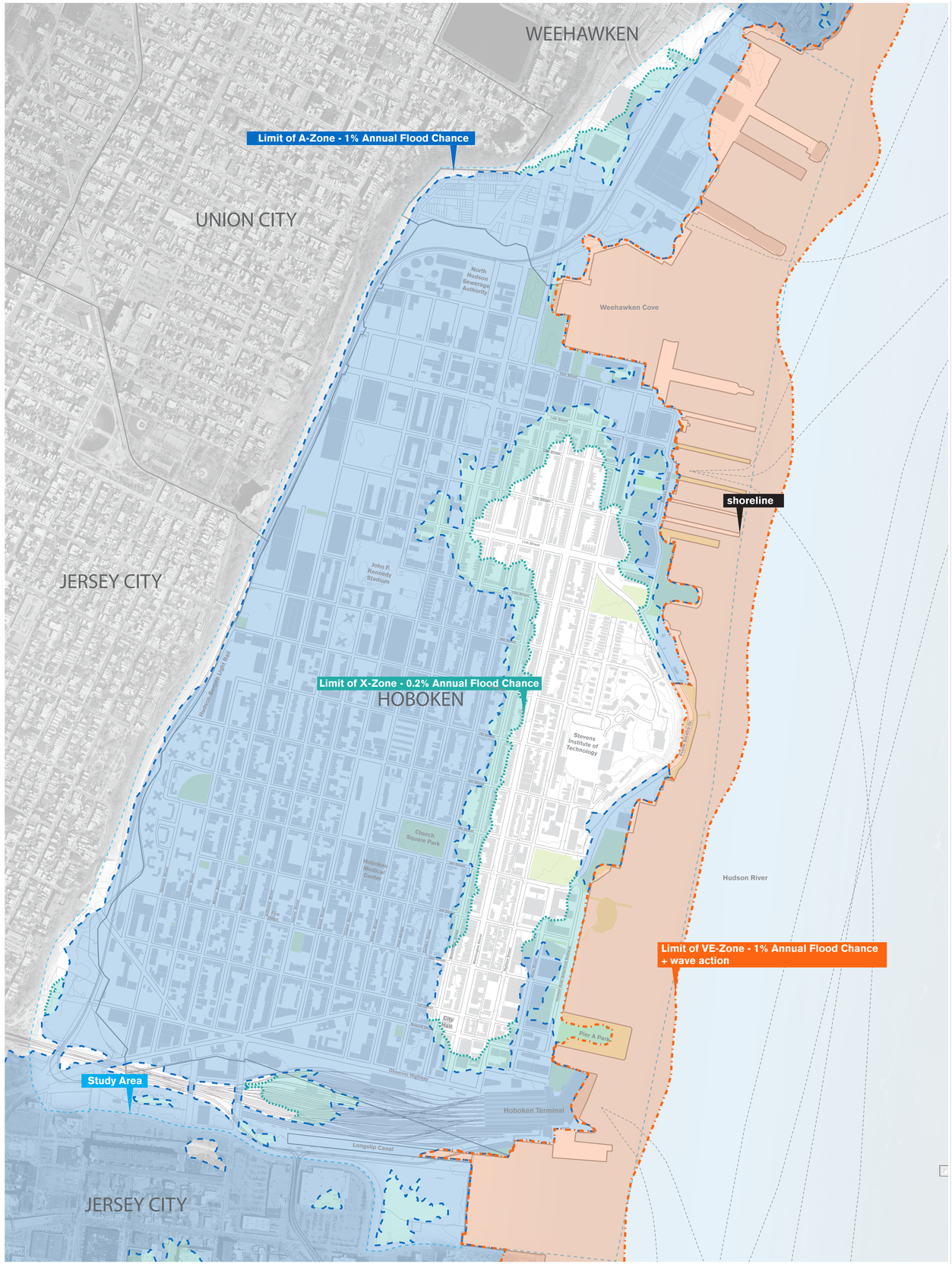
EXISTING CONDITIONS

FEMA FLOOD MAP

- Flood Insurance Rate Maps (FIRMs) illustrate the extent of flood hazards in a community by depicting flood risk zones and the Special Flood Hazard Area (SFHA). FIRMs also depict other information including Base Flood Elevations (BFEs) for the 1% annual chance storm event.
- FIRMs are used by FEMA to determine which properties should purchase flood insurance.
- FEMA is currently in the process of updating their flood maps for New Jersey to reflect new data so residents, homeowners, business owners, and community officials can better understand their flood risk and manage development. The flood map shown for here is the 2015 Preliminary FIRM. Once approved, this map will replace the previous FIRM.

Legend:

- Limit of AE-Zone
  1% Annual Flood Chance
- Limit of VE-Zone
  1% Annual Flood Chance
- Limit of B-Zone
  0.2% Annual Flood Chance
- AE-Zone
  1% Annual Flood Chance
- VE-Zone
  1% Annual Flood Chance
- B-Zone
  0.2% Annual Flood Chance
- Municipal Boundaries
- Study Area
- Ferry Lines
- Shoreline

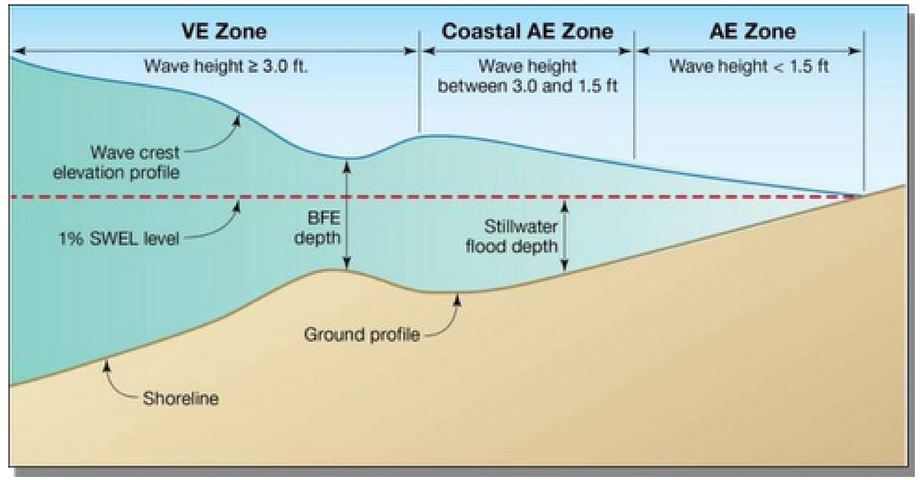


The Meaning of Flood Zones

Areas within the Special Flood Hazard Area (SFHA) or "A" zone have at least a 1% or 1 in 100 chance of flooding in any given year, and at least a 26% chance of flooding over the life of a typical 30-year mortgage. This is also referred to as the "100 year flood zone".

Other flood zones include the "V Zone" which is within the 1% annual chance flood area, but has the added risk of velocity and wave action during a 1% chance storm event.

