

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

BOOK #: \_\_\_\_\_

# Port Covington

**CROMWELL, URBAN PLAZA &  
EAST WATERFRONT**

**PRESENTATION TO THE URBAN  
DESIGN & ARCHITECTURE  
REVIEW PANEL**

April 14, 2016





**CROMWELL,  
URBAN PLAZA &  
EAST WATERFRONT**  
Introduction

CAROLINE PAFF  
Sagamore Development  
Vice President

# UDARP PRIOR ACTIONS & RELATED PROJECTS

PORT COVINGTON  
MASTER PLAN

Jan 7, 2016  
*Systems*  
DISCUSSION

*Hanover Street and  
West End District*

Mar 3, 2016  
*Ecology + Streetscape Diversity*  
DISCUSSION

Feb 18, 2016  
DISCUSSION

Mar 24, 2016  
DISCUSSION

*Cromwell Street,  
Urban Plaza and  
East Waterfront*

Jan 28, 2016  
*East Waterfront  
Park*  
SCHEMATIC  
APPROVAL WITH  
COMMENTS

Mar 3, 2016  
*East Waterfront  
Park*  
FINAL DESIGN  
CONTINUED

Apr 14, 2016  
DISCUSSION

*East End and  
Founders Park*

May 5, 2016  
DISCUSSION

JAN

FEB

MAR

APR

MAY

JUN

JUL

UNDER ARMOUR  
MASTER PLAN

Jan 28, 2016  
RECOMMENDED APPROVAL  
WITH COMMENTS

SAGAMORE SPIRIT  
DISTILLERY

June 25, 2015  
RECOMMENDED APPROVAL  
WITH COMMENTS

## URBAN DESIGN GOALS

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Create a sense of arrival and make it a destination.

Make strong connections between uses, ecology and people.

Induce multi-modal behaviors through great design and investment in the public realm.

Make it walkable.

Include multiple points of view to ensure diversity and plan resiliency.

Innovate.



**MARCH 24, 2016 FRAMEWORK**



**WESTPORT**

**SOUTH BALTIMORE**

**RIVERSIDE**

**95**

**SOUTH LOCUST  
POINT**

**MIDDLE  
BRANCH**

**WINANS COVE**

**HANOVER  
STREET BRIDGE**

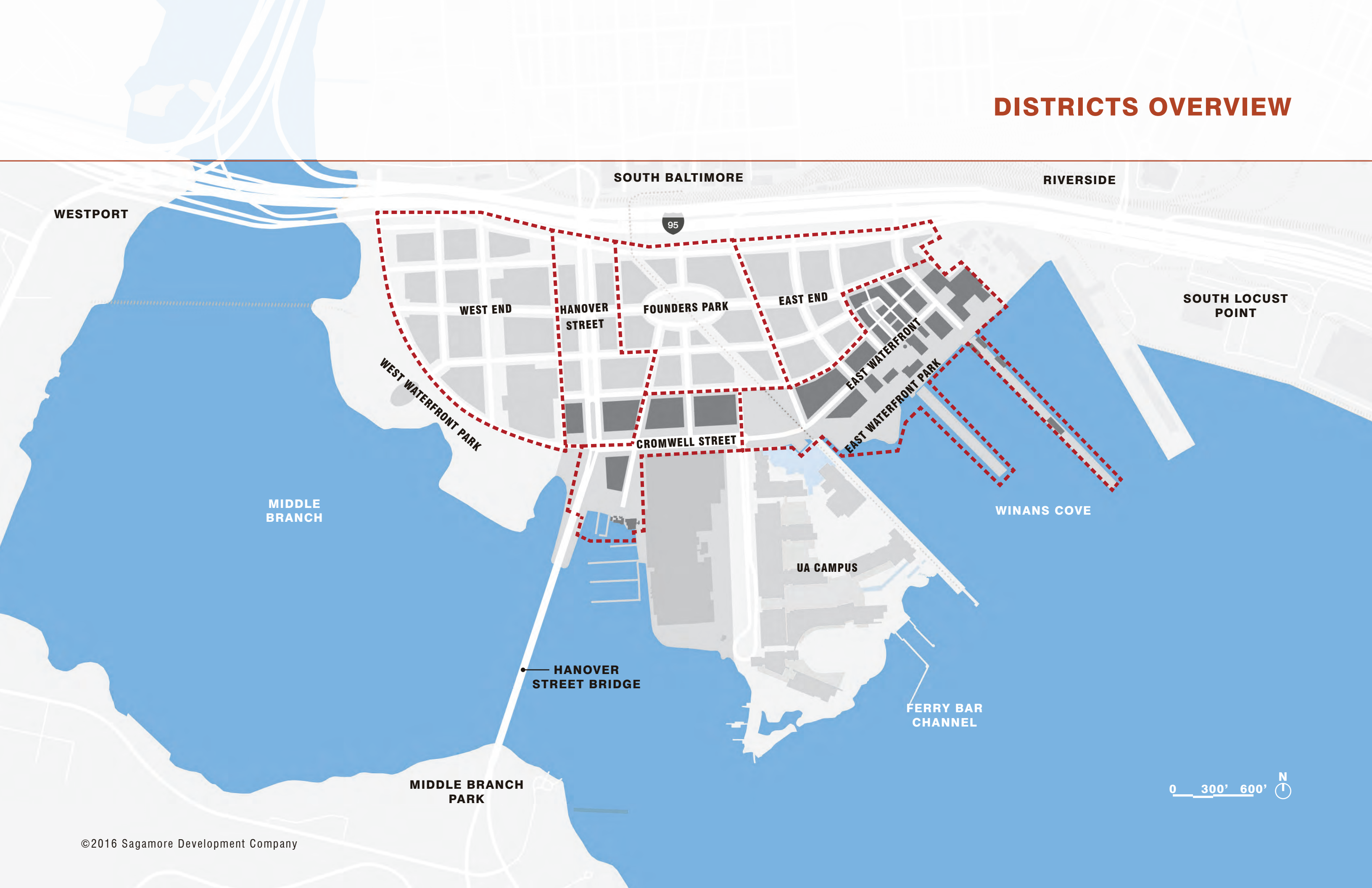
**FERRY BAR  
CHANNEL**

**MIDDLE BRANCH  
PARK**





# DISTRICTS OVERVIEW



WESTPORT

SOUTH BALTIMORE

RIVERSIDE

WEST END

HANOVER STREET

FOUNDERS PARK

EAST END

SOUTH LOCUST POINT

WEST WATERFRONT PARK

CROMWELL STREET

EAST WATERFRONT PARK

MIDDLE BRANCH

WINANS COVE

UA CAMPUS

HANOVER STREET BRIDGE

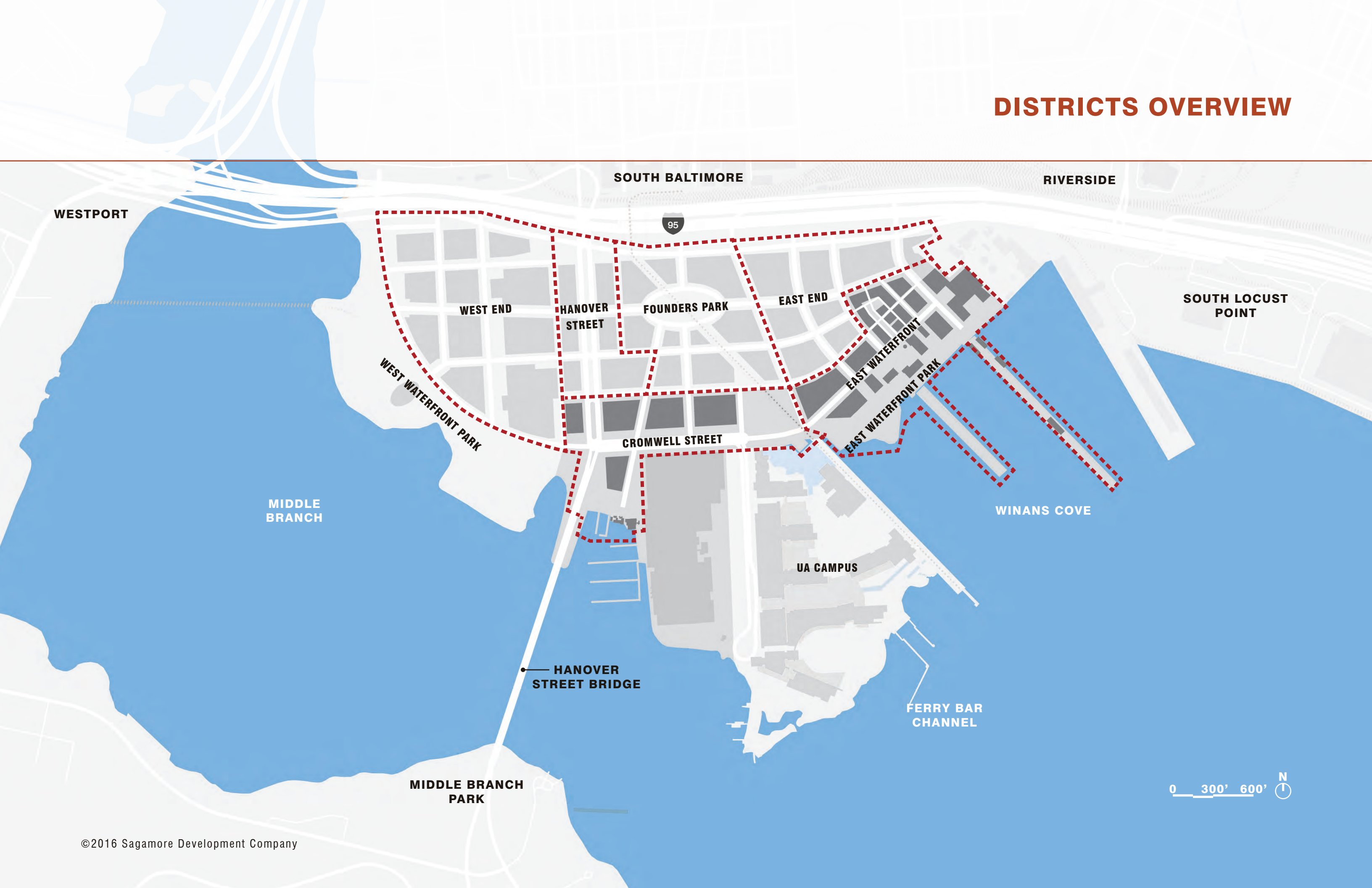
FERRY BAR CHANNEL

MIDDLE BRANCH PARK

0 300' 600' N



# DISTRICTS OVERVIEW



WESTPORT

SOUTH BALTIMORE

RIVERSIDE

WEST END

HANOVER STREET

FOUNDERS PARK

EAST END

SOUTH LOCUST POINT

WEST WATERFRONT PARK

CROMWELL STREET

EAST WATERFRONT PARK

MIDDLE BRANCH

WINANS COVE

UA CAMPUS

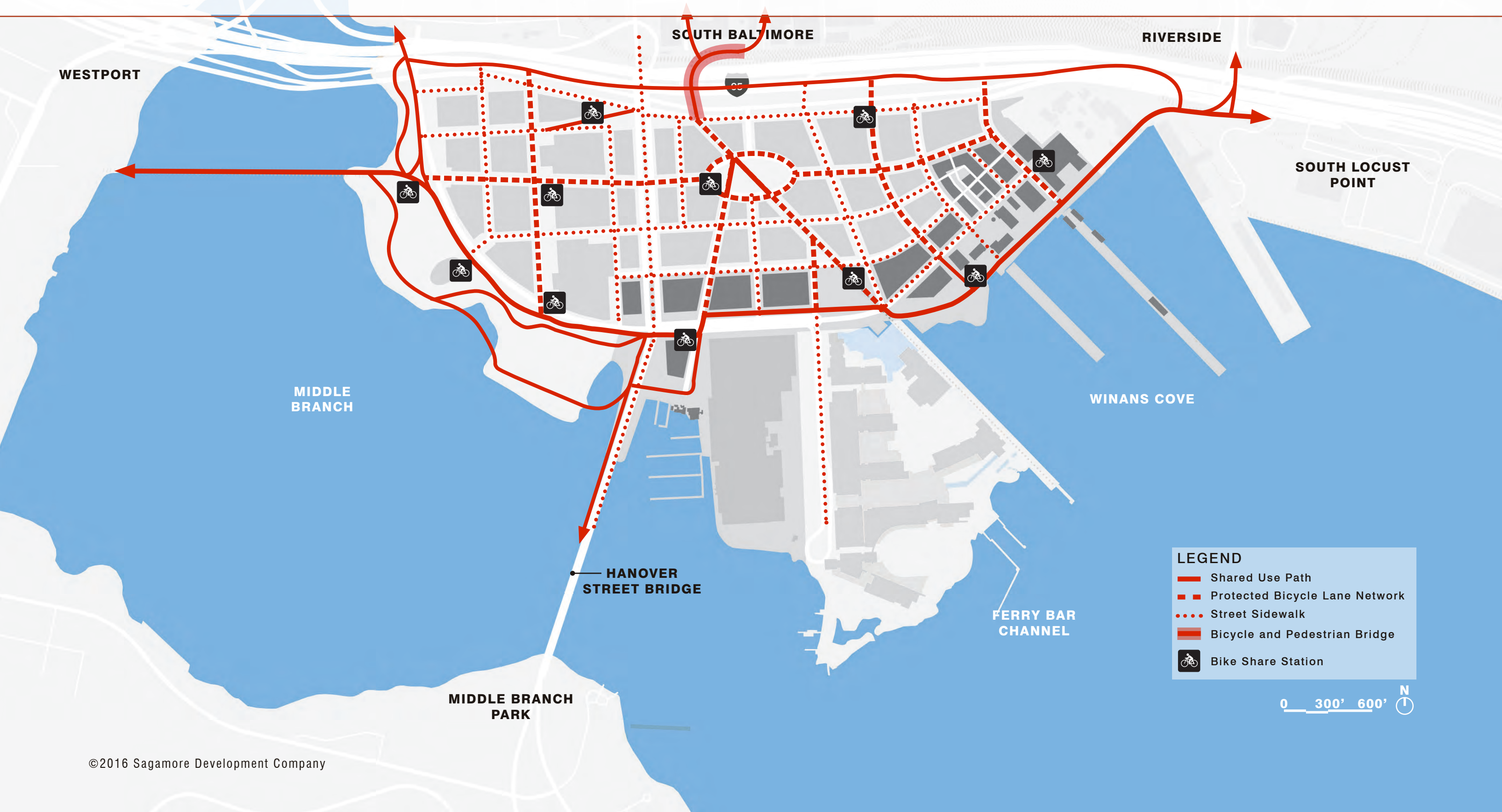
HANOVER STREET BRIDGE

FERRY BAR CHANNEL

MIDDLE BRANCH PARK



# BICYCLE AND PEDESTRIAN NETWORK



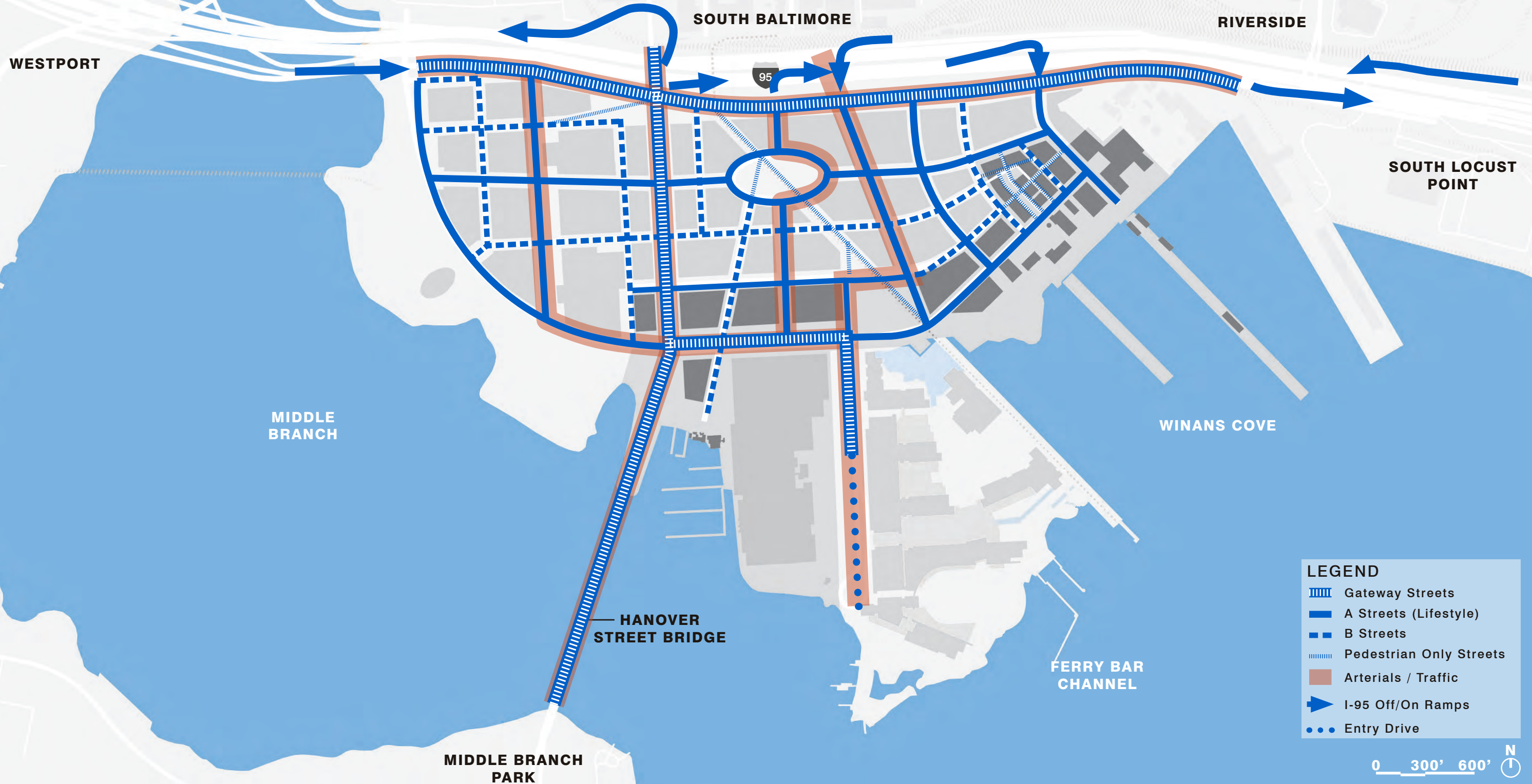
**LEGEND**

- Shared Use Path
- - Protected Bicycle Lane Network
- ... Street Sidewalk
- Bicycle and Pedestrian Bridge
- 🚲 Bike Share Station

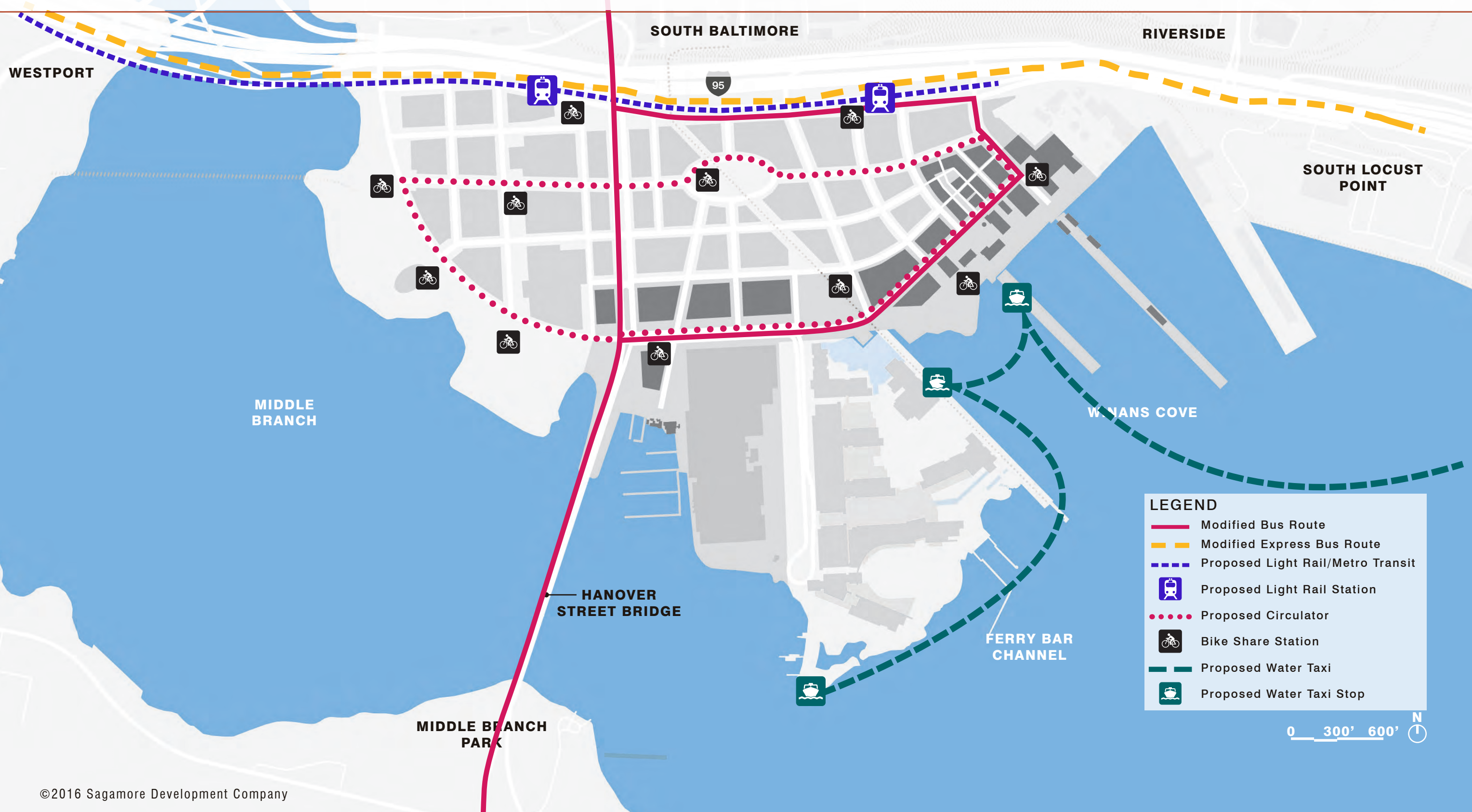




# STREET TYPOLOGIES



# TRANSIT CIRCULATION





## PANEL COMMENTS

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Make Cromwell a gateway.

Look at East-West connectivity using Cromwell and Hanover.

Strengthen each important axis with a receiver;  
use the parks to reinforce the focal points, vistas and connective elements.

Coordinate at the seam of the mixed-use and campus projects;  
reflect each massing plan in the other.

The pedestrian experience on West Peninsula to the park is important.

Think carefully through locations of delivery and service areas.

## **PRESENTATION OVERVIEW**

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### **EXISTING CONDITIONS & SITE CHARACTER**

Addison Palmer, STV Inc.

### **DEVELOPMENT & MASSING**

**CROMWELL, URBAN PLAZA & EAST WATERFRONT**

David Manfredi, Elkus Manfredi Architects





# **CROMWELL, URBAN PLAZA & EAST WATERFRONT**

## Existing Conditions & Site Character

ADDISON PALMER, RLA, LEED AP

STV Incorporated  
Regional Manager



# EXISTING CONDITIONS





# ENVIRONMENTAL CONSTRAINTS

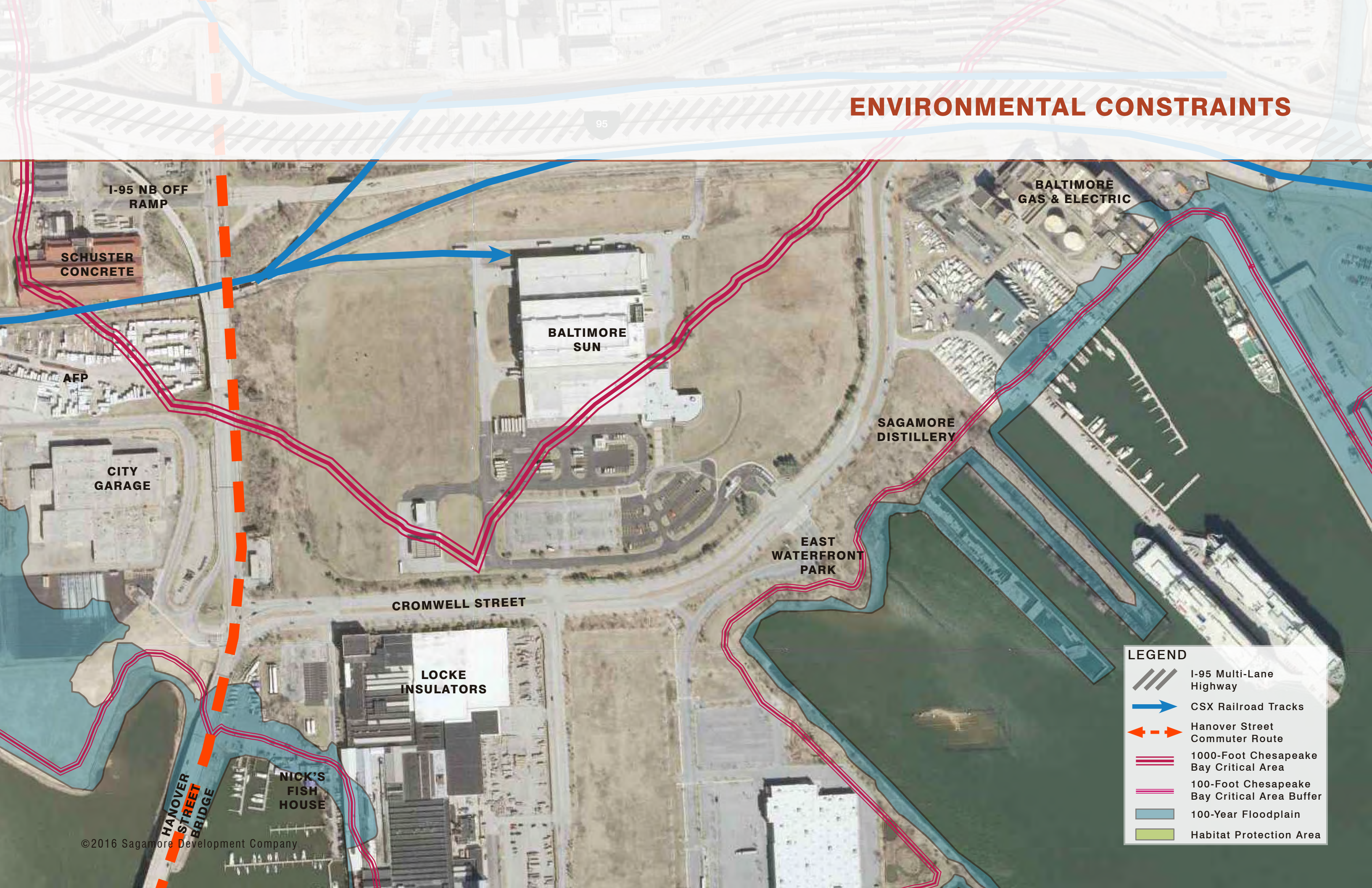


**LEGEND**

-  I-95 Multi-Lane Highway
-  CSX Railroad Tracks
-  Hanover Street Commuter Route
-  1000-Foot Chesapeake Bay Critical Area
-  100-Foot Chesapeake Bay Critical Area Buffer
-  100-Year Floodplain
-  Habitat Protection Area



# ENVIRONMENTAL CONSTRAINTS

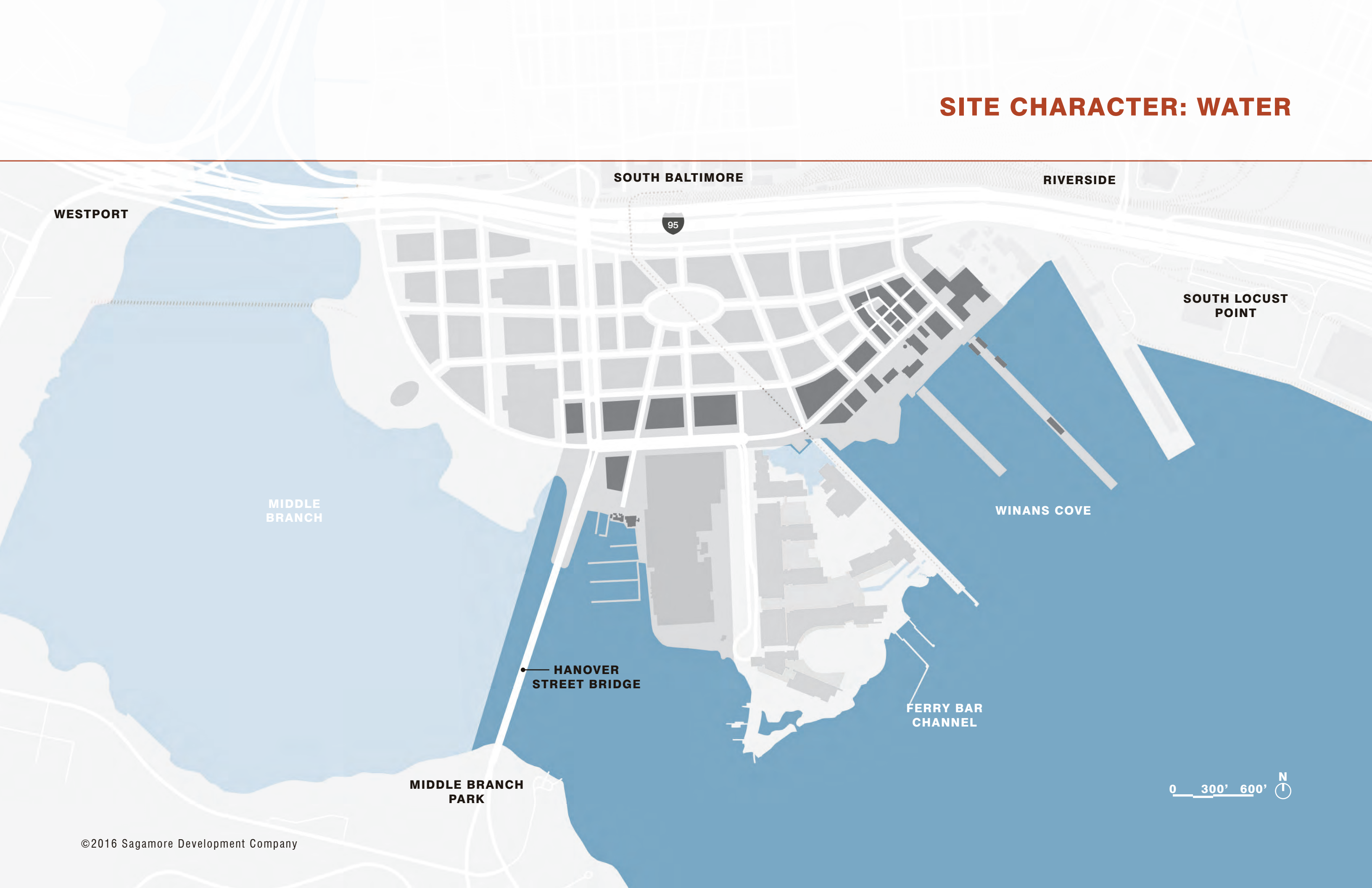


**LEGEND**

- I-95 Multi-Lane Highway
- CSX Railroad Tracks
- Hanover Street Commuter Route
- 1000-Foot Chesapeake Bay Critical Area
- 100-Foot Chesapeake Bay Critical Area Buffer
- 100-Year Floodplain
- Habitat Protection Area



