

Coastal Resilience in Nantucket's Downtown



Leah Hill
Town of Nantucket
Coastal Resilience Coordinator

Agenda

- Downtown Neighborhood Flood Barrier
 - Short term and long-term strategies
- Easy Street Flood Mitigation Project
- Francis Street Beach Improvement Project



Downtown Neighborhood Flood Barrier

- Protect Downtown from high tide flooding out to 2070
- Concept alignment-further study on actual alignment needed
- Partner with private property owners to reduce flood risk



Downtown Neighborhood Flood Barrier Alignment Alternatives



N
0 0.1 0.2 Miles

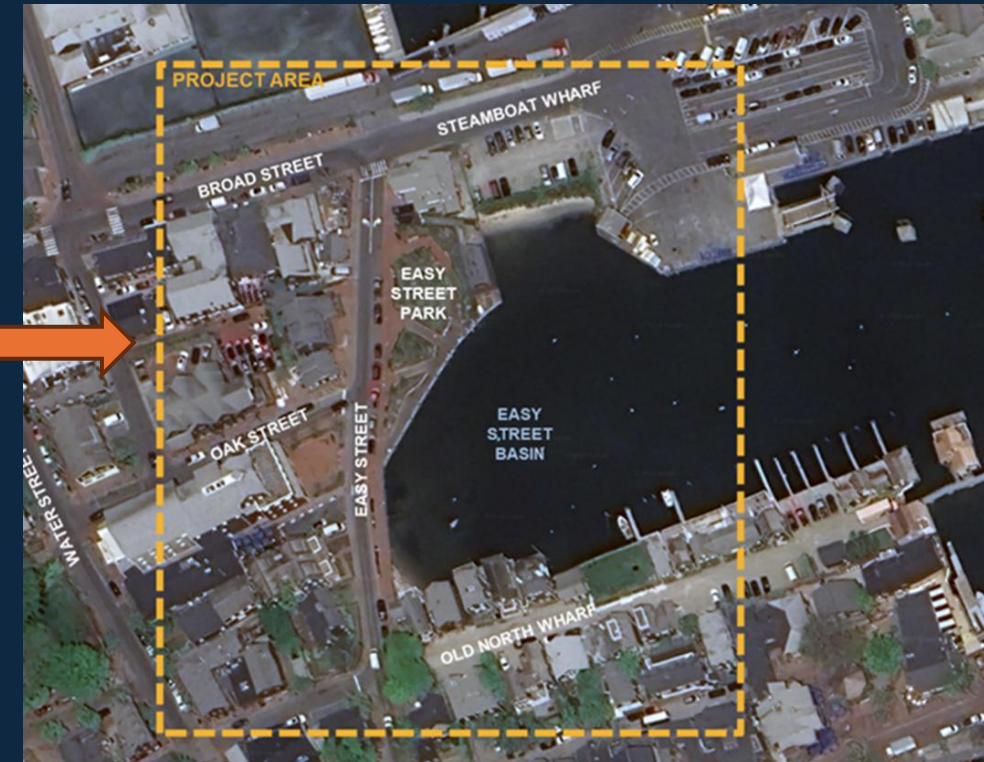
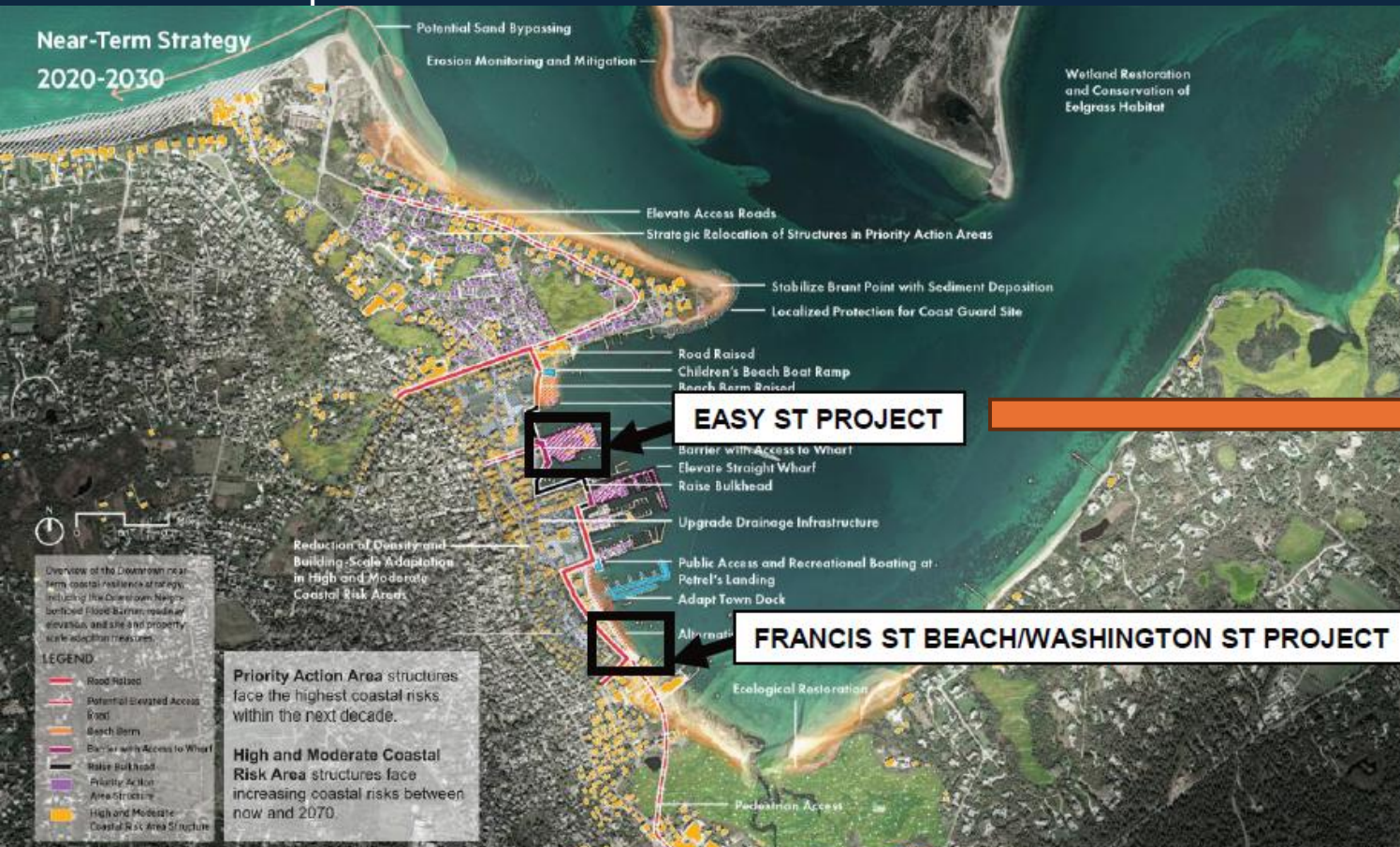
LEGEND