Areas within the "X" or "shaded X" zone have a .2%, or 1 in 500 chance of flooding in any given year. This is also referred to as the "500 year flood zone".



source: FEMA

EXISTING CONDITIONS

FLOOD ELEVATION & MINIMUM HEIGHT REQUIREMENT

FOR 1% ANNUAL CHANCE STORM EVENT

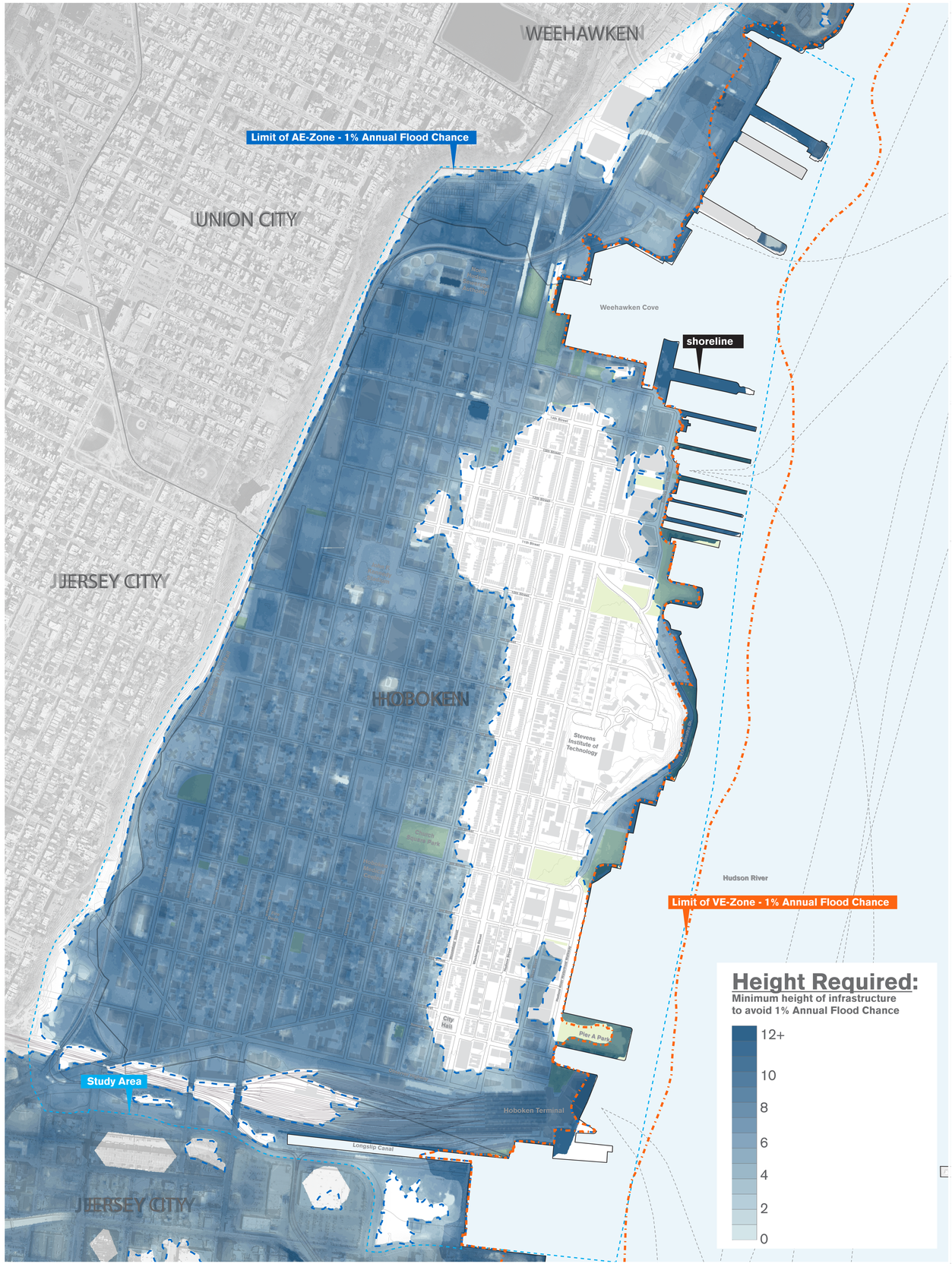
- For RESIST, the height required for intervention depends on the ground elevation at one specific location and the target flood level, plus freeboard at that same location.
- Ground elevations are lowest along the western edge of Hoboken and right at the shoreline.
- Flood elevations generally decrease further from the shoreline as wave energy flood heights are attenuated by the land.
- The height of a RESIST intervention is dependent on the the target flood elevation and the existing ground elevation.
- For this project, the MINIMUM proposed design elevation for RESIST elements is the Base Flood Elevation (BFE) for the 1% annual chance storm plus 2' of freeboard.

Legend:

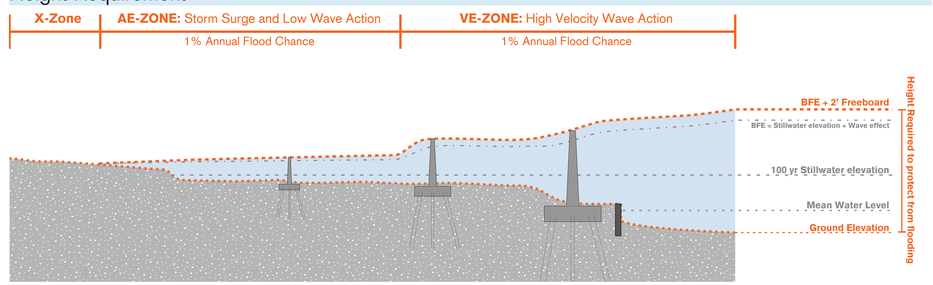
- Municipal Boundaries
- Study Area
- Ferry Lines
- Shoreline
- Limit of AE-Zone
  1% Annual Flood Chance
- Limit of VE-Zone
  1% Annual Flood Chance

N

0' 400' 800' 1,600'

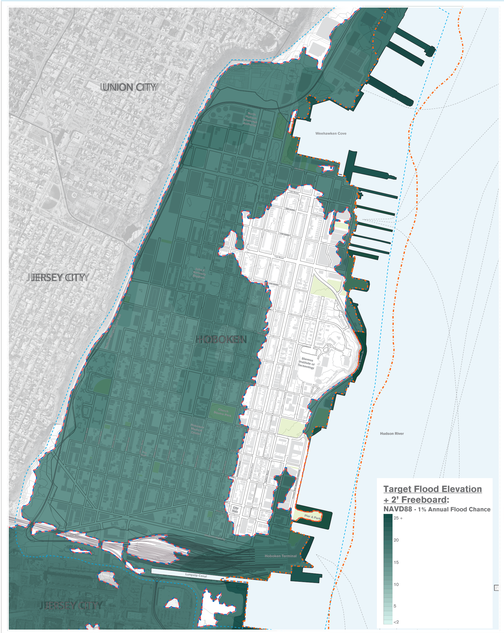


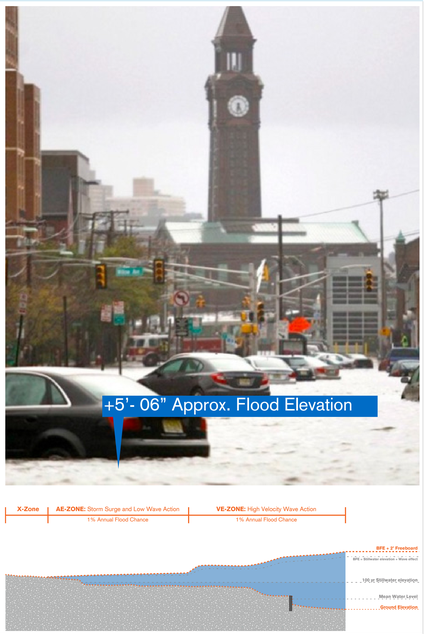
Height Requirement



Ground Elevation

Base Flood Elevation + 2' freeboard





EXISTING CONDITIONS

PUBLIC / PRIVATE PROPERTY

- In the study area, most land is privately owned.
- For the project, we are not considering interventions on privately owned land. We are considering using the public Right-of-Way.
- The limited number of public sites limits the range of intervention, leaving only few sites available to implement Resist, Delay, Store and Discharge.