# SITE CHARACTER: WATER



WESTPORT

SOUTH BALTIMORE

RIVERSIDE

95

SOUTH LOCUST POINT

MIDDLE BRANCH

WINANS COVE

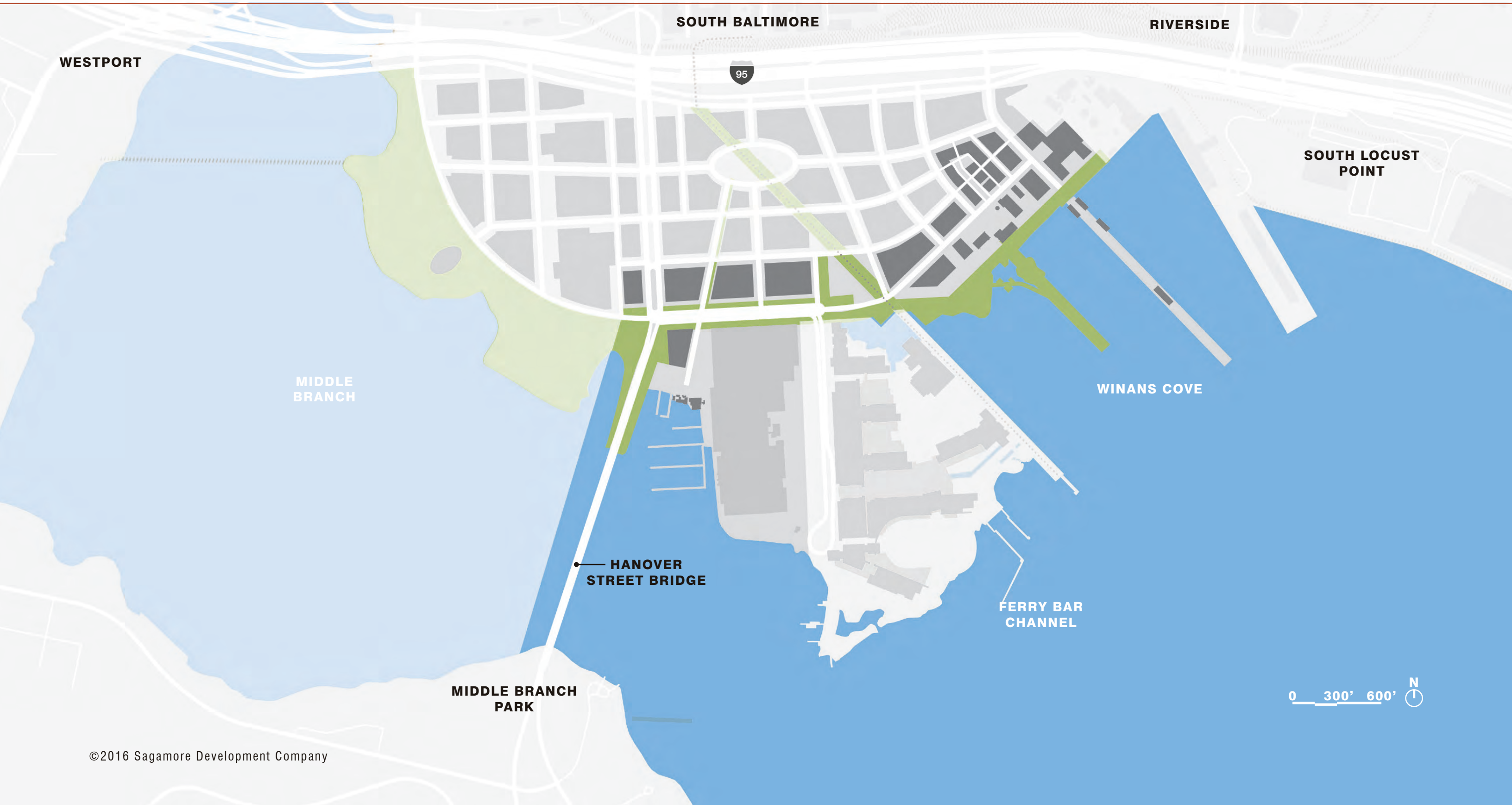
HANOVER STREET BRIDGE

FERRY BAR CHANNEL

MIDDLE BRANCH PARK

0 300' 600' N

# SITE CHARACTER: PARK SYSTEM



WESTPORT

SOUTH BALTIMORE

RIVERSIDE

95

SOUTH LOCUST  
POINT

MIDDLE  
BRANCH

WINANS COVE

HANOVER  
STREET BRIDGE

FERRY BAR  
CHANNEL

MIDDLE BRANCH  
PARK



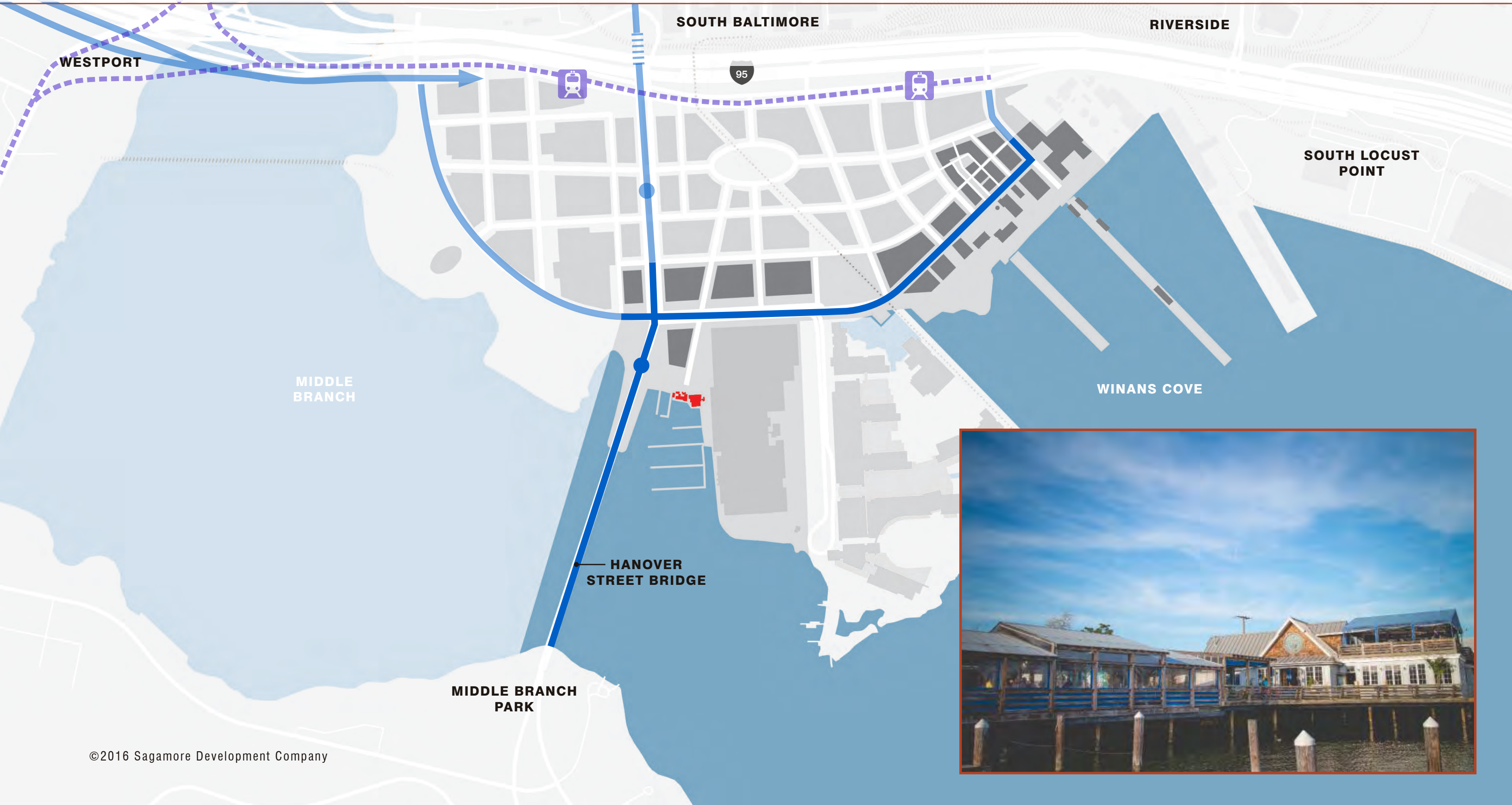


# SITE CHARACTER: HANOVER STREET & CROMWELL STREET



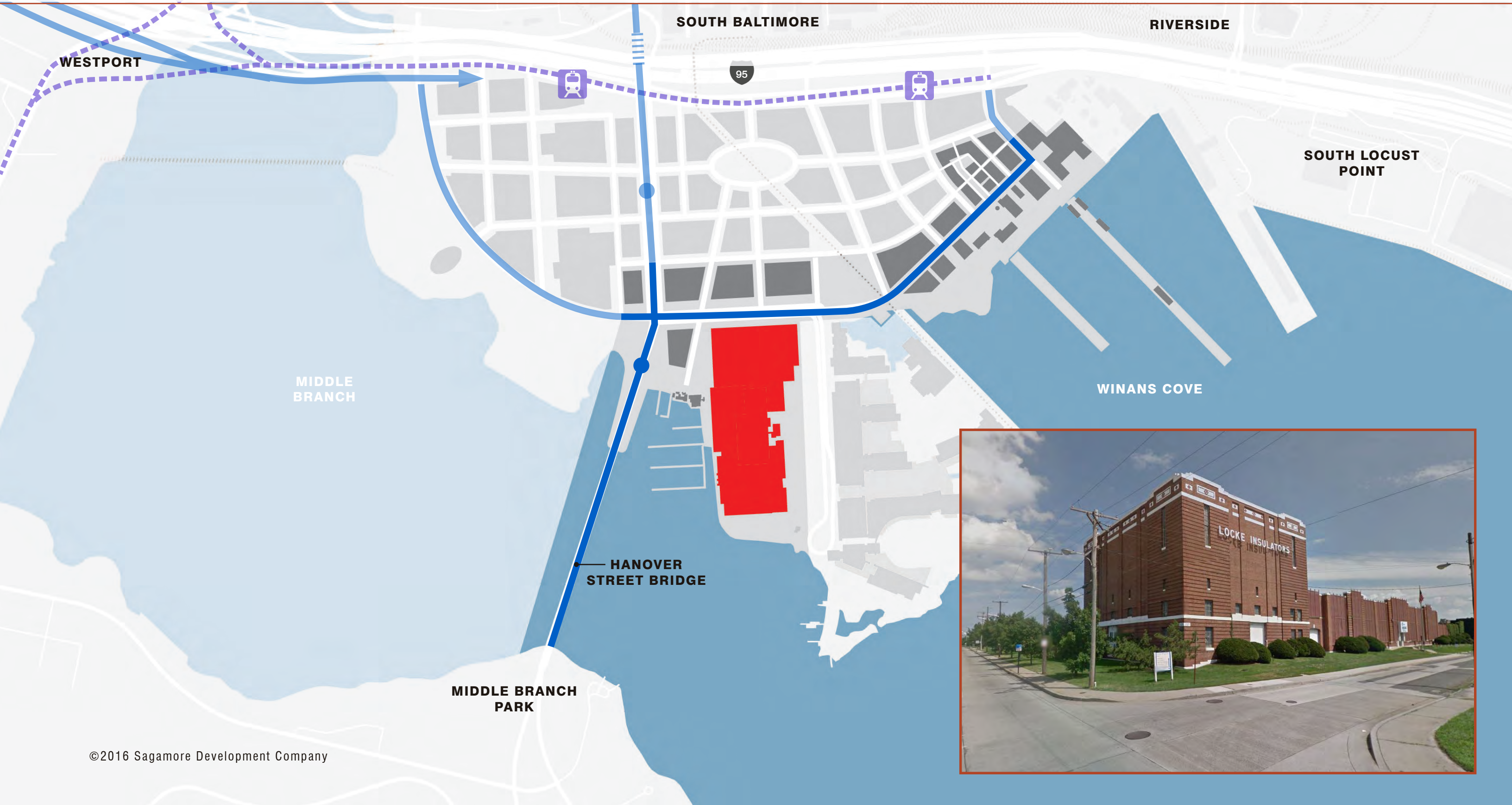


# SITE CHARACTER: NICK'S FISH HOUSE



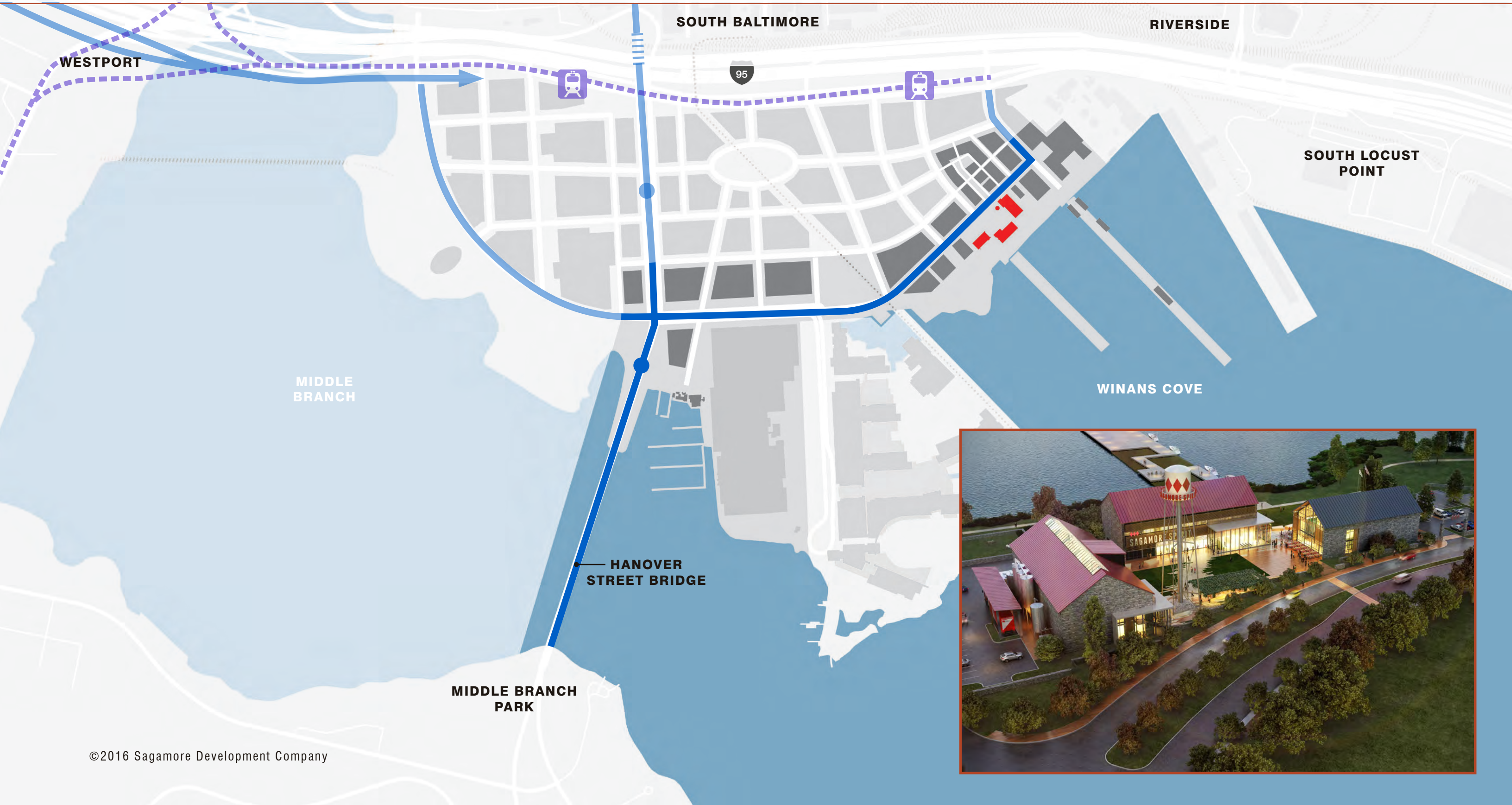


# SITE CHARACTER: LOCKE INSULATORS





# SITE CHARACTER: SAGAMORE SPIRIT





# SITE CHARACTER: BALTIMORE SUN





# SITE CHARACTER: BGE & EXELON







Port  
Covington

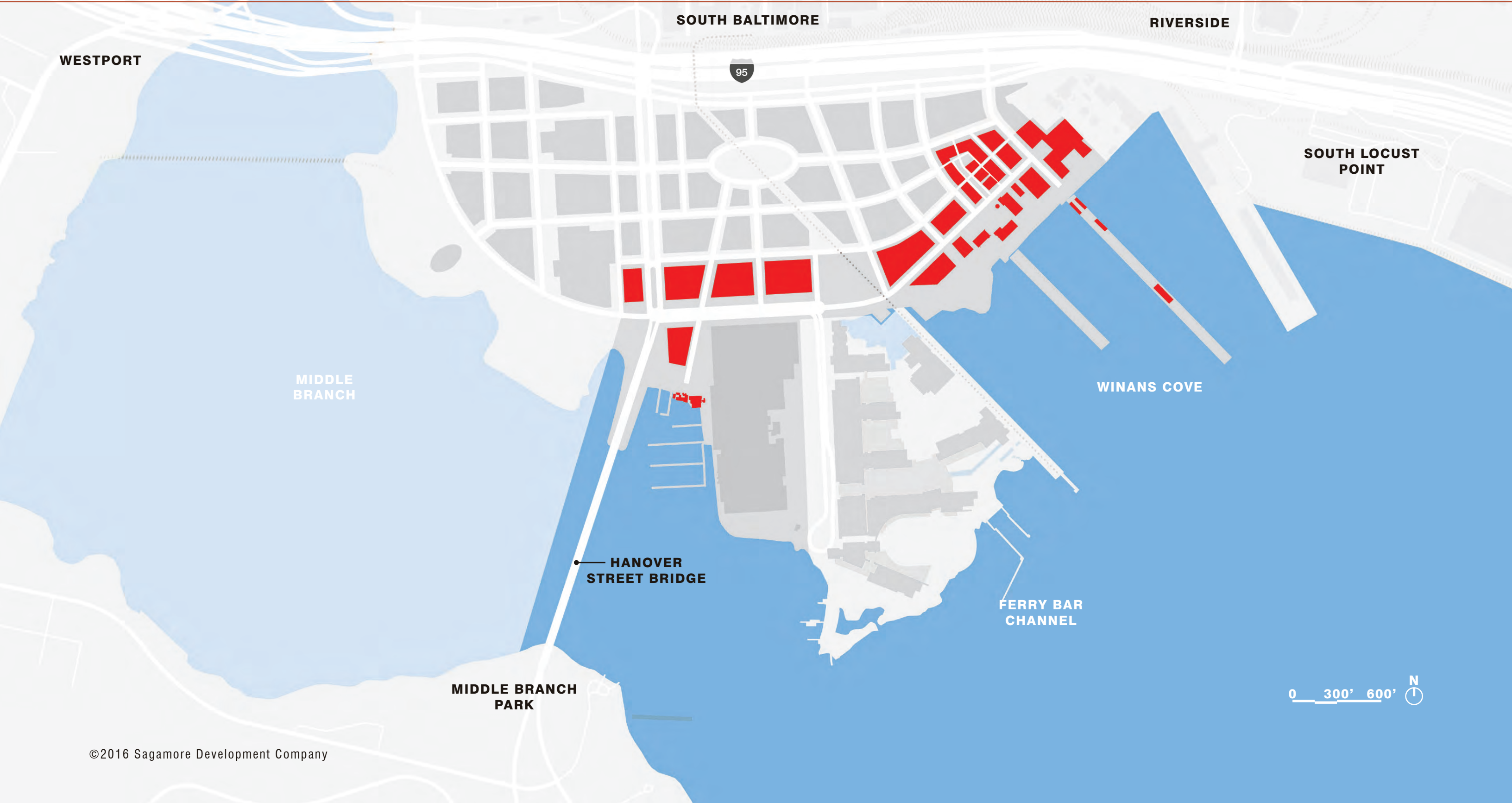
**CROMWELL,  
URBAN PLAZA &  
EAST WATERFRONT**  
Development & Massing

DAVID MANFREDI FAIA, LEED AP

Elkus Manfredi Architects  
Principal



# CROMWELL, URBAN PLAZA & EAST WATERFRONT



WESTPORT

SOUTH BALTIMORE

RIVERSIDE

SOUTH LOCUST POINT

MIDDLE BRANCH

WINANS COVE

HANOVER STREET BRIDGE

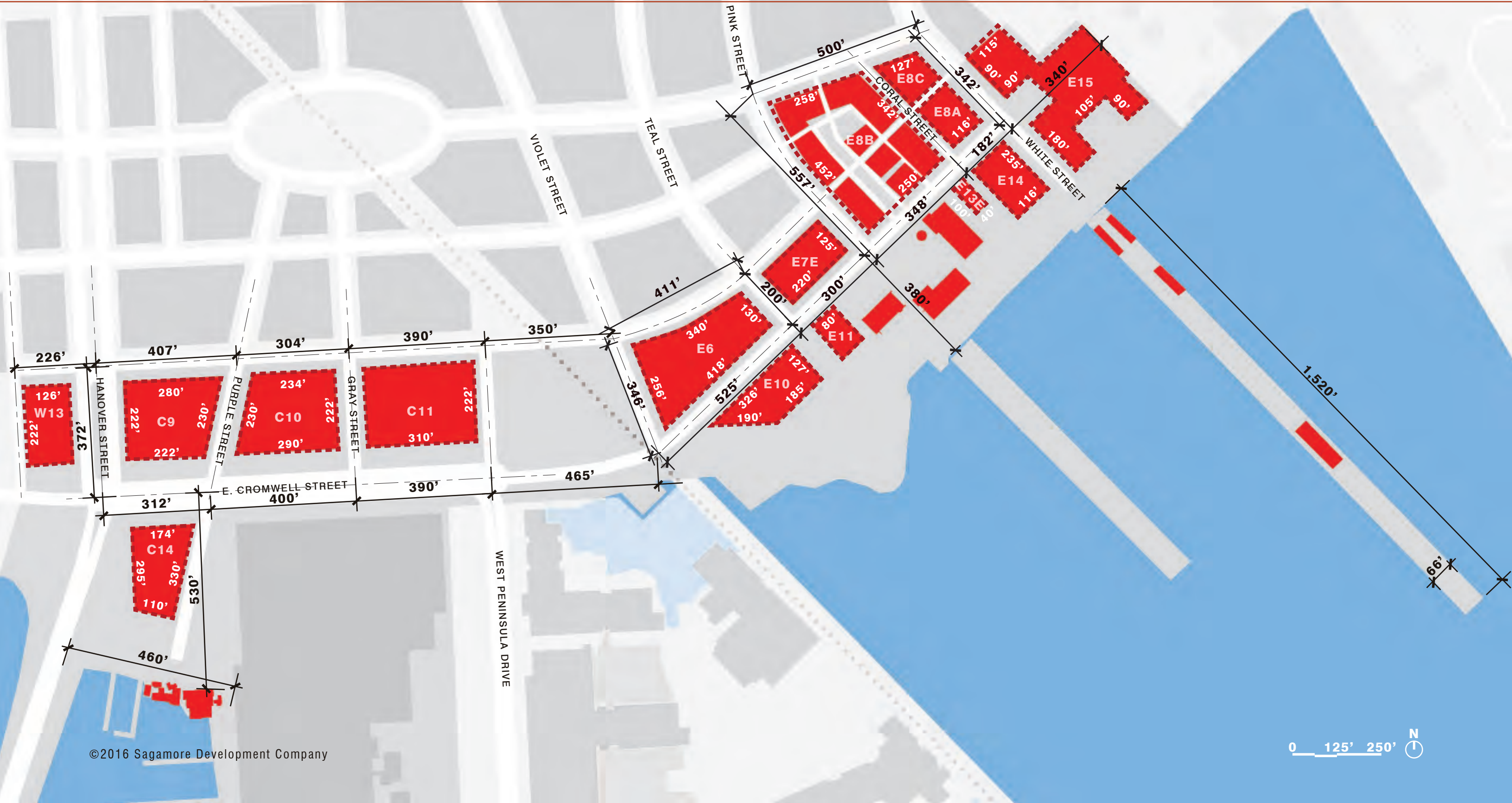
FERRY BAR CHANNEL

MIDDLE BRANCH PARK



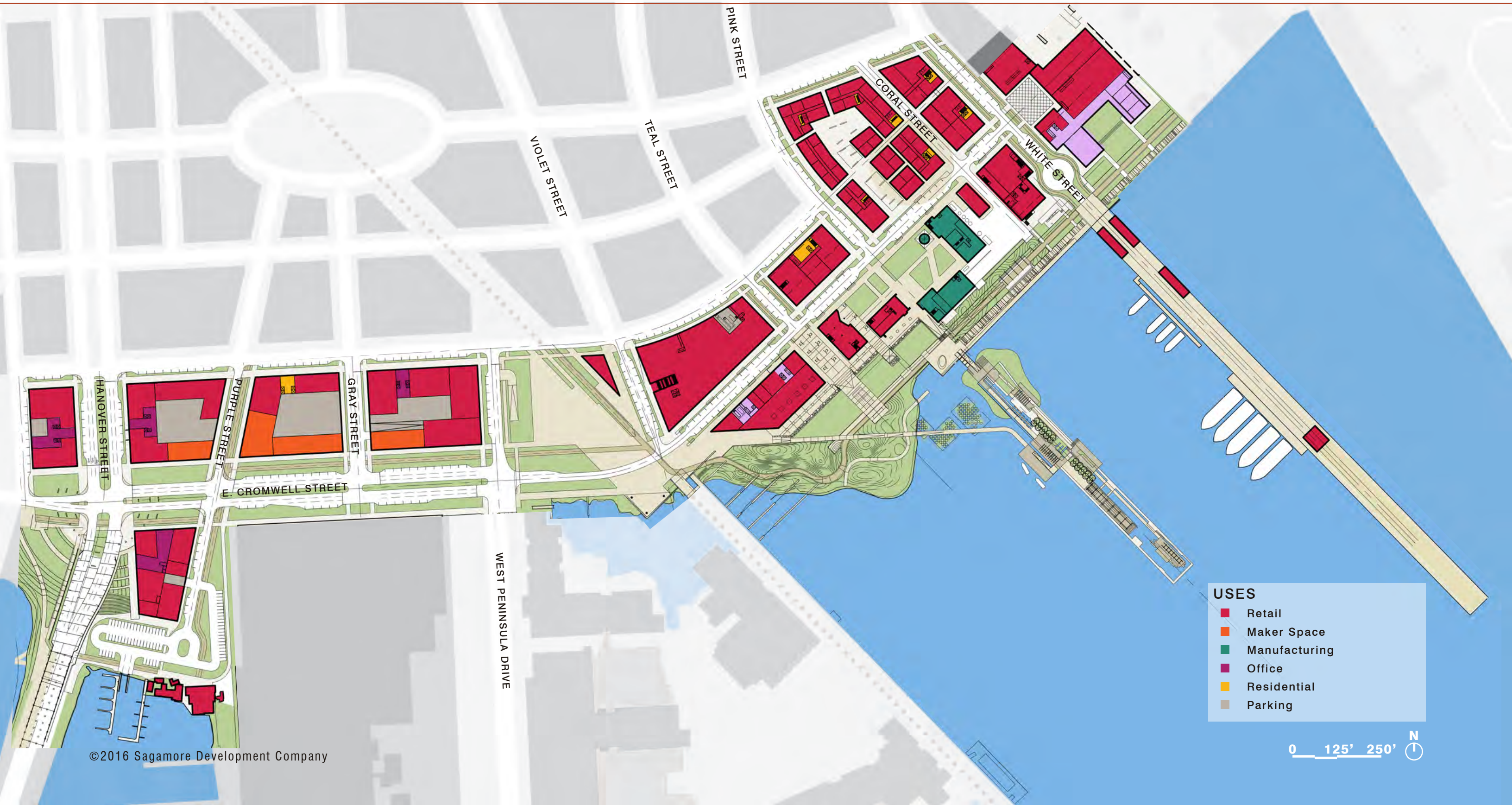


# CROMWELL, URBAN PLAZA & EAST WATERFRONT BLOCKS





# CROMWELL, URBAN PLAZA & EAST WATERFRONT GROUND LEVEL USES





# CROMWELL, URBAN PLAZA & EAST WATERFRONT

## UPPER LEVEL USES





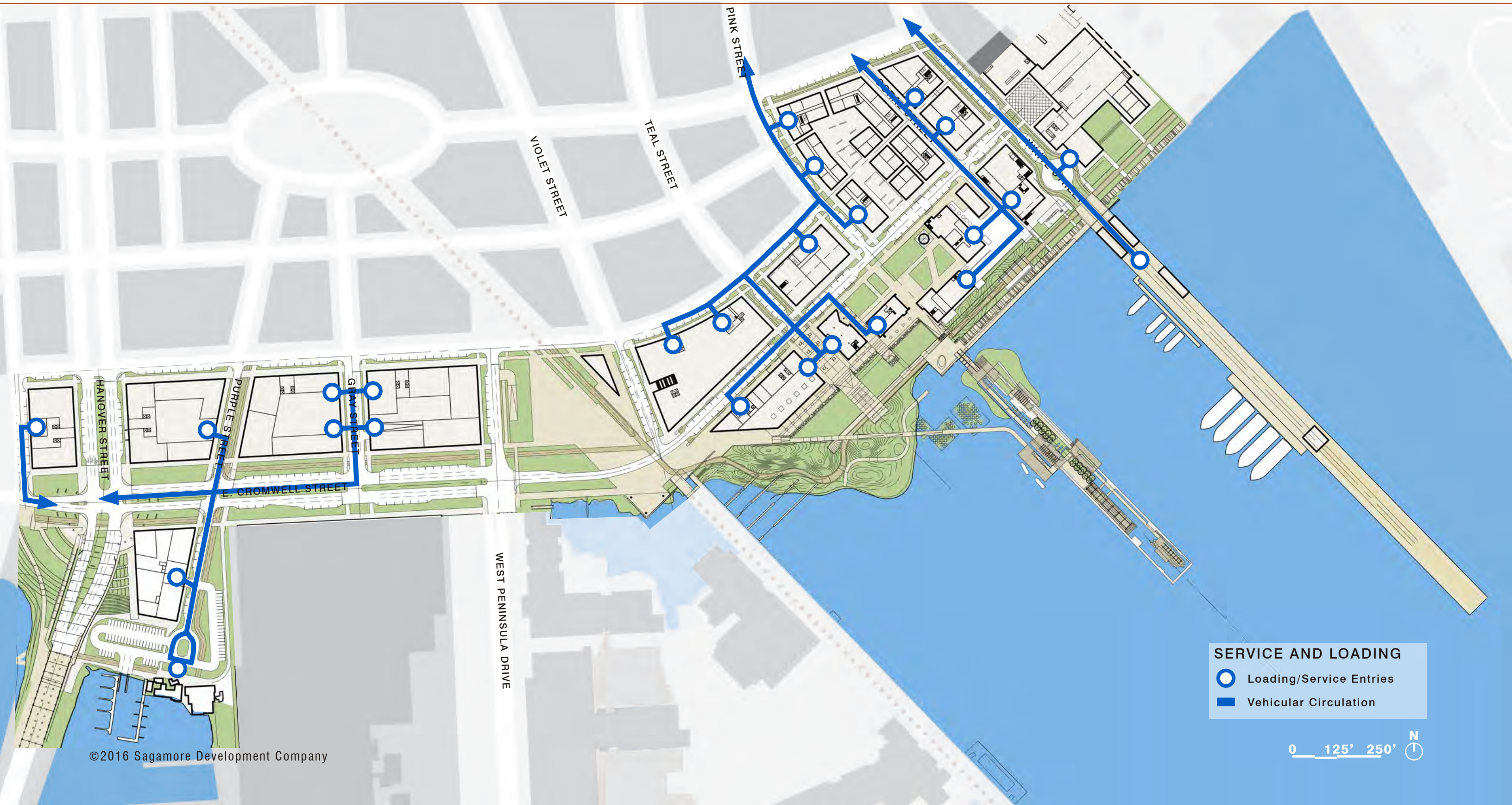
# CROMWELL, URBAN PLAZA & EAST WATERFRONT ENTRIES





# CROMWELL, URBAN PLAZA & EAST WATERFRONT

## LOADING AND SERVICE ENTRIES



**SERVICE AND LOADING**

- Loading/Service Entries
- ▬ Vehicular Circulation





# CROMWELL, URBAN PLAZA & EAST WATERFRONT LOADING ZONES



**SERVICE AND LOADING**

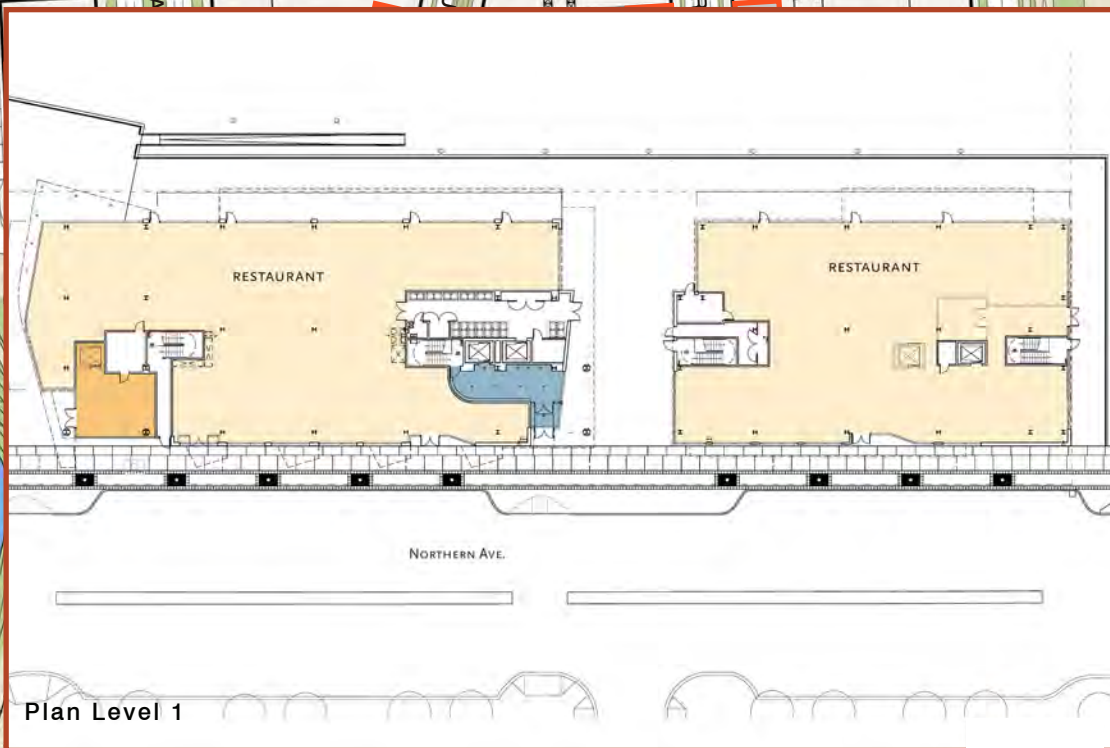
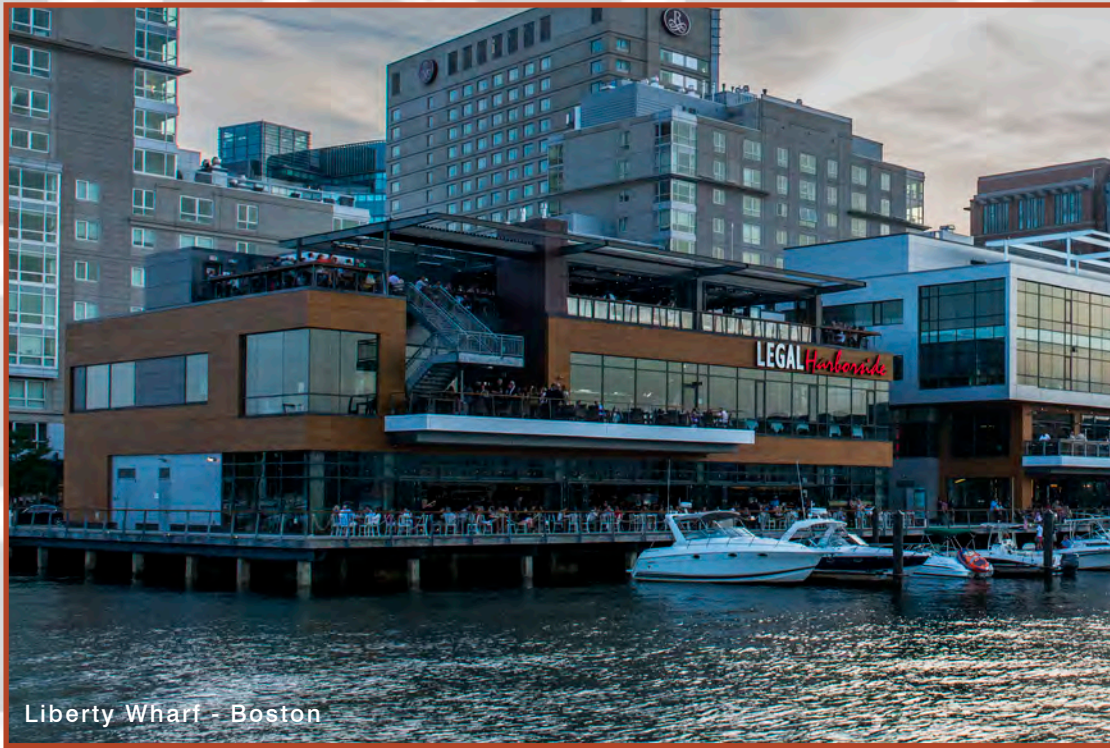
- Loading Zones
- On Street Loading