- Proposed Downtown Neighborhood Flood Barrier
- - Alternative Alignment Options

Easy Street Flood Mitigation Project



- Highest priority recommendation in the CRP
- Goals:
 - Develop feasible project to mitigate stormwater and coastal flood risk along Easy St.
 - Inclusively engage the community and stakeholders island-wide in the design development process
 - Seek co-benefits that improve access, mobility, and the environment as part of the design development process



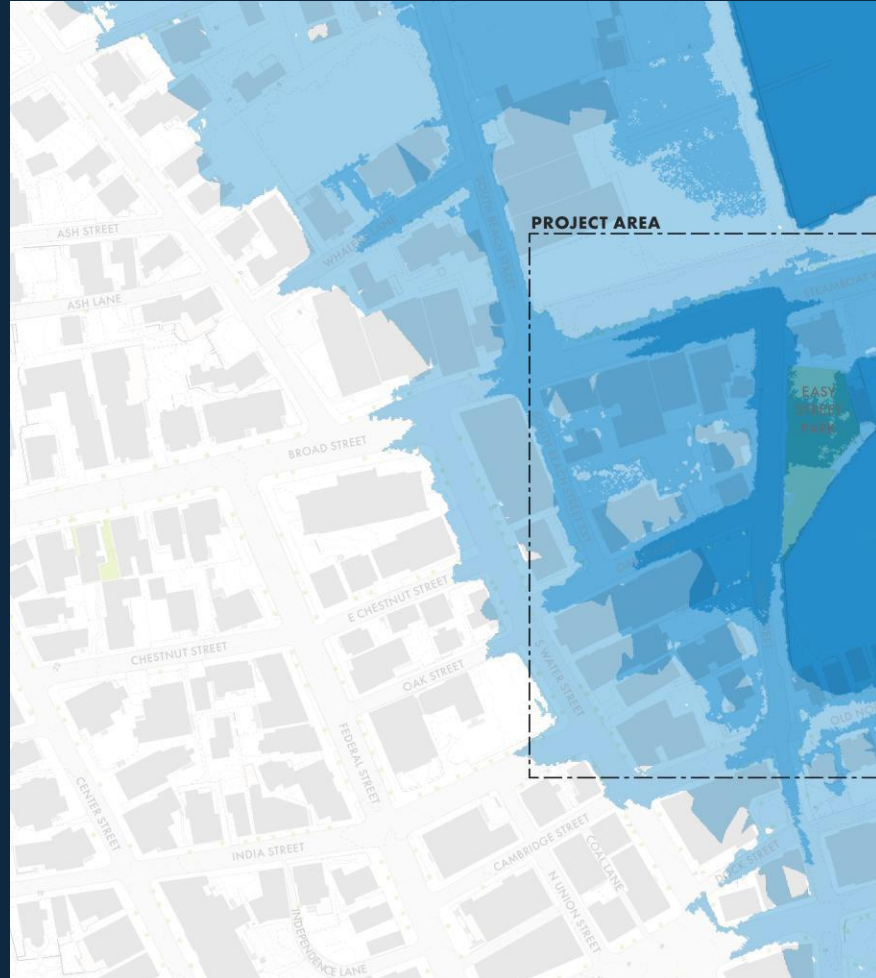