North Hudson Wastewater Treatment Plant

1600 Park

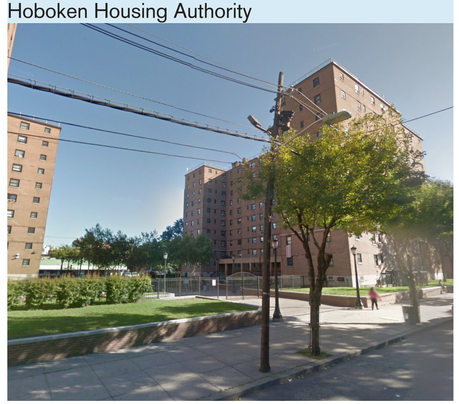
BASF Site

Hoboken Cove Boathouse

JFK Stadium

Church Square Park

Hoboken Housing Authority

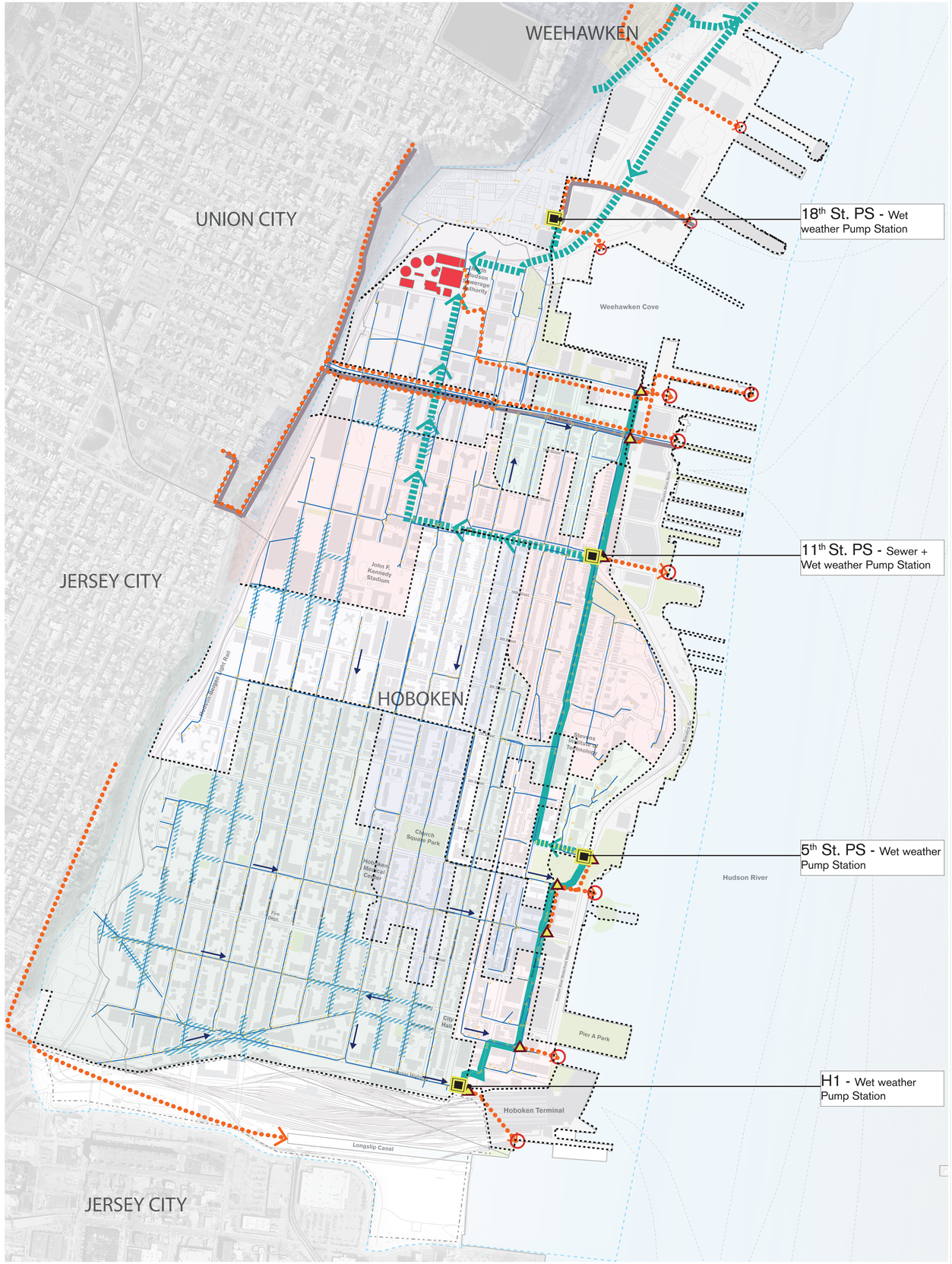


Hoboken Terminal NJ Transit

EXISTING CONDITIONS

THE SEWER SYSTEM

- In the study area, the sewer system is a combined sewer system, meaning wastewater and stormwater are collected within the same pipes.
- When the system is is at capacity, this combined sewage overflows directly in the Hudson River without any treatment.
- In the case of a high tide, the system cannot discharge into the river, and so pipes can back-up, resulting in localized flooding.



Legend:

Sewer **Lines**
- Gravity
- Interceptor
- Pressurized Lines (Siphon+ Forced mains)
- County Storm
- CSO Outfall Lines
- Pump Stations
- Regulators
- Wastewater Treatment Plant
- Existing Flooding "Hotspot"