# CROMWELL, URBAN PLAZA & EAST WATERFRONT

## WATERFRONT LOADING ZONES - PRECEDENT





# CROMWELL, URBAN PLAZA & EAST WATERFRONT PARKING



**SERVICE AND LOADING**

- Ⓟ Parking Garage Above
- Ⓧ Potential Parking Below
- ▬ On Street Parking






# MARCH 24, 2016 - HANOVER STREET DISTRICT PLAN

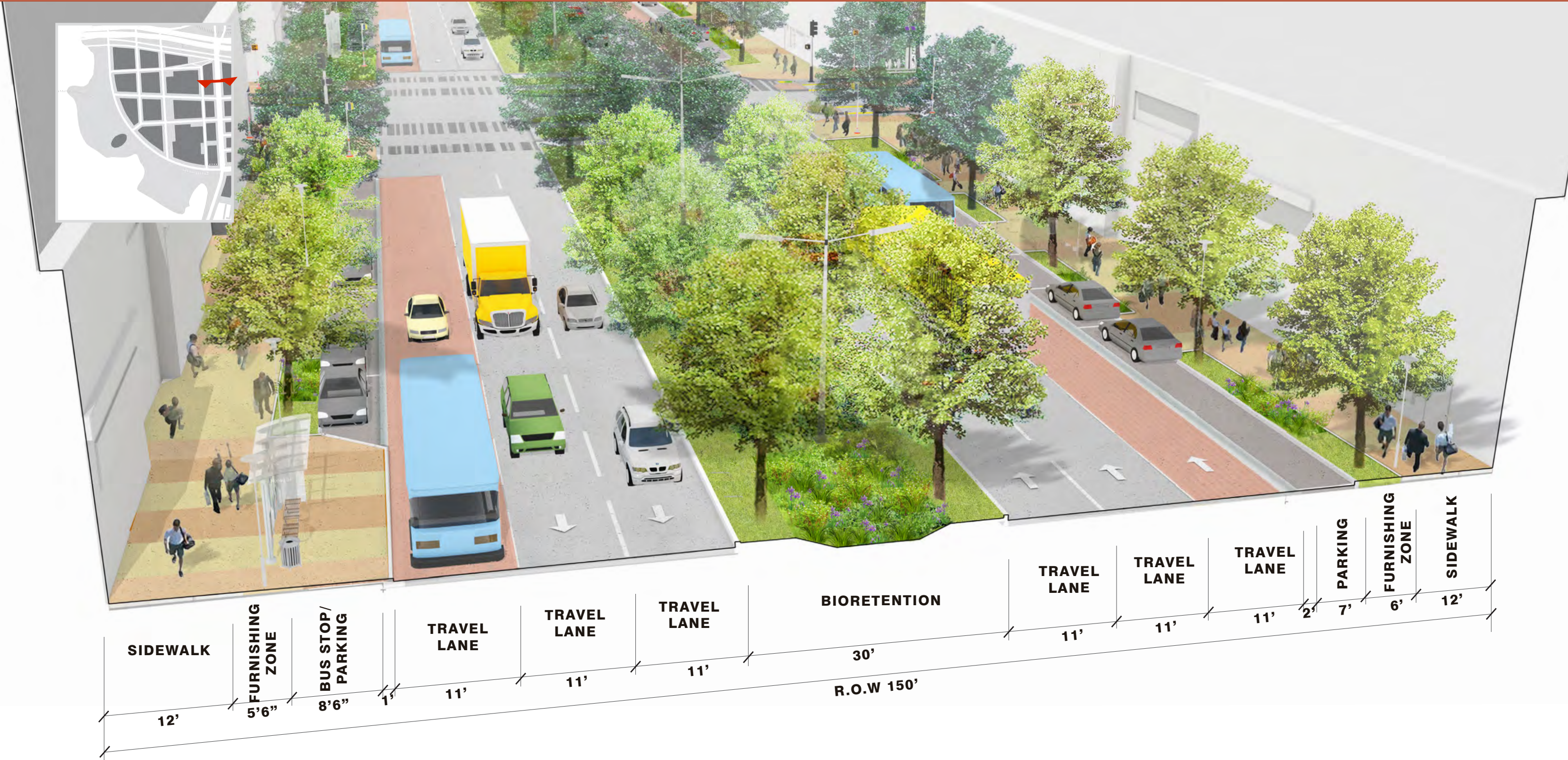


**HANOVER STREET**  
**A** Hanover Street Gateway  
**B** 'A' Street Intersection  
**C** 'B' Street Intersection  
**D** Hanover Street Median

0 125' 250' 



# MARCH 24, 2016 - HANOVER STREET SECTION





# EAST CROMWELL STREET PLAN

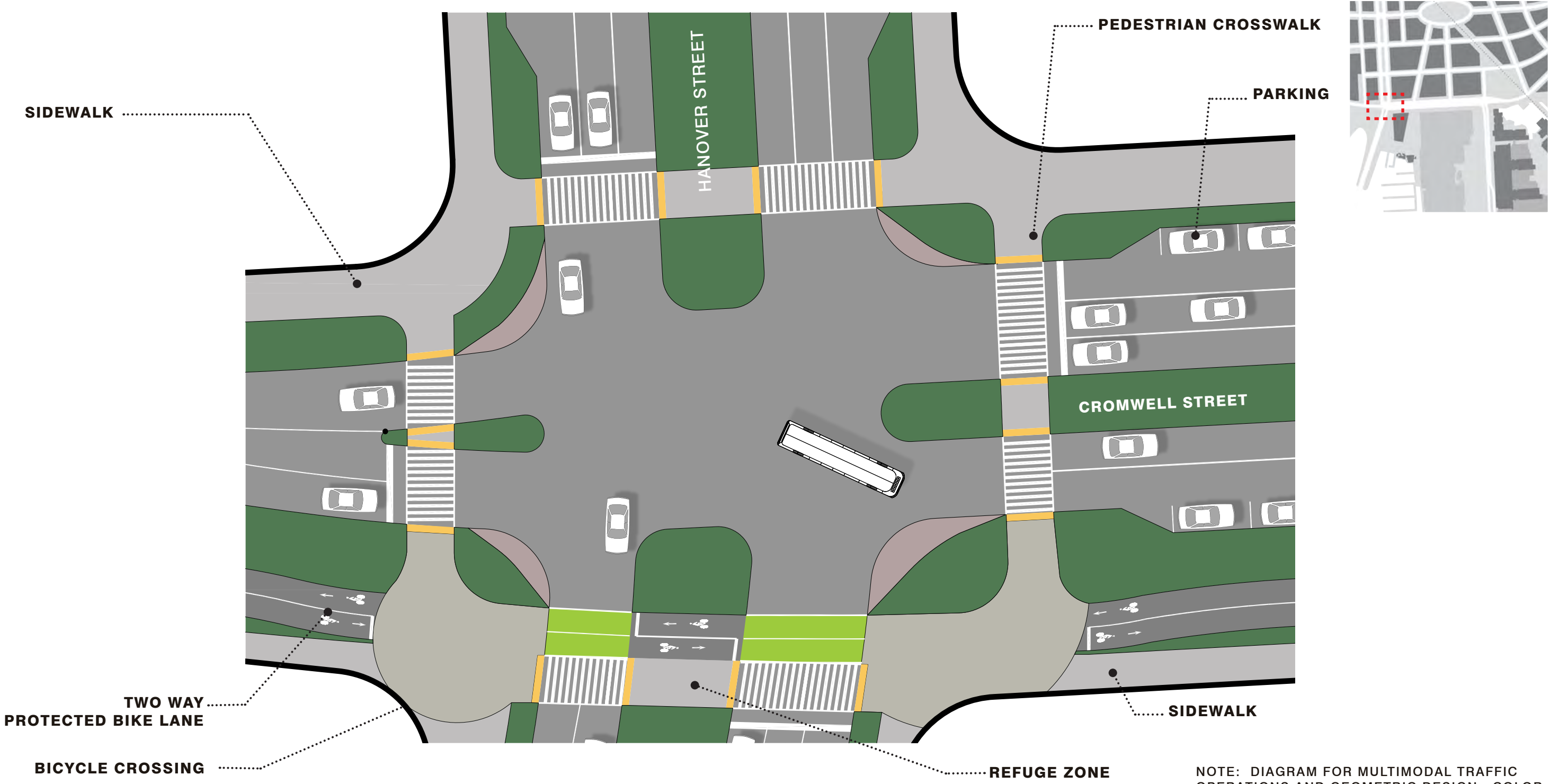


- CROMWELL STREET**
- A** A Street Intersection
  - B** B Street Intersection
  - C** Perch
  - D** Marina
  - E** Nick's
  - F** Southern Gateway





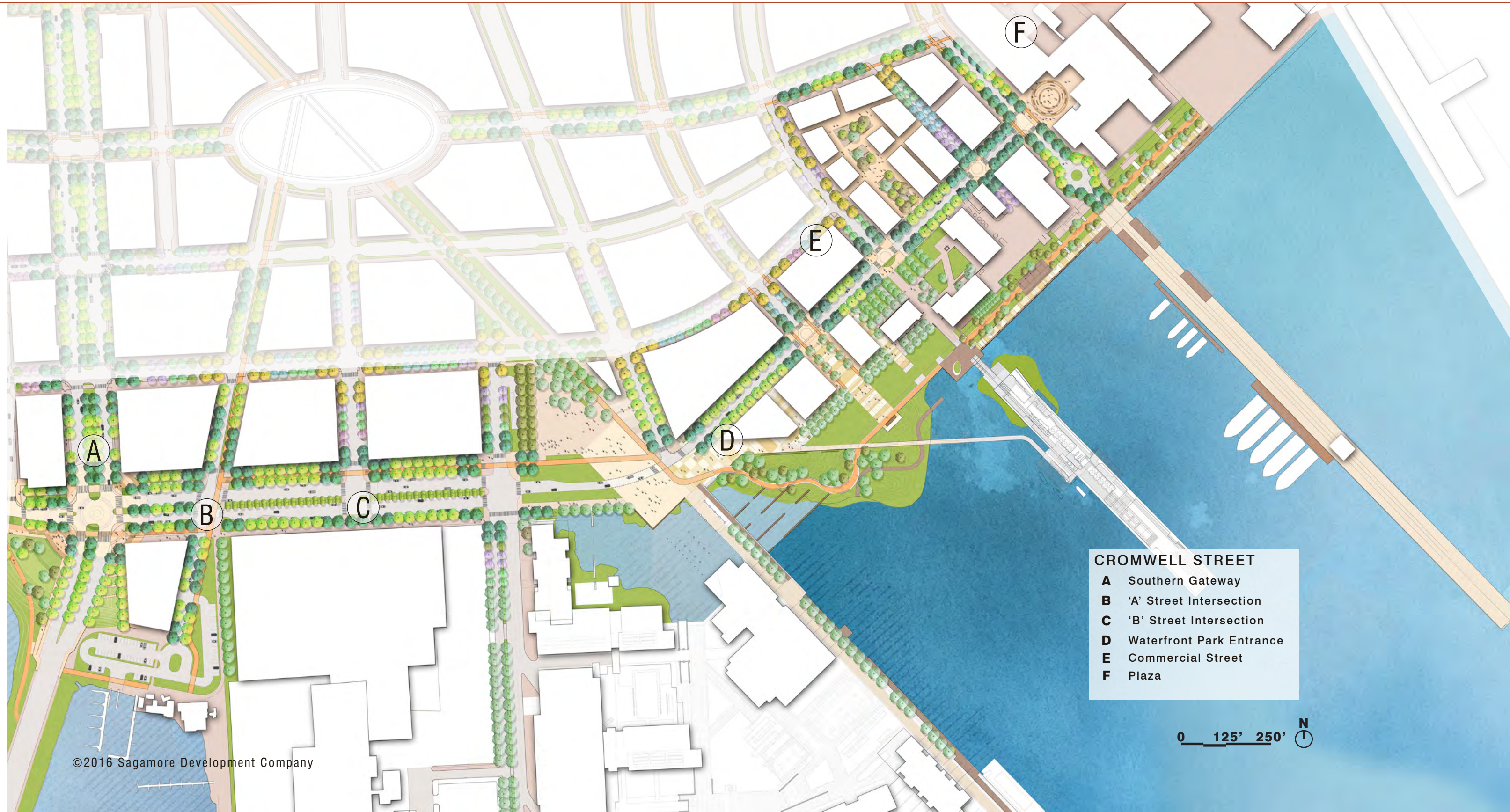
# HANOVER AND CROMWELL STREET INTERSECTION



NOTE: DIAGRAM FOR MULTIMODAL TRAFFIC OPERATIONS AND GEOMETRIC DESIGN. COLOR USED FOR ILLUSTRATIVE PURPOSES ONLY AND DOES NOT INDICATE PAVEMENT COLOR PREFERENCES. FINAL DESIGN SUBJECT TO CITY APPROVAL.



# CROMWELL, URBAN PLAZA & EAST WATERFRONT PLAN

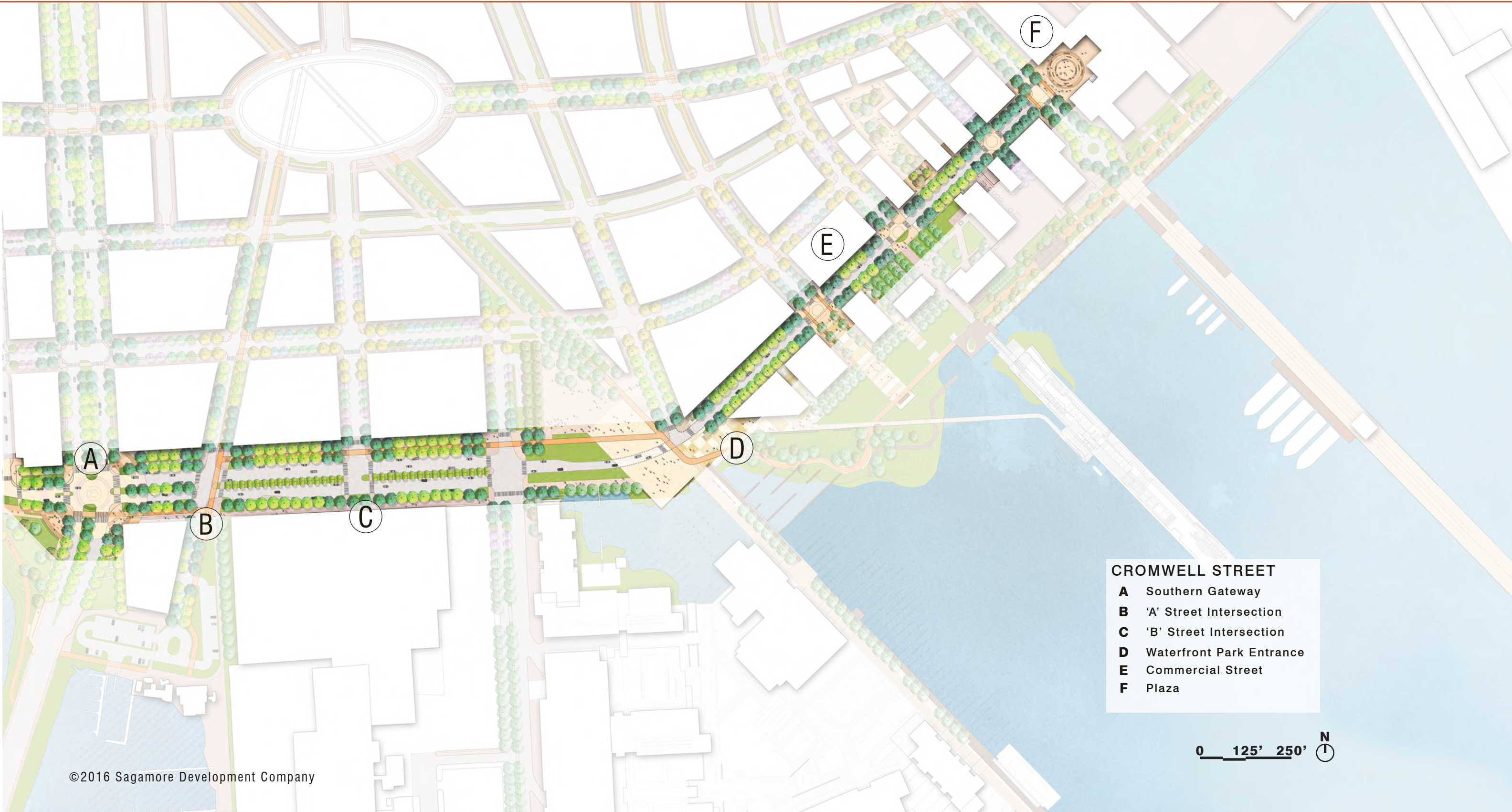


- CROMWELL STREET**
- A** Southern Gateway
  - B** 'A' Street Intersection
  - C** 'B' Street Intersection
  - D** Waterfront Park Entrance
  - E** Commercial Street
  - F** Plaza

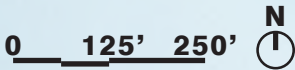
0 125' 250' N



# CROMWELL STREET DISTRICT PLAN



- CROMWELL STREET**
- A** Southern Gateway
  - B** 'A' Street Intersection
  - C** 'B' Street Intersection
  - D** Waterfront Park Entrance
  - E** Commercial Street
  - F** Plaza



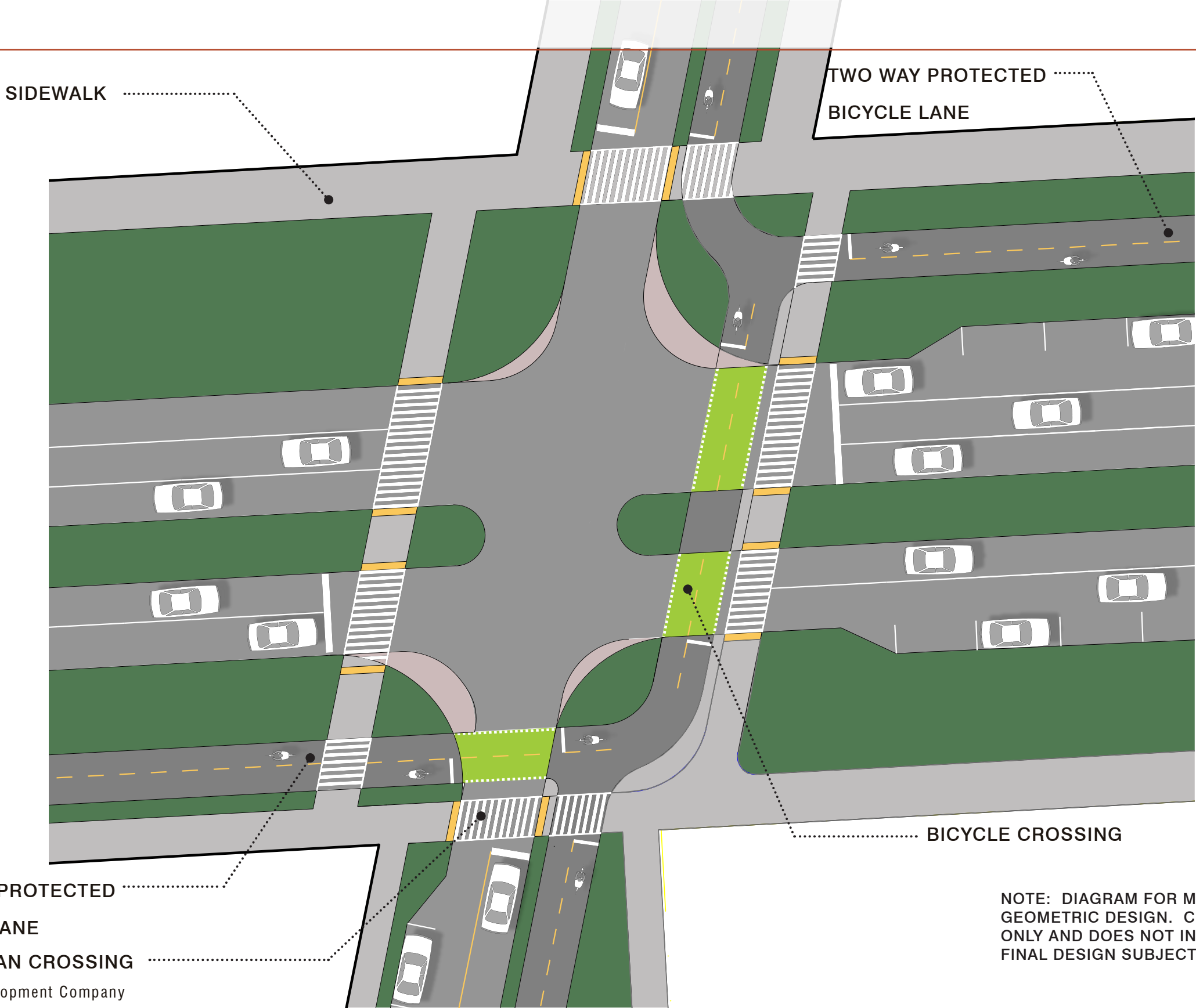


# CROMWELL STREET





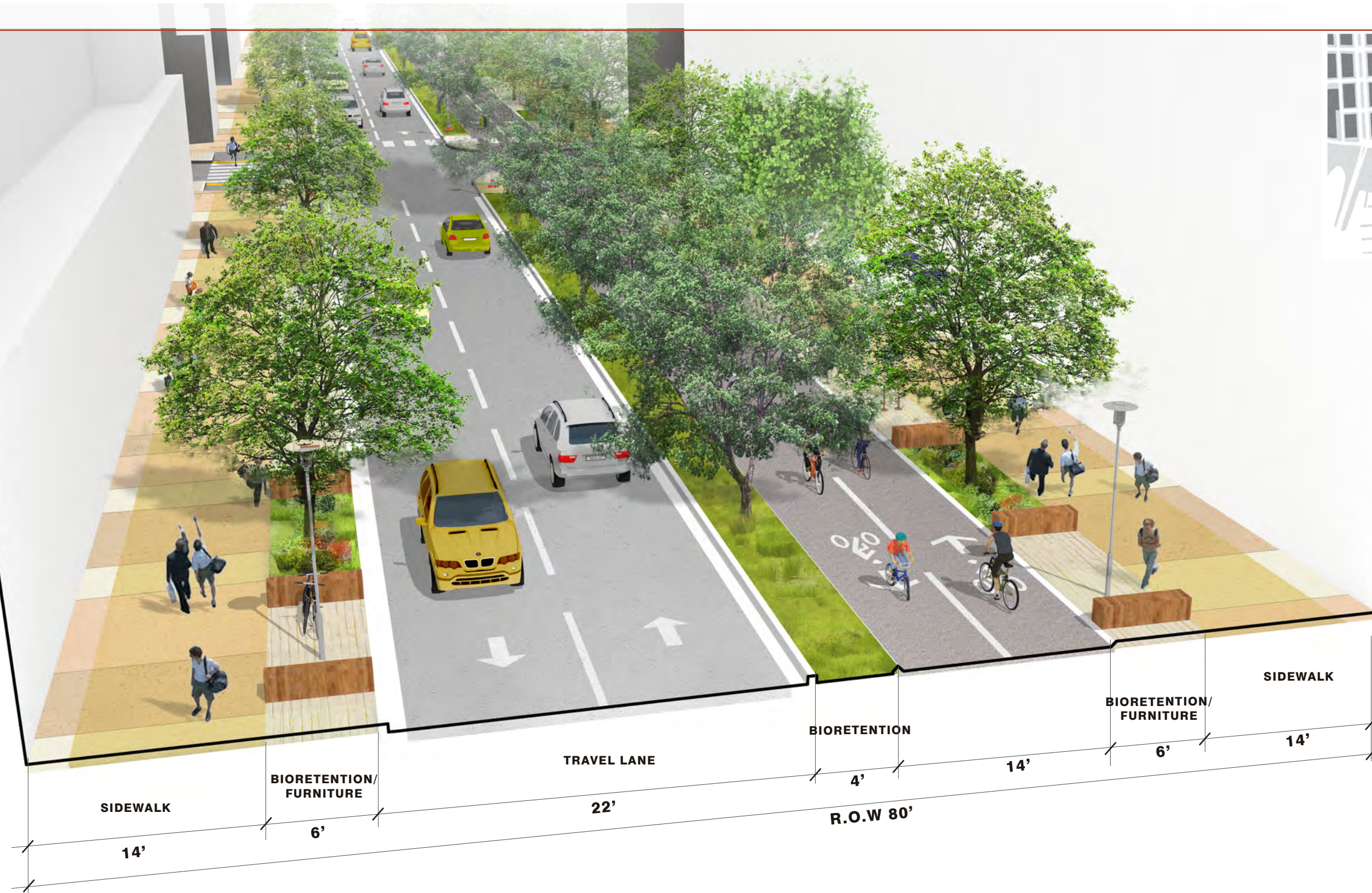
# EAST CROMWELL AND PURPLE STREET INTERSECTION



NOTE: DIAGRAM FOR MULTIMODAL TRAFFIC OPERATIONS AND GEOMETRIC DESIGN. COLOR USED FOR ILLUSTRATIVE PURPOSES ONLY AND DOES NOT INDICATE PAVEMENT COLOR PREFERENCES. FINAL DESIGN SUBJECT TO CITY APPROVAL.



# PURPLE STREET





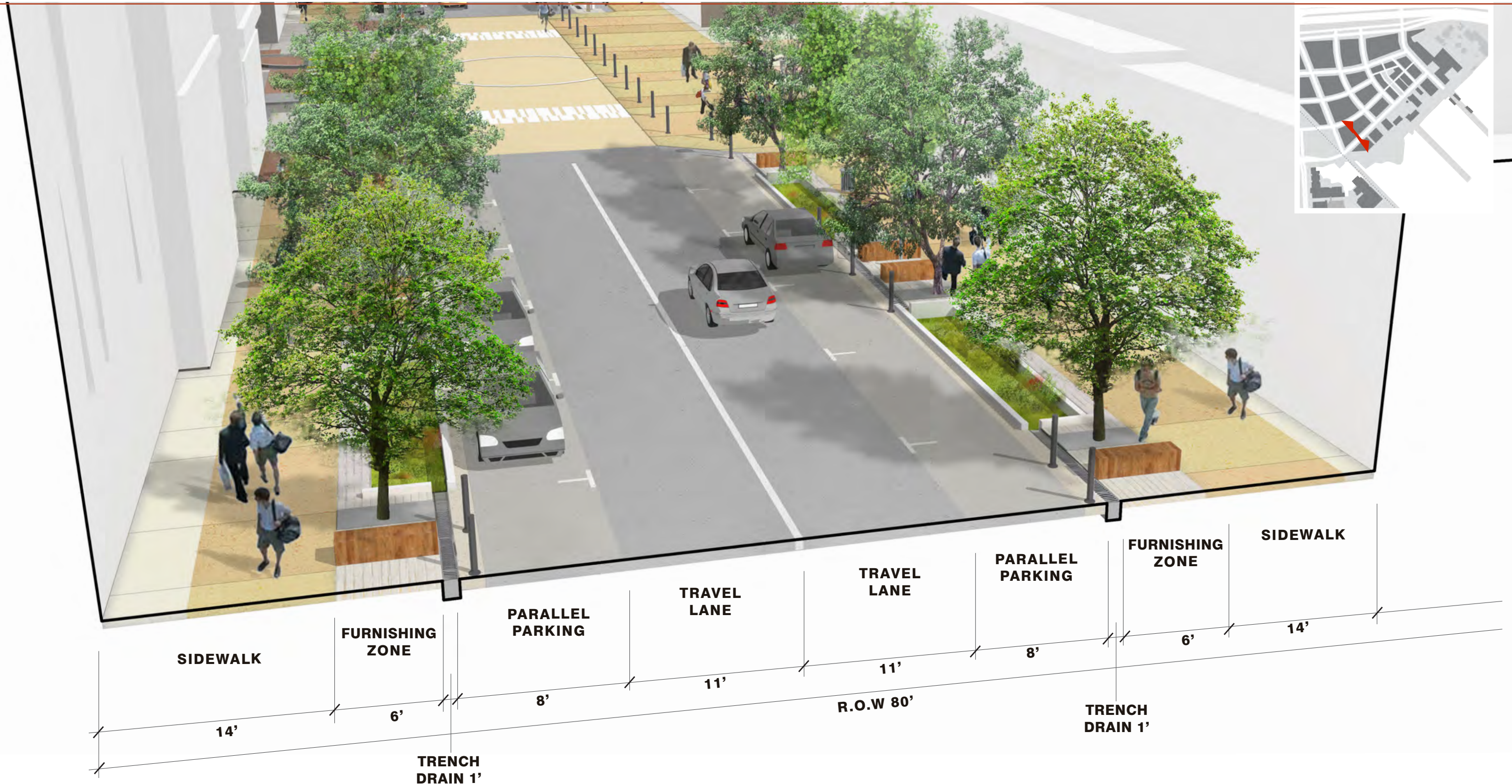
# EAST CROMWELL AND WEST PENINSULA DRIVE INTERSECTION



NOTE: DIAGRAM FOR MULTIMODAL TRAFFIC OPERATIONS AND GEOMETRIC DESIGN. COLOR USED FOR ILLUSTRATIVE PURPOSES ONLY AND DOES NOT INDICATE PAVEMENT COLOR PREFERENCES. FINAL DESIGN SUBJECT TO CITY APPROVAL.