Previous Work

Flood Risk Assessment

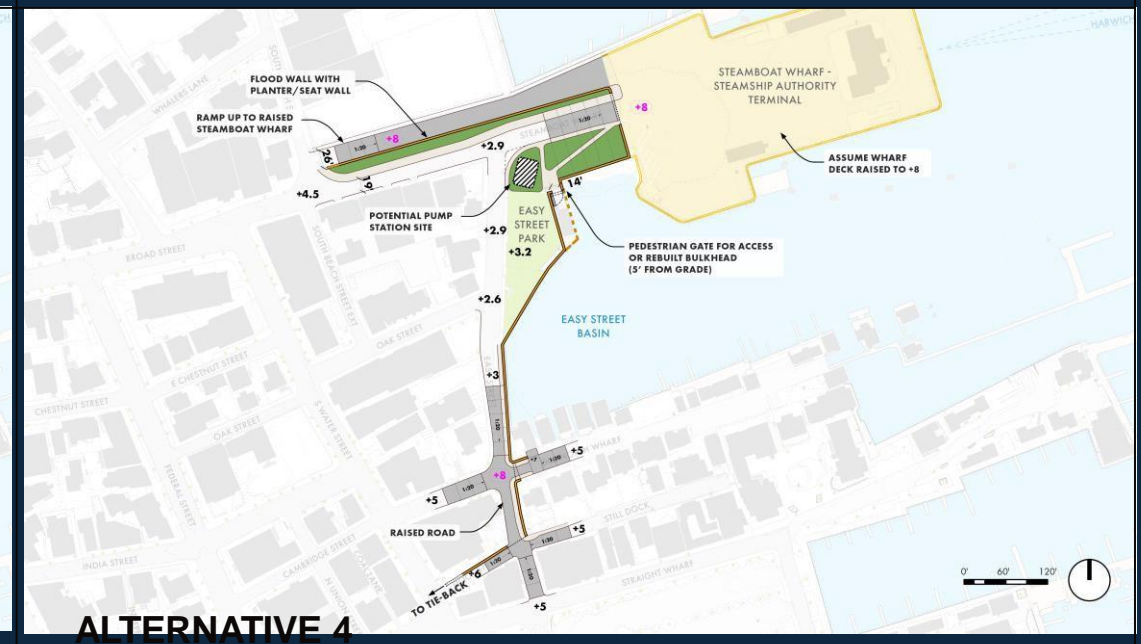
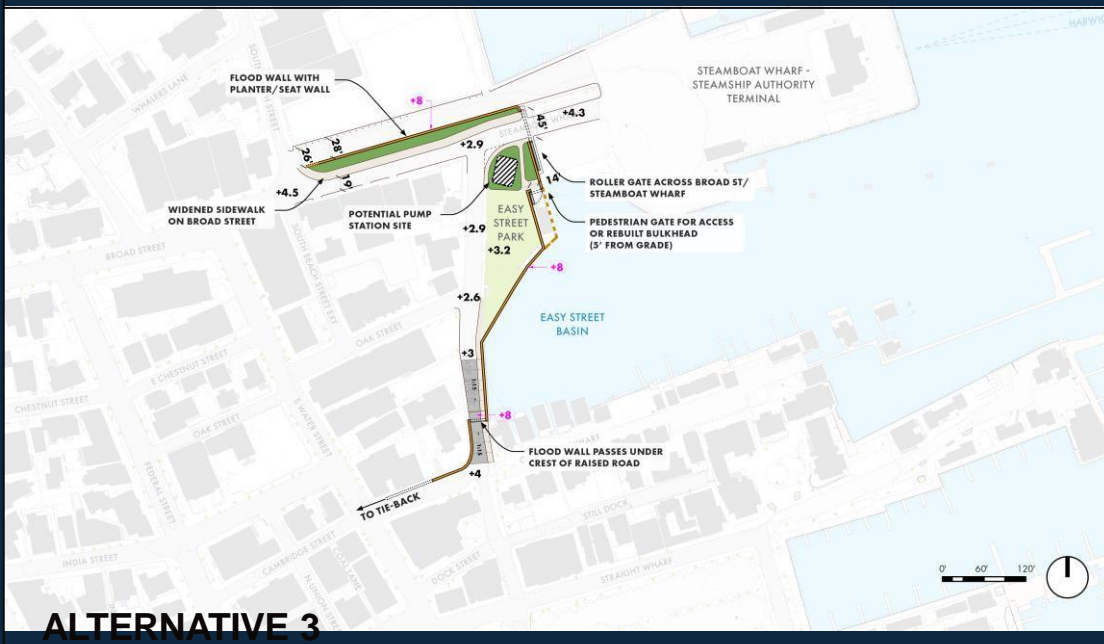
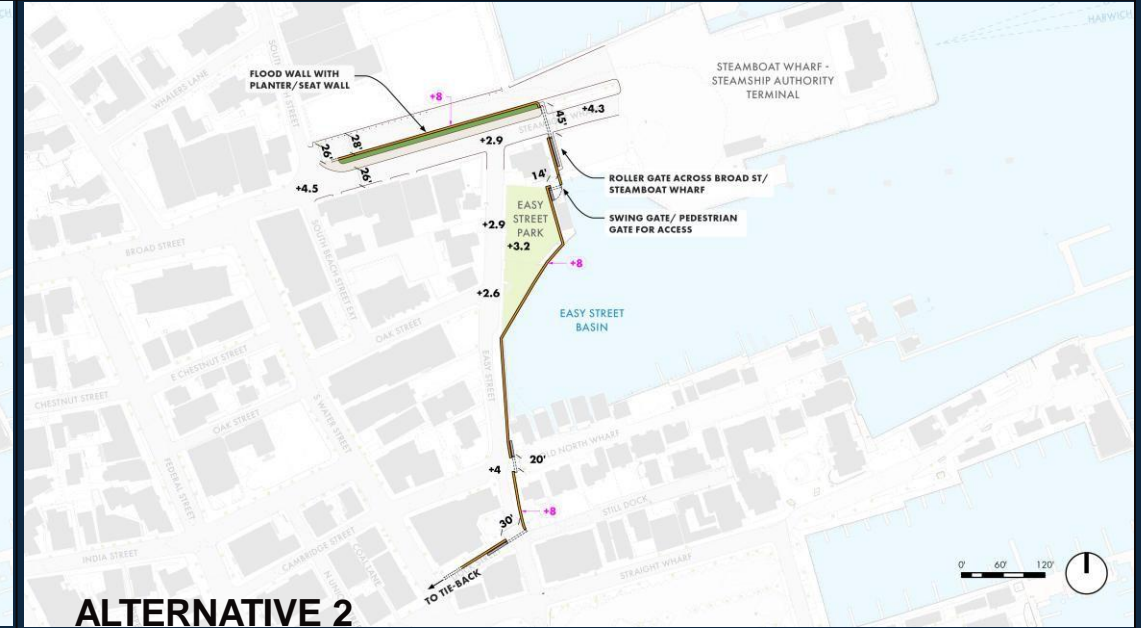
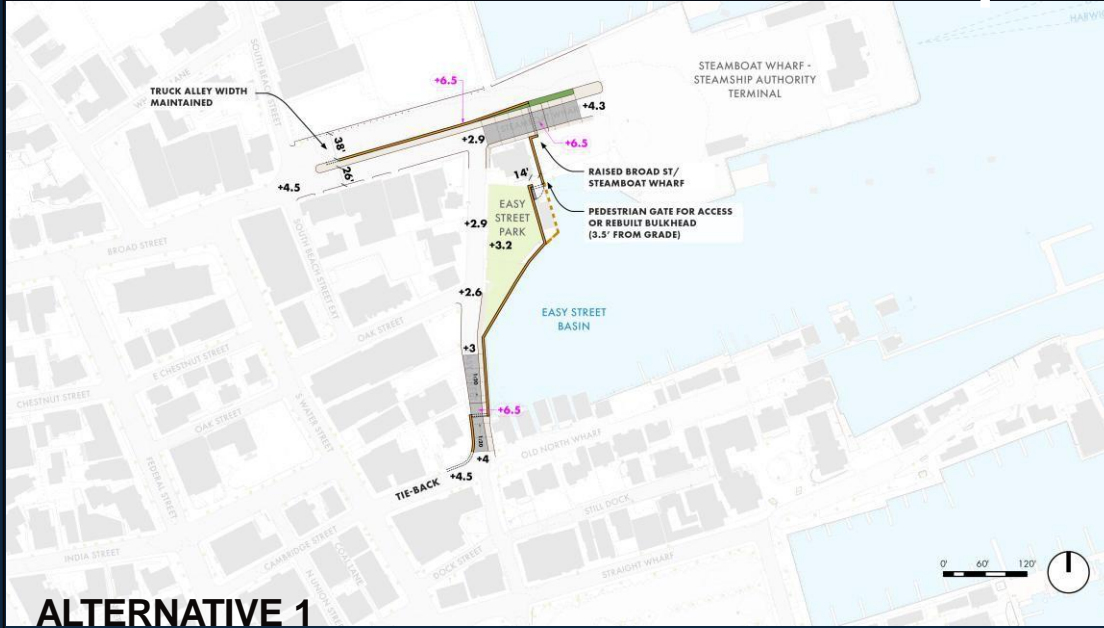
*What were **key takeaways** of the flood risk assessment?*