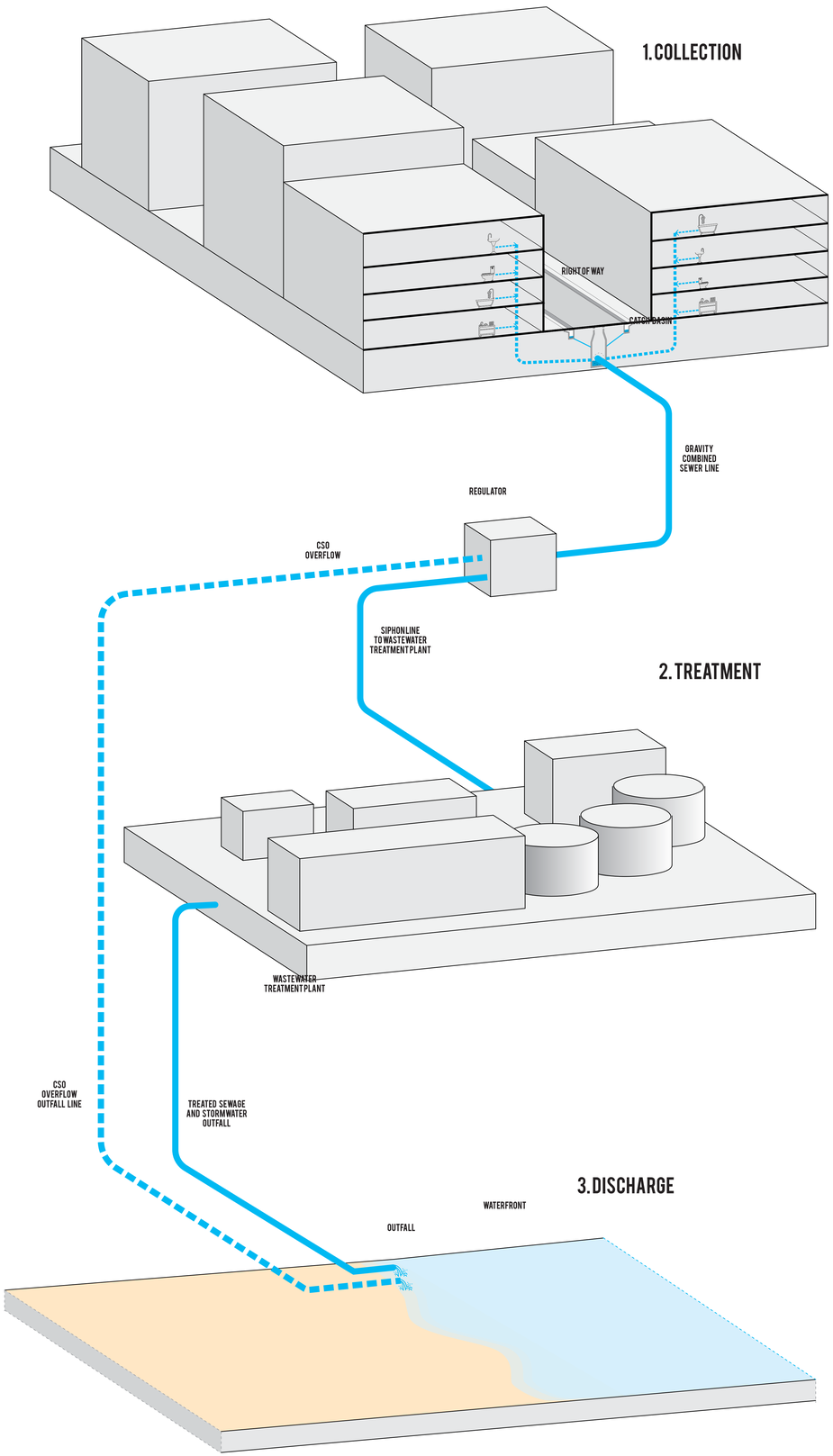
Sewersheds
- Municipal Boundaries
- Study Area
- Ferry Lines
- Shoreline

N

0' 400' 800' 1,600'

State of New Jersey Department of Environmental Protection

Existing Sewer System



▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

CONSTRAINTS AND MANHOLES

- Most utilities are located in the roadbed, leaving little to no room for stormwater storage infrastructure.
- Other utilities and streetscape elements are located witin the sidewalk
- The plan is to locate stormwater management largely within the sidewalk, but need to consider existing utilities and streetscape elements (locations adjacent to the curb near intersections may be feasible in some locations).
- Tanks for stormwater storage have to drain water flows downhill, otherwise a pump is needed, which is challenging, costly, and harder to maintain.

Legend:

Distance between top of manhole and sewer invert elevation:

- Deep (over 8 feet below grade)
- Shallow (Less than 8 feet below grade)
- Existing Flooding "Hotspot"

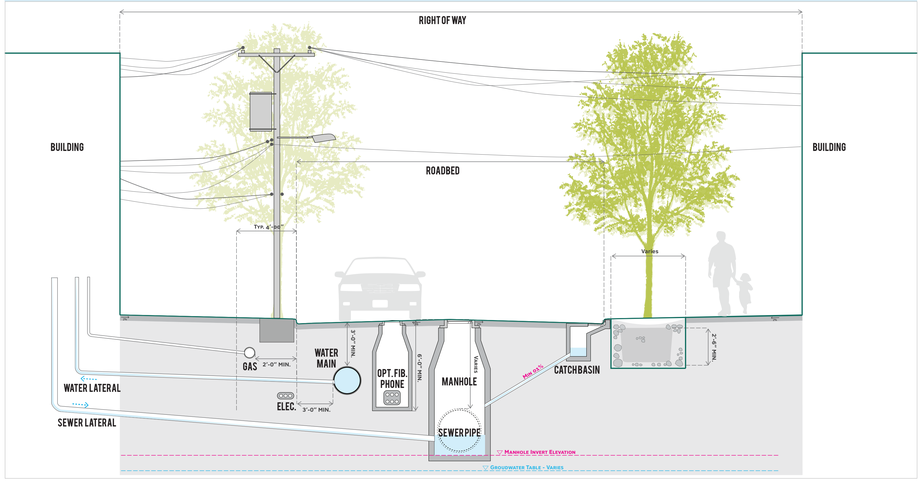
Sewersheds

- Municipal Boundaries
- Study Area
- Ferry Lines
- Shoreline

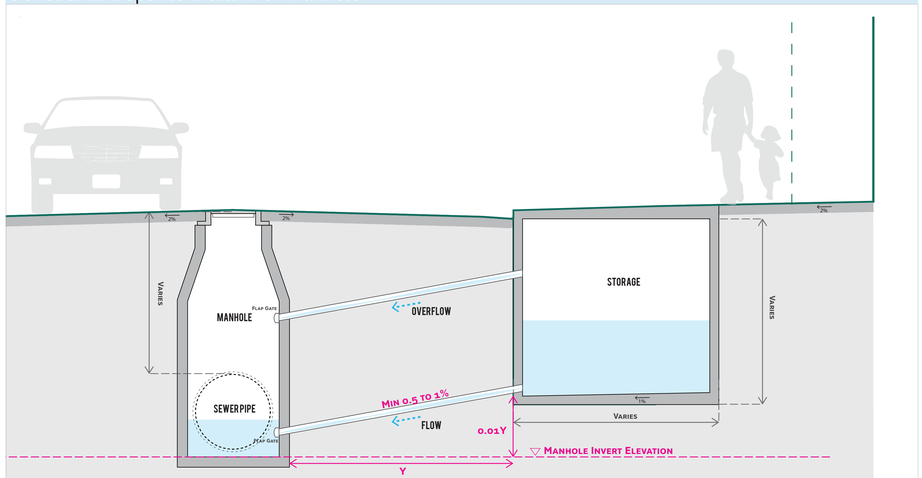
N

0' 400' 800' 1,600'

Constraint: Utilities



Constraint: Depth to Bottom of Manhole



DELAY
STORE
DISCHARGE

OVERALL STRATEGY

- Design proposal aims to maximize the potential to capture, store, infiltrate, evaporate, and release stormwater.
- Goal is to achieve community co-benefits while improving management of stormwater that could reduce rainfall flooding.
- Besides BASF site, all stormwater management strategies are entirely on publicly-owned land.
- Proposal uses both “green” and “grey” stormwater management strategies.
- The team considered physical, environmental and infrastructure constraints in locating and designing specific interventions.

