Preliminary Report

Value Engineering Study

City of New York
Office of Management and Budget

East Side Coastal Resiliency Project

New York City, NY

April 2018

Strategic Value Solutions, Inc.
Value Improvement Specialists

Preliminary

Value Engineering Study Report

for

East Side Coastal Resiliency Project

New York, NY

April 2018

Prepared for:

City of New York Office of Management and Budget
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Acknowledgements

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In addition, we would like to thank the members of the AKRF/KSE JV design team for sharing their knowledge about the project and for their responsiveness to our questions and requests throughout this Value Engineering study.

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

This report presents the results of a Value Study conducted by Strategic Value Solutions, Inc. (SVS) on the design of the East Side Coastal Resiliency (ESCR) project for the City of New York, Mayor's Offices of Resilience & Recovery (ORR), and OMB. Also participating in the workshop were Department of Parks and Recreation (DPR), NYC Department of Transportation (NYCDOT), DDC, and DEP. The project was reviewed at 40 percent design completion.

The Value Study included a one-day orientation meeting and site visit on Feb 22, 2018 followed by a 5-day (40-hour) value methodology workshop that was conducted with a multidisciplinary team in New York, NY on March 5-9, 2018.

Project Description Summary

In response to future risk caused by coastal flooding and climate change, and as part of the Rebuild by Design competition, New York City was awarded $335 million in US Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funding to implement the first phase of the winning concept. This concept forms the basis for the East Side Coastal Resiliency Project, which is a series of levees and flood walls spanning 2.4 miles of the lower east side of Manhattan, from Montgomery Street in the south to East 25th Street in the north. The project raises the grade in some areas of East River Park and restores the East River Park playing fields and activity areas, except for the newly rebuilt soccer field.

In order to construct the flood wall and levees on the west edge. A large tunnel will be constructed around multiple Con Ed transmission lines to avoid relocation of the lines.

As part of the project, two pedestrian bridges at 10th Street and Delancey Street are to be reconstructed to improve access to the park's facilities for the local community. The project also includes modifications to the interior drainage of lower Manhattan to avoid sewer backups during high water events.

Cost Reconciliation

Slocum Construction Consulting (Slocum) prepared the independent cost estimate for the project prior to the workshop based upon Draft 40% design documents, dated November 10, 2017. The differences between the estimate prepared by AKRF/KSE JV and Slocum were reconciled between Slocum's estimator and AKRF/KSE JV's estimator to arrive at a total estimated project construction cost of $988,463,300. The reconciled estimate includes the Con Edison tunnel, tree mitigation expense and DEP interior drainage work, as well as the work required under the ESCR construction contract. The estimate includes the following markups:

General Conditions	*10%*
Overhead & Profit	*15%*
Bond & Insurance	*2%*
Escalation	*4% per year*
Contingency	*30%*

Cost Models

Further analysis of the project cost and schedule was conducted using cost models. These models gave the team a better perspective on how the costs are distributed through the project. In particular, the team was looking for those aspects of the project which account for the largest shares of the total cost. This analysis indicated that the work with the highest construction value (flood wall, utilities, general requirements) is being performed last in the sequence of work. This strategy makes it more difficult to meet the requirement for expenditure of the HUD grant by April 2022.

Workshop Results

With an understanding of the functional requirements, the Value Team transitioned to the Creative Phase of the workshop and brainstormed on all the possible ways to accomplish each of those functions. The team generated 205 ideas for potential changes to the current design.

Based on the team members' professional judgment and input from ORR, DPR, DOT, DDC, DEP, NYC, and OMB, 26 of these ideas were selected for development into Value Alternatives.

In addition to the Value Alternatives, the team also identified eight design suggestions. These are suggestions for changes or clarifications to the project documents that did not have an identifiable or quantifiable cost impact that could be determined within the scope of the workshop.

Organization of Alternatives

The Alternatives and Design Suggestions presented on the following pages are organized by project or functional categories, and then numerically within each of those categories. The divisions used to organize the alternatives are as follows:

AD	Assure Dependability
C	Construction
IA	Improve Access

LI Limit Inundation

These designations have been used throughout the VE process to organize the ideas.

Significant Proposals

Among the recommendations developed by the VE team, the following are worthy of highlighting.

- **AD-10 Move the manholes off FDR:** Under the current plan, manholes will be installed in the roadway of FDR Drive to provide access to the CSO lines leading to the river. Moving the manholes to a location that is not in the roadway will provide greater accessibility for DEP to gain access without stopping traffic on FDR Drive. This proposal has a cost reduction of $6.7 million.

- **AD-23 Eliminate isolation chambers and direct flow to interceptors:** The current design incudes installation of 12 new isolation chambers to allow diversion of the combined sewer flow to the 108-inch interceptor during an extreme event. Constructing isolation chambers brings the risk that, if not maintained, they will not operate in the future. Eliminating the isolation chambers and directing flow from the combined sewer lines to the interceptor would eliminate this risk and reduce cost by $9.9 million. The consequence would be that the 108-inch interceptor may surcharge during a high-water event and create a backup in the combined sewer system.

- **C-04 Close park entirely during construction.** The current phasing plan keeps the East Side Park and the shared use path open during construction of the flood wall and reconstruction of the fields. To reduce safety concerns and to expedite construction, this recommendation suggests closing the park while construction is underway. This will also free up additional space to be used for laydown and staging during construction. This would reduce cost by $11.2 million.

- **C-20 Precast the tunnel as a U-shape and place on tunnel slab:** The present design reflects a cast-in-place tunnel configuration for the length of the Con Ed tunnel. By using pre-cast U-sections to complete the top of the tunnel, construction of the tunnel will be quicker and minimize the exposure of workers to the high voltage lines. This would reduce cost by $19.3 million.

- **C-40 Use southbound service road as part of FDR mainline and shift traffic west:** Shifting all lanes of FDR to the southbound service road (10 feet to the west) allows 24/7 construction activity to occur, reducing the schedule and disruption to the local community. This change could save $29.3 million.

- **IA-03 Rebuild Houston Street pedestrian ramps to hand HS-20 loads:** The Houston Street ramps currently do not support HS-20 loads, even though the bridge deck does. Rebuilding the ramps to handle HS-20 loads to permit access by emergency vehicles and park maintenance trucks will give a secondary access for emergency situations improving the response time. This would add cost of $4.5 million.

- **LI-29 Elevate park high enough to eliminate wall:** Under the current plan, the area is protected by a series of walls and levees. By raising the elevation of the park, the same level of protection can be achieved, eliminating the need for walls, levee, and sheet piling. This change is a more sustainable solution, eliminates operations and maintenance associated with the flood wall, and increases the attractiveness of the area. This approach could reduce cost by #319 million including park alienation costs.

- **LI-30 Realign flood wall to east edge of East River Park in combination with levees:** Moving the flood wall away from FDR and placing it along the landside of the promenade. Adding a series of gates along this wall will give access to the promenade and increase the viewshed to the river. With this approach, cost may be reduced by $100 million and the park utilities can remain in place and the Con Ed tunnel will not be required.

- **LI-35 Shift all construction to the east to avoid closures on FDR**: The current plan includes constructing the flood wall close enough to the existing traffic barrier on FDR that this barrier will be replaced. Shifting the construction even as little as 3 feet will eliminate replacement of the traffic barrier along with eliminating impacts to FDR during wall construction. This change would reduce cost by $30 million.

- **LI-38 Use only I-wall the entire length**: Replacing the designed flood wall along the entire length of the protected area with I-wall will eliminate the Con Ed tunnel and levee construction. Embankment will still be required at the pedestrian bridges in order to make them handicapped accessible. This would reduce cost by $102.6 million.

- **LI-61 Tie flood wall into either side of the Con Ed intake structure and keep the floodwall on the east side of the FDR:** The current plan is for the flood wall to cross FDR Drive with a swing gate at the Con Ed intake structure, tie into the Con Ed building, then travel to Avenue C, crossing back across FDR Drive to tie in at Stuyvesant Cove Park. The alternative recommends tying in to the Con Ed intake structure, thereby keeping the wall on the East side of FDR for the entire length. This not only eliminates two swing gates, 4 pedestrian and roller gates, and 4 swing and roller gates at Avenue C, but it also keeps FDR protected the entire length of the project. This would reduce cost by $19.8 million.

Additionally, the Value Team detailed several recommendations that have minor or no cost implications. These recommendations facilitate the expenditure of the HUD grant prior to its expiration and/or reduce risk and its potential impact to the project. Among those provided in the report are:

- **C-08 Modify construction sequencing to facilitate use of HUD money:** The current construction phasing and sequencing plan has the work scheduled in such a manner that Segments 2, 3, and 4 must be completed in order to meet the spending deadline for the HUD grant. The critical path of the project is through the flood wall, which is fraught with risk. This schedule is quite aggressive and does not build in any float or margin for delays that could impact meeting this deadline. Adjusting the schedule to account for more realistic time frames, using early, or advance, contracts to complete work that is independent of the flood wall, and consider using parallel contracts for specific work in order to ensure the HUD spend-down deadline is met.

- **C-19 Advance order long-lead items to improve schedule and use HUD money:** Given the time constraints for using the HUD money, ordering long-lead items, will provide for advancement of the schedule and, at the same time, help in meeting the deadline for expenditure of the HUD grant. Items that could be advance purchased include sheet piles, pre-cast concrete items, and flood gates. This work could encumber $41.5 million.

- **C-35 Complete bulkhead repairs as an early package and part of this project:** The VE team suggests accelerating the inspection and including repairs to the bulkhead under the East Side Coastal Resiliency Project. This will allow the contractor to begin using the bulkhead earlier and perhaps help in meeting the expenditure timeline for the HUD grant. By encumbering $9.05 million.

- **C-58 Evaluate project schedule with regard to risk**: The current schedule is a very aggressive schedule and does not appear to take into consideration all of the risks that may be encountered during execution. Consideration of the potential risks now would allow for mitigation strategies to minimize impact to the project.

- **C-60 Focus the HUD scope of work on CSO construction and park utilities as an early contract:** Another option provided for consideration is to advance the CSO and award that work, along with the park utilities work, early. This will get the deep excavation and work that could otherwise hold up construction of the flood wall and sports fields off the critical path and encumber $149 million.

Value Study Team

The team members that comprised this multidisciplinary Value Team are listed in Table 1-1 at the end of this section. All other participants of the study are provided in the Appendix.

Table 1-1
Value Study Team

Value Team Leadership

[redacted]	Strategic Value Solutions, Inc. (VETC)
[redacted]	Strategic Value Solutions, Inc. (AVETC)
[redacted]	Strategic Value Solutions, Inc. (Technical Assistant)

Technical Team Members

Name	Organization	Role
[redacted]	Michael Van Valkenburgh Associates Inc.	Landscape Resiliency Architect
[redacted]	COWI Marine, North America	Construction Manager
[redacted]	Lazarev Engineering, LLC	Electrical Engineer
[redacted]	NV5	Traffic Engineer
[redacted]	Strategic Value Solutions, Inc.	Geotechnical Engineer
[redacted]	Water Resources Associates	Hydraulic Engineer
[redacted]	NAIK Consulting Group, PC	Bridge Structural Engineer
[redacted]	HDR, Inc.	Civil/Site Engineer
[redacted]	Tetra Tech	Flood Control Engineer
[redacted]	Slocum Construction Consulting, Inc.	Cost Estimator
[redacted]	Slocum Construction Consulting, Inc.	Cost Estimator

Table 1-2
Summary of Alternatives

Alt. No.	Description	First Cost Savings
AD - Assure Dependability		
AD-06	Replace interceptor isolation gates with adjustable orifice gates or weirs to maximize storage capacity	No Cost Change
AD-10	Move manholes off FDR	$6,690,000
AD-19	Standardize roadway and pedestrian gates' sizes and hardware to facilitate maintenance	Design Suggestion
AD-23	Eliminate isolation chambers and direct flow to interceptor	$9,950,000
AD-41	Do not expose and wrap the Con Ed lines	$6,086,000
AD-59	Optimize tunnel electrical	($5,224,000)
AD-60	Optimize park electrical	($277,000)
C-04	Close park entirely during construction	$11,245,000
C-08	Modify construction sequencing to facilitate use of HUD money	No Cost Change
C-10	Delay Pier 42 Phase 1B Park opening until ESCR is complete in that area	Design Suggestion
C-12	Use pre-cast concrete wall panels	$1,621,000
C-15	Leave area in north end open to allow trucks to access FDR to Exit 7 during construction	($478,000)
C-19	Advance order long-lead items to improve schedule and use HUD money	Design Suggestion
C-20	Pre-cast U-shape and place on tunnel slab	$19,362,000
C-35	Complete bulkhead repairs as an early package and part of this project	Design Suggestion
C-36	Use A + B bidding	Design Suggestion
C-38	Keep landscape packages small enough to encourage competition	Design Suggestion
C-40	Use southbound service road as part of FDR mainline and shift traffic west	$29,281,000
C-50	Use landing barge or floating dock to allow landing in shallow areas	($8,772,000)

Alt. No.	Description	First Cost Savings
C-51	Allow a construction access (road) by building a temporary berm at Houston Street for construction access into the park	($11,358,000)
C-58	Evaluate project schedule with regard to risk	Design Suggestion
C-60	Focus the HUD scope of work on CSO construction and park utilities as an early contract	Design Suggestion
IA-03	Rebuild Houston Street pedestrian ramps to handle HS-20 loads	($4,524,000)
IA-04	During construction, remove FDR jersey barrier in several places to facilitate night time construction vehicle access	($956,000)
IA-16	Use a pre-fab bridge design at pedestrian bridge crossings	$16,388,000
LI-06	Lower the final park elevation by 1 foot and reduce the cross section of the horticultural soil	$3,955,000
LI-14	Simplify levee and use a high-performance erosion control mat in lieu of clay	$508,000
LI-29	Elevate park high enough to eliminate wall	$319,112,000
LI-30	Realign flood wall to east edge of East River Park in combination with levees	$105,704,000
LI-35	Shift all construction to the east to avoid closures on FDR	$30,036,000
LI-38	Use only I-wall the entire length	$102,590,000
LI-41	Use bottom-hinged gates at road closures	$6,254,000
LI-43	Use lightweight fill and eliminate deep foundations for the tunnel	$309,000
LI-61	Tie floodwall into either side of the Con Ed intake structure and keep the floodwall on the east side of the FDR	$19,782,000

SECTION 2

VALUE ALTERNATIVES

SECTION 2
VALUE ALTERNATIVES

The results of this Value Study represent the value improvement opportunities that can be realized on this project. They are presented as individual alternatives for specific changes to the current design.

Each alternative includes:

- A summary of the original concept
- A description of the alternative concept
- A brief narrative comparing the original design and the recommended change
- Sketches, where appropriate, to further explain the alternative
- Calculations, where appropriate, to support the technical adequacy of the alternative
- A capital cost comparison
- And a life cycle cost analysis, if appropriate

Cost was the primary resource that was compared to the functions being accomplished in the project. To ensure that costs were compatible within the Value Alternatives proposed by the team, the reconciled cost estimate was used as the basis of cost.

Evaluating the Value Alternatives

Each part of a Value Alternative should be evaluated on its own merit, rather than discarding an entire Value Alternative because of concern over a particular aspect of the proposed change. Furthermore, ORR, AKRF/KSE JV, OMB and other agency representatives are encouraged to review all the ideas shown in the creative idea listing in the Appendix. Since the Value Team was constrained by a finite duration for the workshop and the production capacity of the team not all ideas were developed. Therefore, there may be other ideas in that list that would provide additional value improvement opportunities for the project.

Organization of Alternatives

The alternatives presented on the following pages are organized by project or functional categories, and then numerically within each of those categories. The divisions used to organize the alternatives are as follows:

Assure Dependability (AD)

Constructability (C)

Improve Access (IA)

Limit Inundation (LI)

These designations have been used throughout the VE process to organize the ideas.

ASSURE DEPENDABILITY (AD)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	AD-06
Replace interceptor isolation gates with adjustable orifice gates or weirs to maximize storage capacity	
Description of Original Concept:	
The original concept is to construct two interceptor isolation gates, a north and south gate, and the isolation gate at M-39, to eliminate flow into the 108-inch interceptor between the three gates during extreme events in order to provide storage capacity in the 108-inch interceptor for combined sewer flow from the drainage area that is unable to discharge through the CSO outfalls because of the high river stages.	
Description of Alternative Concept:	
In advance of a major coastal storm, initiate operational actions to manage flows in the sewer system that will reduce flooding. This will obviate the need for interceptor isolation gates, which can be a long-term maintenance issue.	

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	No Cost Change		
Alternative Concept			
Savings			

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Changes the requirement for the north interceptor gate from a 108 -inch isolation gate, which would be very difficult to construct and operate, to a flow control orifice or adjustable weir. • Changes the requirement for the south interceptor gate from a 108 -inch isolation gate to a flow control orifice or adjustable weir. • Changes the requirement for the M-39 isolation gate from an isolation gate to a flow control orifice or adjustable weir. • Takes advantage of the peak pumping capacity of the Manhattan Pump Station	• Requires SCADA system capable of monitoring flow and water surface elevations throughout the Newtown Creek WWTP service area. • Requires proactive operation of the Manhattan Pump Station, the Canal/Varick St Pump Station, the Newtown Creek WWTP and the new orifice weir or adjustable gates during extreme storm events.

Discussion

Alternative No.: AD-06

The currently planned north and south isolation gates on the 108-inch, interceptor would be extremely difficult to construct due to the size and age of the sewer and limitations of construction within the street, especially at the 20th Street location. Likewise, it will be difficult to conduct required O&M of these structures for the same reasons. In addition, the hydraulic effects (e.g. flooding with sanitary sewage) of completely shutting off flow to this segment of the interceptor could be catastrophic to upstream customers both north and south of the two proposed gates.

The Manhattan Pump Station was upgraded in 2011 to pump an average daily flow of 155 MGD. However, the peak rated capacity of the station is 400 MGD. This excess capacity can be used to drain the 108 -inch interceptor during extreme storm events. This operation, along with restricting flow into the 108 -inch interceptor at the north and south ends of the project area with the orifice or adjustable weir gates, would provide significant additional capacity in the interceptor to handle increased combined flow from the storm event. Throttling of flow from other parts of the service area at the Newtown Creek WWTP would also be accomplished to provide capacity for the increased flow from the Manhattan Pump Station.

The alternative concept is, in lieu of the planned interceptor isolation gates, to initiate the following operational procedures:

- Limit flow pumped to the 108 -inch interceptor from the smaller pump station at Canal & Varick Street in Manhattan;
- Maximize in-system storage upstream of the 108-inch interceptor by using orifice gates or adjustable weirs in lieu of the north and south interceptor isolation gates and isolation gate at M-39 to minimize flow into the 108 -inch interceptor,
- Simultaneously, maximize pumping from the Manhattan Pump Station to the Newtown Creek WWTP to maximize flow pumped out of the 108 -inch interceptor, The Manhattan Pump Station has an average daily flow of 155 MGD, but a peak capacity of 400 MGD.
- As allowable based on SCADA information, throttle flows at the Newtown Creek WWTP from areas other than Manhattan, prioritizing capacity to accept flows from Manhattan;
- If necessary and feasible, employ an emergency bypass around treatment processes at the Newtown creek WWTP to maximize influent from the Manhattan Pump Station

Again, the result of the above operational measures will be to maximize available capacity within the 108 -inch interceptor to store combined flow from the interior flood protected sewer shed. The alternative allows the DEP to reduce flows into the 108-inch interceptor without shutting off flow and threatening flooding of the service area. It is also assumed that, in periods of emergency such as the design condition being evaluated here, the Newtown Creek WWTP would be allowed to bypass at least its secondary treatment process train, and possibly the primary units as well.

The requirement for proactive management of the flows in the sewerage system would have to be done in any case in case of an extreme emergency such as the current design event.

This alternative reduces the risk and potential seriousness of flooding and damage within the project area, but it does not eliminate such risk. It is also noted that the Manhattan Pump Station and its service area would benefit by adding the capability for an emergency pumping bypass directly to the East River to mitigate the risk of catastrophic damage due to back-up of CSO into the service area when extreme events eliminate the ability to relieve the system by discharge through the CSO outfalls.

Quantifying the benefit of this alternative with respect to increased capacity in the 108-inch interceptor would have to be determined using the DEPs hydraulic model of the sewerage system, including the pump stations and WWTPs.

Sketch

Alternative No.: AD-06

☑ Original ☐ Alternative

Sketch

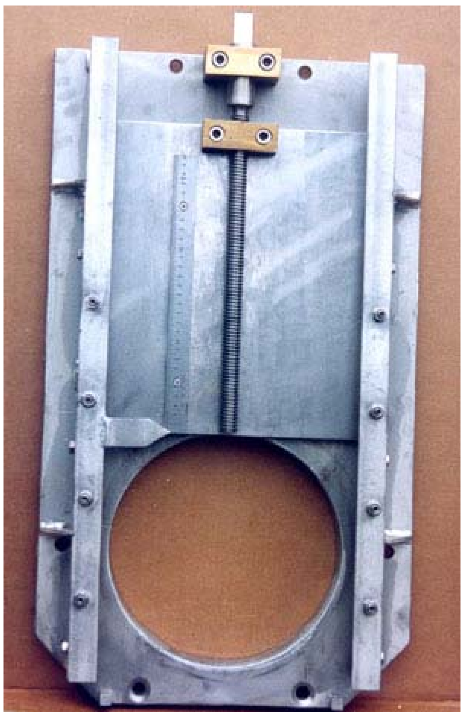
Alternative No.: AD-06

☐ Original ☑ Alternative

Sketch

Alternative No.: AD-06

☐ Original ☑ Alternative



Example of an Orifice Gate

Example of an Adjustable Weir Gate

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	AD-10
Move manholes off FDR	

Description of Original Concept:

The current concept is that, due to the construction of the Con Ed Tunnel and the floodwall/fill adjacent to the FDR Drive, approximately 11 conduits which convey combined sewer flow from the CSO regulators in the sewer system to the discharge points in the East River will require a new manhole to be built in FDR Drive. This will be required to allow DEP to access the existing or reconstructed/replaced CSO conduits leading to the River. The concept was conveyed to the VE Team as a very recent requirement that has not been included in the designs or cost estimate to date. There are also three locations at which new storm sewer manholes and/or storm drains have been located on the north bound lane of FDR Drive for drainage purposes.

Description of Alternative Concept:

The alternative concept is to locate the required new manholes and storm drains in locations other than directly in FDR Drive.

Cost Savings Summary (Present Worth)

	First Cost	O&M	Total LCC
Original Concept	$10,513,000	$0	$10,513,000
Alternative Concept	$3,823,000	$0	$3,823,000
Savings	$6,690,000	$0	$6,690,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Greatly reduces construction requirements including requirements for construction in the very heavily traveled FDR Drive. • Reduces design load requirements for the manhole structures. • Ease of access to new manholes for regular O&M activities.	• Vertical location of the new manholes may not be exactly where the DEP would prefer.

Discussion

Alternative No.: AD-10

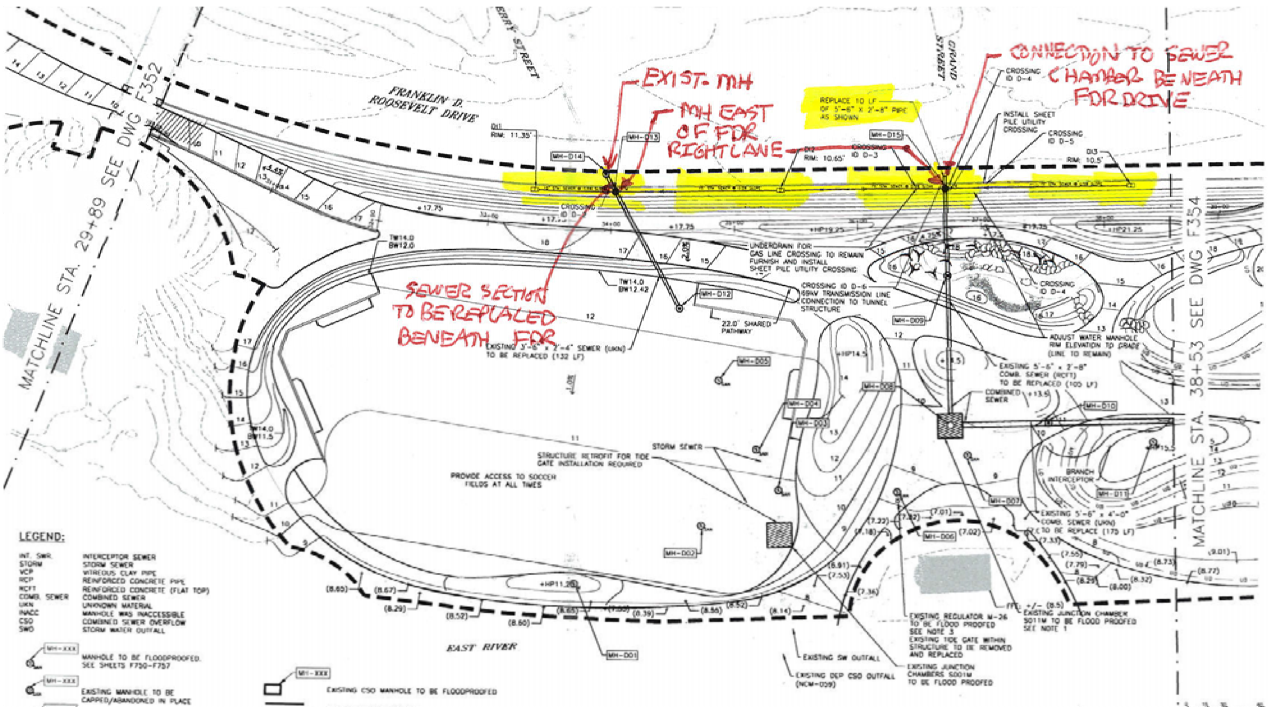
Construction, operation and maintenance requirements for the approximately 10 new CSO or storm drain manholes needed to access existing, reconstructed or replaced CSO discharge conduits to the East River would be greatly reduced by locating these manholes either on the new berm, in the park area (with flood-proofing of the structures) or west of the floodwall and FDR Drive.

Construction of these manholes would be prohibitively disruptive and, therefore, mot preferred by the DOT. In addition, access to these manholes by DEP for O&M purposes would be similarly disruptive and unacceptable to both DOT and DEP.

Sketch

Alternative No.: AD-10

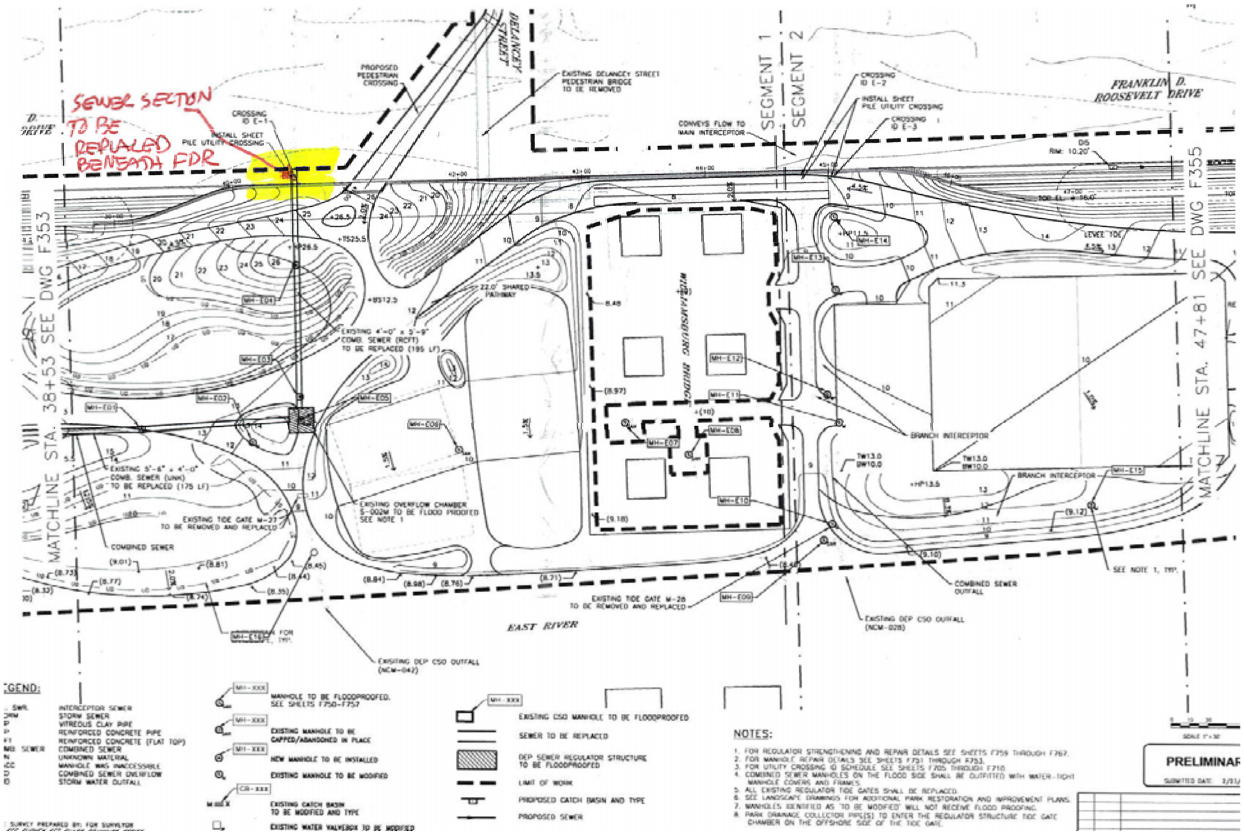
☑ Original ☐ Alternative



Sketch

Alternative No.: AD-10

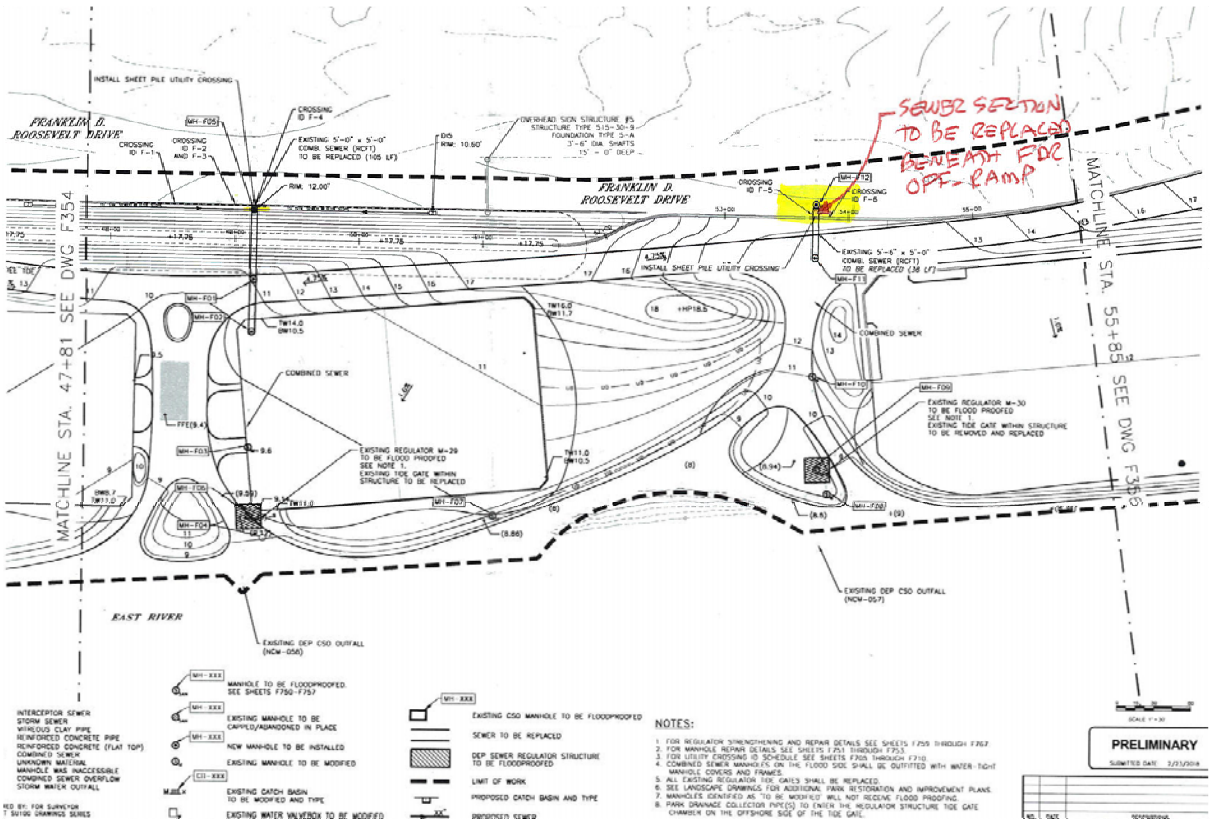
☑ Original ☐ Alternative



Sketch

Alternative No.: AD-10

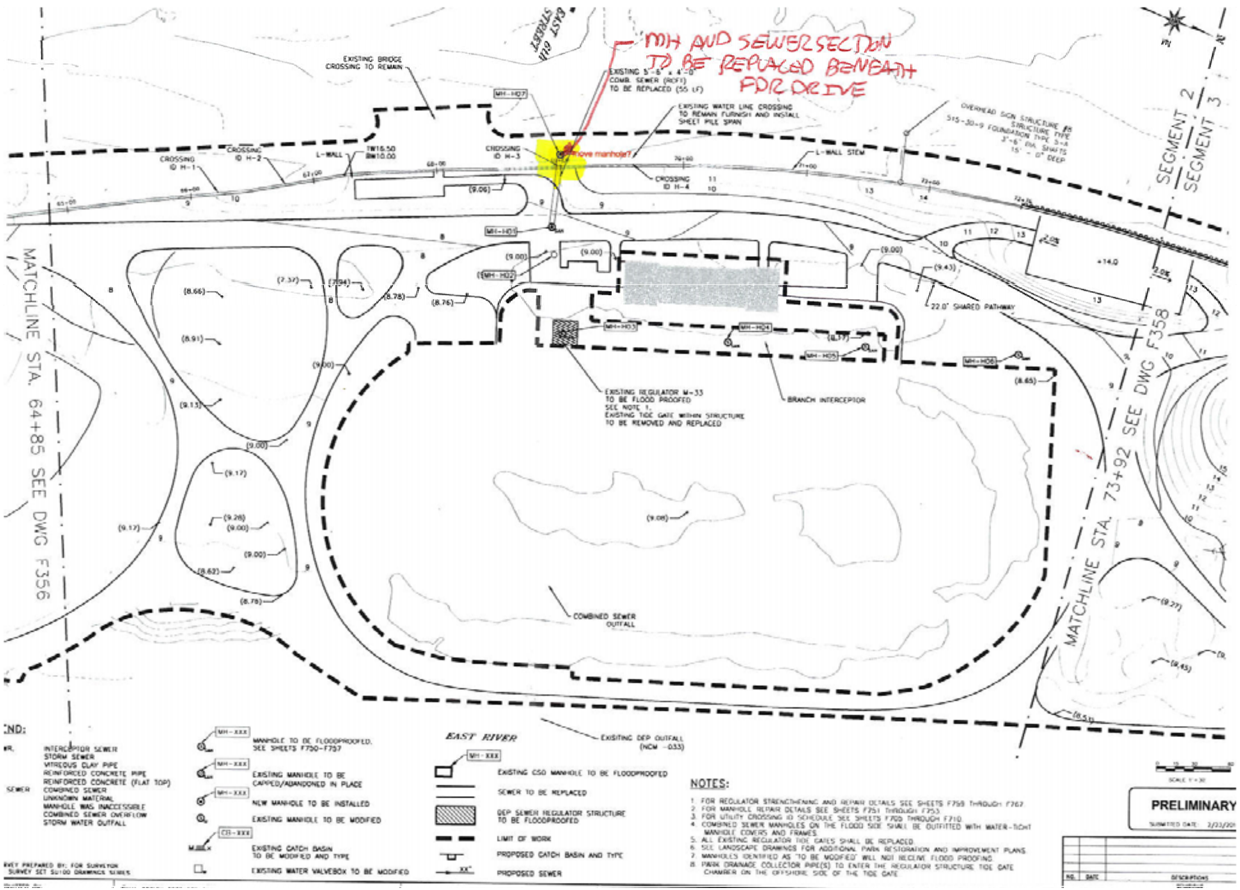
☑ Original ☐ Alternative



Sketch

Alternative No.: AD-10

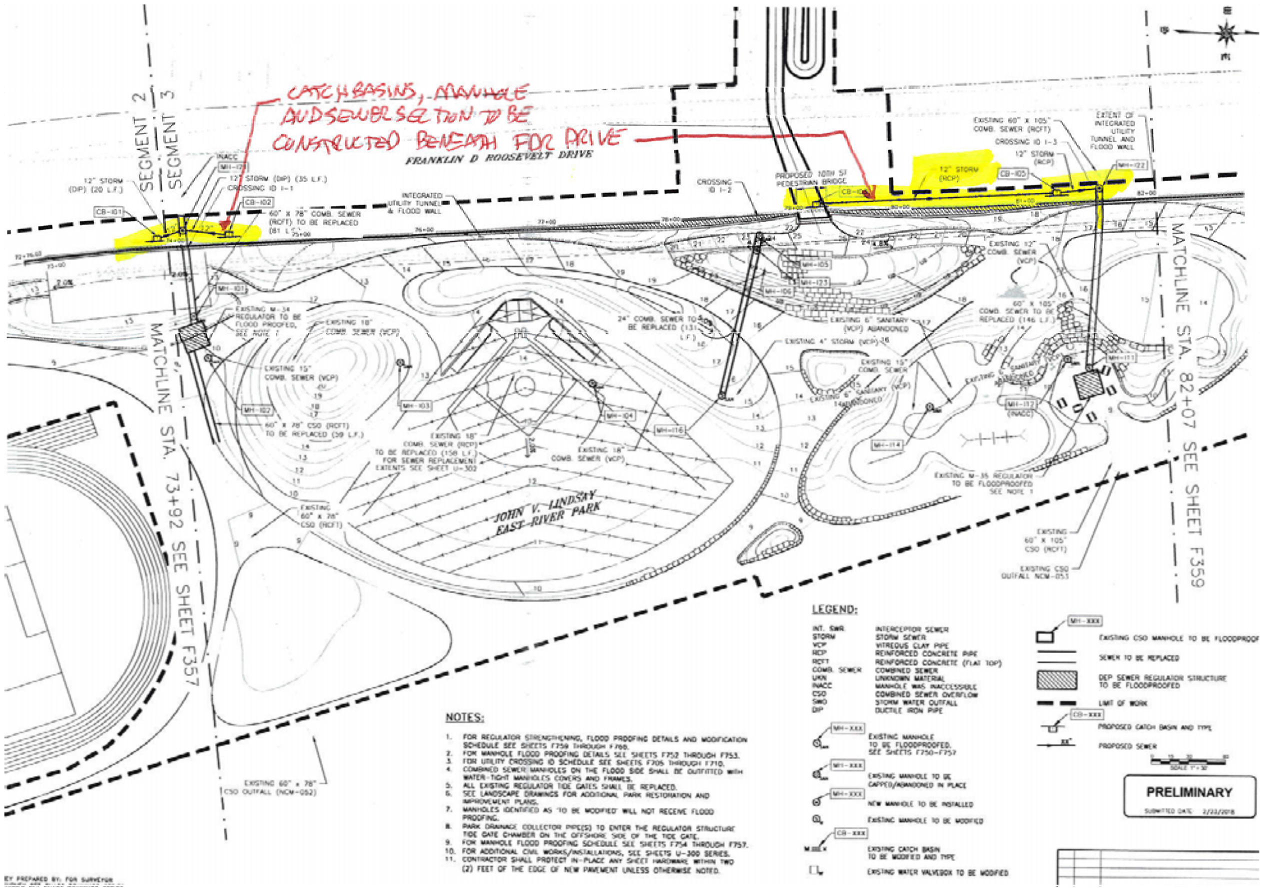
☑ Original ☐ Alternative



Sketch

Alternative No.: AD-10

☑ Original ☐ Alternative



Construction Cost Estimate

Alternative No.: AD-10

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
Manholes, Constructed in FDR	EA	550,000.00	10	$5,500,000		
Reconstruct of Manholes outside of FDR Roadway	EA	200,000.00			10	$2,000,000
Total Markup	91.14%			$5,012,622.48		$1,822,771.81
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$10,513,000.00		$3,823,000
NET SAVINGS						$6,690,000

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	AD-19
Standardize roadway and pedestrian gates' sizes and hardware to facilitate maintenance	
Discussion	

The gates referred to are the surface gates used to close openings in the line of flood protection (pedestrian and roadway gates).

As currently designed, there are two sizes of pedestrian gates: 3'-9" and 5'-0". This is likely due to geometry and probably wouldn't save much to standardize the width of these. However, the hinge and locking systems should be standardized.

Gates #2, 10, 12 and 18 are 25'-3", 28'-3", 28'-0" and 24'-0" respectively. Consider making gates #10 and 12 the same size based on governing minimum opening geometry. Also, closely look at #2 and 18 to see if they can be a common width. Design for the larger load (if height or loading varies) and duplicate the gate.

Consider providing design criteria and loading information to the manufacturer and allow them to design the gates and submit for design/shop drawing review by the structural engineer. There may be more readily available steel sections or shapes available that could speed production or reduce cost. The bearings, wheels, pintles, hinges, etc. should be standardized, where possible, so that the number of replacement parts is minimized. Consider the operations and maintenance schedules and details for gates when designing so that the procedures are readily transferred between gate structures.

The locking of the gates is a critical detail, especially across the FDR. Care should be taken to ensure the public cannot unlock the gate and operate it. In addition to locking mechanisms, other brakes or restraints should be considered.

In addition, allowing varied materials for construction of gates and imbedded metals should be considered. For instance, painted steel is typical, but for a recent project, stainless steel was more readily available and was provided at a lower cost than painted steel.

A storage building, or location, should be considered for storing spare parts and associated flood fighting equipment (sand bags, sheeting, etc.). This/these location(s) should be located close to the gates on the protected side. One in the south end and one in the north end would be desirable.

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

Alternative No:	
Title:	AD-23
Eliminate isolation chambers and direct flow to interceptor	
Description of Original Concept:	
The original concept is to install 12 manually operated isolation chambers in the sewer shed west of the floodwall to divert combined sewer flow during extreme rainfall events to the 108-inch interceptor in order to reduce street flooding due to surcharging of the combined sewers. The isolation chambers prevent backflow from the interceptor into the combined sewer conduits.	
Description of Alternative Concept:	
The alternative concept is to eliminate the 12 isolation chambers and direct flow from the surcharged combined sewer pipes directly to the interceptor.	
Advantages of Alternative Concept	**Disadvantages of Alternative Concept**
• Eliminates operational difficulties related to staff travel to and accessing the isolation chamber, opening the isolation gate and then, post-storm, reversing the process to close and clean the isolation gate and connecting pipes	• Without the closed flap gate in each isolation chamber, there is some increased risk of surcharging of the 108-inch interceptor causing backflow into the combined sewer system

	Cost Savings Summary (Present Worth)		
	First Cost	**O&M**	**Total LCC**
Original Concept	$114,178,000	$0	$114,178,000
Alternative Concept	$104,228,000	$0	$104,228,000
Savings	$9,950,000	$0	$9,950,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Eliminates the need to site, design and construct the 12 isolation chambers in very congested city streets • Avoids probable need to relocate other utilities in city streets to install and operate the isolation chambers • Eliminates the clogging of the conduits connecting the combined sewers to the isolation chambers. This is especially problematic during smaller storms when the isolation gate is not open.	

Discussion

Alternative No.: AD-23

In order to reduce the probability of surface flooding from combined sewers in the sewer shed west of the floodwall, twelve parallel conveyance conduits are to be installed in that drainage area to increase wet weather flow to the 108-inch interceptor that conveys combined sewage to the Manhattan Pump Station. On each of the 12 connections from the existing combined sewer system to the parallel conveyance conduits, an isolation chamber will be built to prevent backflow from the 108-inch interceptor to the combined sewer system should the 108-inch interceptor be surcharged when the combined sewer system is not surcharged.

The current design of the isolation chambers poses serious concerns including:

1. Clogging of the connecting pipes leading to the isolation chamber from the combined sewers. These pipes will accumulate sanitary solids, sediment and debris from storms smaller than those requiring opening of the flap gate in the isolation chamber. These solids will be very difficult to remove leading to their solidification, greatly reducing the capacity of the connecting pipes and the parallel conveyance system.

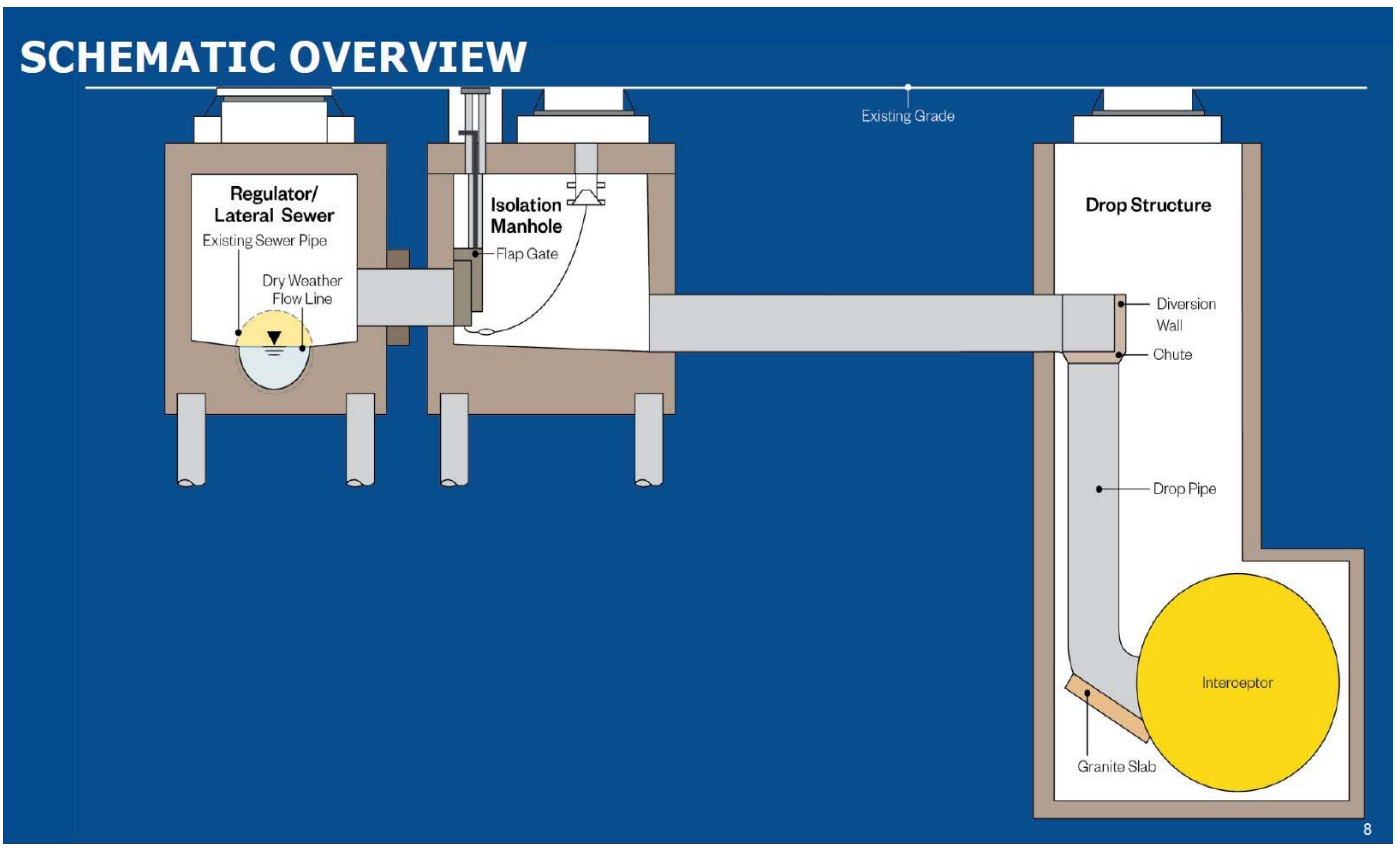
2. The isolation chamber gates are to be manually operated, requiring multiple staff both before and after major storm events to open and close the flap gates and to clean the pipes and mechanisms after each event to ensure future operability. Because of the uncertainty related to future meteorological conditions, decisions to mobilize staff to open these gates must be made early in a storms occurrence to take advantage of the available capacity in the 108-inch interceptor and avoid surface flooding. The requirements for such a conservative decision process will lead to more frequent, unnecessary operation of the chambers. This translates to additional time for the O&M staff.

3. Without the benefit of detailed hydraulic analyses using the InfoWorks model, it appears likely that surcharging of the 108-inch interceptor to the Manhattan Pump Station will cause surcharging or backflow to the combined system with or without the proposed parallel conveyance conduits. Thus, the isolation chambers would be of little benefit hydraulically but is adding a substantial capital cost and poses very serious operation and maintenance problems that would render them in operable and ineffective in any case.

Sketch

Alternative No.: AD-23

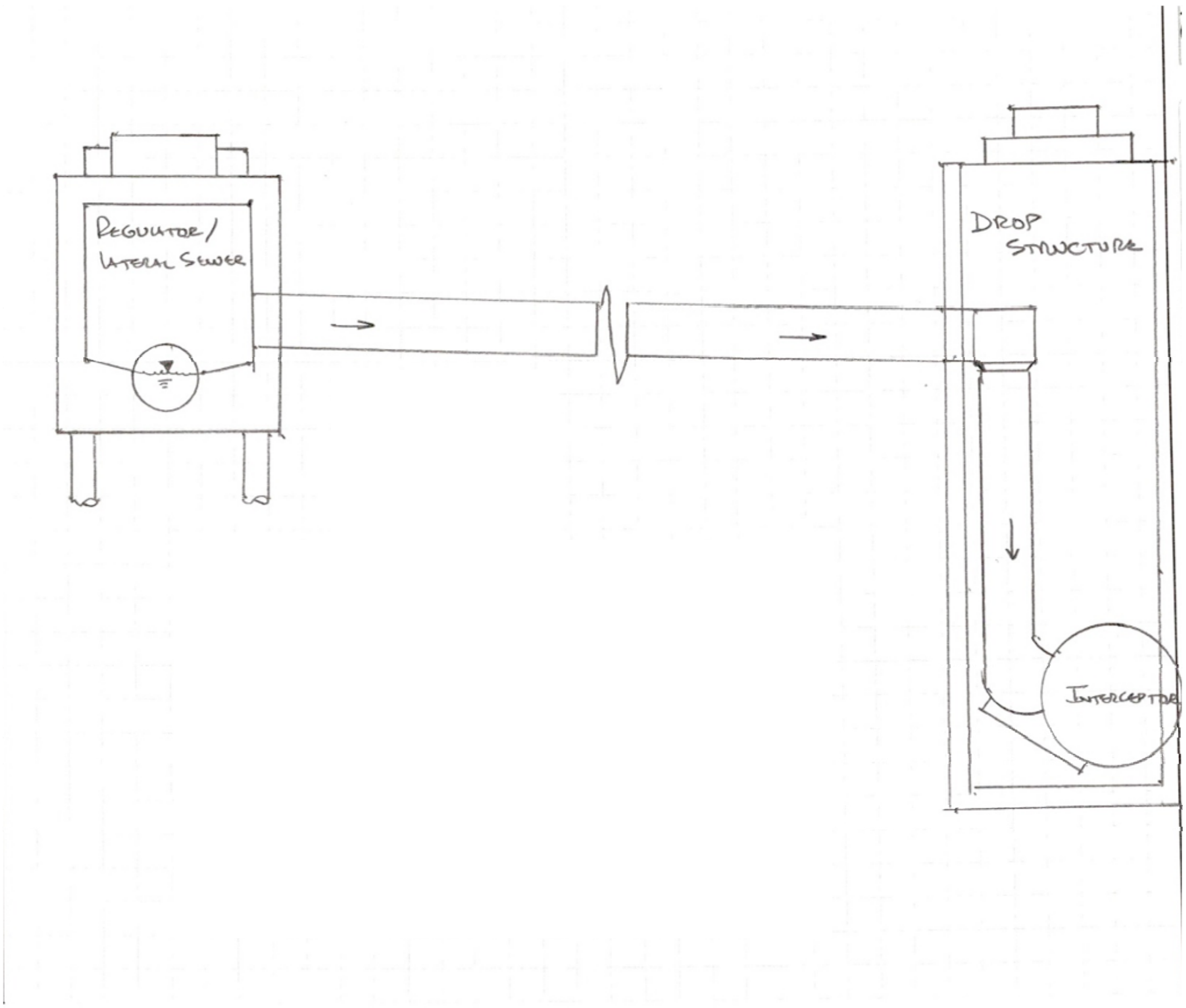
☑ Original ☐ Alternative



Sketch

Alternative No.: AD-23

☐ Original ☑ Alternative



Construction Cost Estimate

Alternative No.: AD-23

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Gated Isolation Chamber	EA	400,000.00	12	$4,800,000		
Extend Piping	LF	2,500.00			240	$600,000
Maintenance & Protection of Traffic	LS	25,000.00	1	$25,000		
Duration Savings	MO	980,546.00	56	$54,910,576	55	$53,930,030
Total Markup	91.14%			$54,442,161.99		$49,697,900.74
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$114,178,000.00		$104,228,000
NET SAVINGS						$9,950,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	AD-41
Do not expose and wrap the Con Ed lines	

Description of Original Concept:

The original concept includes exposing the existing Con Edison transmission lines near the flood wall and wrapping with carbon fiber.

Description of Alternative Concept:

The alternative concept is to not to wrap the Con Edison transmission lines thereby eliminating the requirement to excavate and expose the lines.

Advantages of Alternative Concept	Disadvantages of Alternative Concept
[redacted]	[redacted]

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$110,104,000	$ 0	$110,104,000
Alternative Concept	$104,018,000	$ 0	$104,018,000
Savings	$6,086,000	$ 0	$6,086,000

Discussion

Alternative No.: AD-41

[redacted]

[redacted]

[redacted]

Sketch

Alternative No.: AD-41

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: AD-41

☐ Original ☑ Alternative

[redacted]

Construction Cost Estimate

Alternative No.: AD-41

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Carbon Fiber Wrapping at Conduit	LF	63.80	10,328	$658,896		
Excavation, Structural Fill, Compaction, Hauling	CY	90.28	22,538	$2,034,731		
Duration Savings	MO	980,546.00	56	$54,910,576	55.5	$54,420,303
Total Markup	91.14%			$52,499,658.68		$49,597,897.10
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$110,104,000.00		$104,018,000
NET SAVINGS						$6,086,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	AD-59
Optimize tunnel electrical	
Description of Original Concept:	
Some of the electrical solutions shown at this stage of the project are not yet fully developed.	
Description of Alternative Concept:	
Optimize the tunnel electrical design to delete the fire alarm system, reduce the number of lighting fixtures, add exit signs, use 480/277 V throughout, positive ventilation control, using aluminum conduits, using NEMA 6P equipment, raising the height of the tunnel to provide safe clearance.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• [redacted]	• [redacted]

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$137,415,000	$0	$137,415,000
Alternative Concept	$142,415,000	$0	$142,415,000
Savings	($5,224,000)	$0	($5,224,000)

Discussion

Alternative No.: AD-59

A. [redacted]

[redacted].

Advantages:

- [redacted]
- [redacted]

Disadvantages:

- [redacted]

B. [redacted]

1. [redacted]

   [redacted]

Advantages:

- [redacted]
- [redacted]

Disadvantages:

- [redacted]

2. [redacted]

Advantages:

- [redacted]
- [redacted]

Disadvantages:

- [redacted]

3. [redacted]

[redacted]

Advantages:

- [redacted]
- [redacted]
- [redacted]

Disadvantages:

- [redacted]

4. [redacted]

C. [redacted]

[redacted]

D. [redacted]

[redacted]

[redacted]

E. [redacted]

F. [redacted]

Sketch

Alternative No.: AD-59

☐ Original ☑ Alternative

EXIT SIGNS

Reflective Glow Exit Sign Cyalume 9-30070

Reflective glow exit signs clearly identify exit areas in your facility during a power failure.

Exceed NFPA standards 5x for bright white visibility in a power outage.

Self-adhesive exit sign with water-resistant backing.

Easily mark floors, stairways, floors, exit routes and fire equipment.

Patented material glows brighter than standard glow-in-the-dark materials.

Sketch

Alternative No.: AD-59

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: AD-59

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: AD-59

☑ Original ☐ Alternative

[redacted]

Construction Cost Estimate

Alternative No.: AD-59

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
A. Fire Alarm						
Central Station	EA	50,000.00	1	$50,000		
Fire detection devices	EA	400.00	420	$168,000		
Conduit & Wire	LF	18.00	4,500	$81,000		
Aux. Equipment	LS	20,000.00	1	$20,000		
B. Tunnel Lighting						
Lighting Fixture	EA	450.00	410	$184,500	205	$92,250
Regular Lighting / Conduit & Wire	LF	18.00	4,500	$81,000	4,500	$81,000
Exit Signs	EA	550.00	300	$165,000	15	$8,250
Exit Sign Conduit & Wire	LF	18.00	4,500	$81,000	4,500	$81,000
30 KVA, 480/277 V - 120/208 V XFMR	EA	6,000.00	4	$24,000		
150 KVA, 120/208 V - 480/277 V XFMR	EA	20,000.00	2	$40,000		
400 A Disconnect Switch	EA	800.00	2	$1,600		
Conduit & Wire	LF	25.00	4,500	$112,500		
1" PVC Coated RGS conduit, Installed in Trench	LF	15.00	22,500	$337,500		
1" Aluminum conduit, installed in trench	LF	12.00			22,500	$270,000
Increase Tunnel Headroom	LS	70,329,632.00	1	$70,329,632	1.05	$73,846,114
Substitute NEMA 4X Enclosures for NEMA 6P Enclosures	LS	100,000.00	1	$100,000	1.30	$130,000
Total Markup	91.14%			$65,415,390.47		$67,906,100.60
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$137,191,000.00		$142,415,000
NET SAVINGS						($5,224,000)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	AD-60
Optimize park electrical	
Description of Original Concept:	
Electrical project is in early stages of development and all details are not yet shown.	
Description of Alternative Concept:	
The alternative concept encourages items to improve the electrical distribution throughout the park, including hardening of the electrical and use of NEMA 6 type enclosures for temporary submergence, downsizing transformers throughout the project, using LED lighting in lieu of metal halide fixtures, use of 277 V for low light poles and 480V for high masts, reusing existing raceways where possible, and using PVC conduit in lieu of RGS for park lighting.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Described below for each subsection	• Described below for each subsection

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$136,903	$0	$136,903
Alternative Concept	$287,000	$0	$287,000
Savings	($277,000)	$0	($277,000)

Discussion

Alternative No.: AD-60

A. Harden electrical equipment to withstand temporary submergence.

The park lighting poles have handholes for the wire connections that are located close to the grade level. Extreme flood conditions may lead to short circuiting of the power supply branches resulting in costly wire and terminal blocks replacement and/or repair. We suggest replacing all electrical boxes and equipment prone to be flooded with the NEMA 6 rated enclosures capable of withstanding temporary submergence. A similar approach should be taken regarding the lighting controllers, DOT DSL relay cabinets, traffic boxes, etc. Hardening electrical equipment may substantially increase the capital cost of the project.

B. Revisit transformers' sizing throughout the project.

It appears that the transformers shown on drawing No. E-602 are new equipment serving this project (see attached Sketch). If this is the case, the transformer sizes need to be revisited as the project develops and when the actual electrical loads could be accurately calculated. Based on the electrical loads connected to the 750-kVA transformer as shown on the sketch, the size of the transformer could be reduced from 750 kVA (750 kVA can deliver up to 900 A at 480 V) to 500 kVA or less (500 kVA can deliver 600 A at 480 V). The other transformers also appear to be oversized. The cost reduction will be achieved because of less expensive transformers, circuit breakers, reduced wire sizes and reduced sizes of raceways.

C. Replace Metal Halide flood light luminaires with flood light LEDs

Drawing E-107 calls for replacement of two existing 40 ft. light poles with two new lighting masts with (13) 1000 W metal halide (MH) lights on each. The VE team believes that the LED lights would be a better choice for sports facility floodlight, especially in the light of the fact that the Design Engineer called for LEDs in other locations of the project. While initial capital investments for MH are lower and initial lumen output (lumens/watt) are comparable, some of the LED advantages are as follows.

- LED bulbs are much more efficient, especially after 6 months of life

- Metal Halide lights require a notoriously long warm up period, it means that if a short power failure occurs during a sport event, the MH will restart in, say, 15 minutes

- Longer life, lesser maintenance.

D. Use 277 V for lighting for low light fixtures (below 22 feet). Use 480 V for lighting masts (above 22 feet).

The original concept adapts 120 V voltage for promenade and walkway lighting (see sketch E-1 for example) 277 V voltage for high mast floodlights. When the promenade lighting service is 120 V, the use of heavy 4#2/0 wires installed in 3" conduit is justified because of the high current and significant voltage drop conditions over the substantial distances (see attached Sketch).

We proposed a new approach with the higher voltage: using 480/277 V system as follows:

277 V (phase-to-neutral) for low poles (480 V in not permitted by NEC in the lighting installations below 22 ft.), and 480 V (phase-to-phase) for the light masts and high poles. Using higher voltage will allow reduced the load current by 130% for low poles and by 73% for masts.

Advantages:

- lower construction efforts

Disadvantages:

- none apparent

The cost saving is calculated **per 1000 ft**., assuming that the higher voltage may reduce the wire size from #2/0 to #4, and the raceway size from 3" to 1 ½".

E. Reuse existing raceways when possible.

Under the original concept most raceways and wiring are removed in the areas of sport field 1 & 2, and sport fields 5 & 6. Consider a possibility of reusing some of the raceways in these and other applicable areas. Because the condition of the existing is unknown, no credit has been taken.

F. Use PVC conduit for parks lighting instead of PVC coated rigid galvanized steel (RGS).

PVC coated RGS is frequently used by Design Engineers for NYC public facilities outdoor lighting (for example, a recent project for NYCHA).

PVC coated rigid galvanized steel conduit is the most expensive type of the raceways used in electrical installations. The perception is that the PVC coated conduits provide superior protection of the electrical raceways against corrosion. And this is true, but only if the installation crews use all methods and materials recommended by the manufacturer without exceptions when the conduits are to be measured, cut in place, and threaded to meet the field conditions. It not always happens in the real construction cycle. There are a few reasons to consider other types of raceway that are way less expensive but will serve the purpose well. Non-metallic conduit is a good alternative solution to be considered. Since the majority of park distribution conduit is installed at least 24" below grade, the raceway protection against physical damage can be considered adequate, unless digging at the conduit locations occurs. Most likely digging locations, such as places where electric conduit crosses other underground utility, can be better protected by placing thin (4") concrete plates above the electric conduit. This is a widely used approach that will provide a better level of protection than the metal conduit without concrete encasement does.

1. Rigid non-metallic PVC Schedule 80 conduit is rated by NFPA 70 (National Electrical Code) for installations exposed and/or concealed above ground and for the direct burial below grade. NFPA 70 identifies this type of the raceway suitable for protection in the areas of possible physical damage. The appearance of this type of the raceway is no different than the PVC coated RGS conduits.

