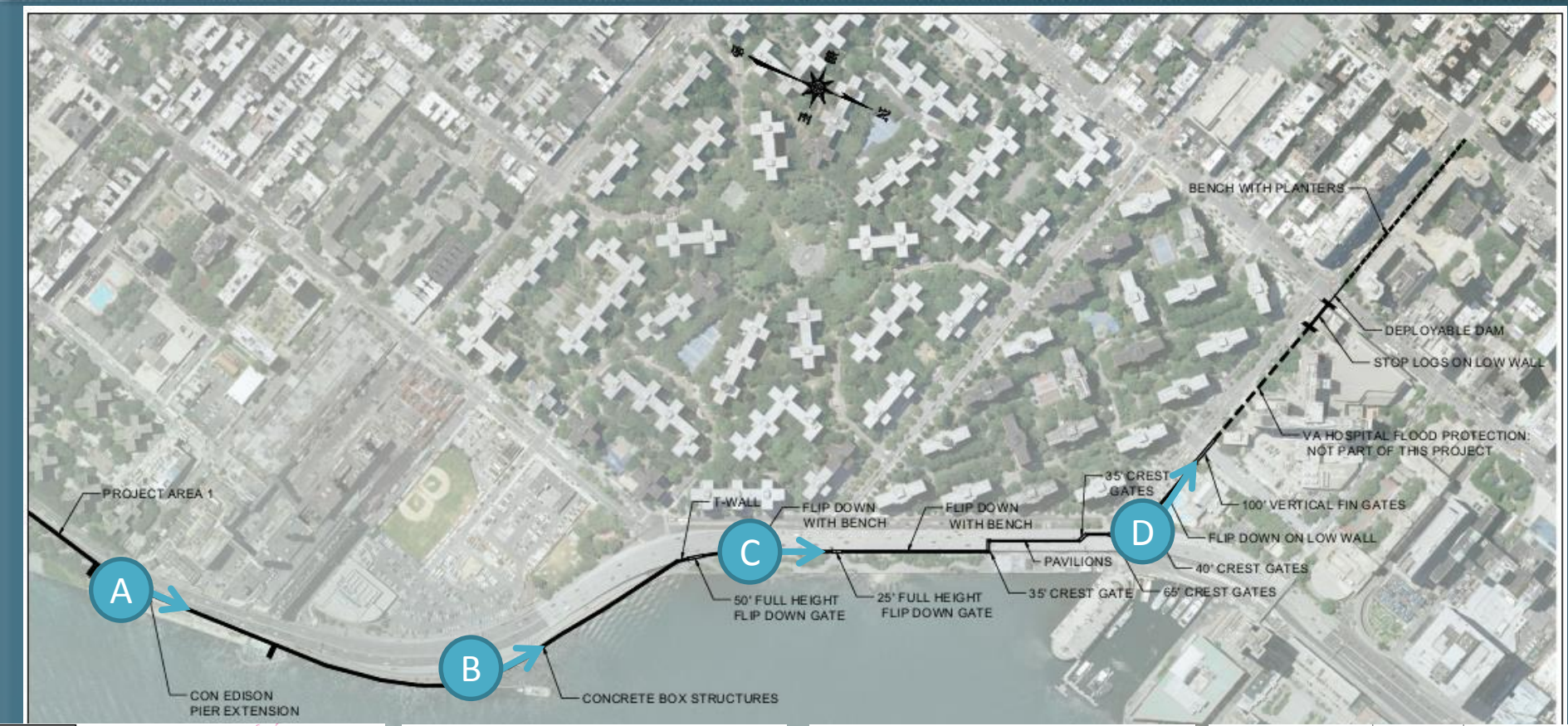
Configuration 2 - Highest Reliability

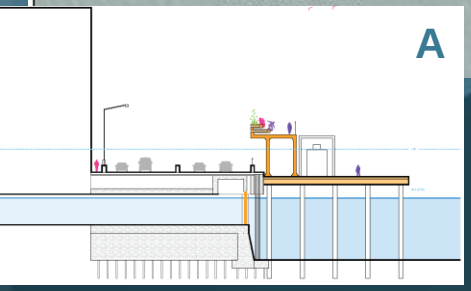
Develop Configurations

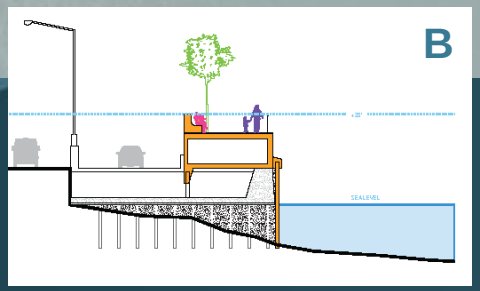


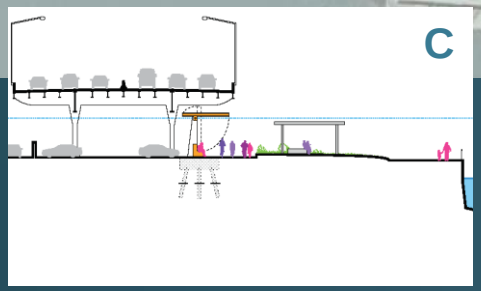
Configuration 3 – Greatest Urban Design Potential