Legend:

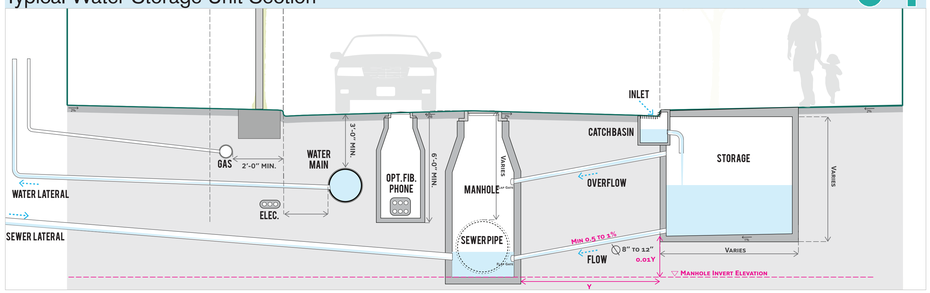
- Delay + Store - Parks
- Water Storage Sites
- Catchment Area
- New Outfall Pipe
- New Storm Sewer Pipe
- Hybrid Tank
- Tank
- Tank Bumpout
- Ongoing Projects
- Existing Flooding “Hotspot”
- Municipal Boundaries
- Study Area
- Ferry Lines

N

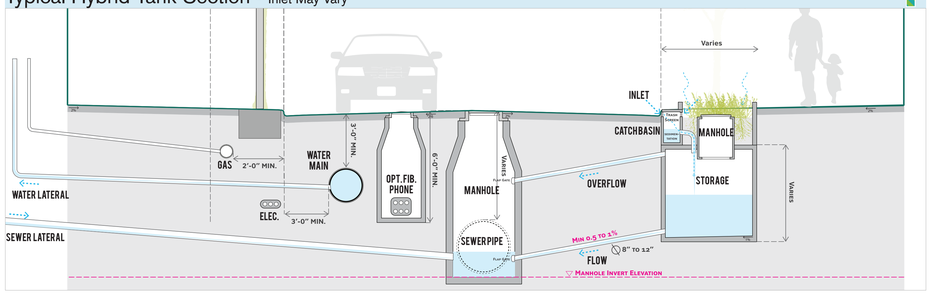
0’ 400’ 800’ 1,600’

State of New Jersey
Department of Environmental Protection

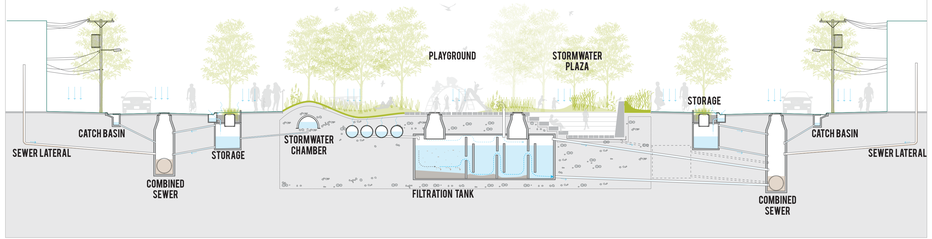
Typical Water Storage Unit Section



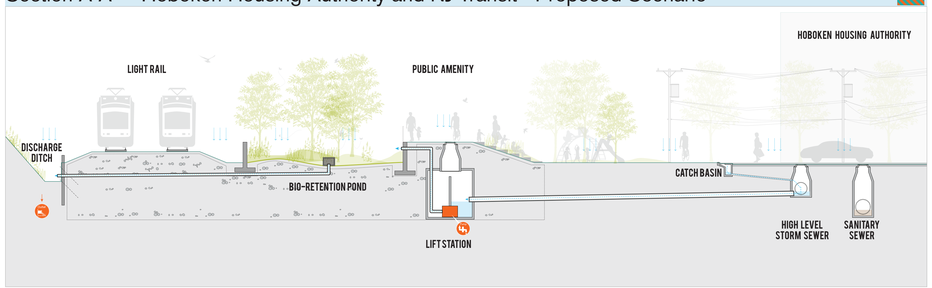
Typical Hybrid Tank Section - Inlet May Vary



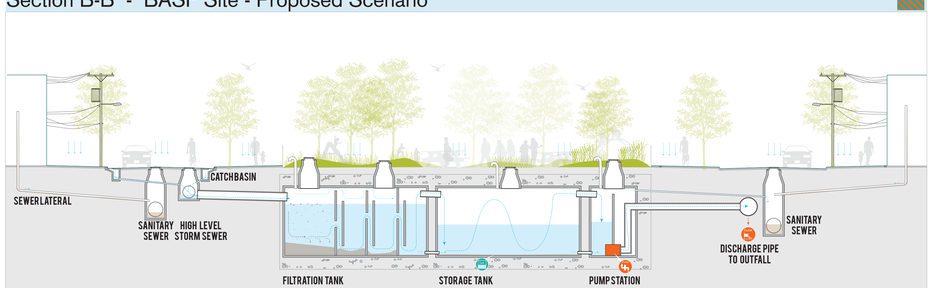
Typical Retrofitted Park Condition - Proposed Scenario