2. Non-metallic High-Density Polyethylene (HDPE) conduit is rated by NFPA 70 for the direct burial below grade installations but cannot be installed exposed. It means that another type of raceway should be utilized, e.g. rigid galvanized steel conduit or PVC Sch. 80 conduit, for connection between the lighting panelboard and the underground installation. While providing lesser level of protection against physical damage, the HDPE conduit somewhat less expensive than the PVC Sch. 80 and is recognized as recyclable material.

Advantages:

- Easier installation
- Shorter construction duration
- Better level of protection against corrosion

Disadvantages:

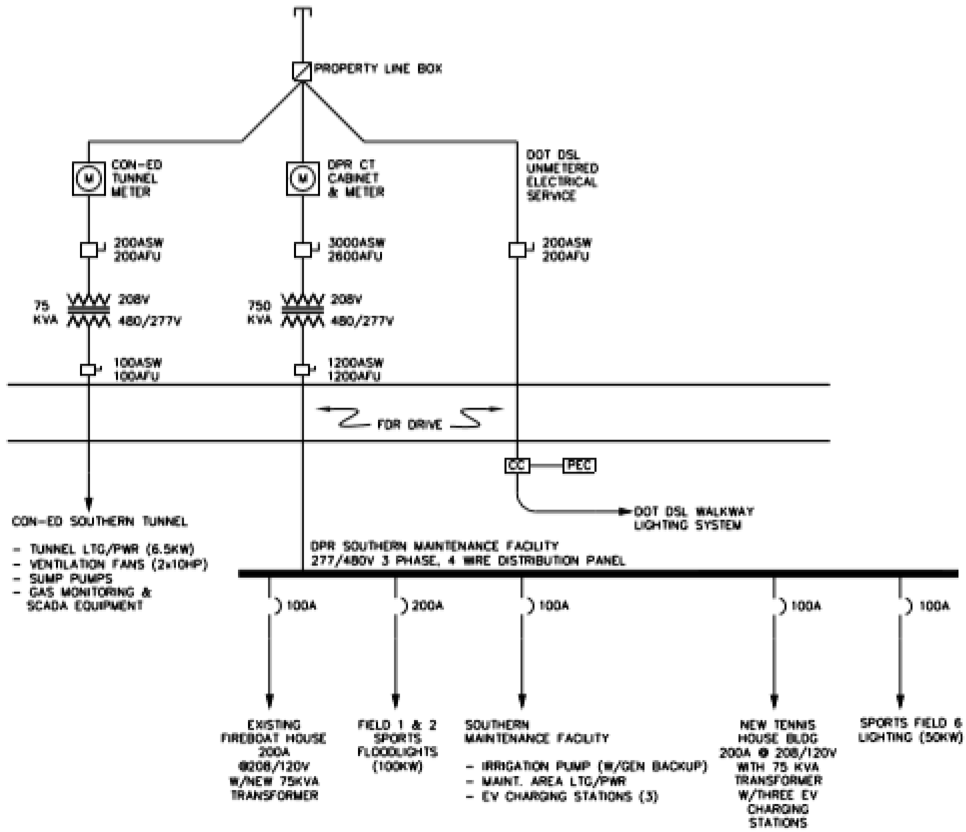
- Lesser level of protection against physical damage

The cost saving is calculated **per 1000 ft**. assuming installation of PVS sch. 80 conduit vs. PVC coated RGS

Sketch

Alternative No.: AD-60

☑ Original ☐ Alternative

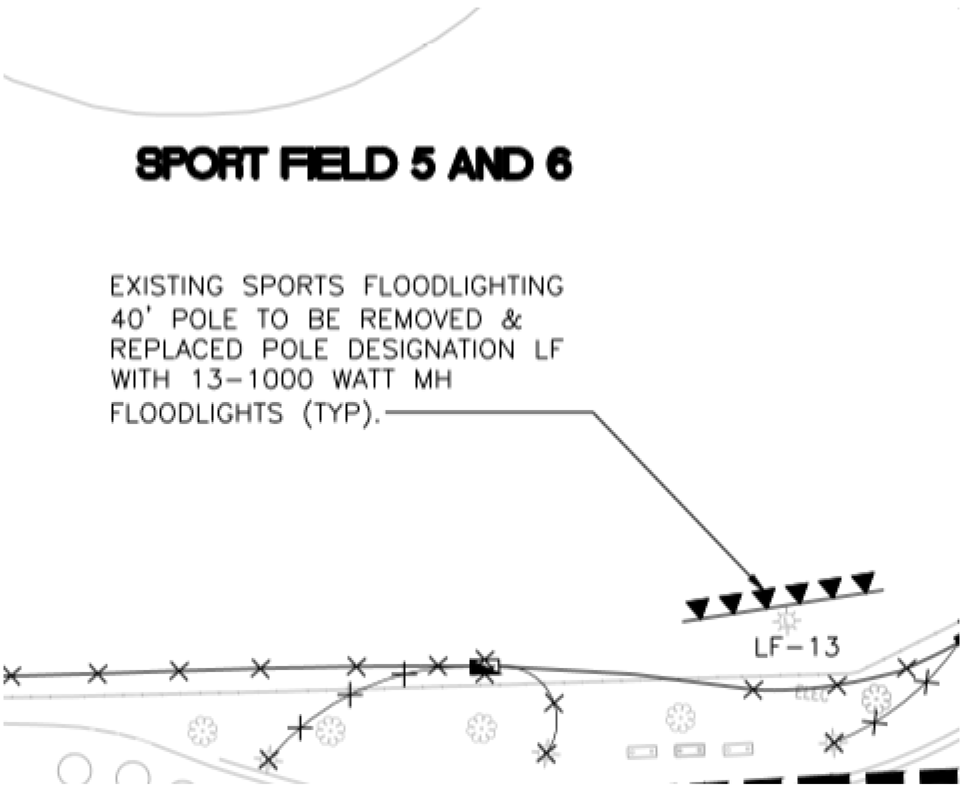


DELANCY ST BRIDGE (SOUTHERN)
ELECTRIC SERVICE ONE-LINE DIAGRAM

Sketch

Alternative No.: AD-60

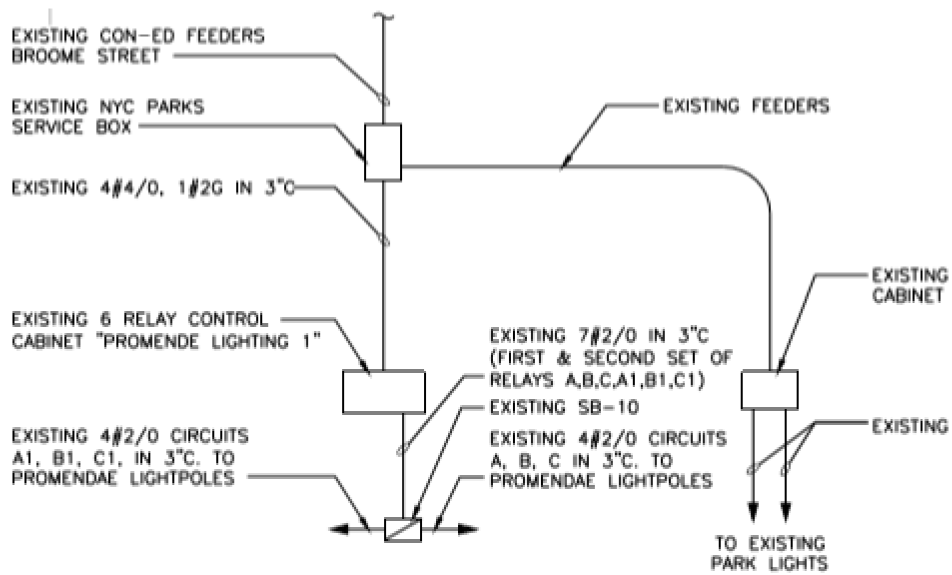
☑ Original ☐ Alternative



Sketch

Alternative No.: AD-60

☑ Original ☐ Alternative



Construction Cost Estimate

Alternative No.: AD-60

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Change out Luminaires at Field Lighting Towers, Fields 5 & 6 (AD-47)	EA	20,000.00			8	$160,000
Higher Voltage for Lighting						
Underground 3" RGS Conduit	LF	42.00	1,000	$42,000		
Underground 1.5" RGS Conduit	LF	20.00			1,000	$20,000
600 V, 2/0 XHHW Copper Wire	LF	7.00	4,000	$28,000		
600 V, #4 XHHW Copper Wire	LF	3.00			4,000	$12,000
1" PVC	LF	8.00			1,000	$8,000
1" RGS PVC	LF	15.00	1,000	$15,000		
Additional Cost for Hardening System	LS	50,000.00			1	$50,000
750 KVA Transformer	EA	65,215.00	1	$65,215		
500 KVA Transformer	EA	45,090.00			1	$45,090
Total Markup	91.14%			$136,903.83		$268,940.87
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$287,000.00		$564,000
NET SAVINGS						($277,000)

CONSTRUCTION (C)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-04
Close park entirely during construction	
Description of Original Concept:	
The original concept is to keep portions of East River Park and the entire Shared Use Path open throughout the duration of construction. Portions of the park will be closed for construction, while some facilities are to remain open.	
Description of Alternative Concept:	
The alternative concept is to close entire sections of East River Park and the Shared Use Path throughout the duration of construction, thereby allowing use by the contractor of the entire work areas.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Closure of the Park will allow use of portions of the park as staging and laydown areas, decreasing the need for off-site areas. • Risk of injury to Park and Shared Use Path users will be eliminated.	• The Community will not have use of East River Park or the Shared Use Path for multiple years durations throughout the 5-year construction schedule. • Possibility of increase in temporary park alienation durations due to closure of the track and some playing fields, while non-park construction takes place.

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$104,955,000	$0	$104,955,000
Alternative Concept	$93,710,000	$0	$93,710,000
Savings	$11,245,000	$0	$11,245,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Park closure allows the 10th Street and Delancey Street pedestrian bridges to be constructed without requiring maintenance of Park access. • The Shared Use Path can be fully utilized as a construction access road. Barge unloading would take place between Williamsburg Bridge and the track. Closure of park and path would allow unloading of materials such as precast tunnel segments on travel lifts, which would likely shorten duration of this critical path construction.	

Discussion

Alternative No.: C-04

Closure of the Park in areas within the work zone for each particular stage will have significant benefits to construction efficiency and safety. Closure will allow increased areas for potential use as staging and laydown areas, decreasing the need for off-site areas. Risk of injury to Park and Shared Use Path users will be eliminated for closed portions.

Park closure allows the 10th Street and Delancey Street pedestrian bridges to be constructed without requiring maintenance of Park access. While potential additional savings could be obtained by utilizing common FDR Drive lane closures by constructing bridges simultaneously, it is unlikely that it would be possible to schedule the work on both bridges with precision to allow for simultaneous closures.

The general sequence of work in each closed segment is anticipated to be construction of sewers and utilities, driving piles and installing floodwall sections, installing utility tunnel sections, then constructing levee and park elements. The use of barging is recommended to maximize efficiency. Barge unloading must take place between the Williamsburg Bridge and the track. Closure of park and shared use path would allow unloading of materials such as precast tunnel segments without having to cross facilities in use. Two of the three tunnel segments are located across from the barge unloading area. There appears that there would be duration savings due to quicker delivery of materials on-site. If precast floodwalls sections are implemented, they could also be transported in the same manner.

The main disadvantages are closures of portions of Park for a longer duration throughout the 5-year construction schedule. Temporary Park alienation could potentially increase, when non-park construction takes place with park closure.

Sketch

Alternative No.: C-04

☑ Original ☐ Alternative

Sketch

Alternative No.: C-04

☑ Original ☐ Alternative

Sketch

Alternative No.: C-04

☐ Original ☑ Alternative

Sketch

Alternative No.: C-04

☐ Original ☑ Alternative

Sketch

Alternative No.: C-04

☐ Original ☑ Alternative

Construction Cost Estimate

Alternative No.: C-04

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
Enables 3 Shift Work						
Duration Savings	MO	980,546.00	56	$54,910,576	50	$49,027,300
Total Markup	91.14%			$50,044,725.00		$44,682,790.18
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$104,955,000.00		$93,710,000
NET SAVINGS						$11,245,000

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-08
Modify construction sequencing to facilitate use of HUD money	
Discussion:	

The base construction schedule indicates April 2022 for spending the approximately $250M HUD funding in order to meet the federal HUD spending deadline. The original/base construction schedule groups all work together in a linear approach within the six different construction Segments (and associated reaches) as indicated in the construction schedule shown in Figure #1.

The sequence of construction assumes substantial completion of construction work to be in Segments 2, 3, and 4 (see Figures #2 & 3) to be paid from this funding. Working back from the HUD deadline, the schedule indicates a construction groundbreaking date of May 14, 2019, but has little apparent construction float-time, and does not provide enough time for resolution of 3rd-party negotiations and approvals, and to address other project complexities and risks.

The critical path for the base construction schedule runs through the construction of the floodwall and tunnel located along the FDR. This work is slow, and has many schedule risks both during design and construction such as:

- complex negotiations with Con Edison related to the scope of work for protecting their power lines and the complexity of constructing the currently-envisioned tunnel
- maintenance of traffic negotiations with OCMC and stipulations of limited night-time construction windows for constructing the adjacent floodwall, series of flood gates, pedestrian bridges, and utility work in, and crossing, the FDR
- unknowns associated with the full extent of the manufactured gas plant (MGP) environmental clean-up work in Segment 5
- limited construction site access points to/from the Park as well as truck restrictions on the FDR and conflicts with the new public ferry access locations

However, a review of the timeline for design and construction reveals schedule slippage and the real risk of not meeting the federal spending date. This is due to complex negotiations and challenging design conflicts of the floodwall along a major traffic arterial as well as issues related to parkland alienation and other environmental impact issues. Other project constraints on the construction schedule and sequencing of the work include:

- Access to the track and field complex and esplanade are expected to be maintained.
- Activities at Stuyvesant Cove Park cannot overlap with the L-train shutdown.
- OCMC traffic and 3rd-party constraints are advanced as the earliest construction packages

In order to facilitate early use of the HUD funding, a revised, non-linear sequencing approach is suggested that considers simultaneous early construction of ancillary, supporting work.

To facilitate this, the design team is encouraged to view the site as having 2-3 separate access points: Montgomery Street, potentially Houston Street, and the waterfront. Schedule the work based on 1) work that can more easily advance through design, and 2) project locations on the site that can potentially have separate access and staging, such as a front waterfront approach and a separate back-side roadway approach. For example, it is assumed that work in Reach E South will begin on the south side of the Williamsburg Bridge Pier and move southward, and that barges could be used for lay-down area, especially if the contractor is incentivized by an A+B contracting approach.

Issue one or more early make-ready contracts for construction while completing the final design of the floodwall and tunnel.

While the small reaches are useful graphically for organizing the project, document set across disciplines and for cross referencing details, use of the reaches is not practical for organization of the Cost Estimate or construction sequencing. The VE team found the current approach to segmentation and reaches a hindrance to understanding the estimate quantities, and the full scope of the work.

In order to better ensure the deadline for spending the federal HUD funding is met:

1) Adjust the baseline construction schedule to account for project risks having a schedule impact to the critical path (see VE Alternative No. C-58) and allow more realistic timeframes for the City's processes for design, approvals, alienation, permitting, solicitation, construction award and registration. Refocus a new critical path on the 'make-ready' projects for early bid.

2) Sequence the construction around the access, staging, and laydown requirements of the early 'make-ready' contracts. Consideration for early contracts should include:

a) **DPR/DEP utilities and CSO conveyance work within the Park** (See VE proposal C-60). The utilities and CSO work in the Park is approximately $149M.

b) Scope of **resiliency strengthening repairs to the bulkhead** - Although this is a separate project, it is an enabling make-ready scope with a timeline that appears to align well with the dates associated with the HUD spending deadline. To facilitate payment through the HUD funds, the bulkhead scope of the repairs may need to be included in the ESCR DEIS. Costs associated with this work are assumed to be $15-20M (See VE proposal C-35).

c) Advance an **early earthworks construction and fill placement** contract for certain areas in the Park associated with utility work.

d) Provide a **temporary construction berm at Houston Street** as an early contract. This has been estimated to cost $11M. (See VE proposal C-51).

d) **Rebuilding Houston St. pedestrian ramps to handle HS-20** loads is also an enabling contract worth approximately $4.5M that could be performed as an early contract (See VE proposal IA-03).

e) Use of a pre-fab pedestrian bridge design would permit **early prefabrication of bridge components** for jobsite assembly. The pedestrian bridge group within DDC could oversee acceleration of this project component. Approximately $16M is being carried in the estimate for the prefabricated pedestrian bridge spans (See VE proposal IA-16). Some or all of the full cost of the pedestrian bridges, estimated at approximately $79M may also be eligible.

f) **Advance purchase long-lead items.** (See VE proposal C-19.) Costs for these items total roughly $77M.

g) Investigate whether the **DEP interceptor work,** which should remain as a separate project, might be eligible for the federal HUD funding. As an enabling resiliency project to the ESCR floodwall, it will address interior drainage within the flood plain for handling heavy precipitation and groundwater swells during severe storms. Although the design has not been started and it may not be ready in time, it carries a separate, preliminary estimate of $161M.

3) Based on the components that are selected for early advancement, sequence the work using a 'front side/back side' construction approach to the site that would permit two or more contractors to work in parallel. One could work primarily from barges along the waterside bulkhead edge, while others could access their worksites from Montgomery and/or Houston Street for work within the park.

4) Advance two or more early contracts <u>in parallel</u>. For example, the DPR/DEP utilities and CSO work within the park could be constructed simultaneously with the repair work to the bulkhead.

Implementing these changes to the current construction schedule will provide a more realistic timeline for better assessment of the impacts of time-sensitive issues, particularly during design. This schedule can be cost-loaded for earned-value management, to help with managing the funding requirements. including meeting the HUD funding deadline.

Additional management effort by City forces will be required for concurrent contracts, as well as the possibility of contractors working in the same area simultaneously. This could be mitigated with discrete scopes of work for the early contracts. It may also be necessary to add the strengthening of the bulkhead and the interceptor work to the DEIS in order for it to be reimbursed from the HUD funding.

Alternative No.: C-08

☑ Original ☐ Alternative

ESCR - Preliminary Draft Construction Schedule
2/09/2018

ID	Task Name	Duration	Start	Finish
1	**Preliminary Draft Construction Schedule**	**1306 days**	**Tue 5/14/19**	**Tue 5/14/24**
2	**Project Area No. 1 - Segment 3** East River Park (North)	**535 days**	**Tue 5/14/19**	**Mon 5/31/21**
3	Reach J	73 days	Tue 5/14/19	Thu 8/22/19
4	Reach I	480 days	Mon 7/22/19	Fri 5/21/21
5	Landscape Construction - Reach I & J	494 days	Wed 7/10/19	Mon 5/31/21
6	Landscape Planting - Reach I & J	130 days	Tue 9/1/20	Mon 5/31/21
7	10th Street Bridge Reconstruction	395 days	Fri 10/4/19	Thu 4/8/21
8	**Project Area No. 1 - Segment 2** East River Park (Mid)	796 days	Tue 5/14/19	Tue 5/31/22
9	Reach H	210 days	Tue 5/14/19	Mon 3/2/20
10	Reach G	314 days	Tue 11/26/19	Fri 2/5/21
11	Reach F	328 days	Mon 9/14/20	Wed 12/15/21
12	Reach E - North	138 days	Wed 10/13/21	Fri 4/22/22
13	Landscape Construction - Reach F, G, H, E North	602 days	Mon 2/10/20	Tue 5/31/22
14	Landscape Planting - Reach F, G, H, E North	132.5 days	Wed 9/1/21	Tue 5/31/22
15	**Project Area No. 1 - Segment 1** East River Park (South)	**710 days**	**Wed 8/25/21**	**Tue 5/14/24**
16	Reach E - South	174 days	Wed 8/25/21	Mon 4/25/22
17	Reach D	265 days	Thu 2/3/22	Wed 2/8/23
18	Reach C	89 days	Thu 12/29/22	Tue 5/2/23
19	Reach B	120 days	Wed 3/22/23	Tue 9/5/23
20	Reach A	208 days	Wed 7/12/23	Fri 4/26/24
21	Landscape Construction - Reaches A, B, C, D, E South	472 days	Mon 7/25/22	Tue 5/14/24
22	Landscape Planting - Reaches A, B, C, D, E South	118.5 days	Fri 9/1/23	Tue 5/14/24
23	Delancey Street Bridge Reconstruction	395 days	Wed 8/25/21	Tue 2/28/23
24				
25	**Project Area No. 2 - Segment 4** Con Ed to Murphy Bro.	**796 days**	**Tue 5/14/19**	**Tue 5/31/22**
26	Reach K	192 days	Tue 5/14/19	Wed 2/5/20
27	Reach L	361 days	Fri 11/8/19	Fri 3/26/21
28	Reach M	233 days	Mon 10/12/20	Wed 9/1/21
29	Landscape Construction - Murphy Brothers	236 days	Tue 7/6/21	Tue 5/31/22
30	Landscape Planting - Murphy Brothers	66 days	Tue 3/1/22	Tue 5/31/22
31	L Train Shutdown	296 days	Tue 5/14/19	Tue 6/30/20
32	**Project Area No. 2 - Segment 5** Stuy Cove Park	**761 days**	**Wed 7/1/20**	**Wed 5/31/23**
33	Reach N	420 days	Wed 7/1/20	Tue 2/8/22
34	Reach O	339 days	Wed 7/28/21	Mon 11/14/22
35	Landscape Construction - Stuyvesant Cove	304 days	Fri 4/1/22	Wed 5/31/23
36	Landscape Planting - Stuyvesant Cove	132 days	Thu 9/1/22	Wed 5/31/23
37	**Project Area No. 2 - Segment 6** E23rd to Asser Levy	**532 days**	**Sun 5/1/22**	**Tue 5/14/24**
38	Reach Q	412 days	Sun 5/1/22	Mon 11/27/23
39	Landscape Construction - Asser Levy	227 days	Mon 7/3/23	Tue 5/14/24
40	Landscape Planting - Asser Levy	53 days	Fri 3/1/24	Tue 5/14/24
41				
42	**Parallel Conveyance**	TBD	TBD	
44	**Interceptor Gates - South**	TBD	TBD	
46	**Interceptor Gates - North**	TBD	TBD	

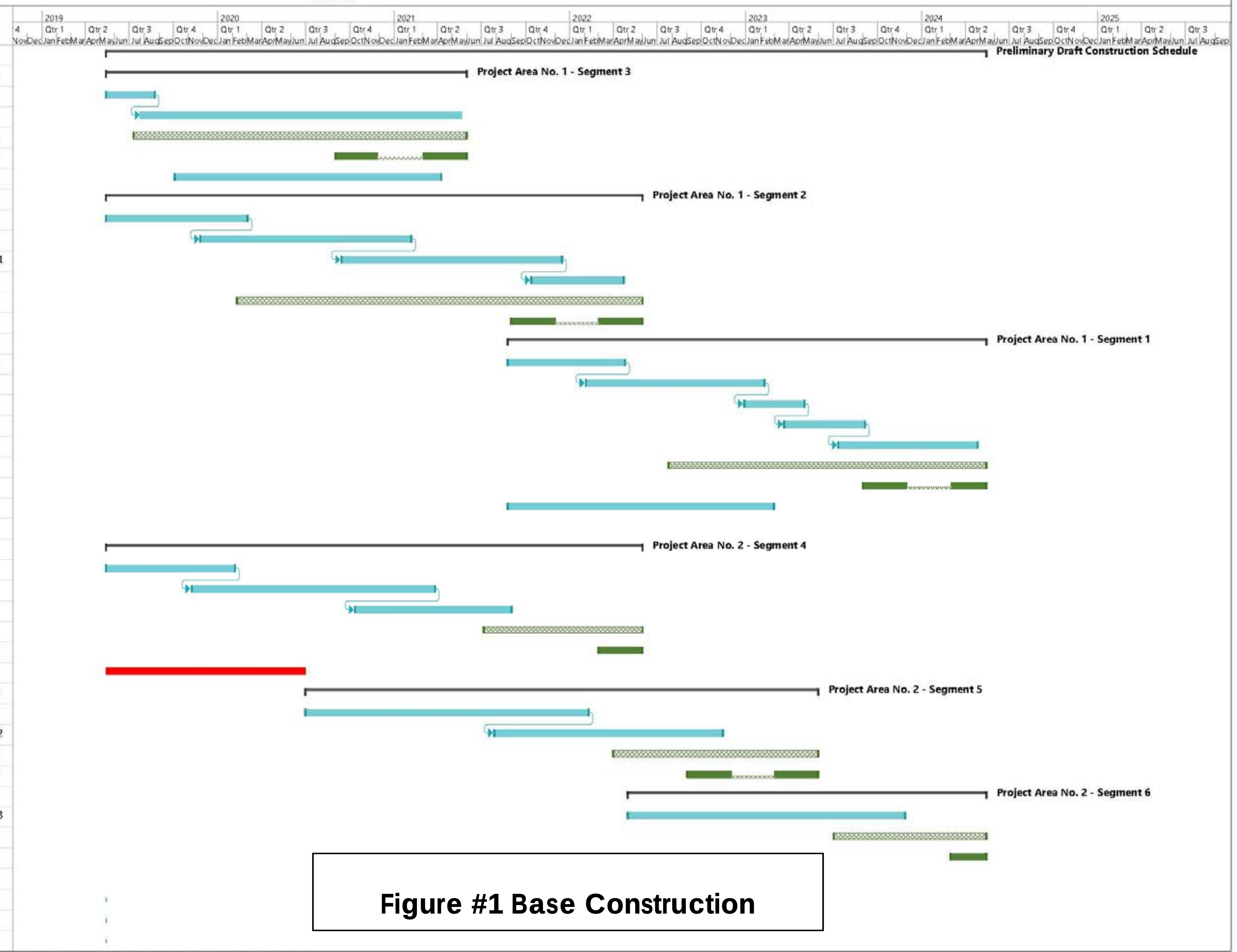


Figure #1 Base Construction

- The schedule is modified in order to spend the approximately $250M for federal reimbursement, which includes all works in Segments 2, 3 and 4 before April 2022.
- The Landscape Construction has been extended beyond the federal reimbursement cutoff to May 31st in Segments 2 and 3 to meet the planting restrictions. If there is not enough money spent for federal reimbursement before April 2022, some works in Segment 5 also overlap and construction expenditure there can be used to supplement.
- The Landscape Construction has been shortened to May 14th, 2024 in Segments 1 and 6 to meet a 5 year overall construction schedule.
- For Landscaping Construction/Planting, hashed lines indicate work required prior to or between planting windows (soil and plant procurement, soil mixing and testing, on-site nursery, irrigation, etc.) The solid line indicates actual plantings.
- Landscaping Construction duration does not show or include the one year of maintenance required.
- The Site Preparation task originally in the EIS version of the schedule has been removed as these tasks are rolled into each individual Segment.
- Day work is assumed to be an 8 hour shift.
- FDR night work is assumed to be a 6 hour shift.
- Schedule shown is for 5 work days a week.
- Assumed that a Day shift and a Night shift can occur on the same calendar day.
- Slowdowns due to MGP is accounted for in the schedule.
- Current schedule assumes that there are no site access conflicts between various phases and or contractors. Mitigation factors that may be required include, but are not limited to, general barge access for deliveries, potential temporary pier for barge access, alternative concrete delivery under/over FDR, concrete batch plant on site and movable barrier system for FDR closure for night work.

Sketch

Alternative No.: C-08

☑ Original ☐ Alternative

Figure #2 Key Work Areas from Q3 2021 to Q2 2022 in Base Construction Plan

Sketch

Alternative No.: C-08

☑ Original ☐ Alternative

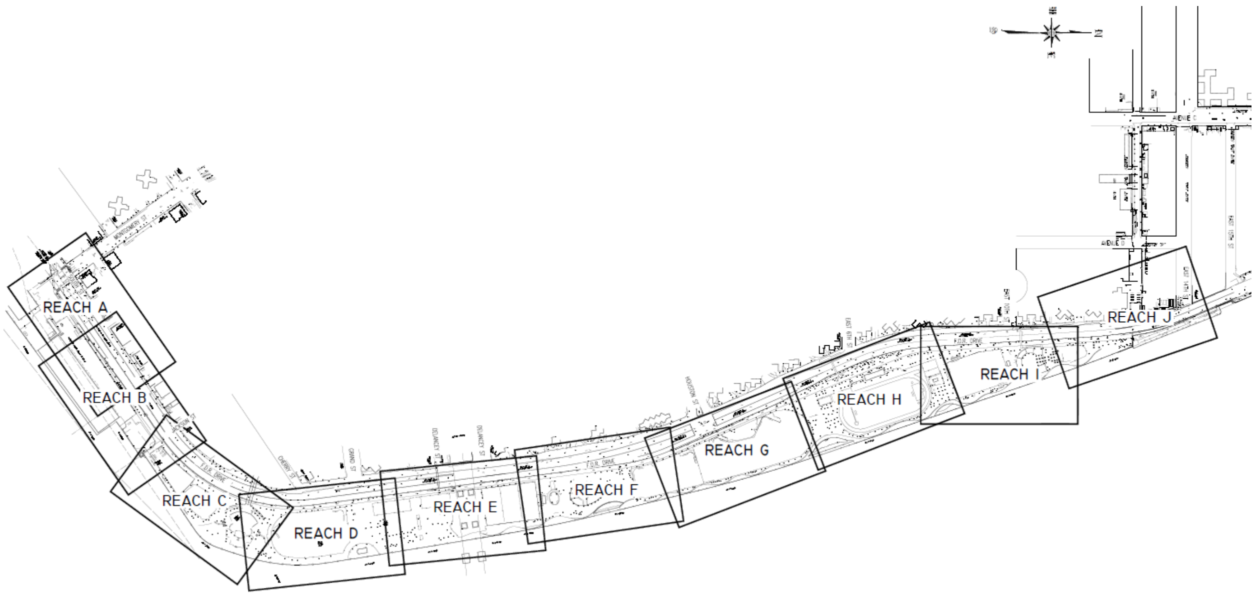


Figure #3 Key Plan of Southerly Construction Reaches in Base Schedule

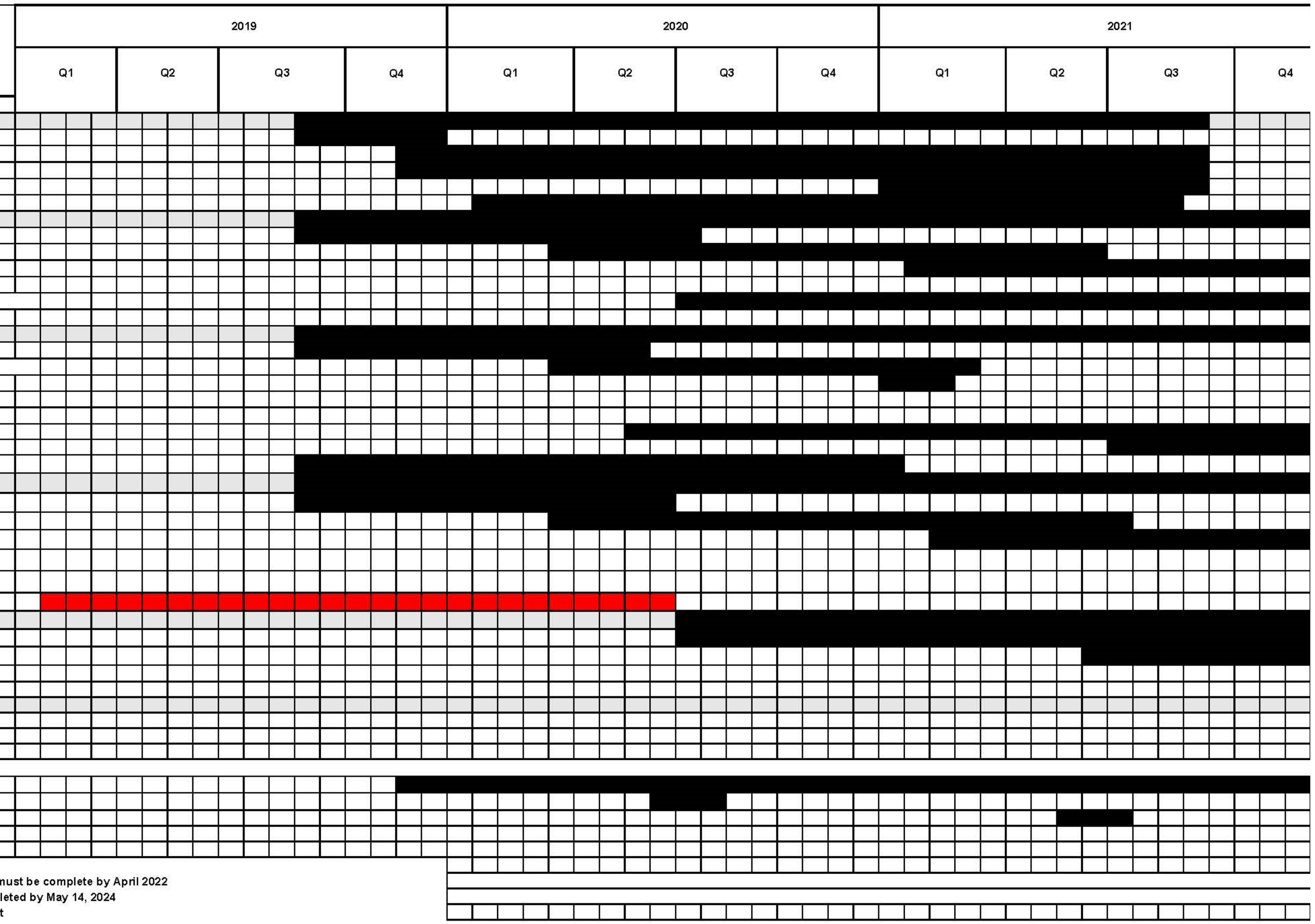
Sketch

Alternative No.: C-08

☐ Original ☑ Alternative

Modify Construction Sequencing to Facilitate Use of HUD Money

Task Name	Duration	Start	Finish
Project Area No. 1 -Segment 3		9/14/2019	9/31/2021
Reach J	73 days	9/14/2019	12/22/2019
Reach I	480 days	11/22/2019	9/21/2021
Landscape Const Reach - I & J	494 days	11/10/2019	9/31/2021
Landscape Planting - Reach I & J	130 days	1/2/2021	9/31/2021
10th Street Bridge Reconstruction	395 days	2/4/2020	8/8/2021
Project Area No. 1 -Segment 2		9/14/2019	9/31/2022
Reach H	210 days	9/14/2019	7/32/2020
Reach G	314 days	3/26/2020	6/5/2021
Reach F	328 days	1/14/2021	4/15/2022
Reach E - North	138 days	2/13/2022	8/22/2022
Landscape Const Reach - F, G, H, E North	602 days	6/10/2020	9/31/2022
Landscape Planting - Reach F, G, H, E North	133 days	1/2/2022	9/31/2022
Project Area No. 1 - Segment 1		9/14/2019	5/14/2024
Reach E - South	174 days	9/14/2019	5/25/2020
Reach D	265 days	3/3/2020	3/8/2021
Reach C	89 days	12/20/2020	2/19/2021
Reach B	120 days	3/2/2023	9/5/2023
Reach A	208 days	7/12/2023	4/26/2024
Landscape Constr Reaches A, B, C, D, E South	472 days	5/25/2020	5/14/2024
Landscape Planting - Reaches A, B, C, D, E South	119 days	7/1/2021	5/14/2024
Delancy Street Bridge Reconstruction	395 days	9/14/2019	1/17/2021
Project Area No. 2 - Segment 4	796 days	9/14/2019	9/31/2022
Reach K	192 days	9/14/2019	6/5/2020
Reach L	361 days	3/8/2020	7/26/2021
Reach M	233 days	2/12/2021	1/2/2022
Landscape Constr - Murphy Brothers	236 days	11/6/2021	9/31/2022
Landscape Planting - Murphy Brothers	66 days	7/1/2022	9/31/2022
L Train Shutdown	296 days	5/14/2019	6/30/2020
Project Area No. 2 - Segment 5	761 days	7/1/2020	5/31/2023
Reach N	420 days	7/1/2020	2/8/2022
Reach O	339 days	7/28/2021	11/14/2022
Landscape Construction - Stuyvesant Cove	304 days	4/1/2022	5/31/2023
Landscape Planting - Struyvesant Cove	132 days	9/1/2022	5/31/2023
Project Area No. 2 - Segment 6	532 days	5/1/2022	5/14/2024
Reach Q	412 days	5/1/2022	11/27/2023
Landscape Construction - Asser Levy	227 days	7/3/2023	5/14/2024
Landscape Planting - Asser Levy	53 days	3/1/2024	5/14/2024
Parallel Conveyance		9/14/2019	4/25/2022
Interceptor Gates - South		6/15/2000	10/15/2000
Interceptor Gates - North		6/15/2001	10/15/2001

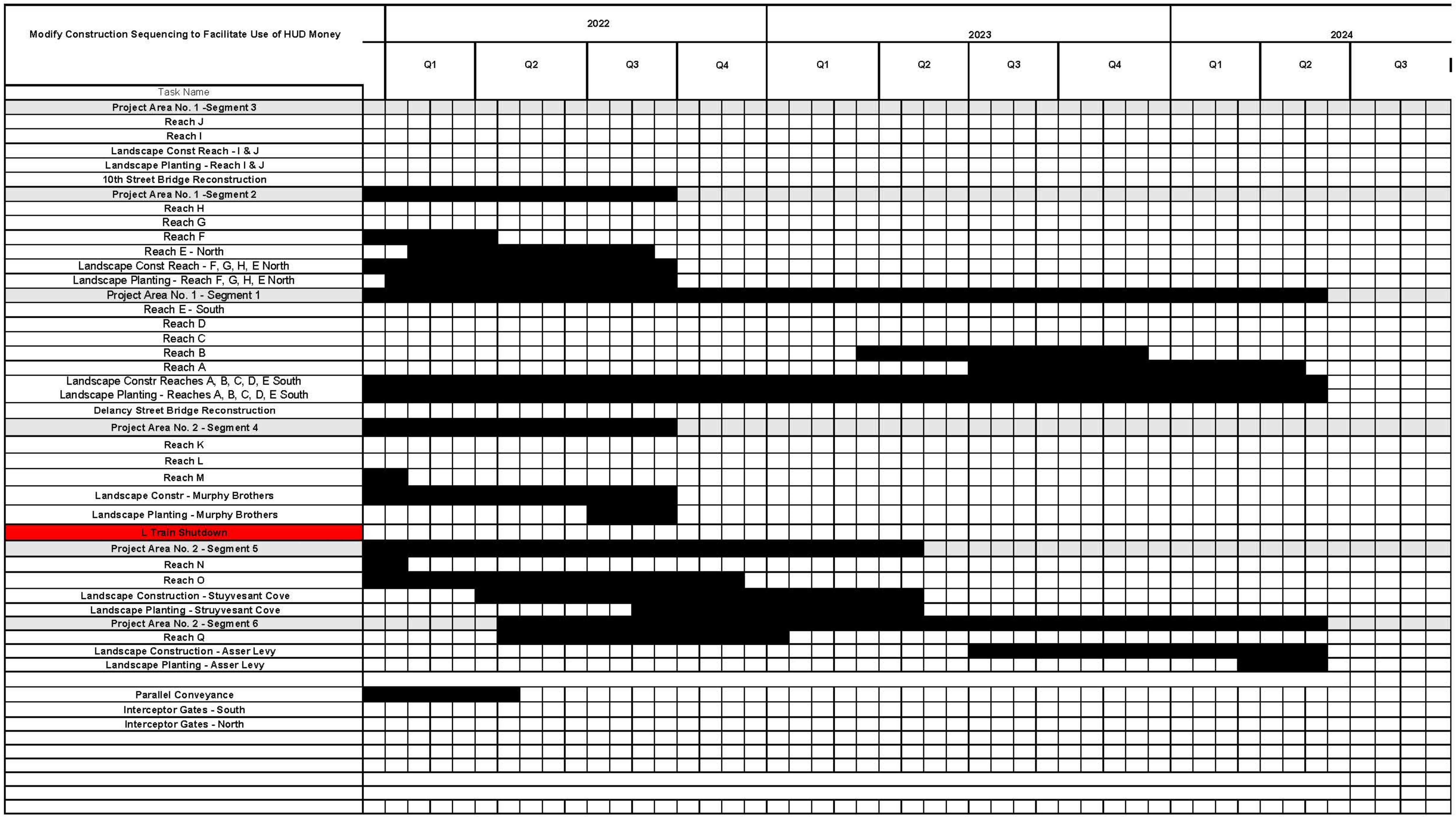


Assumptions:
1. To meet HUD reimbusement requirement $250M of construction must be complete by April 2022
2. Delayed groundbreaking begins Sept 14, 2019 and must be completed by May 14, 2024
3. 5-day work week with 8-hr day shift and as needed 6-hr night shift

Sketch

Alternative No.: C-08

☐ Original ☑ Alternative



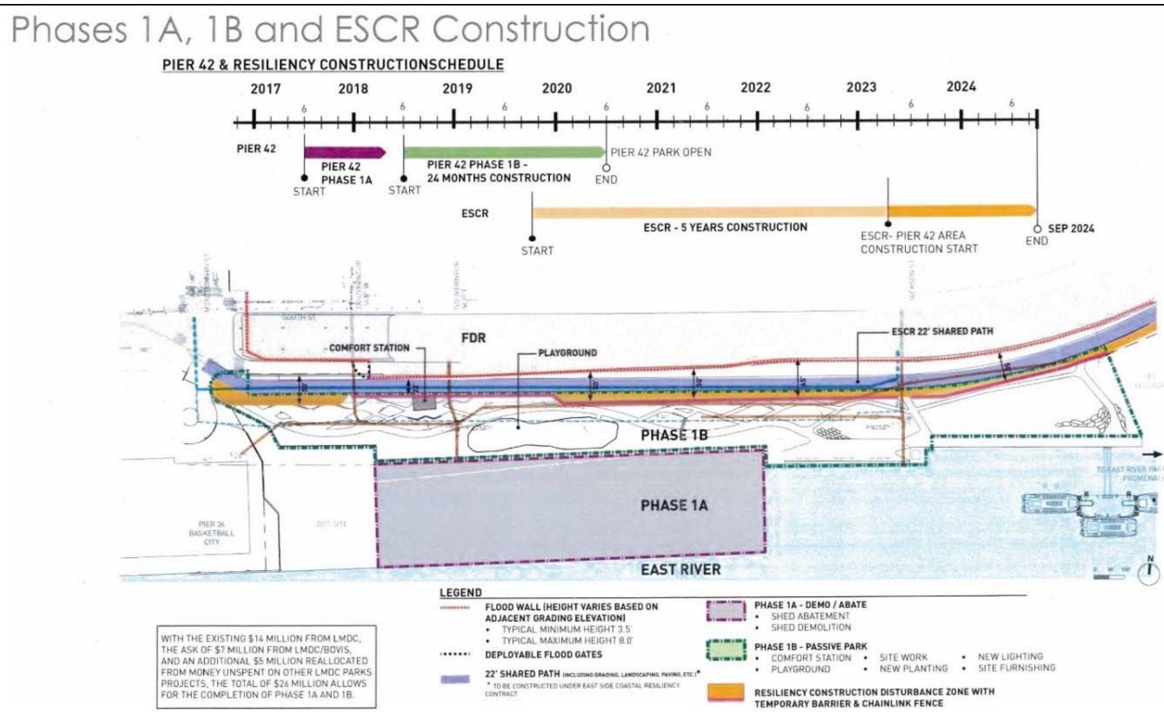
Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-10
Delay Pier 42 Phase 1B Park opening until ESCR is complete in that area	
Discussion	

Pier 42 is currently a temporary shed used for events like the planned Summer Waterfront Celebration and Salsa Concert in August 2018. The planned opening of the new park is June 2020. If the park is officially opened prior to the construction of the ESCR, there are likely alienation costs for removing the park from public access during construction of the ESCR in this area. The alienation cost for taking Pier 42 out of service may be avoided by not officially opening Pier 42 until after the ESCR construction. ESCR construction at Pier 42 is scheduled from March 2023 until September 2024.

This would avoid safety conflicts between the public and the construction vehicles from June 2020 until September 2024 or 4 years and 3 months. This is not intended to preclude using Pier 42 or at least parts of Pier 42 that do not interfere with ESCR construction; it only changes the official opening.



Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-12
Use pre-cast concrete wall panels	
Description of Original Concept:	
The original concept was to cast all concrete in-place for a concrete pile cap on the I-wall sections of the flood wall.	
Description of Alternative Concept:	
The alternative concept is to use pre-cast I-wall caps for the flood wall.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Reduces field construction time • Reduces formwork • Allows for upfront spending of construction funds • Can be produced off-site and barged or trucked in • Not as weather dependent • Could be considered as an early contract to further expedite construction • Sections at wall can easily be replaced	• Possibly first time designed or constructed • Connection detail may be challenging • Requires a load/pilot test in field prior to construction/production • The wall section may be wider at the bottom to accommodate the connection detail

	Cost Savings Summary (Present Worth)		
	First Cost	**O&M**	**Total LCC**
Original Concept	$108,071,000	$0	$108,071,000
Alternative Concept	$106,450,000	$0	$106,450,000
Savings	$1,621,000	$0	$1,621,000

Discussion

Alternative No.: C-12

Capping the sheet pile wall by casting concrete in place to form an I-wall section is the original concept and a customary practice (see original sketch following). This alternative includes the design and construction of a pre-cast cap section that could be placed over the sheet pile cut-off and grouted in-place.

The typical detail from The U.S. Army Corps of Engineers Hurricane and Storm Risk Reduction System (HSDRRS) guidance is included in the sketch. In the typical section, holes are cut in the sheet pile to allow rebar to pass through the sheet pile at the top and bottom of the connection for the cast in place method. So “just” dropping a precast segment over the pile and grouting would not be sufficient. Some creative details for the joint would need to be developed. Aligning holes in precast and sheet pile could be an issue. And may require field drilling the sheet pile holes. The length of cap and vertical joint details will need to be designed as well.

A field test of construction and possibly load testing for a short length using this method should be piloted to ensure performance under design load.

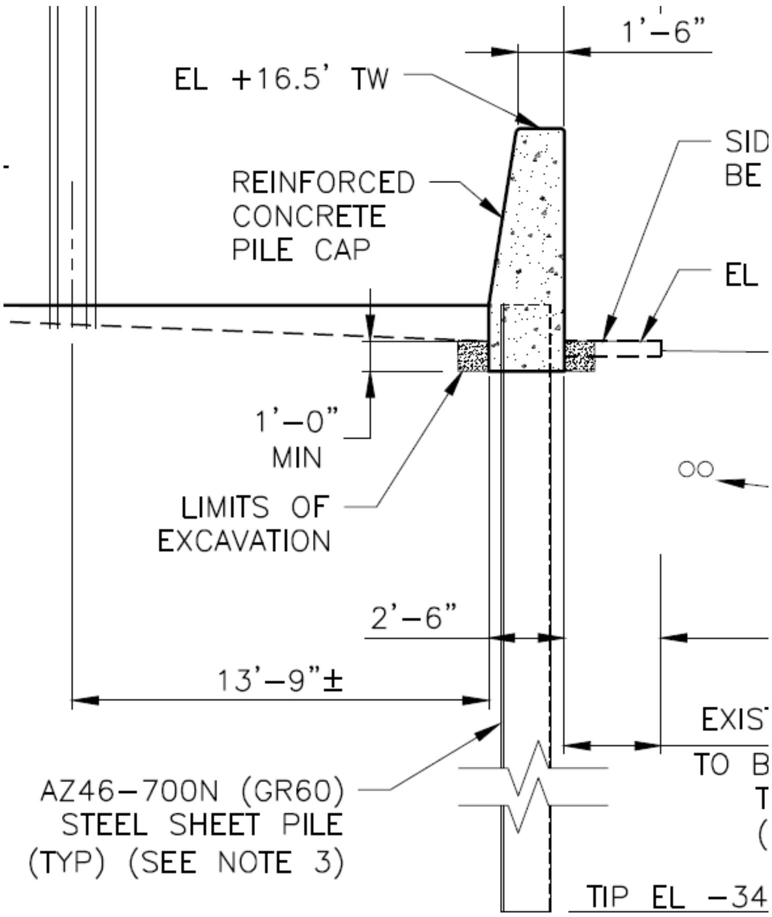
Cap heights should be standardized to the extent possible to minimize the number of different pre-cast shapes. Transitions between wall types and major elevation changes would call for detailed design and likely cast-in place techniques.

Sketch

Alternative No.: C-12

☑ Original ☐ Alternative

From Sheet F600

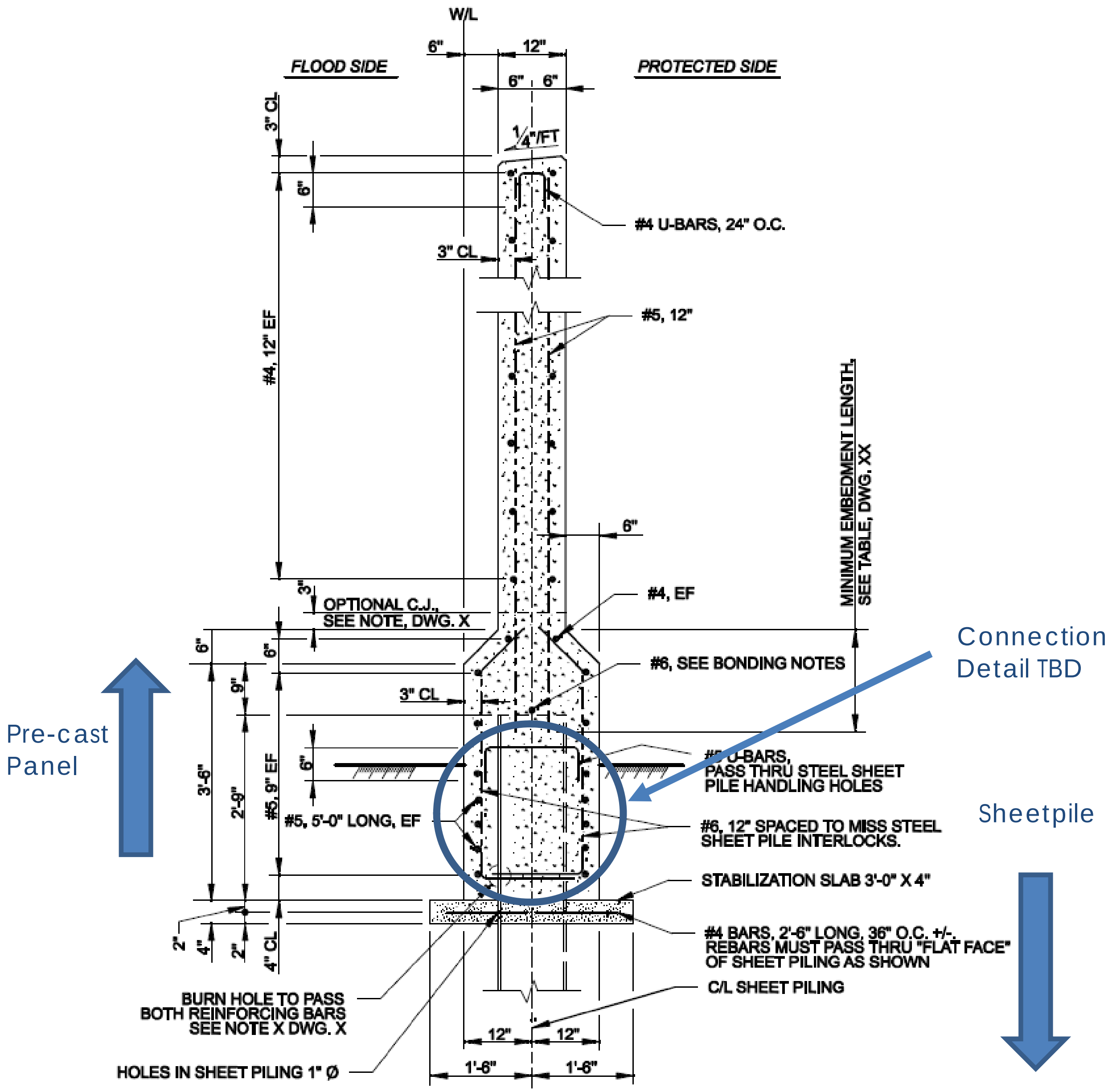


Sketch

Alternative No.: C-12

☐ Original ☑ Alternative

Detail taken from USACE HSDRRS



TYPICAL I-WALL SECTION

SCALE: 1" = 3/4'- 0"

Sketch

Alternative No.: C-12

☐ Original ☑ Alternative

Precast concrete wall

Construction Cost Estimate

Alternative No.: C-12

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Precast Wall						
Precast Wall	CY	350.00			1,400	$490,000
Place Wall	LF	62.50			3,865	$241,563
Pin Through Sheeting	EA	500.00			1,289	$644,500
Grout, 2CF / LF	CF	50.00			7,730	$386,500
Existing Cap, as designed	CY	1,255.00	1,299	$1,630,245		
General Conditions						
Duration (Cost / Month)	MO	980,546.00	56	$54,910,576	55	$53,930,030
Total Markup	91.14%			$51,530,507.32		$50,757,444.27
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$108,071,000.00		$106,450,000
NET SAVINGS						$1,621,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-15

Leave area in north end open to allow trucks to access FDR to Exit 7 during construction

Description of Original Concept:

The original concept is to only have one access at Montgomery Street to Area 1 (East River Park) section of the project, which would handle both entering and exiting vehicles to the park, including all construction related vehicles.

Description of Alternative Concept:

The alternative concept is to provide an exit to Area 1 at the north end of East River Park, so that construction vehicles can enter at Montgomery and exit at the north end.

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Improves safety in park and work zones • Improves construction productivity and efficiency • Reduces need for flagmen to control pinch points such as Corlears Hook Bridge • Reduces impacts to old growth trees	• Construction vehicles will drive through finished portions of the park as construction progresses south • Potential impacts to road condition on FDR and Exit Ramp

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$0	$0	$0
Alternative Concept	$478,000	$0	$478,000
Savings	($478,000)	$0	($478,000)

Discussion

Alternative No.: C-15

The original concept proposes that all construction vehicles would enter and exit the park at Montgomery Street. This would require all vehicles to turn around inside the park to exit, which may prove very challenging for certain vehicles and locations. The park and flood protection, and all other components, are proposed to be constructed beginning at the north end of the park and "backing out" to the south end at Montgomery Street and Pier 42.

Two-way traffic would be maintained at all times to /from the construction areas. At certain constrained points, such as the Cherry Street Bridge, space will only allow one-way traffic at a time, therefore two flagmen would be required to control/alternate one-way flows.

This alternative concept proposes creating a temporary exit onto the FDR at the north end of the park. This would allow construction vehicles to continue in one direction through the park, without the need to U-turn, or require two-way traffic control. When trucks are exiting onto the FDR, the right lane of the northbound FDR would be closed so that trucks can safely exit onto the FDR. Trucks would travel a short distance on the FDR (approximately 1,000 feet) and exit at Exit 7 to 20th Street.

Advantages:

- Safety - Improves safety in park and work zones.
    - The entrance to the park at Montgomery Street will be particularly busy with many conflicts between entering and exiting construction vehicles, park maintenance vehicles, and pedestrians/bicyclists accessing the park and waterfront.
    - In addition, the park roads will be safer with one-way vehicular flows that don't need to pass each other in opposite directions.
    - Eliminating the need for U-turns should also reduce the possibility of crashes with fixed objects (e.g. trees, fences, benches, buildings).
- Productivity – The smoother traffic pattern and elimination of U-turns will improve construction productivity and efficiency. A reduction in resources should be a result as there is less needing to manage and direct vehicles to turn around.
- Reduces Flagmen - Reduce need for flagmen to control pinch points such as the Cherry Street Bridge. It is likely that there are certain areas, in addition, where two-way traffic will not be possible and therefore require one or two flagmen to control.
- Impact to Trees - Reduce impacts to old growth trees. The reduced footprints to accommodate traffic flows should reduce impacts to old growth trees and other landscaping that will remain. There would be fewer trucks, or no trucks that would be rolling over roots, and potentially accidently crashing.

Disadvantages

- Safety – Increased conflicts along FDR between trucks and exiting cars at Exit 7. There will be about 1,000 feet between the proposed construction exit from the park and Exit 7 from the FDR. Therefore, just as trucks are entering the FDR, general traffic will be merging over to access the exit or continue in the 3rd lane of the FDR. The differential in speeds and merging movements could increase the frequency and potential for some types of conflicts.
- Finished Park Impacts - Construction vehicles will drive through finished portions of the park as construction progresses south. This could provide opportunities for unintentional impacts to finished portions of the park, Con Ed tunnel, or flood protection elements.
- Condition of FDR - Potential impacts to road condition on the FDR and the exit ramp. The increased heavy vehicles using the portion of the FDR and exit ramp could result in wearing and grooving of the pavement.

Sketch

Alternative No.: C-15

☑ Original ☐ Alternative

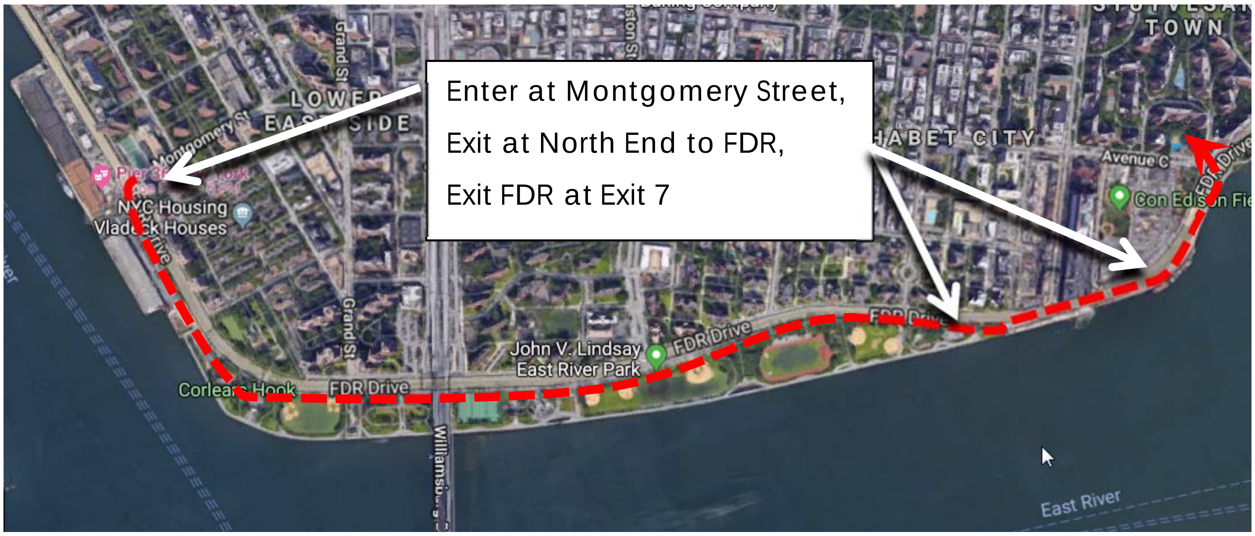
All vehicles enter and exit at Montgomery Street / Pier 42.

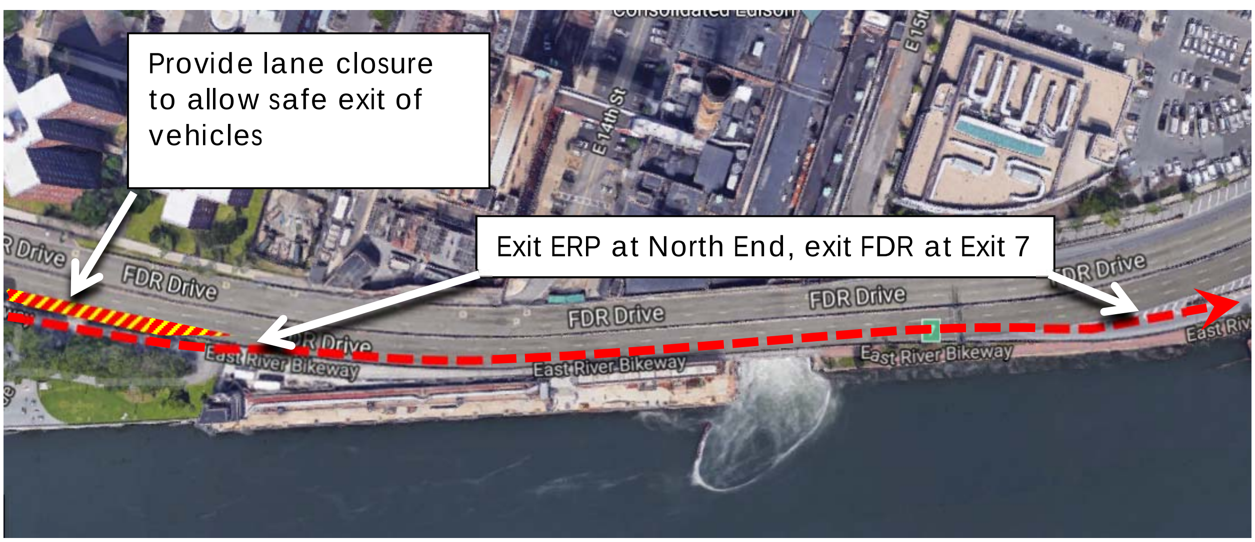
Corlears Hook Bridge and back of Amphitheater – Pinch point only one-way at a time.

Sketch

Alternative No.: C-15

☐ Original ☑ Alternative





Construction Cost Estimate

Alternative No.: C-15

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
MPT For Single Lane Closure	LS	50,000.00			1	$50,000
Roadway Modifications	LS	100,000.00			1	$100,000
Restore Finished Park Sections	LS	100,000.00			1	$100,000
Total Markup	91.14%					$227,846.48
TOTALS	Breakdown of Markup can be found in the Cost Appendix					$478,000
NET SAVINGS						($478,000)

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-19
Advance order long-lead items to improve schedule and use HUD money	
Discussion	

Under conventional construction contract, the contractor would be responsible for procuring and delivering all contracted materials, means and methods.

The proposed change would be for NYC to determine which long-lead items that it wants to procure and provide them to the winning contractor(s) at the appropriate times should it be necessary to make up a shortfall towards spending the HUD funding by the established deadline.

Advantages:

- Helps to meet the HUD spending requirement of April 2022 which could become critical if construction does not start by May 2019
- Can shorten the total construction period.
- Can reduce risk in the contractors' ability to procure items with uncertain availability.

Disadvantages:

- Limits subsequent design changes/improvements.
- Creates a need to coordinate delivery to and/or storage of pre-procured items to the winning contractor(s).
- Requires additional management by NYC.

The following are potential items that NYC may wish to consider pre-procuring:

1. **Silent Piling System Service**: Giken silent piler sheet piling system (see Figure #1), or equivalent, with an auger (see Figure 2), may be necessary to install the sheet piles while meeting the noise and vibration requirement. There are a limited number of subcontractors who have this equipment available, so it might help both schedule and the spending stream to reserve schedule and pre-purchase services for this equipment.