Develop Configurations









Summary of Configurations
Evaluation Criteria and Estimated Construction Cost

Configuration	Reach	Reliability	Cost	Constructability	Maintenance	Operations	Urban Design	Schedule	Environment	Opinion-of-Probable-Cost (Low-to-High Range, -25%/+30%)
Configuration 1 – Lowest Cost	A: Con Edison	3	3	2	4	3	2	3	3	~$150M (~$115M - $200M)
	B: Cpt Patrick J Brown Walk	3	3	2	2	2	1	3	3	
	C: FDR Dr -Stuyvesant Cove	4	3	3	4	3	1	3	3	
	D: FDR Dr-Peter Cooper Rd to East 23rd Street	4	3	3	3	3	1	3	3	
	E: East 23rd Street	4	3	3	3	3	2	3	3	
Configuration 2 – Highest Reliability	A: Con Edison	4	1	1	3	4	4	2	2	~$230M (~$170M - $295M)
	B: Cpt Patrick J Brown Walk	5	2	2	4	5	4	2	1	
	C: FDR Dr -Stuyvesant Cove	5	3	4	5	5	2	4	3	
	D: FDR Dr-Peter Cooper Rd to East 23rd Street	4	3	3	4	3	1	3	3	
	E: East 23rd Street	4	3	3	3	3	2	3	3	
Configuration 1 – Greatest Urban Design Impact	A: Con Edison	4	1	1	3	4	4	2	2	~$220M (~$165M - $285M)
	B: Cpt Patrick J Brown Walk	2	4	3	3	5	4	2	1	
	C: FDR Dr -Stuyvesant Cove	3	2	3	2	2	4	3	3	
	D: FDR Dr-Peter Cooper Rd to East 23rd Street	4	3	3	4	3	3	3	3	
	E: East 23rd Street	3	2	2	3	2	3	3	3	

Summary of Configurations
Evaluation Criteria Rating System

Grading System: 0 (Worst) to 5 (Best)

Criteria	**Baseline Rating**
Reliability	3 -High Degree of Confidence that system will provide protection required.
Cost	3 -Cost relative to the median estimated cost (per linear foot) for proposed alternatives
Constructability	3- Moderate difficulty of construction due to location/constraints/existing infrastructure
Maintenance	3- Maintenance requirements in line with those for similar to standard urban infrastructure elements (e.g. roadways, tunnels, piers, etc.)
Operations	3- Minimal operations requirements prior to storm event (limited personnel action and no specialized equipment required)
Urban Design	2 - No effect on urban realm
Schedule	3 - Moderate level of confidence of timely completion
Environment	3 - No effect on environment

Summary of Opinion-of-Probable Costs 500-year & 100-year Flood Event

Protection Requirement	Design Elevation (surge + SLR + storm induced waves)	Project Area One (Montgomery – East 13th St) (1,2,4)	Project Area Two (East 13th St – East 23rd St) (1,3)	Total (Montgomery – East 23rd St) (1,2,3,4)
2050s/ 500-Year	20ft NAVD88 (13.9ft + 2.5ft + 3.5ft)	~$225M – $275M	~$150M – $230M	~$375M – $505M
2050s/ 100-Year	16ft NAVD88 (10.9ft + 2.5ft + 2.5ft)	~$175M – $225M	~$115M – $190M	~$290M – $415M

Notes:

1. ESCR Feasibility costs developed are to be considered preliminary only, are characterized as having a wide range, and are not to be considered exact.
2. ESCR Feasibility costs include $60 million allowance in Project Area One for sewer system mitigation measures.
3. ESCR Feasibility costs include $20 million allowance in Project Area Two for sewer system mitigation measures.
4. ESCR Feasibility costs do not include construction of new and/or improvement to existing pedestrian bridges (estimated cost between $5 million to $10 million per bridge in RBD proposal for a total of $35M to $50M).

Use of 2050s 500-year Flood Event Design Criteria Increases Estimated Construction Cost for Flood Protection System (~15% to 25%)

Summary of Feasibility Report

Three technically feasible configurations developed.

Feasibility study reflects 2050s 500-Year flood event design criteria.

Alternatives are scalable (urban design elements, level of protection, climate change).

All configurations include unique and innovative approaches to Urban Flood Protection.

500-Year flood event vs 100-Year flood event design criteria significantly impacts estimated construction costs.

Next Steps
Decisions Needed

Storm Event Design Criteria (required from Client Team by 4/14)

Interceptor Flow Management (meeting with DEP on 4/16)

Project Area Two Authorization to Proceed (required by 4/7)

Con Edison Coordination (ongoing)

Pedestrian Bridges (confirm inclusion of enhanced/additional connections)

Decision for Design Criteria Needed to Proceed with Conceptual Design for Project Areas One and Two and Maintain Project Schedule

Questions and Discussion