- Sea level rise will contribute to sunny-day flooding caused by monthly and daily high tides as soon as 2030
- Future storm surge can cause damage to the Downtown core of Nantucket
- The existing bulkhead structures are not designed to protect against coastal flood risks

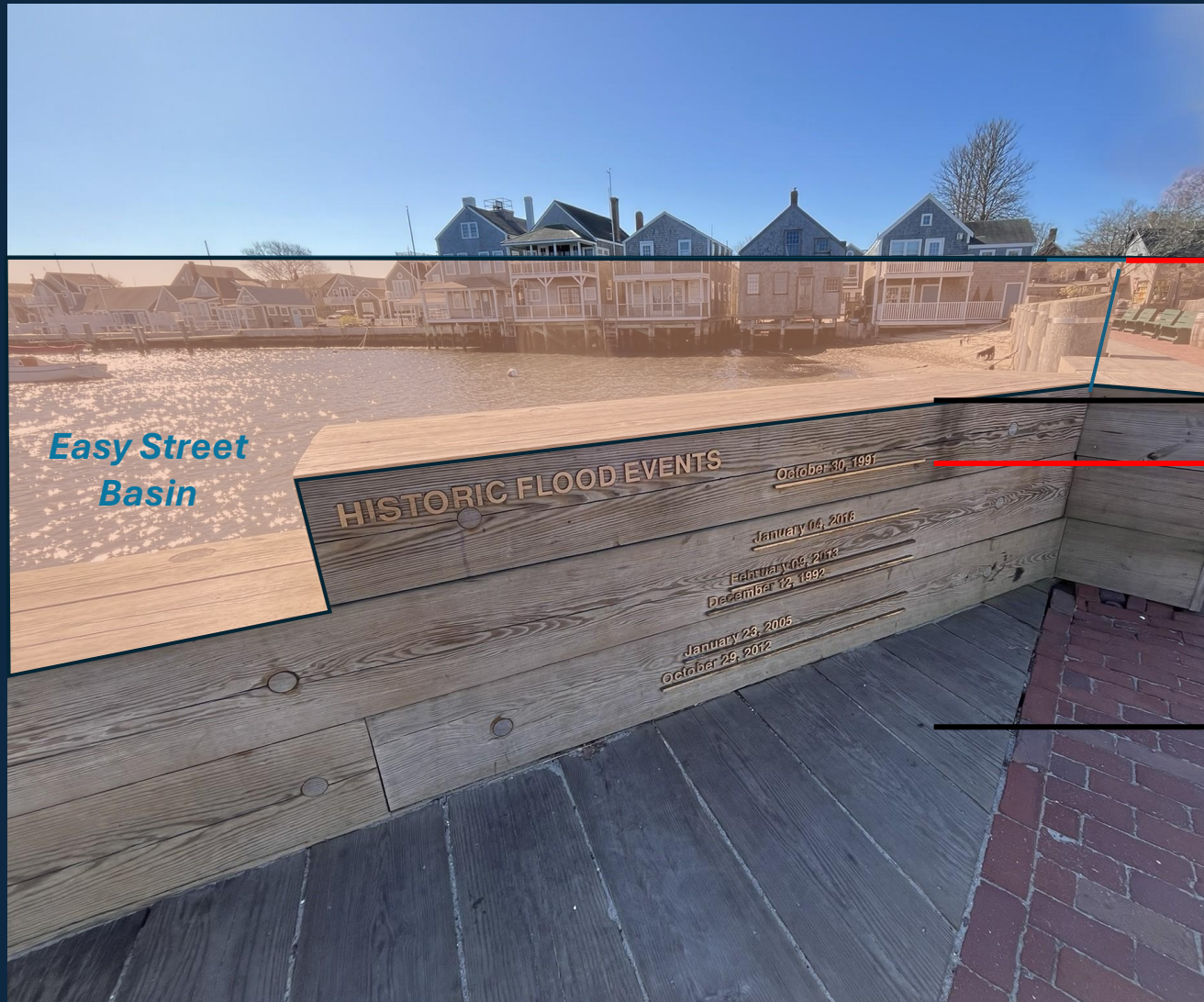
*From now through 2070,
cumulative expected
losses from coastal
flooding can total up to
\$1.2 Billion*