Section A-A - Hoboken Housing Authority and NJ Transit - Proposed Scenario



Section B-B - BASF Site - Proposed Scenario

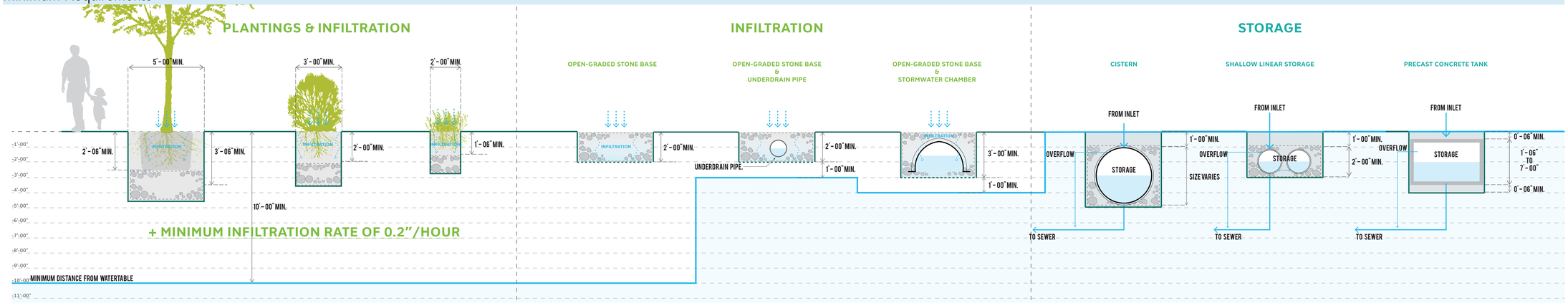


▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

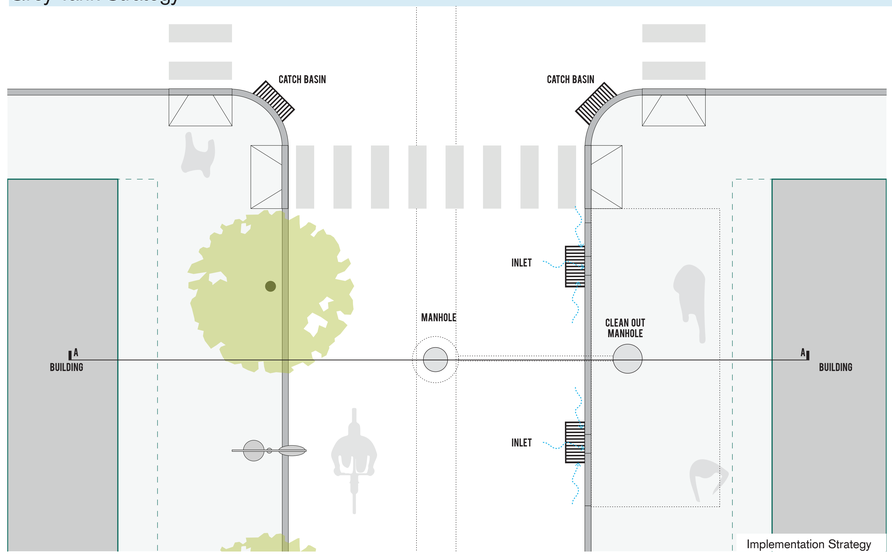
DELAY
STORE
DISCHARGE

PUBLIC RIGHT OF WAY: STRATEGIES

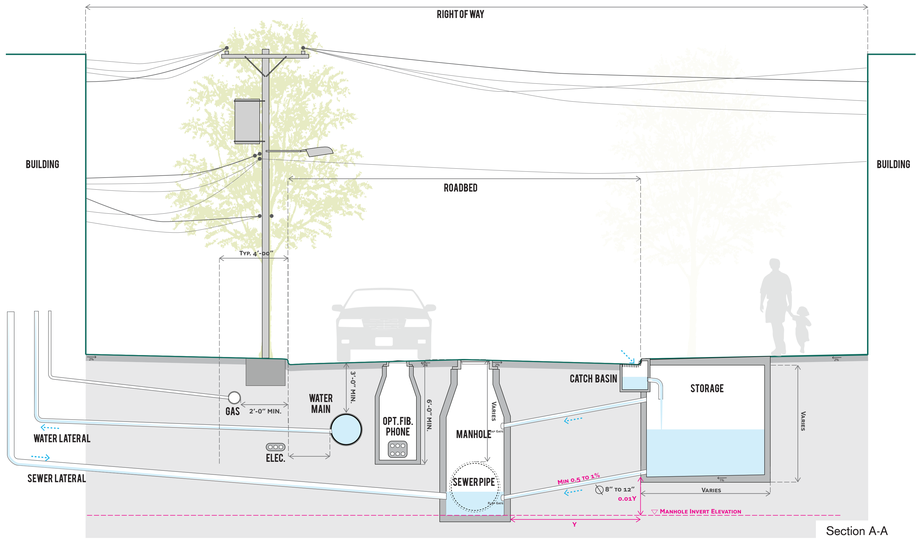
Minimum Requirements



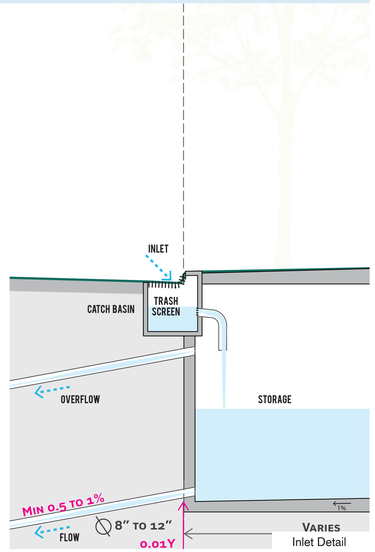
Grey Tank Strategy



Implementation Strategy

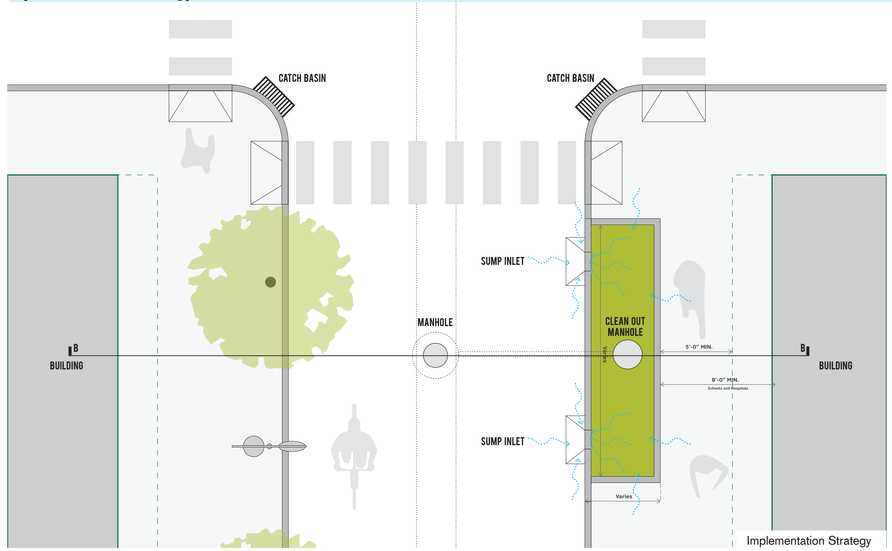


Section A-A

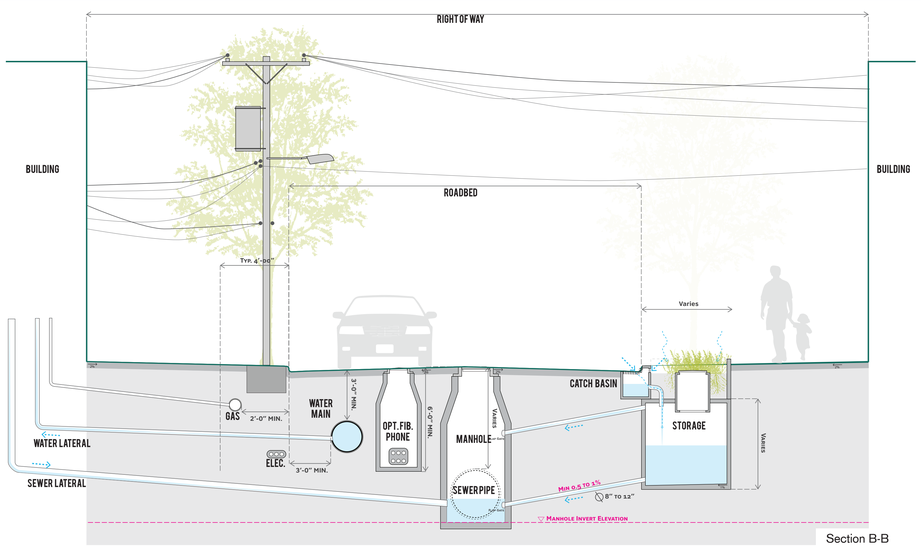


Inlet Detail

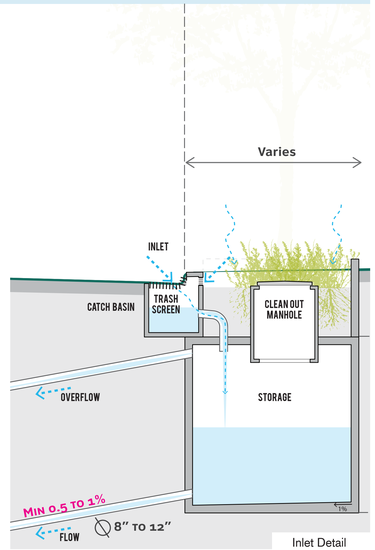
Hybrid Tank Strategy



Implementation Strategy



Section B-B



Inlet Detail

DELAY STORE DISCHARGE

PUBLIC RIGHT OF WAY: SITE SELECTION PROCESS

#01 - PUBLIC RIGHT OF WAY

#02 - SIDEWALKS

#03 - SITING CRITERIA

#04 - ADDITIONAL SURFACE CONSTRAINTS

#05 - UNDERGROUND UTILITY CONFLICTS

#06 - TANK CONNECTION

#07 - UPSTREAM LOCATION

#08 - NHSA BASF PROJECT

#09 - CATEGORIZE

#10 - ENVIRONMENTAL CONSIDERATIONS

NEXT STEPS ...