2. **Flood Gates**: The base design of the flood gates require custom fabrication; therefore, if NYC were to pre-purchase these gates they would not only help assure

meeting the HUD spending requirement but would also reduce contractor and schedule risk. (Estimated material cost $3,530,000)

3. **Precast Concrete Elements**: If NYC decides to change the base design to use precast concrete floodwall and/or tunnel segments, then these elements could be pre-ordered and fabricated while the foundation contractor is preparing the associated in-ground work.

4. **Offsite Staging Areas**: If NYC decides to procure rights to pre-identified offsite staging areas (especially those with river access). Then the expense associated with such lease options may count towards the HUD spending goal and would reduce both contractor and schedule risks.

5. **Geotechnical Fill Material**: There are several different grades of geotechnical fill that could be pre-purchased in order to meet the HUD spending requirement. As such a pre-procurement would not reduce either contractor or schedule risk, it is recommended that such a pre-procurement could be used to meet the HUD spending requirement as a low priority after other pre-order items have been contracted. (Estimated material cost $2,790,000)

6. **Pre-grown Vegetation**: If NYC decides to utilize pre-grown vegetation, then such items could be advance purchased for the contractor; which could allow custom ordered vegetation sufficient time to grow before being transplanted.

7. **Sheet Piles**: As there is a relatively large quantity of sheet piles for the ESCR project, pre-purchasing these items would not only contribute to the HUD spending requirement but would also help to ensure that the sheet piles would be available when needed (as such large quantities could tax the market's capacity to deliver). (Estimated material cost $11,748,000)

8. **Driven Piles**: There are meaningful quantities of different types of driven piles for the ESCR; which could be pre-ordered by NYC as foundation work occurs relatively early in the construction schedule. (Estimated material cost $7,000,000)

9. **Concrete Materials**: Concrete materials (aggregate and cement) can be costly to store if pre-purchased; however, if properly coordinated with the contractor's needs; such advanced purchases could help to meet the HUD spending requirement. (Estimated material cost $16,485,000)

It should be noted that pre-purchase of any of the items suggested in this proposal creates an issue to the project and may add storage costs. Therefore, this proposal should only be considered if it is not possible to implement VE proposals C-60 and C-35.

Information on the Giken Silent Piler can be obtained at:

https://www.giken.com/en/products/silent_piler/

Figure #1 Representative Giken Silent Piler System

Figure #2 Representative Auger Attachment for Giken Silent Piler Equipment

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-20
Pre-cast U-shape and place on tunnel slab	
Description of Original Concept:	
Construct each section of the utility tunnel as cast-in-place.	
Description of Alternative Concept:	
Use precast U-shaped reinforced concrete sections and install on cast-in-place tunnel floor slabs, except at CSO crossings and where tunnel is integral with floodwall.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• [redacted] • [redacted] • [redacted]	• [redacted] • [redacted]

	Cost Savings Summary (Present Worth)		
	First Cost	O&M	Total LCC
Original Concept	$129,015,000	$0	$129,015,000
Alternative Concept	$109,653,000	$0	$109,653,000
Savings	$19,362,000	$0	$19,362,000

Discussion

Alternative No.: C-20

[redacted]

[redacted]

[redacted]

Sketch

Alternative No.: C-20

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: C-20

☐ Original ☑ Alternative

[redacted]

Sketch

Alternative No.: C-20

☐ Original ☑ Alternative

[redacted]

Construction Cost Estimate

Alternative No.: C-20

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Tunnel (Partial Length)	LF					
Elevated Slab	CY	1,255.00	2,176	$2,730,692		
Cast in Place Walls	CY	1,255.00	6,140	$7,705,700		
Slab on Grade	CY	1,255.00	1,714	$2,151,070		
Pre-Cast						
Pre-Cast U - Shaped Section	CY	350.00			8,316	$2,910,600
Place 20' Sections	EA	78.00			2,500	$195,000
Seals at Pre-Cast	LF	25.00			5,708	$142,700
Slab on Grade	CY	1,255.00			1,714	$2,151,070
Duration Savings	MO	980,546.00	56	$54,910,576	53	$51,968,938
Total Markup	91.14%			$61,516,760.45		$52,284,667.30
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$129,015,000.00		$109,653,000
NET SAVINGS						$19,362,000

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-35
Complete bulkhead repairs as an early package and part of this project	
Discussion	

The original concept does not consider the use of the East River Park esplanade for barge access during construction. There is a separate project to perform bulkhead repair.

The alternative concept is to complete recommended bulkhead repairs in advance of necessary construction access across the esplanade but include such work in the EIS in the interest of using HUD funding for this.

Advantages:

- Facilitates construction access by barge.
- Accelerates bulkhead repairs in advance of future ferry landing operations.
- Eases concerns of meeting HUD spending deadlines

Disadvantages:

- Adds scope to this project.

The Preliminary Design project description (Mass Mailing #1, Nov. 10, 2017) includes the following exclusions:

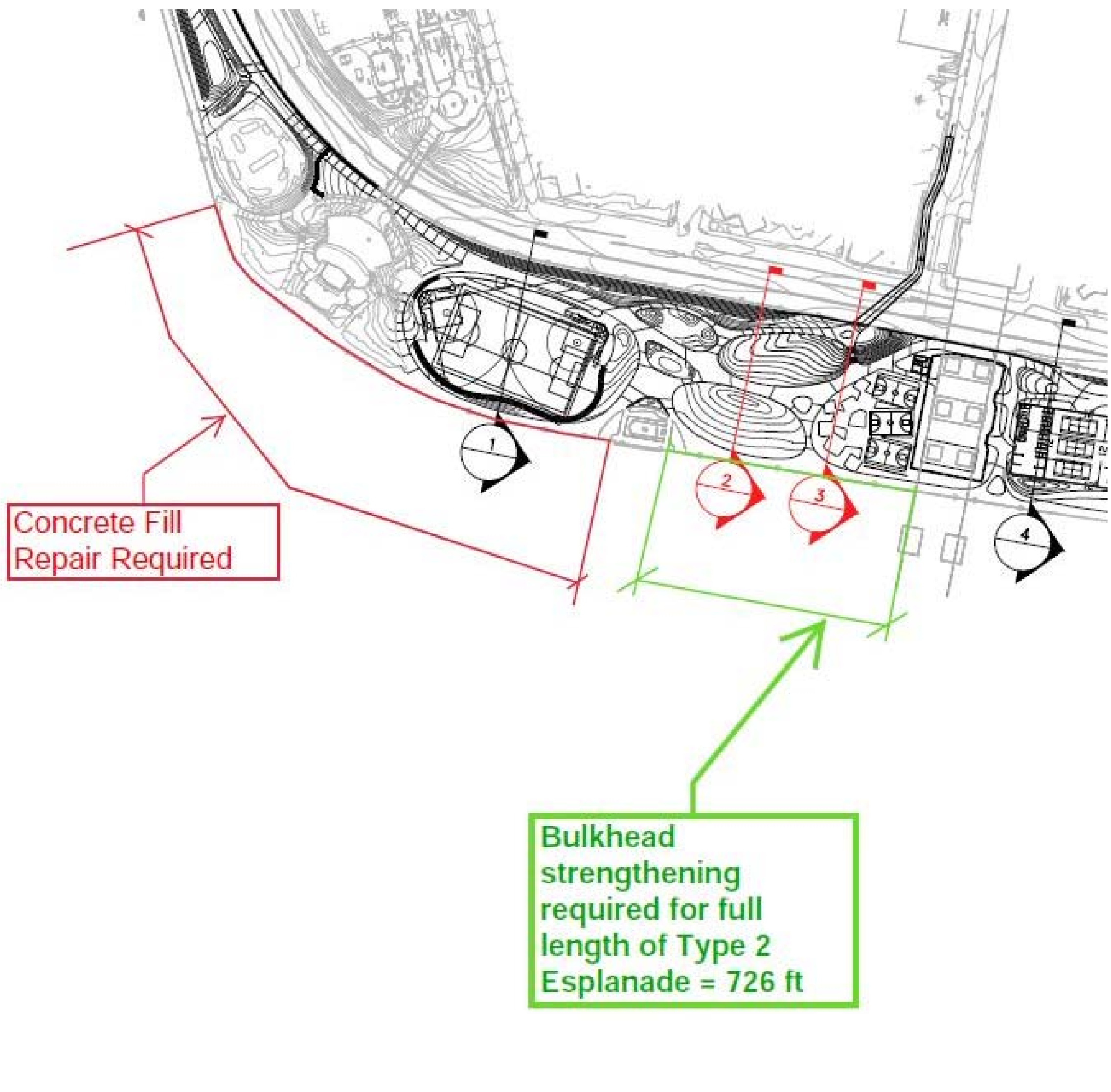
- No work to the existing park waterfront esplanade, bulkhead, or esplanade railings in East River Park are included;
- No work has been included for the improvement of existing or for providing new vehicular access points to East River Park during construction;
- No additional allowances have been included for accessibility constraints, such as low vehicular clearance at Corlears Hook Bridge, or for other modes of delivery, such as barging;

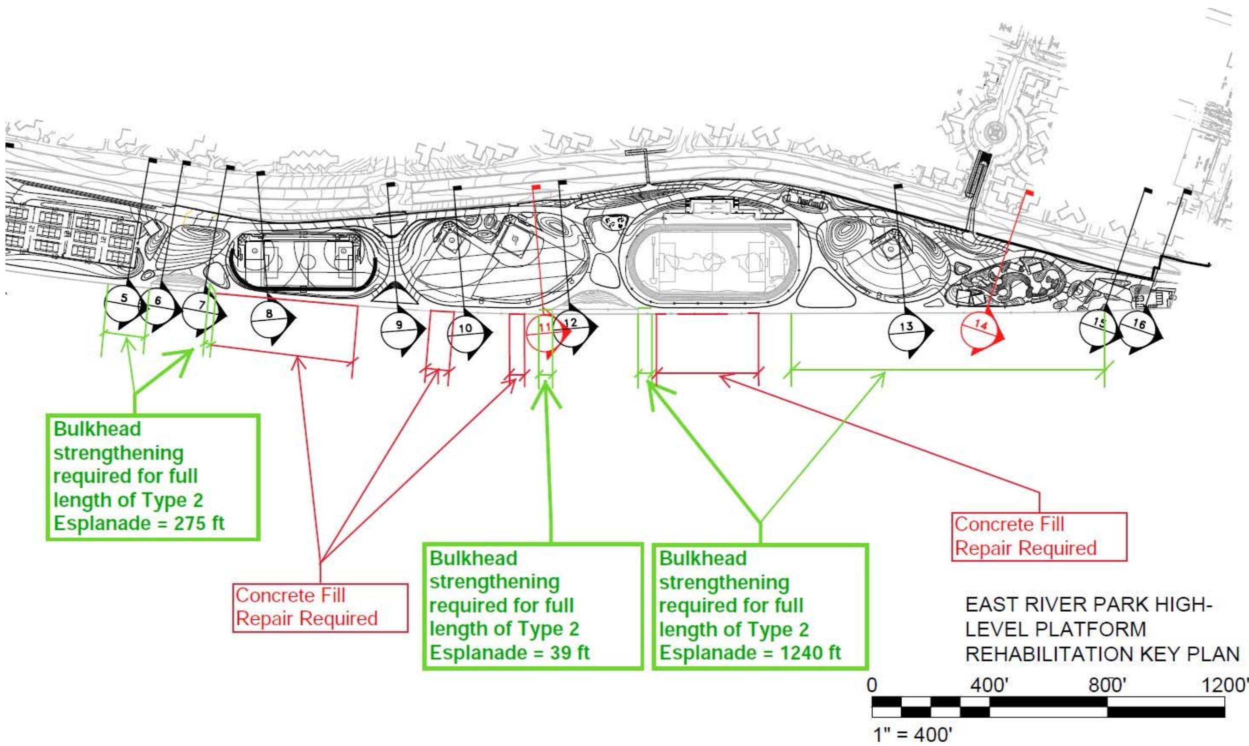
Considering the limitations on vehicular access at the Montgomery Street entrance, the mile-long waterfront esplanade at East River Park presents a very attractive alternative for the delivery of heavy construction equipment and materials.

The priority repairs which were recommended in the Sept. 29, 2016 bulkhead inspection report extend along most of the length of the esplanade. The nature of the repairs indicate that they are necessary to safely support heavy loads and to prevent future settlement inland of the recently completed high-level relieving platform construction.

It is recommended that this work be expedited to allow contractors' unimpeded use of the esplanade, subject to specified park use restrictions and marine accessibility considerations and included as part of this project to access HUD funding.

The estimated cost of the work in 2016 was $8.2M; in 2018 dollars the estimated cost would be 9.05M.

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Bulkhead strengthening required for full length of Type 2 Esplanade = 275 ft
Concrete Fill Repair Required
Bulkhead strengthening required for full length of Type 2 Esplanade = 39 ft
Bulkhead strengthening required for full length of Type 2 Esplanade = 1240 ft
Concrete Fill Repair Required
EAST RIVER PARK HIGH-LEVEL PLATFORM REHABILITATION KEY PLAN
0
400'
800'
1200'
1" = 400'

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-36
Use A + B bidding	
Discussion	

It is suggested that NYC consider the use of A + B bidding for the ESCR project. A+B bidding is a method of rewarding a contractor for completing a project as quickly as practicable (the attachment describes the current NYC A + B bidding guidelines). By providing a cost for each working day, the contract combines the cost to perform the work (A component) with the time impact to the public (B component) to provide the lowest cost to the public.

However, in NYC, the Request for Bids must identify a weight for all criteria, and schedule becomes part of the criteria for award along with cost and qualifications. Additionally, to use this bidding method, the NYC will need to assign a monetary daily user cost multiplier to apply to the construction duration (number of days) that each bidder submits with his work plan/bid. The determination of this monetary multiplier is separate from the question of any liquidated damages or bonus for early completion that NYC may want to specify in order to address such issues as potentially missing the HUD spending deadline of May 2022.

Determination of the monetary multiplier should account for all relevant negative impacts on the public including: a) alienation from the parks/facilities; b) environmental justice issues including traffic impacts and noise, c) economic impacts on local businesses and d) NYC administrative expenses.

It is also recommended that NYC develop a base conceptual construction plan to provide bidders with a baseline schedule target (to May 2022 for HUD spending and to Q2 2024 for project completion) from which bidders can compete to efficiently improve on. Furthermore, NYC should identify: a) construction risks that are the contractor's responsibility; b) all project constraints (including third party issues), c) environmental hazards; and d) any staging areas that NYC will provide and what access/permits/staging area issues that are the contractor's responsibility.

Advantages of this bidding method include:

a) Best value procurement includes consideration of the construction schedule in the selection; therefore, bidders understand the importance of schedule for success;

b) Bidders are encouraged to be thoughtful and creative with means and methods that can accelerate project delivery;

c) The owner shares in reduced costs that accrue daily associated with general conditions, MPT's/TEA's, and park alienation, etc.; and

d) Increases likelihood that HUD spend-down constraint is satisfied.

There are no apparent disadvantages to this bid method other than the administrative costs associated with implementing this method.

PRICE + TIME BIDDING
A+B
Guidelines

A. <u>Introduction</u>

The Department first introduced A+B Bidding in 1996. A+B bidding is a method of awarding a project based on both cost and time. Each bid submitted consists of two parts:

- The A portion of the bid is the sum bid for the contract work items.
- The B portion of the bid is the time in calendar days proposed by the bidder to complete the project or a portion of the project, multiplied by a daily road user cost determined by the Department.

The contract is awarded based on the sum of the A portion and the B portion of the bid. The contract amount after award is limited to the A portion of the bid.
A disincentive provision is incorporated into the contract (based on road user costs) should the Contractor fail to complete the work in the length of time bid. An incentive provision is also included to pay for acceleration costs and to reward the Contractor for earlier completion.

Experience has shown that A+B bidding is an effective way to reduce construction induced congestion and delays by allowing the cost of work and time to be balanced through the open competitive bidding process. Benefits of A+B include:

- encourages potential Contractors to develop even more detailed well thought out plans in order to bid on the time to complete a project or project phase. Since the time bid by each Contractor is based on their own capabilities to perform the work, the more efficient Contractors can generally bid shorter times.
- encourages Contractors to schedule their operations to maximize the efficiency of their work crews and equipment in order to meet the time bid.
- encourages Contractors to work overtime, double shifts and at night to reduce construction time.
- encourages Contractors to develop innovative ways to reduce construction duration at the lowest cost during bid preparation and during construction.
- road user costs and inconvenience are minimized.
- reduces the number of congestion related complaints from the road users and local communities.
- congestion related pollution and environmental impacts are reduced.

Guidelines for Developing A+B Provisions

Some of the guidance below is based on guidelines for the development and use of I/D provisions, contained in FHWA Technical Advisory T 5080.10 titled Incentive/Disincentive for Early Completion, dated February 8, 1989.

1. Project Selection

The use of A+B Bidding provisions is primarily intended for critical projects or critical project phases where traffic inconvenience and delays must be held to a minimum. User delay costs or public benefit must be significant enough to warrant construction acceleration. If UDOT staff and the Contractors staff are working double shifts and/or overtime to complete a project or phase and there is no apparent user delay or reason to expedite the work, Contractors, UDOT staff, and the public, may question why they are rushing to finish. This is not cost effective or good for morale. Generally, the use of these provisions should be limited to those projects or project phases that would severely disrupt highway traffic. As a guide, user delay and other documented delay costs should be at least $3,000 per day to warrant the use of incentive provisions.

The following characteristics are associated with projects appropriate for A+B bidding:

- ☐ high traffic volume facilities generally found in urban areas,
- ☐ projects that will complete a gap in a significant highway system,
- ☐ major reconstruction or rehabilitation on an existing facility that will severely disrupt traffic,
- ☐ major bridges out of service,
- ☐ projects with lengthy detours of high volumes of traffic,

A+B bidding may be used for projects or phases which produce user delay costs less than $3,000/day if extraordinary concerns exist such as interference with public events or significant public interest and benefit.

If the established contract time is longer than necessary for a good contractor to finish using normal effort, unnecessary prolonged delays and impacts are imposed on the public. On the other hand, if established contract time is too short, the contractor is forced to increase the bid to compensate for acceleration costs. A+B bidding provides an opportunity for the contractor to balance the time required to complete the work with the costs associated with doing the work. It is extremely important in all cases that the user costs established in the contract accurately represent the projected user costs.

When selecting projects for A+B bidding, the total B portion of the bid must be an amount large enough to influence the bidding. If a very large project has a very short B portion completion time, the time element may have little impact on the overall results of the bidding. For example, a $30,000 B portion (10 days X $3,000/day) would have minimal effect on a $20 million project (A portion) due to its small percentage of the total A+B bid. On the other hand, a $1,250,000 B portion (250 days X $5,000/day) on a $5 million project (A portion) may provide too much influence on how the bid is structured and how the work proceeds because the relative value of the B portion is so high. The B(time) portion of the bid shouldn't exceed 10-15% of the total cost of the work to avoid undesirable emphasis on time over the actual cost of the work.

2. Project Development

It is essential that a project's suitability for A+B bidding be identified during the early stages of project development. During the development of A+B projects, extra effort should be made to ensure that the design, specifications, schedule, etc., are compatible and appropriate for the project. A field change to correct mistakes in plans can be very costly in both time and money on an A+B project. The plans and specifications should indicate any unusual conditions or restrictions the Contractor may be required to work under, such as prohibiting jack hammering, pile driving or heavy equipment operation during the night due to noise problems.

During the preconstruction phase of the project, all affected parties (e.g., local officials, police, Regional functional groups, businesses, schools, utility companies, railroads, etc.) should be involved in the project development. It is essential that designers work closely with the Region Construction group regarding schedules, wording of the special provisions, etc.

Pre-design field reviews are essential since "as built" plans or old construction plans may not be reliable, due to maintenance operations or field changes not recorded on the plans. Also, a pre-bid meeting may be necessary to discuss the I/D phase and any unusual features of the project with prospective bidders.

A. Special Note: Description of B Portion Work

The contract must clearly define what constitutes the start and the completion of the B portion work. Both may differ from the start or completion of the project. For example, the B time might not begin until a detour is implemented, a bridge closed or traffic is otherwise impacted. This allows the Contractor time to fabricate and deliver steel, obtain mix design approval, do other pre-construction planning, etc. However, it is necessary to define in detail what is expected of the Contractor. This can be done through the plans and by detailed description in the special provisions. Work to be completed must be clearly stated. Completion of items such as paving up to, and including, base course, signing, lighting, signals, striping, curb, shoulder, etc., should be addressed. Off-road items such as landscaping, sidewalks or other items that could be performed without disrupting traffic should also be addressed. If the intent is to get the roadway open to traffic as soon as possible, off-road items may be excluded from the B portion work.
Counting days for the B portion work can begin with the lane closure or event that results in user delay, or with the award notification, or with a combination thereof.

A.1 Begin B portion work with lane closure or event that results in user delay

Under this condition, B portion work begins with an event such as closing a bridge or the first lane closure(s) and ends with an event, i.e., when the bridge is reopened or all work requiring lane closures is complete.

Price + Time Bidding - Guidelines.doc
3/28/2005
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This is the preferred method of starting the B portion work if the goal is to minimize user delay associated with a certain situation. The Contractor should be allowed the flexibility to prepare for the lane closure period and select a start date that will result in the shortest period of time, within the overall time limits of the contract. Bridge replacement projects with an off-site detour are ideally suited for this situation. The counting of B portion workdays should start when the Contractor closes the bridge to traffic and end when the bridge is reopened to traffic. This encourages the Contractor to take care of all shop drawing submittals, ordering and delivery of materials, and other preparatory work such that the timing of the closure is based on the critical path of the actual construction. If the B portion work starts with the notice to proceed, the Contractor may close the bridge earlier than necessary, resulting in additional user delay. One thing to consider in this situation is the amount of time that can be allowed before starting the B portion work. If the Contractor waits too long before starting the work, the time bid may end after the contract completion date or some other milestone date. If the B portion work must be complete by a certain date, then the Contractor must be informed in the contract what the consequences are for not completing the work by that date. One option is to indicate in the special note that the disincentive period will begin on a certain date regardless of the time bid. In other words, if the Contractor fails to begin the work in time to complete by the milestone or contract completion date, all incentive payments must be forfeited.

A.2 Begin “B” portion work with notification to proceed

In some cases, the goal is to achieve the B portion milestone date as soon as possible, by having the Contractor mobilize and begin working immediately. The starting point could then be tied to the notice to proceed. Standard wording in the special provision for this situation could be:

“The counting of consecutive calendar days for the B portion work shall begin 10 calendar days after the date of the Notice to Proceed.”

The10 day period (or whatever number of days is appropriate) is not meant to be a day that any physical work begins; it is an agreed date to begin counting.

A.3 Begin “B” portion work with either an event that results in user delay or tied to notification to proceed.

This option still gives the contractor the flexibility desirable in a.1 while also allowing the Department to demand the B portion work begin within a reasonable time period. Standard wording in the special provision for this situation could be:

“The counting of consecutive calendar days for the B portion work shall start on the earlier of the following dates 1) 60 calendar days after the date shown on the Notice to Proceed, or, 2) when the Contractor first restricts traffic....”

Again the 60 day period (or whatever number of days appropriate) is not meant to be a day that any physical work begins; it is an agreed date to begin counting the B portion of contract.

b. Multiple B Phases

Periodically, projects include multiple phases with varying degrees of user delay. Furthermore, projects may not be completed in one season, but the roadway must be fully open for the winter months.

For example, assume Phase 1 of a project is "pave westbound" and phase 2 is "pave eastbound", and the project is let early enough to allow the Contractor to complete both phases in one season. If the user delay is the same for each direction and we want both phases completed in one season, separate B portions may not be required.

If this same project is let late in the season and both phases are in the same B portion work and can not be done concurrently, some Contractors may bid one season, while others may bid 2 seasons. A Contractor that bids one season would have a significantly lower B portion bid because they are not including the winter months within their bid. The one season bid may require late season paving. If there are any significant increases in the B portion work during construction of Phase 1, the Contractor would most certainly request an extension of time which would result in the performance of Phase 2 in the second season.

The need for multiple B portions must be determined on a project-specific basis in consideration of the problems and objectives of the situation. All options must be considered when developing the description of the B portion work. A general guide is to tie the B portion work to the user delay. If there is no user delay during the winter, this period should not be included in the B portion work. If the user delay for westbound is different than eastbound, they should be separate B portions. If the roadway is closed or restricted during the winter with a measurable user impact, the winter should be included in the B portion time frame.

c. Utilities and Railroads

Utility, Railroad or other third party work within the B portion requires additional effort by designers and construction staff in order to minimize potential for delays. If possible, arrangements should be made to have this third party work done prior to the start of B portion work. If this is not possible, special provisions must be included in the contract describing the time frames allowed for any Utility, Railroad or other third party agreement. It is essential that these time frames be consistent with the description of B portion work and the Designer's schedule. Conflicts between these third party schedules and the time specified for the B portion work must be avoided. Underground utilities within the B portion phase should be located with the highest possible degree of accuracy if there is contract work that could potentially interfere with these utilities.

e. Special notes regarding time restrictions

If the contract contains work hour restrictions, milestone dates or other time restrictions, consideration must be given to the location of these requirements. Restrictions in various special provisions, on different plan sheets, and in several specifications could lead to confusion. Consider combining time restrictions in a separate special provision and appropriate cross- references.

3. Determination of the Daily Cost

The daily cost must be determined by estimating the user cost associated with the construction or delay in delivering the product. This can be done by using "Delay User Cost" (DUC) developed by BYU for UDOT or by using "Delay E", written by Martin Knopp and made available by him to UDOT. The B component may be adjusted downward from the maximum values obtained from a delay analysis. It is important to remember that the daily cost must be sufficient to encourage the Contractor to develop innovative ideas, work efficiently and complete the project in a timely manner, but not so large as to induce undue risk to the contractor. Extreme risk will lead to undesirable bids and even a lack of interested bidders.

a. Typically the contract has an incentive/disincentive clause in it. The daily I/D amounts must be equal to the daily user costs estimated for the B portion of the work The contract should provide for disincentives to continue until the specified work is complete.
b. A cap on the amount of incentive paid under A+B provisions is required for budgeting and other fiscal reasons. As a general guideline, the maximum number of days of incentive for each incentive period could be limited to 10 % of the number of days estimated by the Engineer rounded to the nearest whole day. In addition, the sum of all incentives for a single contract should also be limited. As general guideline, use 5% of the Engineer's estimated contract amount as a maximum. Although this cap limits the number of days of incentive payment, keep in mind that the Contractor must bid on the time in order to get the project, and it is to their advantage to bid fewer days in order to be the lowest bidder. The daily cost disincentive will also encourage completion on or ahead of schedule. The Engineer's estimate must include the appropriate amount for the maximum incentive for the contract. If a contract contains multiple B phases, the sum of all maximum incentives must be included in the estimate for budgeting purposes.

4. B Portion Work Time Determination

When determining the maximum duration for the B portion time period, the Designer must consider to what extent, and at what cost, construction can be compressed from a normal construction schedule. Normal construction time is generally based on a highly qualified Contractor working five days a week, eight hours a day, while an accelerated time should be based on the performance of the same Contractor working extended or extra shifts with additional workers and crews for six or seven days a week. However, the use of a continuous seven-day workweek is cautioned against, because extended periods of work without days off may result in reduced efficiency and morale, and high turnover rates for both Contractor and inspection personnel. The maximum duration for the B portion time period should be based on an accelerated but achievable work schedule. If the completion date is impossible to meet, the Contractor will not even try to earn the incentive. In fact, unreasonable completion dates may discourage potential bidders from bidding.

It is important to establish a maximum acceptable duration for the B portion of the contract so that the contractors don't bid a duration that is unacceptable for the project goals.

To accurately determine the B portion time period, Designers should develop a schedule using the critical path method. This will ensure that the maximum duration specified is achievable, and that any other time related contract provisions are incorporated and consistent, i.e., utility schedule, railroad involvement, seasonal limitations, work restrictions, etc.

The season of the year in which the project will be constructed should also be considered in determining the B portion time.

5. Constructability Review

On any project where the Designer intends to use A+B bidding, the Special Provisions, supporting analyses, CPM schedule, and Limitation of Operations should be developed and coordinated with the Region Construction Group.

6. Information Required With the PS&E Submission

a. Special Provisions for A+B bidding (see Attachments)
   i. Section 02221S (Bidding Contract Time)
   ii. Section 00515M (Award and Execution of Contracts)
   iii. Section 00555M (Prosecution and Progress)
   iv. Section 00570M (Definitions)

The above provisions are generic special provisions that need to be modified to fit each project circumstances. There are either blanks to be filled in or highlighted narratives that provide suggestions to consider.

Innovative Contracting Techniques that Consider Driver Impacts
Use of A+B Bidding

Presented by: David L. Kent P.E.
New York State Department of Transportation

Implementation of A + B Bidding in New York

- Initial guidelines / special provisions issued - December 1993.
- FHWA Special Experimental Project 14, Innovative Contracting Practices.
- Based on FHWA sample provisions.
- 150 Contracts awarded 4/94 to 2/03.
- Total contract value $ 3.1 billion.

What Is A + B Bidding ?

- A method of bidding that includes both cost and time in low bid determination.
- "A" = $ amount of work to be performed.
- "B" = no. of calendar days bid to complete the work X user delay cost.
- Lowest A + B is awarded the contract.

I/D for "B" Portion Work

- Incentive / disincentive included.
- Max. days incentive = 10% of Eng. Est.
- Total incentives for each contract limited to 5% of Eng. Est. cost.
- No cap on disincentive.

When To Use A+B Bidding

- Critical projects or project phases.
- User delay and other documented delay costs > $3,000 per day.

A+B Project Characteristics

- High traffic volume facilities,
- Complete a gap in a highway system,
- Major projects that will severely disrupt traffic,
- Major bridges out of service,
- Lengthy detours of high volumes of traffic.

Benefits of A+B Bidding

- Encourages contractors to develop detailed well thought out plans in order to bid on the time to complete a project or project phase.
- More efficient contractors can generally bid shorter times.

Benefits of A+B Bidding

Encourages contractors to:

- Schedule operations to maximize efficiency of crews and equipment.
- Work OT, double shifts, at night.
- Develop innovative ways to reduce construction duration at the lowest cost during bid preparation and construction.

Applicability of Use in Other Locations

- A+B Bidding is being used in many areas of the US.
- State Bidding Laws vary and must be reviewed.

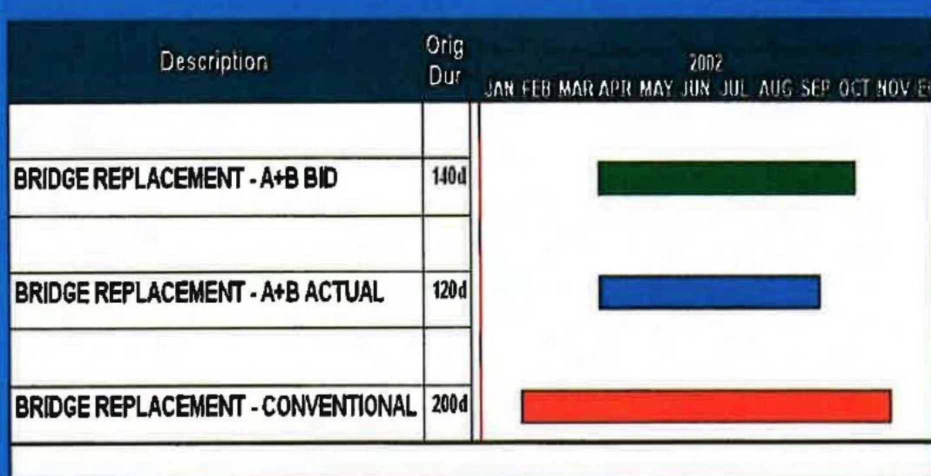
Lessons Learned Design Phase

- Project selection
  - Avoid projects where unanticipated conditions are likely to be encountered,i.e., utilities, rock, historical artifacts,etc.
  - Protect environmentally sensitive areas from high production construction operations.
  - Consider "B" portion work for critical phases instead of the whole project.

A Good Application For A+B

- Bridge replacement project / off-site detour.
- Contractors bid on bridge closure duration.
- Timing of bridge closure coordinated with shop drawing submittals, ordering and delivery of materials, and other preparatory work.

A Good Application For A+B



Lessons Learned
Design Phase

- User delay cost calculations
- Description of "B" portion work
- Constructability reviews
- Accuracy of Department estimate of time

Lessons Learned
Construction Phase

- Time as a pay item
- Critical path method scheduling
- Time adjustments due to changed conditions
  - Added rehab. work, utilities, subsurface conditions, drainage redesign, piles, lane closure delays / revised restrictions
- Overtime pay for inspection, night work, multiple shifts - offset by shorter duration.

Lessons Learned Construction Phase

- Contractors shift experienced staff to A+B projects.
- Contractors propose innovative ways to accelerate.
  - Revised M&PT schemes
  - Use of precast concrete or modular items
  - Use of new technology
- Change proposals that save time may also save money – Value Engineering provisions.

A+B Bidding Results

- NYSDOT has used A+B bidding on more than 150 contracts.
- Contractors are bidding 31% below Engineers estimated time and completing work ahead of schedule.

A+B Bidding Results

- 133 projects completed "B" portion work.
  - Original contract value = $ 2.2 billion
  - 98 contracts awarded to low "A" portion bidder.
  - 35 contracts awarded to a bidder with a higher "A" cost and shorter "B" duration.
  - Added "A" cost of these 35 contracts is less than 1%.

Time & User Cost Savings

- 133 projects completed "B" portion work.
  - 114 earned incentives, total $ 57.6 million.(2.5% of orig. contract value)
  - 10 completed on time, no incentive or disincentive.
  - 9 assessed disincentive of $ 625,000.

Time & User Cost Savings

- 133 projects completed “B” portion work.
  - 42 % of B periods required time adjustments.
  - $ 305 million estimated user cost savings.
  - 23,000 construction days saved.

Additional Information

- NYSDOT engineering instruction 99-033.
- Guidelines for use of time-related contract provisions.
- Http://www.dot.state.ny.us/cmb/consult/eib/files/ei99033.pdf.

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-38
Keep landscape packages small enough to encourage competition	
Discussion	
The estimated cost of the landscaping work on the East Side Coastal Resiliency Project is more than $100 million. Projects this size can benefit from multiple phases of landscape work to promote competition and provide flexibility with cash flow/funding. The phases can range in value from as small as $5 to $10 million up to $65 to $70 million, depending on funding availability. This will allow smaller construction companies, in addition to the larger companies, to bid on the work. Breaking the work into phases also assists the owner in understanding future costs for upcoming projects. In other words, the owner will gain construction data as each additional phase is completed.	

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-40
Use southbound service road as part of FDR mainline and shift traffic west	
Description of Original Concept:	
The original concept is to close one lane northbound overnight to allow construction activity associated with the wall, pedestrian bridges and other elements of the design.	
Description of Alternative Concept:	
The alternative concept is to shift all lanes of the FDR 10 feet to the west to allow 24/7 construction activity adjacent to the FDR.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Allows 24/7 construction activity • Reduces schedule and overall disruption to park and community • No need for nighttime work and associated noise impacts to community • Reduces duration of alienation • Improves opportunities for means and methods	• Impacts the service road traffic and parking • Constrained traffic flows due to shift and conflicts with ramp traffic • Should be included in EIS, as parking lane/service road is affected

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$46,209,000	$0	$46,209,000
Alternative Concept	$16,928,000	$0	$16,928,000
Savings	$29,281,000	$0	$29,281,000

Discussion

Alternative No.: C-40

The original concept proposes to conduct any work adjacent to the FDR during overnight hours when one lane of the FDR could be closed. Current estimates assume the following allowances for closure of traffic lanes in the FDR Drive:

- Multiple-lane closures:
  - 1:00 AM to 5:00 AM
- Single-lane closures:
  - 11:00 PM to 5:30 AM weekdays
  - 12:00 AM to 6:00 AM Saturdays
  - 1:00 AM to 11:00 AM Sundays
- Full closure of 3 lanes of traffic is limited to 15 minutes;

The close proximity of the proposed floodwall, floodgates, utility tunnel, combined sewer replacement, and pedestrian bridges to the FDR Drive has been a recognized constraint on the project construction methods, cost and schedule. The floodwall and utility tunnel design requires driving deep sheet piles, placing significant quantities of concrete and special care when working in close proximity to high-voltage underground transmission lines. All of this work is sited along the backside of East River Park and necessitates the closure of the adjacent lane during active construction to ensure the safety of passing vehicles. The allowable hours would provide for approximately 4 hours of work per night.

This alternative concept proposes realignment of two sections of the FDR to facilitate construction. All lanes could be shifted to the east 10-12 feet, which would provide the required offset needed to conduct construction during all hours of the day, and have multiple crews working on different segments/elements of the project. This concept would apply to the following "reaches", Reach D, E, F, H and half of I; including the Delancey St Bridge.

Shift lanes west into the service road between 10th Street and the Houston Street Ramp exit, then shift west from Houston to Grand Street.

- Allows full time closure of lane next to wall.
- Remove median between directions of FDR, pave over median to allow lane shift.
- Also remove jersey barrier between southbound lanes and service road, to allow shift into service road.

DDC believes that the standard hours provided by DOT OCMC are not sufficient for the required setup and breakdown for the MPT associated with closing this lane each night - the standard hours would leave approximately 4 hours of work per night, significantly limiting productivity. Given the need to spend down approximately $250M in federal funds on construction between May 2019 and September 2022, DDC had anticipated that multiple crews will be working around the clock to advance the work at this pace.

The peak hour traffic volumes are experienced during the weekday morning period on the FDR; shown in the table below.

Time	Northbound	Southbound
8-9am	4,000	3,800

FDR Weekday Traffic Volumes between Houston Street and 10th Street.

	TIME	NORTHBOUND		TIME	SOUTHBOUND	
		Volume	2 Lane Capacity		Volume	2 Lane Capacity
Weekday	00:00 - 1:00	1,204	2,700	00:00 - 1:00	1,595	2,700
	1:00 - 2:00	635	2,700	1:00 - 2:00	824	2,700
	2:00 - 3:00	400	2,700	2:00 - 3:00	468	2,700
	3:00 - 4:00	362	2,700	3:00 - 4:00	401	2,700
	4:00 - 5:00	594	2,700	4:00 - 5:00	573	2,700
	5:00 - 6:00	1,458	2,700	5:00 - 6:00	1,377	2,700
	6:00 - 7:00	3,502	2,700	6:00 - 7:00	2,798	2,700
	7:00 - 8:00	4,080	2,700	7:00 - 8:00	3,377	2,700
	8:00 - 9:00	3,907	2,700	8:00 - 9:00	3,806	2,700
	9:00 - 10:00	3,685	2,700	9:00 - 10:00	3,354	2,700
	10:00 - 11:00	3,604	2,700	10:00 - 11:00	2,939	2,700
	11:00 - 12:00	3,532	2,700	11:00 - 12:00	2,794	2,700
	12:00 - 13:00	3,583	2,700	12:00 - 13:00	2,880	2,700
	13:00 - 14:00	3,542	2,700	13:00 - 14:00	2,992	2,700
	14:00 - 15:00	3,930	2,700	14:00 - 15:00	3,160	2,700
	15:00 - 16:00	3,175	2,700	15:00 - 16:00	3,608	2,700
	16:00 - 17:00	3,325	2,700	16:00 - 17:00	3,591	2,700
	17:00 - 18:00	3,725	2,700	17:00 - 18:00	3,596	2,700
	18:00 -19:00	3,860	2,700	18:00 -19:00	3,242	2,700
	19:00 - 20:00	3,651	2,700	19:00 - 20:00	3,231	2,700
	20:00 - 21:00	3,396	2,700	20:00 - 21:00	3,111	2,700
	21:00 - 22:00	3,117	2,700	21:00 - 22:00	2,902	2,700
	22:00 - 23:00	2,747	2,700	22:00 - 23:00	2,748	2,700
	23:00 - 00:00	1,761	2,700	23:00 - 00:00	2,440	2,700

Due to the lane shift and merging with entrance/exit ramp traffic, the capacity of the three lanes is expected to be reduced slightly. In order to mitigate the potential impacts, the following strategies are suggested:

- Travel Demand Management - Investigate earlier travel demand management methods such as communications through radio, web, other media to decrease demand either through alternate modes, times, or routes.
- Close Avenue C southbound on-ramp – Reroute traffic southbound along Ave C to Houston Street and then enter southbound FDR at Houston Street (estimated 500 cars/hour during peak).
- Close northbound Montgomery on-ramp – Reroute traffic along Pitt Street and Houston Street to Houston northbound on-ramp (estimated 300 cars/hour during peak).

Advantages:

- Allows 24/7 construction activity – Can conduct construction during the day, in shifts, or larger periods during evening. Different work can occur in close proximity, such as bridge work on Delancey Street Bridge, while wall and other work done in other areas within same Reach.
- Reduces schedule and overall disruption to park and community – Memo from NYCDOT Manhattan Borough Engineer Margaret Forgione to DDC/AKRF refers to DDC's estimate that schedule could be reduced from 31 months to 8 months.
- No need for nighttime work and associated noise impacts to community – Pile driving, in particular, will create disturbing high noise levels during the nights for long periods of time.
- Reduces duration of alienation – Public use is interrupted for shorter period and park is returned for use earlier. Associated political, neighborhood, and financial advantages.
- Improves opportunities for means and methods – Full access to adjacent roadway provides improved safety, laydown, etc.

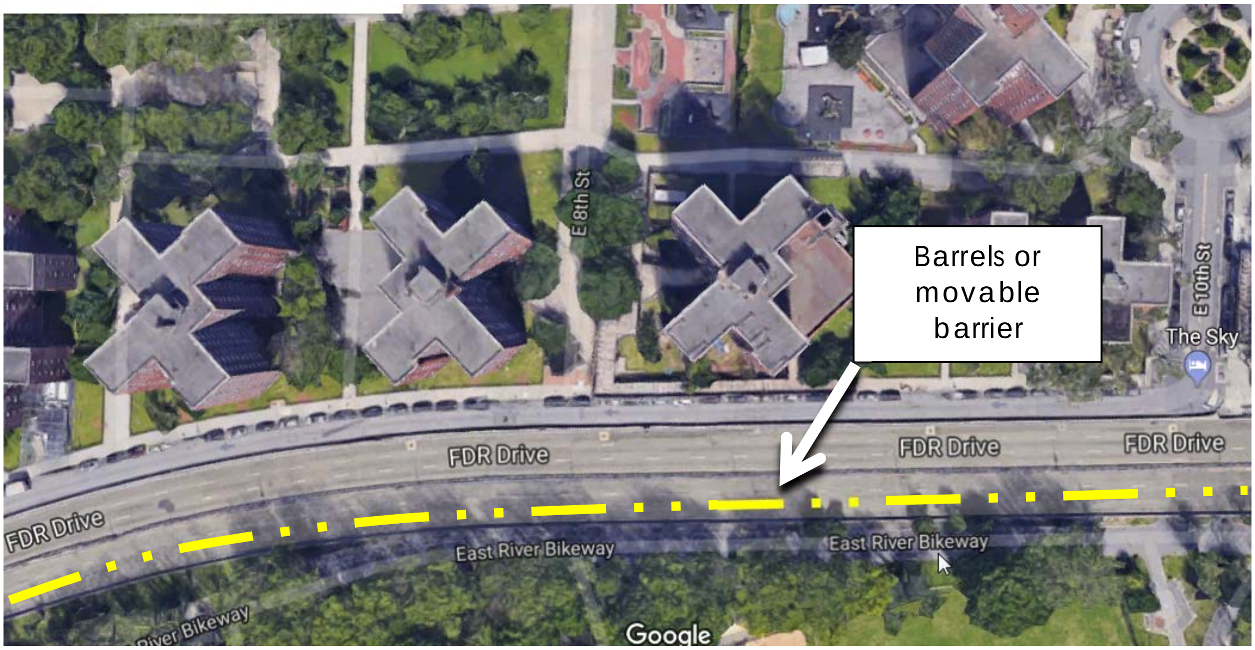
Disadvantages

- Impacts the service road traffic and parking – The service roads currently carry local traffic and provide on-street parking (approximately 50-70 parking spaces impacted). It is likely that if parking is removed, then a local travel lane can be maintained.
- Constrained traffic flows due to shift and conflicts with ramp traffic – The changes in geometry, shift in lanes and merging with ramp traffic, will reduce the overall capacity of the lanes. Current capacity has been identified around 1,350 per lane, Capacity may be reduced to approximately 1,200/lane.
- Potential safety concerns due to lane shifts - Lane shifts will likely have substandard taper lengths for construction purposes, and may require reduced speed messaging/enforcement

Sketch

Alternative No.: C-40

☑ Original ☐ Alternative



Sketch

Alternative No.: C-40

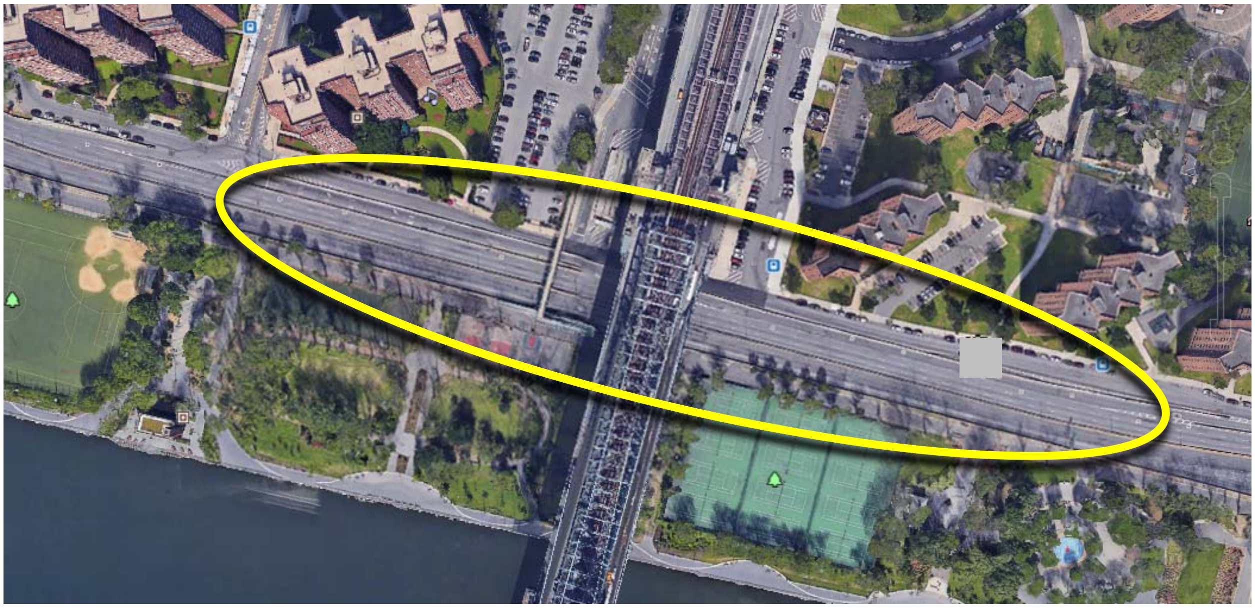
☐ Original ☑ Alternative

Sketch shows Reach H and Half of I

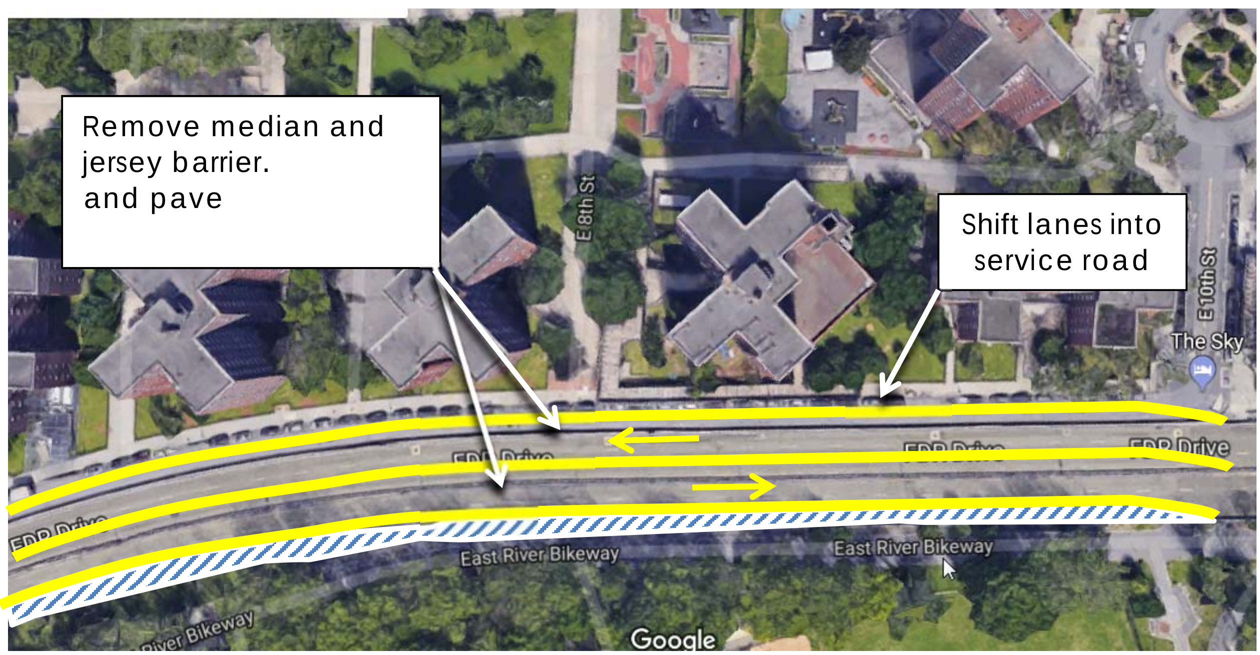
- Area of lane shift transition to service road.
- Make lane adjacent to wall available for construction.

Sketch shows Reach D, E, F

- Area of lane shift transition to service road.
- Make lane adjacent to wall available for construction.



Sample lane shift



Street view of service road adjacent to Manhattan Bridge

Street view of service road adjacent to Housing

Construction Cost Estimate

Alternative No.: C-40

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
Remove Jersey Barrier Median	LF	60.00			2,572	$154,320
Temporary Paving	SF	123.00			12,860	$1,581,780
Temporary Striping	LF	10.00			2,572	$25,720
Signage	LS	1.00			20,000	$20,000
Relocate						
New Jersey Barrier	LF	125.00			2,572	$321,500
Paving	SF	123.00			12,860	$1,581,780
Striping	LF	10.00			2,572	$25,720
Signage	LS	1.00			20,000	$20,000
MPT	LF	970.00	10,782	$10,458,540		
MPT	LF	700.00			2,572	$1,800,400
General Conditions						
Duration (Reach D, E, F, H, 50% of I)	MO	415,670.00	33	$13,717,110	8	$3,325,360
Total Markup	91.14%			$22,033,346.65		$8,071,762.18
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$46,209,000.00		$16,928,000
NET SAVINGS						$29,281,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-50
Use landing barge or floating dock to allow landing in shallow areas	
Description of Original Concept:	
The original concept would provide only one barge berthing location on the rehabilitated esplanade (see Figure 1) between Construction Segments 2 and 3 (see Figure 2), without any floating dock.	
Description of Alternative Concept:	
The alternative concept is to develop conceptual drawings of multiple (assume three) spudded floating docks such as FlexiFloat Units or an existing landing barge or floating dock) to allow barge access from the esplanade. This will permit concurrent East River construction access to Construction Segments 1, 4 and 5.	

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$104,955,000	$0	$104,955,000
Alternative Concept	$113,727,000	$0	$113,727,000
Savings	($8,772,000)	$0	($8,772,000)

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Allows for accelerated construction both to achieve HUD spending by April 2022 and to reduce alienation costs. • Reduced negative impacts on the local community. • Allows for the use of a floating concrete batch plant that could relocate from dock to dock as necessary • The bidding contractor could use pre-existing landing barges or floating docks. • Provides more lay-down areas. • Reduces construction traffic on the local streets	• Adds cost for renting spudded FlexiFloat pontoon units (or equal) for floating docks • Need to obtain permits to moor the docks along the esplanade. • Intent to use barges for construction and tentative locations must be included in the EIS

Discussion

Alternative No.: C-50

This concept assumes that NYC will develop conceptual drawings indicating locations approved in the EIS for spudded floating docks in the East River waterfront to allow construction access to Segments 1, 4 and 5 that would be provided to potential bidders (Note it is assumed that construction access from the East River can be provided to Segments 2 and 3 without the use of floating docks). These pre-bid drawings should include the bathymetry along the East River Park waterfront.

The spuds would be sufficient to moor the docks and articulated ramps would be long-enough to result in acceptable slopes between low and high tide. It is noted that some contractors may prefer to use jack-up legs (instead of spuds) together with fixed ramps. Information on Flexifloat flotation units and attachments can be obtained from: www.flexifloat.com.

It is recommended that the pre-bid drawings could show a floating concrete batch plant moored at and moving between docks as needed, with supply barges moored to either the docks and/or the floating batch plant. Alternately, the pre-bid drawing could show concrete delivered to the floating docks by transit mixer trucks on barges from existing land-based concrete batch plants.

It is noted that if properly configured, the floating docks can accommodate the transshipment of heavy construction equipment from delivery barges to shore (see Figure 4).

Sketch

Alternative No.: C-50

☑ Original ☐ Alternative

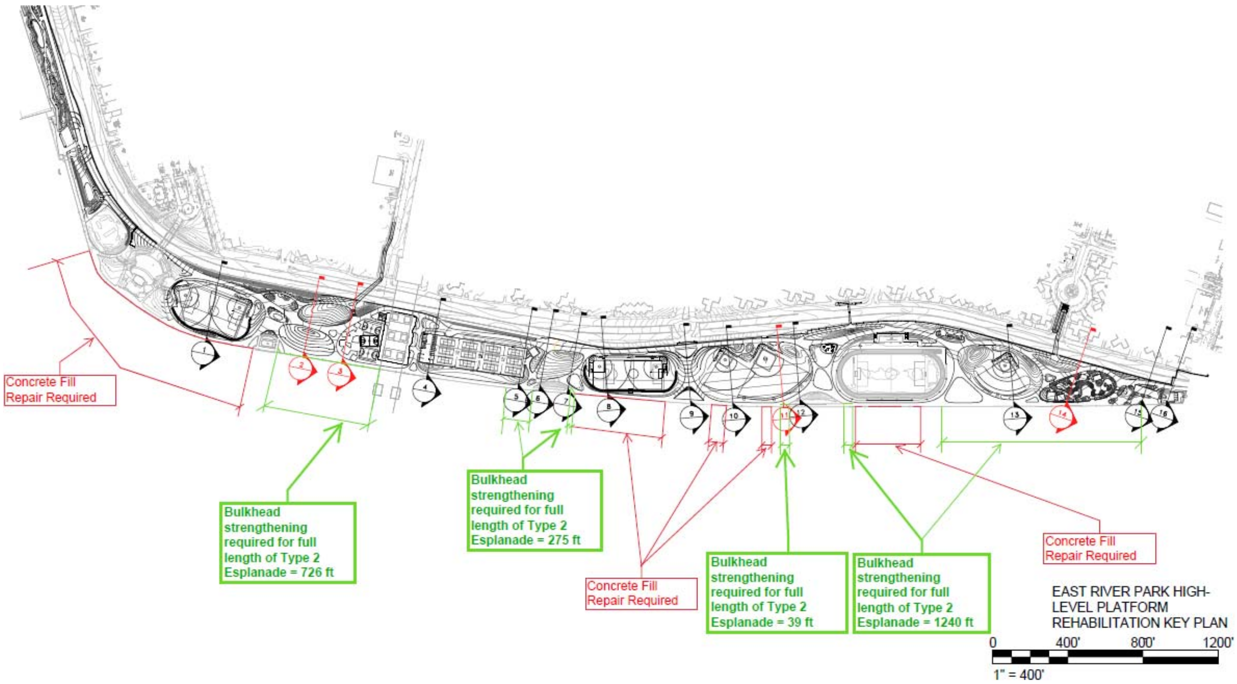


Figure #1 Rehabilitation of the East River Park High-Level Platform (Esplanade)

Figure #2 Construction & Construction Access Q2 2019 to Q2 2020

Sketch

Alternative No.: C-50

☐ Original ☑ Alternative

December 1, 1981 Page IX-B-3

SERIES S-70 FLOATATION UNITS		NUMBER	FLEXIFLOATS			BUOYANT ATTACHMENTS			
SPECIFICATIONS			200 DUO-FLOATS	300 TRI-FLOATS	400 QUADRA-FLOATS	701 SKID RAKE	702 END RAKE	703 SKEG RAKE	704 LOADING RAMP
DIMENSIONS (Effective)	Length	feet	20.00	30.00	40.00	7.00	15.00	15.00	20.00
		meters	6.10	9.14	12.19	2.13	4.57	4.57	6.10
	Width	feet	10.00	10.00	10.00	10.00	10.00	10.00	10.00
		meters	3.05	3.05	3.05	3.05	3.05	3.05	3.05
	Depth	inches	84.0	84.0	84.0	84.0	84.0	84.0	84.0
		centimeters	213.4	213.4	213.4	213.4	213.4	213.4	213.4
UNIT WEIGHT	Minimum	net tons	**9.45**	**13.39**	**17.80**	**2.60**	**5.25**	**7.00**	**7.35**
		metric tons	**8.57**	**12.15**	**16.15**	**2.35**	**4.76**	**6.35**	**6.67**
RATED LOAD CAPACITY (@ 65% Submergence)	Buoyancy	net tons	**19.20**	**29.50**	**40.00**	3.10	4.50	3.24	**2.23**
		metric tons	**17.42**	**26.76**	**36.29**	2.81	4.08	2.94	**2.02**
LOCKING UNITS	Number of	male	6	8	10	Option of 2 Male or Female			
	Number of	female	6	8	10				
LOCK SPACING	Horizontal	inches	60.0	60.0	60.0	60.0	60.0	60.0	60.0
		centimeters	152.4	152.4	152.4	152.4	152.4	152.4	152.4
	Vertical	inches	76.0	76.0	76.0	76.0	76.0	76.0	76.0
		centimeters	193.0	193.0	193.0	193.0	193.0	193.0	193.0
LOCK STRENGTH (@ 65% of yield)	Tension or Shear	net tons	70.0	70.0	70.0	70.0	70.0	70.0	70.0
		metric tons	63.5	63.5	63.5	63.5	63.5	63.5	63.5
PLATE THICKNESS (Minimum)	Deck	inches	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		millimeters	6	6	6	6	6	6	6
	Bottom	inches	0.31	0.31	0.31	0.31	0.31	0.31	0.31
		millimeters	8	8	8	8	8	8	8
	Sides	inches	0.25	0.25	0.25	0.25	0.25	0.25	0.25
		millimeters	6	6	6	6	6	6	6
DECK BEAM SPACING (Maximum)	Longitudinal	inches	18.0	18.0	18.0	18.0	18.0	18.0	18.0
		centimeters	45.7	45.7	45.7	45.7	45.7	45.7	45.7
	Transverse	inches	19.1	19.1	19.1	19.1	19.1	19.1	19.1
		centimeters	48.5	48.5	48.5	48.5	48.5	48.5	48.5
DECK BEARING (Rated Capacity)	Pounds	per sq. ft.	5000	5000	5000	3000	3000	3000	6000
	Grams	per sq. cm.	2441	2441	2441	1465	1465	1465	2930
ROPE THIMBLES		number of	6	6	6	1	1	1	2
OPTIONAL BULKHEADS		number of	None	2	2	None	None	None	None
	Distance from end	feet		10.00	10.00				
		meters		3.05	3.05				
	Added Weight	net tons		1.00	1.00				
		metric tons		0.91	0.91				

Figure #3 Representative FlexiFloat Components Assumed to be Used for Floating Docks

Sketch

Alternative No.: C-50

☐ Original ☑ Alternative

Figure #4 Representative FlexiFloat Units Configured as a Floating Construction Dock

Calculations

Alternative No.: C-50

☑ Original ☑ Alternative

It is assumed in the base design that NYC will design and install at least two temporary (removable) mooring bollards on the esplanade between Segment 2 & 3.

In addition (or in addition and replacement) to the assumed temporary mooring bollards between Segments 2 &3, it is assumed that at least three floating docks will be provided along the East River waterfront in Segments 1, 4 and 5. Each floating dock is assumed to consist of 4 FlexiFloat S-70 No. 400 Quada-floats (see Figure #3 for metrics), with four spuds and one hinged 40-ft long ramp.