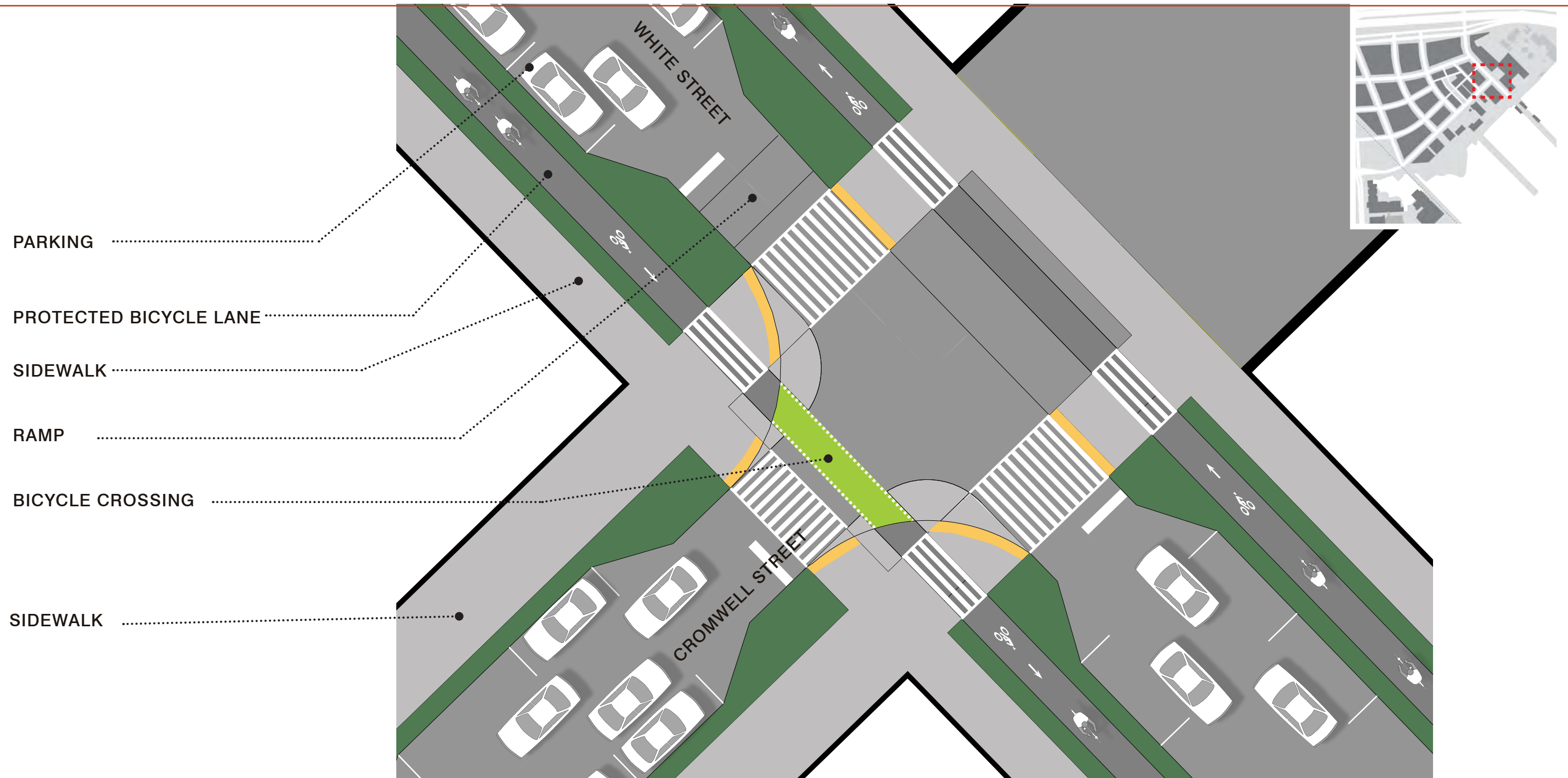


# CROMWELL COMMERCIAL STREET



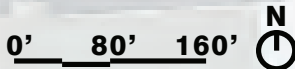
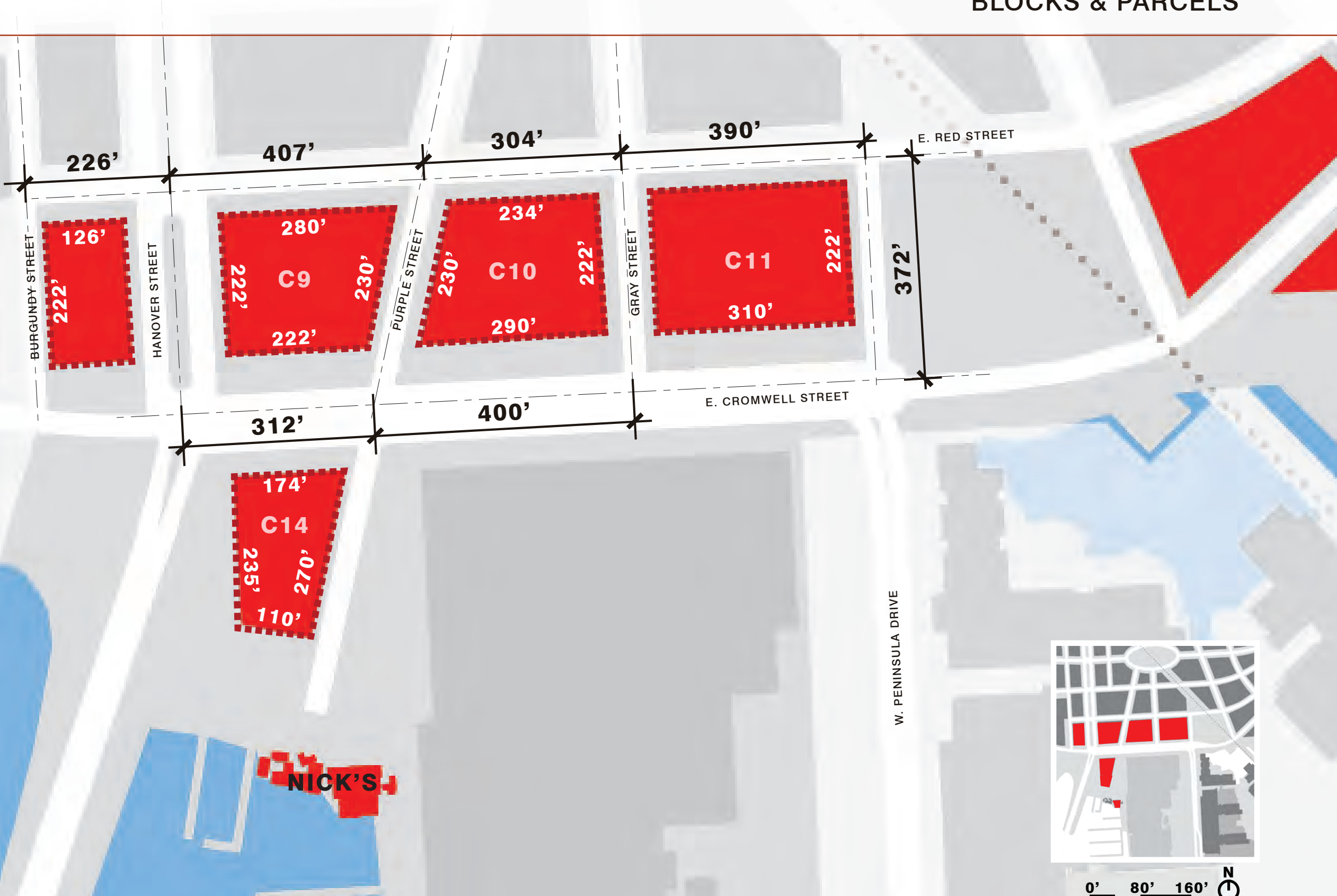