Initial Conceptual Alternatives



Levels of Flood Protection



What does the top of wall elevation protect against?

- Long-term over-topping and flooding from high tides
- Near-term over-topping and flooding from storms and waves

Protect against high-tide flooding expected as soon as 2070*

Level of Protection, Elevation = 8.0 ft. NAVD88

Top of Existing Timber Bulkhead Cap, Elevation = 6.4 ft. NAVD88

Halloween Storm (Oct. 30, 1991) Storm of Record

Nantucket Harbor Tidal Station 8449130 Elevation = 5.78 ft. NAVD88

Deck, Approximate Elevation = 3.7 ft. NAVD88

*High tide flooding elevations are based on MC-FRM (Massachusetts Coast Flood Risk Model) which includes sea level rise (SLR) projections using a HIGH scenario, as adopted by the Commonwealth of Massachusetts. All elevations reference NAVD88.

Alternatives Summary



Bulkhead Expansion & Elevation

- Replace existing bulkhead with floodwall to be higher and wider
- Slight road raising (similar to a longer speed hump) at Steamboat Wharf entrance, on Easy St. near Old North Wharf, and South Beach St.



Adaptable Road Raising to 6.5 feet NAVD88

- Raise Easy Street to 6.5 feet elevation today and 8ft at a later date, including portions of Broad and surrounding streets
- Small walls along sidewalks in Easy St/Old North Wharf area and in the middle of Broad Street