Construction Cost Estimate

Alternative No.: C-50

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
Barge Service	LOC	500,000.00			3	$1,500,000
2 Free Deck						
1 Crane Mounted						
Temporary Bridge to Park, from Barge	LOC	250,000.00			3	$750,000
Rental Estimate	MO	70,000.00			36	$2,520,000
Man Power (6 ea x $150 X 176 hrs.)	MO	158,400.00			36	$5,702,400
Duration Savings (Assumption)	MO	980,546.00	56	$54,910,576	50	$49,027,300
Total Markup	91.14%			$50,044,725.00		$54,227,187.93
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$104,955,000.00		$113,727,000
NET SAVINGS						($8,772,000)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-51
Allow a construction access (road) by building a temporary berm at Houston Street for construction access into the park	
Description of Original Concept:	
The original concept is to have a single construction entrance to East River Park at Montgomery Street to access the work zone for all work within the park.	
Description of Alternative Concept:	
The alternative concept is to obtain approval for a second construction entrance from the Houston Street overpass with a temporary construction ramp down to the Park. To allow for this, this will likely require inclusion in the EIS.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Providing a second access point to East River Park will ease congestion at the Montgomery Street entrance and enhance safety during construction. • Providing second access point will likely increase productivity. • Temporary fill will not have to be removed, since the area is being built up in final condition.	• Existing FDR ramps and pedestrian bending from the overpass need to be supported to accommodate HS-20 loading for construction vehicles. • A reinforced earth (GRES type wall) will be required to retain fill for ramp to avoid impacting ramp and overpass structures. • Likely requires inclusion in the EIS

	Cost Savings Summary (Present Worth)		
	First Cost	**O&M**	**Total LCC**
Original Concept	$0	$0	$0
Alternative Concept	$11,358,000	$0	$11,358,000
Savings	($11,358,000)	$0	($11,358,000)

Discussion

Alternative No.: C-51

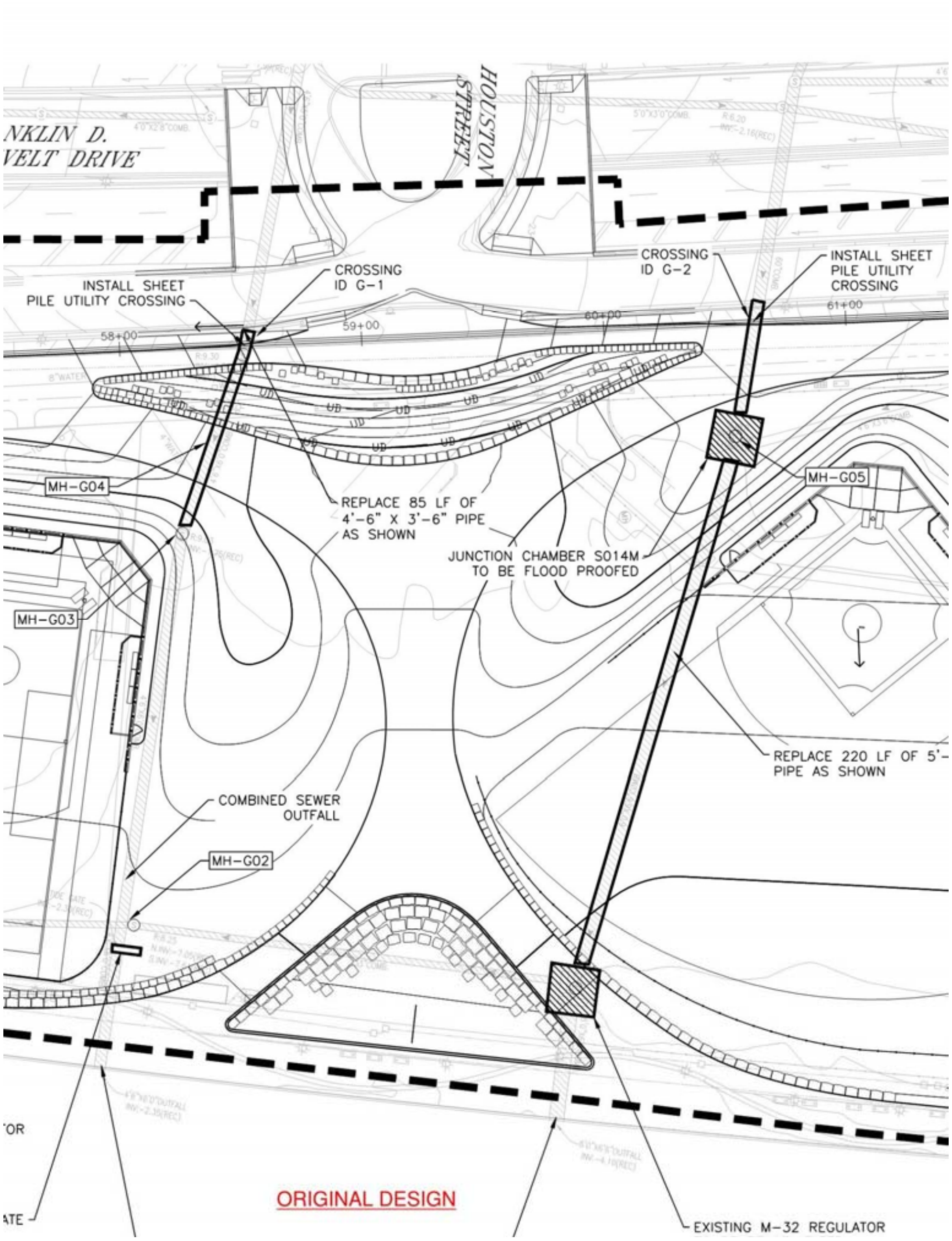
Providing a second access point to the park will likely increase productivity and shorten overall construction duration, as well as improve site safety. Congestion from construction vehicles at the only current entrance at Montgomery Street will be alleviated.

Installation of the temporary access ramp on fill will require the installation of a reinforced earth (GRES type) retaining wall parallel to the Houston Street ramps and overpass curtain wall in order to avoid loading of these facilities. The existing pedestrian ramp from the overpass needs to be supported to accommodate loading from construction vehicles. Temporary fill will not have to be removed, since the area is being built up in final condition.

Sketch

Alternative No.: C-51

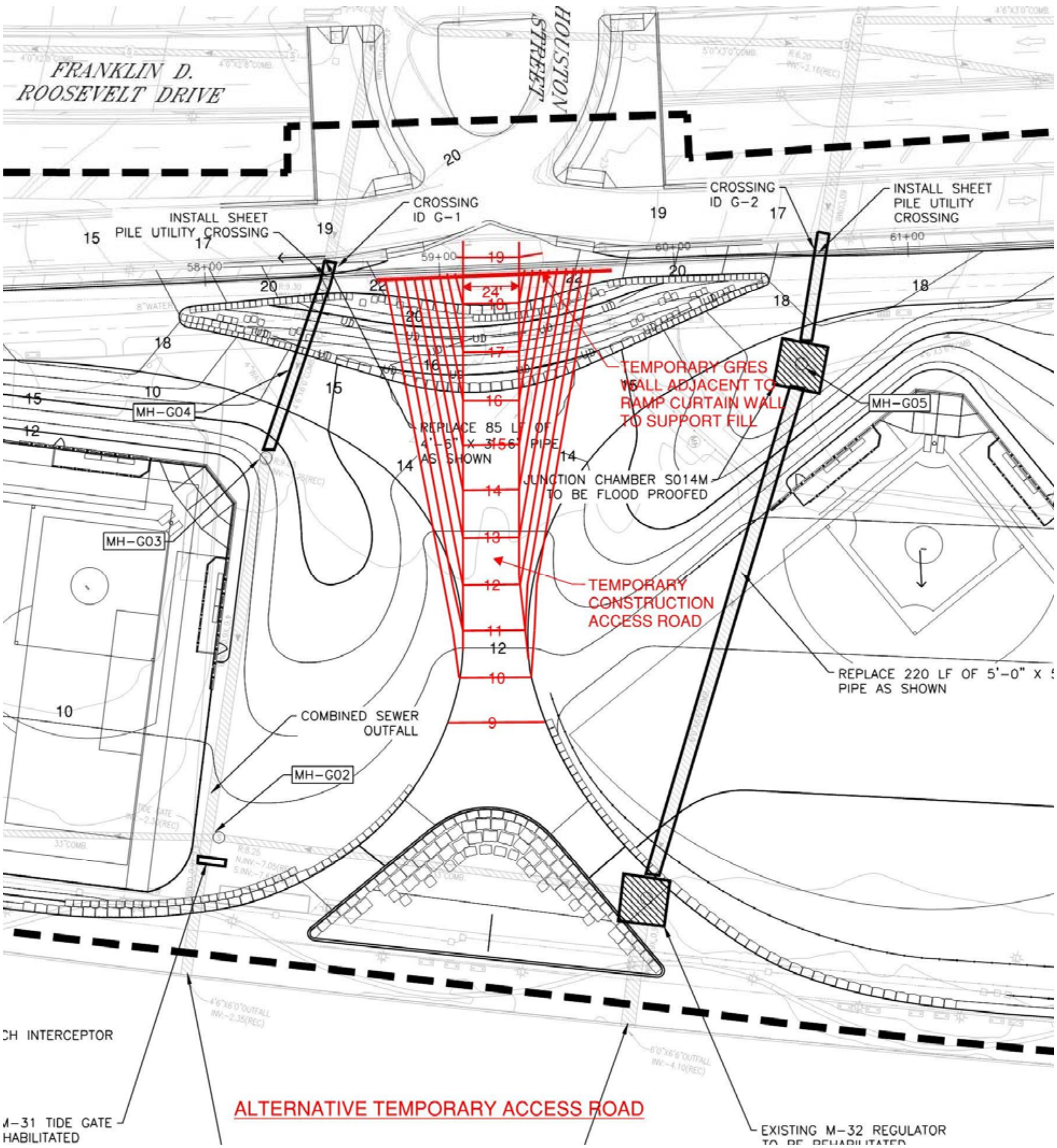
☑ Original ☐ Alternative



Sketch

Alternative No.: C-51

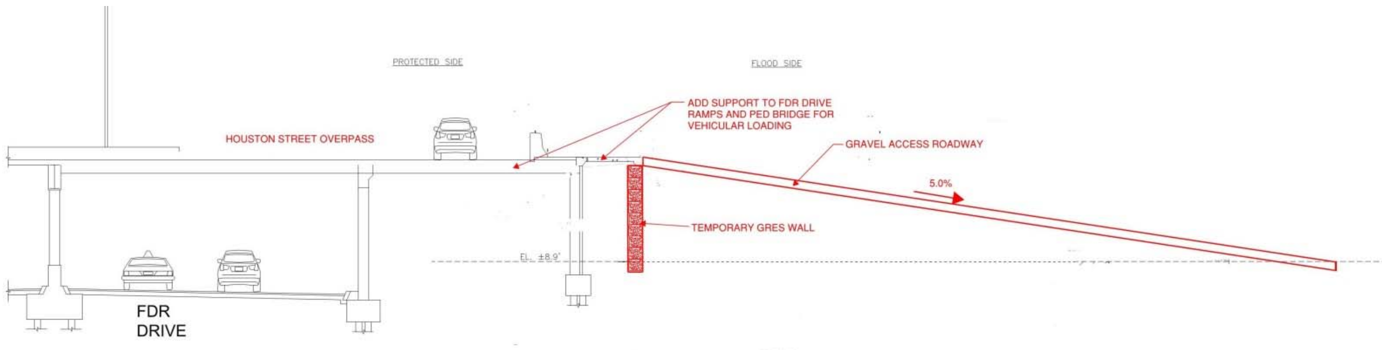
☐ Original ☑ Alternative



Sketch

Alternative No.: C-51

☐ Original ☑ Alternative



ALTERNATIVE TEMPORARY ACCESS ROAD

Construction Cost Estimate

Alternative No.: C-51

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
Gres Wall	SF	35.00			157,500	$5,512,500
Fill	CY	50.00			3,567	$178,350
Road Modification	LS	50,000.00			1	$50,000
Construct Roadway	SF	10.00			10,148	$101,480
Removal/Restoration	LS	100,000.00			1	$100,000
Total Markup	91.14%					$5,415,755.80
TOTALS	Breakdown of Markup can be found in the Cost Appendix					$11,358,000
NET SAVINGS						($11,358,000)

Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-58
Evaluate project schedule with regard to risk	
Discussion	

The current base design and construction schedules do not yet address all project delivery risks and have not fully identified schedule float-time that could be used to accommodate future potential schedule delays (such as: design delays, negotiation and approval delays, procurement delays and/or construction delays).

It is recommended that a formal evaluation of the current base design for design and construction schedule risk issues be conducted, and provision of schedule allowances (to account for potential late starts and delayed finish dates) for at least the risk issues identified in this write-up. Identification of project (design & construction) schedule risk items can be used to:

a) re-sequence the critical path of the schedule;

b) trigger pre-procurement of long-lead construction items;

c) develop an alternate construction methodology (such as designing precast concrete elements) that could accelerate construction by allowing for concurrent construction of pre-fabricated superstructure and foundations. Thorough evaluation of schedule risks can be used to limit both alienation costs and possible areas of cost growth.

As the design progresses some of the risk items currently not addressed by the base schedule may (or may not) be realized and the float will adjust accordingly.

The key milestone completion dates in the current approval process include:

- ULURP Certification (July 9, 2018)
- PDC Final Design Review (August 13, 2018)
- DPR DCD & Chief Engineer Review (Sept 3, 2018)
- Law Review (Oct. 12, 2018)
- Bid and Advertisement (Oct. 15, 2018)
- Review & Analysis of Multiple Bids (Dec 3, 2018)
- Con Edison Acceptance of Final Construction Package (Dec 4, 2018)
- Release Final EIS (Jan. 8, 2019)
- Construction Groundbreaking (May 14, 2019)

The key factor not listed in the design schedule are negotiations to be completed to handle NYCHA, NYPA, LWCF, (land and water conservation fund) parkland alienation, and various other entities. Many of these negotiations are at very early stages and could benefit from greater stakeholder involvement.

The following discussion evaluates potential risks associated with the schedules for: design, approvals, permits, and construction.

Per the January 30, 2018 ESCR Preliminary & Final Design Schedule document, the Mass Mailing #2 of final design is currently scheduled for July 11, 2018 and the risk exists that this mailing might be delayed. If this happens then the approval/permit process may be delayed, and the bid/procurement process will also be delayed.

Even if the final design is completed as scheduled, the approval process could be delayed by such issues as:

- Potential DEC and/or EIS issues,
- Potential USACE issues,
- Unexpected assessments of parkland alienation costs
- Con Ed agreement negotiations
- Potential issues of public access to park facilities during construction (which could limit the contractor's ability to accelerate construction by working weekends,
- Potential issues with two separate night closures of the two new pedestrian bridges,
- Potential internal problems with being able to issue the multiple bid advertisements on time,
- Receipt of unexpectedly high bids for the required schedule

Potential means to mitigate possible delays in design, approvals, permits and/or issuance of bid solicitations, include:

- Parallel development of selected VE concepts/preliminary-designs that are identified as having a potential to accelerate project delivery,
- Potential implementation of key Construction Management at Risk, CMAR, contracts to assist with completion of the design will allow the construction contract to be awarded before completion of the full design, thereby eliminating the bid period.
- Potentially delaying the opening of Pier 42 Park to the public in order to avoid potential alienation costs associated with obstruction to this public access caused by ESCR construction.
- If practicable involve the Mayor to accelerate approvals.

- Re-sequence the planned construction schedule to allow for additional concurrent construction (such as by providing fenced pedestrian ferry traffic through construction zones),
- Use A+B bid solicitations to incentivize bidders to accelerate construction schedule.
- Sub-divide the solicitation into work scopes that will facilitate concurrent constructive activities.

The current base construction schedule includes considerations/allowances for the following issues:

- The schedule is modified in order to spend the approximately $250M for federal reimbursement before April 2022.
- The landscape construction has been extended beyond the federal reimbursement cutoff to May 31st to meet the planting restrictions. If there is not enough money spent for federal reimbursement before April 2022, some work overlaps and construction expenditure there can be used to supplement.
- The landscape construction has been shortened to May 14, 2024 to meet a 5-year overall construction schedule.
- For landscaping construction/planting, hashed lines indicate work required prior to or between planting windows such as soil and plant procurement, soil mixing and testing, on-site nursery, irrigation, etc. The solid line indicates actual plantings.
- The landscaping construction duration does not show or include the one year of maintenance required.
- The Site Preparation task originally in the EIS version of the schedule has been removed as these tasks are rolled into each individual Segment.
- Day work is assumed to be an 8-hour shift.
- FDR night work is assumed to be a 6-hour shift.
- Schedule shown is for 5 work days per week.
- The schedule assumes that a day shift and a night shift can occur on the same calendar day.
- Slowdowns due to the manufactured gas plant (MGP) are accounted for in the schedule.
- Current schedule assumes that there are no site access conflicts between various phases and/or contractors. Mitigation factors that may be required include, but are not limited to, general barge access for deliveries, potential temporary pier for barge access, alternative concrete delivery under/over FDR, concrete batch plant on site and movable barrier system for FDR closure for night work.

The current base schedule does not include considerations/allowances for the following issues, which might (or might not) delay project delivery:

- The schedule assumes that work to the existing park waterfront esplanade, bulkhead, or esplanade railings in East River Park will be completed prior to May 2019. If this construction is delayed it could impact the ESCR schedule;
- Coordination might be required between ESCR work, and work to the existing park seawall in Stuyvesant Cove Park or existing waterfront retaining structures along the FDR Drive;
- Coordination might be required between ESCR work, and work to repair soils and planting on the west edge of the proposed Pier 42 park;
- Allowances may be needed for work required for the characterizing, handling, or disposal of existing soils which cannot be reused on-site, including contaminated materials;
- Allowances may need to be made for impacts to construction productivity resulting from the excavation, characterizing, handling, or disposal of contaminated soils that have not been accounted for in the development of the schedule;
- Schedule allowances may need to be provided for the construction of temporary mooring or offloading/bridging facilities at the existing esplanade for delivery of construction materials and equipment;
- Schedule allowances many need to be provided for the improvement of existing or for providing new vehicular access points to East River Park during construction;
- Additional allowances may need to be included for accessibility constraints, such as low vehicular clearance at Corlears Hook Bridge, or for other modes of delivery, such as barging;
- No work required for any field testing, additional engineering analysis or the redesign, reconstruction, or replacement of the foundations for the combined sewer outfall (CSO) lines that may be required during the replacement of the existing CSO sections in East River Park is included. Existing timber pile systems will be analyzed to determine if they can support the proposed loads. Costs for replacement or upgrades to that system are not included;
- As the design is not complete, additional schedule allowance may need to be made for work required for the replacement of any CSO elements not currently proposed or specified in the design;
- Additional schedule allowance made need to be provided for flood-proofing, repair, or replacement of existing park structures to remain in East River Park, Stuyvesant Cove Park, and Asser Levy Playground;
- Additional schedule allowance for interior drainage improvements, including parallel conveyance lines whose designs are still developing);

- Additional schedule allowances may be required to make all existing Con Edison conduits and/or manholes watertight within the unprotected floodplain; and
- Additional schedule allowances may be required for coordinating with the owners of constructed facilities (Con Edison Substation and Generating Station and the VA Medical Center) for connection to the flood barrier;
- Potential construction delays of Pier 42 park that might impact the ESCR construction activities; and
- Potential delays in Con Edison activities.

A thorough evaluation of the construction schedule risks can be used to:

a) Re-sequence to reduce the length of the critical path of the schedule (possibly by improving construction access sufficiently to allow for concurrent construction at the beginning of the project);

b) Trigger pre-procurement of long-lead construction items;

c) Develop alternate construction means (such as by designing precast concrete elements for flood wall and/or tunnel structures) that could accelerate construction by allowing for concurrent construction of pre-fabricated superstructure and foundations;

d) The introduction of late activity start-dates and float-time to the project schedule, also

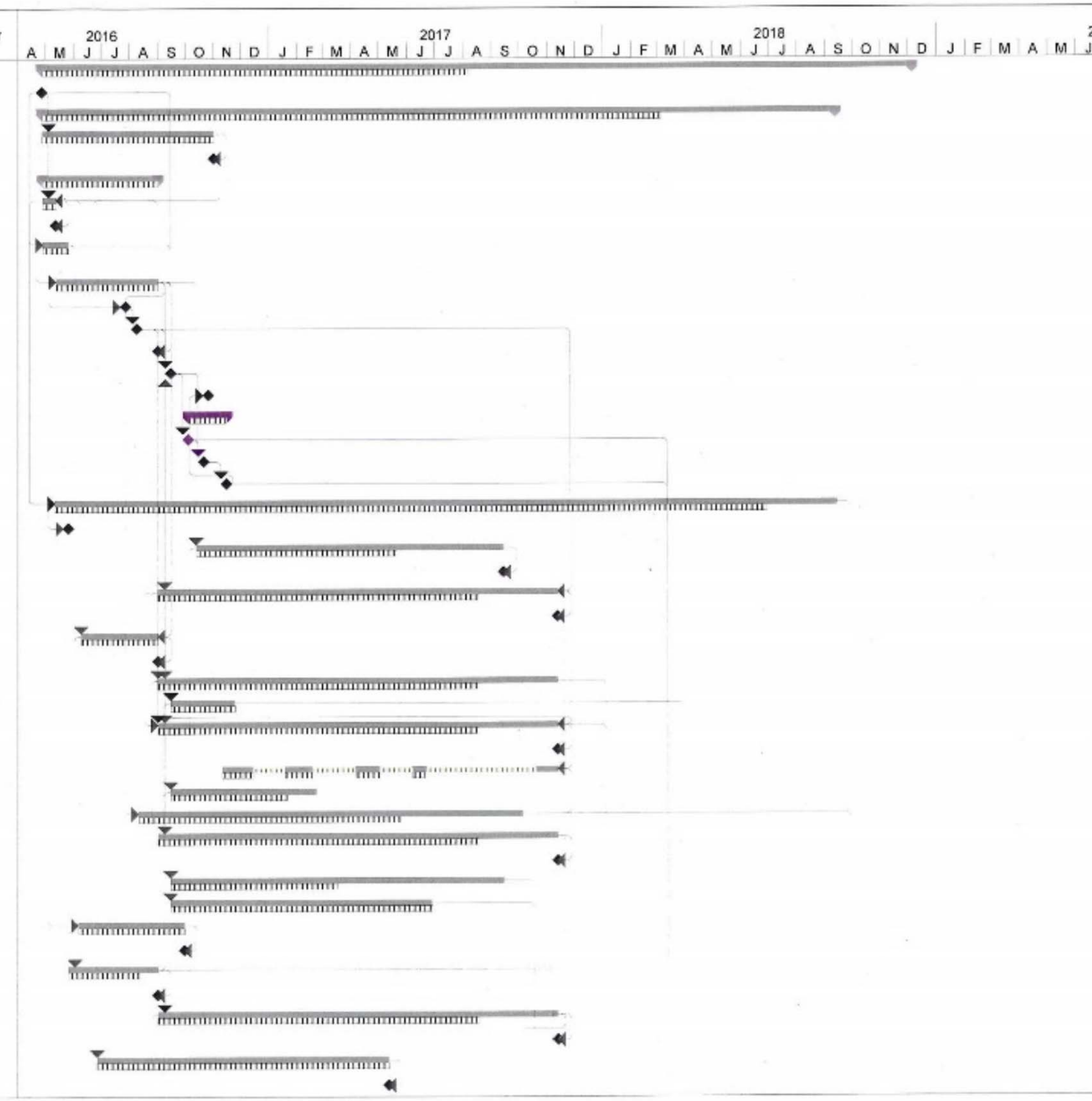
e) A thorough evaluation of schedule risk could be used to limit both alienation costs and possible areas of cost growth.

East Side Coastal Resiliency
Preliminary & Final Design Schedule

Tue 1/30/18

NYC Mayor's Office of Recovery & Resiliency · NYC DDC Department of Design and Construction · NYC Parks · NEW YORK CITY DOT

ID	Task Name	Duration (Calendar Days)	Projected Start	Projected Finish	Delay (Calendar Days)
1	**East Side Coastal Resiliency Preliminary & Final Design**	**952**	**Wed 4/27/16**	**Tue 12/4/18**	**0**
2	Notice to Proceed	0	Wed 4/27/16	Wed 4/27/16	0
3	**Preliminary Design**	**868**	**Wed 4/27/16**	**Tue 9/11/18**	**0**
4	Task 1 - Feasibility & Review of Existing Reports	188	Wed 4/27/16	Mon 10/31/16	174
5	Milestone 2 - Feasibility and Review of Existing Reports	0	Mon 10/31/16	Mon 10/31/16	174
6	Task 2 - Cost Effective & Value Engineering Alternatives	126	Thu 4/28/16	Wed 8/31/16	0
7	Task 2a - Feasibility of Cost Effective Alternative	14	Thu 4/28/16	Wed 5/11/16	0
8	Milestone 3 - Feasibility of Cost Effective Alternative	0	Wed 5/11/16	Wed 5/11/16	0
9	Task 2b - Preliminary Design Development of Cost Effective Design	28	Thu 4/28/16	Wed 5/25/16	0
10	Task 2c - Value Engineering Alternative	112	Thu 5/12/16	Wed 8/31/16	0
11	Preferred Conceptual Alternative Selected	0	Wed 7/27/16	Wed 7/27/16	0
12	DPR DDC Concept Approval	0	Mon 8/8/16	Mon 8/8/16	0
13	Milestone 4 - Final Conceptual Design	0	Wed 8/31/16	Wed 8/31/16	0
14	DPR DDC Schematic Sign-off	0	Wed 9/14/16	Wed 9/14/16	0
15	DPR Arboriculture & Horticulture Review	0	Wed 10/26/16	Wed 10/26/16	-22
16	PDC Conceptual Design Review	42	Mon 10/3/16	Mon 11/14/16	0
17	Community Board Review	0	Mon 10/3/16	Mon 10/3/16	0
18	PDC Conceptual Design Submission	0	Fri 10/21/16	Fri 10/21/16	0
19	PDC Conceptual Design Presentation	0	Mon 11/14/16	Mon 11/14/16	0
20	Task 3 - Community Engagement	854	Wed 5/11/16	Tue 9/11/18	319
21	Milestone 1 - Community Engagement Schedule and Plan	0	Wed 5/25/16	Wed 5/25/16	0
22	Task 4 - Traffic Study Program	335	Thu 10/13/16	Tue 9/12/17	256
23	Milestone 5 - Traffic Study Program	0	Tue 9/12/17	Tue 9/12/17	256
24	Task 5 - Schematic Geometric Design	436	Thu 9/1/16	Fri 11/10/17	282
25	Milestone 8 - Schematic Geometric Design	0	Fri 11/10/17	Fri 11/10/17	282
26	Task 6 - Park Resiliency Options	84	Thu 6/9/16	Wed 8/31/16	0
27	Milestone 7 - Park Resiliency Options	0	Wed 8/31/16	Wed 8/31/16	0
28	Task 7 - Preliminary Design of Maintenance Storage Facilities	436	Thu 9/1/16	Fri 11/10/17	282
29	Task 8 - Tree Inventory Update	70	Thu 9/15/16	Wed 11/23/16	42
30	Task 9 - Schematic Landscape/Urban Design	436	Thu 9/1/16	Fri 11/10/17	282
31	Milestone 9 - Schematic Landscape/Urban Design	0	Fri 11/10/17	Fri 11/10/17	282
32	Task 10 - Preliminary Site Grading Plan	366	Thu 11/10/16	Fri 11/10/17	282
33	Task 11 - Hazardous Waste & Site Contamination	159	Thu 9/15/16	Mon 2/20/17	131
34	Task 12 - Subsurface Exploration Program	419	Thu 8/11/16	Tue 10/3/17	223
35	Task 13 - Preliminary Design of Interior Drainage Management	436	Thu 9/1/16	Fri 11/10/17	282
36	Milestone 10 - Preliminary Interior Drainage Management Design	0	Fri 11/10/17	Fri 11/10/17	282
37	Task 14 - Vault Program Level I	363	Thu 9/15/16	Tue 9/12/17	335
38	Task 15 - Railroad & Abandoned Trolley Facilities Research	285	Thu 9/15/16	Mon 6/26/17	243
39	Task 16 - Inspection & Cost Estimates for Bulkhead Repairs	116	Mon 6/6/16	Thu 9/29/16	29
40	Milestone 6 - Inspection of Bulkhead Repairs	0	Thu 9/29/16	Thu 9/29/16	29
41	Task 17 - Conceptual Bridge Design	98	Thu 5/26/16	Wed 8/31/16	0
42	Milestone 11 - Conceptual Bridge Design	0	Wed 8/31/16	Wed 8/31/16	0
43	Task 18 - Preliminary Bridge Design	436	Thu 9/1/16	Fri 11/10/17	282
44	Milestone 12 - Preliminary Bridge Design	0	Fri 11/10/17	Fri 11/10/17	282
45	Task 19 - Drainage Study [illegible]	[illegible]	Mon 8/[illegible]/16	Wed 5/10/17	264
46	Milestone 13 - Drainage Study	0	Wed 5/10/17	Wed 5/10/17	264



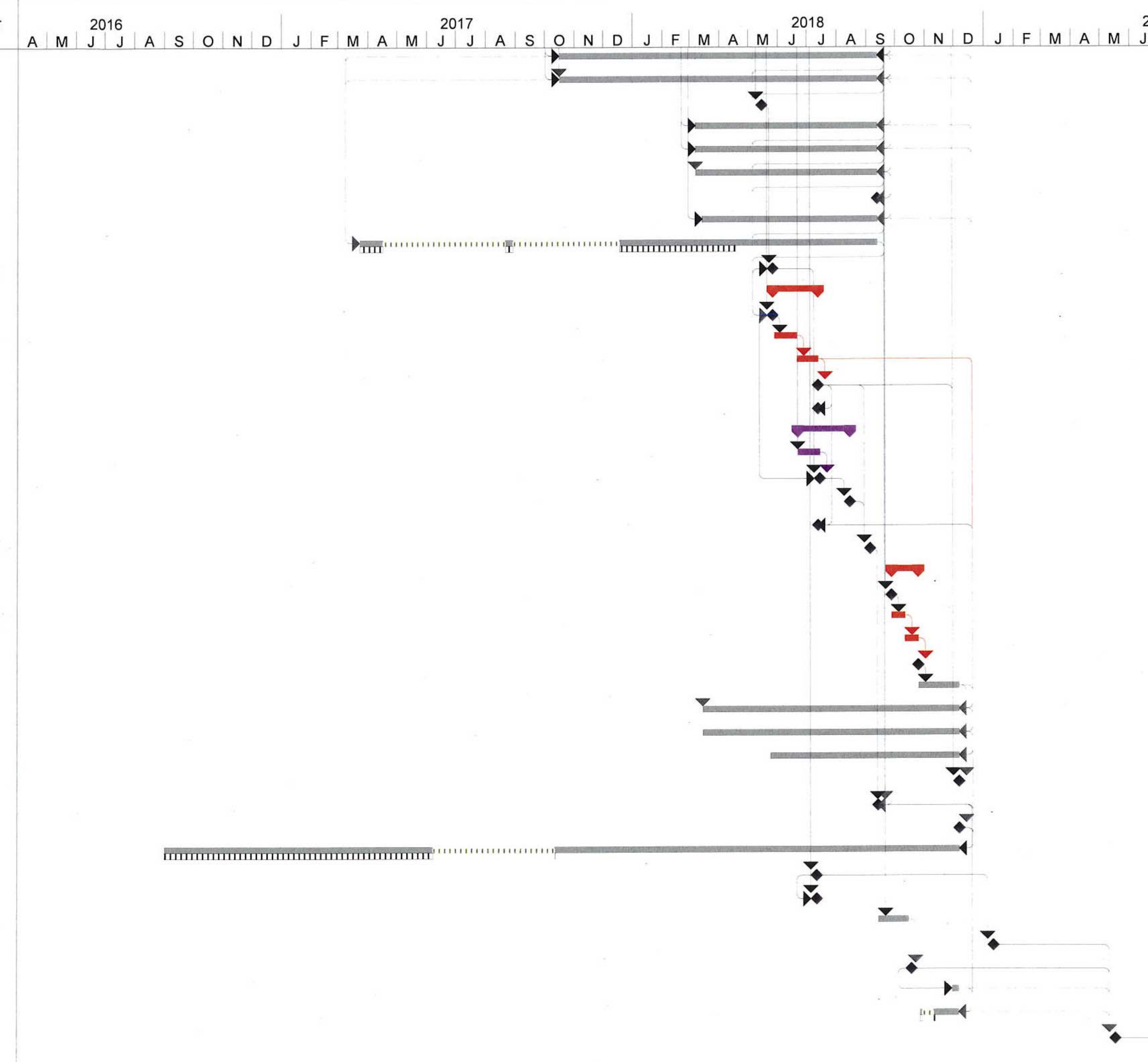
Note: Final design schedule assumes no substantial changes in design direction subsequent to City Team design direction received December 22, 2017.

AKRF KSE

East Side Coastal Resiliency
Preliminary & Final Design Schedule

Tue 1/30/18

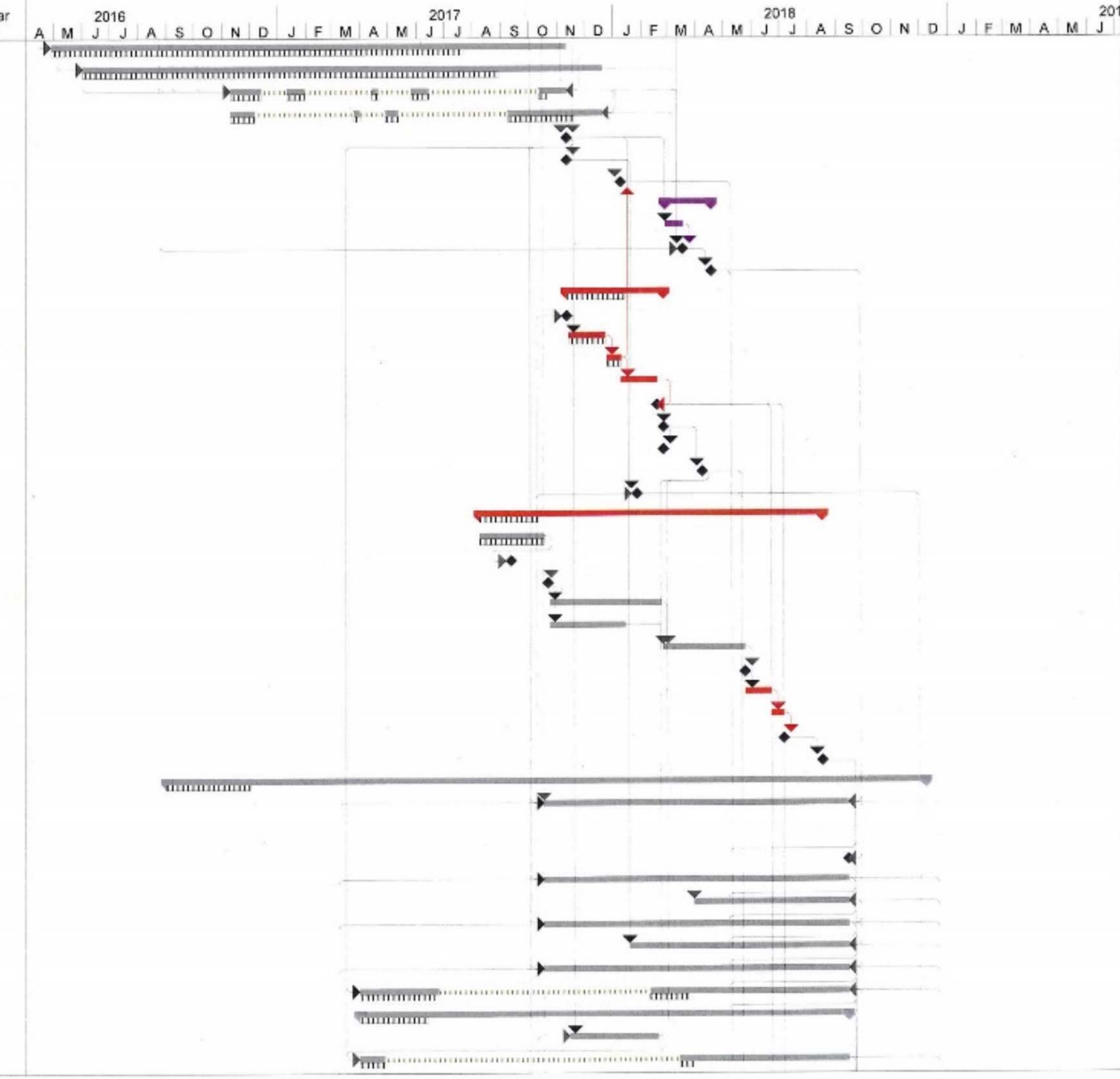
ID	Task Name	Duration (Calendar Days)	Projected Start	Projected Finish	Delay (Calendar Days)
92	Task 32 - Final Bridge Design	331	Mon 10/16/17	Tue 9/11/18	319
93	Task 33 - Final Design of Integrated Flood Protection System	331	Mon 10/16/17	Tue 9/11/18	319
94	DPR Arboriculture & Horticulture Review	0	Mon 5/14/18	Mon 5/14/18	427
95	Task 34 - Street Lighting System Design	189	Wed 3/7/18	Tue 9/11/18	319
96	Task 35 - Design of Electrical System	189	Wed 3/7/18	Tue 9/11/18	319
97	Task 36 - Final O&M Manual & ERP	189	Wed 3/7/18	Tue 9/11/18	319
98	Milestone 17 - Operations and Maintenance Manual	0	Tue 9/11/18	Tue 9/11/18	319
99	Task 37 - Final Construction Staging & MPT	182	Wed 3/14/18	Tue 9/11/18	319
100	Task 38 - Construction Contract Duration/Scheduling Study	538	Thu 3/23/17	Tue 9/11/18	392
101	DPR DCD Review & Senior Designer Review	0	Fri 5/25/18	Fri 5/25/18	319
102	Mass Mailing #2	47	Fri 5/25/18	Wed 7/11/18	0
103	Draft Mass Mailing #2 Submitted to DDC	0	Fri 5/25/18	Fri 5/25/18	319
104	DDC Review of Mass Mailing #2	23	Mon 5/28/18	Tue 6/19/18	333
105	Revision per DDC Comments	22	Wed 6/20/18	Wed 7/11/18	341
106	Mass Mailing #2 Distributed	0	Wed 7/11/18	Wed 7/11/18	341
107	Milestone 16 - Mass Mailing #2	0	Wed 7/11/18	Wed 7/11/18	341
108	PDC Final Design Review	54	Thu 6/21/18	Mon 8/13/18	0
109	Community Board Review	23	Thu 6/21/18	Fri 7/13/18	346
110	PDC Final Design Submission	0	Fri 7/13/18	Fri 7/13/18	326
111	PDC Final Design Presentation	0	Mon 8/13/18	Mon 8/13/18	329
112	Submit Conditional Letter of Map Revision (CLOMR)	0	Wed 7/11/18	Wed 7/11/18	22
113	DPR DCD & Chief Engineer Review	0	Mon 9/3/18	Mon 9/3/18	329
114	MM#2 Drainage Addendum	28	Tue 9/25/18	Tue 10/23/18	0
115	Draft MM#2 Drainage Addendum to DDC	0	Tue 9/25/18	Tue 9/25/18	13
116	DDC Review of MM#2 Drainage Addendum	14	Wed 9/26/18	Tue 10/9/18	13
117	Revision per DDC Comments	14	Wed 10/10/18	Tue 10/23/18	13
118	MM#2 Drainage Addendum Distributed	0	Tue 10/23/18	Tue 10/23/18	13
119	Drainage Design Finalization	42	Wed 10/24/18	Tue 12/4/18	13
120	Task 39 - Final Quantity and Cost Estimating	266	Wed 3/14/18	Tue 12/4/18	403
121	Task 40 - Preparation of Specifications	266	Wed 3/14/18	Tue 12/4/18	403
122	Task 41 - Preparation of Multiple Bid Packages	196	Wed 5/23/18	Tue 12/4/18	403
123	Con Edison Acceptance of Final Construction Package	0	Tue 12/4/18	Tue 12/4/18	403
124	Milestone 18 - Submission of Final Contract Documents (excluding drair	0	Tue 9/11/18	Tue 9/11/18	319
125	Submission of Final Drainage Contract Documents	0	Tue 12/4/18	Tue 12/4/18	13
126	Task 44 - Levee Certification & FEMA Accreditation	825	Thu 9/1/16	Tue 12/4/18	403
127	Release Draft EIS (date per E/P schedule dated 1/30/18)	0	Mon 7/9/18	Mon 7/9/18	385
128	ULURP Certification (date per E/P schedule dated 1/30/18)	0	Mon 7/9/18	Mon 7/9/18	160
129	Law Review	31	Wed 9/12/18	Fri 10/12/18	308
130	Release Final EIS (date per E/P schedule dated 1/30/18)	0	Tue 1/8/19	Tue 1/8/19	347
131	Bid and Advertisement (date per E/P schedule dated 1/30/18)	0	Mon 10/15/18	Mon 10/15/18	131
132	Task 42 - Review & Analysis of Multiple Bids	7	Tue 11/27/18	Mon 12/3/18	150
133	Task 43 - Electronic Archiving & Indexing	40	Thu 10/25/18	Mon 12/3/18	367
134	Groundbreaking (date per E/P schedule dated 1/30/18)	0	Tue 5/14/19	Tue 5/14/19	189
135	Construction Completion	0	Mon 5/13/24	Mon 5/13/24	189



Note: Final design schedule assumes no substantial changes in design direction subsequent to City Team design direction received December 22, 2017.

East Side Coastal Resiliency
Preliminary & Final Design Schedule
Tue 1/30/18

ID	Task Name	Duration (Calendar Days)	Projected Start	Projected Finish	Delay (Calendar Days)
47	Task 20 - Design of Tie-Backs and Deployable Gates	562	Thu 4/28/16	Fri 11/10/17	282
48	Task 21 - Preliminary O&M Manual and ERP	566	Thu 6/2/16	Tue 12/19/17	321
49	Task 22 - Preliminary Quantity & Cost Estimating	366	Thu 11/10/16	Fri 11/10/17	282
50	Task 23 - Life Cycle Cost Analysis	405	Thu 11/10/16	Tue 12/19/17	321
51	DDC Preliminary Design Submission	0	Fri 11/10/17	Fri 11/10/17	282
52	Con Edison Acceptance of Mid-Point Package	0	Fri 11/10/17	Fri 11/10/17	301
53	DPR Commissioner Approval	0	Mon 1/8/18	Mon 1/8/18	360
54	PDC Preliminary Design Review	50	Mon 2/26/18	Mon 4/16/18	0
55	Community Board Review	19	Mon 2/26/18	Fri 3/16/18	413
56	PDC Preliminary Design Submission	0	Fri 3/16/18	Fri 3/16/18	392
57	PDC Preliminary Design Presentation	0	Mon 4/16/18	Mon 4/16/18	399
58	Mass Mailing #1	105	Fri 11/10/17	Fri 2/23/18	0
59	Mass Mailing #1 Submitted to City Team	0	Fri 11/10/17	Fri 11/10/17	247
60	City Team Budget Determination & Resolution	40	Mon 11/13/17	Fri 12/22/17	11
61	City Team Review of Mass Mailing #1	15	Mon 12/25/17	Mon 1/8/18	292
62	Revision per City Team Comments	39	Tue 1/9/18	Fri 2/16/18	317
63	Mass Mailing #1 Electronic Delivery	0	Fri 2/16/18	Fri 2/16/18	317
64	Mass Mailing #1 Distribution	0	Fri 2/23/18	Fri 2/23/18	324
65	Milestone 15 - Mass Mailing #1	0	Fri 2/23/18	Fri 2/23/18	324
66	Alignment meeting	0	Fri 4/6/18	Fri 4/6/18	337
67	Con Edison Acceptance of Preliminary Review Package	0	Thu 1/25/18	Thu 1/25/18	255
68	MM#1 Drainage Addendum	372	Tue 8/8/17	Tue 8/14/18	0
69	ESCR-LMCR Joint Drainage Modeling	70	Tue 8/8/17	Mon 10/16/17	41
70	ESCR-LMCR Drainage Approach Meeting	0	Mon 9/11/17	Mon 9/11/17	2
71	City Team Drainage Design Direction	0	Fri 10/20/17	Fri 10/20/17	24
72	Parallel Conveyance Survey	121	Mon 10/23/17	Tue 2/20/18	90
73	Parallel Conveyance & Interceptor Gate Conceptual Design	82	Mon 10/23/17	Fri 1/12/18	64
74	ESCR Drainage Preliminary Design & Cost Estimating	89	Fri 2/23/18	Tue 5/22/18	111
75	Draft MM#1 Addendum to City Team	0	Tue 5/22/18	Tue 5/22/18	111
76	City Team Review of MM#1 Addendum	28	Wed 5/23/18	Tue 6/19/18	110
77	Design Addresses Comments	14	Wed 6/20/18	Tue 7/3/18	103
78	Distribution of MM#1 Addendum Citywide	0	Tue 7/3/18	Tue 7/3/18	102
79	MM#1 Addendum Alignment Meeting	0	Tue 8/14/18	Tue 8/14/18	102
80	Final Design	825	Thu 9/1/16	Tue 12/4/18	0
81	Task 24 - Street Design Including Study & Design of Street Grades, Study & Design of Street Drainage, Permanent Street Signs & Preparation of Grade Change Exhibit	331	Mon 10/16/17	Tue 9/11/18	319
82	Milestone 14 - Street Design	0	Tue 9/11/18	Tue 9/11/18	319
83	Task 25 - Final Design of Maintenance Storage Facilities	331	Mon 10/16/17	Tue 9/11/18	319
84	Task 26 - Final Tree Impact Mitigation & Tree Planting Program	168	Wed 3/28/18	Tue 9/11/18	319
85	Task 27 - Final Landscape/Urban Design	331	Mon 10/16/17	Tue 9/11/18	319
86	Task 28 - Design of Irrigation System	238	Wed 1/17/18	Tue 9/11/18	319
87	Task 29 - Final Design of Interior Drainage Management	331	Mon 10/16/17	Tue 9/11/18	319
88	Task 30 - Sewer Design	531	Thu 3/30/17	Tue 9/11/18	319
89	Task 31 - Water Main Impact Analysis & Design	531	Thu 3/30/17	Tue 9/11/18	0
90	Task 31a - Water Main Impact Analysis	96	Mon 11/13/17	Fri 2/16/18	241
91	Task 31b - Water Main Design	531	Thu 3/30/17	Tue 9/11/18	319



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Design Suggestion

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	C-60
Focus the HUD scope of work on CSO construction and park utilities as an early contract	
Discussion	

The original concept does not specify explicit timing or contracting means for construction of the CSO and utility replacement and/or installation requirements within the park or berm areas east of the floodwall. It is assumed that the work for these items would be completed in conjunction with other activities within the same project area and reach as shown in the current Preliminary Draft Construction Schedule.

The alternative concept is to procure an early contract(s) to perform CSO conduit, CSO regulator strengthening and tide gate replacement, park drainage, water line and other utility work that is relatively independent of the major Con Ed tunnel, floodwall, embankment and landscaping work that will be built above the basic utility infrastructure. This early procurement would utilize the HUD funding for work within the park flood protection area. For cost estimating purposes, it I can be assumed that with a separate contract CSO/utilities work could be started with an NTP in July 2019 and completed in December 2023.

Advantages:

- The replacement, addition and/or rehabilitation of the deeper structures related to storm drainage, CSO discharge lines, CSO regulators, water lines and other utilities can be fast-tracked, to complete work off the critical path.
- Early utilization of HUD funding
- The use of a dedicated, separate contract would focus the GC and its subs on the more difficult work related to the Con Ed tunnel, flood berm, flood gates and other work items.

Disadvantages:

- Substantial completion of 100% design would be required to assure that work under this contract would not require change orders
- Defining the boundary of the utilities to be included in this early contract would have to be done carefully. Utilities that need to be constructed in conjunction with the flood wall, Con Ed tunnel and other project features would need to be excluded from this contract.

Early progress on the CSO, drainage, water and other utility requirements will utilize HUD funding within the first three years of construction and allow focus of later contracts on the more challenging aspects of the project. Along with design and contingency, these work items would comprise a major percentage of the HUD funding amount.

For cost estimating purposes it can be assumed that with a separate contract CSO/utilities work could be started with an NTP in July 2019 and completed in December 2023. CSO/utilities are currently estimated to be roughly $149M. This VE proposal may be additive with VE proposal C-35.

IMPROVE ACCESS (IA)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	IA-03
Rebuild Houston Street pedestrian ramps to handle HS-20 loads	
Description of Original Concept:	
The original concept is to provide two pedestrian paths along the new flood protection berm that would provide pedestrian and bike access to/from the park via the Houston Street overpass.	
Description of Alternative Concept:	
The alternative concept is to provide/allow emergency vehicle access from Houston Street by upgrading the infrastructure to handle HS-20 loads.	

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$0	$0	$0
Alternative Concept	$4,524,000	$0	$4,524,000
Savings	($4,524,000)	$0	($4,524,000)

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Improves safety and response times for emergency access • Could also assist with access for maintenance vehicles • If constructed early, could be used by construction vehicles • Reduces potential damage to Houston Street deck if heavy vehicles mistakenly access the deck or FDR ramps. • Allows heavy vehicles to make U-turns at Houston Street deck without damage	• Will have to secure use from non-authorized vehicles • Traffic impacts during construction

Discussion

Alternative No.: IA-03

The original concept proposes to replace the existing pedestrian ramps at the Houston Street access with a new design that integrates the shared use path (SUP) on a berm that rises up to the Houston Street deck and access point. The park entrance is envisioned as a pedestrian and bike entrance only, without any accommodation for a vehicular entrance of any type, including emergency or park vehicles. The park side of the deck would have a short wall as a traffic barrier, with openings aligned with the crosswalks to allow pedestrian/bike access.

Houston Street currently terminates at the park with a structural roadway deck over the FDR which provides vehicular access to/from the northbound FDR ramps, as well as pedestrian/bike access to the park.

Roughly 3/4ths of the deck has been upgraded to HS-20 (now HL-93) loading, however the eastern section of the deck directly adjacent to the park (roughly 25 feet wide), as well as the vehicle ramps to/from the northbound FDR, are not designed to support HS-20 loads. Therefore, even if the park SUP could support larger vehicles (i.e. HS-20 loads), the deck could not, and therefore only small vehicles (two axles up to 15 tons) could access the park if desired.

This alternative concept proposes designing the entrance to allow access to larger vehicles when needed, such as emergency and maintenance vehicles. The following changes to the design would be included:

- The loading of the Houston Street deck and adjacent park SUP (on berm) would be upgraded to support HS-20 (HL-93) loading.
- Redesign entrance geometry to physically allow emergency or DPR vehicles to access the park from Houston Street. Remove the proposed traffic barrier wall, and replace with movable components, such as removable bollards or gates. (Note: the AKRF/KSE design team has identified several alternative designs to achieve secure vehicular access which addresses security concerns.

Advantages:

- Improves safety and response times for emergency access - (See figure below) The singular existing vehicular park entrance causes all emergency access to enter at Montgomery Street. The Alternative concept would allow for improved access with significantly shorter response times. The alternative concept also allows for redundancy in case there is an incident that blocks off access from the Montgomery Street route.
- Maintenance Vehicle Access - Maintenance vehicles would have an alternate access to the park. This could reduce the amount of park vehicles that would conflict with park users, as a shorter path within the park would be needed for 3/4ths of the park.
- Facilitates Park Construction - If constructed early, this improvement could be used by construction vehicles which would facilitate certain construction activities and efficiencies (see VE Alternative C-51).
- Resiliency – This alternative reduces potential damage to Houston Street deck if heavy vehicles mistakenly access the deck or FDR ramps. (Type C School buses, as shown below are just below the 15-ton limit).

- Heavy Vehicle U-turns - Allow heavy vehicles to make U-turns at Houston Street deck without damage.

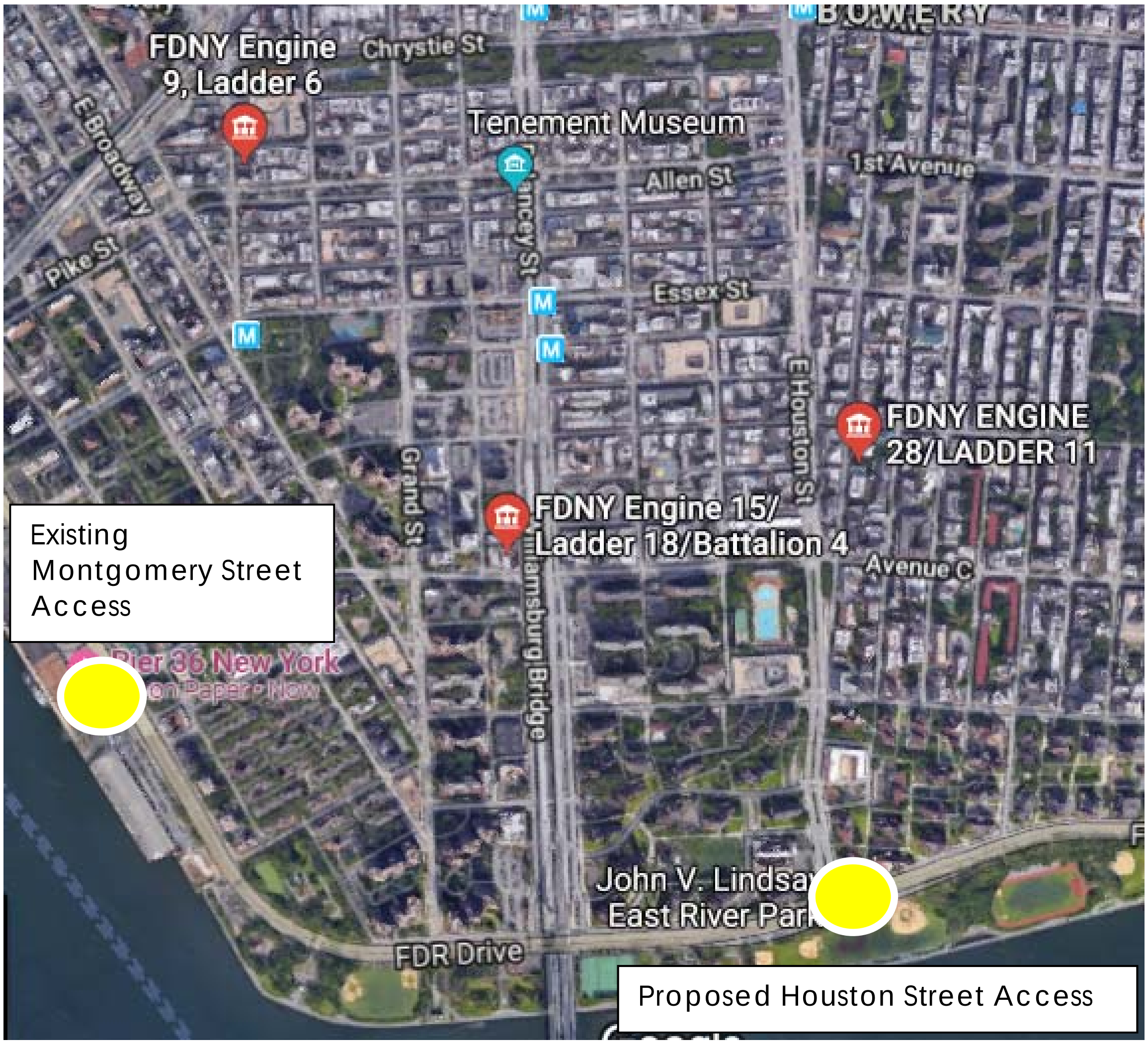
Disadvantages

- Security - Security concerns with unintended use by non-authorized vehicles. Depending on the design of the access, the park could be compromised if an un-authorized vehicle could navigate into the park.
- Traffic impacts during construction – The additional construction of this alternative would require maintenance and protection of traffic to phase in the improvements, which would impact traffic and pedestrian/bike flows in this area.

Sketch

Alternative No.: IA-03

☐ Original ☑ Alternative



<u>Illustration of Existing and proposed Park Access points and location of FDNY Stations</u>

Sketch

Alternative No.: IA-03

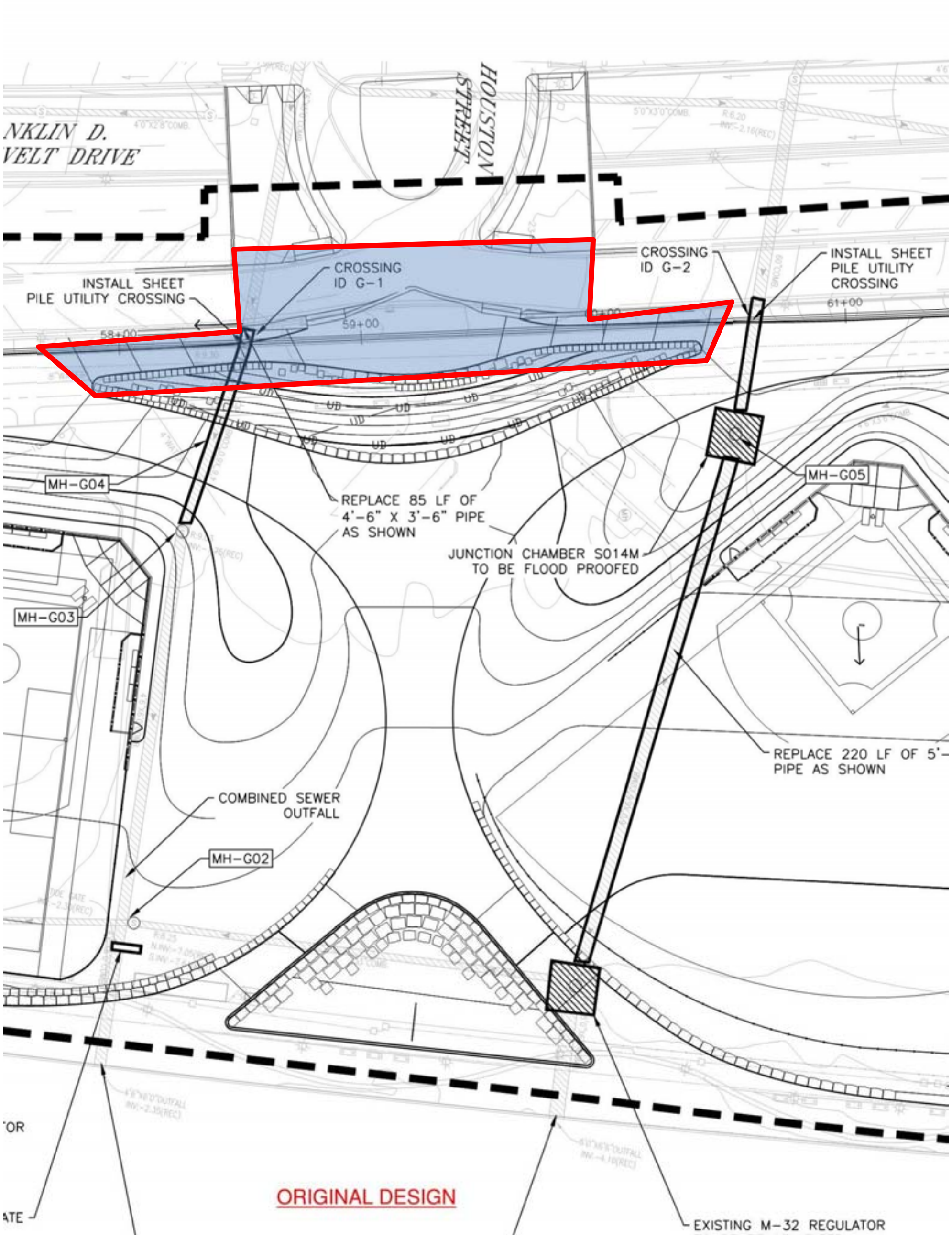
☑ Original ☐ Alternative

Existing portion of the Houston Street deck is not HS20 rated.

Sketch

Alternative No.: IA-03

☑ Original ☐ Alternative

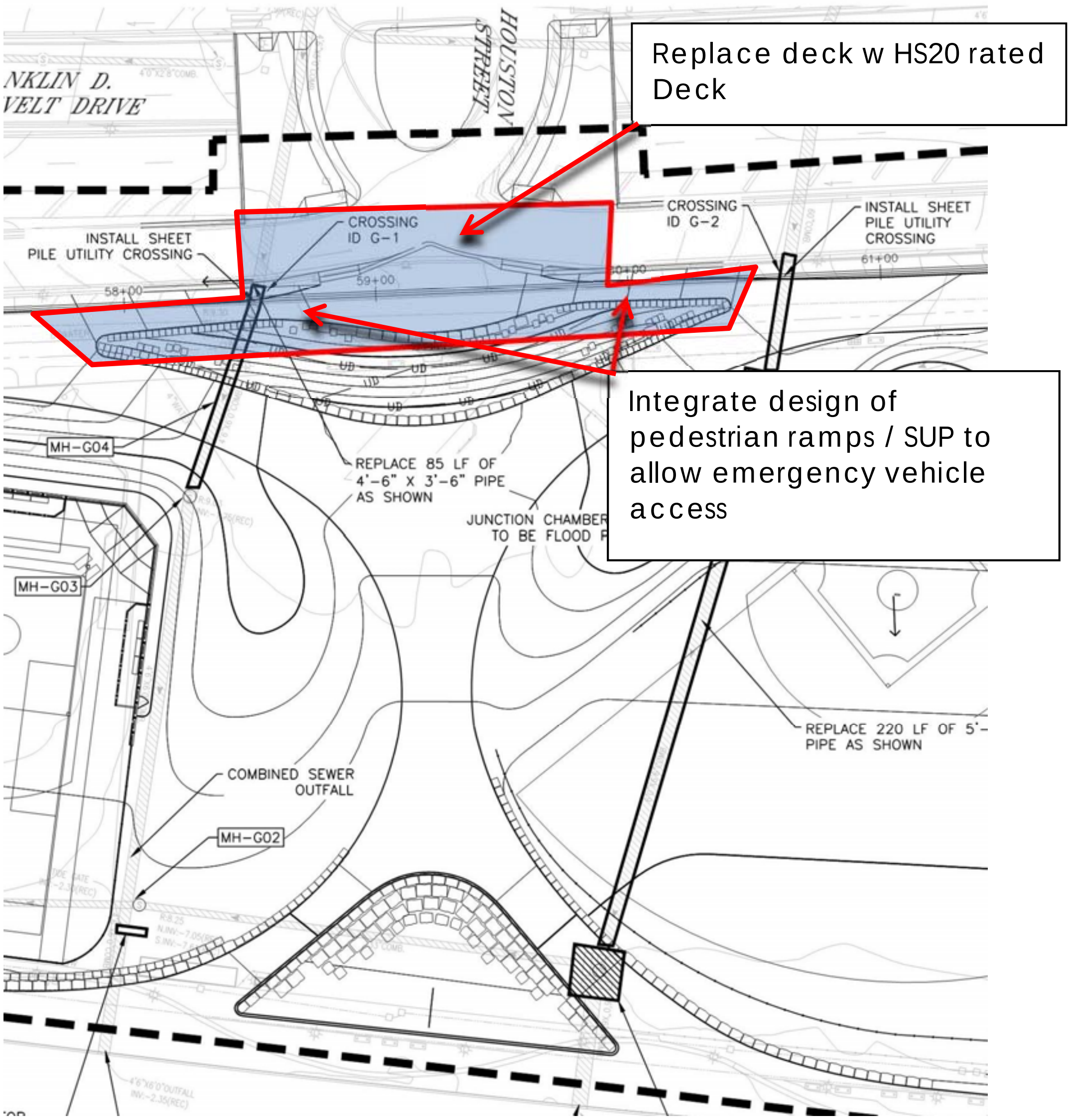


Existing portion of the Houston Street deck is not HS20 rated.

Sketch

Alternative No.: IA-03

☐ Original ☑ Alternative



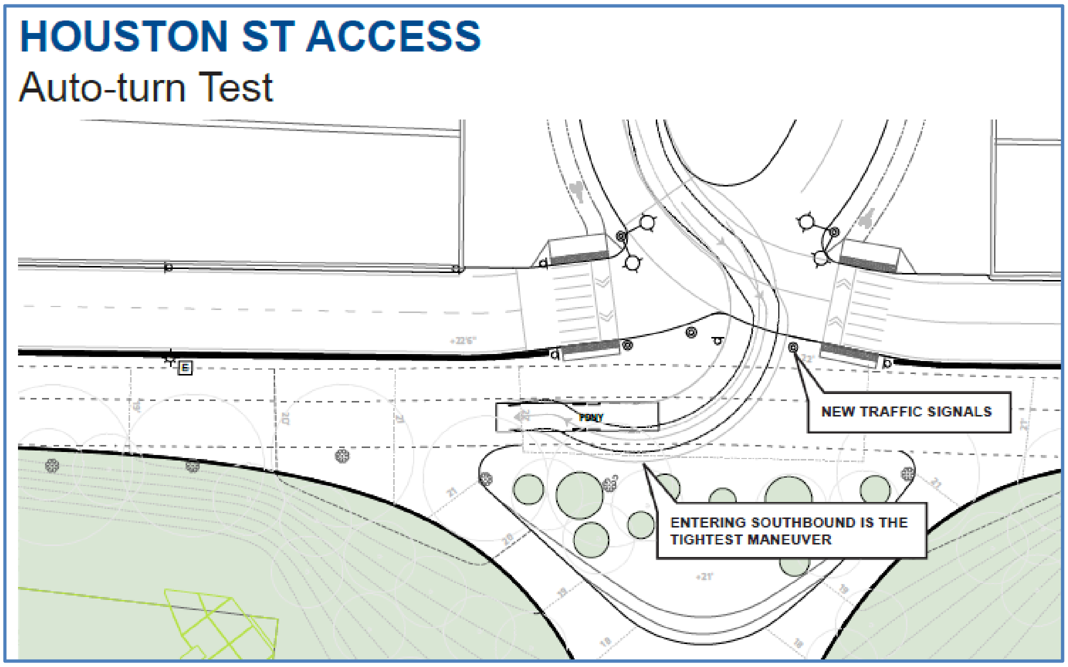
Rebuild Houston Street Deck and pedestrian ramps to handle HS20 loads. Integrate Pedestrian Ramps to accommodate fire trucks and emergency vehicles.