# EAST CROMWELL AND WHITE STREET INTERSECTION



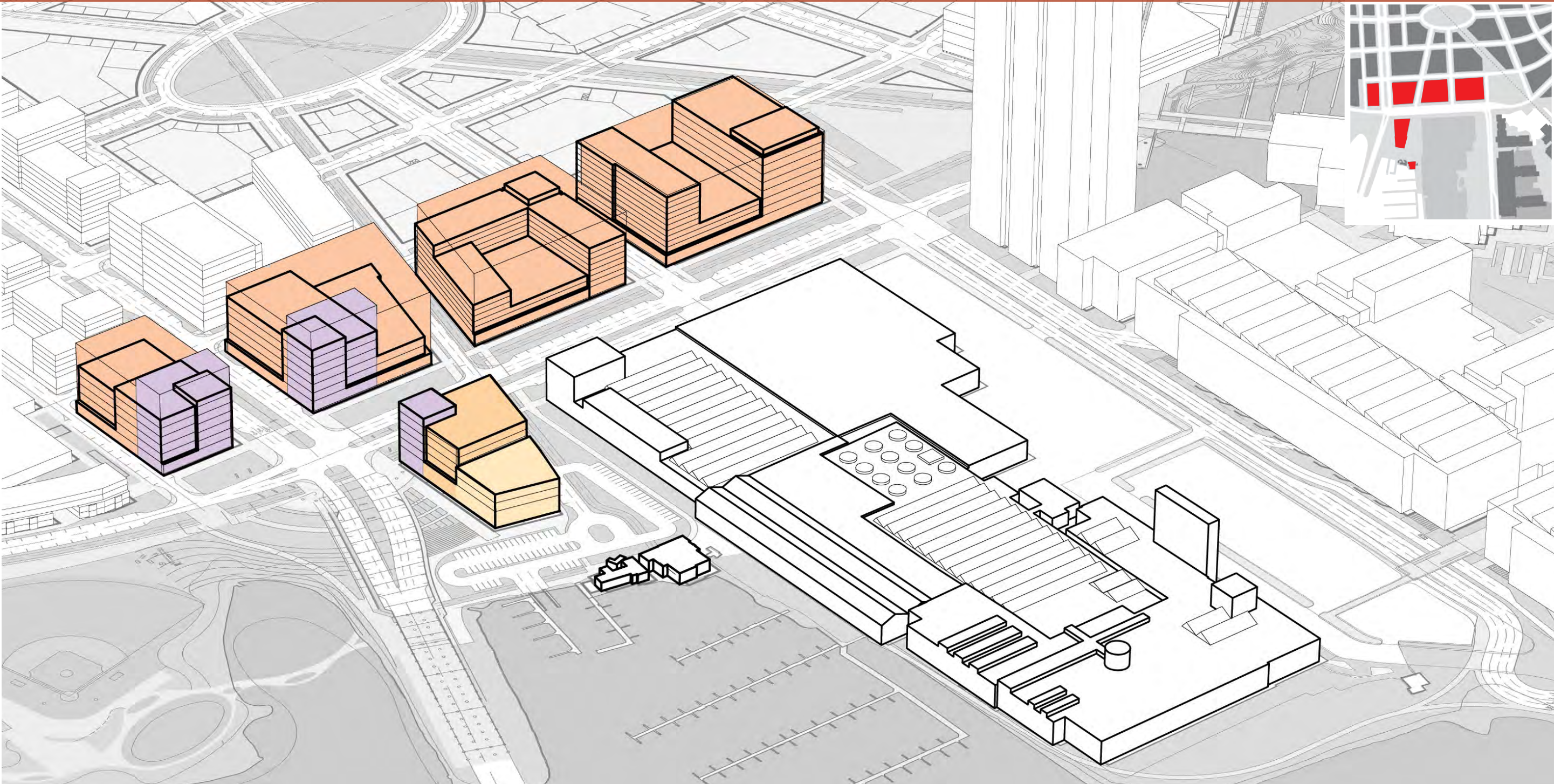


# CROMWELL STREET DISTRICT BLOCKS & PARCELS





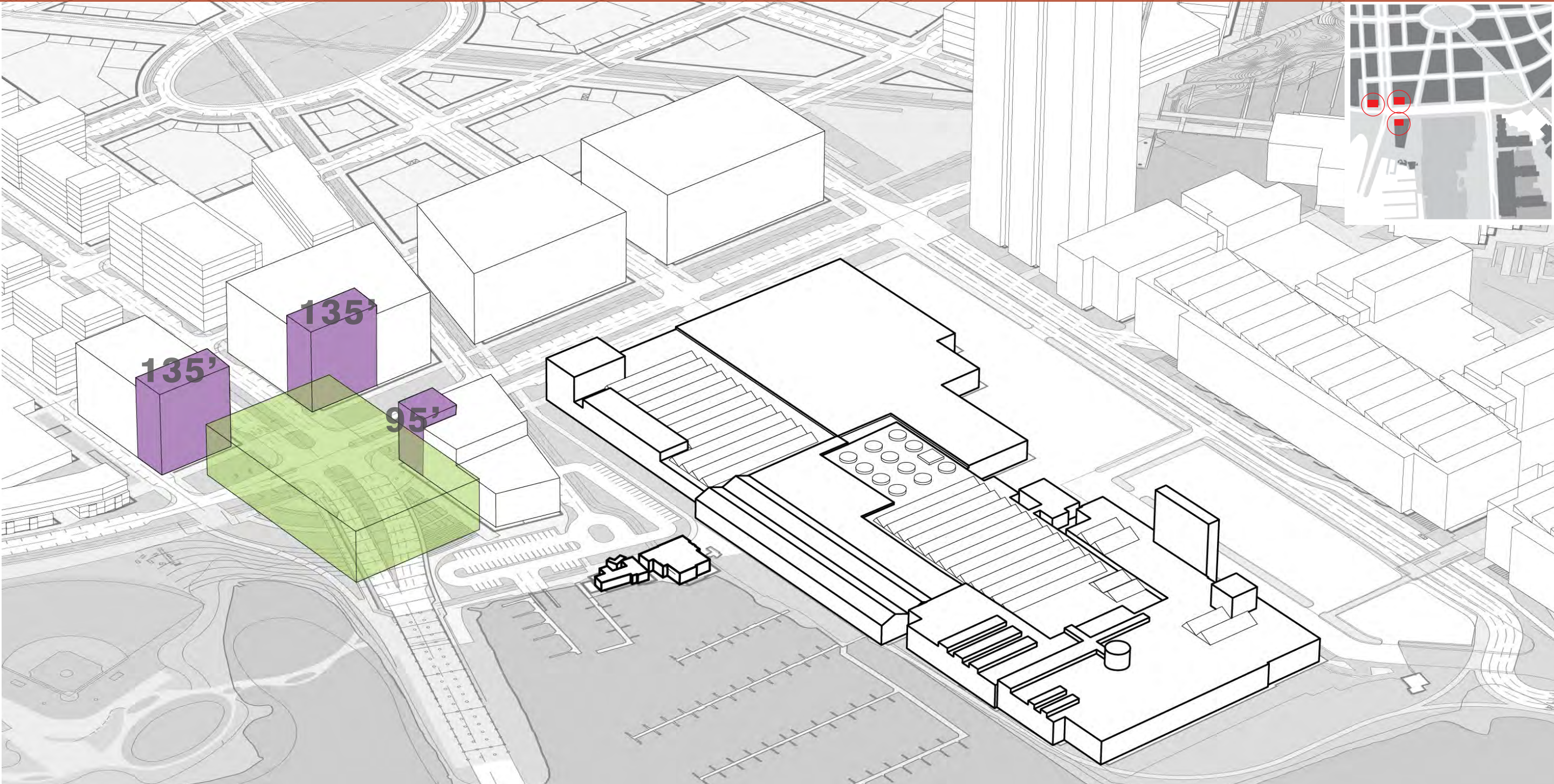
# CROMWELL STREET DISTRICT MASSING OVERLAY





# CROMWELL STREET DISTRICT

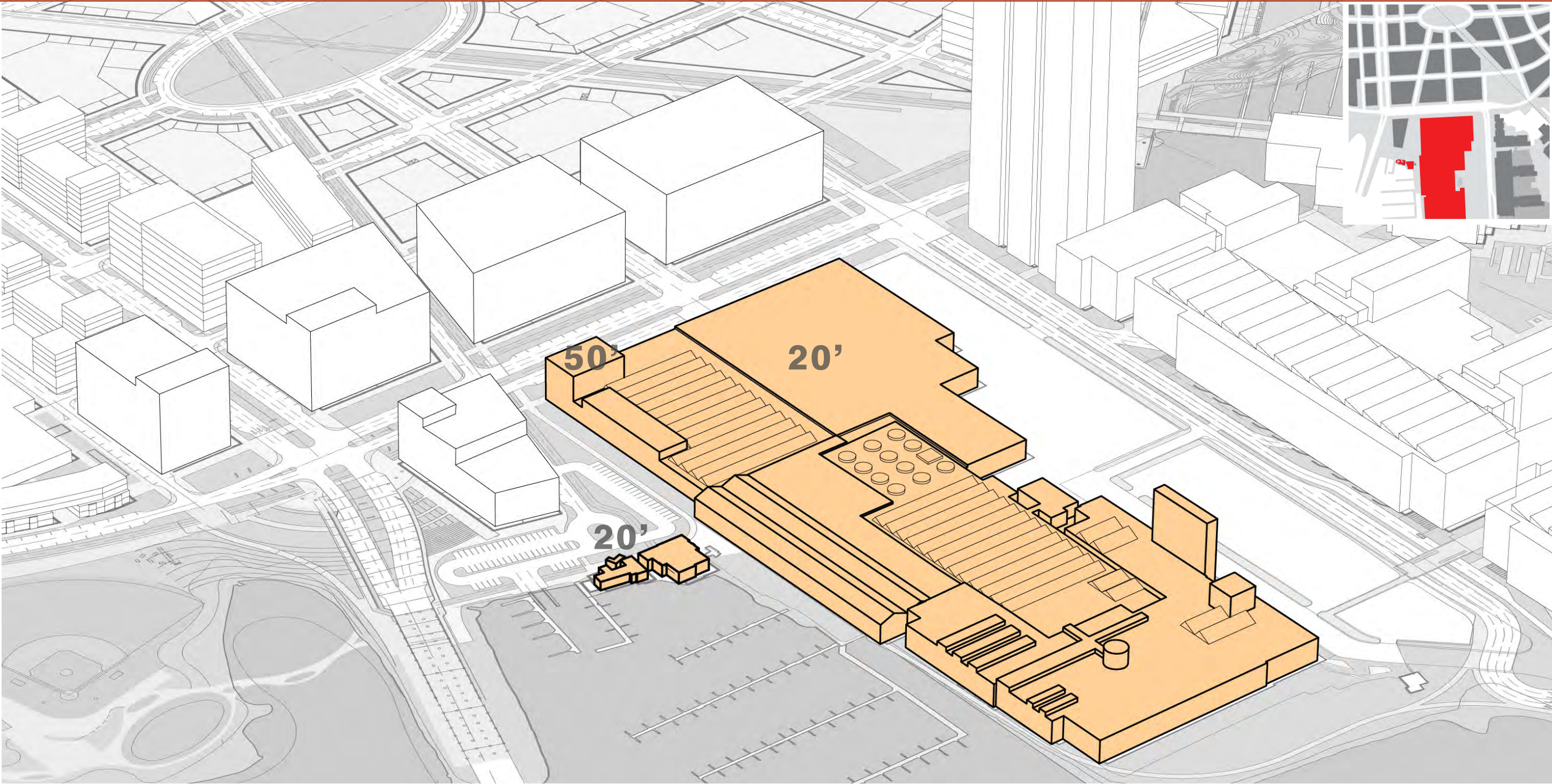
## PORTAL & GATEWAYS





# CROMWELL STREET DISTRICT

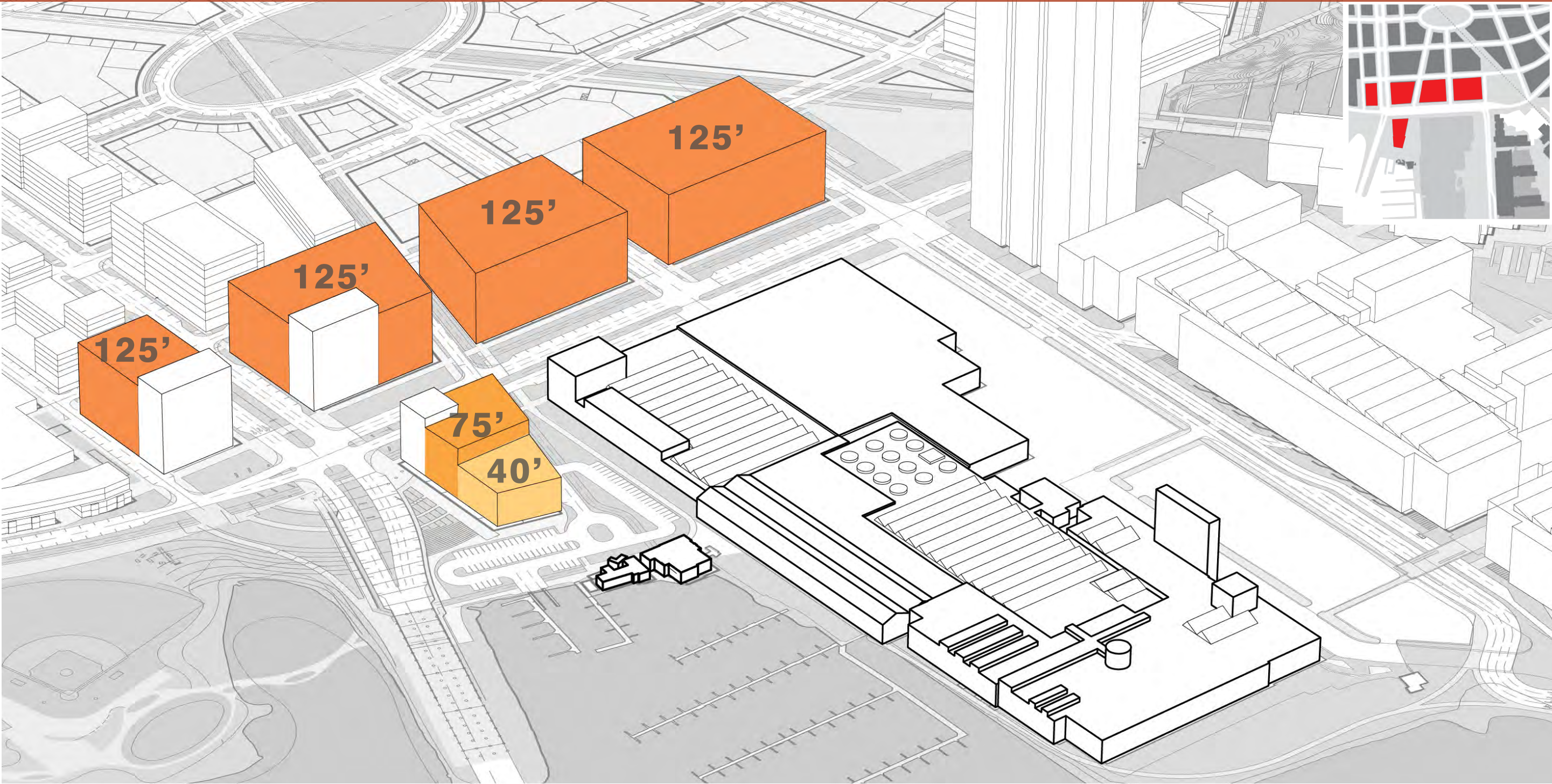
## EXISTING NICK'S AND LOCKE BUILDINGS





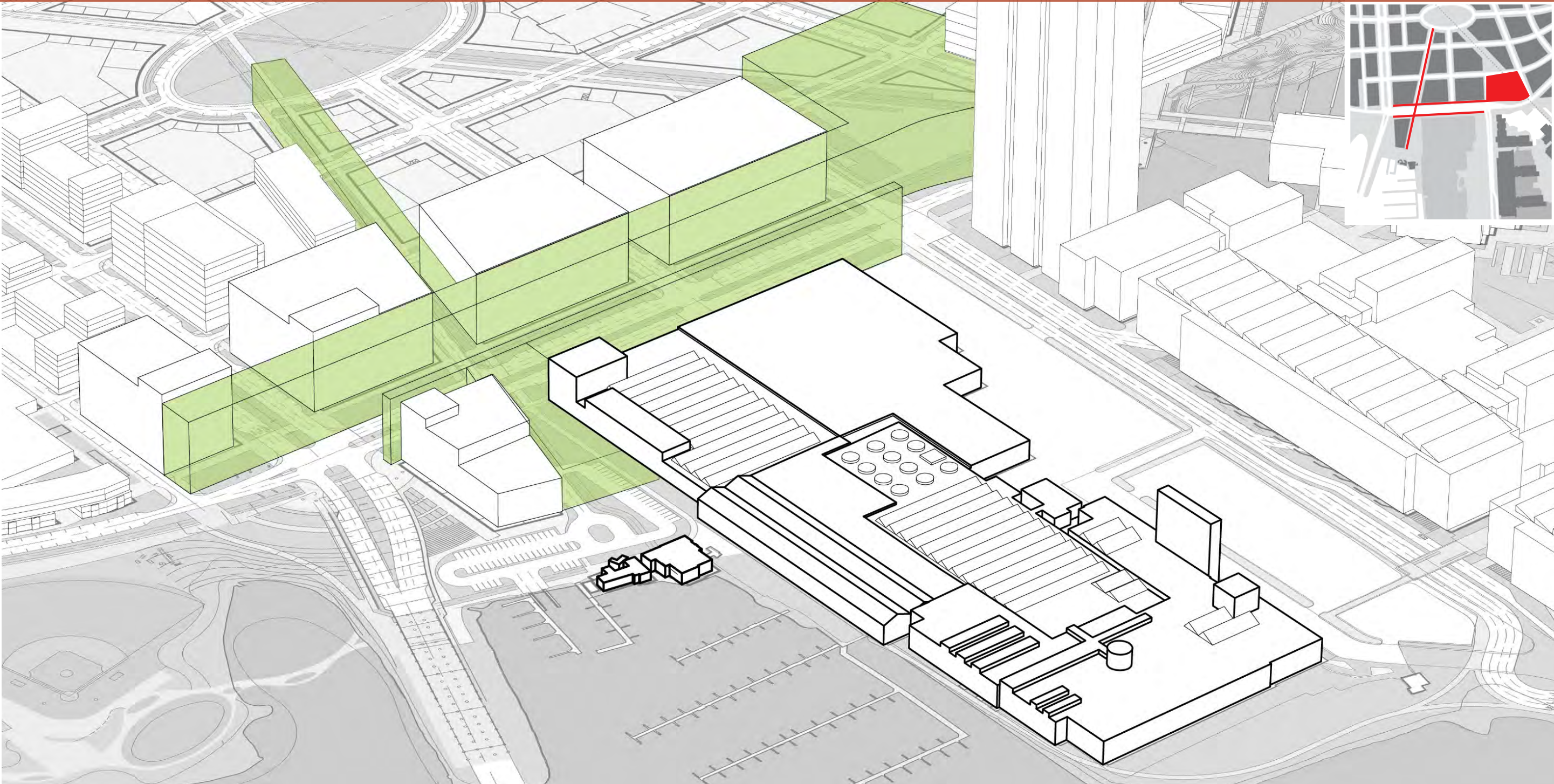
# CROMWELL STREET DISTRICT

## BUILDING HEIGHTS



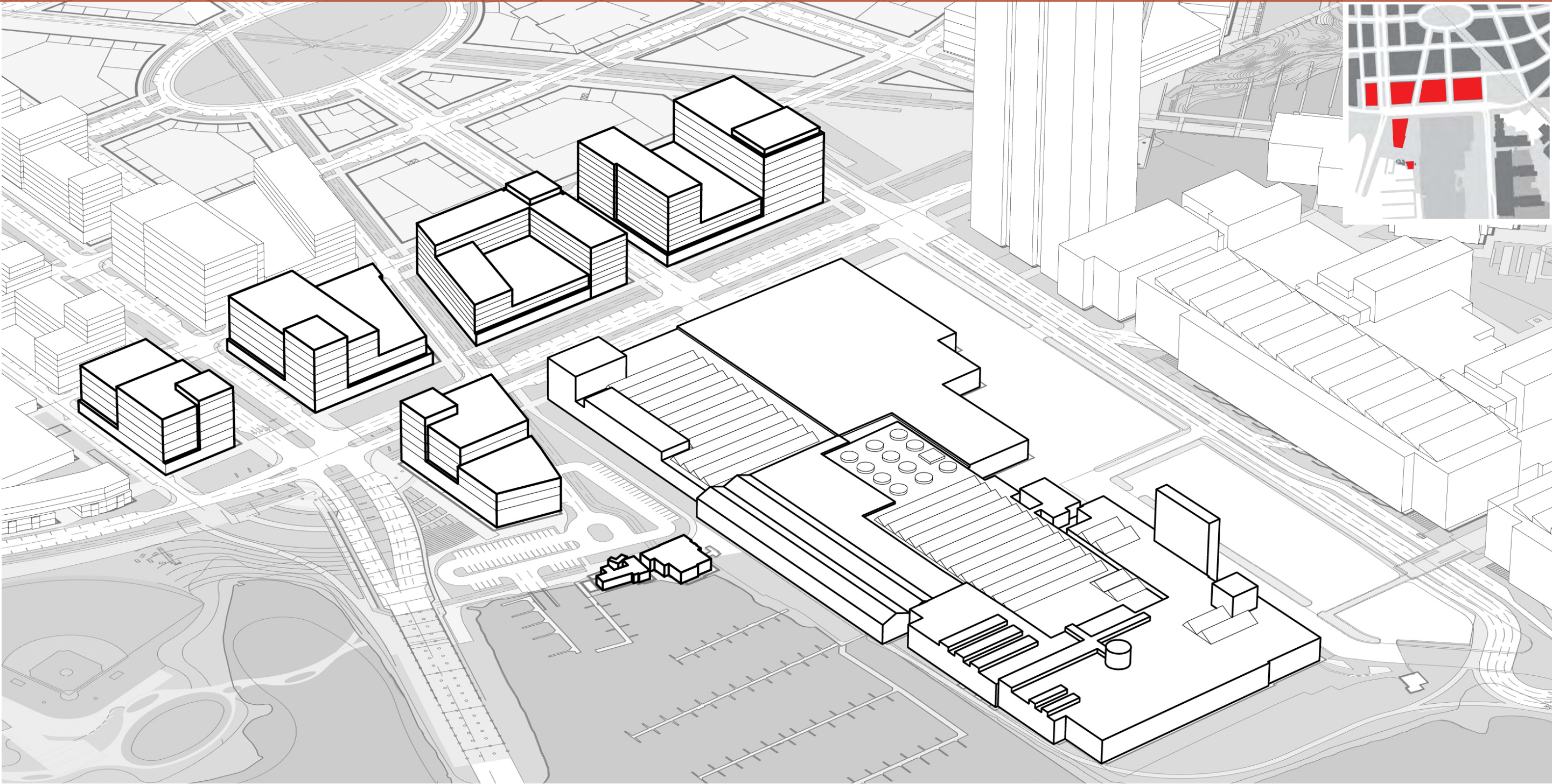


# CROMWELL STREET DISTRICT PUBLIC REALM





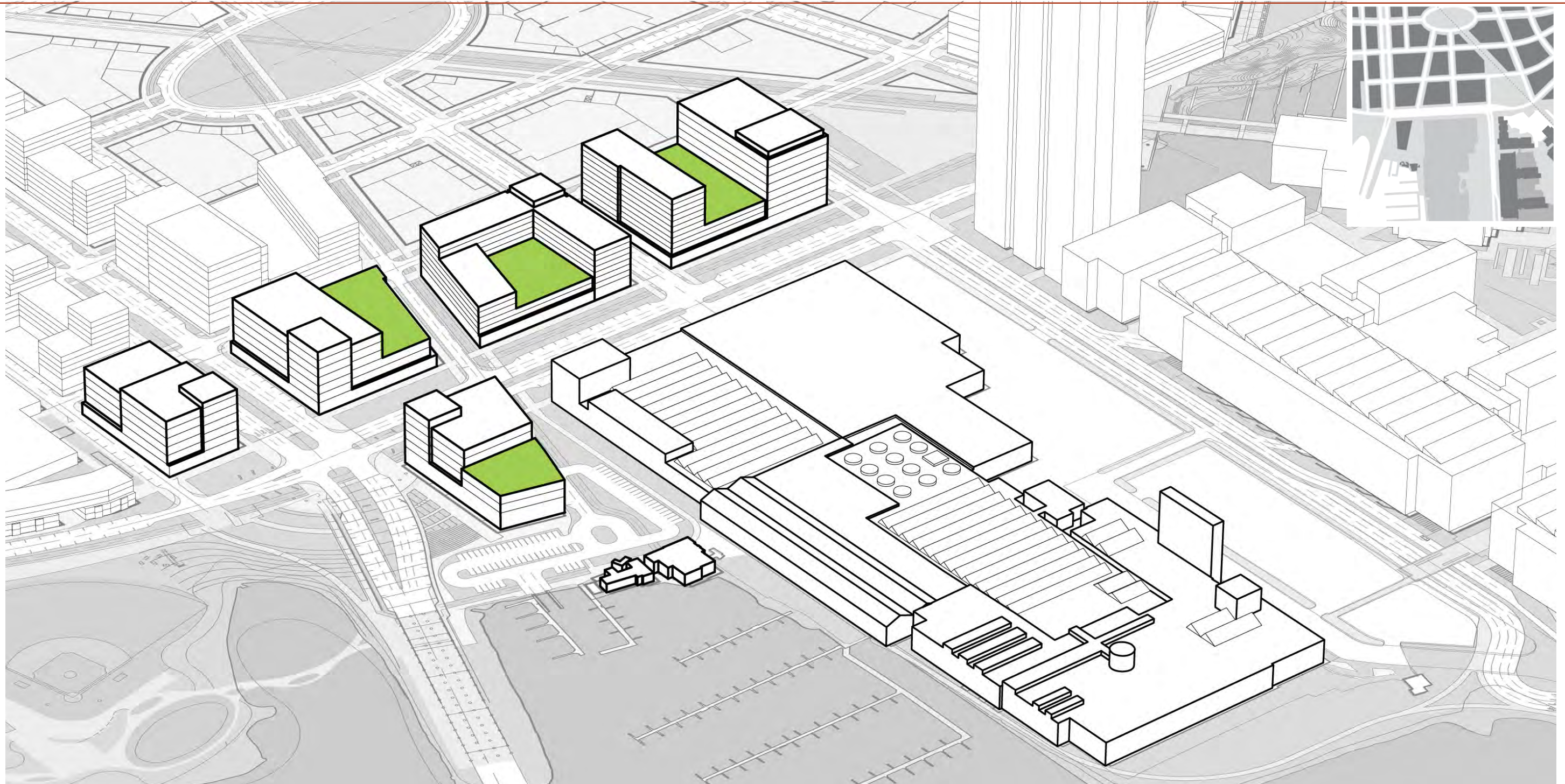
# CROMWELL STREET DISTRICT MASSING





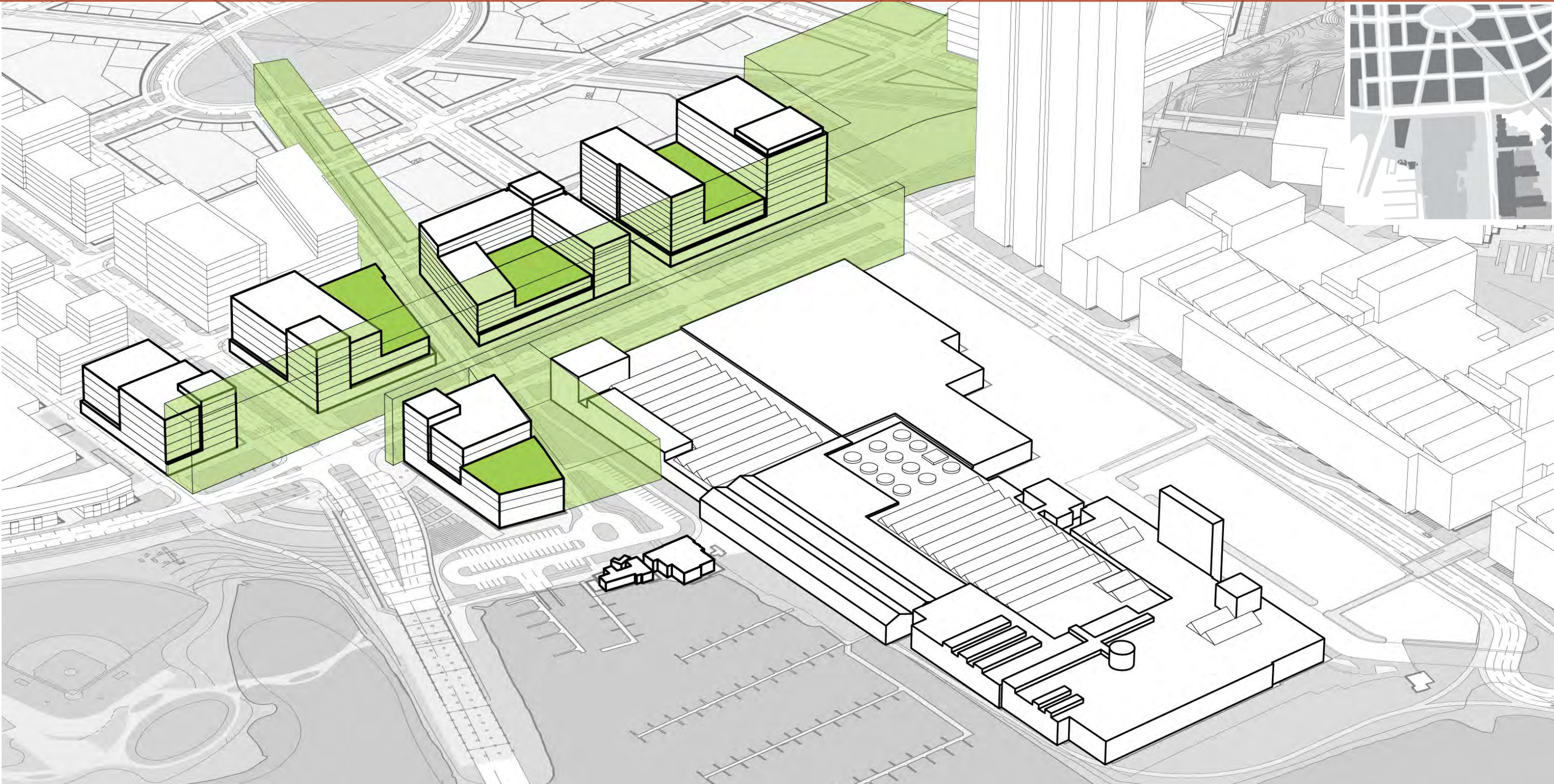
# CROMWELL STREET DISTRICT

## POTENTIAL GREEN ROOF OPPORTUNITIES





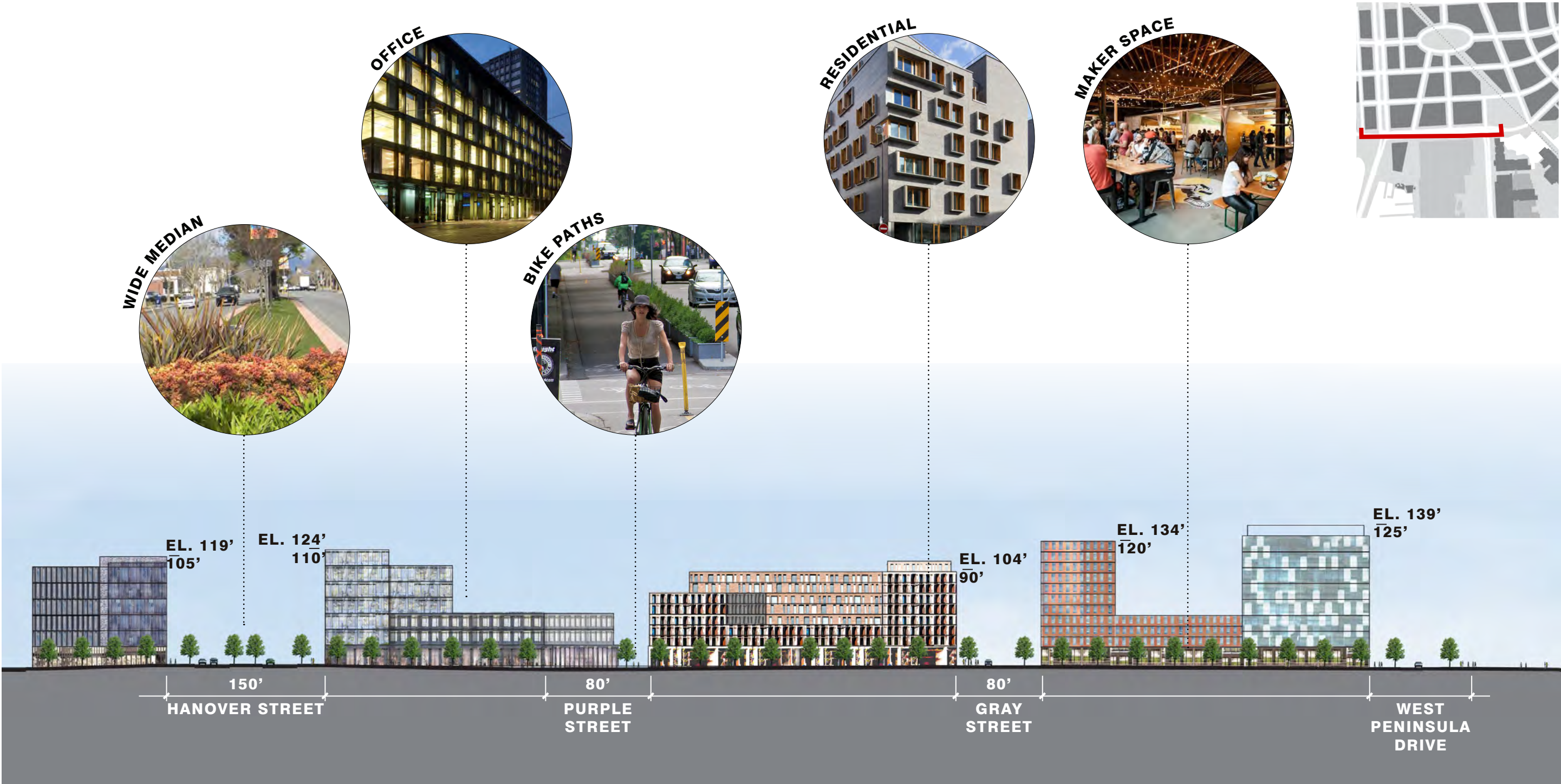
**CROMWELL STREET DISTRICT**  
LIVING SYSTEMS





# CROMWELL STREET DISTRICT

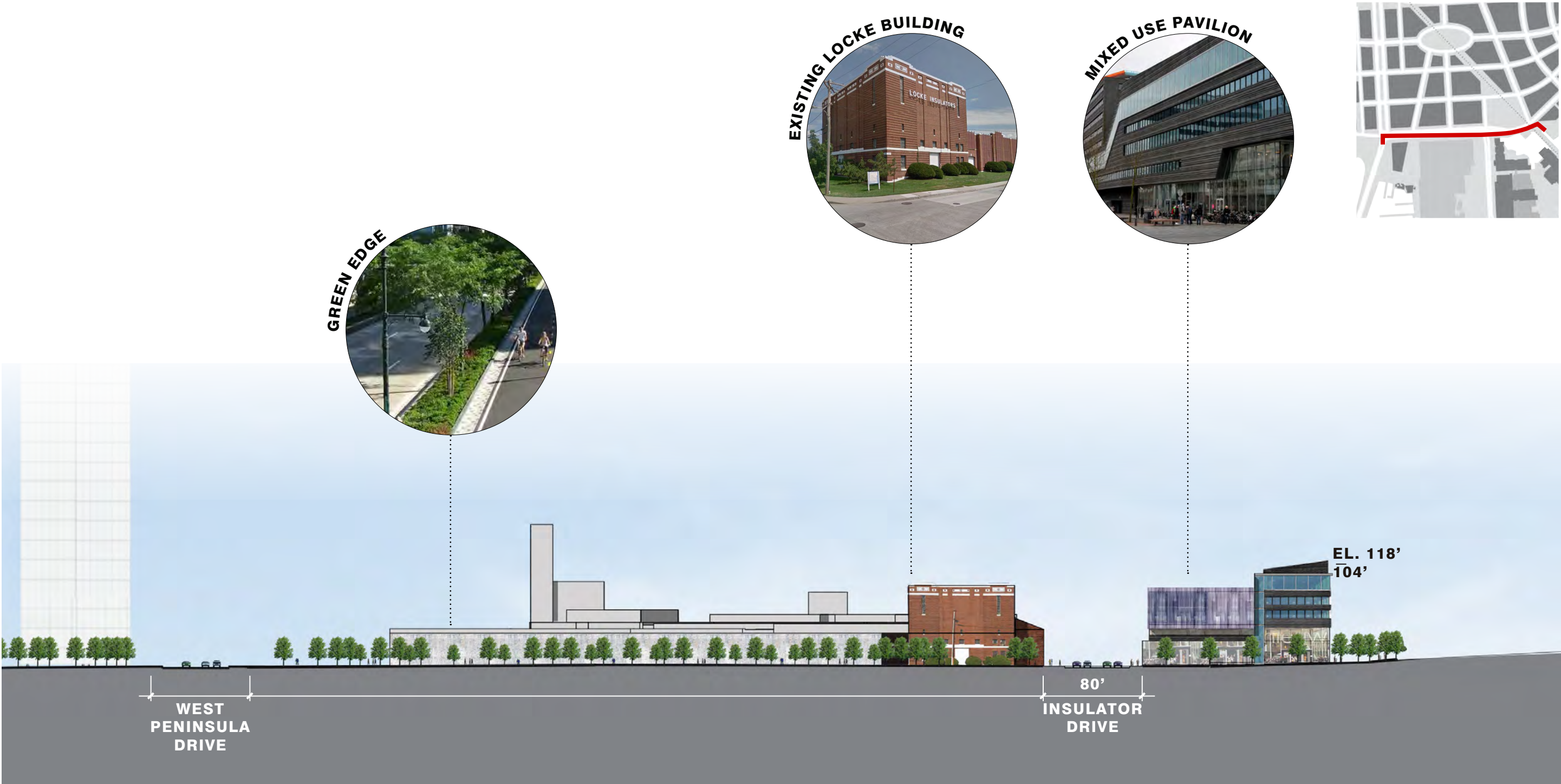
## CROMWELL STREET NORTH ELEVATION





# CROMWELL STREET DISTRICT

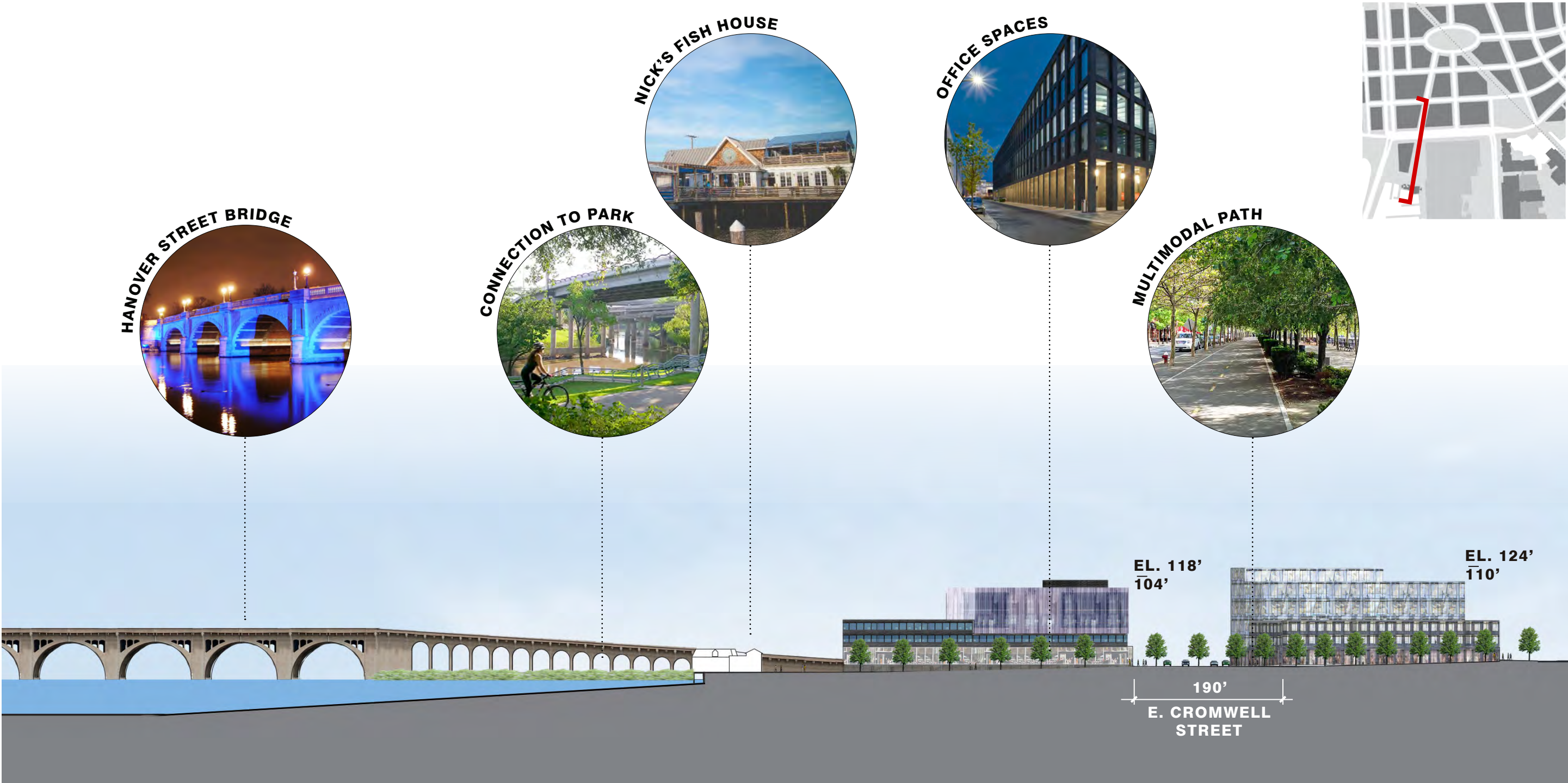
## CROMWELL STREET SOUTH ELEVATION





# CROMWELL STREET DISTRICT

## INSULATOR DRIVE WEST ELEVATION





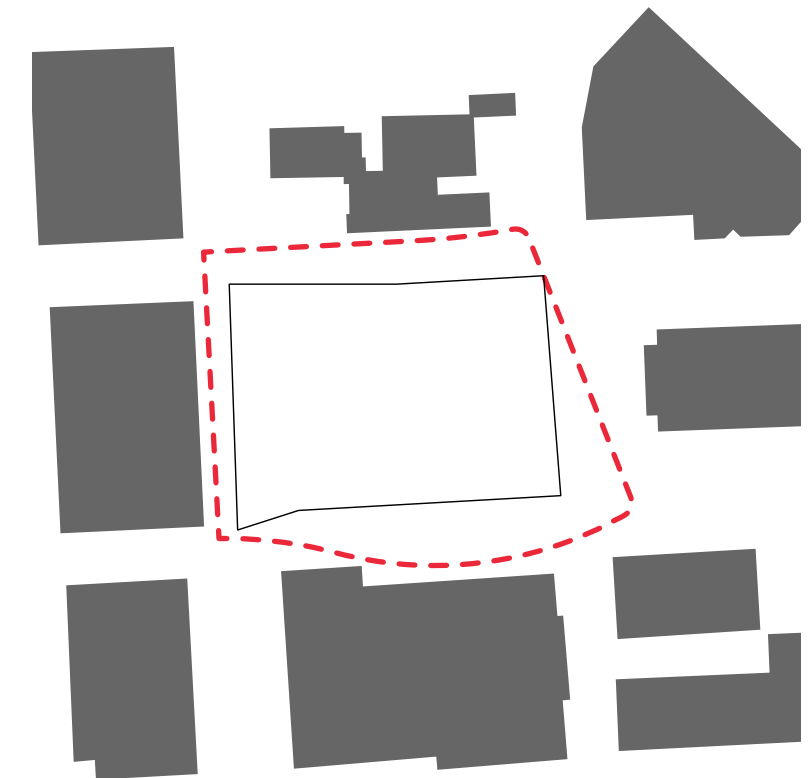
# URBAN PLAZA BLOCKS





# URBAN PLAZA SCALE COMPARISONS

## WAR MEMORIAL PLAZA, BALTIMORE

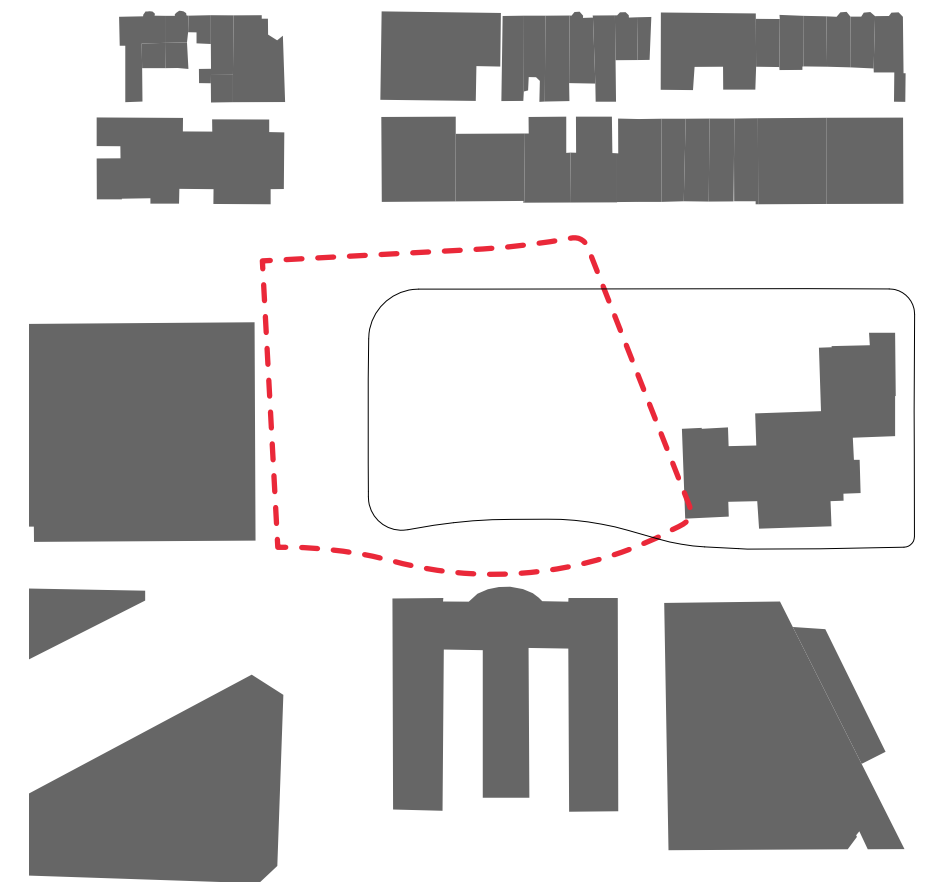


0 100' 200'  
1.7 ACRES



# URBAN PLAZA SCALE COMPARISONS

## COPLEY SQUARE, BOSTON

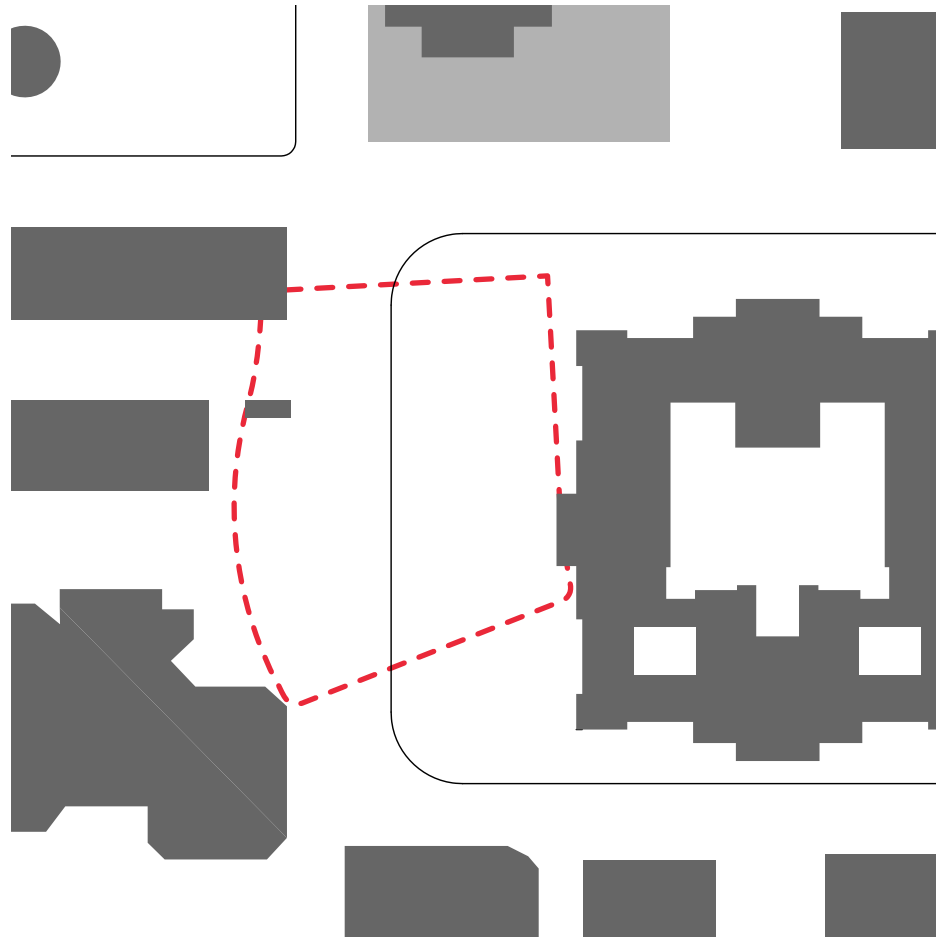
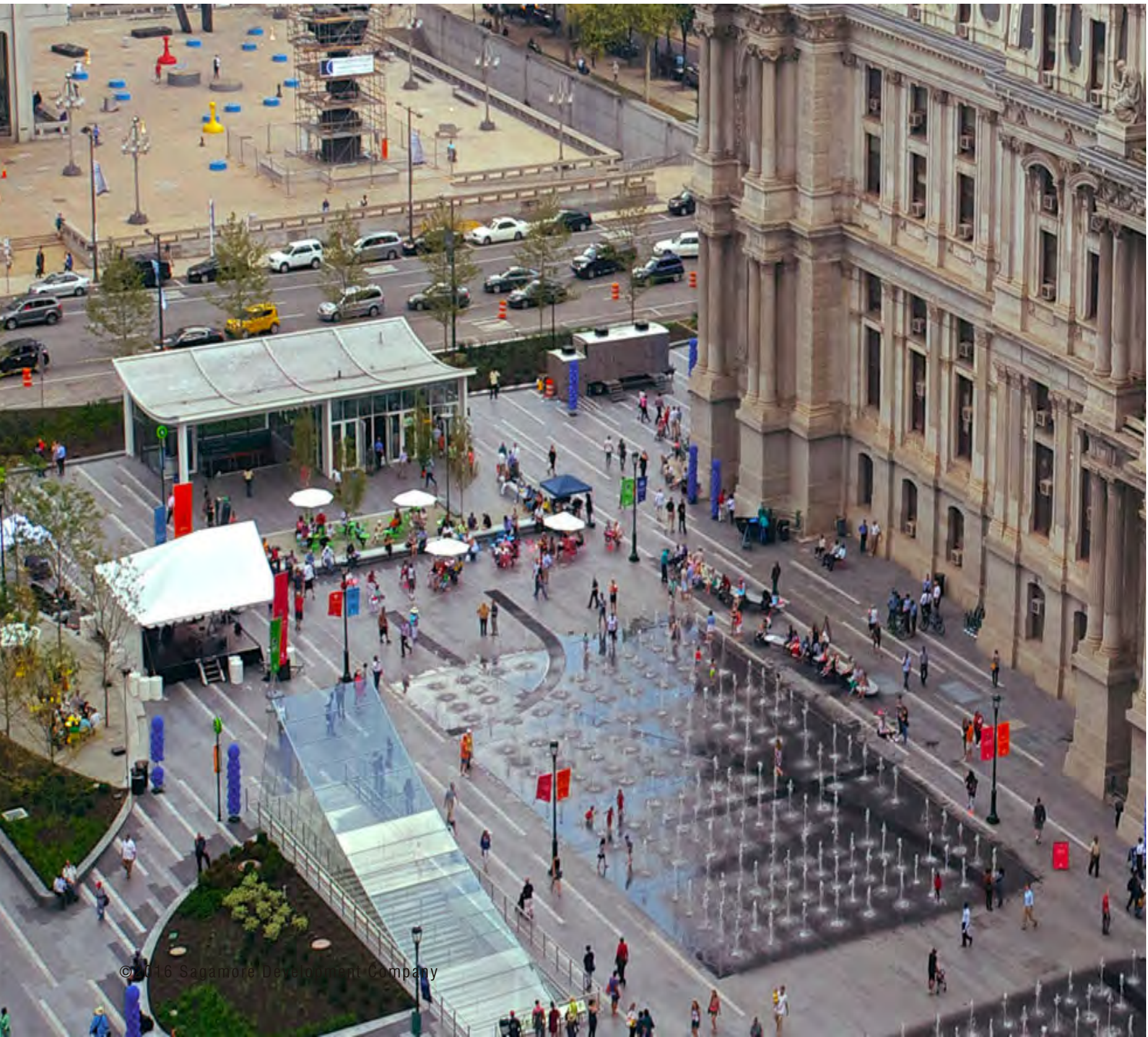