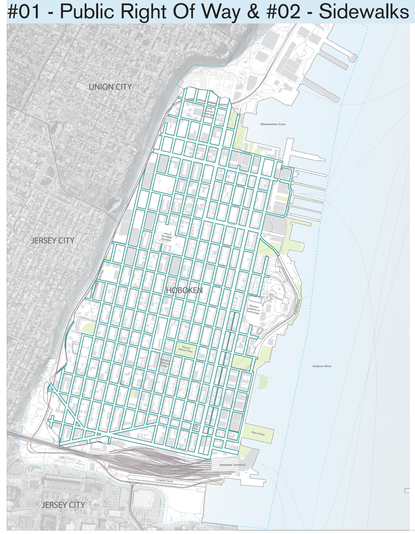
Legend:

- Public Right Of Way
- Sidewalk
- Screened out site
- Potential site
- Hybrid tank
- Tank
- Bumpout tanks
- Municipal Boundaries
- Study Area
- Ferry Lines

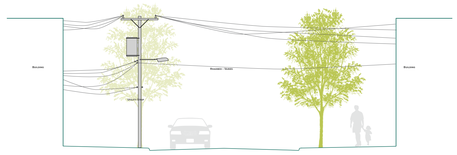
N

State of New Jersey Department of Environmental Protection

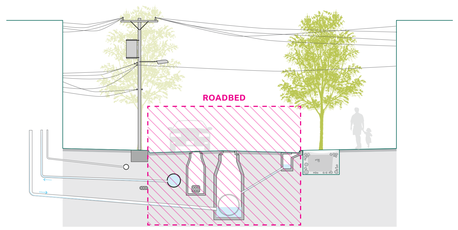
#01 - Public Right Of Way & #02 - Sidewalks



Consider only the public right of way

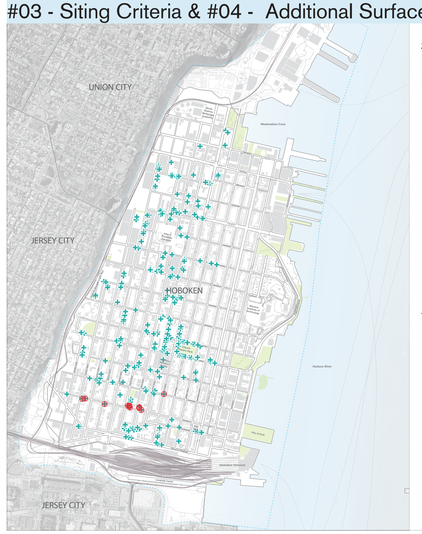


Sidewalks

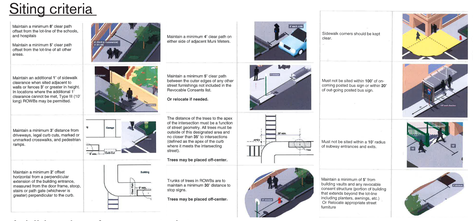


- Avoid conflict with major underground utilities which are generaly located within the roadbed.

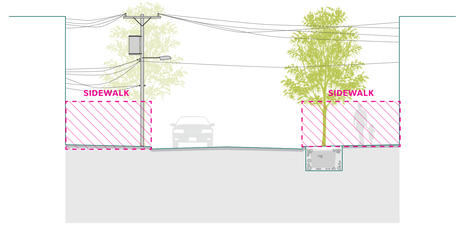
#03 - Siting Criteria & #04 - Additional Surface Constraints



Siting criteria



Additional surface constraints



- Define criteria to avoid conflict with existing urban fabric
- **Loading zones**: Loading area, clearance is there but cannot propose building in location.
- **Narrow streets**: Sidewalk width less than required clearance (<9') and based on city of Hoboken's criteria for siting bumpout, we cannot propose one.
- **Exisiting city projects**: City of Hoboken has ongoing project for bumpouts on different locations.

#05 - Underground Utility Conflicts

Underground utility conflicts

- NHSA main: North Hudson Sewage Authority main sewer lines are in or within 3' of edge of sidewalk.
- United Water:

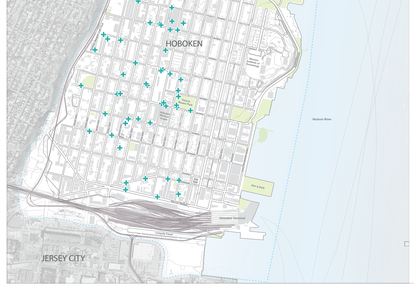
- United Water laterals crossing proposed location.

- United Water main water lines in or within 3' of edge of sidewalk.

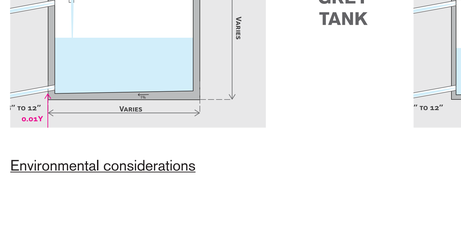
- United Water main water lines in or within 3' of edge of sidewalk and laterals crossing proposed location.

- Verizon: Verizon utility running underneath proposed location.
- Cable vision
- PSEG

#06 - Tank Connection & #07 - Upstream Location



Tank connection



Upstream location

- **Tank connection**: After running hydraulic calculations, we found that we cannot connect to existing manhole/ system, because existing manhole too shallow.
- **Upstream location**: Excess (reserved) sites that are located upstream of an existing site within the same tributary area. The reason we kept the downstream location is because of the potential for more gutter flow as well as to manage a reasonable percentage of runoff volume.

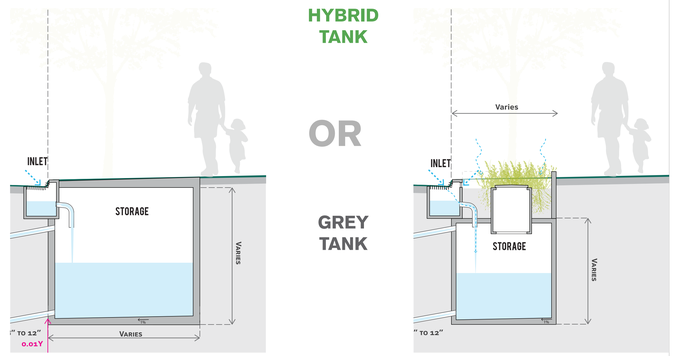
#08 - NHSA BASF Project

NHSA BASF project

- **NHSA BASF proposed site**: The site falls within the drainage area of the propose BASF project and stormwater capture and storage would be addressed by that intervention.