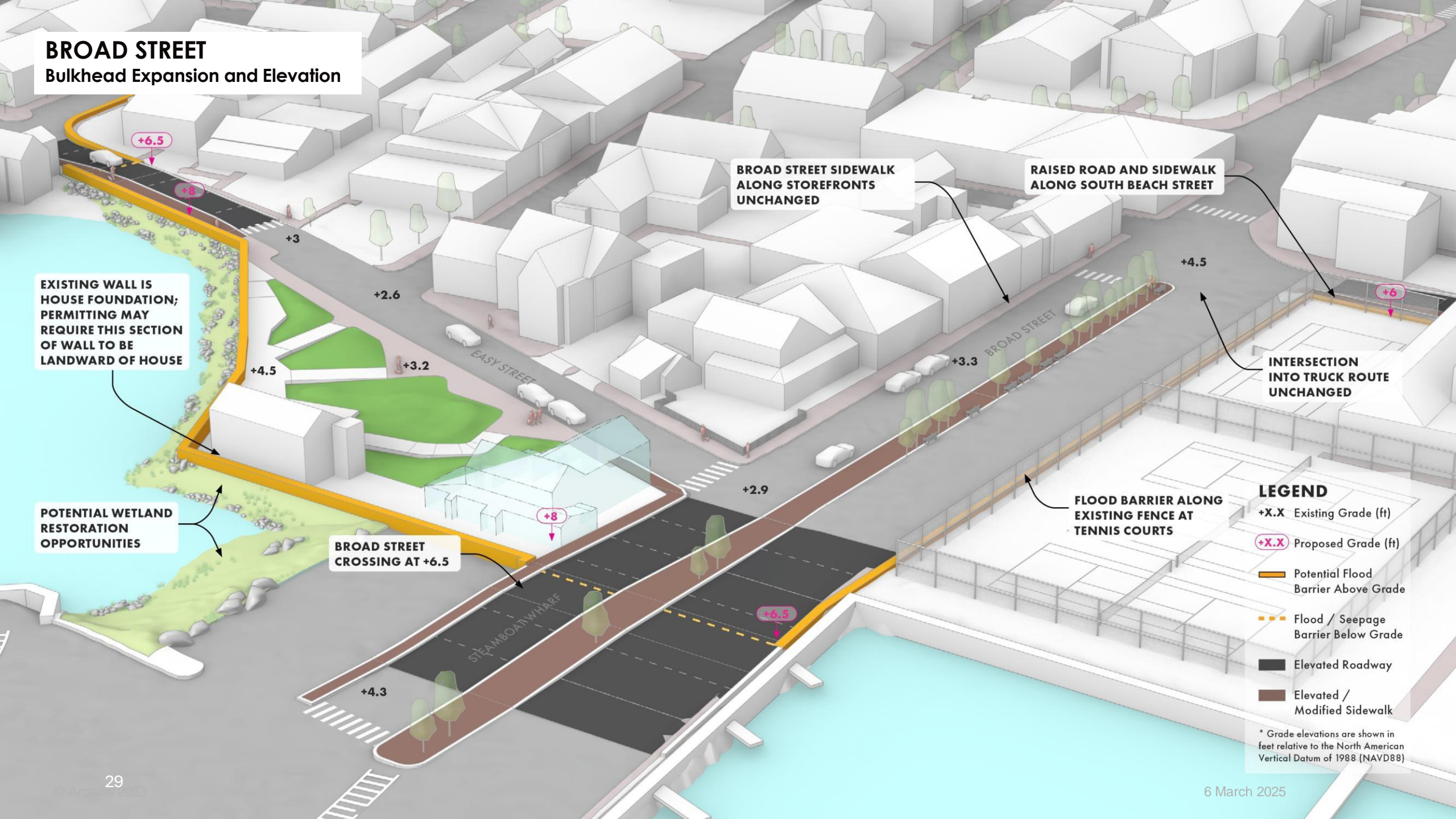


Road Raising to 8.0 feet NAVD88

- Raise Easy Street to 8.0 feet elevation, including portions of Broad and surrounding streets
- Larger walls along sidewalks in Easy St/Old North Wharf area and in the middle of Broad Street