0 100' 200'  
3 ACRES



# URBAN PLAZA SCALE COMPARISON

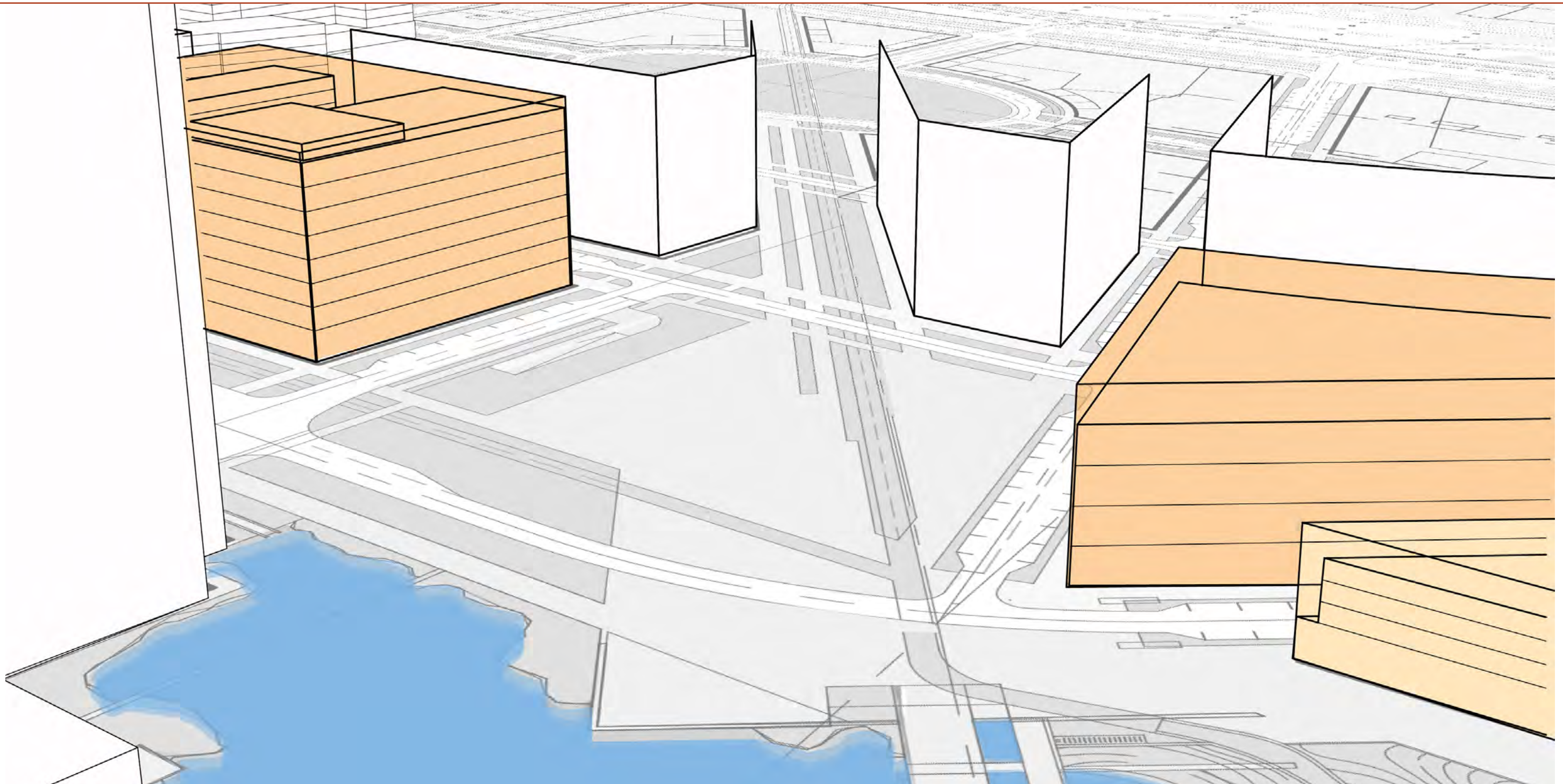
DILLWORTH PARK, PHILADELPHIA



0 100' 200'  
2.75 ACRES

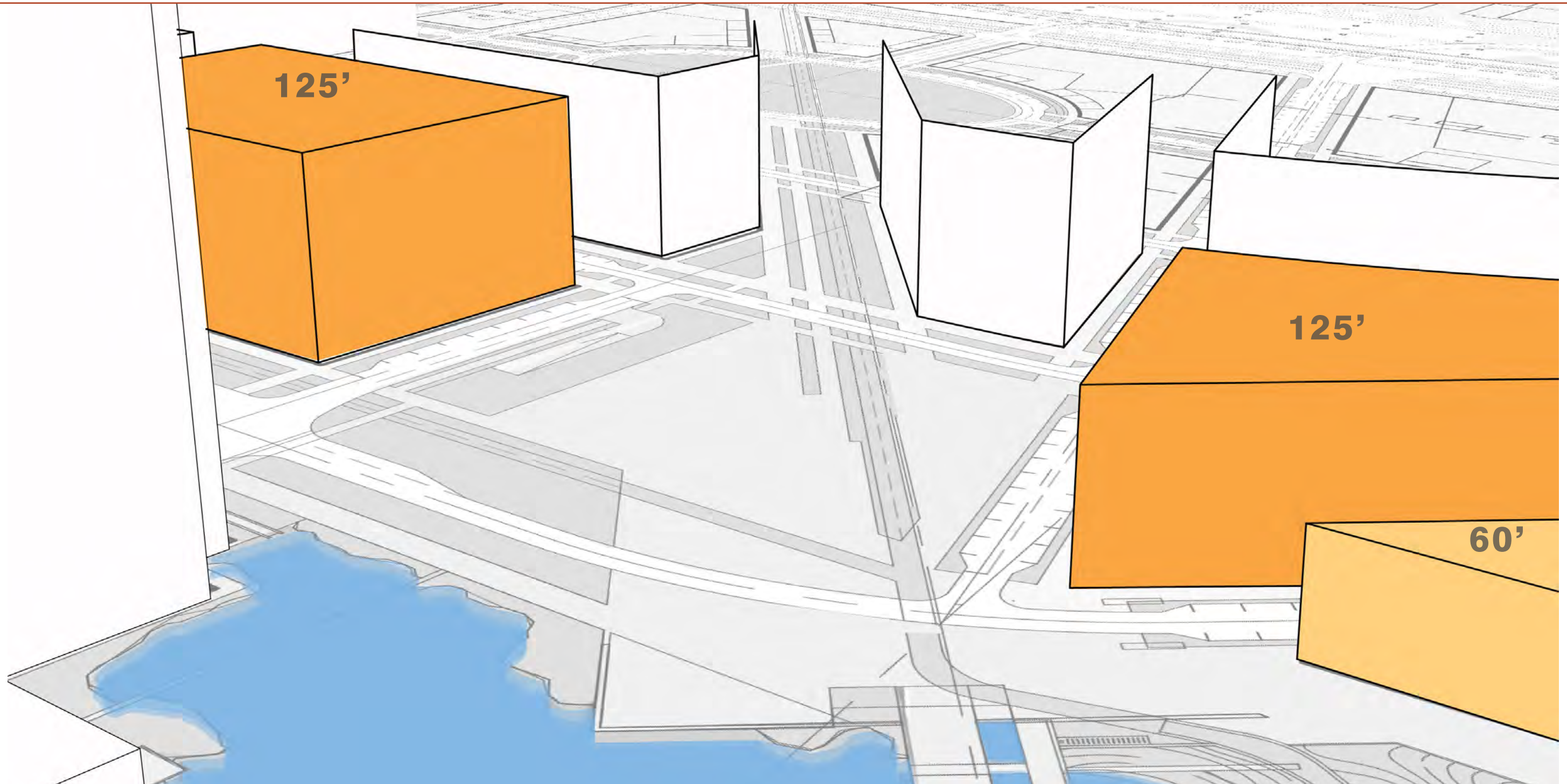


# URBAN PLAZA MASSING OVERLAY





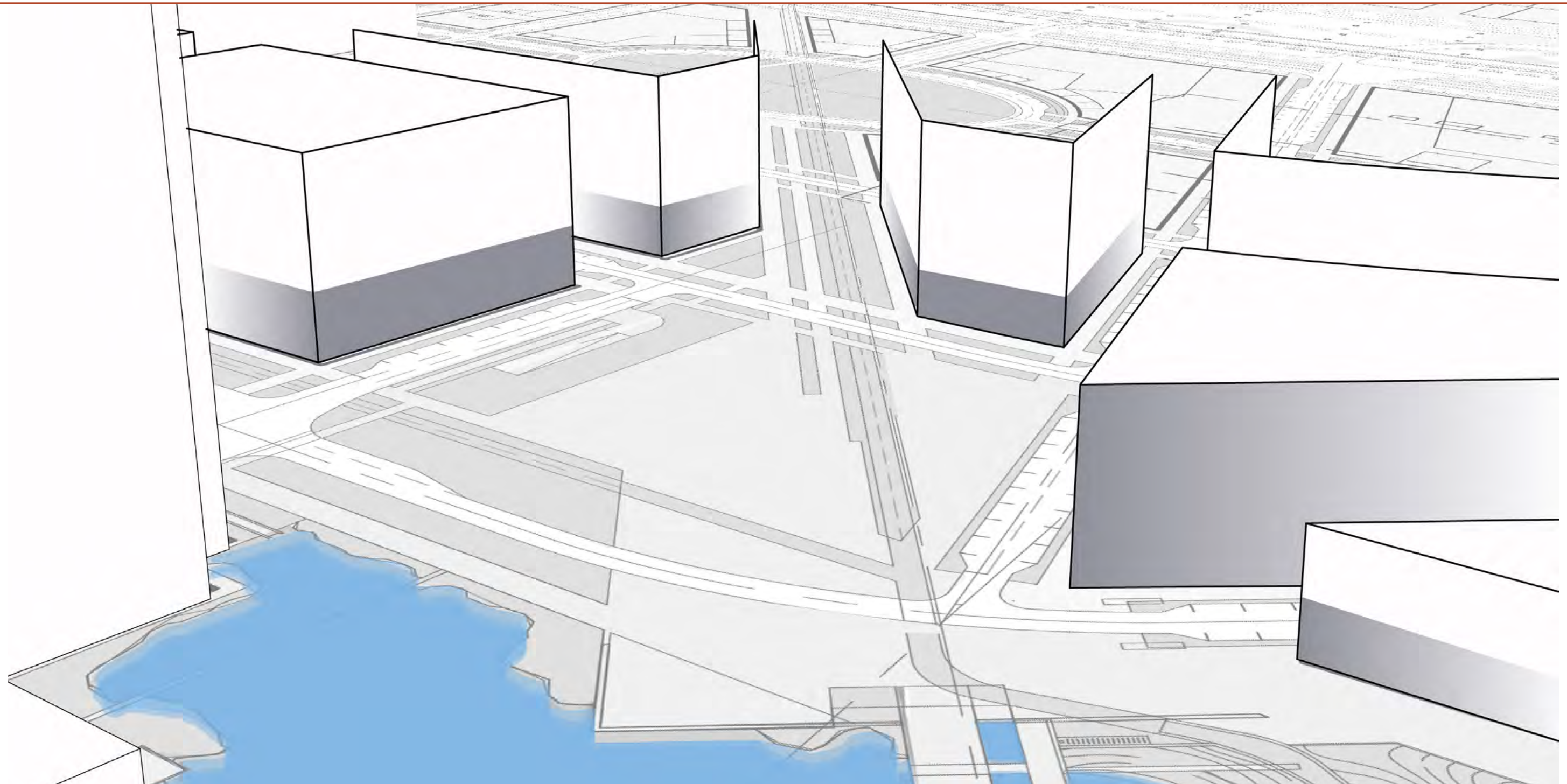
# URBAN PLAZA HEIGHTS





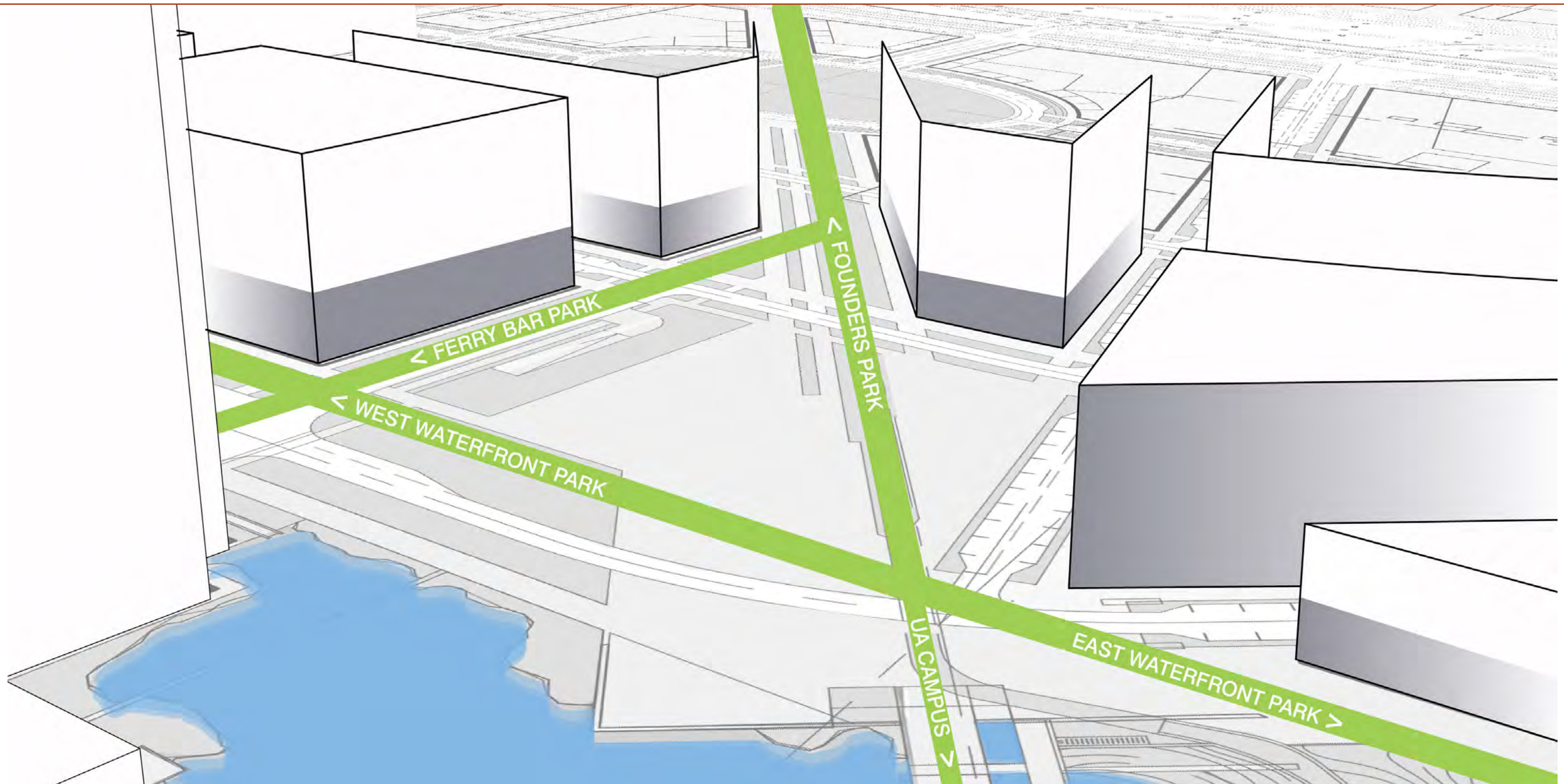
# URBAN PLAZA

## ACTIVE EDGES



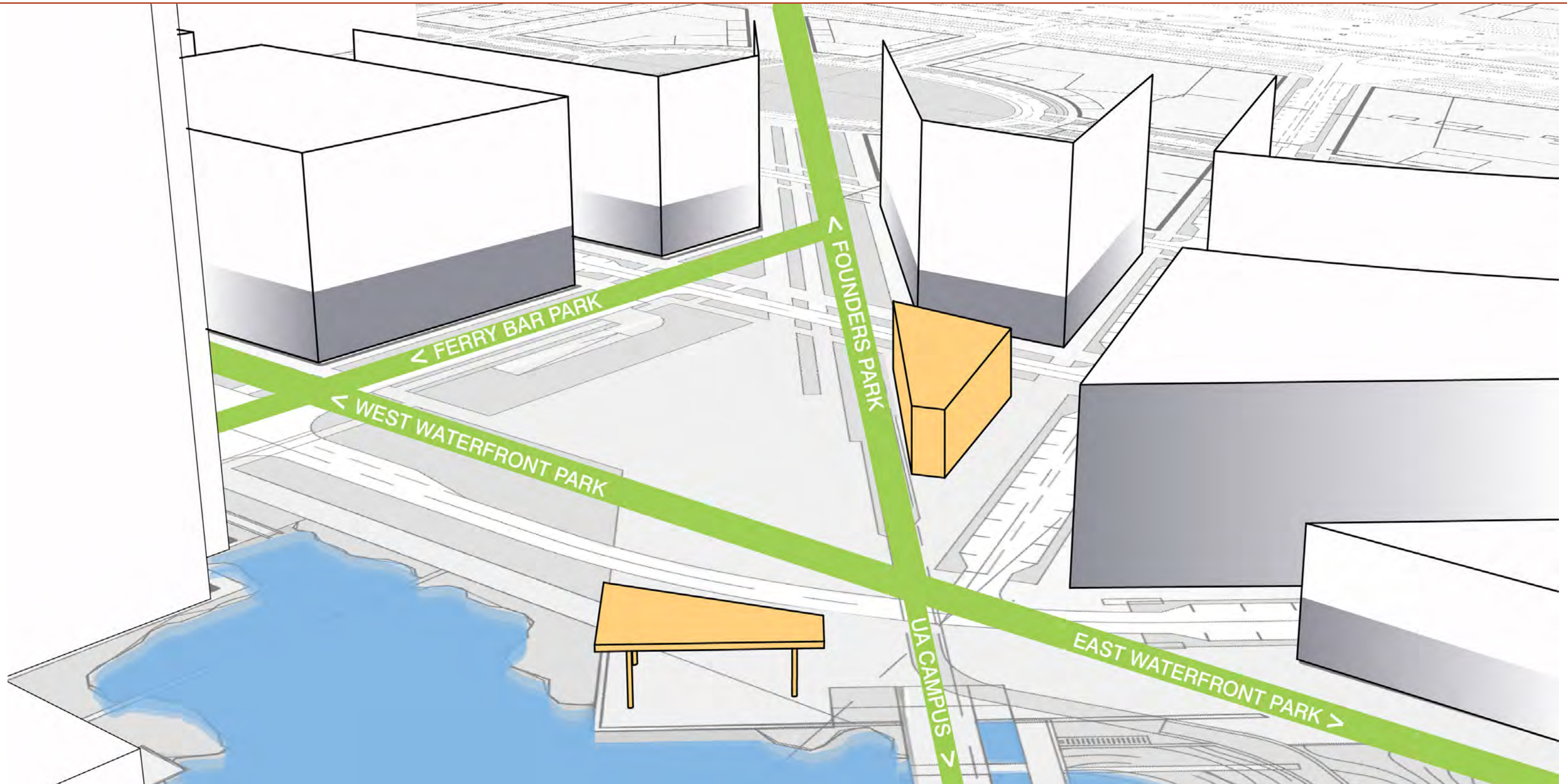


# URBAN PLAZA PARK NETWORK



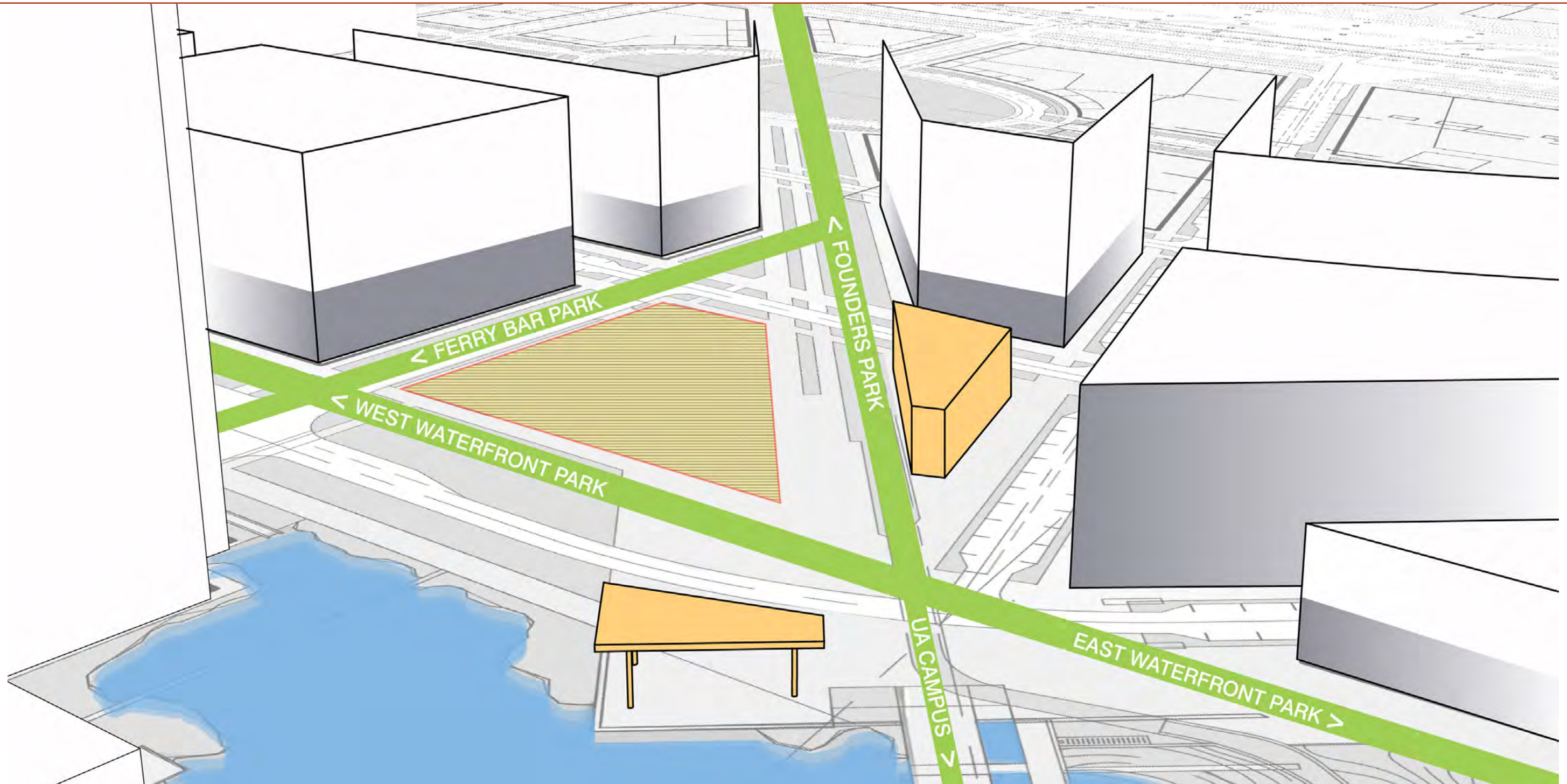


# URBAN PLAZA PAVILIONS



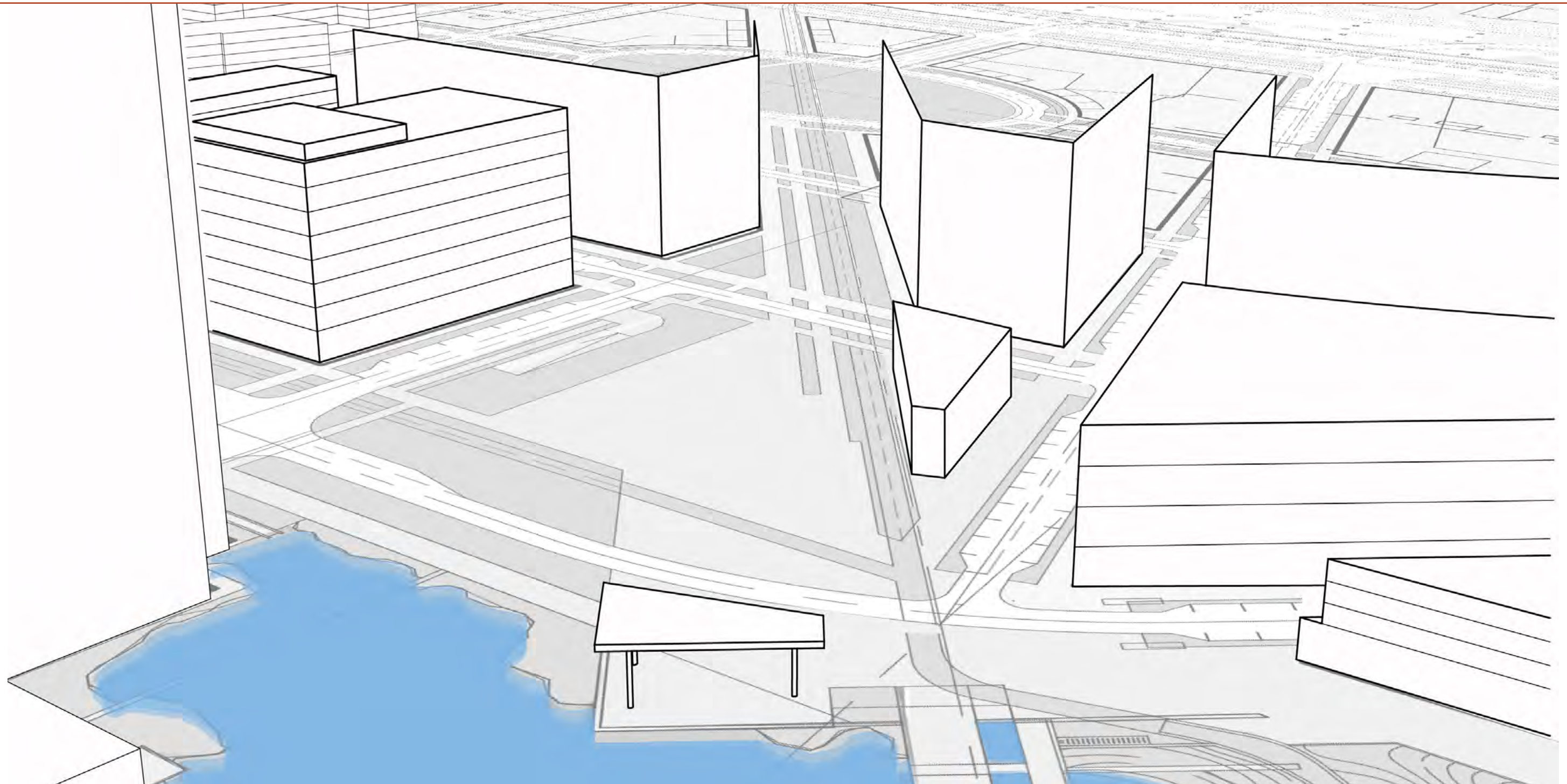


# URBAN PLAZA PROGRAMMABLE SPACE



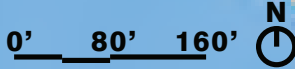


# URBAN PLAZA MASSING



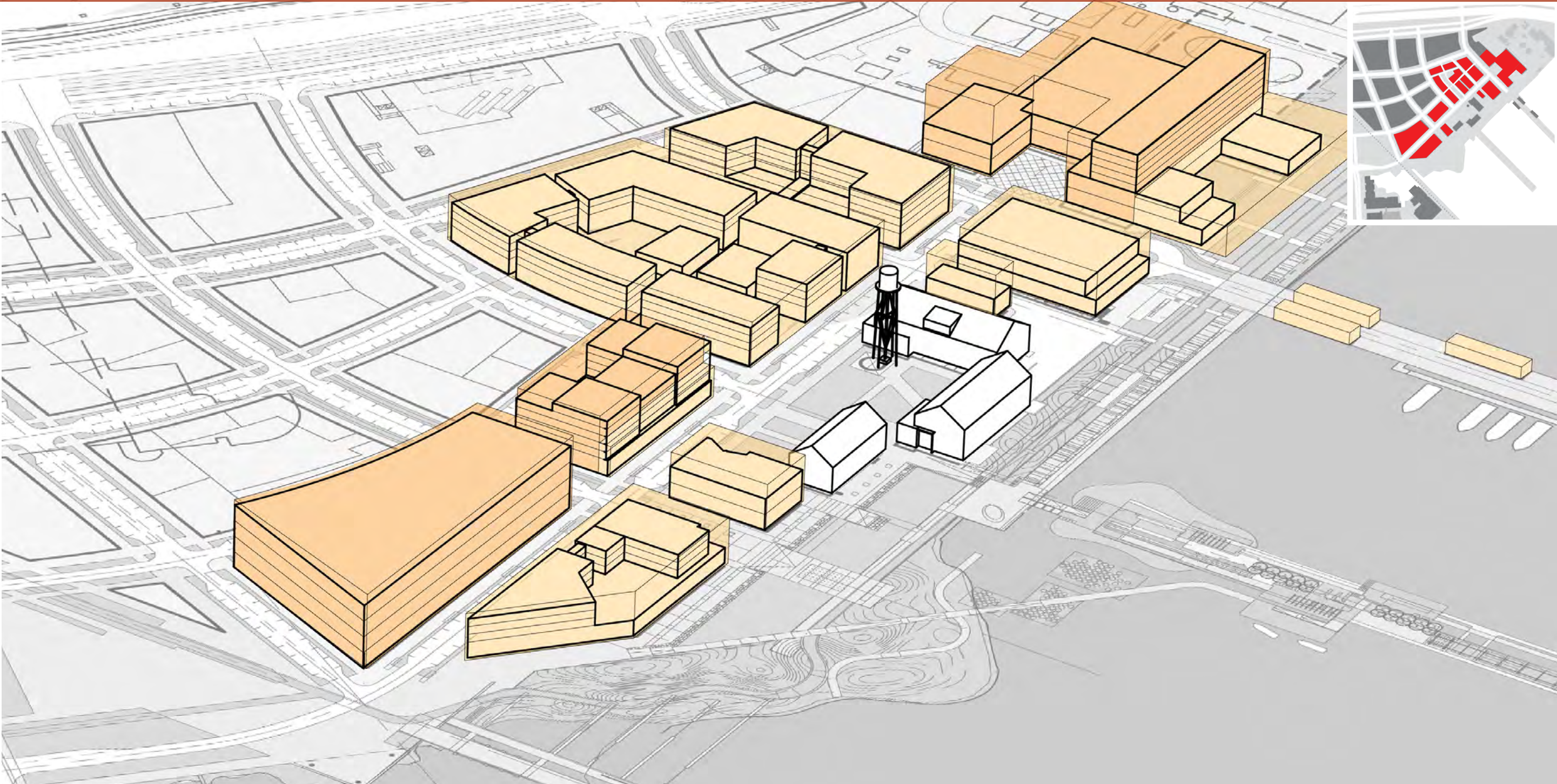


# EAST WATERFRONT DISTRICT BLOCKS



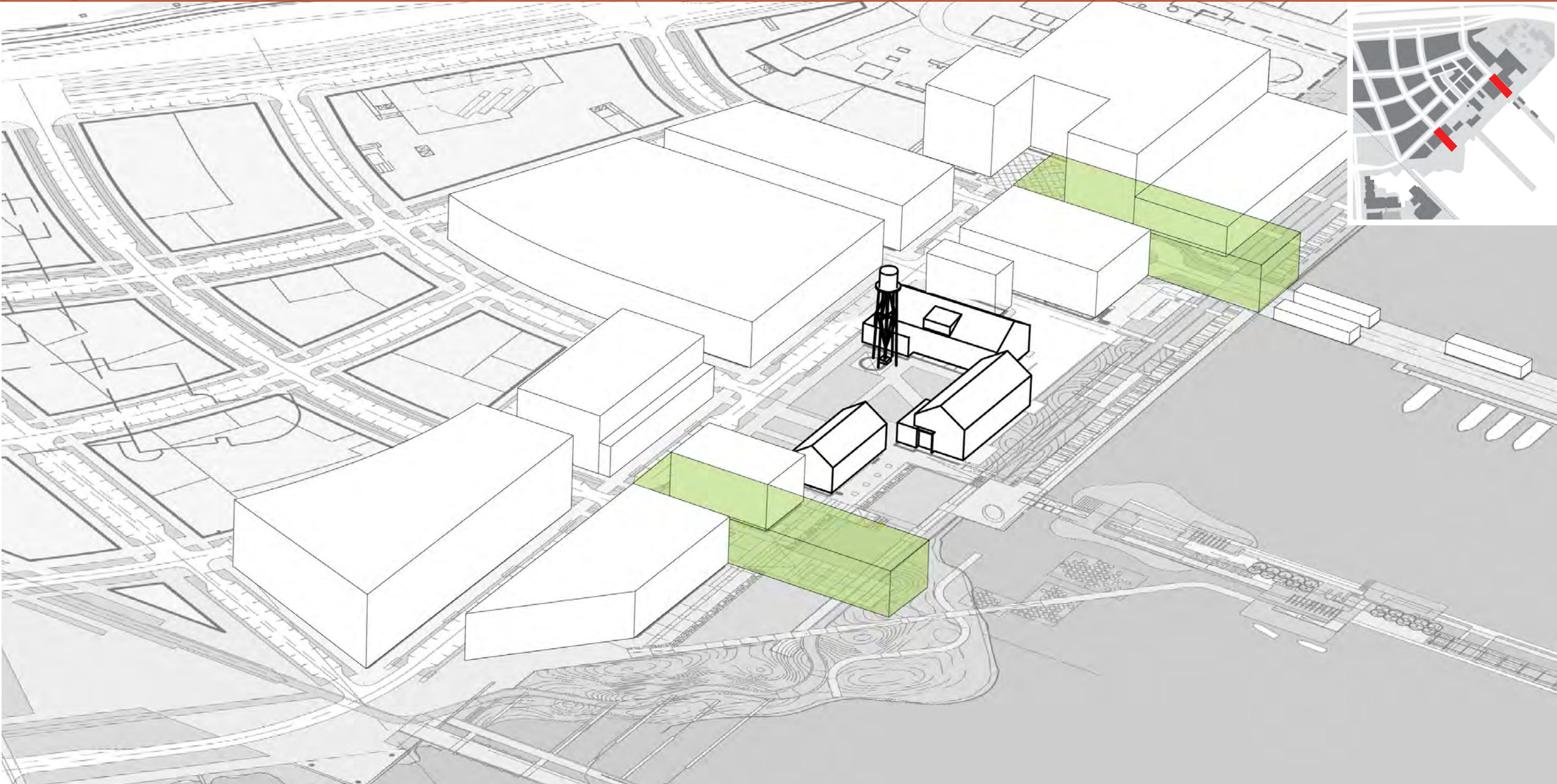


# EAST WATERFRONT DISTRICT MASSING OVERLAY





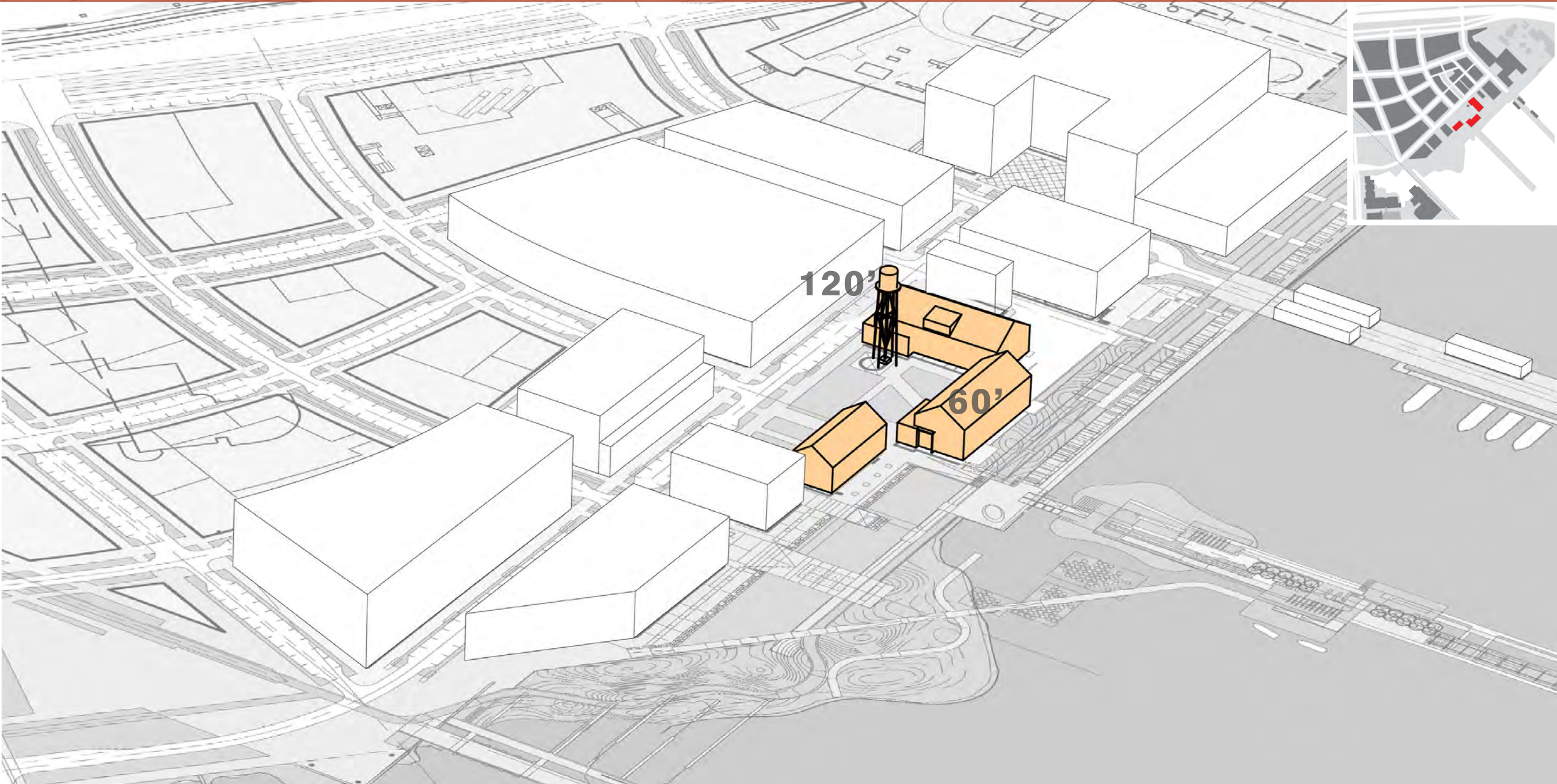
# EAST WATERFRONT DISTRICT PORTALS





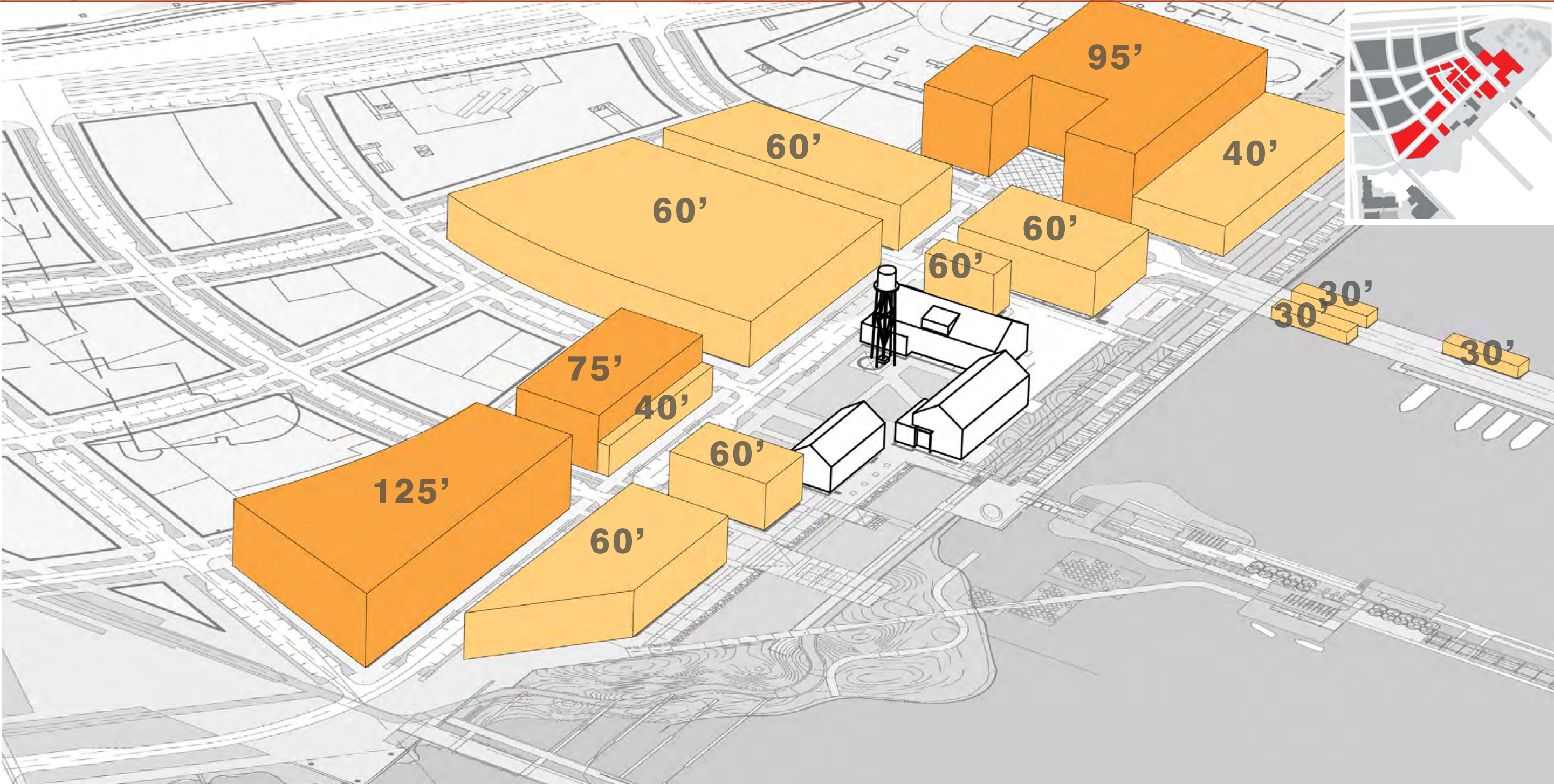
# EAST WATERFRONT DISTRICT

## EXISTING DISTILLERY BUILDINGS



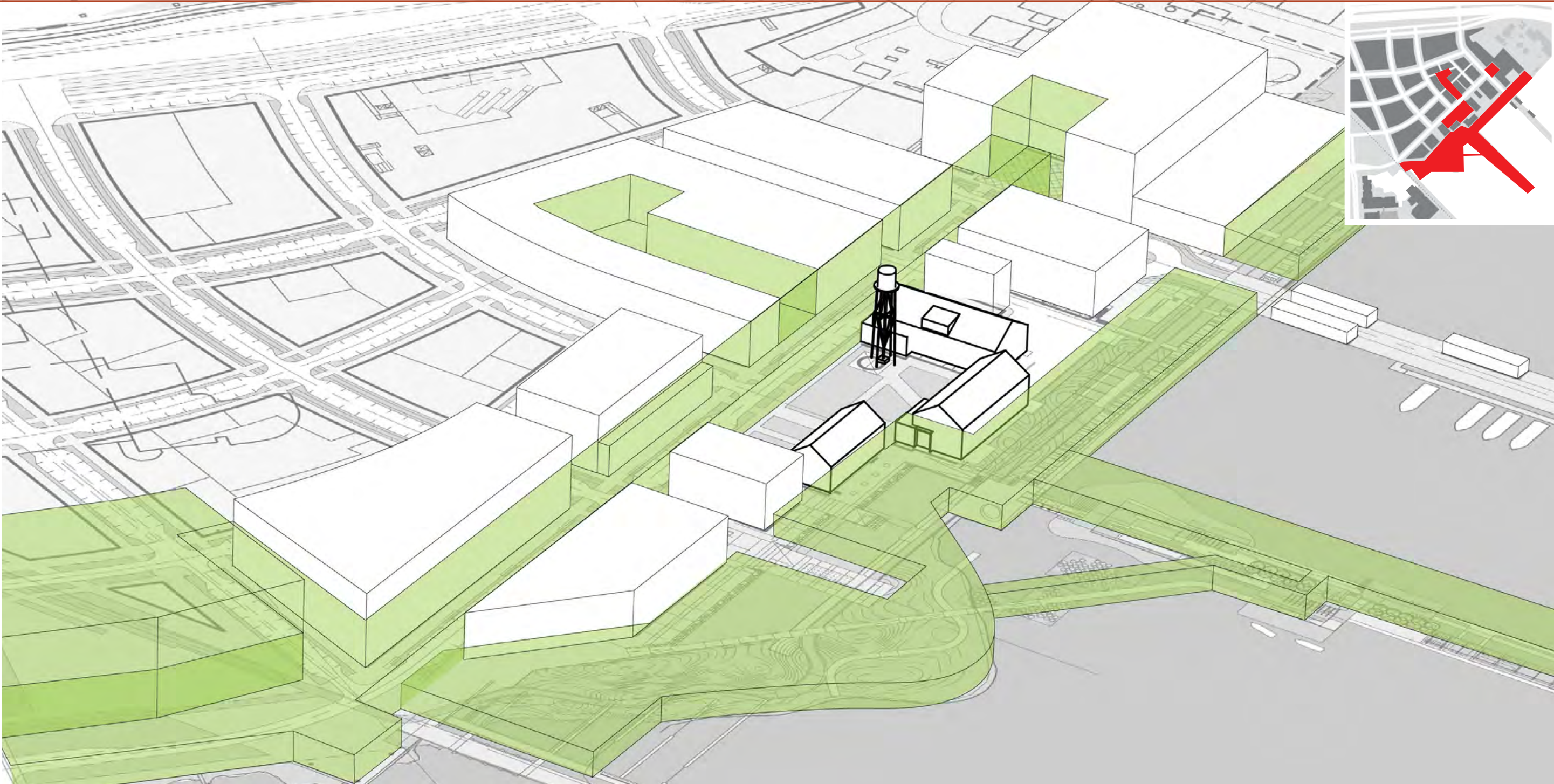


# EAST WATERFRONT DISTRICT BUILDING HEIGHTS



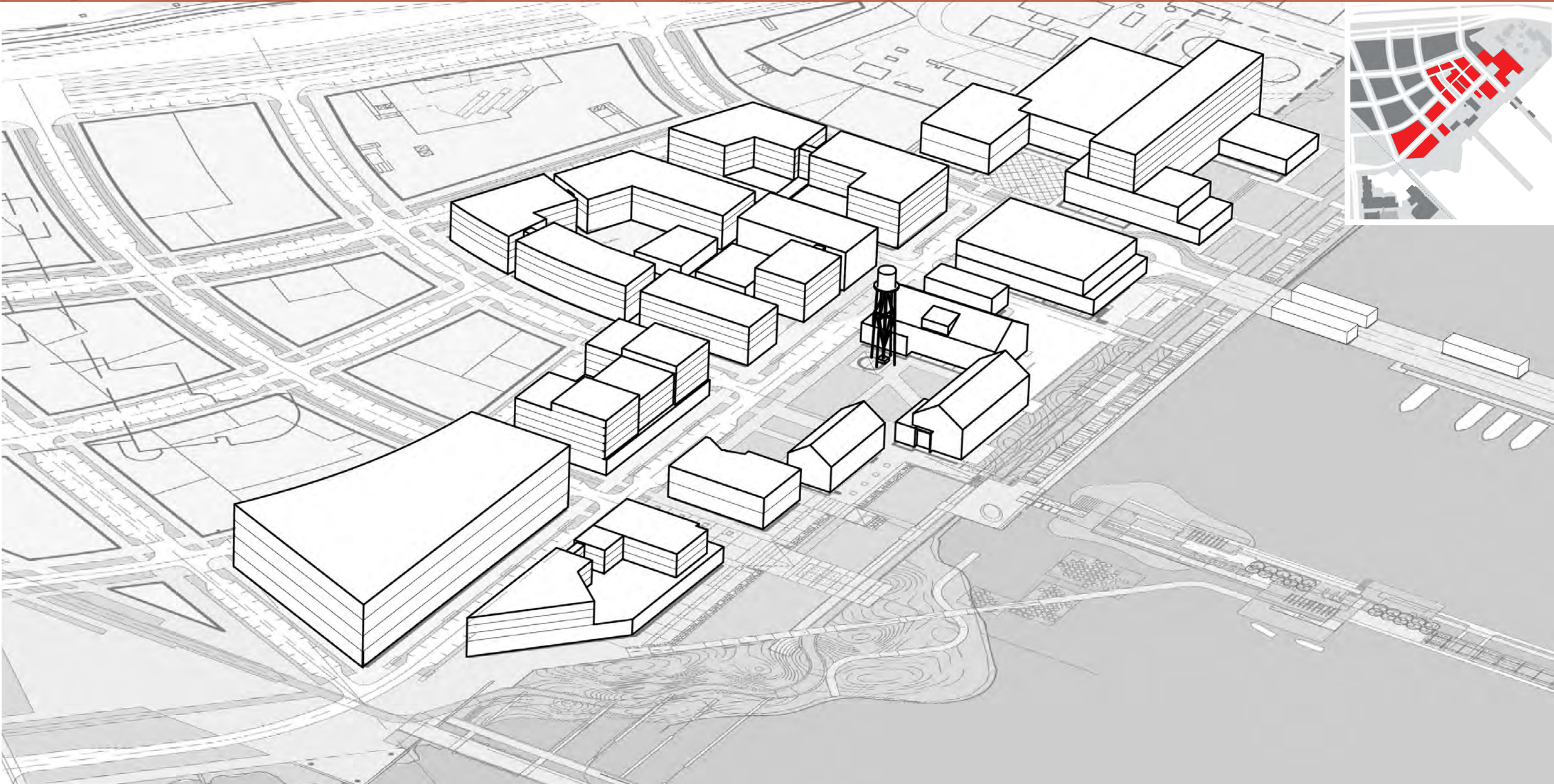


# EAST WATERFRONT DISTRICT PUBLIC REALM





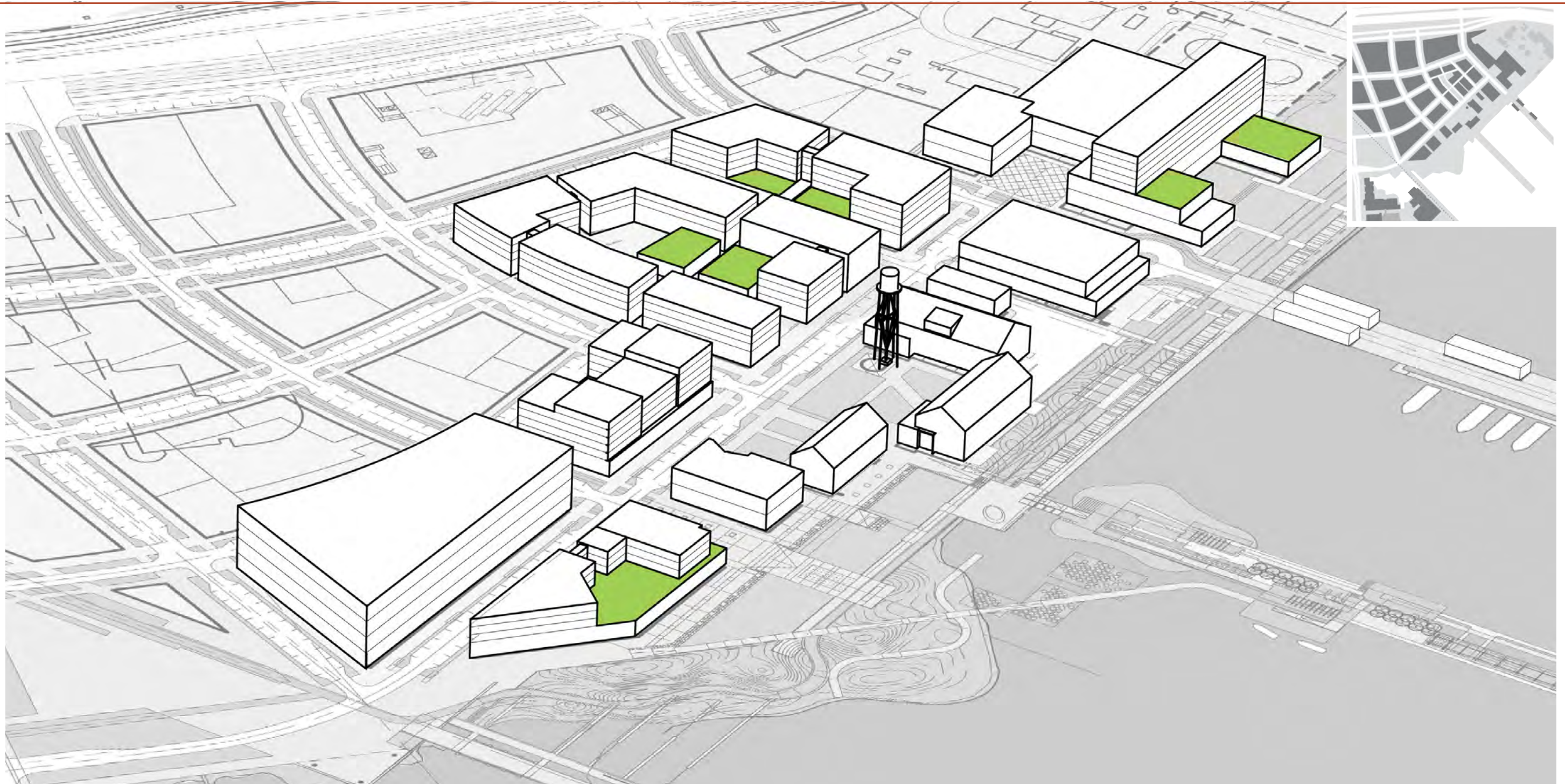
# EAST WATERFRONT DISTRICT MASSING





# EAST WATERFRONT DISTRICT

## POTENTIAL GREEN ROOF OPPORTUNITIES





**EAST WATERFRONT DISTRICT**  
LIVING SYSTEMS





# EAST WATERFRONT DISTRICT

## EAST CROMWELL STREET SOUTH ELEVATION





# EAST WATERFRONT DISTRICT

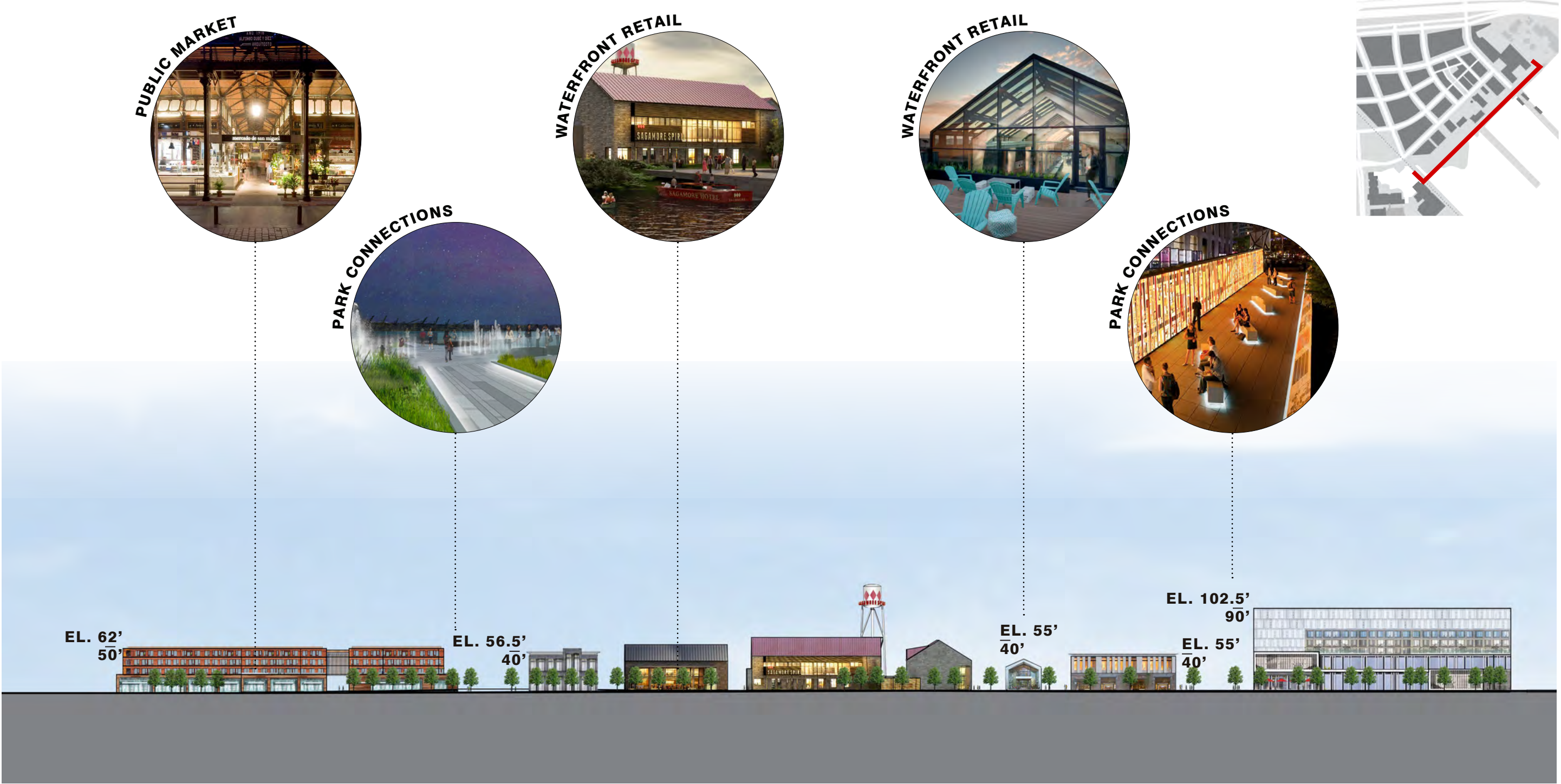
## EAST CROMWELL STREET NORTH ELEVATION





# EAST WATERFRONT DISTRICT

## WATERFRONT ELEVATION



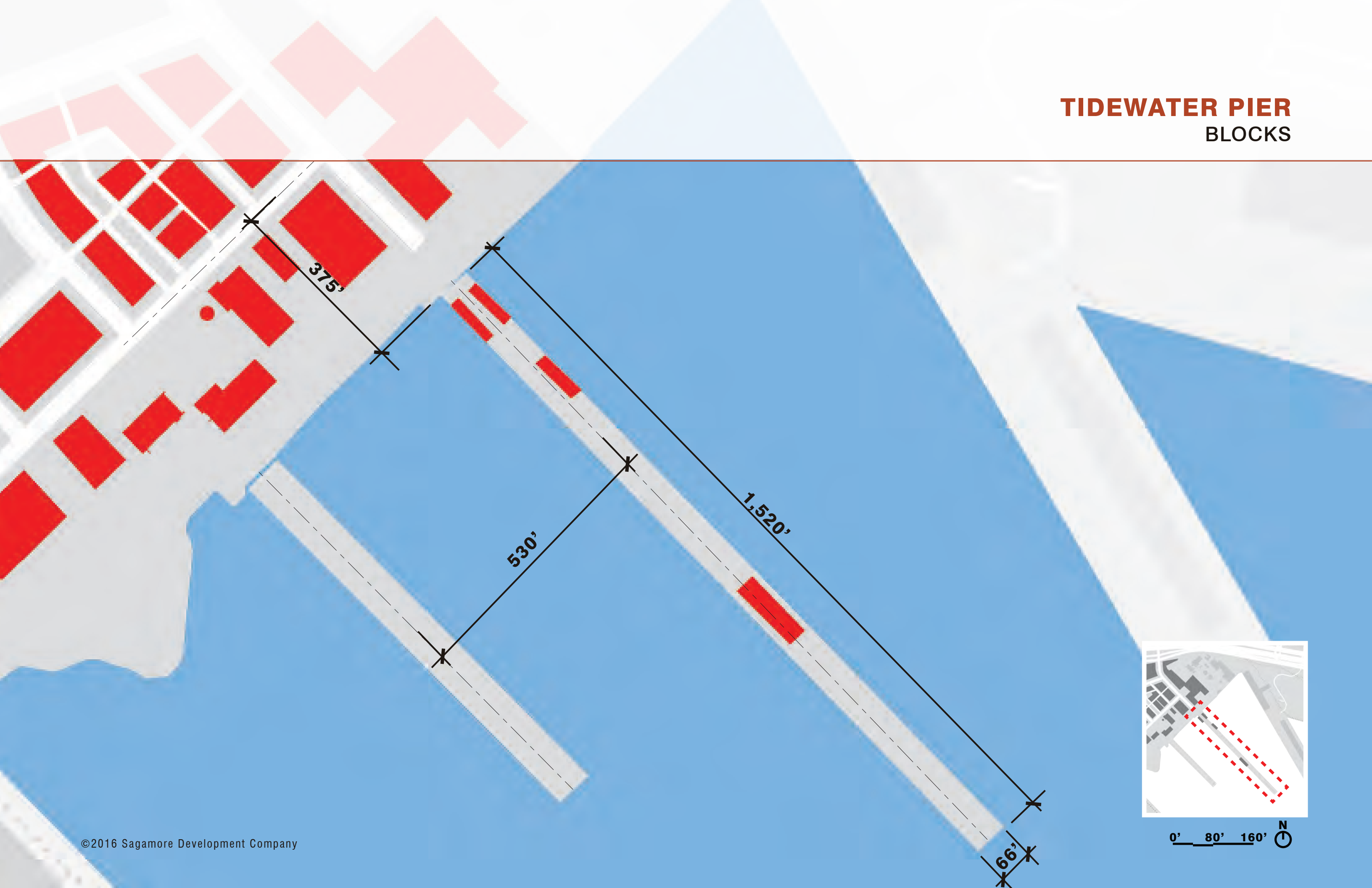


# EAST WATERFRONT DISTRICT PEDESTRIAN STREET SECTION



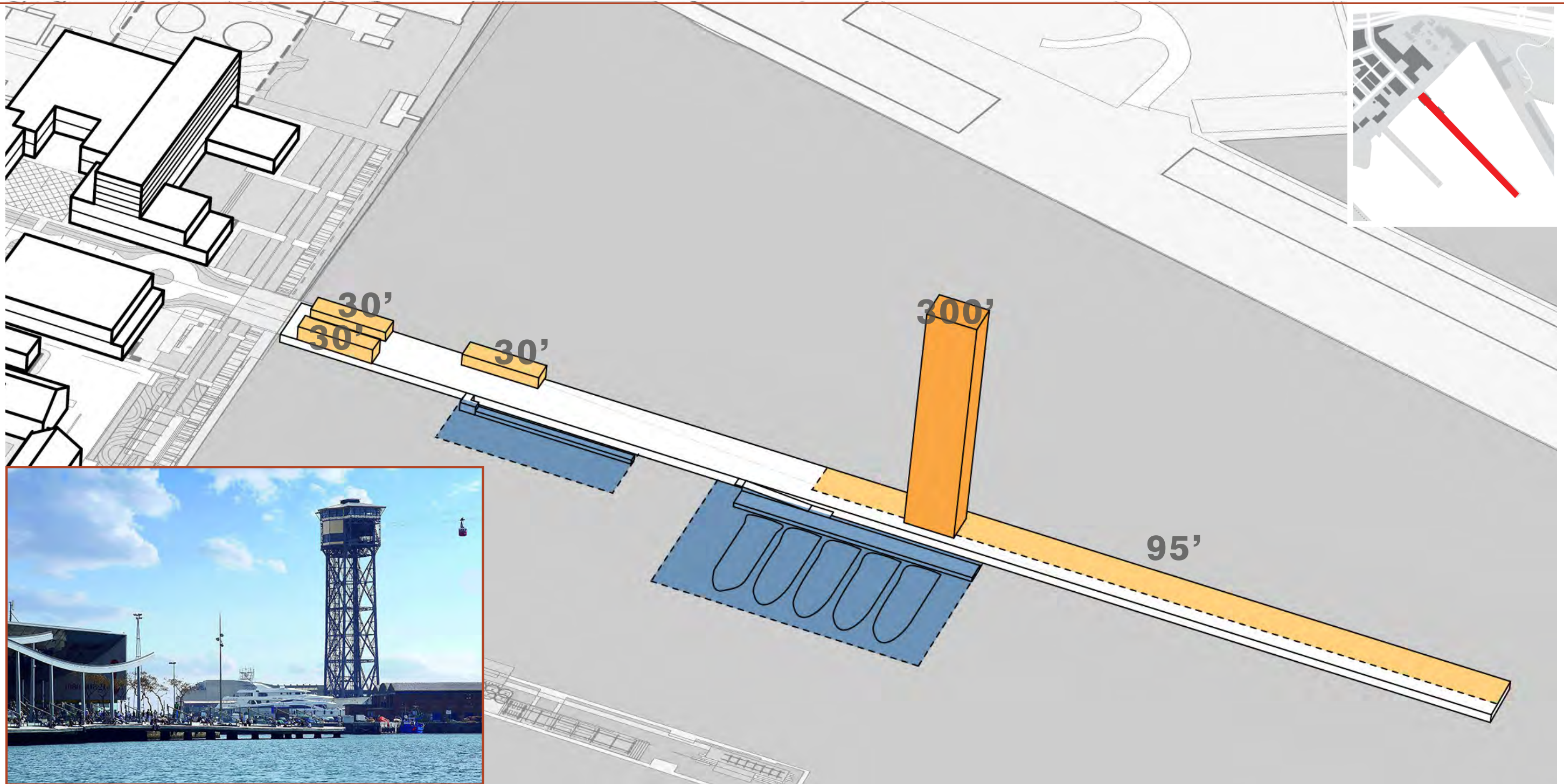


# TIDEWATER PIER BLOCKS





# TIDEWATER PIER OVERLAY





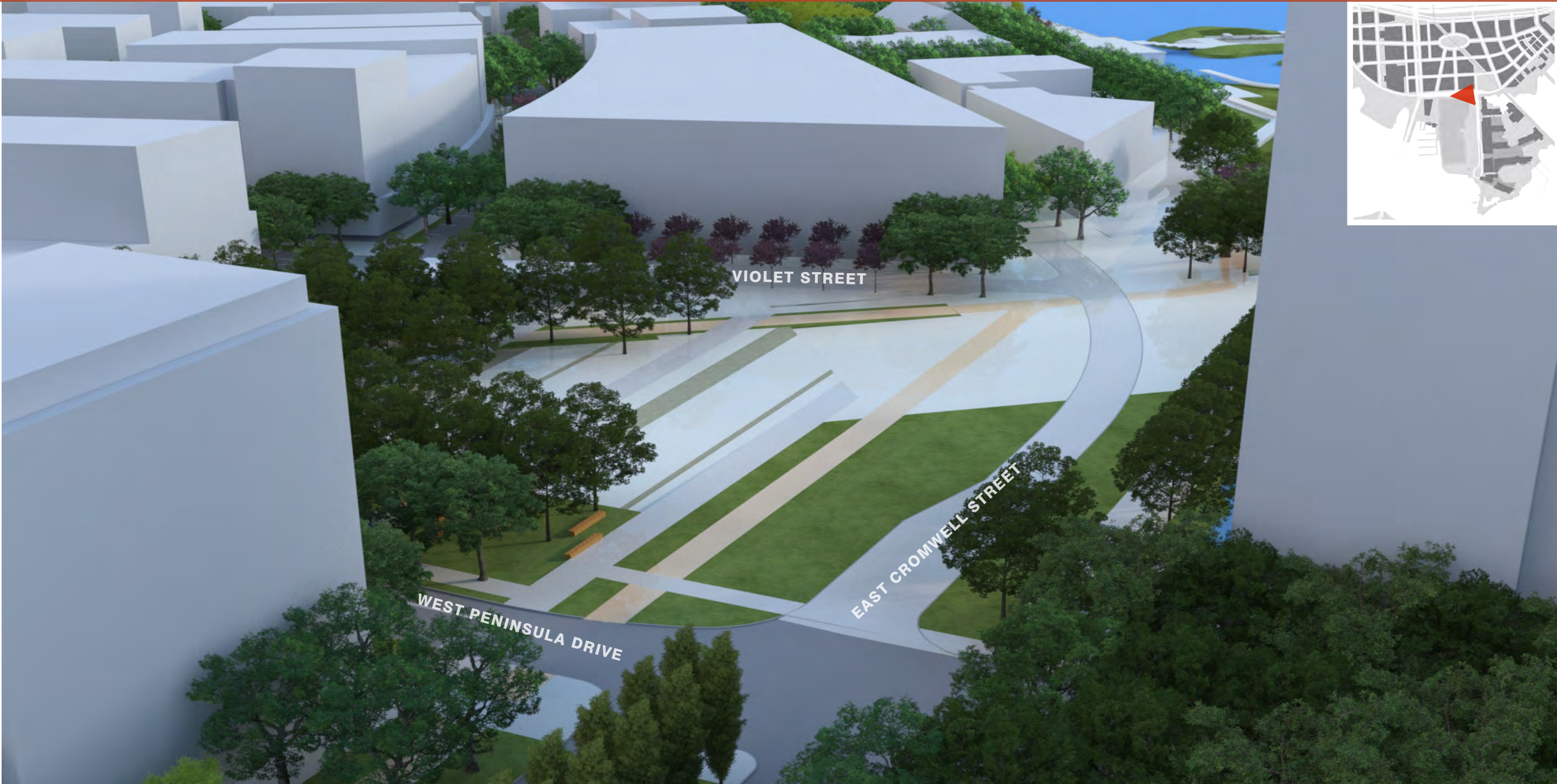
# CROMWELL STREET DISTRICT

## AERIAL VIEW FROM THE WEST





**URBAN PLAZA**  
AERIAL VIEW FROM THE WEST



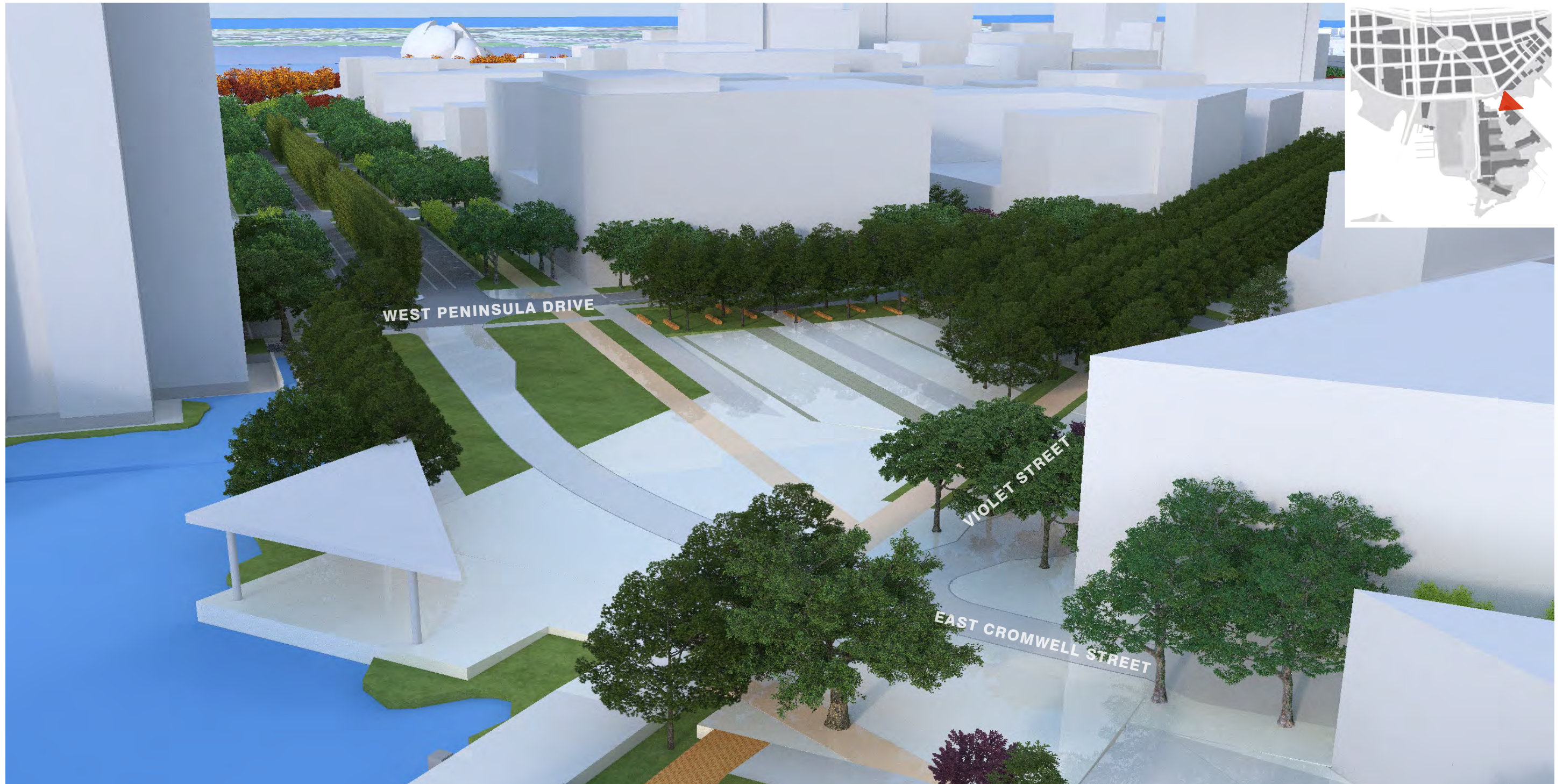


**URBAN PLAZA**  
AERIAL VIEW FROM THE NORTH



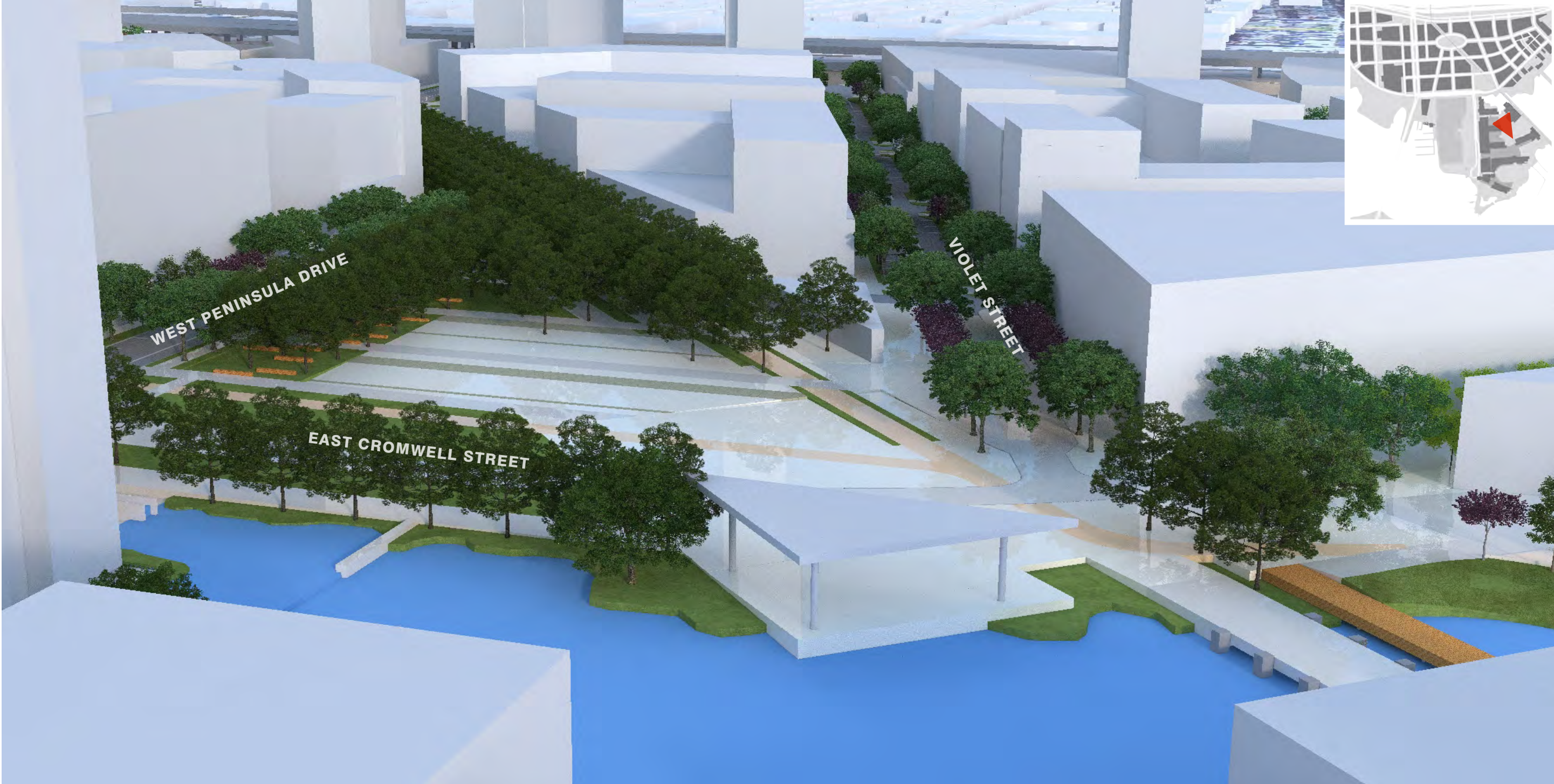


**URBAN PLAZA**  
SOUTHEAST AERIAL VIEW





**URBAN PLAZA**  
AERIAL VIEW FROM THE SOUTH





**EAST WATERFRONT DISTRICT**  
AERIAL VIEW FROM THE WEST





# EAST WATERFRONT DISTRICT

AERIAL VIEW FROM THE SOUTH





**EAST WATERFRONT DISTRICT**  
AERIAL VIEW FROM THE EAST





# EAST WATERFRONT DISTRICT

## AERIAL VIEW FROM THE NORTHEAST





# EAST WATERFRONT DISTRICT

## EAST CROMWELL STREET





# EAST WATERFRONT DISTRICT EAST CROMWELL STREET





# EAST WATERFRONT DISTRICT

## EAST CROMWELL STREET





**EAST WATERFRONT DISTRICT**  
**PEDESTRIAN STREET**





**EAST WATERFRONT DISTRICT**  
**EAST CROMWELL STREET**





## NEXT STEPS

---

- Response to comments
- Founders Park and East End Districts





**WE ARE FROM THIS CITY.  
OF THIS CITY.  
WE ARE GOING TO HELP CREATE  
SOMETHING GREAT IN THIS CITY.**

**— KEVIN PLANK**

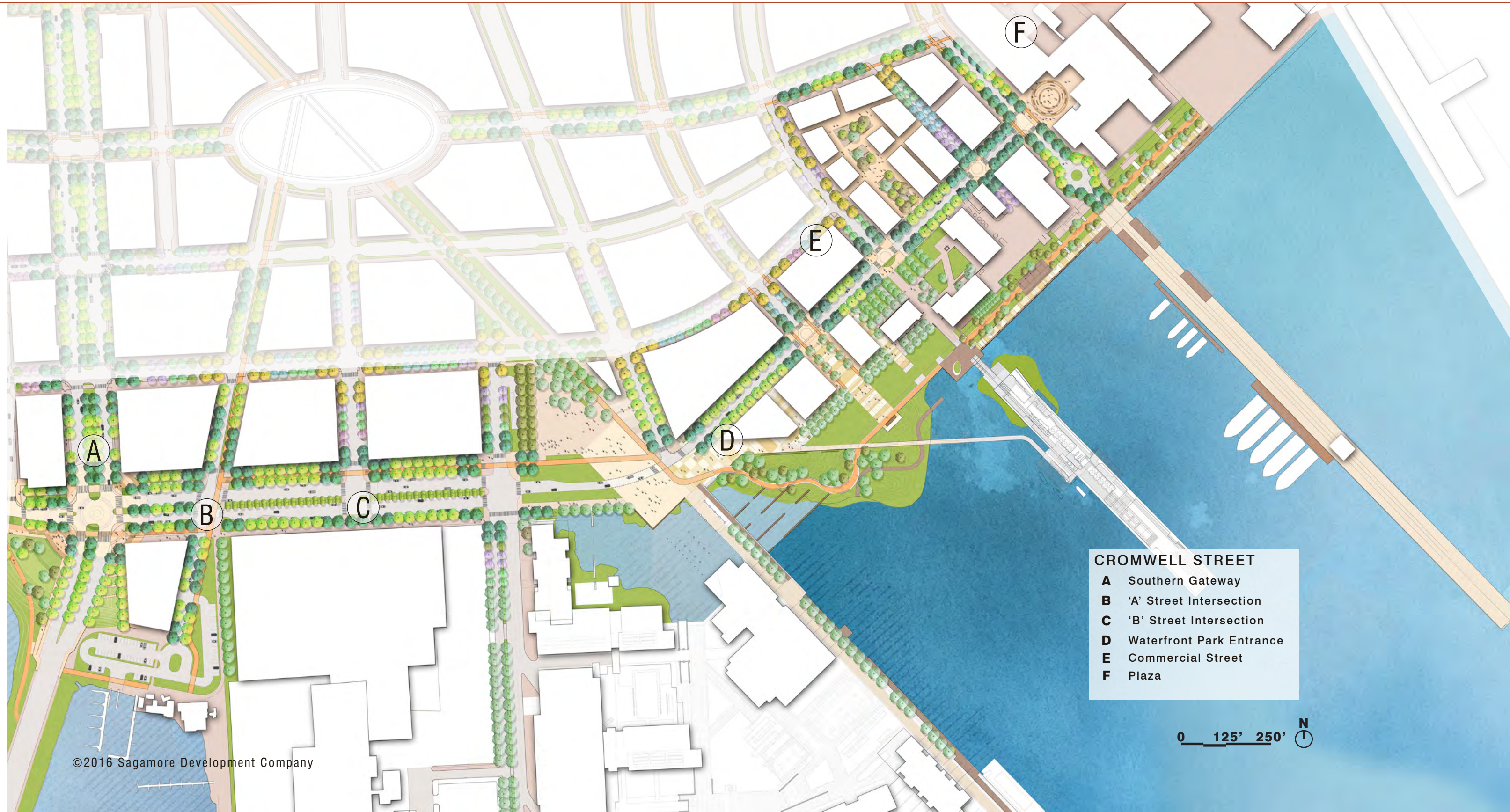




Port  
Covington | REFERENCE



# CROMWELL, URBAN PLAZA & EAST WATERFRONT PLAN



- CROMWELL STREET**
- A** Southern Gateway
  - B** 'A' Street Intersection
  - C** 'B' Street Intersection
  - D** Waterfront Park Entrance
  - E** Commercial Street
  - F** Plaza

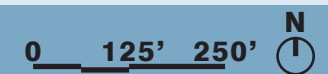
0 125' 250' N



# OPEN SPACE SYSTEM TREE CANOPY



COMMON NAME	SCIENTIFIC NAME
<b>STREET TREE PLANTING</b>	
RED MAPLE	<i>Acer rubrum</i>
SUGAR MAPLE	<i>Acer saccharum</i>
AMERICAN YELLOWWOOD	<i>Cladastris kentukea</i>
THORNLESS HONEYLOCUST	<i>Gleditsia triacanthos ver. inermis</i>
SWEETGUM	<i>Liquidambar styraciflua</i>
LONDON PLANETREE	<i>Platanus x acerifolia 'Bloodgood'</i>
SYCAMORE	<i>Platanus occidentalis'</i>
SWAMP WHITE OAK	<i>Quercus bicolor</i>
SCARLET OAK	<i>Quercus coccinea</i>
SHUMARD OAK	<i>Quercus shumardii</i>
CHINKAPIN OAK	<i>Quercus muehlenbergii</i>
SHINGLE OAK	<i>Quercus imbricaria</i>
<b>UNDERSTORY TREE PLANTING</b>	
HEDGE MAPLE	<i>Acer campestre</i>
RED BUCKEYE	<i>Aesculus pavia</i>
DOWNY SERVICEBERRY	<i>Amelanchier arborea</i>
SHADBLOW SERVICEBERRY	<i>Amelanchier canadensis</i>
RIVER BIRCH	<i>Betula nigra</i>
EASTERN REDBUD	<i>Cercis canadensis</i>
WHITE EASTERN REDBUD	<i>Cercis canadensis var. alba</i>
HACKBERRY	<i>Celtis occidentalis</i>
FRINGETREE	<i>Chionanthus virginicus</i>
STAR MAGNOLIA	<i>Magnolia kobus var. stellata</i>
SWEETBAY MAGNOLIA	<i>Magnolia virginiana 'Henry Hicks'</i>
CRABAPPLE	<i>Malus spp.</i>
FLOWERING PURPLE PLUM	<i>Prunus cerasifera'</i>
WILLOW OAK	<i>Quercus phellos</i>
NANNYBERRY	<i>Viburnum lentago</i>
BLACKHAW VIBURNUM	<i>Viburnum prunifolium</i>