#09 - Categorize + Infiltration Tests & #10 - Environmental Considerations

Categorize

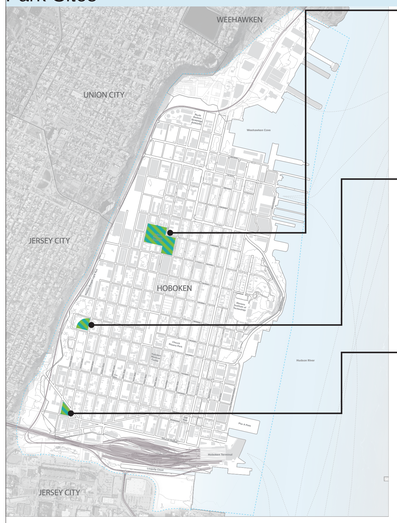


Environmental considerations

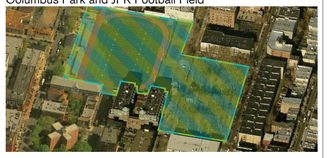
DELAY
STORE
DISCHARGE

PARCEL BASED SITES: STRATEGIES

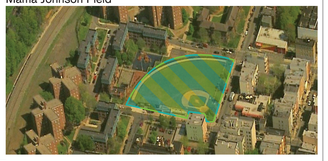
Park Sites



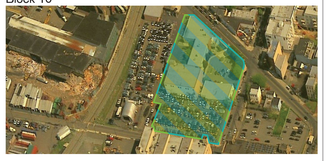
Columbus Park and JFK Football Field



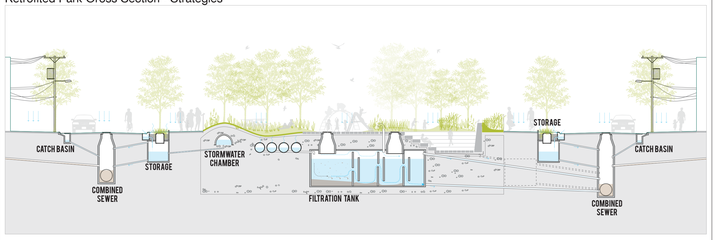
Mama Johnson Field



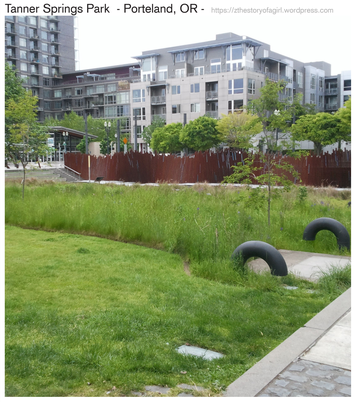
Block 10



Retrofitted Park Cross Section - Strategies



Tanner Springs Park - Porteland, OR - https://zthestoryofagirl.wordpress.com



Benthemplein Water Square - Rotterdam - http://www.c40.org/

Klyde Warren Park - Dallas, TX - www.pinterest.com

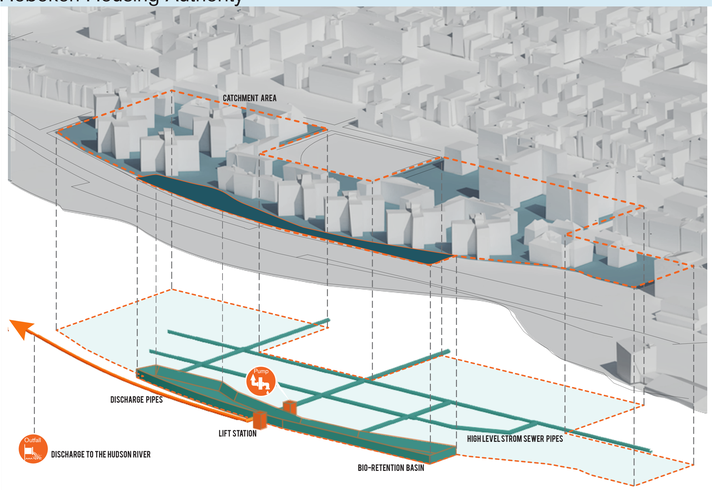
Brooklyn Botanic Garden Visitor Center - NYC - http://www.archdaily.com/

N

0' 400' 800' 1,600'

State of New Jersey
Department of Environmental Protection

Hoboken Housing Authority

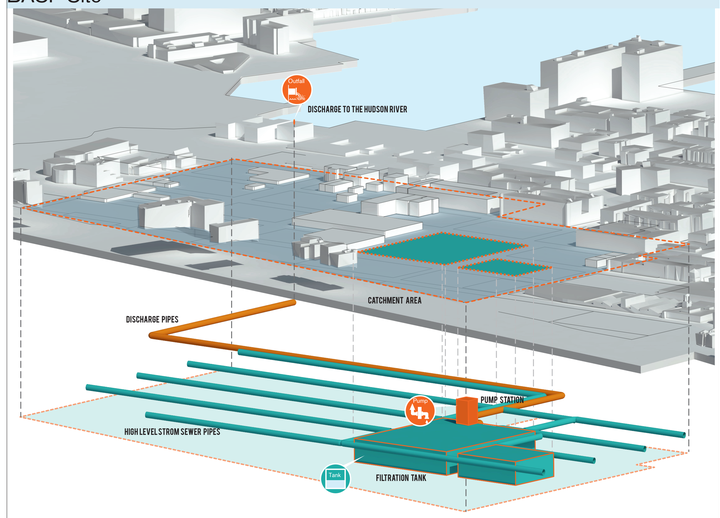


Hoboken Housing Authority and NJ Transit Sites - Proposed Scenario

Bio-Retention Basin - Dry Condition

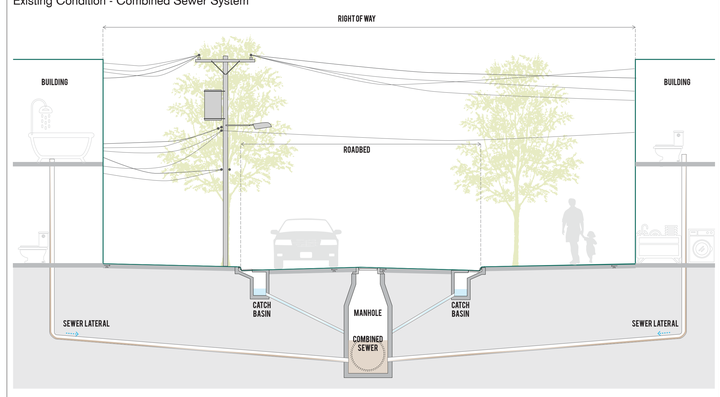
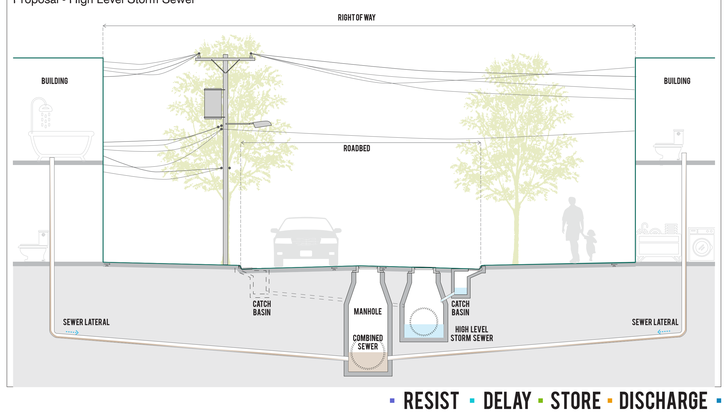
Bio-Retention Basin - Rain Event Condition

BASF Site



BASF Site Proposed Scenario

Existing Condition - Combined Sewer System



Proposal - High Level Storm Sewer