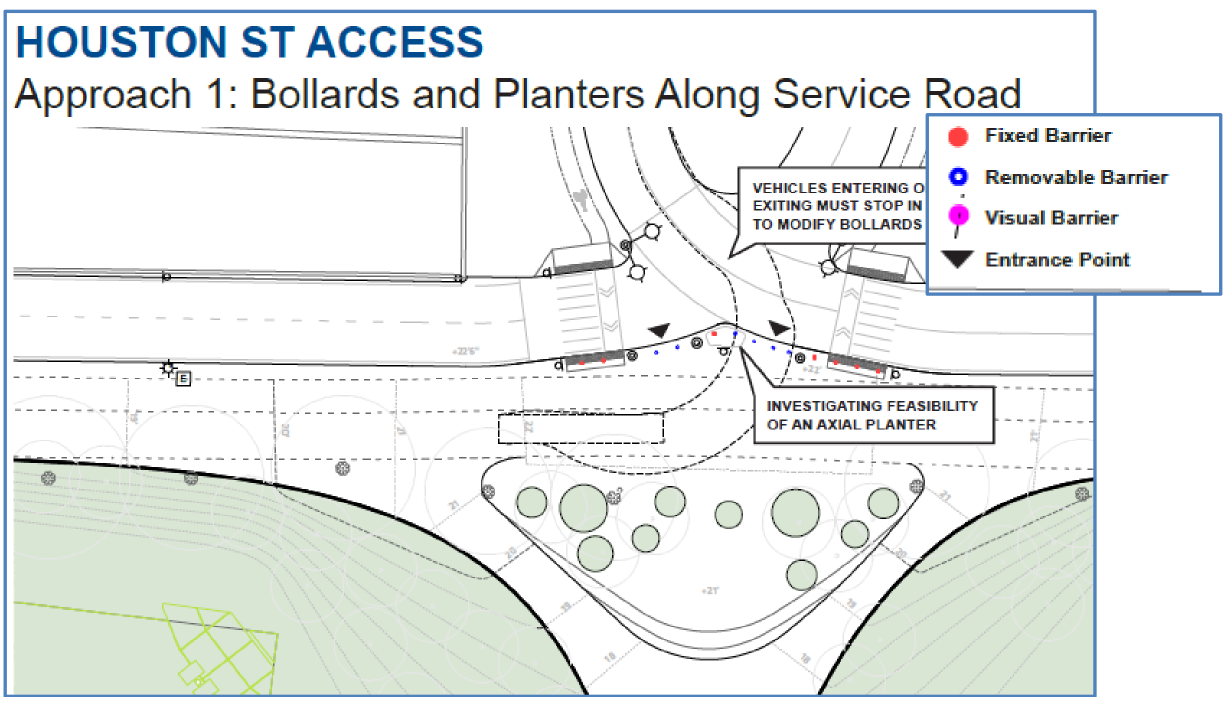
Sketch

Alternative No.: IA-03

☐ Original ☑ Alternative

Sample designs by AKRF/KSE design team:





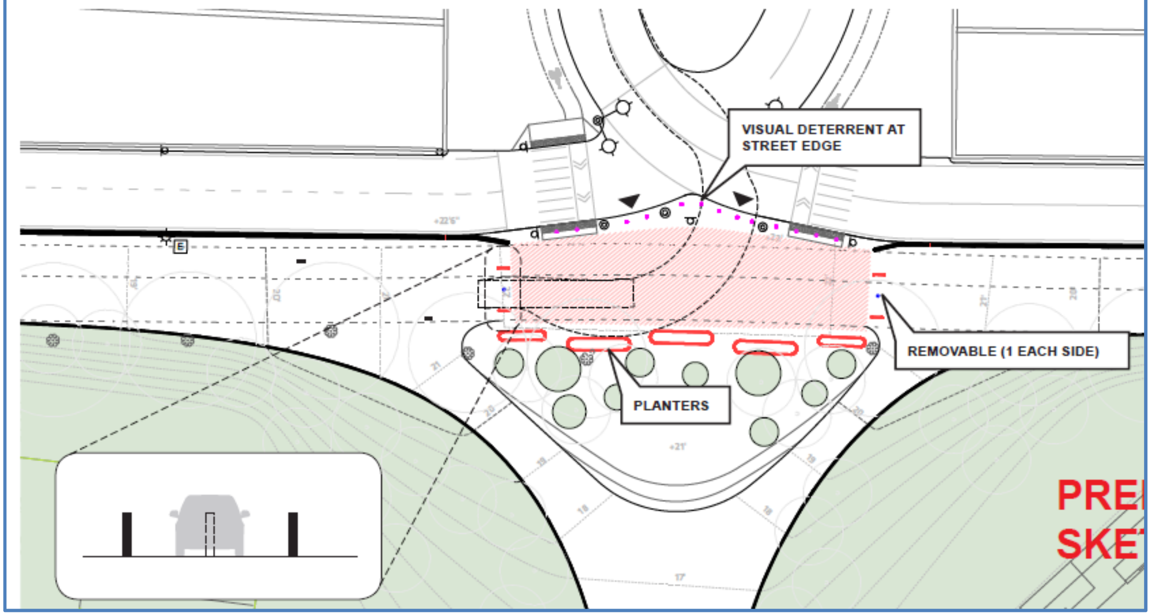
Sketch

Alternative No.: IA-03

☐ Original ☑ Alternative

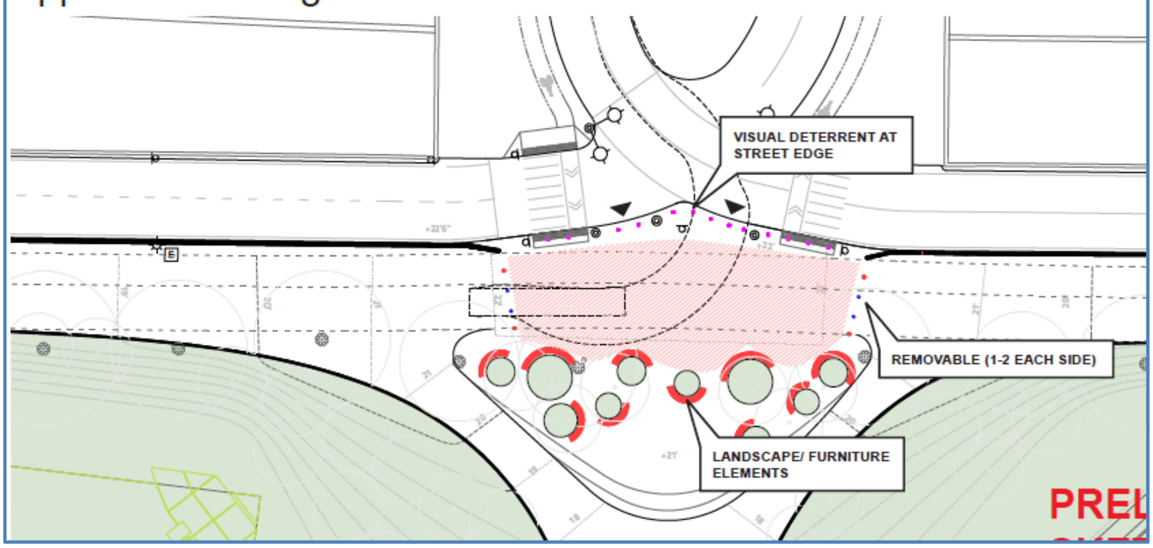
HOUSTON ST ACCESS

Approach 3: Bollard & Planter Containment Zone



HOUSTON ST ACCESS

Approach 4: Integrated Tree Planter & Bollard Containment Zone



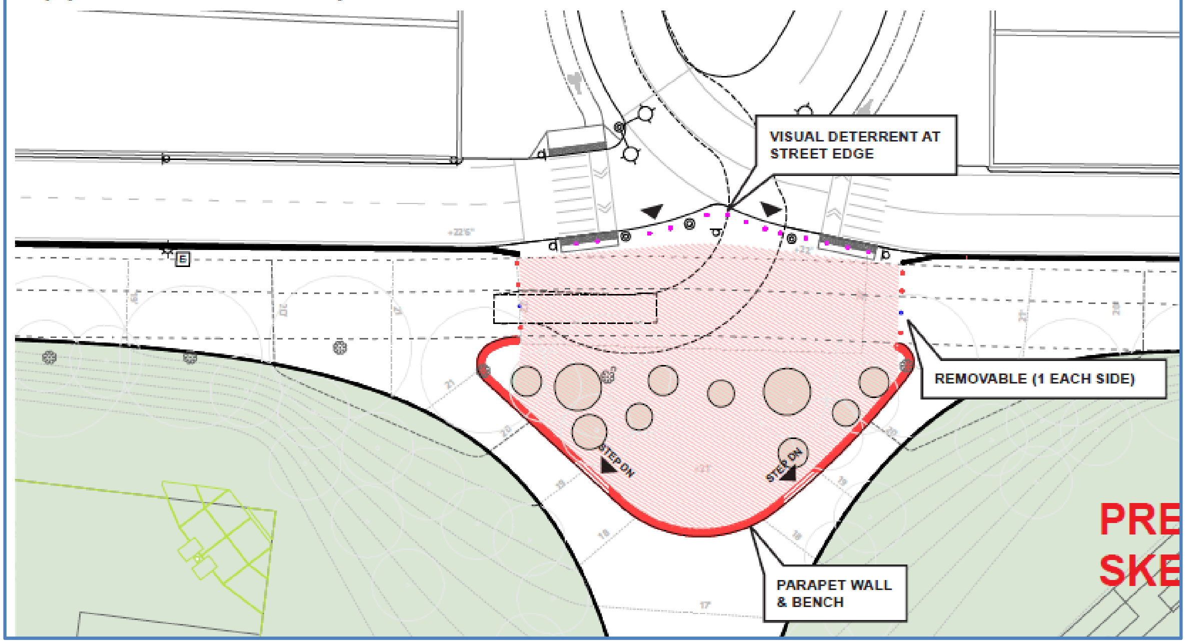
Sketch

Alternative No.: IA-03

☐ Original ☑ Alternative

HOUSTON ST ACCESS

Approach 5: Parapet Furniture & Bollard Containment Zone



Construction Cost Estimate

Alternative No.: IA-03

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
Reconstruct Road	SF	150.00			11,750	$1,762,500
Cuts & Fills	CY	125.00			435	$54,375
Reconstruct Ramps	LS	250,000.00			1	$250,000
Parapet	LF	1,000.00			250	$250,000
Seating	LF	400.00			125	$50,000
Total Markup	91.14%					$2,157,136.51
TOTALS	Breakdown of Markup can be found in the Cost Appendix					$4,524,000
NET SAVINGS						($4,524,000)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	IA-04
During construction, remove FDR jersey barrier in several places to facilitate night time construction vehicle access	
Description of Original Concept:	
The original concept is to only have one access at Montgomery Street to Area 1 (East River Park) section of the project, which would handle both entering and exiting vehicles to the park, including all construction related vehicles.	
Description of Alternative Concept:	
The alternative concept is to provide several "breaks" in the existing jersey barrier that separates the park from the FDR, so that construction vehicles can enter/exit at different locations along the park.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Improves safety in park and work zones • Improved construction productivity and efficiency • Reduces need for flagmen to control pinch points such as Corlears Hook Bridge • Reduce impacts to old growth trees	• Safety on FDR - Construction vehicles will drive on and off the FDR mixing with existing through traffic • Potential impacts to road condition on FDR and Entrance / Exit Ramps

Cost Savings Summary (Present Worth)	First Cost	O&M	Total LCC
Original Concept	$0	$0	$0
Alternative Concept	$956,000	$0	$956,000
Savings	($956,000)	$0	($956,000)

Discussion

Alternative No.: IA-04

The original concept proposes that all construction vehicles would enter and exit the park at Montgomery Street. This would require all vehicles to turn around inside the park to exit, which may prove very challenging for certain vehicles and locations. The park and flood protection, and all other components, are proposed to be constructed beginning at the north end of the park and "backing out" to the south end at Montgomery Street and Pier 42.

Two-way traffic would be maintained at all times to /from the construction areas. At certain constrained points, such as Corlears Hook Bridge, space will only allow one-way traffic at a time, therefore two flagmen may be required to control/alternate one-way flows.

This alternative concept proposes creating other access points directly from/to the FDR adjacent to ERP. This would allow construction vehicles to continue in one direction through the park, without the need to U-turn, or require two-way traffic control. The areas where access is provided from the FDR for trucks entering and exiting would require the right lane of the northbound FDR to be closed, so that trucks can safely maneuver into and out of park. Trucks would travel a short distance on the FDR from the Montgomery Street entrance ramp, and then exit at Exit 7 to 20th Street.

The alternative would require removal of sections of the Jersey barrier, and temporary paving at these locations to allow construction access.

Advantages:

- Safety - Improves safety in park and work zones.
  - The entrance to the park at Montgomery Street will be particularly busy with many conflicts between entering and exiting construction vehicles, park maintenance vehicles, and pedestrians/bicyclists accessing the park and waterfront. This alternative reduces the amount of two-way traffic at Montgomery Street.
  - In addition, the park roads will be safer with one-way vehicular flows that don't need to pass each other in opposite directions.
  - Eliminating the need for U-turns should also reduce the possibility of crashes with fixed objects (e.g. trees, fences, benches, buildings).
- Productivity – The smoother traffic pattern, and elimination of U-turns will improve construction productivity and efficiency. A reduction in resources should be a result as less need to manage and direct vehicles to turn around. When multiple crews are working on different sections of the park, this alternative allows for access to/from the different work areas, without driving through the other areas.

- Reduce Flagmen - Reduce need for flagmen to control pinch points such as Corlears Hook Bridge. It is likely that there are certain areas, in addition to Corlears, where two-way traffic will not be possible and therefore require one or two flagmen to control.
- Impact to Trees - Reduce impacts to old growth trees. The reduced footprints to accommodate traffic flows should reduce impacts to old growth trees and other landscaping that will remain. There would be less trucks, or no trucks that would be rolling over roots, and potentially accidently crashing

Disadvantages

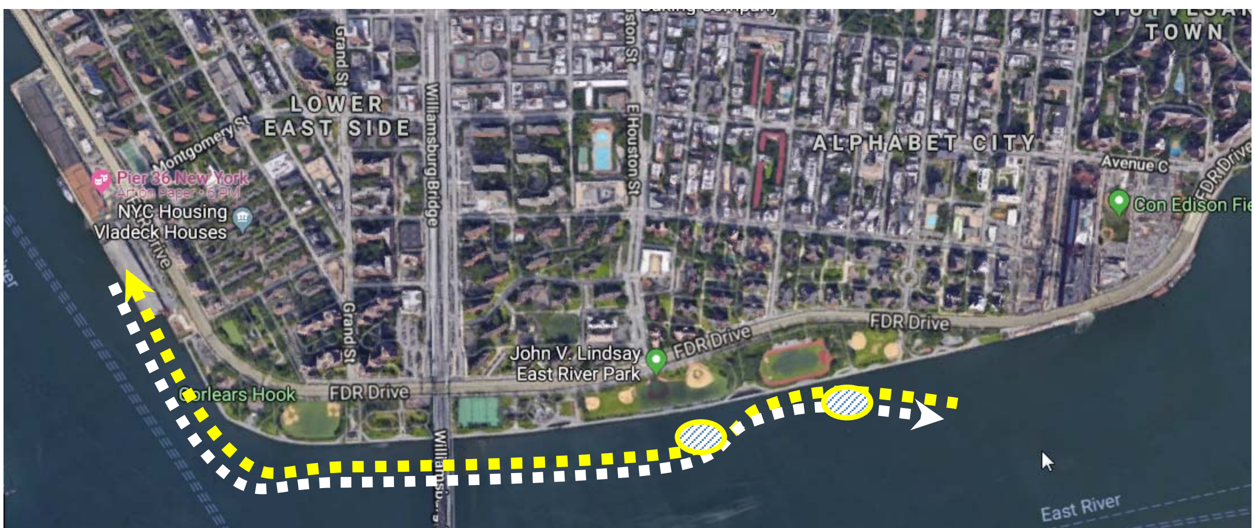
- Safety – Increased conflicts along FDR between trucks and entering/exiting cars at the on-ramps and off-ramps. The merging, weaving, and differential in speeds and merging movements could increase the frequency and potential for some types of crashes.
- Condition of FDR - Potential impacts to road condition on FDR and entrance/exit ramps. The increased heavy vehicles using the portion of the FDR and ramps could result in wearing and grooving of the pavement.

Sketch

Alternative No.: IA-04

☑ Original ☐ Alternative

All vehicles enter and exit at Montgomery Street / Pier 42.



The entire length of Area 1 would be accessed from Montg
zones would be traversed.

Sketch

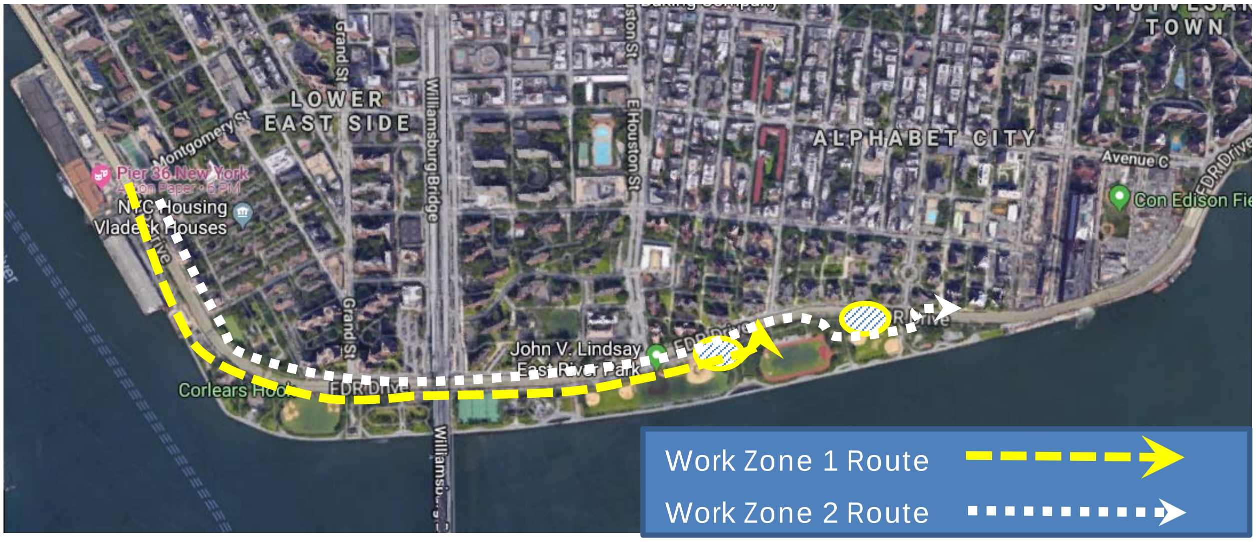
Alternative No.: IA-04

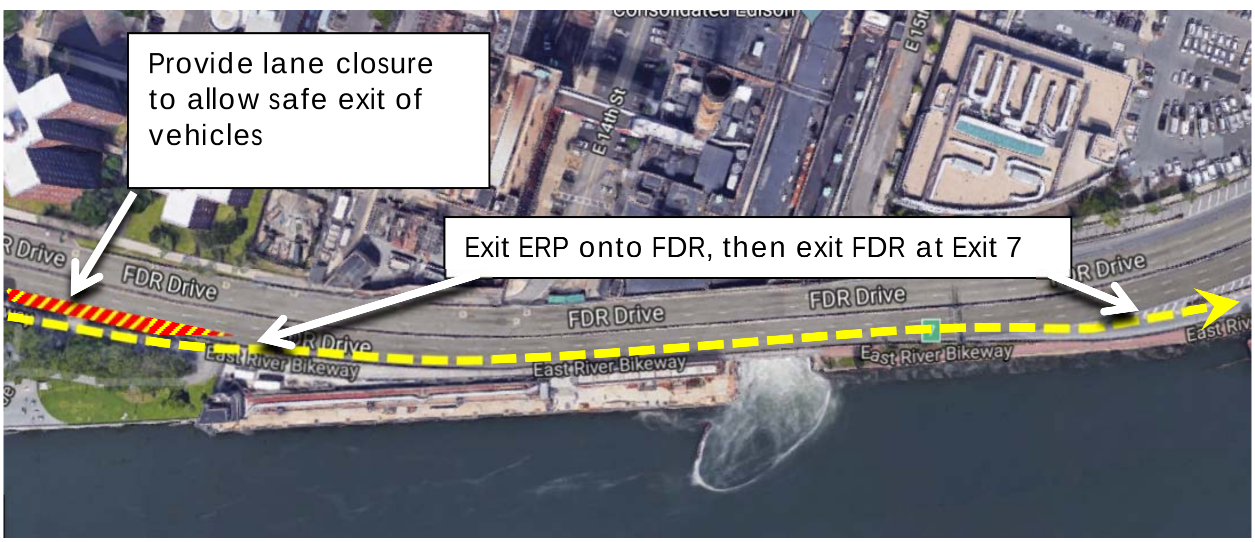
☑ Original ☐ Alternative

Sketch

Alternative No.: IA-04

☐ Original ☑ Alternative





Construction Cost Estimate

Alternative No.: IA-04

			Original Concept (Deletions)		Alternative Concept (Additions)	
Item	**Unit of Meas**	**Unit Cost**	**Qty**	**Total**	**Qty**	**Total**
MPT For Single Lane Closure	LS	50,000.00			2	$100,000
Roadway Modifications	LS	100,000.00			2	$200,000
Restore Finished Park Sections	LS	100,000.00			2	$200,000
Total Markup	91.14%					$455,692.95
TOTALS	Breakdown of Markup can be found in the Cost Appendix					$956,000
NET SAVINGS						($956,000)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	IA-16
Use a pre-fab bridge design at pedestrian bridge crossings	

Description of Original Concept:

The original concept is using multiple prestressed concrete box beams for each pedestrian bridge to be replaced (Delancey Street and East 10th Street)

Description of Alternative Concept:

The alternative concept is using a completely prefabricated bridge for each span of each bridge (Delancey Street – 2 spans, East 10th Street – 3 spans).

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Permits a single complete closure of the FDR Drive for the placement of each bridge span that crosses the highway. • Requires no additional heavy construction activities over the highway after the span is placed. • Reduced pile requirements for lighter superstructure.	• Challenges NYC-DOT policy to provide structural redundancy; however, these are not critical structures.

	Cost Savings Summary (Present Worth)		
	First Cost	**O&M**	**Total LCC**
Original Concept	$32,776,000	$0	$32,776,000
Alternative Concept	$16,388,000	$0	$16,388,000
Savings	$16,388,000	$0	$16,388,000

Discussion

Alternative No.: IA-16

The proposal is to change the design of each of the pedestrian bridges from multiple prestressed concrete box beams carrying each span, to a single prefabricated pedestrian bridge for each span.

The Delancey Street Bridge has 2 spans: a 62-ft span over a service road, and a 103-ft span over the FDR Drive. The East 10th Street Bridge has 3 spans: 100-ft span as part of a switch-back ramp, a 43-ft span over the service road and an 86-ft span over the FDR Drive.

These concrete box beams weigh 900 to 1000 lbs. per foot. Each beam spanning the FDR Drive weighs 52 tons for Delancey Street (4 beams) and 39 tons for East 10th Street (3 beams). Placement of each beam will require the complete short duration fall closure (per NYC DOT requirements) of the FDR Drive during a night shift. Overhead construction activities will also continue with deck placement, parapets, etc.

A completely prefabricated span of the same length will weigh about the same as a single concrete box beam, requiring the same lifting equipment. Each span would require only one highway closure as opposed to multiple closures.

Assuming that the cost of each prefab span is the same as the box beam construction, the savings is related to the number of highway closures and time to complete the installation.

The lighter superstructure will reduce the pile requirements for each pier footing on the west side of the FDR Drive. Assume 2 fewer piles at 2 footings and 3 fewer at the east abutment for Delancey Street (total 7 fewer) and a reduction of 2 piles at each of 3 footings plus a reduction of 2 piles at the abutment at East 10th Street (total 8 fewer).

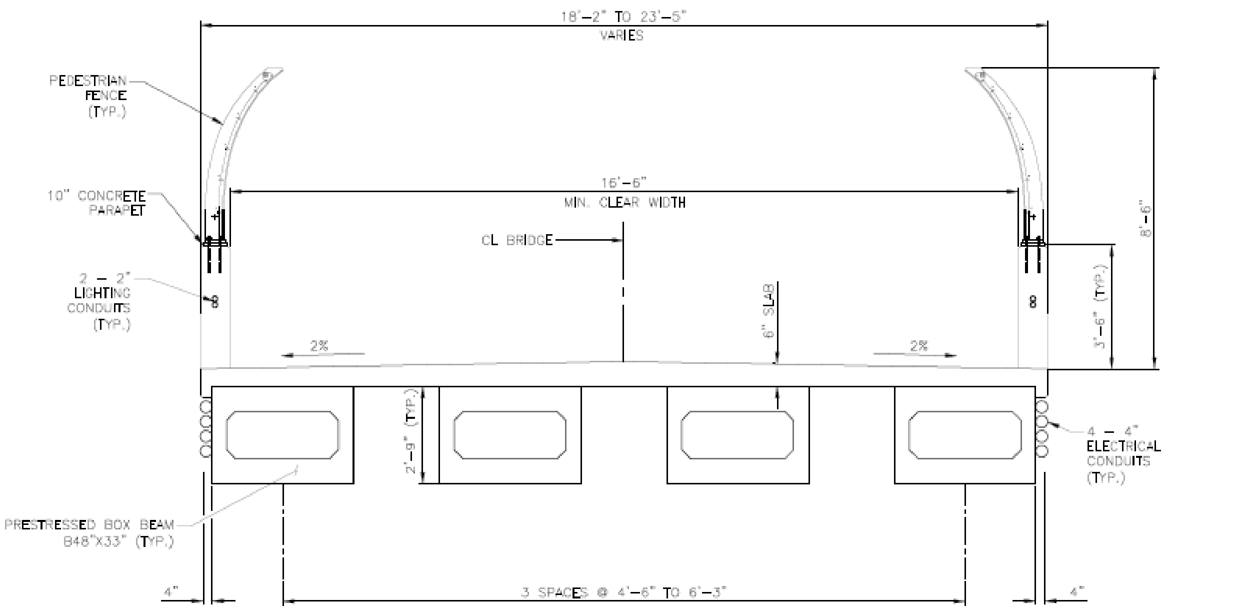
DOT generally prefers to construct redundant structures, but many other pedestrian bridges do not meet this condition.

It is anticipated that the prefabricated spans would be delivered by barge and then trucked as a heavy-haul across the park. The earthwork would be completed prior to delivery of the spans. The slopes are only 1:20 which is an easy grade for the truck. A short duration closure of FDR would be necessary for the lift of the spans on to the abutments.

Sketch

Alternative No.: IA-16

☐ Original ☑ Alternative



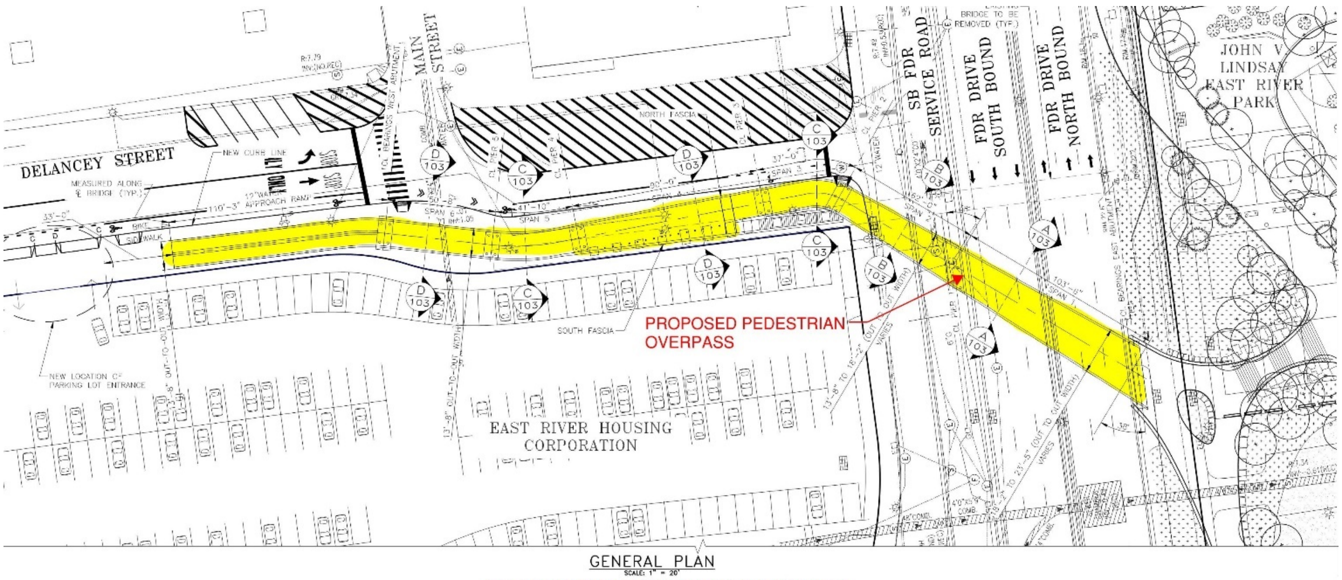
A/102 CROSS SECTION - SPAN 1
SCALE: 1/2" = 1'-0"

Delancey Street Pedestrian bridge – span 1.

Sketch

Alternative No.: IA-16

☑ Original ☐ Alternative

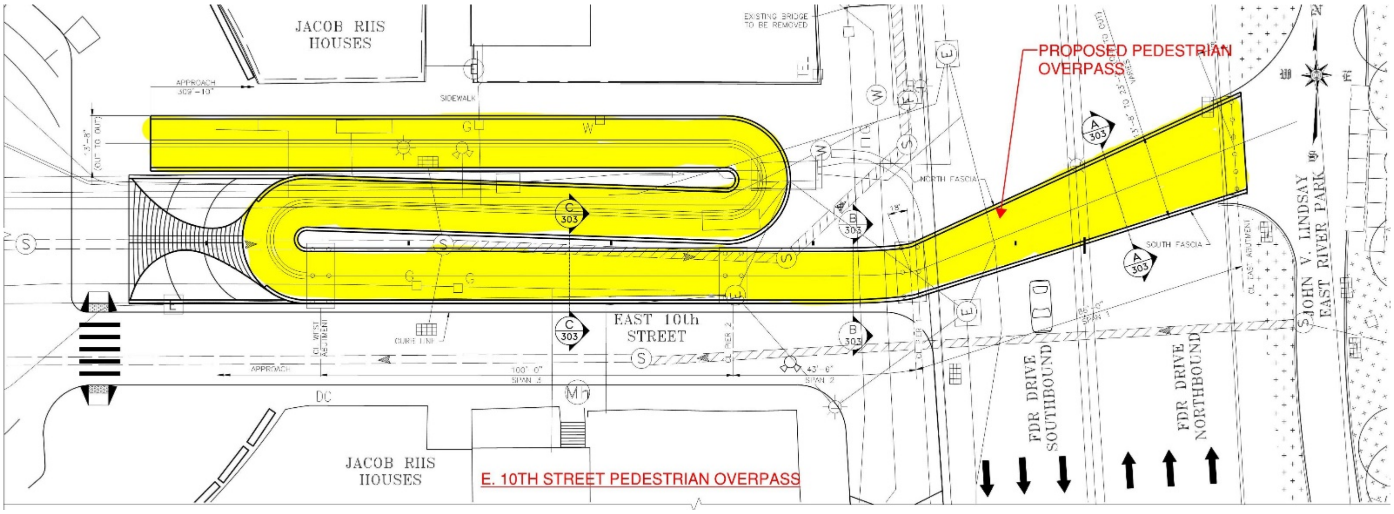


DELANCEY STREET PEDESTRIAN OVERPASS

Sketch

Alternative No.: IA-16

☐ Original ☑ Alternative



Sketch

Alternative No.: IA-16

☐ Original ☑ Alternative

Typical prefabricated pedestrian bridge (124 ft long, 14 ft wide)

Calculations

Alternative No.: IA-16

☐ Original ☑ Alternative

Original design will require 7 separate complete closures of the FDR Drive.

Proposed design will require only 2 complete closures.

The proposed lighter prefab superstructures can eliminate approximately 15 piles.

Construction Cost Estimate

Alternative No.: IA-16

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Estimate Correction						
Delancey Street						
Site Built Spans	LF	43,522.00	165	$7,181,130		
Pre-Fabricated Pedestrian Spans	LF	21,761.00			165	$3,590,565
10th Street						
Site Built Spans	LF	43,522.00	229	$9,966,538		
Pre-Fabricated Pedestrian Spans	LF	21,761.00			229	$4,983,269
Total Markup	91.14%			$15,628,142.92		$7,814,071.46
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$32,776,000.00		$16,388,000
NET SAVINGS						$16,388,000

LIMIT INUNDATION (LI)

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-06
Lower the park elevation by 1 foot and reduce the cross section of horticultural soil	
Description of Original Concept:	
The original concept is reflected in the current grading plans and has a 3'-0" horticultural soil profile.	
Description of Alternative Concept:	
The alternative concept looks at lowering the park elevation by 1 foot but still meeting the 16.5-foot flood protection elevation, and reviews reducing the 36" horticultural soil profile to 32".	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Reduces the amount of bulk fill needed across the park site in Sections 1 and 2 thus saving on trucking costs and needed fill. • Horticultural soil is expensive but necessary for the liability of a thriving park. However, reducing the 3'-0" soil profiles will reduce the quantity of horticultural medium.	• Grading plans would need to be reviewed and some steeper slopes would be needed to meet the 16.5-foot flood protection elevation. • Greater flooding inundation possible in areas in the park.

	Cost Savings Summary (Present Worth)		
	First Cost	**O&M**	**Total LCC**
Original Concept	$20,083,000		$20,083,000
Alternative Concept	$16,128,000		$16,128,000
Savings	$3,955,000		$3,955,000

Discussion

Alternative No.: LI-06

Reduce the elevation of the park landscape by one foot. This will reduce the amount of bulk fill needed across the site. The top of floodwall elevation of (16.5) will still be met. This will be done by holding the floodwall/ levee elevation and then transitioning the grading down to an elevation one foot lower than the current design. This can be accomplished with the following techniques:

Using steeper slopes to transition

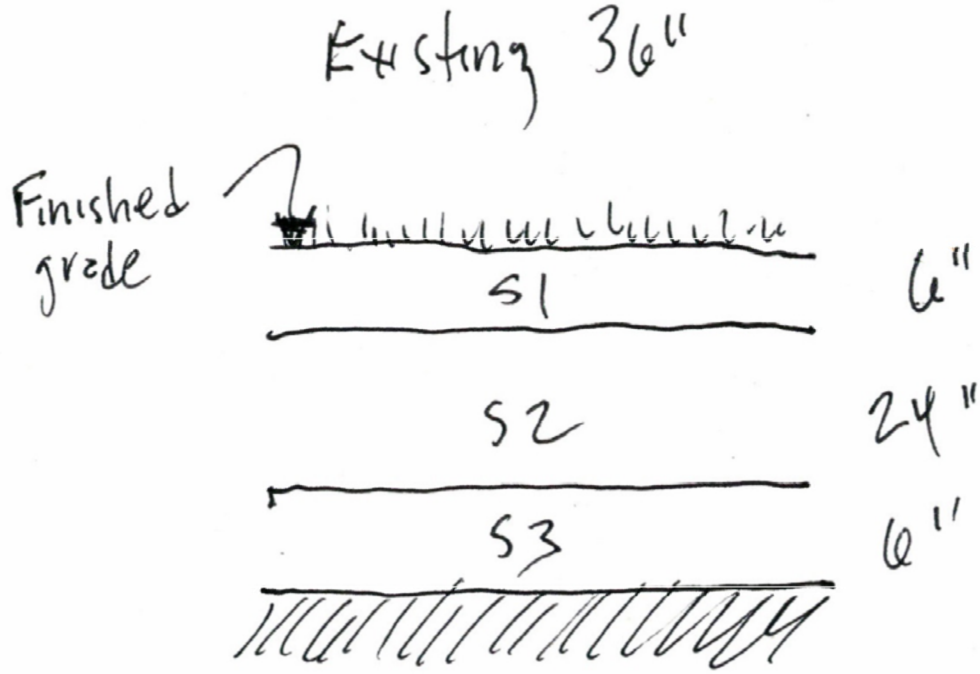
Exposing the concrete floodwall one foot more in places

Reduce the Cross Section of Horticultural Soil. Reduce the horticultural medium from 36" to 32". In most soil profiles there are three layers (see sketch). The S1 layer (organics) and S3 layer (drainage) should remain. The reduction should be made in the S2 layer.

Sketch

Alternative No.: LI-06

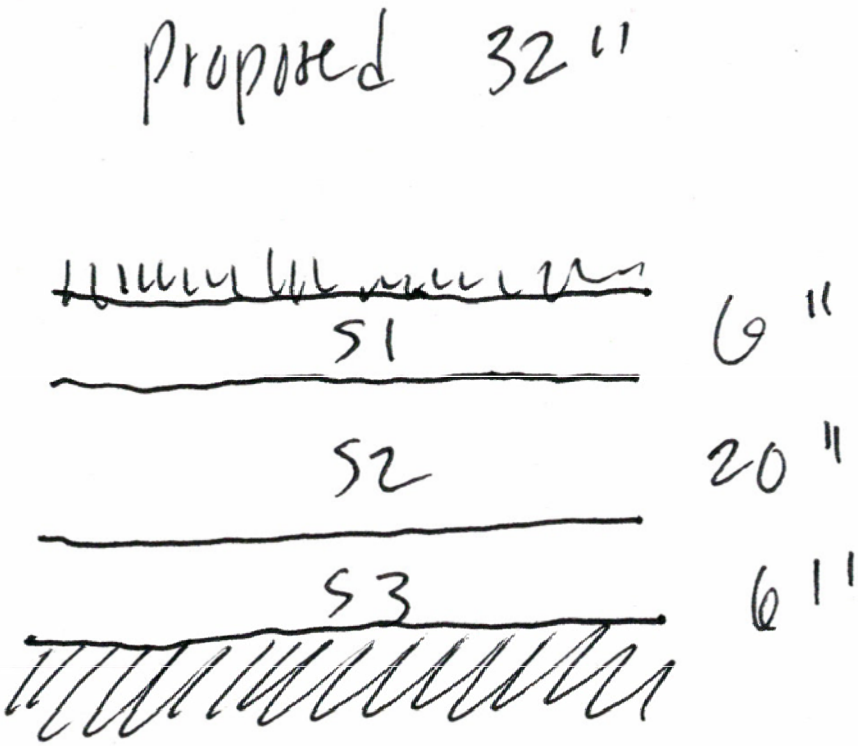
☑ Original ☐ Alternative



Sketch

Alternative No.: LI-06

☐ Original ☑ Alternative



Discussion

Alternative No.: LI-06

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Reduce Park Elevation by 1' overall, General Fill	CY	50.00	60,000	$3,000,000	40,000	$2,000,000
Reduce 36" Planting soil profile by 4" Overall	CY	94.38	58,491	$5,520,381	51,991	$4,906,911
Lower Fence on Top of Wall	LF	973.31	2,041	$1,986,526		
Lower Fence on Top of Wall, Less 1'	LF	750.00			2,041	$1,530,750
Total Markup	91.14%			$9,575,995		$7,690,084
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$20,083,000		$16,128,000
NET SAVINGS						$3,955,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-14
Simplify levee and use a high-performance erosion control mat in lieu of clay	
Description of Original Concept:	
The original concept is to construct an impervious clay cap for the levee sections.	
Description of Alternative Concept:	
The alternative concept is to use high-performance erosion control mat for scour protection and homogenous general backfill for the levee cap.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Simplifies construction • Reduces quality control burden since there are fewer types of material • Simplifies borrow sources	• General backfill may have lower scour resistance to overtopping if erosion blanket is damaged or breached

Cost Savings Summary (Present Worth)	First Cost	O&M	Total LCC
Original Concept	$1,846,000		$1,846,000
Alternative Concept	$1,338,000		$1,338,000
Savings	$508,000		$508,000

Discussion

Alternative No.: LI-14

The project must be certified by FEMA to receive the HUD funding. FEMA requires engineering analyses that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.

FEMA also requires engineering analyses that evaluate levee embankment stability. The analyses provided must evaluate expected seepage during loading conditions associated with the base flood and must demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (USACE) Engineer Manual 1110–2–1913, Design and Construction of Levees, (Chapter 6, Section II), may be used.

The maximum height of the levee above top of natural ground is about ten feet. General fill is placed on the flood side slope. The top of levee is approximately four feet or less above general fill. The levee has a crest width of ten feet and 3 horizontal to 1 vertical (3H:1V). The levee core is imperious clay cap. The levee slopes and crest are covered with erosion control mat and is planted as seeded meadow.

The alternative proposal is to use general fill in place of impervious fill throughout these segments. With a flat slope on the foreshore, 3H:1V slope, and a height of four feet or less, the potential for wave damage or overtopping is low. The length of the landside slope is relatively short and is terminated on a concrete retaining wall. The levee slopes and crest are covered with erosion control mat and planted as seeded meadow as in the original concept. In general, the Con Edison tunnel is immediately below and parallel to the landside slope. The risk for under and through seepage is low through the levee and the general fill that is placed on the flood side. The duration of inundation is over a very short period and in frequent. Levees throughout the world that operate under similar requirements are constructed with homogeneous structural fill.

Other areas of impervious blanket are placed flood side from the wall of the tunnel. In these sections there is continuous sheet pile wall and concrete wall to Elevation 16.5. This impervious material does not contribute to limiting through or under seepage.

Sketch

Alternative No.: LI-14

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: LI-14

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: LI-14

☑ Original ☐ Alternative

[redacted]

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Alternative No.: LI-14

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Alternative No.: LI-14

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: LI-14

☐ Original ☑ Alternative

[redacted]

Construction Cost Estimate

Alternative No.: LI-14

Item	Unit of Means	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Remove all impervious fill	CY	69.00	14,000	$966,000		
Backfill with general fill, compact	CY	50.00			14,000	$700,000
Total Markup	91.14%			$880,412		$637,980
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$1,846,000		$1,338,000
NET SAVINGS						$508,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-29
Elevate park high enough to eliminate wall	
Description of Original Concept:	
Flood protection through Section 1 and 2 of the East River Park is a series of levees and different wall constructions.	
Description of Alternative Concept:	
Raise the park high enough to work as the flood protection barrier and reduce the need for the Con Edison tunnel and minimize the concrete flood walls.	

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$412,526,000	$0	$412,526,000
Alternative Concept	$93,414,000	$0	$93,414,000
Savings	$319,112,000	$0	$319,112,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Simplifies construction methods for flood protection. • Reduces conflict and coordination with the Con Edison Lines. • Park has better visual prospects to the City and East River. • Existing park program can be kept, almost in place, just elevated • Raising the park provides future longevity – keeping it out of the future floodway. • The park can be built in sections thus reducing parkland alienation and providing competitive landscape bidding. In-park work is less likely to trigger alienation • Significantly reduces lane closures needed on the FDR. Only the localized requirements needed for the pedestrian bridges would require temporary closures. • Eliminates demolition and replacement of traffic barrier and fence. • Eliminates need for demolition and replacement of FDR Drive pavement.	• Redesign needed – but hopefully just documentation adjustments-not full redesign. • Public updates will be needed but the major design program should still be valid. Update should focus on schedule and cost reductions.

Discussion

Alternative No.: LI-29

Elevating the park in Sections 1 and 2 to provide the needed flood protection will simplify the construction materials and methods. By moving the park's topographic rise east, we can avoid conflicts with the Con Edison lines. Also, the added fill providing the flood protection, will eliminate the need for sheet pile walls to deal with seepage as the fill will work as a seepage blanket.

The construction method of placing fill in lifts is a common construction method and should provide a greater bidding competitiveness. The amount of trucks and earth moving will need to be studied from a traffic perspective and staging strategy. Also, the park could be built in a series of phases that would reduce park land alienation and provide the public park land opening in phases instead of being closed all at once.

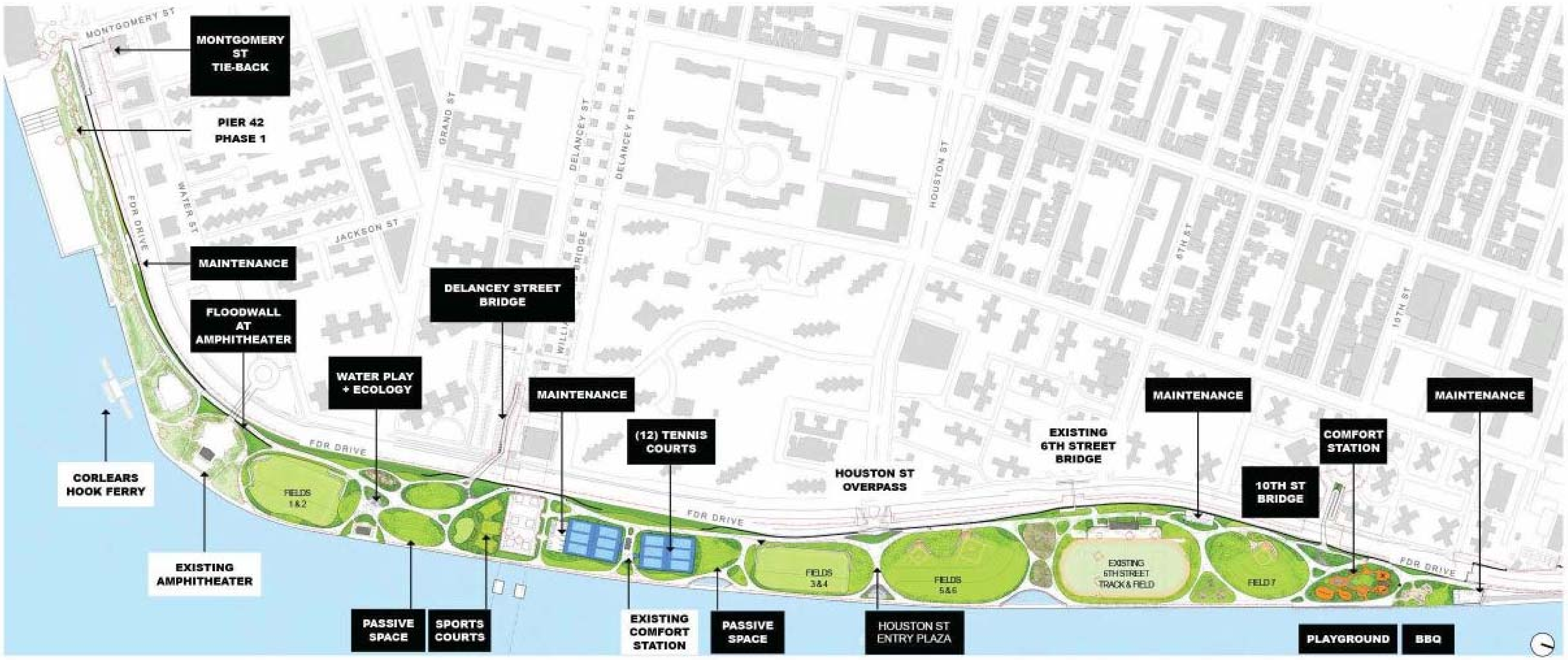
From a city building perspective, the views will be greater to the City and the East River as well as moving the park up and out of future se level rise. The raise in elevation should (in most cases) be able to accommodate the current design program reducing any major updates needed for community input. Alterations would be needed to the grading design, and the change will affect many of the design documents, but hopefully the main intent of the design should remain intact.

Sketch

Alternative No.: LI-29

☑ Original ☐ Alternative

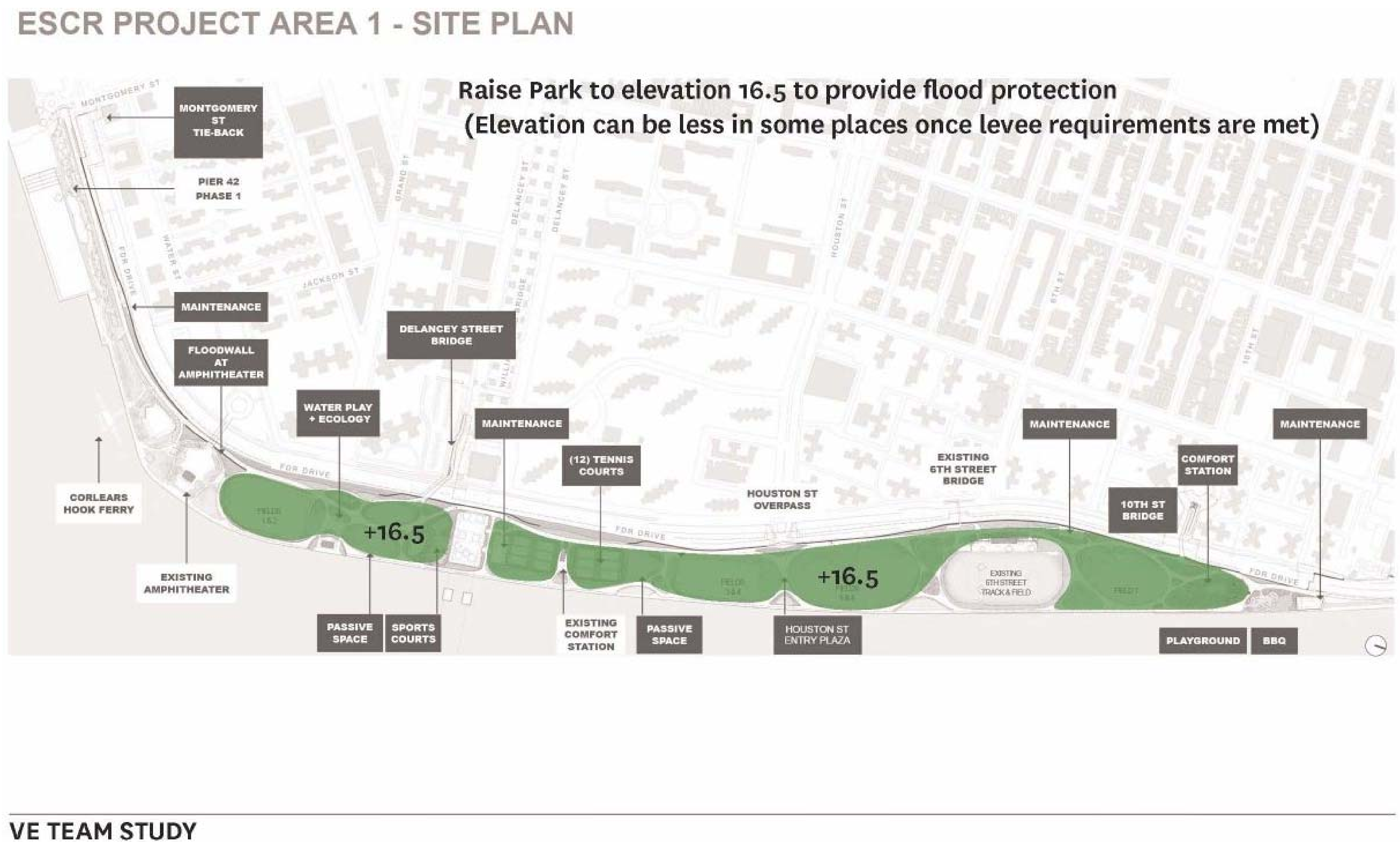
ESCR PROJECT AREA 1 - SITE PLAN



DESIGN TEAM PROPOSAL

Alternative No.: LI-29

☐ Original ☑ Alternative



Alternative No.: LI-29

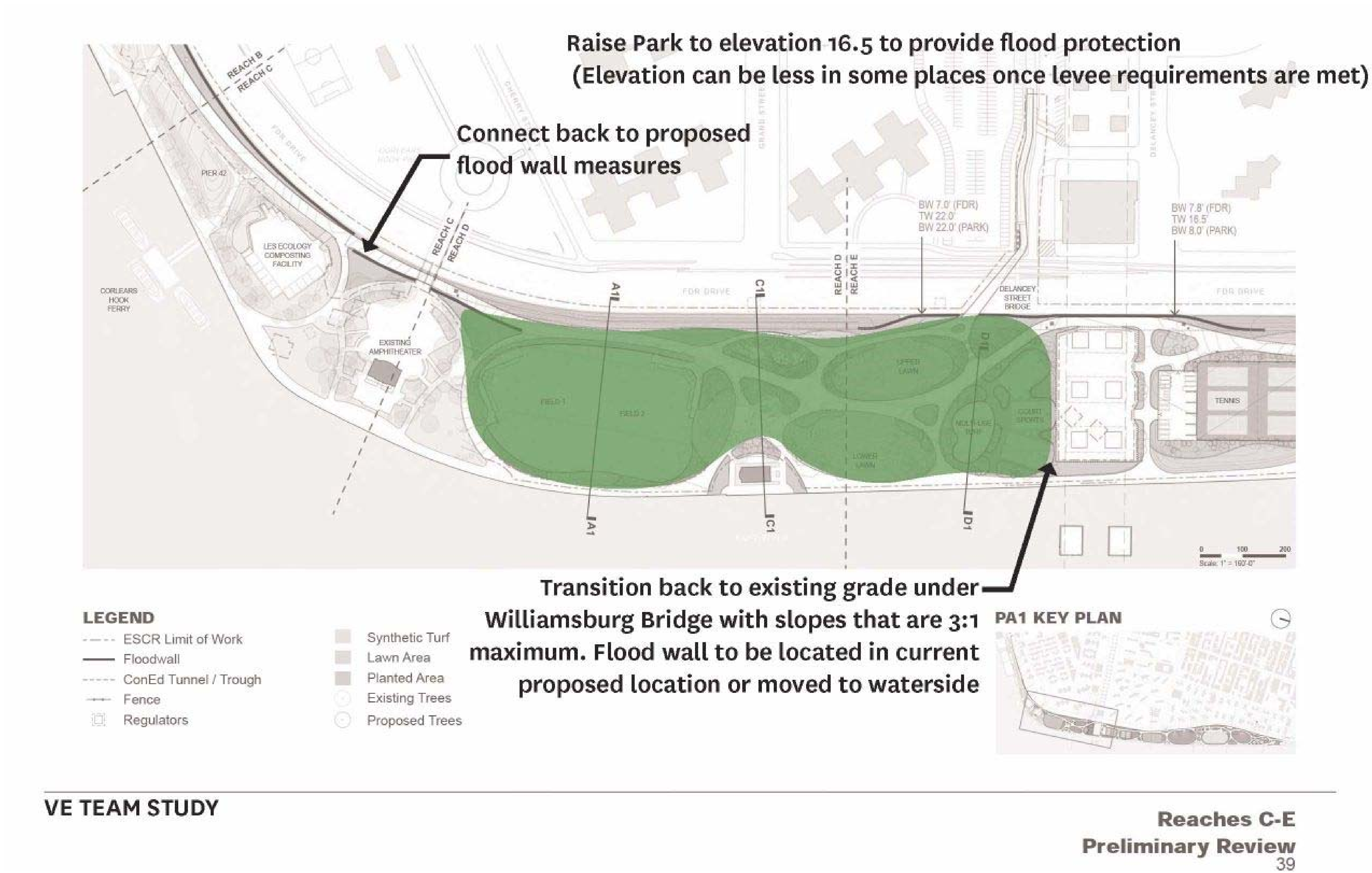
☑ Original ☐ Alternative

DESIGN TEAM PROPOSAL

Reaches C-E
Preliminary Review

Alternative No.: LI-29

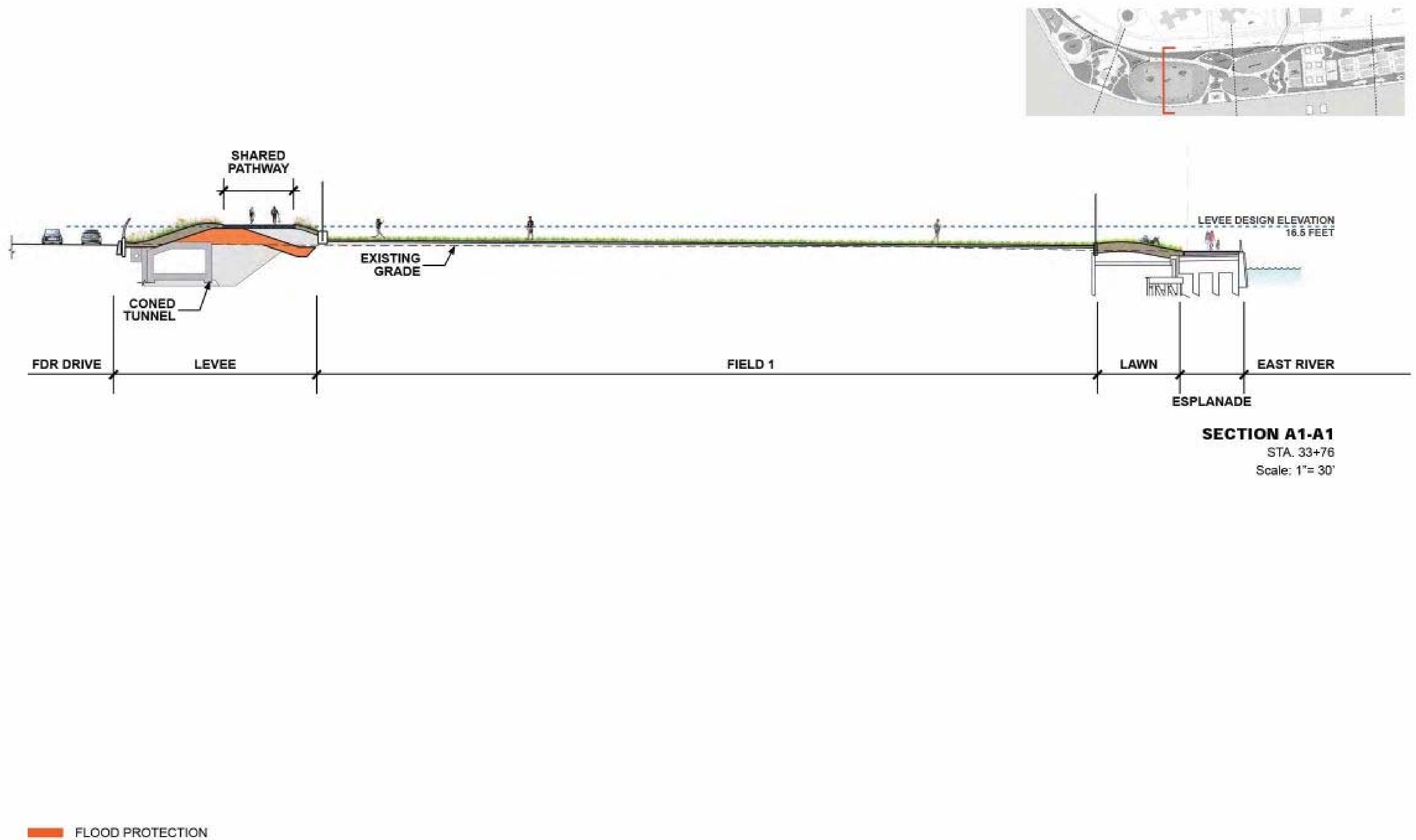
☐ Original ☑ Alternative



Sketch

Alternative No.: LI-29

☑ Original ☐ Alternative

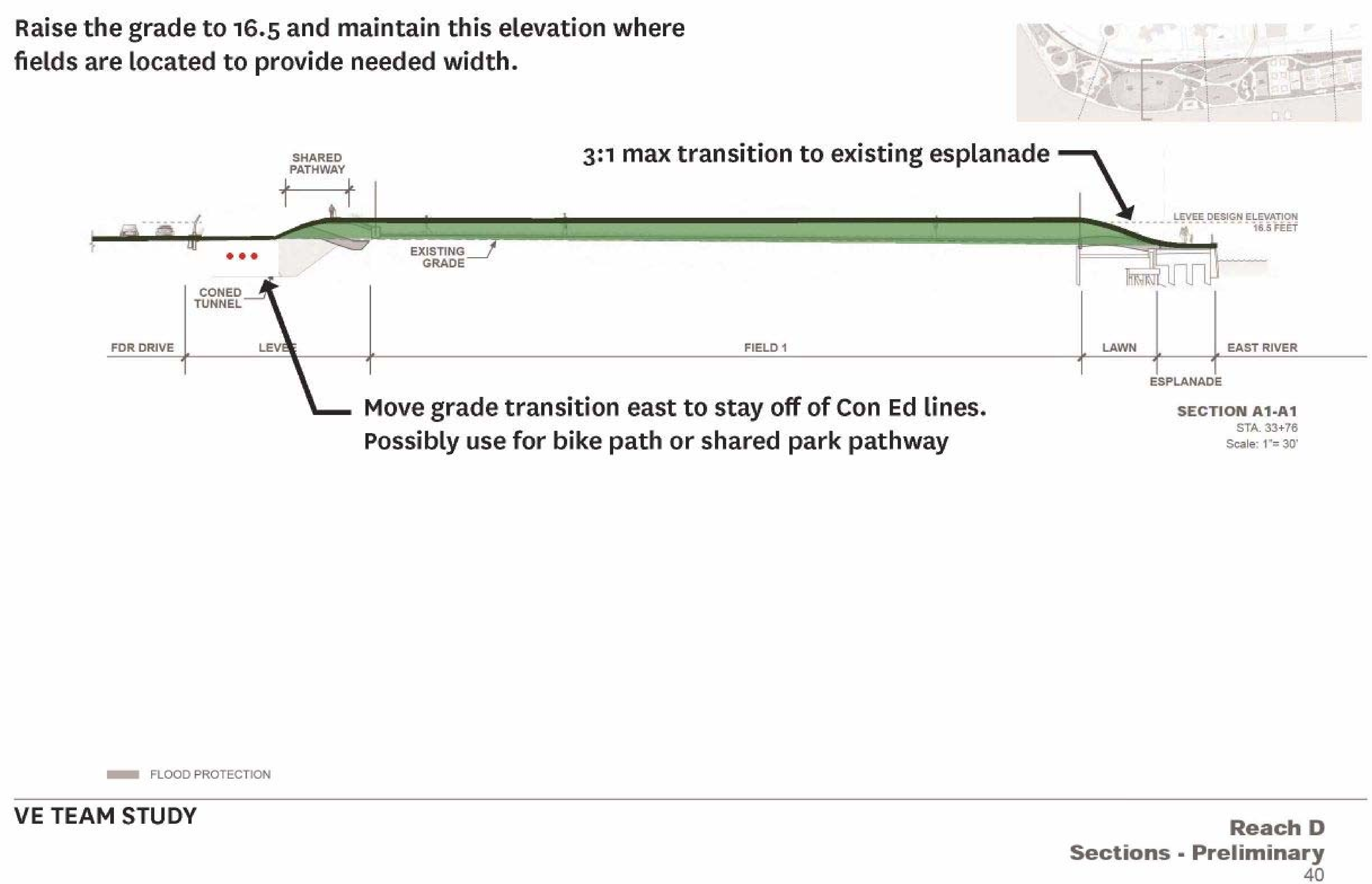


DESIGN TEAM PROPOSAL

Reach D
Sections - Preliminary
40

Alternative No.: LI-29

☐ Original ☑ Alternative



Alternative No.: LI-29

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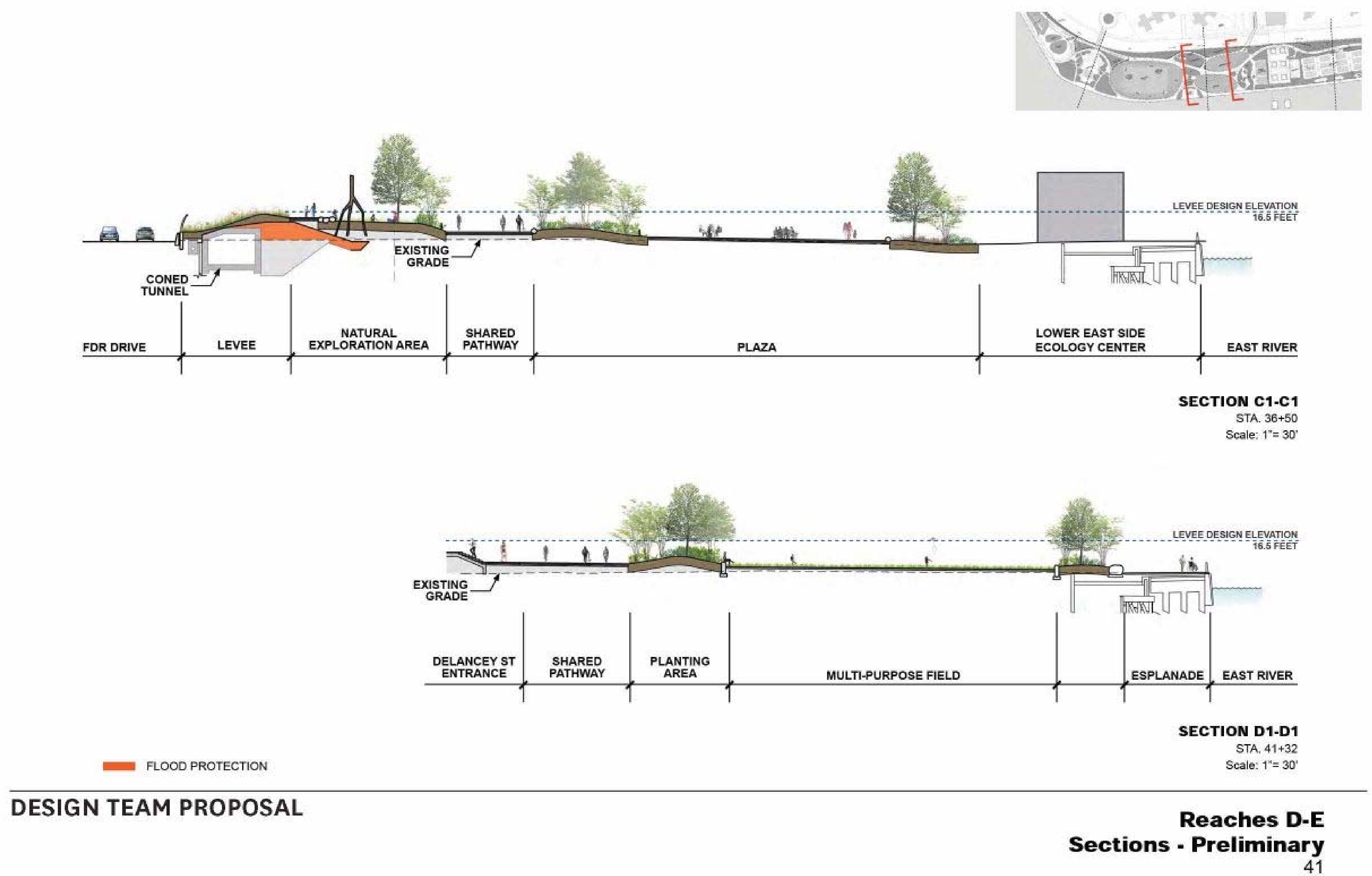
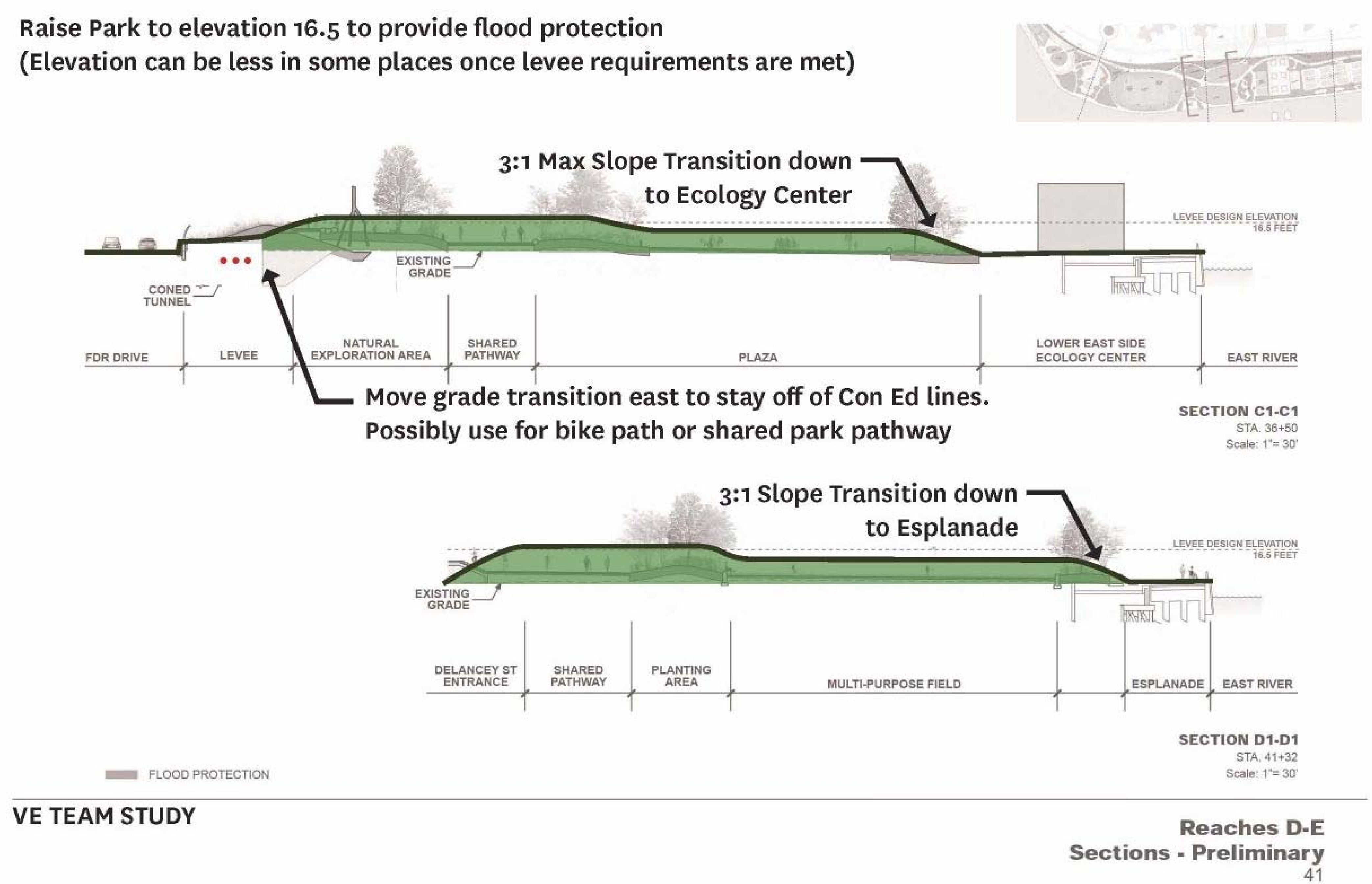