# A STREETS TREE CANOPY



**AMERICAN  
YELLOWWOOD**



**AMERICAN  
SYCAMORE**



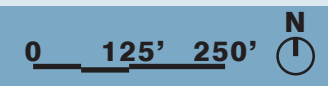
**HONEY  
LOCUST**



**RED MAPLE**



'A' STREET TREE PLANTING	
COMMON NAME	SCIENTIFIC NAME
RED MAPLE	<i>Acer rubrum</i>
AMERICAN YELLOWWOOD	<i>Cladastris kentukea</i>
THORNLESS HONEYLOCUST	<i>Gleditsia triacanthos ver. inermis</i>
LONDON PLANETREE	<i>Platanus x acerifolia 'Bloodgood'</i>
SCARLET OAK	<i>Quercus coccinea</i>





# B STREETS TREE CANOPY



**SCARLET OAK**

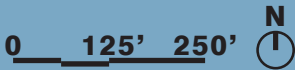
**AMERICAN YELLOWWOOD**

**RIVER BIRCH**

**SHUMARD OAK**

**SUGAR MAPLE**

'B' STREET TREE PLANTING	
COMMON NAME	SCIENTIFIC NAME
SUGAR MAPLE	<i>Acer saccharum</i>
SHUMARD OAK	<i>Quercus shumardii</i>
RIVER BIRCH	<i>Betula nigra</i>
CHINKAPIN OAK	<i>Quercus muehlenbergii</i>
SCARLET OAK	<i>Quercus coccinea</i>
PIN OAK	<i>Quercus paukustris</i>
AMERICAN YELLOWWOOD	<i>Cladastris kentukea</i>
STAR MAGNOLIA	<i>Magnolia kobus</i> var. <i>stellata</i>
SWEETBAY MAGNOLIA	<i>Magnolia virginiana</i> 'Henry Hicks'





# CROMWELL STREET TREE CANOPY



HONEY LOCUST



RED MAPLE



EUROPEAN HORNBEAM



AMERICAN SYCAMORE

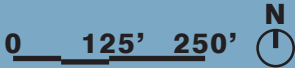


WILLOW OAK



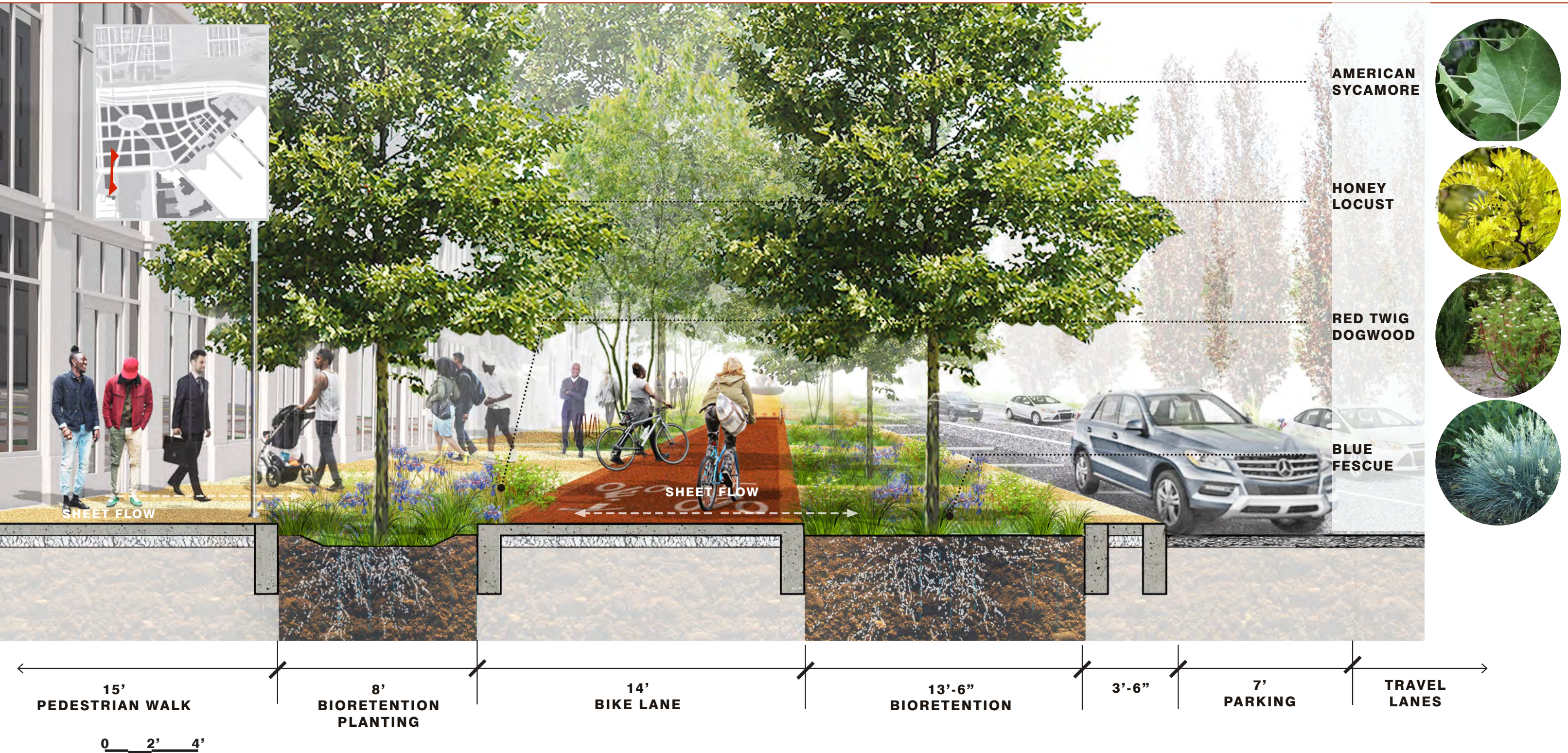
## CROMWELL STREET & PARK TREE PLANTING

COMMON NAME	SCIENTIFIC NAME
HEDGE MAPLE	<i>Acer campestre</i>
DOWNY SERVICEBERRY	<i>Amelanchier arborea</i>
RIVER BIRCH	<i>Betula nigra</i>
EUROPEAN HORNBEAM	<i>Carpinus betulus 'fastigiata'</i>
SWEETGUM	<i>Liquidambar styraciflua</i>
SWEETBAY MAGNOLIA	<i>Magnolia virginiana 'Henry Hicks'</i>
SWAMP WHITE OAK	<i>Quercus bicolor</i>
WILLOW OAK	<i>Quercus phellos</i>



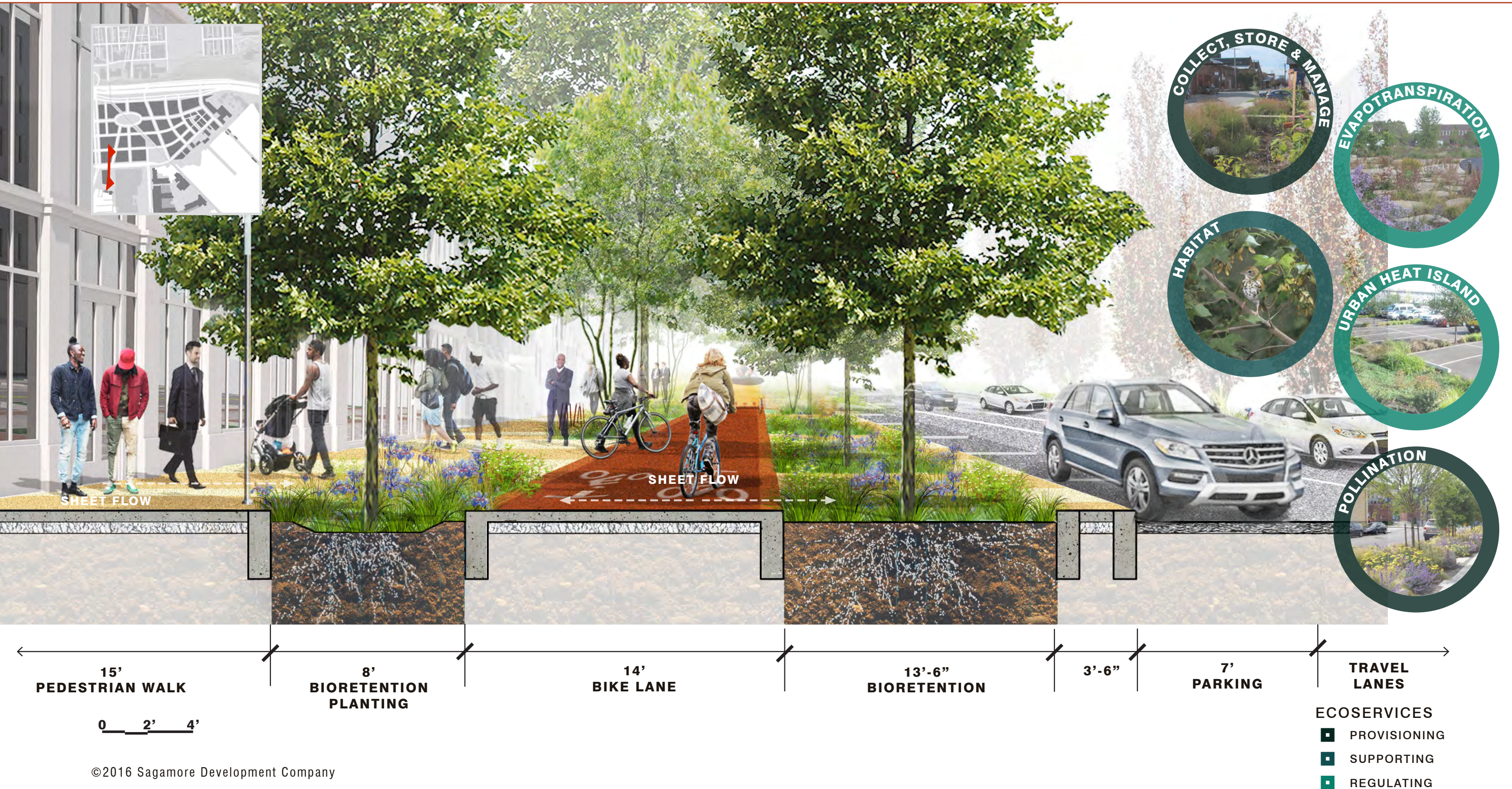


# EAST CROMWELL SECTION





# EAST CROMWELL SECTION





# CROMWELL COMMERCIAL SECTION



**AMERICAN SYCAMORE**



**HONEY LOCUST**



**NORTHERN BAYBERRY**



**SWEET FLAG**



0 2' 4'

**14' PEDESTRIAN WALK**

**6' BIORETENTION**

**1' TRENCH DRAIN**

**8' PARKING**

**22' TWO LANES TRAFFIC**



# CROMWELL COMMERCIAL SECTION



0 2' 4' **14' PEDESTRIAN WALK** **6' BIORETENTION** **1' TRENCH DRAIN** **8' PARKING** **22' TWO LANES TRAFFIC**

©2016 Sagamore Development Company

- ECOSERVICES**
- PROVISIONING
  - SUPPORTING
  - REGULATING



# 'A' STREETSCAPE SECTION



**HONEY LOCUST**



**RED MAPLE**



**RED TWIG DOGWOOD**



**SWEET FLAG**



**SWITCH GRASS**



**MICRO BIORETENTION ±4'-12'**  
**[WITH PERFORATED UNDER DRAIN]**

**BIKE PATH 7'-0"**

**MICRO BIORETENTION**  
**+4'**

**SIDEWALK ±10'**



# 'B' STREETScape SECTION



PIN OAK



RED MAPLE



RED TWIG DOGWOOD



NORTHERN BAYBERRY



PANIC GRASS



MICRO BIORETENTION ±5'  
[WITH STRUCTURAL SOIL]

SIDEWALK ±10"  
MINIMUM 5'-6"

MICRO BIORETENTION ±6'







# ECOZONES





# ECOSYSTEM SERVICES METRICS

		LANDSCAPE POSITION	METRICS
<b>PROVISIONING</b> 	COLLECT, STORE & MANAGE WATER	UPLAND / SHORELINE (Open space, native plantings and BMPs)	Volume of water captured vs volume used vs volume conveyed to storm drain
	FOOD/ URBAN AG	UPLAND (Planter boxes, green roofs, roof gardens)	Calories or lbs. grown on or near site vs imported, pre and post
	POLLINATION	UPLAND / SHORELINE (Living Shoreline and native plantings)	Pollinator surveys, pre and post; square feet of flowering plantings, pre and post
<b>SUPPORTING</b> 	CYCLE NUTRIENTS/ WASTE	UPLAND (Composting from restaurants)	Lbs. of nutrients imported/generated/exported; lbs sequestered on site; offsets; tons food waste directed to compost; lbs of materials reused on site
	HABITAT	UPLAND / SHORELINE (Living shoreline/gardens)	QHEI, # of types of habitat, species counts by habitat type, pre and post
	BUILD SOILS	UPLAND (Native planting zones/BMPs)	Cubic feet of amended soils, annual soil tests; cubic feet of soil organic matter from native plant roots
	INCREASE BIODIVERSITY	UPLAND / SHORELINE (green roofs & gardens)	Species counts by habitat (plant and wildlife) , pre and post
<b>REGULATING</b> 	CONTROL FLOODING	SHORELINE (Living shoreline)	NOAA/ FEMA models - expected vs adapted; living shoreline sq ft
	EVAPOTRANSPIRATION	UPLAND / SHORELINE (Native plantings and BMPs)	itree analysis and output; volume of water captured on roofs versus released
	PROTECT SHORELINE (CRITICAL AREA BUFFER)	SHORELINE / UPLAND (Native plantings)	Buffer width managed for habitat; QHEI; erosion measures pre and post
	DARK SKY COMPLIANCE	UPLAND / SHORELINE / BUILDINGS (Low intensity and timed lighting, low/no lighting in habitat zones)	Pre and post measures, reduction versus typical comparable; wildlife surveys