Alternative No.: LI-29

☐ Original ☑ Alternative



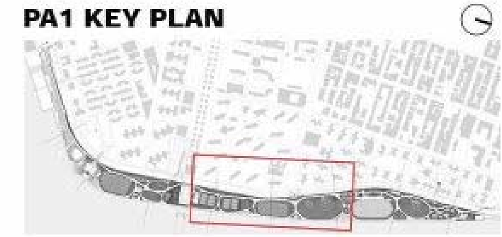
Alternative No.: LI-29

☑ Original ☐ Alternative

LEGEND

- ESCR Limit of Work
- Floodwall
- ConEd Tunnel / Trough
- Fence
- Regulators
- Synthetic Turf
- Lawn Area
- Planted Area
- Existing Trees
- Proposed Trees

PA1 KEY PLAN

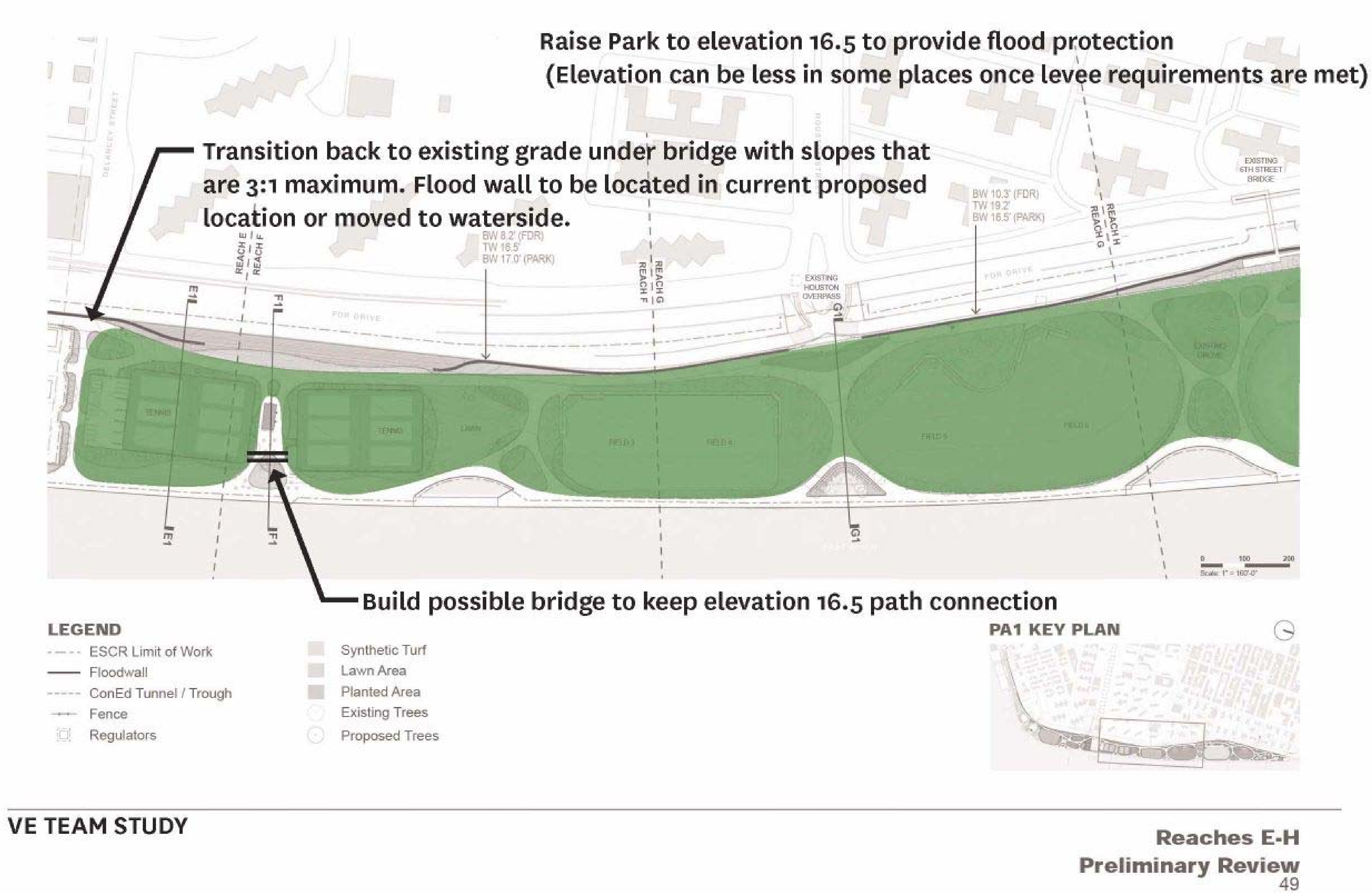


DESIGN TEAM PROPOSAL

Reaches E-H
Preliminary Review
49

Alternative No.: LI-29

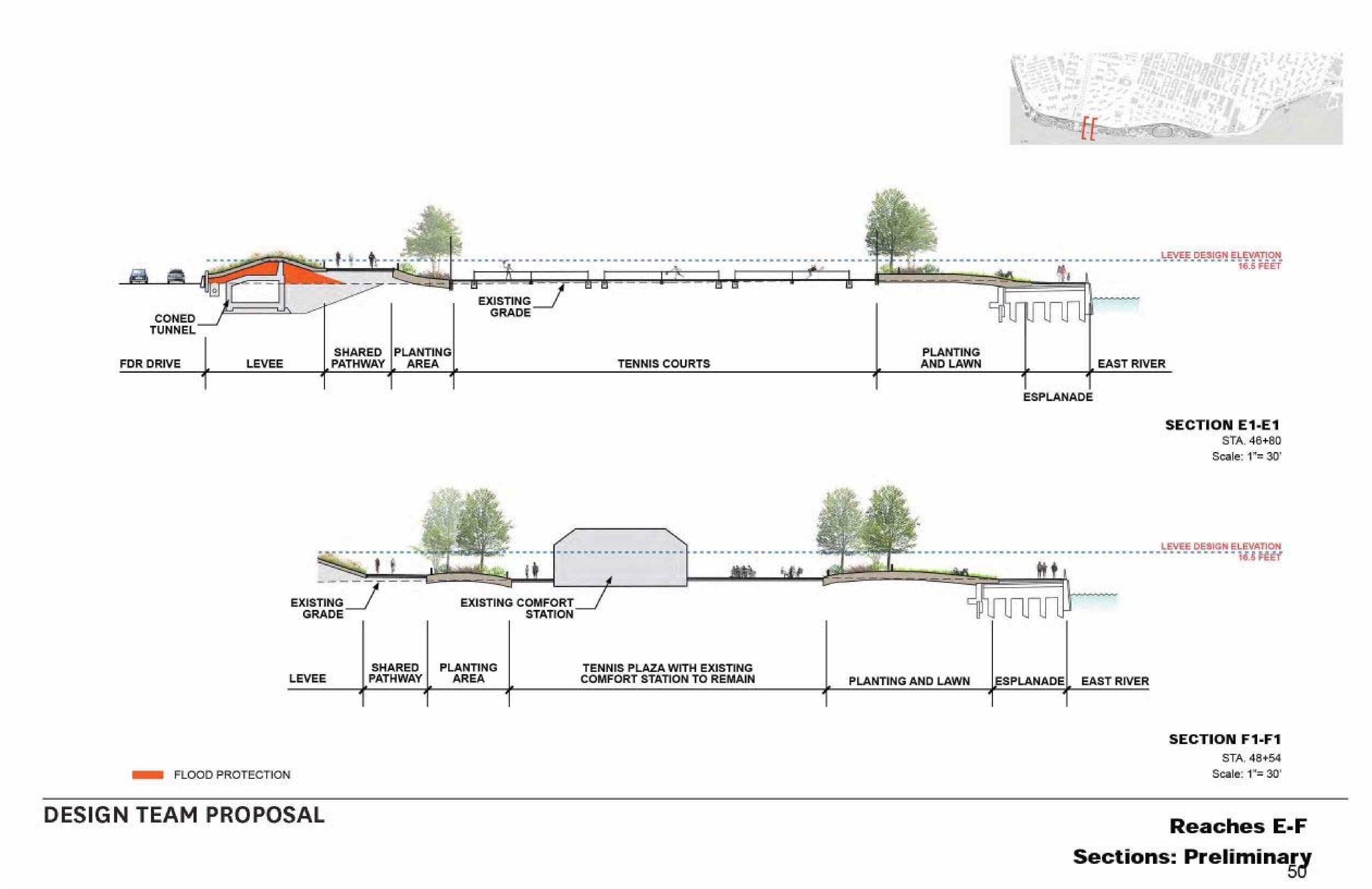
☐ Original ☑ Alternative



Sketch

Alternative No.: LI-29

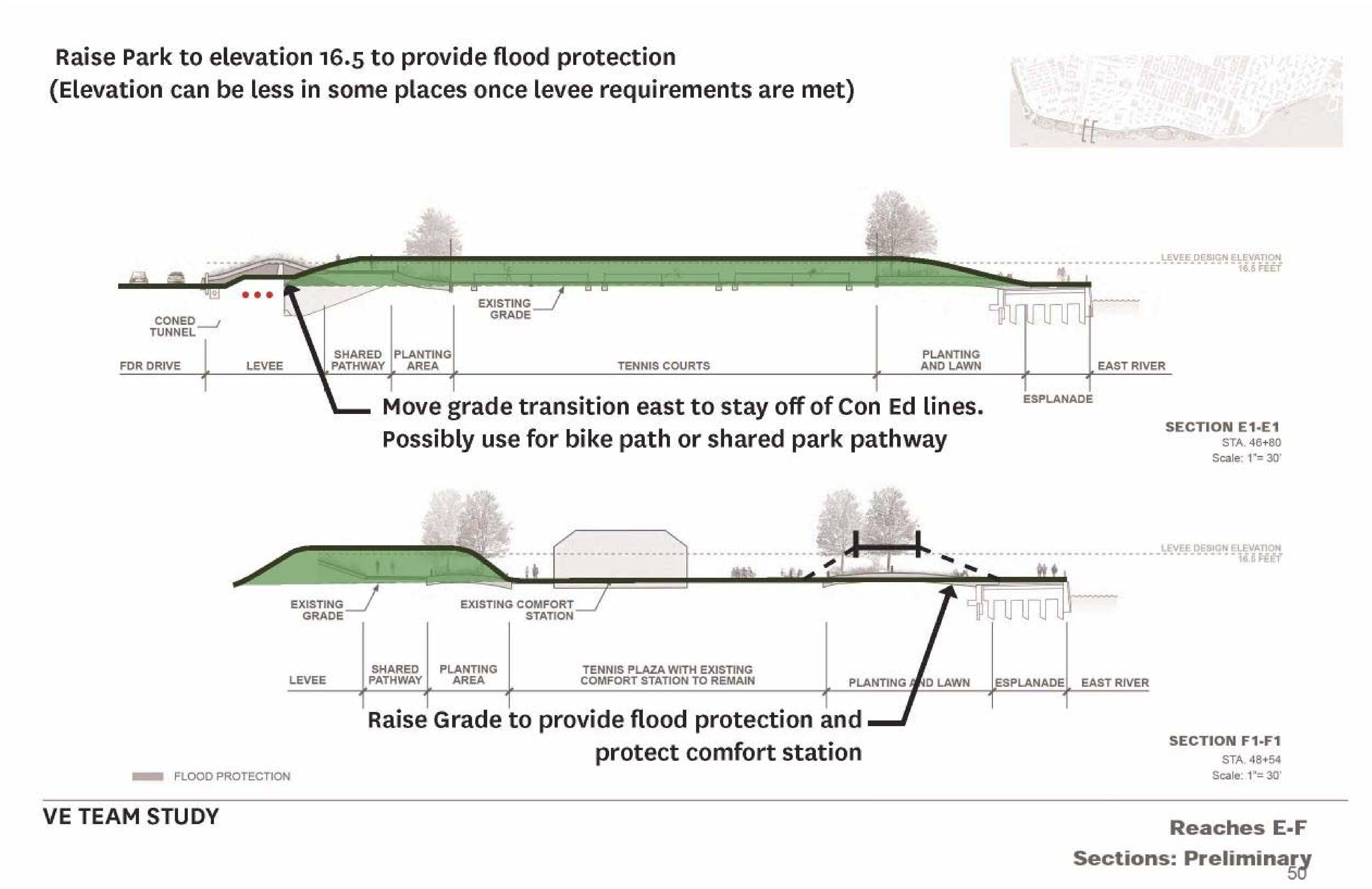
☑ Original ☐ Alternative



Sketch

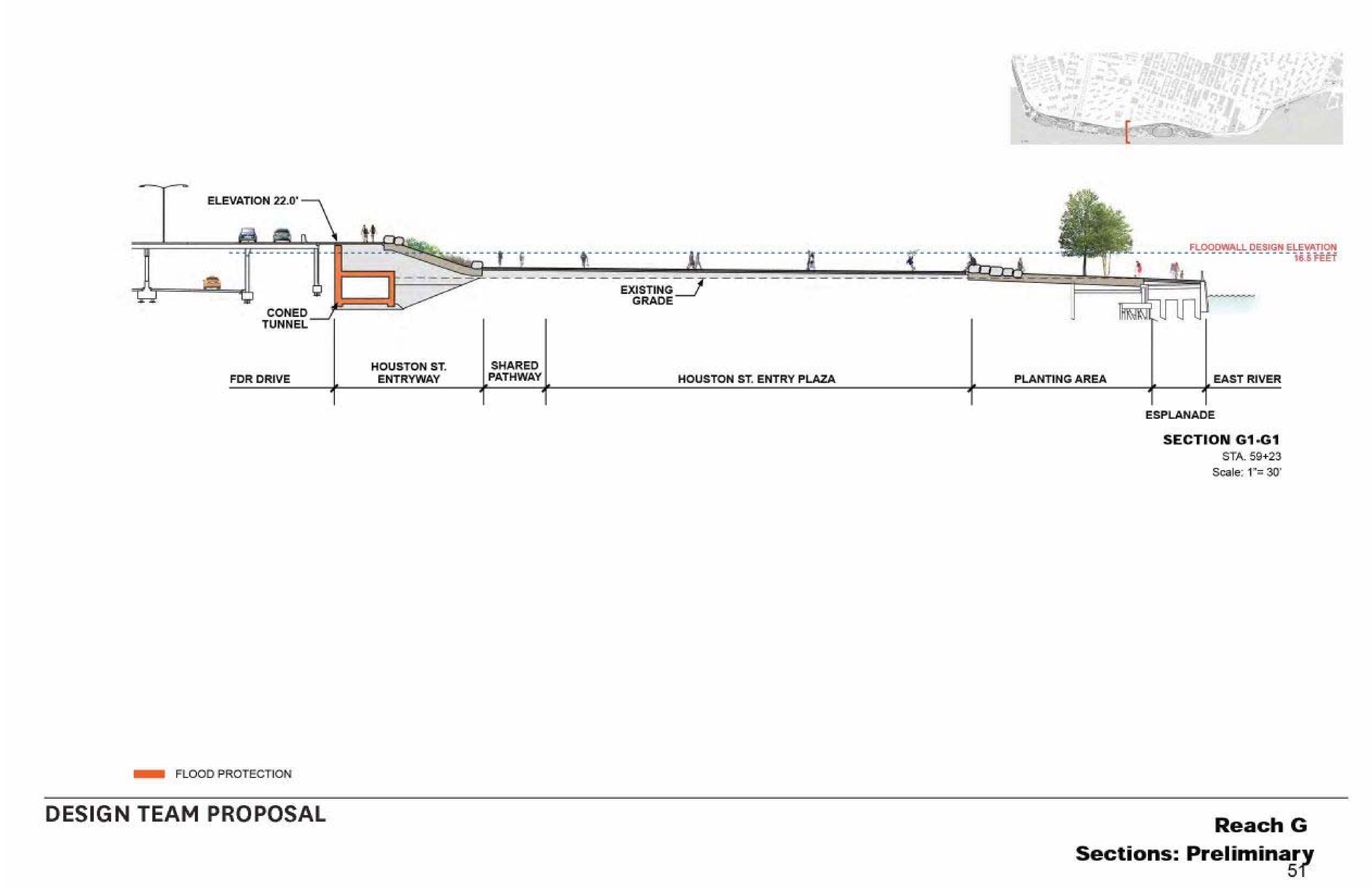
Alternative No.: LI-29

☐ Original ☑ Alternative



Alternative No.: LI-29

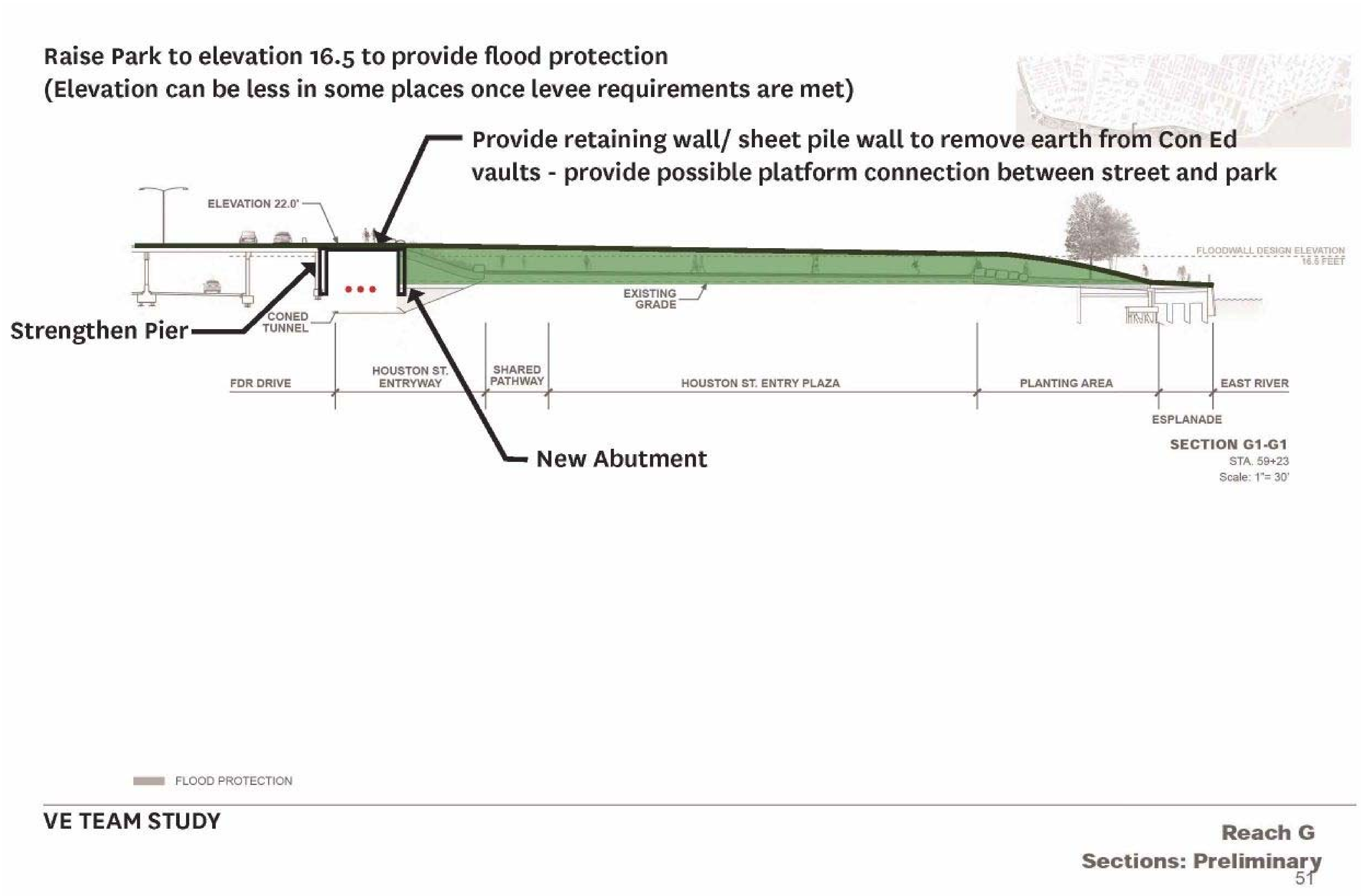
☑ Original ☐ Alternative



Sketch

Alternative No.: LI-29

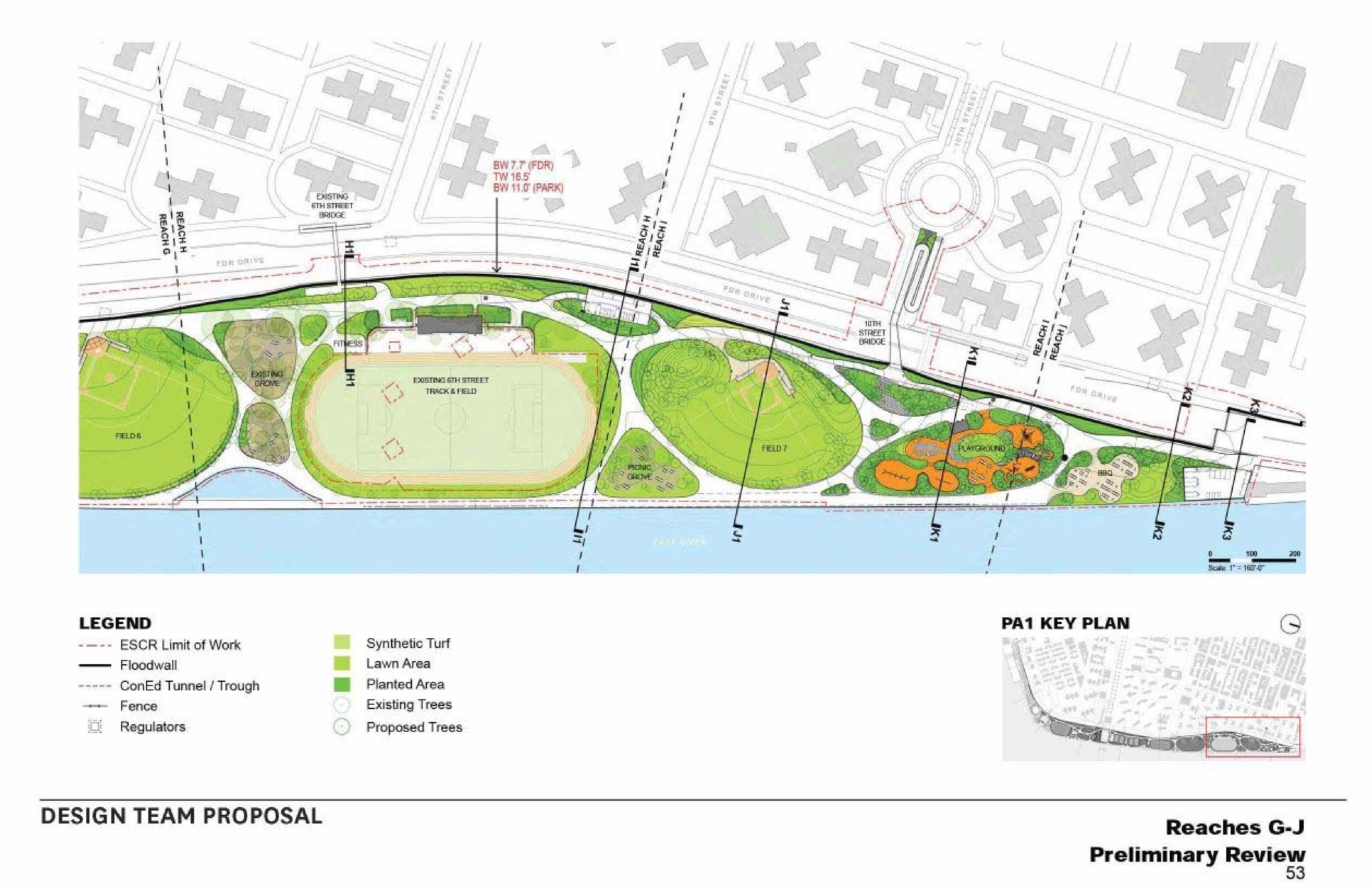
☐ Original ☑ Alternative



Sketch

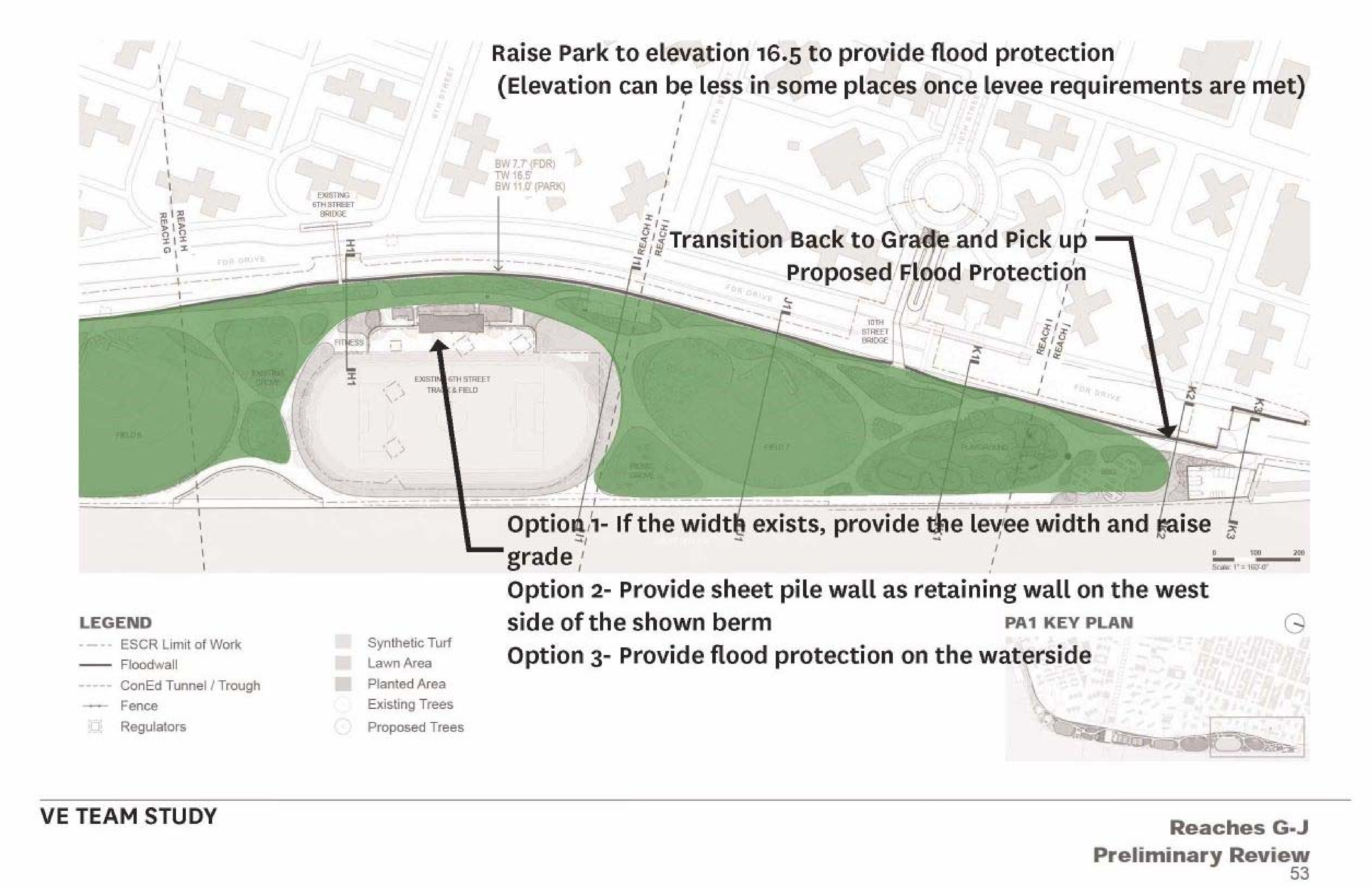
Alternative No.: LI-29

☑ Original ☐ Alternative



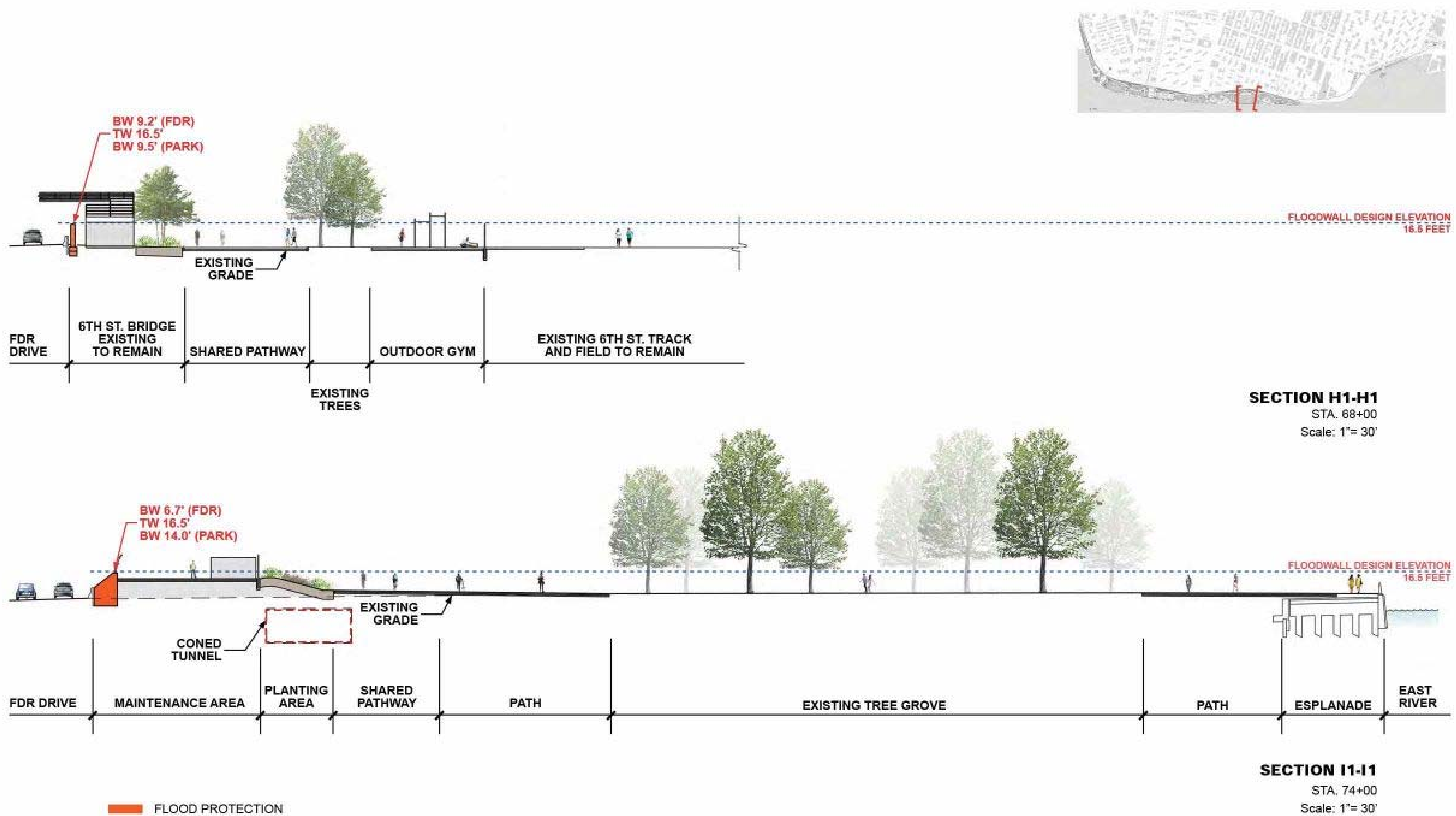
Alternative No.: LI-29

☐ Original ☑ Alternative



Alternative No.: LI-29

☑ Original ☐ Alternative

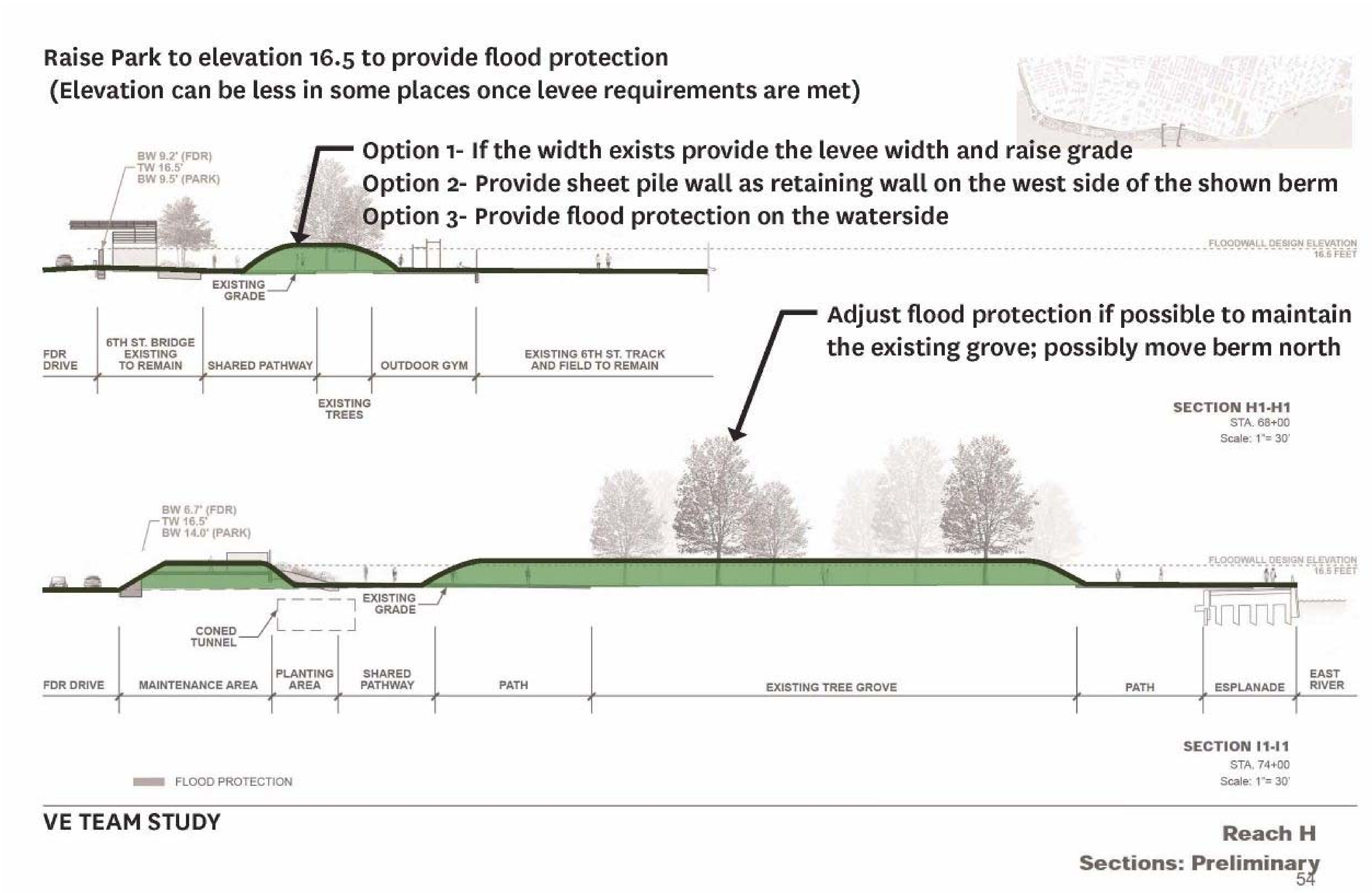


DESIGN TEAM PROPOSAL

Reach H
Sections: Preliminary
54

Alternative No.: LI-29

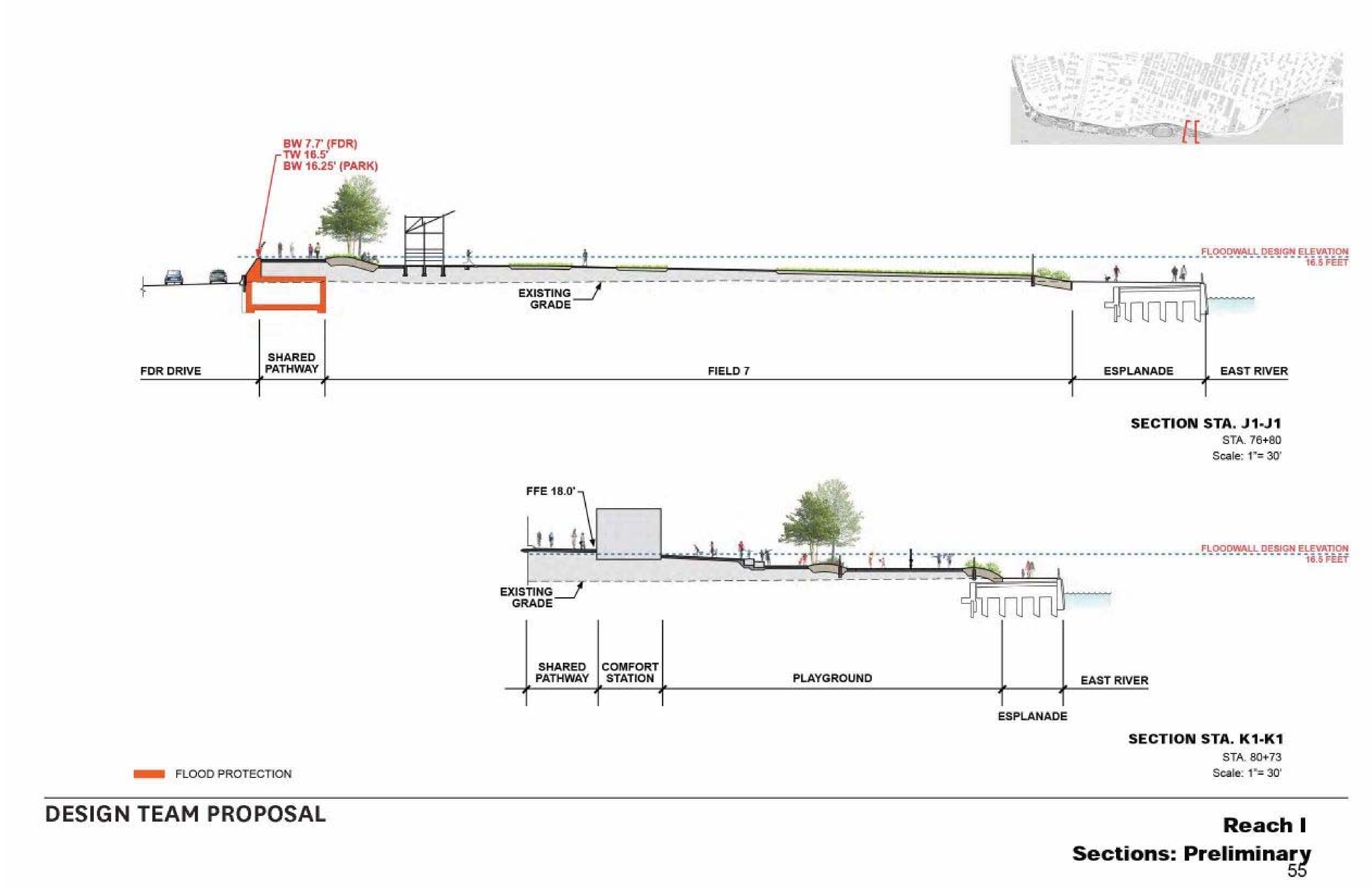
☐ Original ☑ Alternative



Sketch

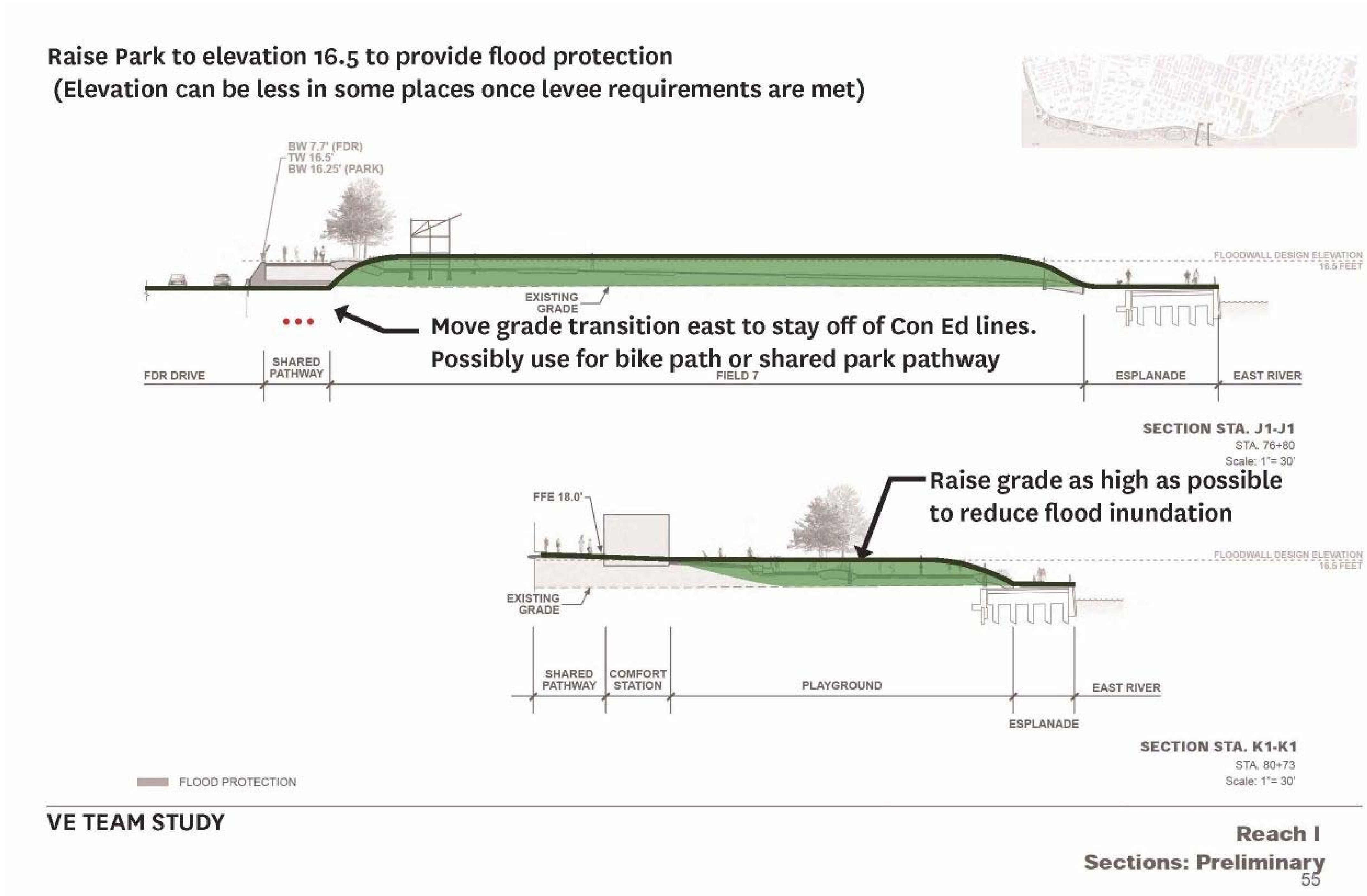
Alternative No.: LI-29

☑ Original ☐ Alternative



Alternative No.: LI-29

☐ Original ☑ Alternative



Construction Cost Estimate

Alternative No.: LI-29

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Gravel Fill, Raise Park to Desired Elevation	CY	50.00			215,000	$10,750,000
I Wall, includes MPT	LF	10,667.00	3,865	$41,227,955	1,000	$10,667,000
L Wall, includes MPT	LF	12,642.00	3,062	$38,709,804		
T Wall, includes MPT	LF	64,665.00	123	$7,953,795		
Tunnel Sections	LF	18,810.00	3,739	$70,330,590		
Carbon Wrap on Conduit	LF	63.80	10,328	$658,926		
Excavate, Backfill with Structural Fill, Compact	CY	90.25	22,538	$2,034,055		
Duration Savings	MO	980,546.00	56	$54,910,576	28	$27,455,288
Total Markup	91.14%			$196,700,501.83		$44,541,514.43
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$412,526,000.00		$93,414,000
NET SAVINGS						$319,112,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-30
Realign flood wall to east edge of East River Park in combination with levees	
Description of Original Concept:	
The original concept is to align the flood protection on the west side of the park.	
Description of Alternative Concept:	
The alternative concept is to place the flood protection aligned along the backside (landside) of the promenade. The flood protection could include a combination of floodwalls, levees and gates.	

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$286,788,000	$0	$286,788,000
Alternative Concept	$181,084,000	$0	$181,084,000
Savings	$105,704,000	$0	$105,704,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Avoids conflicts/closures of FDR during construction • Avoids conflicts with Shared Use Path traffic during construction • Permits the parkland to be more connected to the City – you can see the entire park • Creates a multilevel water's edge path system by keeping the promenade and adding a path along the levee • Moving the flood protection adjacent to the promenade protects a larger majority of the park from flooding (short and long term) and removes the need to do work with the Con Edison lines • Reduces the amount of fill needed to make the park more resilient • Could leave a lot of the trees and other park features in place since they would be protected • Reduces CSO and manhole costs in the park • Reduces other park costs that are associated with hardening or protecting assets to make them resilient	• Promenade may be more difficult to police in places where floodwall/levee are proposed • Levee use along the waterfront could be viewed as a visual barrier • May require larger scope for esplanade strengthening • Will require redesign • Need to be mindful and limit and impacts to the existing EIS • Negotiating environmental removal and/or modification of the low-level relieving structure could delay design competition

Discussion

Alternative No.: LI-30

This alternative is to realign the line of flood protection to behind the promenade. This option would allow for a more open work environment with fewer restrictions. The Con ED, FDR and shared used path (SUP) conflicts would be greatly reduced during construction.

Moving the flood wall adjacent to the promenade protects a larger majority of the park from flooding (short and long term) and would also reduce the amount of fill required, landscape plantings, etc. for resiliency. The alignment also provides a greener view and the parkland is more connected to the city. The assumption is that 60% of the park will be raised to provide protection where a levee is shown on the large-scale schematic.

All types of flood protection could be utilized: levee, floodwall (L-Wall, I-Wall, etc.) as well as deployables (roller gates, swing gates, bottom hinge gates, etc.). A 15-foot clear zone should be maintained behind the flood risk reduction system (measured from the face of floodwall, face of gates and toe of levee). The system could be laid out to maximize connectivity of park users, utility runs, and with visual “windows” to the water. This approach should also reduce alienation costs.

A standard section design would be utilized for each type of protection where possible. The cost assumes that the current I-wall design will be used, and we understand that it is adaptable for future height increase. The levee could also be raised to meet future elevations. The bottom hinged gates in this alternative were priced to be 10 feet tall. The gates as estimated in this alternative would provide protection up to EL 18. This would eliminate the need for future adaptation.

Utilities in the park could also be reduced since they would be protected behind the line of protection (levee/floodwall/gates). This includes the significant CSO investment

Where a levee is used for the line of protection, it could create a multilevel water’s edge path system by keeping the promenade and adding a path along the raised levee.

Depending on the protection is designed. the promenade might be more difficult to police in areas where visibility is blocked. However, this same security issue will need to be addressed regardless to where the wall is placed.

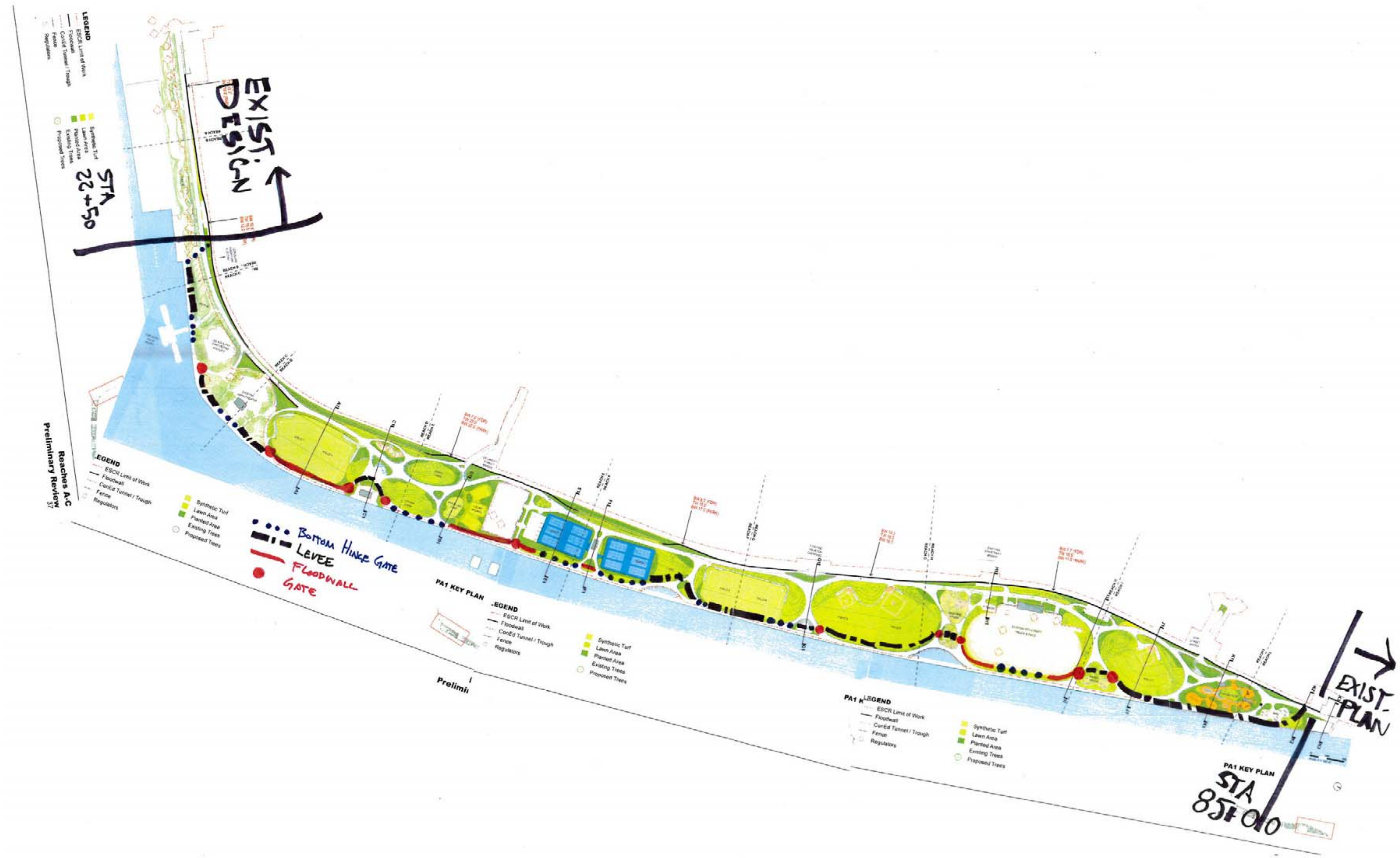
Operation and maintenance of the bottom hinge gates would be more than floodwall or levee only. There is a trade-off for viewshed and access.

Levee use along the waterfront could be viewed as a barrier. It will be important to provide critical visual and physical access points to the waterfront promenade. This can be done by terracing to permit view sheds, raised park areas in limited areas and possible use of transparent or bottom hinged gates that deploy during events.

Design elements and consideration of impacts to the existing EIS will need to be considered.

Alternative No.: LI-30

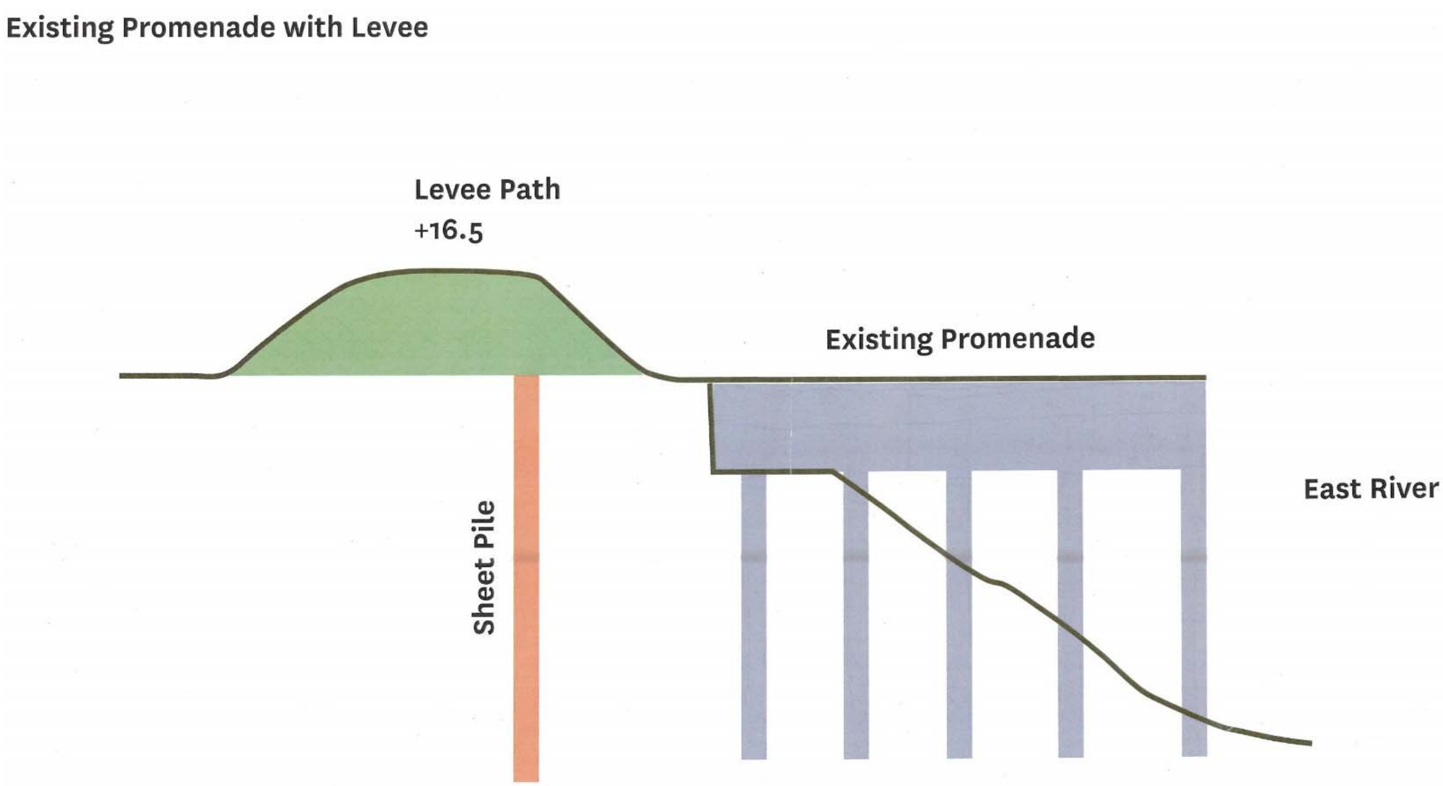
☑ Original ☐ Alternative



Sketch

Alternative No.: LI-30

☐ Original ☑ Alternative

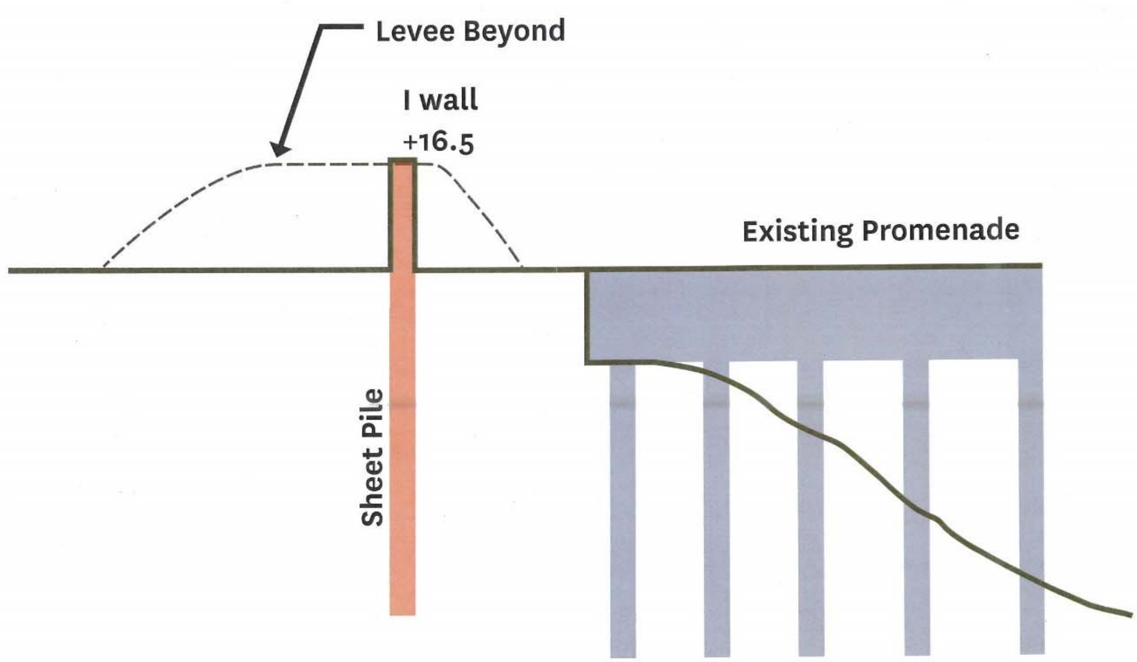


Sketch

Alternative No.: LI-30

☐ Original ☑ Alternative

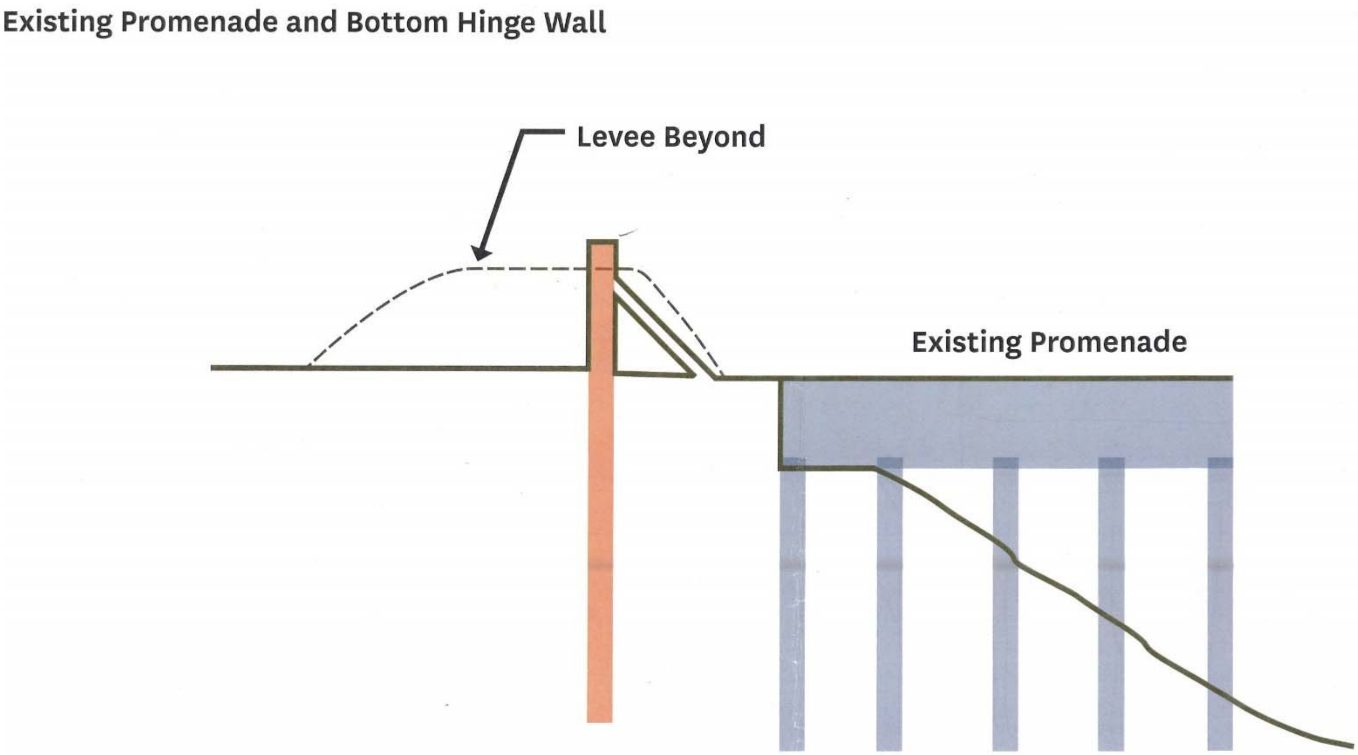
Existing Promenade and 'I' Wall



Sketch

Alternative No.: LI-30

☐ Original ☑ Alternative



Calculations

Alternative No.: LI-30

☐ Original ☑ Alternative

700’	Bottom Hinged Gate
330’	LEVEE
200’	Bottom Hinged Gate
300’	LEVEE
200’	Bottom Hinged Gate
300’	LEVEE
40’	Bottom Hinged Gate
120’	FLOODWALL/I-WALL
40’	Bottom Hinged Gate
280’	FLOODWALL/I-WALL
200’	Bottom Hinged Gate (Existing 6” S-I Truck and Fidd)
200’	FLOODWALL/I-WALL
40’	Bottom Hinged Gate
200’	LEVEE
40’	Bottom Hinged Gate
1300’	LEVEE

Tie into Sta 35+00

Calculations

Alternative No.: LI-30

☐ Original ☑ Alternative

Sta	To 22+55	Existing Design
200’	Bottom Hinged Gate (BHG)	
230’	LEVEE	
200’	Bottom Hinged Gate	
120’	LEVEE	
40’	Bottom Hinged Gate	
130’	LEVEE	
200’	Bottom Hinged Gate (Amphitheater)	
200’	LEVEE	
40’	Bottom Hinged Gate	
500’	FLOODWALL/I-WALL	
340’	LEVEE	
40’	Bottom Hinged Gate	
400’	Bottom Hinged Gate	
400’	FLOODWALL/I-WALL	
40’	Bottom Hinged Gate	
100’	FLOODWALL/I-WALL	

2,640 BHG

1,600 Floodwall/I-wall

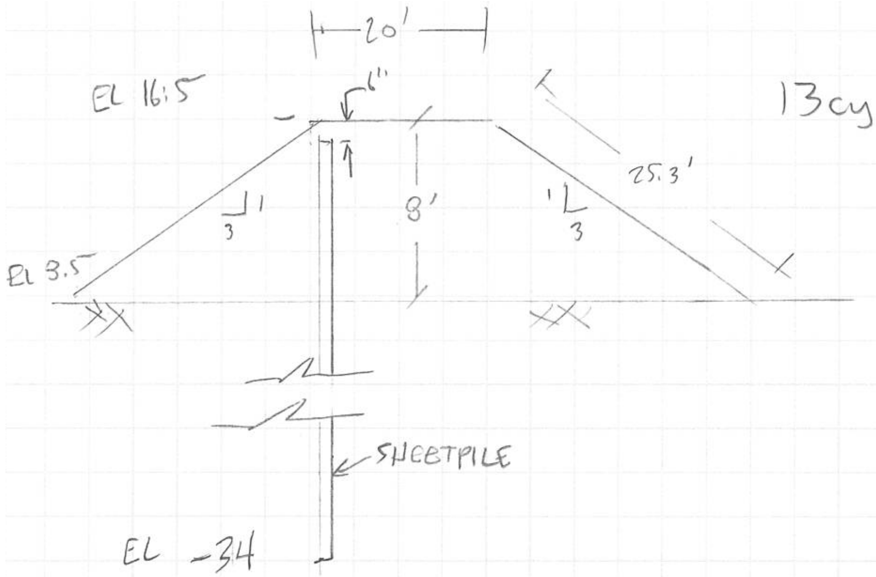
<u>4,100 Levee</u>

8,340 Total LF of protection

Calculations

Alternative No.: LI-30

☐ Original ☐ Alternative



13cy GENERAL FILL/FT

LEVEE QTY

Sheetpile – 50' deep / LF
Top soil – 1.5 cy / LF
Seed – 8 sy / LF
GENERAL FILL 13 cy / LF

Construction Cost Estimate

Alternative No.: LI-30

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 20	LF	22,400.00			2,640	$673,954
Foundation at Actuated Gate, I Wall Equivalent	LF	8,500.00			2,640	$22,440,000
I Wall, includes MPT	LF	10,667.00			1,600	$17,067,200
Reduce General Fill Required at Park	CY	50.00	60,000	$3,000,000	24,000	$1,200,000
Berm						
Sheet piling at Berm	SF	100.00			205,000	$20,500,000
Topsoil at Berm	CY	94.38			6,150	$580,437
General Fill at Berm	CY	50.00			53,300	$2,665,000
Seeding at Berm	SY	6.00			32,800	$196,800
I Wall, includes MPT, Station 22 to 85	LF	10,667.00	1,482	$15,808,494		
Tunnel Sections, Station 22 to 85	LF	18,810.00	3,739	$70,330,590		
L Wall, includes MPT, Station 22 to 85	LF	12,642.00	367	$4,639,614		
Carbon Wrap on Conduit, Station 22 to 85	LF	63.80	5,289	$337,438		
Excavate, Backfill with Structural Fill, Compact	CY	90.25	11,250	$1,015,313		
Duration Savings (Assumption)	MO	980,546.00	56	$54,910,576	30.0	$29,416,380
Total Markup	91.14%			$136,746,186.74		$86,344,491.93
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$286,788,000.00		$181,084,000
NET SAVINGS						$105,704,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-35
Shift all construction to the east to avoid closures on FDR	
Description of Original Concept:	
The original concept is to reconstruct the FDR Drive east side traffic barrier and fence along East River Park.	
Description of Alternative Concept:	
The alternative concept is to shift all floodwall and related work within East River Park, directly along the FDR Drive, to the east, to eliminate the need for barrier replacement and ancillary work.	

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Eliminates demolition and replacement of traffic barrier and fence. • Eliminates need for demolition and replacement of FDR Drive pavement. • Eliminates need for long-term or continuous short-term closures on the FDR Drive. • Eliminate Con Ed tunnel.	• None apparent

Cost Savings Summary (Present Worth)			
	First Cost	O&M	Total LCC
Original Concept	$30,036,000	$ 0	$30,036,000
Alternative Concept	$ 0	$ 0	$ 0
Savings	$30,036,000	$ 0	$30,036,000

Discussion

Alternative No.: LI-35

The current design includes the removal and replacement of the traffic barrier and fence along the FDR Drive for the entire length of East River Park, a distance of about 1.4 miles. This also requires the demolition and replacement of a strip of highway pavement about 2 ft wide.

NYCDOT has declined to approve a long-term lane closure to perform this work, because of the resulting significant traffic disruptions. Therefore, it will have to be performed during nightly closures of 4-5 hours, with the pavement and barrier restored to service at the end of each shift. This would be an extremely time consuming and expensive effort.

The alternative concept is to shift the floodwall only as much as necessary to avoid impacting the existing barrier. Shifting the construction activities to the east, even as little as three feet, will allow the traffic barrier to remain in place. Not replacing the barrier, and providing a little more space between traffic and the construction area will increase the contractor's efficiency, improve safety and reduce the nighttime closures of FDR,

The existing barrier appears to be in acceptable condition that does not necessitate a full-length replacement. The floodwall-related construction, as currently designed, can utilize the existing barrier as the project limit to the west side. The area between the barrier and the new flood wall can be backfilled with lightweight fill or sand.

Sketch

Alternative No.: LI-35

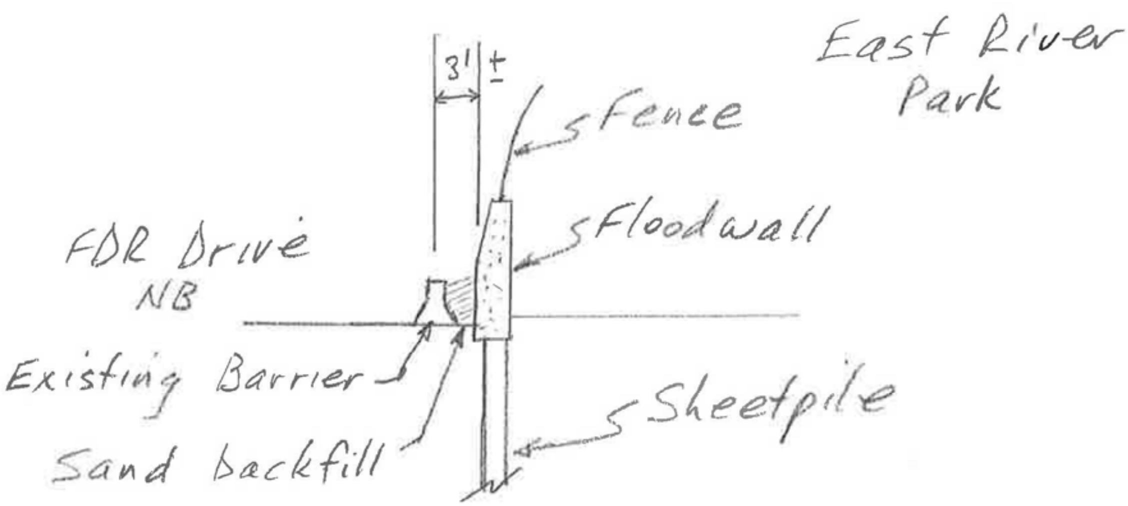
☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: LI-35

☐ Original ☑ Alternative



Construction Cost Estimate

Alternative No.: LI-35

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
FDR Scope to Be Removed						
I Wall Structures						
Saw Cut Pavement	LS	8,102.00	1	$8,102		
Demolish Jersey Barrier	LS	42,880.00	1	$42,880		
New Jersey Barrier	LS	274,253.00	1	$274,253		
Maintenance Protection of Traffic	LS	2,959,450.00	1	$2,959,450		
Roadway Patching	LS	664,804.00	1	$664,804		
L Wall Structures						
Saw Cut Pavement	LS	4,120.00	1	$4,120		
Demolish Jersey Barrier	LS	20,323.00	1	$20,323		
New Jersey Barrier	LS	129,982.00	1	$129,982		
Maintenance Protection of Traffic	LS	1,712,565.00	1	$1,712,565		
Roadway Patching	LS	255,710.00	1	$255,710		
T Wall Structures						
Saw Cut Pavement	LS	488.00	1	$488		
Demolish Jersey Barrier	LS	2,408.00	1	$2,408		
New Jersey Barrier	LS	15,403.00	1	$15,403		
Maintenance Protection of Traffic	LS	178,350.00	1	$178,350		
Roadway Patching	LS	75,756.00	1	$75,756		
Tunnel Structures						
Saw Cut Pavement	LS	11,492.00	1	$11,492		
Demolish Jersey Barrier	LS	109,696.00	1	$109,696		
New Jersey Barrier	LS	3,107,395.00	1	$3,107,395		
Maintenance Protection of Traffic	LS	5,033,443.00	1	$5,033,443		
Roadway Patching	LS	1,107,586.00	1	$1,107,586		
Total Markup	91.14%			$14,321,705.86		
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$30,036,000.00		
NET SAVINGS						$30,036,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-38
Use only I-wall the entire length	

Description of Original Concept:
The original concept is the construction of a levee as the principal flood protection feature for a length of about 4000 ft between the FDR Drive and East River Park.
Description of Alternative Concept:
The alternative concept is to use I-wall construction as the floodwall for the entire length of East River Park. This eliminates the overburden on the Con Ed transmission lines and the need for the utility tunnel as protection for those lines.

Advantages of Alternative Concept	Disadvantages of Alternative Concept
[redacted]	[redacted]

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$412,526,000		$412,526,000
Alternative Concept	$309,936,000		$309,936,000
Savings	$102,590,000		$102,590,000

Discussion

Alternative No.: LI-38

[redacted]

Con Ed maintains several underground high voltage transmission lines within the park along the FDR Drive. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Sketch

Alternative No.: LI-38

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: LI-38

☐ Original ☑ Alternative

Sketch

Alternative No.: LI-38

☐ Original ☑ Alternative

[redacted]

Construction Cost Estimate

Alternative No.: LI-38

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
I Wall	LF	10,667.00	3,865	$41,227,955	10,789	$115,086,263
L Wall	LF	12,642.00	3,062	$38,709,804		
T Wall	LF	64,665.00	123	$7,953,795		
Tunnel Sections	LF	18,810.00	3,739	$70,330,590		
Carbon Wrap on Conduit	LF	63.80	10,328	$658,926		
Excavate, Backfill with Structural Fill, Compact	CY	90.25	22,538	$2,034,055		
Duration Savings	MO	980,546.00	56	$54,910,576	48	$47,066,208
Total Markup	91.14%			$196,700,501.83		$147,783,476.53
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$412,526,000.00		$309,936,000
NET SAVINGS						$102,590,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-41
Use bottom-hinged gates at road closures	
Description of Original Concept:	
The original concept is to construct either roller or swing gates for road closures.	
Description of Alternative Concept:	
The alternative concept is to provide a bottom-hinged gate instead of a roller or swing gate at road crossings.	

Cost Savings Summary (Present Worth)			
	First Cost	**O&M**	**Total LCC**
Original Concept	$35,813,000	$0	$35,813,000
Alternative Concept	$29,559,000	$0	$29,559,000
Savings	$6,254,000	$0	$6,254,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Redundancy of deployment – automatic, pneumatic, manual/lifting • Self-deployable • Reduced manpower for operations (unless actuators fail – see disadvantages) • Possible reduction in foundation requirements due to lower weight gate • Can be constructed for Elevation 18 and will deploy for elevation 16.5 saving future modifications • Some are in service at NYU at 23rd and FDR • The VA is presently constructing 26 foot-wide Floodbreak gates in their floodwall for driveway access • Pneumatic gates have been used on dams with success for many years	• Not as long of a track record or performance on levee systems. • Not as many applications in FEMA Accreditation or U.S. Army Corps of Engineers portfolio • If automation fails, manpower and equipment may be needed to deploy gate • Roadway grit/salt could damage components • A lot of the components are under the roadway and cannot be readily inspected without road closure • If automatically activated, you cannot keep traffic lanes open – you are unable to decide when to close the gate • If pneumatic, space/housing for equipment is required • Debris loading if components are on the flood side (Floodbreak product) • Barge impact loading HSDRRS requirements

Discussion

Alternative No.: LI-41

This alternative is to replace the roller gates and swing gates in the floodwall with bottom hinge gates. The bottom hinge gates could be actuated using any of the following (and combinations of):

- Air bladder (a common practice used on Obermeyer gates) – manually actuated
- Buoyant force deployment – self-actuating
- Manual lifting and structural strut – manual closure. Probably used as a redundancy to the first two methods.

The attached figure is from the Floodbreak website (a manufacturer of these types of gates). This would be for a typical roadway installation. A sketch of the Obermeyer system is also attached.

Quantifying the reduction of foundation requirements is a challenge at this point, but these gates will likely require a less robust foundation than the heavier roller and swing gates.

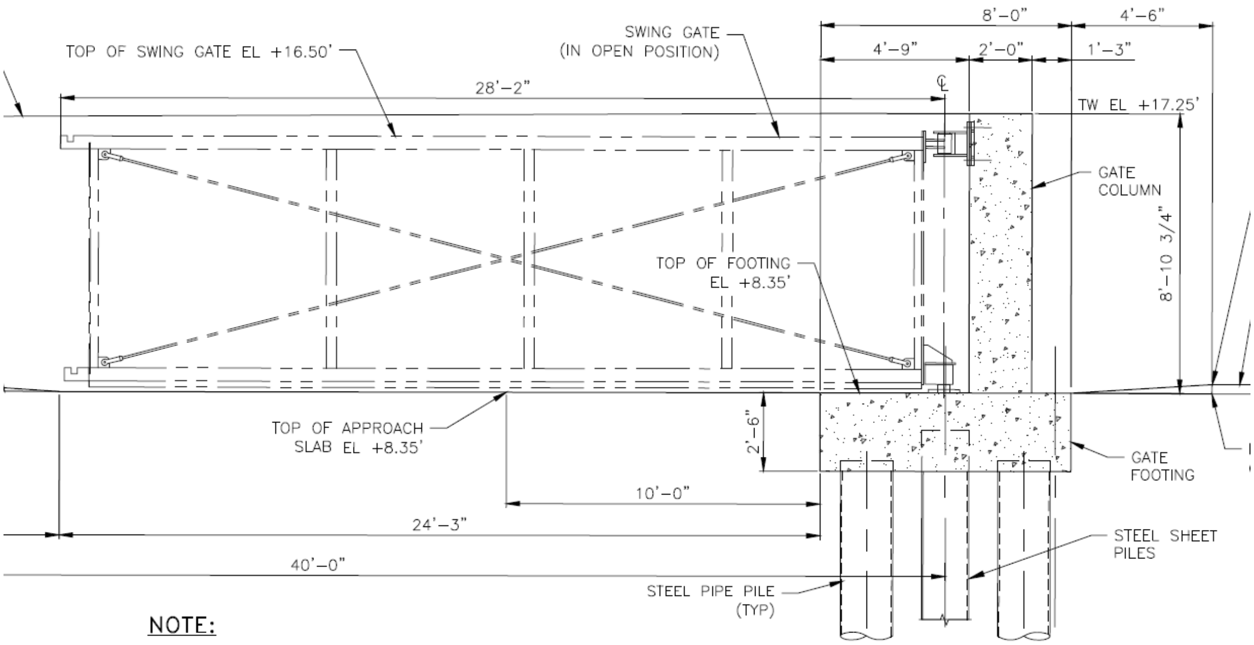
Specialized design will be required to provide redundant systems. Special care should be taken for any self-actuating gates to ensure public safety (traffic control in anticipation of actuation, etc.).

Sketch

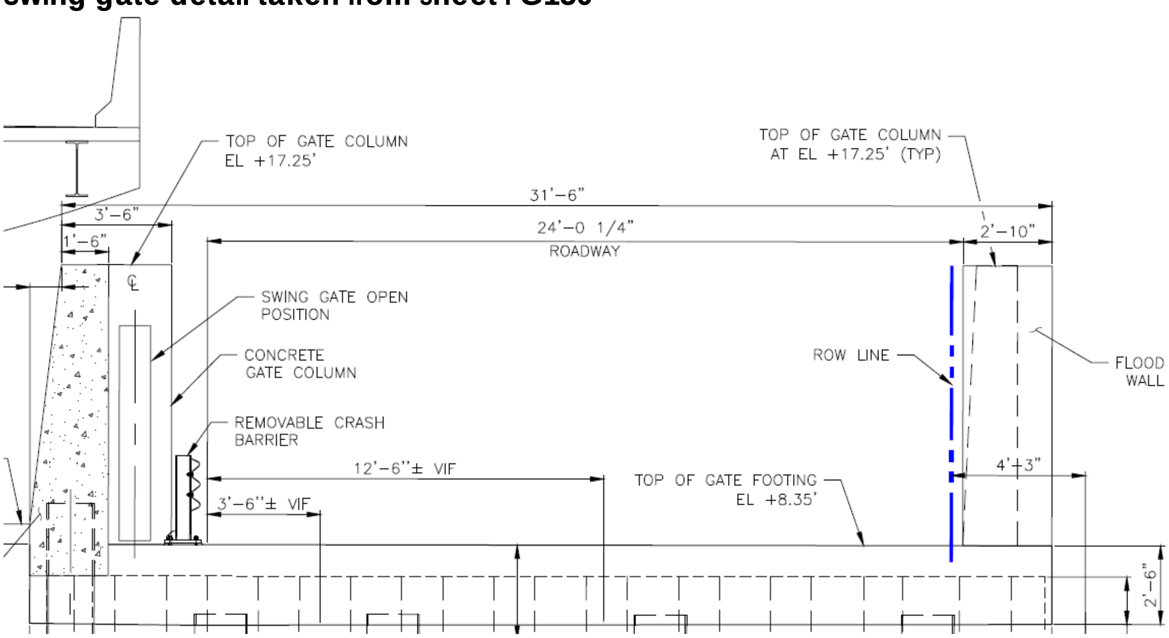
Alternative No.: LI-41

☑ Original ☐ Alternative

Swing gate taken from sheet FG150



Swing gate detail taken from sheet FG150

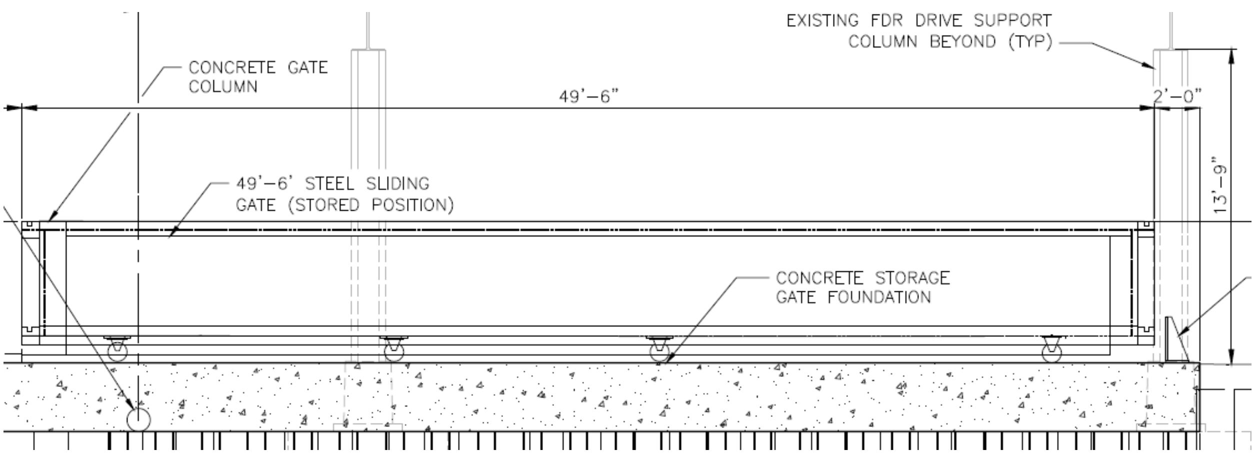


Sketch

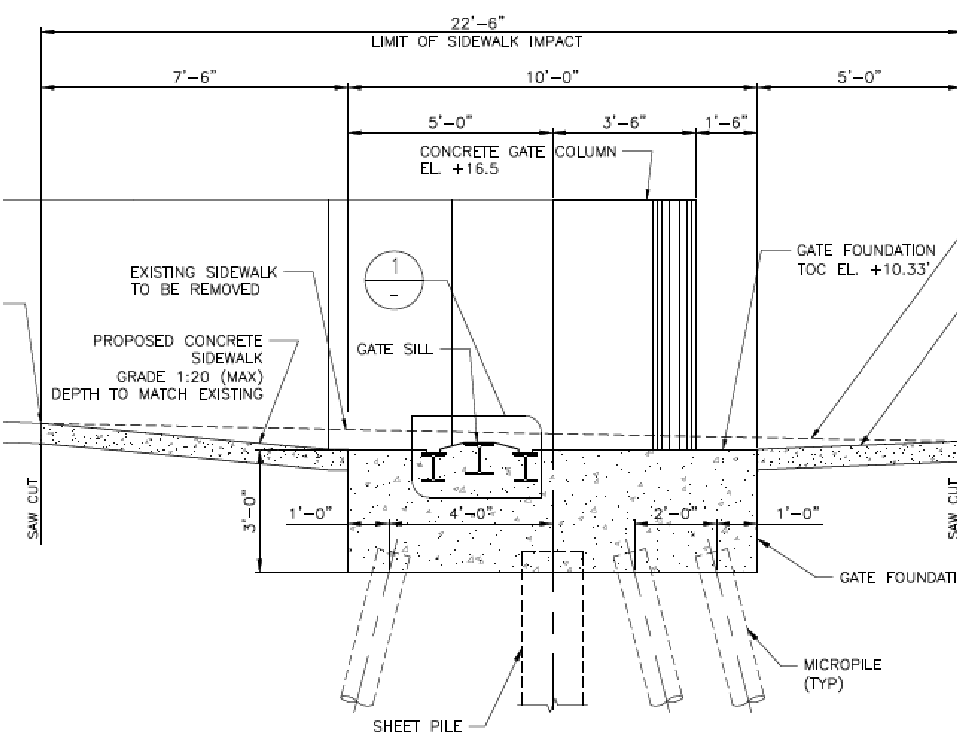
Alternative No.: LI-41

☑ Original ☐ Alternative

Roller gate taken from sheet FG101



Roller gate detail from sheet FG102

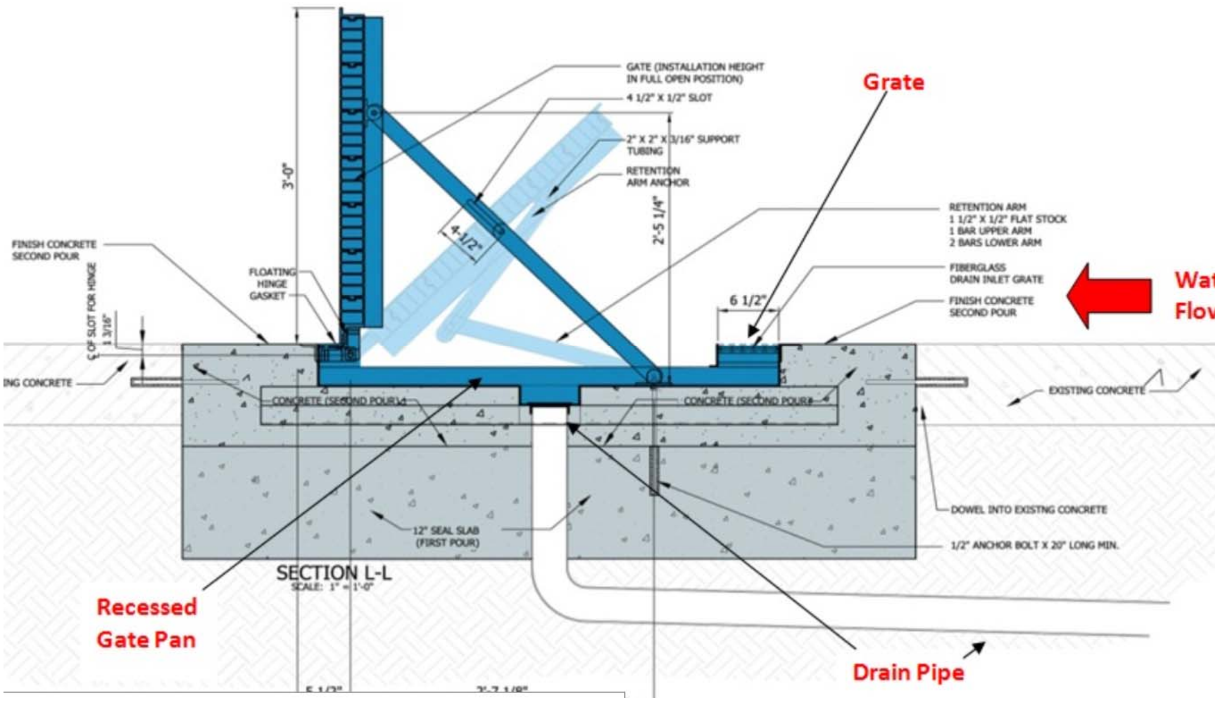


Sketch

Alternative No.: LI-41

☐ Original ☑ Alternative

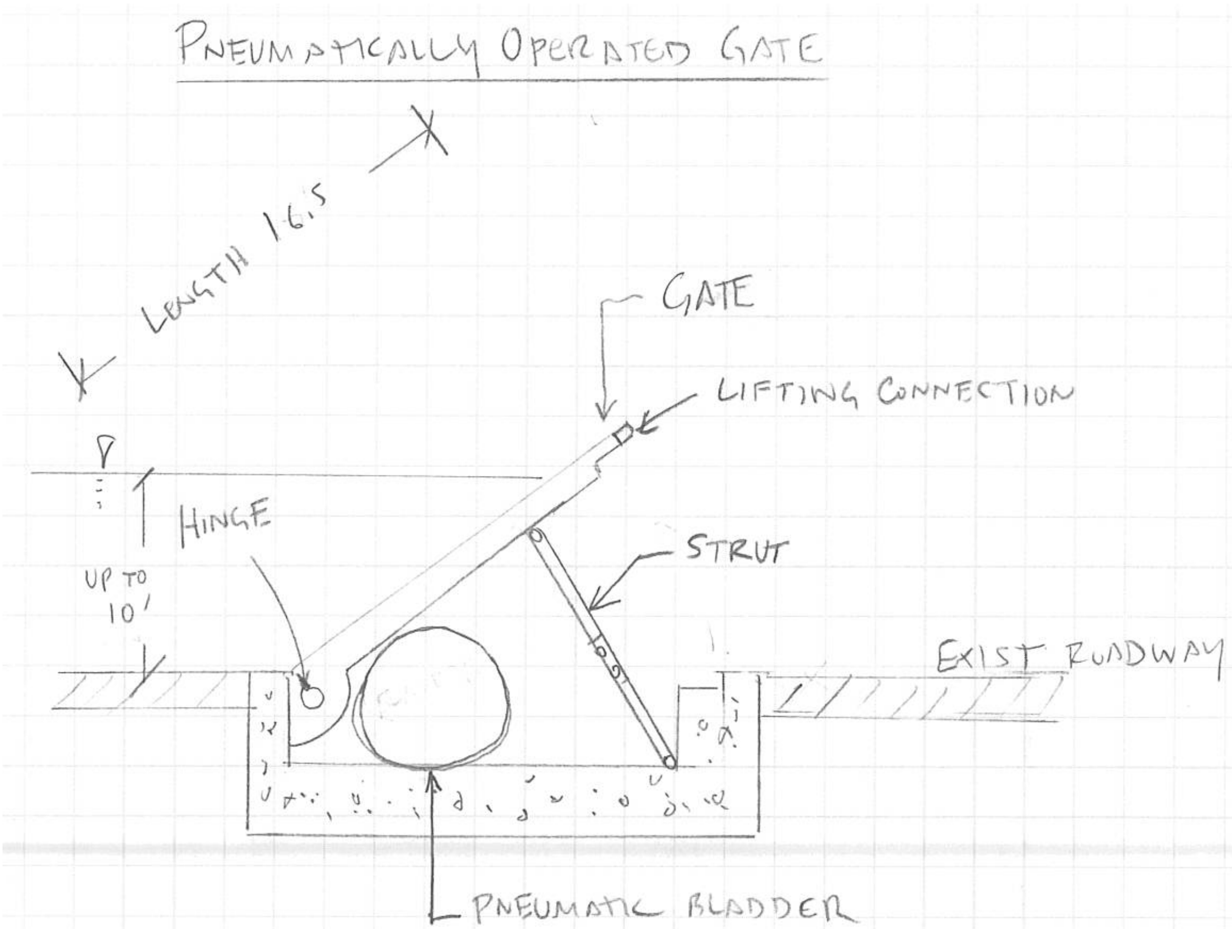
This is taken from the Floodbreak website. It is a self-deploying gate.



Sketch

Alternative No.: LI-41

☐ Original ☑ Alternative



Sketch of pneumatically operated gate

Calculations

Alternative No.: LI-41

☐ Original ☑ Alternative

OBERMEYER EXAMPLE COST

Escalation	Cost of Example	Height Example (ft)	Length of Example (ft)	Intallation Multiplier
1.092727	$ 1,400,000	6.5	350	1.2

PROPOSED GATE SCHEDULE

Gate No.	Sill Elevation (Approx)	Gate Height (Calculated El. 18 minus Sill El.)	Gate Length	Extrapolated Obermeyer Cost	Comment
1	9.00	9	44.66	$ 324,340	
2	7.00	11	25.25	$ 324,340	
3	6.00	12	36	$ 348,597	
4	6.00	12	35.17	$ 324,341	
5	6.00	12	5	$ 48,416	Maybe Low?
6	6.00	12	3.75	$ 324,342	Maybe Low?
7	7.00	11	35.17	$ 312,180	
8	7.00	11	3.75	$ 324,343	Maybe Low?
9	6.00	12	5	$ 48,416	Maybe Low?
10	6.00	12	28.25	$ 324,344	
11	5.75	12.25	40	$ 395,399	
12	5.75	12.25	28	$ 324,345	
13	7.20	10.8	48	$ 418,316	
14	7.20	10.8	54	$ 324,346	
15	7.65	10.35	72	$ 601,329	
16	7.80	10.2	36	$ 324,347	
17	7.00	11	72	$ 639,094	
18	6.10	11.9	24	$ 324,348	
19	9.10	8.9	36	$ 258,543	
20	6.40	11.6	72	$ 324,349	

Assumes same opening width and height as the original gates.

Construction Cost Estimate

Alternative No.: LI-41

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Roller Gate Assemblies, Foundations, Piles, 72'	EA	3,383,268.00	3	$10,149,804		
Roller Gate Assemblies, Foundations, Piles, 44.5'	EA	1,154,108.00	1	$1,154,108		
Roller Gate Assemblies, Foundations, Piles, 35'2"	EA	1,650,375.00	1	$1,650,375		
Roller Gate Assemblies, Foundations, Piles, 48'	EA	1,650,375.00	1	$1,650,375		
Roller Gate Assemblies, Foundations, Piles, 54'	EA	1,864,924.00	1	$1,864,924		
Swing Gate Assemblies, Foundations, Piles, 24'	EA	321,926.00	1	$321,926		
Swing Gate Assemblies, Foundations, Piles, 25'3"	EA	290,786.00	1	$290,786		
Swing Gate Assemblies, Foundations, Piles, 28'	EA	373,435.00	1	$373,435		
Swing Gate Assemblies, Foundations, Piles, 28'3"	EA	319,865.00	1	$319,865		
Swing Gate Assemblies, Foundations, Piles, 36'	EA	480,486.00	2	$960,972		
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 1	LF	44.66			22,400	$1,000,384
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 2	LF	25.25			22,400	$224,127
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 7	LF	35.17			22,400	$787,808
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 10	LF	28.25			22,400	$273,552
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 11	LF	40.00			22,400	$896,000
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 12	LF	28.00			22,400	$276,779
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 13	LF	48.00			22,400	$1,075,200
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 14	LF	54.00			22,400	$470,606
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 15	LF	72.00			22,400	$1,612,800
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 16	LF	36.00			22,400	$296,307
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 17	LF	72.00			22,400	$1,612,800
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 18	LF	24.00			22,400	$230,461
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 19	LF	36.00			22,400	$806,400
Auto/Hydro Actuated Gate Assemblies (Road Load), Installed, Gate 20	LF	72.00			22,400	$673,954
Foundation at Actuated Gate, I Wall Equivalent	LF	8,500.00			615	$5,227,500
Swing/Roller Gate Assembly at Pedestrian Gates and FDR Drive Remain						
Total Markup	91.14%			$17,076,245		$14,094,289
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$35,813,000		$29,559,000
NET SAVINGS						$6,254,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-43
Use lightweight fill and eliminate deep foundations for the tunnel	

Description of Original Concept:

The original concept is to use steel pipe piles to resist the unbalanced load between the weight of excavated soil, and the weight of the concrete tunnel and backfill over the tunnel

Description of Alternative Concept:

The alternative concept is use lightweight backfill over the tunnel to decrease the load and thereby reduce the pilings required.

Advantages of Alternative Concept	Disadvantages of Alternative Concept
[redacted]	[redacted]

	Cost Savings Summary (Present Worth)		
	First Cost	O&M	Total LCC
Original Concept	$7,838,000		$7,838,000
Alternative Concept	$7,529,000		$7,529,000
Savings	$309,000		$309,000

Discussion

Alternative No.: LI-43

[redacted]

[redacted]

[redacted].

Sketch

Alternative No.: LI-43

☑ Original ☐ Alternative

[redacted]

Sketch

Alternative No.: LI-43

☐ Original ☑ Alternative

[redacted]

Calculations

Alternative No.: LI-43

☐ Original ☑ Alternative

[redacted]

Calculations

Alternative No.: LI-43

☐ Original ☑ Alternative

[redacted]

Calculations

Alternative No.: LI-43

☐ Original ☑ Alternative

[redacted]

Calculations

Alternative No.: LI-43

☐ Original ☑ Alternative

[redacted]

Construction Cost Estimate

Alternative No.: LI-43

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Core Filled Steel Pipe Piles, 24"	LF	228.00	14,611	$3,331,308	7,744	$1,765,632
Replace overburden soil over pile supported sections with Flowable Backfill	CY	28.50	27,000	$769,500		
Flowable Backfill	CY	80.50			27,000	$2,173,500
Total Markup	91.14%			$3,737,418.61		$3,590,069.38
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$7,838,000.00		$7,529,000
NET SAVINGS						$309,000

Value Alternative

Project: East Side Coastal Resiliency
Location: New York City, NY

	Alternative No:
Title:	LI-61
Tie floodwall into either side of the Con Ed intake structure and keep the floodwall on the east side of the FDR	
Description of Original Concept:	
The original concept is for the floodwall alignment north of East River Park to cross the FDR Drive using swing gates, tie into the Con Ed Building and proceed along the west side of the sidewalk to the Avenue C intersection and cross below the viaduct to tie in at Stuyvesant Cove Park.	
Description of Alternative Concept:	
The alternative concept is to maintain the floodwall alignment on the east side of the FDR Drive, tie into the Con Ed gate structure at the bike path “pinch point” and proceed along the west side of the bike path to Stuyvesant Cove Park.	

Cost Savings Summary (Present Worth)

	First Cost	O&M	Total LCC
Original Concept	$120,647,000	$0	$120,647,000
Alternative Concept	$100,865,000	$0	$100,865,000
Savings	$19,782,000	$0	$19,782,000

Advantages of Alternative Concept	Disadvantages of Alternative Concept
• Eliminates 2 large swing gates crossing the NB and SB FDR Drive • Eliminates 4 pedestrian and roller gates at 14th and 15th Streets adjacent to Con Ed • Eliminates 4 large swing and roller gates at the Avenue C intersection • Simplifies the floodwall layout at the Avenue C intersection • Provides flood protection for FDR Drive • Lessens burden of manual operation of gates during flood events • Simplifies OCMC negotiations	• Requires floodwall tie-in to the Con Ed gate structure and over the discharge portals • Requires floodproofing of the gate structure building • Adds to the Con Ed negotiations underway, which are time-consuming • Alignment shift must be included in EIS • Adds to the Con Ed negotiations

Discussion

Alternative No.: LI-61

The original concept is for the floodwall alignment north of East River Park to cross the FDR Drive using swing gates, tie into the Con Ed Building and proceed along the west side of the sidewalk to the Avenue C intersection and cross back to the east below the viaduct to tie in to the floodwall at Stuyvesant Cove Park.

For the original design:

- Construction of the 35 ft swing gates across the FDR Drive, including the foundations and under-seepage barrier, will be difficult to complete under limited nightly lane closures.
- The west side floodwall alignment requires pedestrian and vehicular gates solely for the benefit of the Con Ed Facility.
- The floodwall and gate layout at the Avenue C intersection beneath the viaduct is complicated, including several large gates and a free-standing column to act as a gate seal and support.

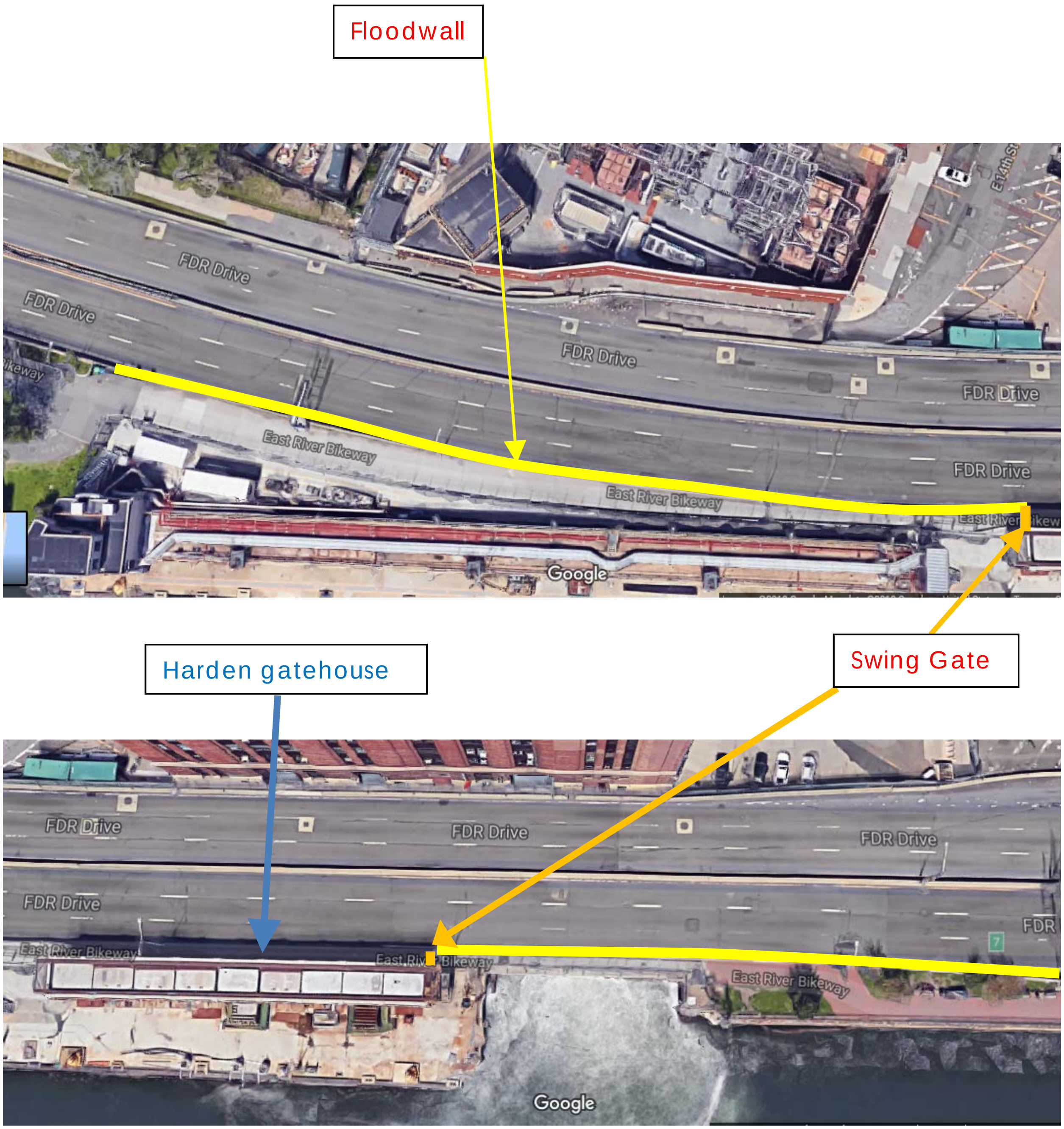
The proposed alignment:

- Eliminates the FDR Drive gates (gates 3 and 4), the gates at the Con Ed facility (gates 5 to 10), and the larger gates at the intersection (gates 11 to 14).
- The Con Ed gatehouse will need to be floodproofed, but that would be similar to the work that was planned for the west side facility. Swing gates at each end would only be about 6 ft wide.
- The substructure of the gatehouse and the discharge facility are massive hydraulic structures. It is expected that drilled-in dowels will provide sufficient capacity to support the lateral hydraulic loads on an 8 ft high floodwall.
- The floodwall along the NB bike path would be similar to the floodwall now shown which ends at Murphy Brothers Park, but shorter in length.
- Replaces the large gates at the intersection with 2 mid-size swing gates (around 12 ft wide).

Sketch

Alternative No.: LI-61

☐ Original ☑ Alternative



Sketch

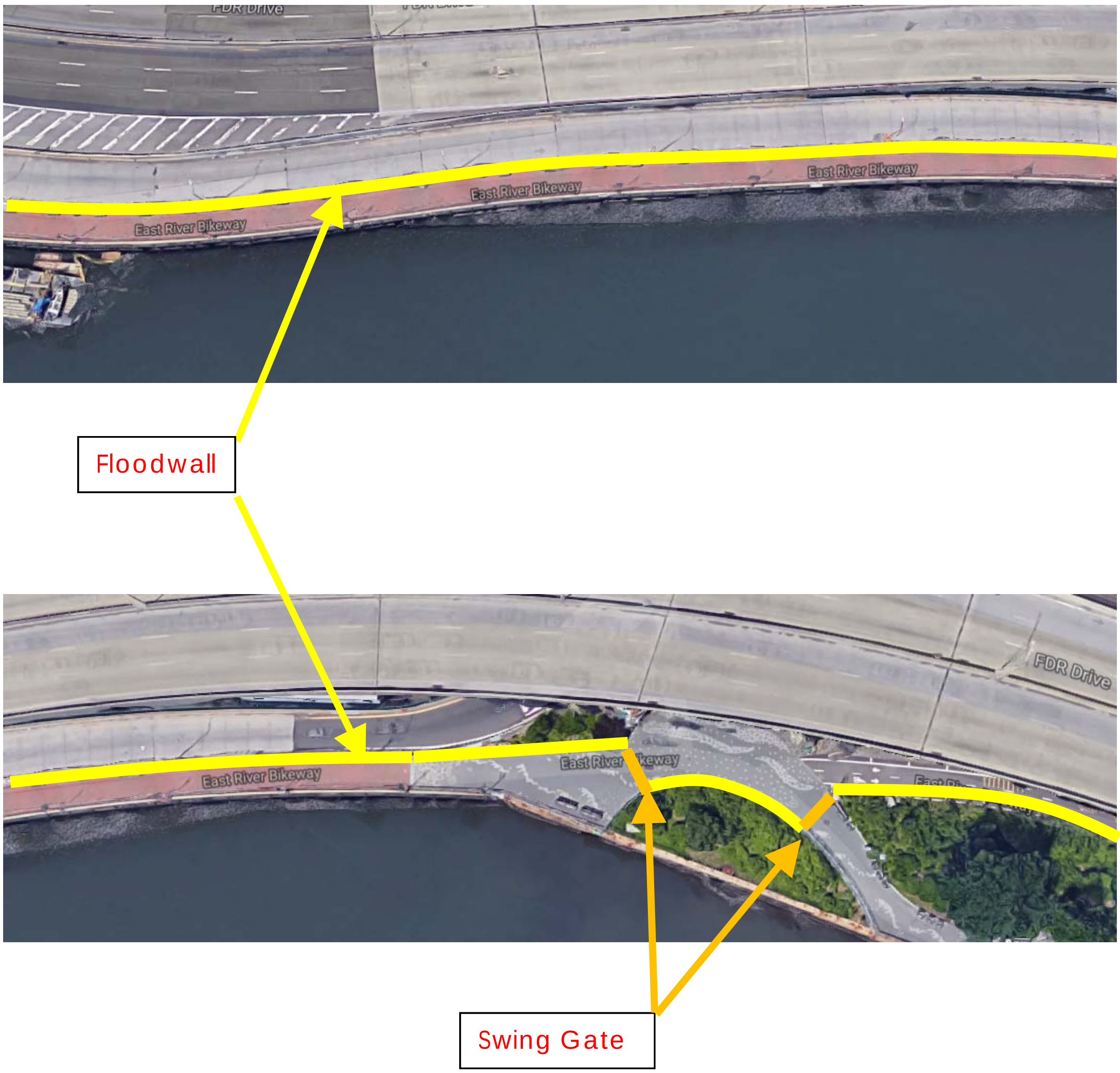
Alternative No.: LI-61

☐ Original ☑ Alternative

Sketch

Alternative No.: LI-61

☐ Original ☑ Alternative



Construction Cost Estimate

Alternative No.: LI-61

Item	Unit of Meas	Unit Cost	Original Concept (Deletions) Qty	Original Concept (Deletions) Total	Alternative Concept (Additions) Qty	Alternative Concept (Additions) Total
Gate 3	EA	871,448.00	1	$871,448		
Gate 4	EA	871,416.00	1	$871,416		
Gate 5	EA	36,348.00	1	$36,348		
Gate 6	EA	27,262.00	1	$27,262		
Gate 7	EA	1,650,375.00	1	$1,650,375		
Gate 8	EA	27,262.00	1	$27,262		
Gate 9	EA	36,348.00	1	$36,348		
Gate 10	EA	319,865.00	1	$319,865		
Gate 11	EA	480,486.00	1	$480,486		
Gate 12	EA	373,436.00	1	$373,436		
Gate 13	EA	1,650,375.00	1	$1,650,375		
Gate 14	EA	1,864,924.00	1	$1,864,924		
10' Foot Gate	EA	43,618.00			2	$87,236
12' Foot Gate	EA	87,235.00			2	$174,470
Con Ed Wall Tie-In	EA	20,000.00			2	$40,000
Con Ed Building Floodproofing	LS	500,000.00			1	$500,000
Duration Savings (Assumption)	MO	980,546.00	56	$54,910,576	53	$51,968,938
Total Markup	91.14%			$57,526,788.60		$48,094,421.14
TOTALS	Breakdown of Markup can be found in the Cost Appendix			$120,647,000.00		$100,865,000
NET SAVINGS						$19,782,000

APPENDICES

A – RECONCILED COST ESTIMATE

Summary of Reconciled Cost Estimate

East Side Coastal Resiliency

Date: 03/11/2018

EAST SIDE COASTAL RESILIENCY
Basis of VE Cost Estimate

The attached cost estimate was developed based on digital quantity takeoff of the 40% design documents, dated November 11, 2017. The labor wage rate table utilized is a NYC Union Labor 2017. Material pricing was sourced from previous bid experience from projects with similar scope, DOT WAIP reports for region 11, market costs received from trade professionals in the NYC metro area.

Assumptions.

The estimate includes some components that are not yet included in the design documents. These elements are included below the line as fully loaded allowances for DEP Interior drainage and DPR tree mitigation.

We have made assumptions when developing this estimate for the inclusion of maintenance and protection fo traffic associated with each detail showing structural work in or abutting the FDR, service roads, streets adjacent to Delancy and 10 Streets. The estimate has been amended to reflect construction of 10 new manholes in the footprint of the FDR drive, but not yet included in the design.
To reflect this uncertainty, we are carrying a 30% contingency.
The allowance for interior drainage was developed by Hazen and Sawyer and includes a contingency of 60%.

Risk Register items were not included in the cost estimate nor was any special contingency to cover recent tariffs placed on imported steel.