	URBAN HEAT ISLAND	UPLAND (increased tree canopy, green roofs, & native plantings)	Annual/seasonal avg temps; albedo (pre and post); %IC vs %PC; NASA cities infrared analysis; micro-climate temp measurements across the site
	CARBON SEQUESTRATION	UPLAND / SHORELINE (increased tree canopy and native plantings)	Annual metric tons carbon generated vs sequestered offsets from trees; vegetation survey, pre and post; monitoring of trees for health and survival
	FILTER AIR AND WATER (SWM)	UPLAND / SHORELINE (BMPs)	itree analysis and output monitor water quality in stormwater practices
	CONTROL PESTS/ INVASIVE SPECIES	UPLAND / SHORELINE (through habitat creation)	IPM; survey of pests and nonnative invasive species, pre and post; adaptive mgt
<b>CULTURAL</b> 	EDUCATION	UPLAND / SHORELINE (Signage, research, & outdoor classrooms)	Long term monitoring, number of educational programs (bio-blitzes) or annual student visits
	RESPITE	UPLAND / SHORELINE (Seating and trails)	Site user surveys; perception of opportunities, daily use
	AESTHETICS	UPLAND / SHORELINE (Native gardens, tree canopy)	Monumented photo sites, change over time; survey of user's perceptions of landscapes
	RECREATION	UPLAND / SHORELINE (trails connections)	Survey of pre-/post-construction user numbers, events held; monitoring of sensitive species
	JOBS	UPLAND / SHORLINE / BUILDINGS (open space maintenance)	Jobs created: landscape maintenance, monitoring; annual & seasonal



# WHY POLLINATORS ?



90% of Earth's plants are flowering species...and 87.5% of them require animal pollinators in order to reproduce.

Ollerton et al., 2011



© Biohabitats



40% of invertebrate pollinator species are facing extinction.

Intergovernmental SciencePolicy Platform on Biodiversity and Ecosystem Services, 2016



© Biohabitats



One out of three mouthfuls of food we eat requires insect pollination.

Grissell, 2001



© Biohabitats

Most plants are pollinated by wildlife, from butterflies and hummingbirds, to birds, bats, bees, & beetles.

Almost all flowering plants need to be pollinated. From flowers, to trees, to christmas trees, to our summer veggies!

90% of Earth's plants are flowering species... and 87.5% of them require animal pollinators in order to reproduce. (Ollerton et. al, 2011)

1000 species of birds and over 300 species of mammals are pollinators.

Pollinators support the production of

- Fruits
- Vegetables
- Spices
- Chocolate
- Herbs
- Coffee



© Biohabitats



# POLLINATOR GROUPS



## MOTHS

clearwing hummingbird moth (*Hemaris thysbe*) on bee balm (*Monarda didyma*)



## BUTTERFLIES

black swallowtail (*Papilio polyxenes*) on New York ironweed (*Vernonia noveboracensis*)



## BUTTERFLIES

least skipper (*Ancyloxypha numitor*) on swamp milkweed (*Asclepias incarnate*)



## FLIES

flower fly (*Syrphidae eristalis*) on goldenrod (*Solidago sp.*)



## BETLES

Pennsylvania leatherwing beetle (*Chauliognathus pennsylvanicus*) on New York ironweed (*Vernonia noveboracensis*)



## BEES

honey bee (*Apis mellifera*) on aster (*Aster amellus*)



## WASPS

great black wasp (*Sphex pennsylvanicus*), a common pollinator of swamp milkweed (not shown)



## HUMMINGBIRDS

ruby throated hummingbird (*Archilochus colubris*) with bee balm (*Monarda didyma*)



# STREETSCAPES - ECOSYSTEM SERVICES



- HABITAT
- INCREASED BIODIVERSITY
- CONTROL PESTS
- POLLINATION
- COLLECT, STORE & MANAGE WATER
- FILTER AIR & WATER (SWM)
- EVAPOTRANSPIRATION
- URBAN HEAT ISLAND
- AESTHETICS
- BUILD SOILS
- DARK SKY COMPLIANCE
- CARBON SEQUESTRATION



# SHORELINE - ECOSYSTEM SERVICES





# BUILDING ROOFTOPS - ECOSYSTEM SERVICES



- HABITAT
- INCREASED BIODIVERSITY
- POLLINATION
- RESPIRE
- COLLECT, STORE & MANAGE WATER
- FILTER AIR & WATER (SMM)
- EVAPOTRANSPIRATION
- URBAN HEAT ISLAND
- AESTHETICS
- CYCLE NUTRIENTS/WASTE
- FOOD/URBAN AGRICULTURE



# POTENTIAL GREEN ROOF APPLICATIONS

## EXTENSIVE



## SEMI-INTENSIVE



## INTENSIVE



© Ekaterina Shustrova



3-5" DEPTH



NARROW PLANT PALETTE



LIGHT MAINTENANCE



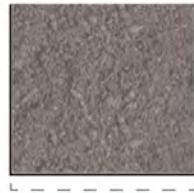
5-7" DEPTH



SEMI-LIMITED PLANT PALETTE



MEDIUM MAINTENANCE



7"+ DEPTH



BROAD PLANT PALETTE



HEAVY MAINTENANCE



# ROOFTOPS TO RESTAURANTS



## BALTIMORE RESTAURANTS WITH ROOFTOP INGREDIENTS

**JACK'S BISTRO**  
3123 ELLIOT ST.

**HAMILTON TAVERN**  
5517 HARFORD RD

## TYPICAL ROOFTOP INGREDIENTS

### SUN-LOVING HERBS

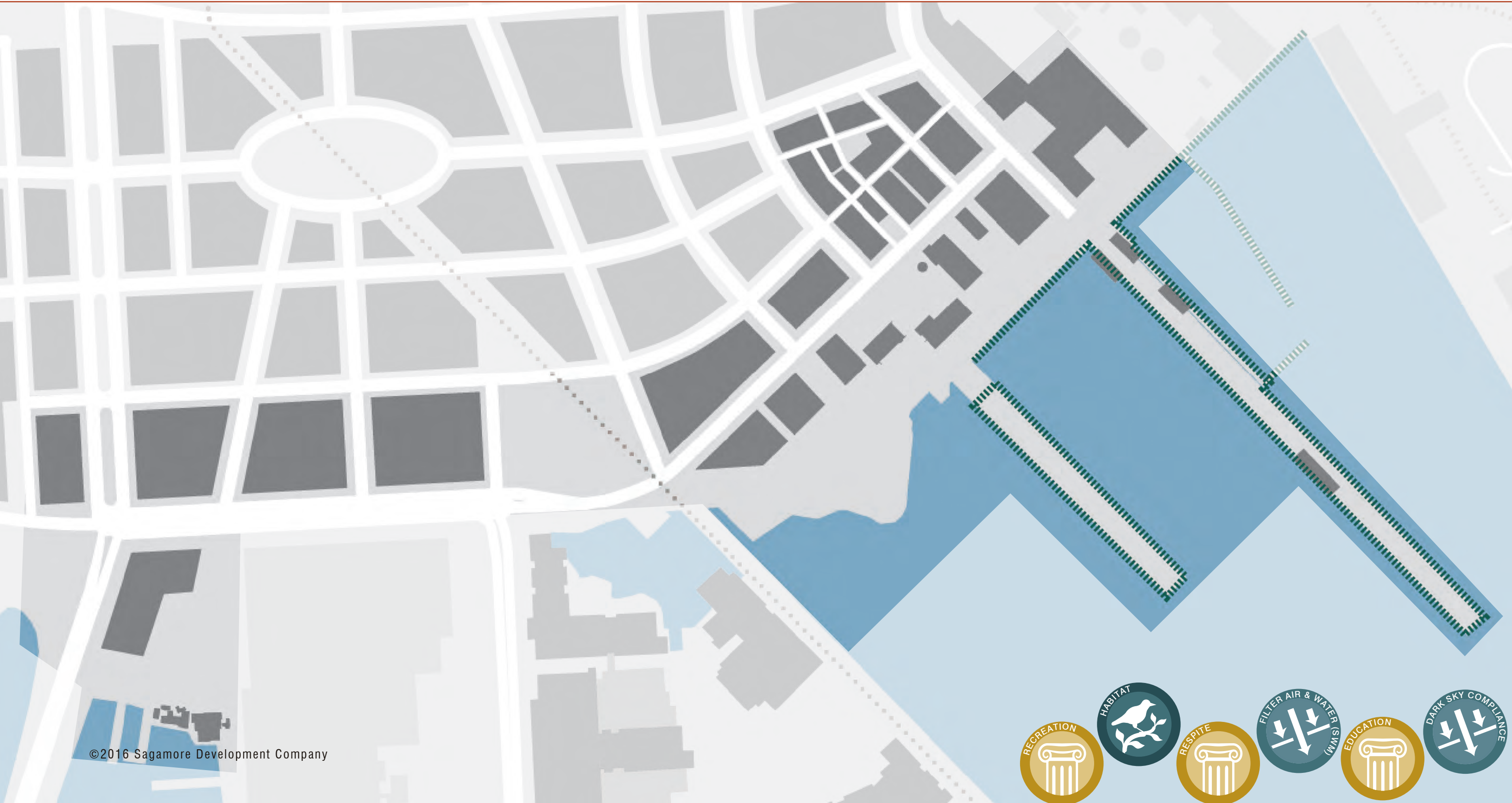


### SHALLOW ROOTING VEGETABLES





# TIDEWATER PIER - ECOSYSTEM SERVICES



- RECREATION (Icon: Column)
- HABITAT (Icon: Bird)
- RESPITE (Icon: Column)
- FILTER AIR & WATER (SMM) (Icon: Arrows)
- EDUCATION (Icon: Column)
- DARK SKY COMPLIANCE (Icon: Arrows)



# TIDEWATER PIER - AQUATIC ECOLOGY