The total Estimated Cost of Construction is $988,463,322, and includes indirect costs calculated by compounding the following percentages:

Direct Cost		**$421,010,012**	
Contingency	**$126,303,003**		**30.000%**
Subtotal		**$547,313,015**	
Escalation 3.34 year x 4%	**$76,350,165**		**13.950%**
Subtotal		**$623,663,180**	
GC General Conditions	**$62,366,318**		**10.000%**
Subtotal		**$686,029,498**	
Overhead & Profit (10%&5%)	**$102,904,425**		**15.000%**
Subtotal		**$788,933,923**	
Contractor Bond & Insurance	**15,778,678**		**2.000 %**
Subtotal		**$804,712,601**	
Tree Mitigation		**$21,783,580**	
DEP Interior Drainage		**$161,967,141**	
Total		**$988,463,322**	

Pkg	Area	Tag	Phase	Description	Takeoff Quantity	Total Amount	Grand Total
01				FLOOD PROTECTION		227,392,227	434,634,298
02				PARK LANDSCAPING		52,115,531	99,612,892
03				PARK UTILITIES		24,462,201	46,756,706
04				PEDESTRIAN BRIDGES	1,183.00 lf	41,221,906	78,790,970
05				COMBINED SEWER SYSTEM		53,306,716	101,889,706
06				COMFORT STATION	702.00 sf	2,799,225	5,350,400
07				INTERCEPTOR GATES	2.00 ea	11,600,000	22,172,077
08				WATER MAIN RELOCATION (24")	1,596.00 lf	2,612,204	4,992,929
09				AMENDMENTS	1.00 ls	5,500,000	10,512,622

Estimate Totals

Description	Amount	Totals	Rate	Cost Basi	Cost per Unit	cent of Total	
Labor	484,978,350					49.06%	
Material	205,175,107					20.76%	
Subcontract							
Equipment	66,964,860					6.77%	
Other	47,594,283					4.81%	
	804,712,600	804,712,600				81.41	81.41%
Tree Mitigation	21,783,580			L		2.20%	
DEP Interior Drainage	161,967,141			L		16.39%	
	183,750,721	988,463,321				18.59	100.00%
Total		***988,463,321***					

Pkg	Area	Tag	Phase	Description	Takeoff Quantity	Total Amount	Grand Total
01				FLOOD PROTECTION		227,392,227	434,634,298
02				PARK LANDSCAPING		52,115,531	99,612,892
03				PARK UTILITIES		24,462,201	46,756,706
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05				COMBINED SEWER SYSTEM		53,306,716	101,889,706
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08				WATER MAIN RELOCATION (24")	1,596.00 lf	2,612,204	4,992,929
09				AMENDMENTS	1.00 ls	5,500,000	10,512,622

Estimate Totals

Description	Amount	Totals	Rate	Cost Basi	Cost per Unit	cent of Total	
Labor	253,731,259					25.67%	
Material	107,343,633					10.86%	
Subcontract							
Equipment	35,034,715					3.54%	
Other	24,900,405					2.52%	
	421,010,012	421,010,012				42.59	42.59%
Contingency	126,303,003		30.000 %	T		12.78%	
	126,303,003	547,313,015				12.78	55.37%
Escalation 3.34 year x 4%	76,350,165		13.950 %	T		7.72%	
	76,350,165	623,663,180				7.72	63.09%
GC Gnl Conditions	62,366,318		10.000 %	T		6.31%	
	62,366,318	686,029,498				6.31	69.40%
Overhead & Profit (10%&5%)	102,904,425		15.000 %	T		10.41%	
	102,904,425	788,933,923				10.41	79.81%
Contractor Bond & Insurance	15,778,678		2.000 %	T		1.60%	
	15,778,678	804,712,601				1.60	81.41%
Tree Mitigation	21,783,580			L		2.20%	
DEP Interior Drainage	161,967,141			L		16.39%	
	183,750,721	988,463,322				18.59	100.00%
Total		***988,463,322***					

Area	Pkg	Tag	Phase	Description	Takeoff Quantity	Total Amount	Grand Total
1				**Segment 1 (Reaches A, B ,C, D & E)**			
	01			FLOOD PROTECTION		97,790,229	186,914,866
	02			PARK LANDSCAPING		18,790,820	35,916,509
	03			PARK UTILITIES		22,234,300	42,498,327
	05			COMBINED SEWER SYSTEM		29,916,945	57,182,827
	07			INTERCEPTOR GATES		11,600,000	22,172,077
				1 Segment 1 (Reaches A, B ,C, D & E)		**180,332,294**	**344,684,605**
2				**Segment 2 (Reaches F, G & H)**			
	01			FLOOD PROTECTION		35,770,767	68,371,739
	02			PARK LANDSCAPING		15,047,746	28,762,049
	03			PARK UTILITIES		213,505	408,090
	04			PEDESTRIAN BRIDGES		21,632,493	41,348,042
	05			COMBINED SEWER SYSTEM		16,673,084	31,868,697
				2 Segment 2 (Reaches F, G & H)		**89,337,593**	**170,758,617**
3				**Segment 3 (Reaches I & J)**			
	01			FLOOD PROTECTION		26,380,061	50,422,477
	02			PARK LANDSCAPING		4,772,467	9,122,027
	03			PARK UTILITIES		35,525	67,902
	04			PEDESTRIAN BRIDGES		19,589,413	37,442,928
	05			COMBINED SEWER SYSTEM		5,927,786	11,330,287
	06			COMFORT STATION		2,799,225	5,350,400
				3 Segment 3 (Reaches I & J)		**59,504,478**	**113,736,021**
4				**Segment 4 Reaches (K, L & M)**			
	01			FLOOD PROTECTION		30,945,689	59,149,154
	02			PARK LANDSCAPING		1,920,778	3,671,347
	03			PARK UTILITIES		21,025	40,187
	05			COMBINED SEWER SYSTEM		618,550	1,182,287
	08			WATER MAIN RELOCATION (24")		18,081	34,560
				4 Segment 4 Reaches (K, L & M)		**33,524,122**	**64,077,535**
5				**Segment 5 (Reaches (N & O)**			
	01			FLOOD PROTECTION		29,950,109	57,246,217
	02			PARK LANDSCAPING		3,052,068	5,833,680
	05			COMBINED SEWER SYSTEM		42,588	81,402
	08			WATER MAIN RELOCATION (24")		2,594,122	4,958,369
				5 Segment 5 (Reaches (N & O)		**35,638,888**	**68,119,668**
6				**Segment 6 (Reach Q)**			
	01			FLOOD PROTECTION		6,555,371	12,529,844

Area	Pkg	Tag	Phase	Description	Takeoff Quantity	Total Amount	Grand Total
	02			PARK LANDSCAPING		963,181	1,841,011
	03			PARK UTILITIES		725	1,385
	05			COMBINED SEWER SYSTEM		127,764	244,206
				6 Segment 6 (Reach Q)		**7,647,041**	**14,616,447**
7				**All Segments & Reaches**			
	03			PARK UTILITIES		1,957,122	3,740,815
				7 All Segments & Reaches		**1,957,122**	**3,740,815**
02							
	02			PARK LANDSCAPING		7,568,471	14,466,270
				02		**7,568,471**	**14,466,270**
*** unassigned ***							
	09			AMENDMENTS		5,500,000	10,512,622
				*** unassigned ***		**5,500,000**	**10,512,622**

Estimate Totals

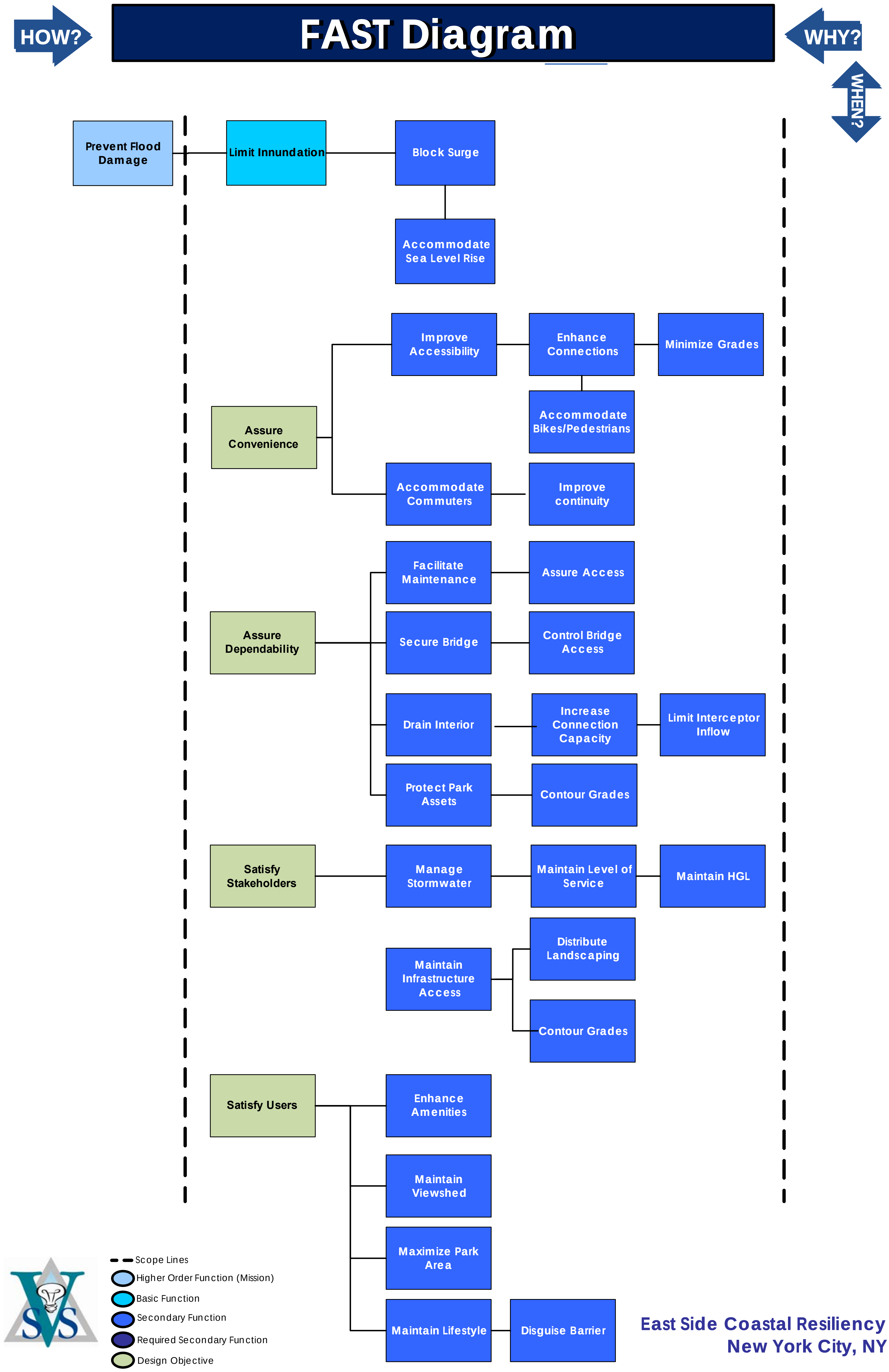
Description	Amount	Totals	Rate	Cost Basi	Cost per Unit	cent of Total	
Labor	253,731,259					25.67%	
Material	107,343,633					10.86%	
Subcontract							
Equipment	35,034,715					3.54%	
Other	24,900,405					2.52%	
	421,010,012	421,010,012				42.59	42.59%
Contingency	126,303,003		30.000 %	T		12.78%	
	126,303,003	547,313,015				12.78	55.37%
Escalation 3.34 year x 4%	76,350,165		13.950 %	T		7.72%	
	76,350,165	623,663,180				7.72	63.09%
GC Gnl Conditions	62,366,318		10.000 %	T		6.31%	
	62,366,318	686,029,498				6.31	69.40%
Overhead & Profit (10%&5%)	102,904,425		15.000 %	T		10.41%	
	102,904,425	788,933,923				10.41	79.81%
Contractor Bond & Insurance	15,778,678		2.000 %	T		1.60%	
	15,778,678	804,712,601				1.60	81.41%
Tree Mitigation	21,783,580			L		2.20%	
DEP Interior Drainage	161,967,141			L		16.39%	

Estimate Totals

	183,750,721	988,463,322	18.59	100.00%
Total		***988,463,322***		

B – FUNCTION ANALYSIS

FAST Diagram



East Side Coastal Resiliency
New York City, NY

C – CREATIVE IDEA LISTING

Idea No.	Description	Votes
AD - Assure Dependability		
AD-01	Design a decision model for different flooding criteria	3
AD-02	Add instrumentation and controls to actively manage system storage (sewer system)	0
AD-03	Connect isolation gates to city-wide SCADA	0
AD-04	Remove control structure and hydraulic operator and use portable operator	3
AD-05	Monitor gate position by SCADA system	2
AD-06	Replace interceptor isolation gates with adjustable orifice gates or weirs to maximize storage capacity	8
AD-07	Build pump station to handle excess flow from interceptor	2
AD-08	Exercise gates monthly	1
AD-09	Install cameras to minimize vandalism and monitor conditions	0
AD-10	Move manholes off FDR	11
AD-11	Directional drill manholes on FDR	0
AD-12	Slip line existing manholes	0
AD-13	Make manhole (gate well) integral to floodwall	0
AD-14	Construct header on park side to intercept to CSOs and eliminate individual outfalls	1
AD-15	Harden electrical equipment to temporary submergence level	7
AD-16	Jack up remaining buildings to reduce inundation	2
AD-17	Berm around existing remaining buildings	1
AD-18	Replace park buildings at a higher elevation	1
AD-19	Standardize gate sizes and hardware to facilitate maintenance	DS
AD-20	Use directional drilling to reduce ponding water	0
AD-21	Use directional drilling for parallel conveyance	1
AD-22	Make two gates at Con Ed as small as operationally possible	7
AD-23	Eliminate isolation chambers and direct flow to interceptors	8
AD-24	Elevate FDR at 14th street and eliminate gates	1
AD-25	Eliminate fire alarm system in tunnel and use temperature sensors	2

Idea No.	Description	Votes
AD-26	Use repeat cycle timer for ventilation in tunnel	2
AD-27	Cross train staff for gate operation (O&M, first responders) twice/year	7
AD-28	Train under adverse conditions	2
AD-29	Have an alert system away from gates	7
AD-30	Use green wall to eliminate graffiti on wall	1
AD-31	Locate maintenance/spare parts facility	1
AD-32	Locate shed for spare parts under FDR in parking area	7
AD-33	Use sand tubes rather than sand bags for final closure	0
AD-34	Provide emergency lighting in tunnel	2
AD-35	Provide non-electrical exit signs in tunnel	2
AD-36	Leave 14th and 15th street gates normally closed	0
AD-37	Move floodwall to river side of FDR and eliminate gates	2
AD-38	Past the Con Ed intake building, extend a floodwall along the esplanade and east of the FDR ramp to 18th street	6
AD-39	Place gates across the 18th street ramp, and align the floodwall east of Stuyvesant park	0
AD-40	Reduce the number of gates by changing the traffic pattern and realigning the flood wall	3
AD-41	Do not expose and wrap the Con Ed lines	8
AD-42	Plant salt tolerant species now to replace landscaping and trees that we are trying to save	2
AD-43	Use stainless steel for road gates to increase life and expedite delivery	0
AD-44	Revisit transformer sizes throughout project	5
AD-45	Eliminate mechanical rooms at the tunnel, install equipment in tunnel	2
AD-46	Use NEMA 6P equipment enclosure rating in the lower part of the tunnel	2
AD-47	Replace metal halide lights at sports fields 5 and 6 with LED lights	7
AD-48	Eliminate low height poles (Flushing Meadow type); use masts for illumination	1
AD-49	Use 277V for lower pole lighting (up to 22 ft)	2

Idea No.	Description	Votes
AD-50	Use PVC 80 conduits for installation below grade (outdoor lighting)	1
AD-51	Use aluminum conduit for lighting, comm, fire alarm, et., within tunnel	2
AD-52	Maintain safe passage in the tunnel	6
AD-53	In the tunnel, use only 120/280 system: 280V lighting, 120V receptacles and eliminate step up transformers	4
AD-54	Reduce the luminaires in the tunnel to achieve the target illumination	5
AD-55	Do not install VFDs for fan control in tunnel, use 2-speed fans	2
AD-56	Reuse sports fields existing underground raceways where possible	1
AD-57	Protect NEMA 3R rated SCADA panels against flood	1
AD-58	Use 480V for lights installed above 22 feet	1
AD-59	Optimize tunnel electrical	8
AD-60	Optimize park electrical	8
C - Construction		
C-01	Consider a Construction Manager at Risk (CM@Risk) contract	7
C-02	Put a concrete plant onsite in a staging area	4
C-03	Close off park to pedestrians and bikes south of the amphitheater; use Cherry Street bridge for access	7
C-04	Close park entirely during construction	8
C-05	Include barging as an option for materials management	7
C-06	Use a floating batch plant	5
C-07	Prequalify/identify offsite storage location	2
C-08	Modify construction sequencing to facilitate use of HUD money	8
C-09	Use FDR parking area for staging and stockpiling materials	2
C-10	Delay Pier 42 Phase 1B Park opening until ESCR is complete in that area	DS
C-11	Establish staging areas on southbound service road for concrete pumping across FDR	7
C-12	Use pre-cast concrete wall panels	8

Idea No.	Description	Votes
C-13	Pre-bid all gates as a package	7
C-14	Pre-bid Con Ed work to work under GC	2
C-15	Leave area in north end open to allow trucks to access FDR during construction	8
C-16	Complete work along FDR first, then complete remainder of work in segment	2
C-17	Use segmented tunnel plant techniques to build Con Ed tunnel	5
C-18	Use sheet pile/shoring as permanent wall for tunnel	3
C-19	Advance order long-lead items to improve schedule and use HUD money	DS
C-20	Pre-cast U-shape and place on tunnel slab	8
C-21	Make Con Ed tunnel construction Con Ed's responsibility	2
C-22	Have a consistent wall section to allow pre-fab	3
C-23	Purchase silent piler equipment and lease back to contractor	5
C-24	Consider separate early utilities contract	7
C-25	Contract grow plants	0
C-26	Identify soil source that will meet specifications	7
C-27	Conduct public community meetings	0
C-28	Allow old/new pedestrian bridge for transporting materials	1
C-29	Use pedestrian bridge for staging area	0
C-30	Encourage use of VECPs	1
C-31	Identify disposal sites for clean and contaminated soils	0
C-32	Prepare alternate bid options for precast wall and tunnel sections	4
C-33	Build Asser Levy and Murphy's Brothers playgrounds as early package	7
C-34	Make pedestrian bridges an early package	6
C-35	Complete bulkhead repairs as an early package and part of this project	DS
C-36	Use A + B bidding	DS
C-37	Use 2-stage bidding process; pre-qualify bidders	1
C-38	Keep landscape packages small enough to encourage competition	DS

Idea No.	Description	Votes
C-39	Use owner's rep in lieu of CM for landscaping packages	2
C-40	Use southbound service road as part of FDR mainline and shift traffic west	8
C-41	Closure at entrance ramp at Avenue C to allow lane shift on FDR	0
C-42	Redesign work to eliminate long-term closures on FDR	7
C-43	Hire program manager now	1
C-44	Look for experienced contractor to assist with constructability review	7
C-45	Hire USACE person to review plans	0
C-46	Consider weekend work for lane closures	7
C-47	Use lightweight fill and eliminate stone columns at MSE walls	6
C-48	Identify poor condition area of bulkhead section and rebuild to allow use of barging	3
C-49	Rebuild esplanade area out to allow barging and recapture space for park land	4
C-50	Use landing barge or floating dock to allow landing in shallow areas	13
C-51	Allow a construction access (road) by building a temporary berm at Houston Street for construction access into the park	8
C-52	Eliminate backslope on levee where it adjoins jersey wall	2
C-53	Match tunnel design to locally available pre-cast segments	6
C-54	Eliminate on-ramp at Montgomery completely	0
C-55	Reroute pedestrian/bike traffic to minimize interference with construction	7
C-56	Move shared use path to the water side	2
C-57	Design fence to minimize debris catching	1
C-58	Evaluate project schedule with regard to risk	DS
C-59	Include flood engineering expertise in negotiations for environmental permitting in water	4
C-60	Focus the HUD scope of work on CSO construction and park utilities as an early contract	DS
IA - Improve Access		
IA-01	Build a heliport for emergency access	1

Idea No.	Description	Votes
IA-02	Reinforce area of sports fields for heliport	0
IA-03	Rebuild Houston Street pedestrian ramps to handle HS-20 loads	12
IA-04	During construction, remove FDR jersey barrier in several places to facilitate night time construction vehicle access	9
IA-05	Add a new ingress/egress for vehicle access at north end of park	7
IA-06	Use straight stairs and elevator in lieu of ramp	0
IA-07	With elevating park, add connections back to city	2
IA-08	Resignalized at Houston street to allow bicycle and small vehicle access into park	1
IA-09	Increase Delancey Street bridge rating to HS20	3
IA-10	Change allowable grades to ADA (1 on 12) to Universal ADA	2
IA-11	Increase capacity of Corlears Hook bridge	7
IA-12	Make Delancey Street bridge perpendicular to FDR	0
IA-13	Replace several adjacent bridges with a deck	0
IA-14	Put a catwalk on top of roller gate for emergency access	0
IA-15	Put a tramway to transport people from Thompkins Park across FDR	0
IA-16	Use a pre-fab bridge design at pedestrian bridge crossings	17
LI - Limit Inundation		
LI-01	Install popup wall	0
LI-02	Construct levee out of roller compact concrete	3
LI-03	Install remote operation of service gates	4
LI-04	Install transparent barrier in critical locations and berm	4
LI-05	Eliminate berm and Con Ed tunnel except at bridge crossovers	7
LI-06	Lower the final park elevation by 1 foot and reduce the cross section of the horticultural soil	12
LI-07	Reduce horticultural soil	7
LI-08	Construct rectangular CSO conduit under the tunnel	4
LI-09	Offset wall to the east of Con Ed lines; add roller gates to maintain viewshed and access	2

Idea No.	Description	Votes
LI-10	Lower top of wall to 13.5' then raise in future as needed	2
LI-11	Separate transmission line project and make Con Ed responsible	4
LI-12	Build wall on west side of the highway	5
LI-13	Contract grow the plants	4
LI-14	Simplify levee and use a high-performance erosion control mat in lieu of clay	9
LI-15	Use a thin veneer of clay	6
LI-16	Use landscape planting erosion control to reinforce levee	3
LI-17	Install intermittent wave deflection for overtopping	0
LI-18	Replace clay with a stem wall extending from Con Ed tunnel	2
LI-19	Move flood protection to water side of esplanade	7
LI-20	Standardize all deep foundations for the wall and use auger cast piles	7
LI-21	Relocate Con Ed lines as close to esplanade/water side to simplify flood wall	2
LI-22	Use raising (lift) gates across FDR and where applicable	1
LI-23	Use inflatable dams in lieu of flood gates	0
LI-24	Raise height of levee to force overtopping to concrete wall areas and eliminate clay and erosion control mat	2
LI-25	Use flex gates in lieu of roller gates	4
LI-26	Use portable electrical gate operators for roller gates	2
LI-27	Plant trees on top of levee to reduce wave impact and alienation cost	1
LI-28	Use landscaping features to break up waves	0
LI-29	Elevate park high enough to eliminate wall	9
LI-30	Rebuild promenade as a flood wall and provide gate access where needed	8
LI-31	Relocate Con Ed lines to southbound sidewalk across FDR Drive	1
LI-32	Reuse excavated material from Con Ed lines for levee construction	3
LI-33	Identify levee as berm in the plans	3

Idea No.	Description	Votes
LI-34	Flatten landside of levee to reduce overtopping and landscaping	1
LI-35	Shift all construction to the east to avoid closures on FDR	8
LI-36	Form a safety shape into the floodwall and eliminate the jersey barrier	3
LI-37	Move wall far enough east to avoid Con Ed lines	6
LI-38	Use only I-wall the entire length	10
LI-39	Harden the wall for scour from wave overtopping	0
LI-40	Disconnect the sheet pile from tunnel where there are no deep foundations	0
LI-41	Use bottom-hinged gates at road closures	11
LI-42	Use bottom-hinged gates as a floodwall	7
LI-43	Use lightweight fill and eliminate deep foundations for the tunnel	10
LI-44	Use flowable backfill around the conduit including thermal dissipation system	1
LI-45	Decrease the size of the tunnel	1
LI-46	Make the tunnel the minimum required size	2
LI-47	Eliminate tying into Con Ed facility by using a barrier wall in the river around the intake structure	0
LI-48	Use TBM in lieu of rectangular culvert and replace conduit	0
LI-49	Use soil modification to eliminate piles under tunnel and other sections	7
LI-50	Relocate Con Ed lines along new alignment	7
LI-51	Use chamber in lieu of tunnel for Con Ed lines	3
LI-52	Put a walkway on top of levee for overtopping	5
LI-53	Expose the landside/west side face for scour protection on that side of the levee	0
LI-54	Build an elevated section above FDR, route traffic over it, build a barrier underneath it	4
LI-55	At t0th street overpass shift the SUP to the east to allow grading down to FDR and flood wall	2
LI-56	Eliminate all temporary sheet pile; make it permanent	4

Idea No.	Description	Votes
LI-57	Either move wall or Con Ed cable to eliminate overlap (See sta. 70+21)	1
LI-58	Use floodwall to support sources of renewable energy	0
LI-59	Raise service road and ramp at Montgomery Street to eliminate two gates	1
LI-60	Build a double sheet pile wall in the water around the Con Ed intake structure	1
LI-61	Tie floodwall into either side of the Con Ed intake structure and keep the floodwall on the east side of the FDR	13
LI-62	Extend an I-wall from intake structure to a point north of Stuyvesant park	5
LI-63	Extend I-wall from north of the intake structure tying into a crossing at FDR	4
LI-64	Cross FDR as planned and tie back into east side of FDR as quickly as possible	2
LI-65	Move wall inland at Avenue C; follow along west side of FDR to reduce number of gates	3
LI-66	Configure Gate 11 to be perpendicular to roadway to shorten the gate width	1
LI-67	Reduce side of Gate 15 to match crosswalk width	4
LI-68	Move wall to river side of BP Station to eliminate gates	2
LI-69	Install flood barriers in river north and south of project limits to provide protection all along Manhattan coast	1

DS – Indicates the Idea was selected to be written as a Design Suggestion and is included in the Design Suggestion Section of this report

RR – Indicates the Idea received enough votes by the Value Team to be developed. However, during the Development Phase the team found that the Idea was not feasible. Therefore, it has been designated RR indicating that it was Reviewed and Rejected by the Value Team.

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STUDY **East Side Coastal Resiliency** *DATE:* **Tuesday, March 6, 2018**

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OMB TECHNICAL SERVICES UNIT
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VETC [redacted] **SVS, Inc.**

LOCATION **OMB, 255 Greenwich Street, 8th Floor, Conference Room S1-S2**

STUDY **East Side Coastal Resiliency** *DATE:* **Tuesday, March 6, 2018**

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25. [redacted]	AKRF	Phone [redacted] Fax E-Mail [redacted]
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36. [redacted]	Slocum Construction Consulting	Phone [redacted] Fax E-Mail [redacted]
37. [redacted]	Slocum Construction Consulting	Phone [redacted] Fax E-Mail [redacted]
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E – MATERIALS PROVIDED

Materials Provided

Document	Prepared by	Date
ESCR Traffic Study, Project Area 1	AKRF/KSE	October 2015
ESCR Traffic Study, Project Area	AKRF/KSE	October 2015
ESCR Preliminary Design	AKRF/KSE	November 10, 2017
Scope of Work- Parallel Conveyance & Isolation Gates	AKRF/KSE	Dec 2017, Rev Jan 2018
ESCR Traffic Studies for East 10th and East 23rd Streets	AKRF/KSE	January 2018
ESCR Interior Drainage Management Conceptual Design Workshop	ORR/DDC/DOT/DEP/DPR	Jan 24, 2018
FDR Lane Closures, DDC Alternate VI	Unknown	Jan 30, 2018
FDR Lane Closures DOT Option A	Unknown	Jan 30, 2018
Field Usage Summary	DPR	Feb 2018
ESCR Contracting Meeting Minutes		Jan 9, 2018
ESCR Construction Phasing & Schedule Meeting	ORR/DDC/DOT/DEP/DPR	Feb 9, 2018
FDR Lane Closures for ESCR	AKRF/KSF	Undated
FDR Drive Closure Recommendation & Impacts	NYCDOT	Feb 22, 2018
ESCR Preliminary Geotechnical Report	AKRF/KSF	Nov 30, 2018
Traffic Counts for FDR NB, FDR SB,	NYCDOT	

F – PROJECT DESCRIPTION

EAST SIDE COASTAL RESILIENCY

PROJECT DESCRIPTION

The Office of Management and Budget, in conjunction with the New York City Office of Recovery and Resiliency (ORR) and the Department of Design and Construction (DDC) conducted a Value Engineering (VE) study of the preliminary design for the East Side Coastal Resiliency Project (ESCR). The designer for this project is a joint venture led by AKRF-KSE.

BACKGROUND

The damage done in 2012 when storm surge from Hurricane Sandy made landfall in New York City revealed a vulnerability that threatened residential and commercial property, open space, and critical infrastructure. To protect the east side of Manhattan from a repeat of the flooding it experienced, the City is now proposing to construct an integrated coastal flood protection system along a stretch of the East River coastline, and to make related improvements to City infrastructure.

The ESCR project originated from the Rebuild by Design competition, in which New York City was awarded $335 million in US Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) funding to implement the first phase of the winning concept. Development is planned for a 2.4-mile span of eastern Manhattan, from Montgomery Street in the south to East 25th Street in the north. It will tie in to an existing flood protection system at the VA Medical Center at East 25th Street. The project area is divided into two sub-areas labeled Project Area

One and Project Area Two, and consists primarily of City property, including parkland and rights-of-way.

PROJECT GOALS

- To reduce future risk caused by coastal flooding and climate change to the East River Park and the Lower East Side of Manhattan
- To provide a reliable, integrated flood protection system that minimizes the use of closure structures
- To achieve implementation milestones and project funding allocations as established by HUD
- To provide resilient park landscapes
- To improve community connection to and enjoyment of the waterfront through integrated landscape and urban design
- To retain and provide enhanced recreational opportunities to residents and visitors
- To achieve a practical and implementable design

SCOPE OF WORK

The designers describe the scope of work as including: "a reliable, adaptable, and integrated flood protection system, composed of a system of levees, floodwalls, and closure structures (flood gates) to reduce the risks of flooding associated with coastal storm tides within the Project Area. The design condition for the flood protection system was selected to be the 100-year Federal Emergency Management Agency (FEMA) Stillwater elevation plus wave action plus the New York Panel for Climate Change (NPCC) 90th percentile probability sea level rise for 2050. The design criteria for the flood protection system, as developed by the Design Team and presented to the City, additionally considers future adaptability of the flood protection system and the resiliency of the system in the event of storm conditions which exceed the design condition. In consideration of these elements, the Preliminary Design includes a flood protection system with a Minimum Design Elevation of +16.5 ft NAVD88 with foundations designed to provide future adaptability to a design elevation of +18.5 ft NAVD88."

The majority of the southern section, known as Project Area One, is comprised of East River Park. To reduce the impact of the flood protection system to the community, the grade of the existing parklands will be raised in some locations to crest above the design flood elevation to function as a berm or levee. Pedestrian bridges will be required for connectivity between the park and its surrounding communities.

At the north end of the site, known as Project Area Two, closure areas will be required in several locations. There are swing gates and roller gates proposed. The FDR Drive elevated roadway will have to bridge over the proposed floodwall at multiple points along this northern section. Located midway through this section is the Consolidated Edison complex, which has utility infrastructure the design must accommodate. Similarly, two playgrounds must be integrated into the protection plan.

In the interest of enhancing drainage capacity in the project area, a parallel sewer conveyance system will be activated during large storm events. The conceptual design called for tank storage, but this was removed due to complexity and cost concerns. This design will require aboveground enclosures for interceptor gates.

PROJECT BUDGET

HUD funding through a City Development Block Grant in the amount of $338 million is expected to be spent and reimbursed by September of 2022, with an allocation of $250 million of this towards ESCR construction. City capital funding is expected to make up a portion of further costs.

PROJECT SCHEDULE

The Final Design phase will finish before 2019, with a land use proposal (ULURP) and Environmental Impact Statement (EIS) to follow shortly thereafter. Construction is to begin in spring of 2019, with a planned five-year duration. Because HUD funding requires reimbursement by 2022, a significant portion of the construction will have to be completed prior to that date.

G – VALUE STUDY PROCESS

VALUE STUDY PROCESS

This section describes the process used to conduct this Value Study and the significant findings of the Value Team. This Value Study used the international standard Value Methodology established by SAVE International, the Value Society. The standard establishes the specific 6-Phase, sequential process, and the objectives of each of those phases, but does not standardize the specific activities in each phase.

Value Methodology (VM) is the general term that describes the structure and process for executing the Value Workshop. This systematic process was used with a multidisciplinary team to improve the value of the project through the analysis of functions and the identification of targets of opportunity for value improvement.

The **Job Plan** provides the structure for the activities associated with the Value Study. These activities are further organized into three major stages:

1. Pre-Workshop preparation
2. Workshop
3. Post-Workshop documentation and implementation

Figure G-2 at the end of this section shows a diagram of the Job Plan used for this Value Study.

Defining Value

Within the context of VM, Value is commonly represented by the following relationship:

$$\text{Value} \approx \frac{\text{Function}}{\text{Resources}}$$

In this expression, functions are measured by the performance requirements of the customer, such as mission objectives, risk reduction and quality improvements. Resources are measured in materials, labor, price, time, etc. required to accomplish the specific function. VM focuses on improving Value by identifying the most resource efficient way to reliably accomplish a function that meets the performance expectations of the customer.

It can be seen from this relationship that Value is improved or increased by:

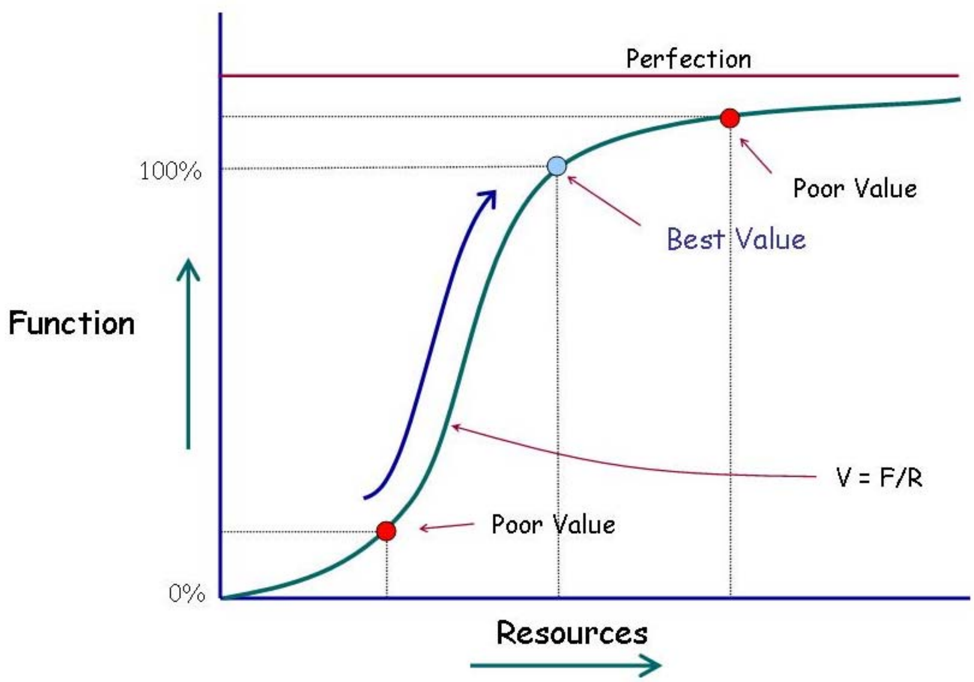
1. Increasing function without increasing resource consumption. Some increase in resources is acceptable as long as there is a greater increase in function performance.

2. Decreasing resources without decreasing function. Again, some decrease in function may be acceptable if the corresponding decrease in resources is significant enough.

Ideally, the Value Team looks for opportunities to increase function and concurrently decrease resource requirements. This will achieve the best value solution.

This Value concept is illustrated in the Figure G-1, The Value Curve. This figure shows a hypothetical curve from plotting the value expression above. This curve will asymptotically approach perfection. The best value solution for a given project or project element will be found at the knee of the curve. At this point the required function or functions have been achieved to 100% of the required level with a corresponding minimum resource commitment. To attempt to increase the function performance beyond this level will result in a resource consumption that has a higher worth than the marginal increase in function. This results in a poor value solution. Conversely, a poor value solution can also be the result of not achieving the function to 100% of the requirement. In this case, an incremental increase in resources delivers significant increase in function performance. The Value Methodology is used to identify the poor value decisions in a project and then develop alternative solutions to better align the project along this curve to achieve a best value solution.

Figure G-1
The Value Curve™



This understanding how Value is affected by changes in function or resources provides the foundation for all SVS Value Studies. The following paragraphs describe the process we used to understand the functional requirements and how we identified value improvement alternatives.

Pre-Workshop

Prior to the start of the workshop, the team was tasked with reviewing the most current documentation on the project development. This was done to familiarize them with the project documents and to prepare them for asking questions of the project stakeholders during the project presentations at the beginning of the workshop other activities included:

- Coordinating workshop logistics and communicating those to the various participants
- Determining necessary presentation content for the project introduction
- Scheduling workshop participants and assigning tasks to ensure the team is prepared for the workshop
- Gathering necessary background information on the project and making sure project documentation is distributed to the team members

Materials furnished to the team are listed in the Appendix.

Site Visit

A site visit was conducted prior to the workshop. This site visit was attended by representatives from the Value Team, Owner Agency, Designer, and OMB. The purpose of the site visit was to give the team members a first-hand opportunity to see the physical features that influenced the project development.

Workshop

The workshop was an intensive session during which the project was analyzed to optimize the balance between functional requirements and resource commitments (primarily capital and O&M costs).

The Job Plan used by SVS includes the execution of the following phases during the workshop:

1. Information Phase
2. Function Analysis Phase
3. Creative Phase
4. Evaluation Phase

5. Development Phase

6. Presentation Phase

Information Phase

At the beginning of the workshop, it was important to understand the background of the project at the level developed. This background was provided in an oral overview by the Owner Agency and the Designer. The overview and subsequent project analysis provided information on the following topics:

- Rationale why this project is necessary
- Project objectives that have governed the proposed project documents
- Rationale for the proposed configuration
- Explanation of features, criteria, and assumptions
- Value Study constraints
- Project cost

The Owner Agency and the Designer presentations provided the team with a presentation of the goals, issues, and expectations for the project. Further, this gave the designer an opportunity to share their issues and concerns about the project from their perspective. This included an explanation of the rationale behind key project decisions. The Owner Agency, the Designer, OMB, and the Value Team also finalized the Value Study constraints.

Function Analysis Phase

Function Analysis is the heart of the VM process and is the key activity that differentiates the VM process from other problem solving or improvement practices. During the Function Analysis Phase of the VM Job Plan, functions are identified that describe the expected outcomes of the project under study. Function Analysis also defines how those outcomes are expected to be accomplished. These functions are described using a two-word, active verb and measurable noun pairing.

This identification and naming convention of project functions enables a more precise understanding by limiting the description of a function to an *active verb* that operates on a *measurable noun* to communicate what work an item or activity performs. This naming convention also helps multidisciplinary teams to build a shared understanding of the functional requirements of the project.

Function Determination

Defining functional requirements for the project allowed the Owner Agency, the Designer, and OMB to be sure that the facility would fulfill the needed purposes. The entire project was analyzed to determine what functions are being accomplished.

Required functions were retained. Some functions were not necessary to accomplish the mission of the project and thus became candidates for deletion.

During the Function Analysis Phase, the Value Team used various function analysis techniques to analyze the project. This analysis helped the team confirm its understanding of the overall project objectives and analyzed the functions of key project elements. The Value Team Leader led the team through an in-depth discussion of the possible functions of each key project element to clearly and precisely identify the purposes of each.

FAST Diagram

Function analysis was enhanced by using a graphical mapping tool known as the *Function Analysis System Technique* (FAST), which allows team members to understand how the functions of a project relate to each other. The resulting FAST Diagram allowed quick visualization of the logical relationship between project functions and the project as a whole. The FAST diagram is in the Function Analysis section of the Appendix.

The FAST Diagram is structured such that moving to the right of any function answers the question, “How are we accomplishing this function?” Moving to the left of any function answers the question, “Why are we accomplishing this function?” Elements that are vertically connected occur “When” or as a consequence of the function it is connected to on the horizontal path.

Creative Phase

This step in the VM process involved generating ideas using creativity techniques. The team recorded all ideas regardless of their feasibility. In order to maximize the Value Team’s creativity, evaluation of the ideas was not allowed during the creative phase. The team’s effort was directed toward a large quantity of ideas. These ideas were later screened in the Evaluation Phase of the workshop.

The creative ideas generated by the team are included in the Appendix. The list also includes ratings for each idea based on the Evaluation Phase of the workshop. These lists should be carefully reviewed, as there may be other good ideas not developed by the team because of time constraints. These should be further evaluated or modified to gain the maximum benefit for the project.

Evaluation Phase

In this phase of the workshop, the team selected the ideas with the most merit for further development.

After an initial vote, the Value Team Leader assessed how many ideas could be developed into Value Alternatives within the remaining duration of the workshop. From this assessment, all ideas with a certain number of votes were selected for development. However, prior to the final selection, the results were revisited collectively by the Value Team to ensure that those selected by the voting process truly represented the best ideas for development. This gave the team the opportunity to down-rate some ideas and to up-rate other ideas based upon team discussion of the ideas.

The criteria used for selection were:

1. The inherent value, benefit and technical appropriateness of the idea

2. The expected magnitude of the potential cost savings, both capital and life cycle

3. The potential for acceptance of the idea

Ideas were selected for development as Value Alternatives based on all three criteria.

Not all ideas were developed. This evaluation process is designed to identify those ideas with the greatest potential for value improvement that can be developed into Value Alternatives within the time constraints of the workshop and the production capacity of the team. The remaining ideas were eliminated from further consideration by the team; however, the ideas not developed should also be reviewed, as there may still be other good ideas not developed by the team because of time constraints or other factors. These could be further evaluated or modified to gain the maximum benefit for the project.

To further ensure the Value Team is focused on developing the best ideas, a mid-point review meeting is conducted with the Value Team Leader, Owner Agency, Designer, and OMB. This mid-point review allowed the Owner Agency, Designer, and OMB to identify any fatal flaws in the ideas that were not apparent to the Value Team but were apparent to the Owner Agency, Designer, and OMB project teams because of their greater institutional knowledge of the project. These fatal flaws may be technical, operational, political, etc.

Development Phase

During the Development Phase of the workshop, each idea was expanded into a workable alternative to the original project concept. Development consisted of preparing a description of the value alternative, evaluating advantages and disadvantages, and making cost comparisons.

Each alternative is presented with a brief narrative to compare the original concept and the alternative concept. Sketches and brief calculations were also developed, if needed, to clarify and support the alternative. The value alternatives developed during the workshop are presented in Section 2 – Value Alternatives.

The Value Team Leader and, to the extent possible, other team members reviewed each alternative to improve completeness and accuracy.

Redesign costs are not included in the cost comparison of alternatives. The Owner Agency will be responsible for determining these costs.

Presentation Phase

The last phase of this workshop was the presentation of the Value Alternatives. The presentation was made by the Value Team to representatives of the Owner Agency's project team, the Designer, OMB, as well as other agencies involved. The Value Team described each Value Alternative and the rationale that went into the development. This was followed by answering the audience's questions. The acceptability of the Value Alternatives was deferred pending the project team's review of our Preliminary Report.

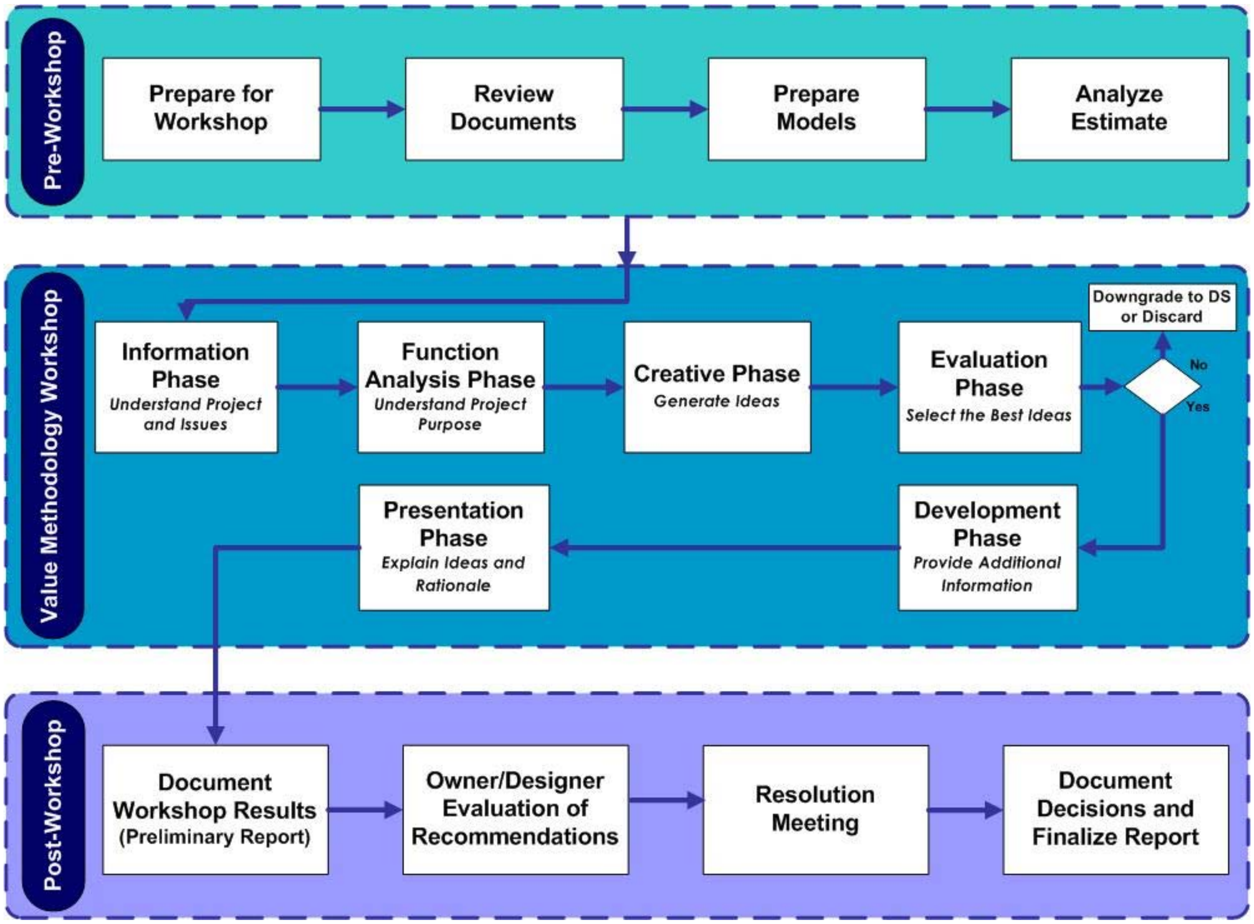
Post-Workshop

The Post-Workshop activities of this Value Study consisted of preparing the Value Study Reports. This Final Preliminary Value Study Report includes documentation of the Value process, as well as, the Value Alternatives developed during the workshop.

Implementation Results

The final phase of the VE process will consist of implementation decisions and actions by Owner Agency, Designer, and OMB. At a mutually agreed upon date, an implementation meeting will be conducted at OMB's offices to discuss each Value Alternative and design suggestion, answer questions, and decide what changes to make to the project.

Figure G-2
Value Engineering Process Diagram



H – AGENDAS

VALUE ENGINEERING ORIENTATION AGENDA

East Side Coastal Resiliency
New York City, NY

Date: **February 22, 2018**

Location: **OMB, 8th Floor Conference Room 8-S1/S2, Tel # (212) 788-6201/6202**

9:00 – 9:30	Welcome & Introductions	**[redacted], SVS & Jill Woller, OMB**
	Explanation of the Value Study Process • Review Agendas for both Orientation Meeting and VE Workshop, including City and Designer participation in the process	**[redacted], SVS**
9:30 – 9:45	Agency Opening Comments • Agency Goals and Objectives for the Project • Key Project Issues & Constraints	**ORR, DDC, DPR, DEP & DOT**
9:45 – 10:30	Project Design Presentation • Key Design Objectives • Overview of the project design • Project Challenges and Risks • Project Schedule	**AKRF/KSE**
10:30 – 10:45	Break	
10:45 – 11:30	Project Design Presentation (continued)	
11:30 – 12:00	Orientation Wrap-Up • Questions & Answers • Requests for Additional Information	**[redacted], SVS**
12:00 – 1:00	Lunch Break	
1:00 – 1:30	Travel to the project site	
1:30 – 3:30	Site Visit	**NYCDDC, AKRF/KSE, VE Team & OMB**
3:30	Adjourn the Meeting at the Project Site	
3:30 – 4:00	Travel back to OMB's office	

VALUE ENGINEERING WORKSHOP AGENDA

East Side Coastal Resiliency
New York City, NY

Date: **March 5-9, 2018**

Location: **OMB, 8th Floor Conference Room 8-S1/S2, Tel # (212) 788-6201/6202**

Monday

8:30 – 8:45	Kick-Off and Introductions	**[redacted],SVS & Jill Woller, OMB**
8:45 – 9:00	Agency Opening Comments Review of Agency Concerns and Goals Objectives and Constraints on the Value Study	**NYCORR, DDC, DPR, OMB, DOT & DEP**
9:45 –12:00	Designer In-Depth Presentation *Detailed Presentation of the Project Design including:* • *Key Design Considerations and Challenges* • *Description of the Project Elements and Features* • *Constructability Challenges* • *Design and Construction Schedule*	**AKRF/KSE JV**
12:00 – 1:00	Lunch Break	
1:00 – 5:30	Estimate Reconciliation ***Conference Room E4*** ***(Concurrent Activity)***	**Design Team Estimator / VE Team Estimator / Design Team Rep**
1:00 – 3:00	Team Review and Project Analysis	**NYC Agency Reps / VE Team / OMB**
3:00 – 5:30	Function Analysis	**NYC Agency Reps / VE Team / OMB**

Tuesday

8:30 – 11:00	Function Analysis (Cont.)	**NYC Agency Reps / VE Team / OMB**
11:00 – 12:00	Creative Idea Generation	**NYC Agency Reps / VE Team / OMB**
12:00 – 1:00	Lunch Break	
1:00 – 5:30	Creative Idea Generation (Cont.)	**NYC Agency Reps / VE Team / OMB**

Value Engineering Workshop Agenda continued

East Side Coastal Resiliency

New York City, NY

Wednesday

8:30 – 9:00	Creative Idea Generation (Cont.)	**NYC Agency Reps / VE Team / OMB**
9:00 – 12:00	Evaluation of Ideas	**NYC Agency Reps / VE Team / OMB**
12:00 – 1:00	Lunch Break	
1:00 – 5:30	Value Alternative Development	**VE Team / OMB**
3:00 – 4:30	Mid-Point Review of Ideas Selected for Development ***Conference Room # 8-E4*** ***(Concurrent Activity)*** *A review of the list of ideas selected for development with the objective of providing an opportunity to brief the designers and key Agency decision makers.*	**Limited NYC Agency & Design Team Reps / SVS / OMB**

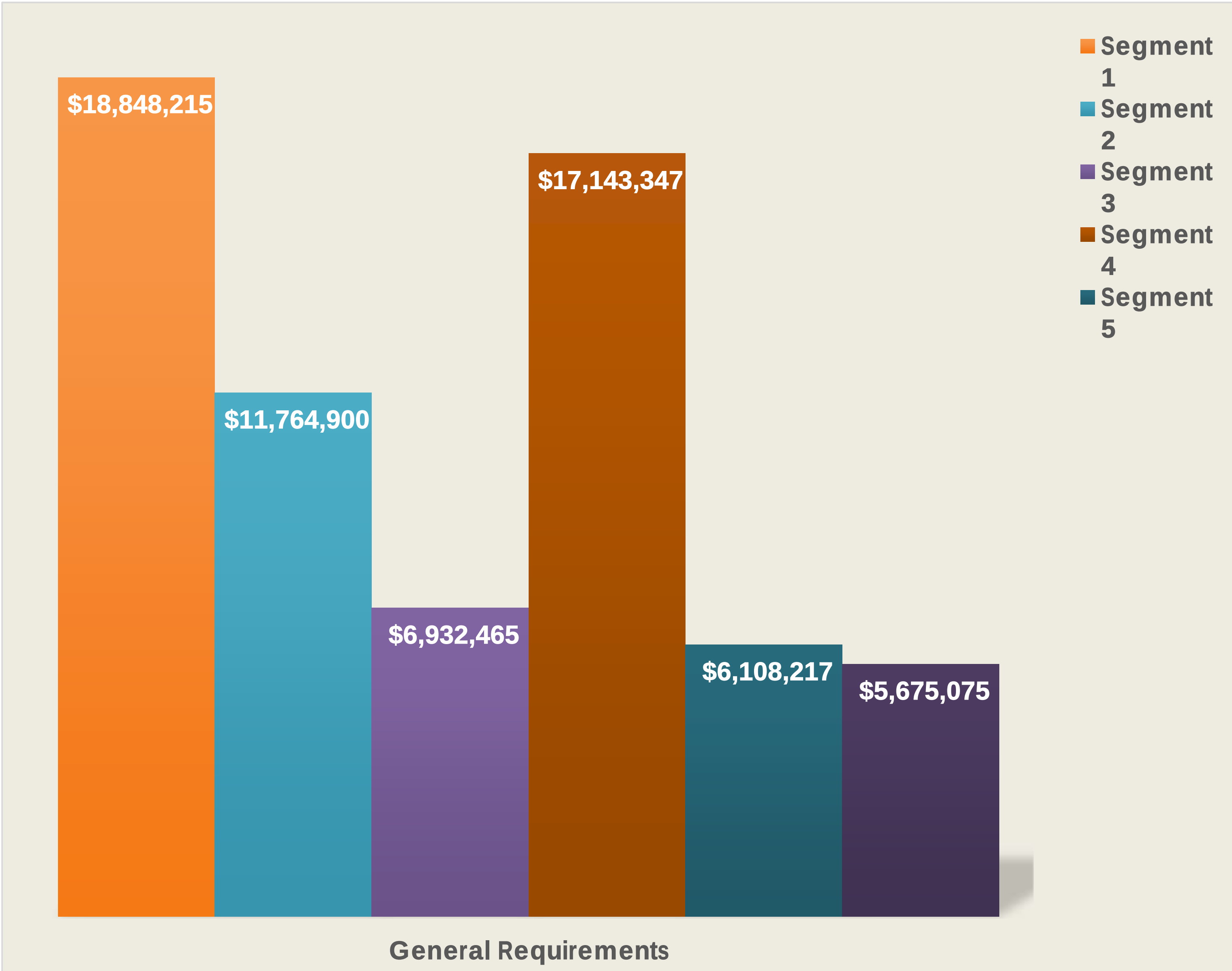
Thursday

8:30 – 12:00	Value Alternative Development (Cont.)	**VE Team / OMB**
12:00 – 1:00	Lunch Break	
1:00 – 6:30	Value Alternative Development (Cont.)	**VE Team / OMB**

Friday

8:30 – 11:00	Value Alternative Development (Cont.)	**VE Team / OMB**
11:00 – 12:00	Wrap Up Value Alternative Development	**VE Team / OMB**
12:00 – 1:00	Lunch Break	
1:00 – 2:00	Prepare for Value Team Presentation	**VE Team / OMB**
2:00 – 4:00	Value Team Presentation of Value Alternatives *The VE Team will present findings and recommendations with the objective of having an exchange of information.*	**ALL**

I – COST MODELS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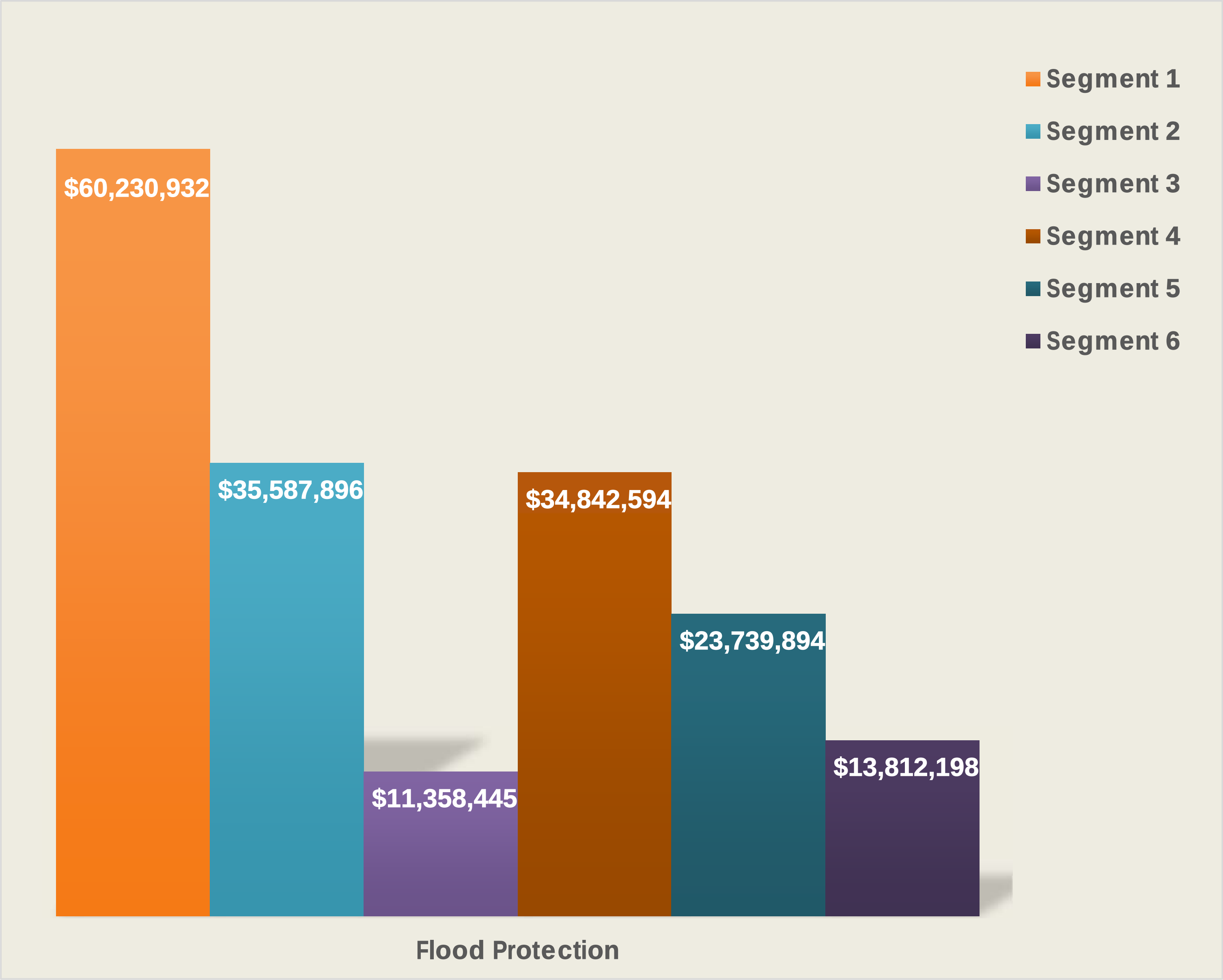
Segment 3
Segment 4
Segment 5
General Requirements



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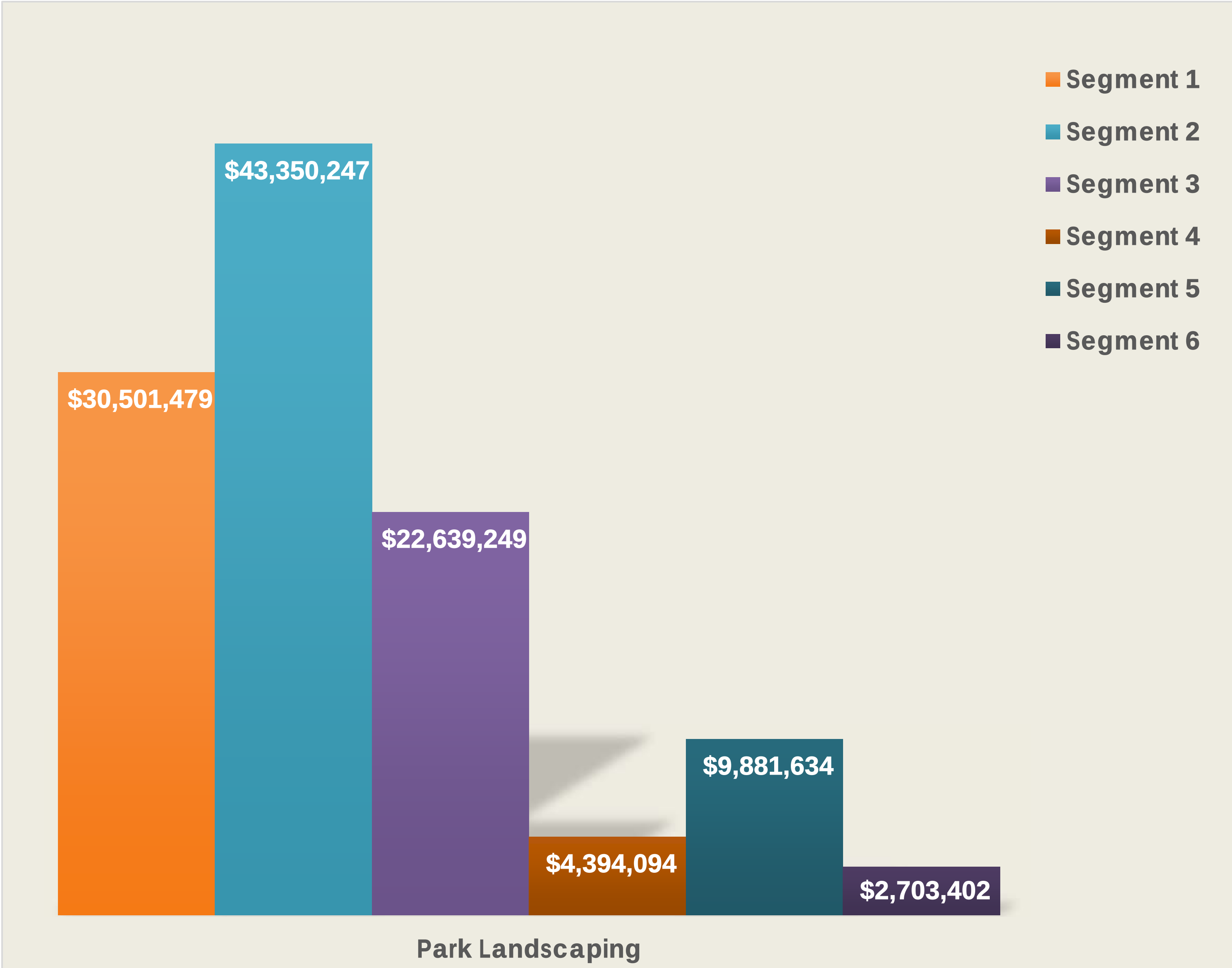

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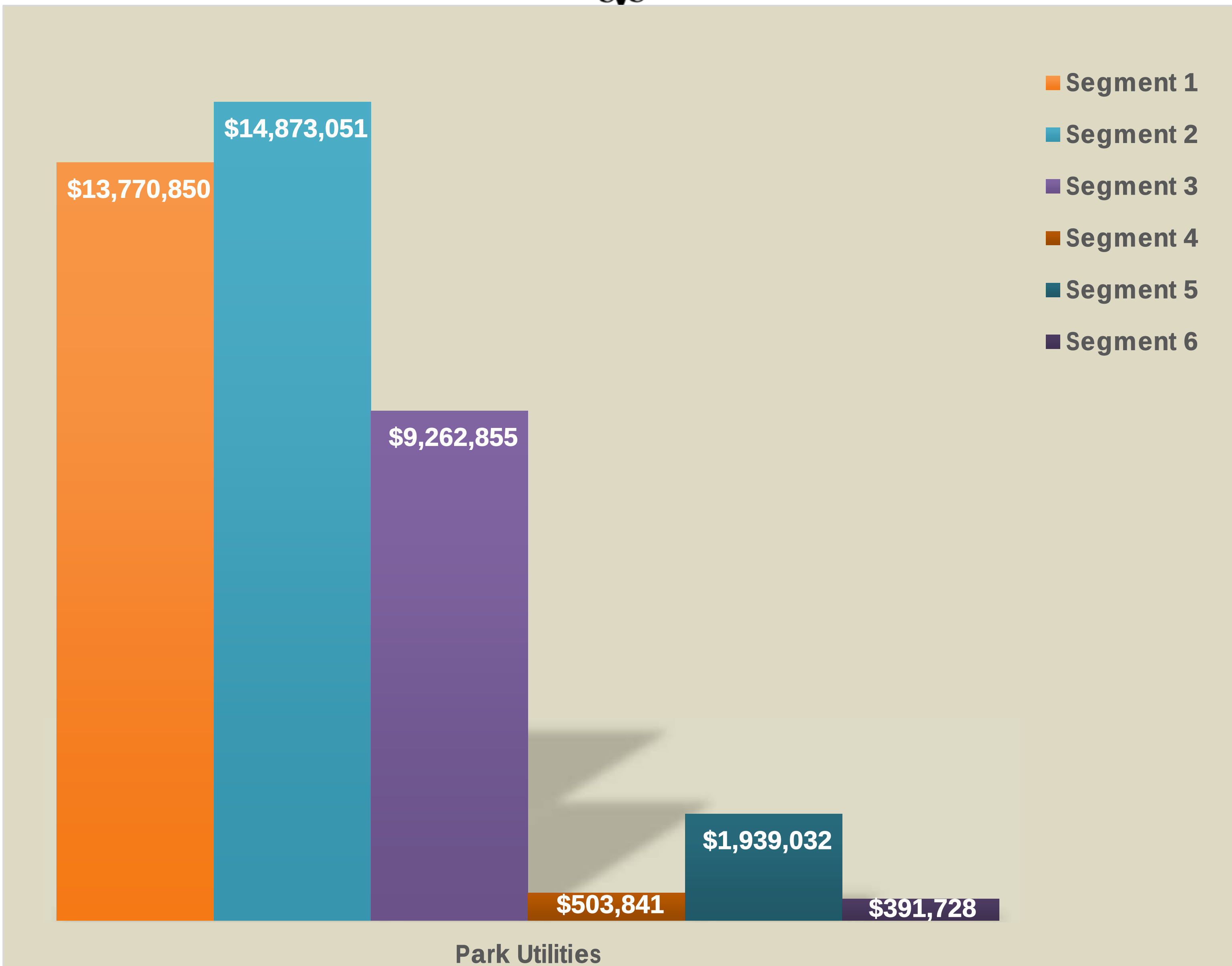
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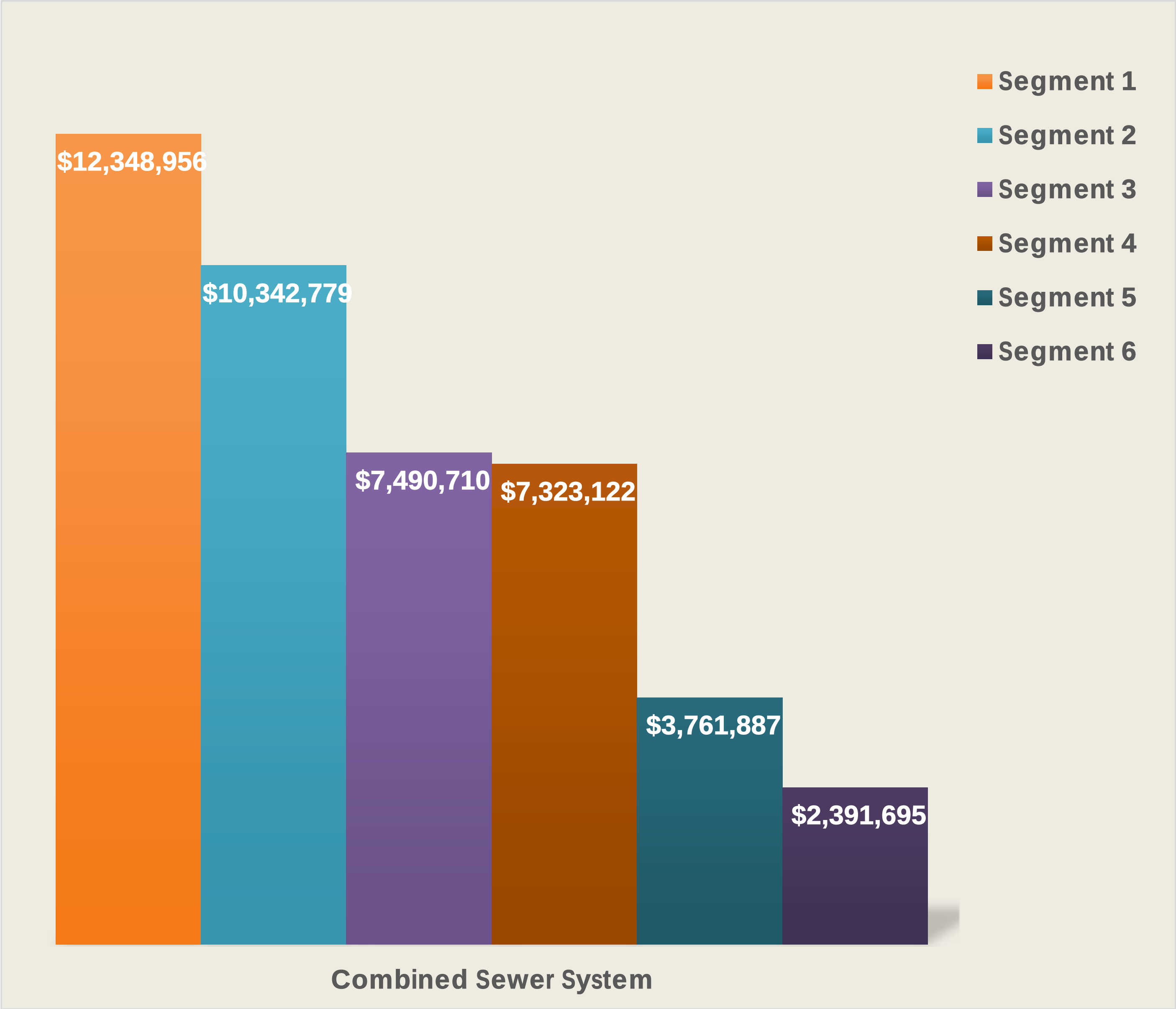
Park Utilities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Combined Sewer System