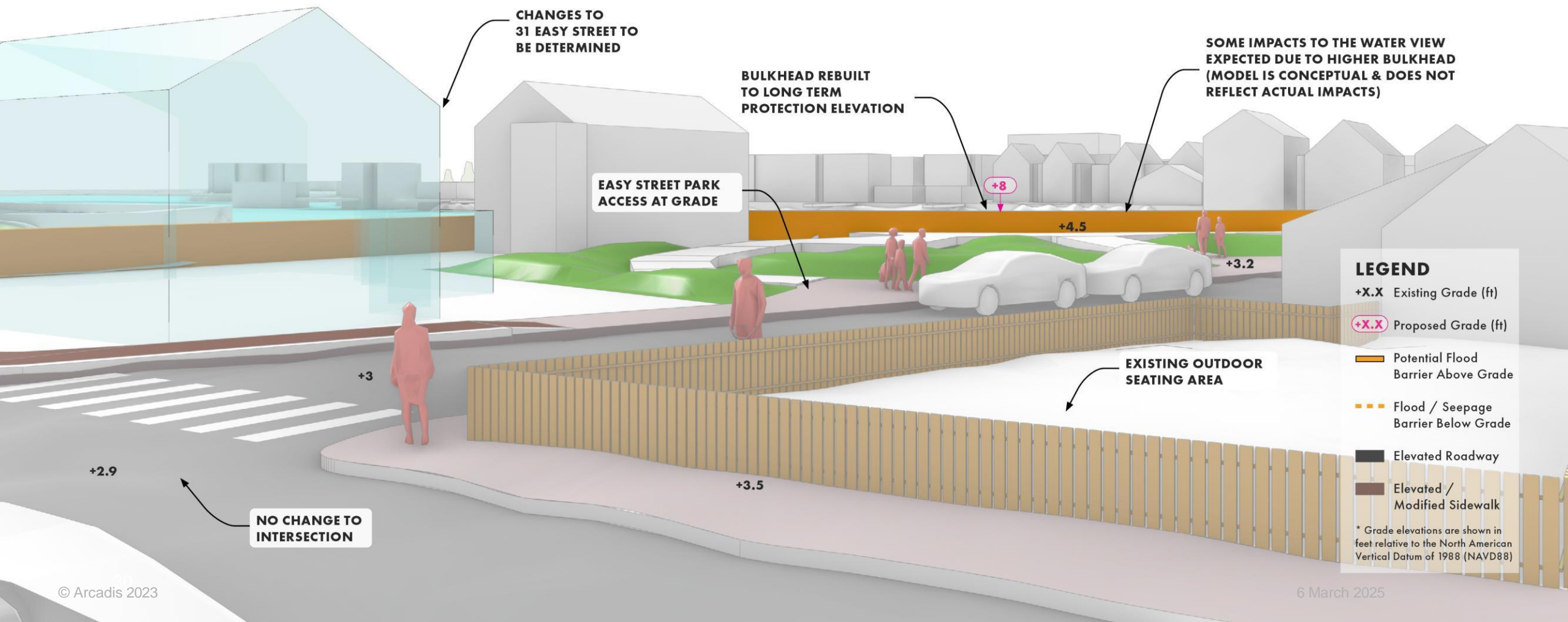
BROAD STREET

Bulkhead Expansion and Elevation



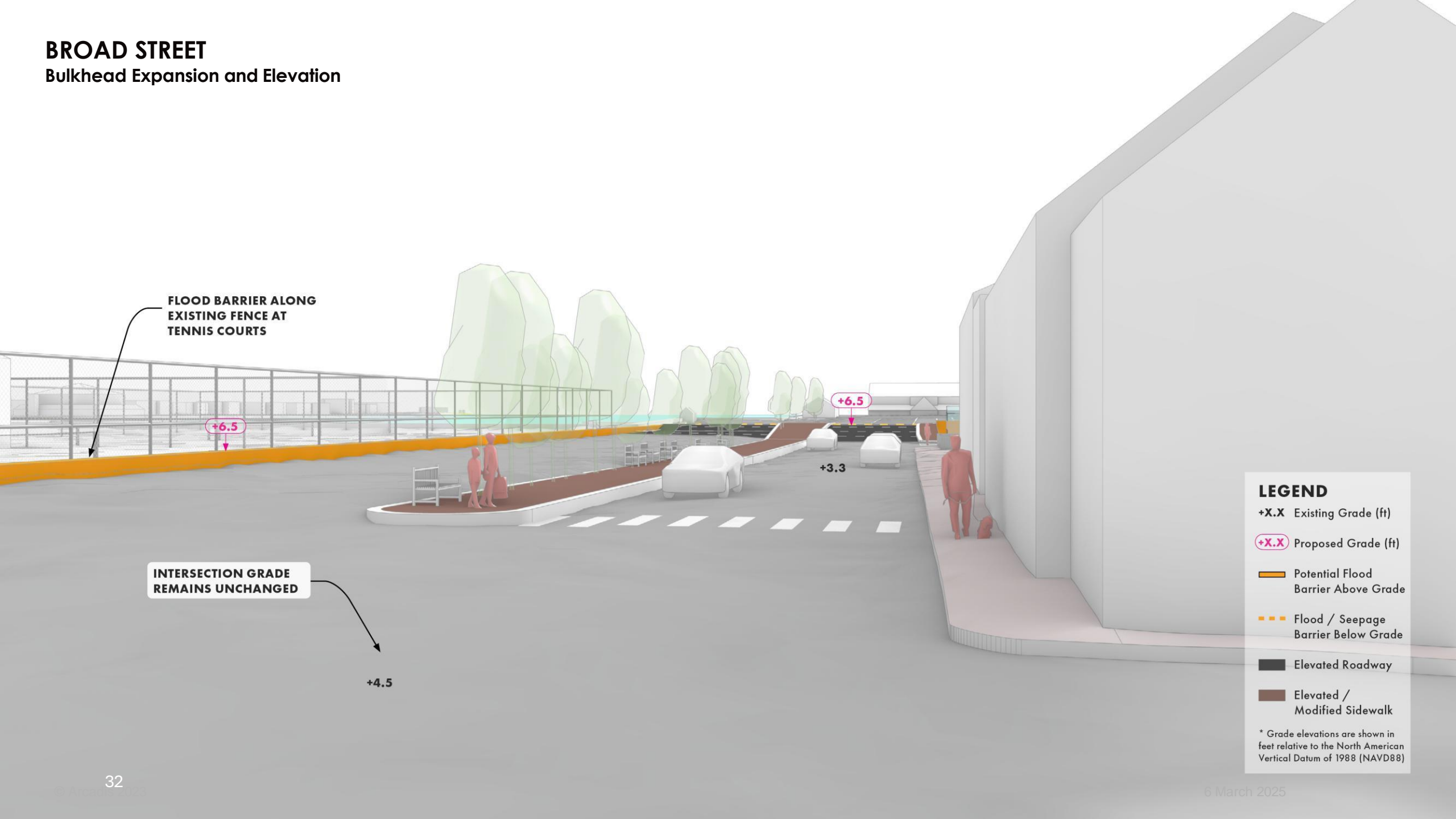
EASY STREET

Bulkhead Expansion and Elevation



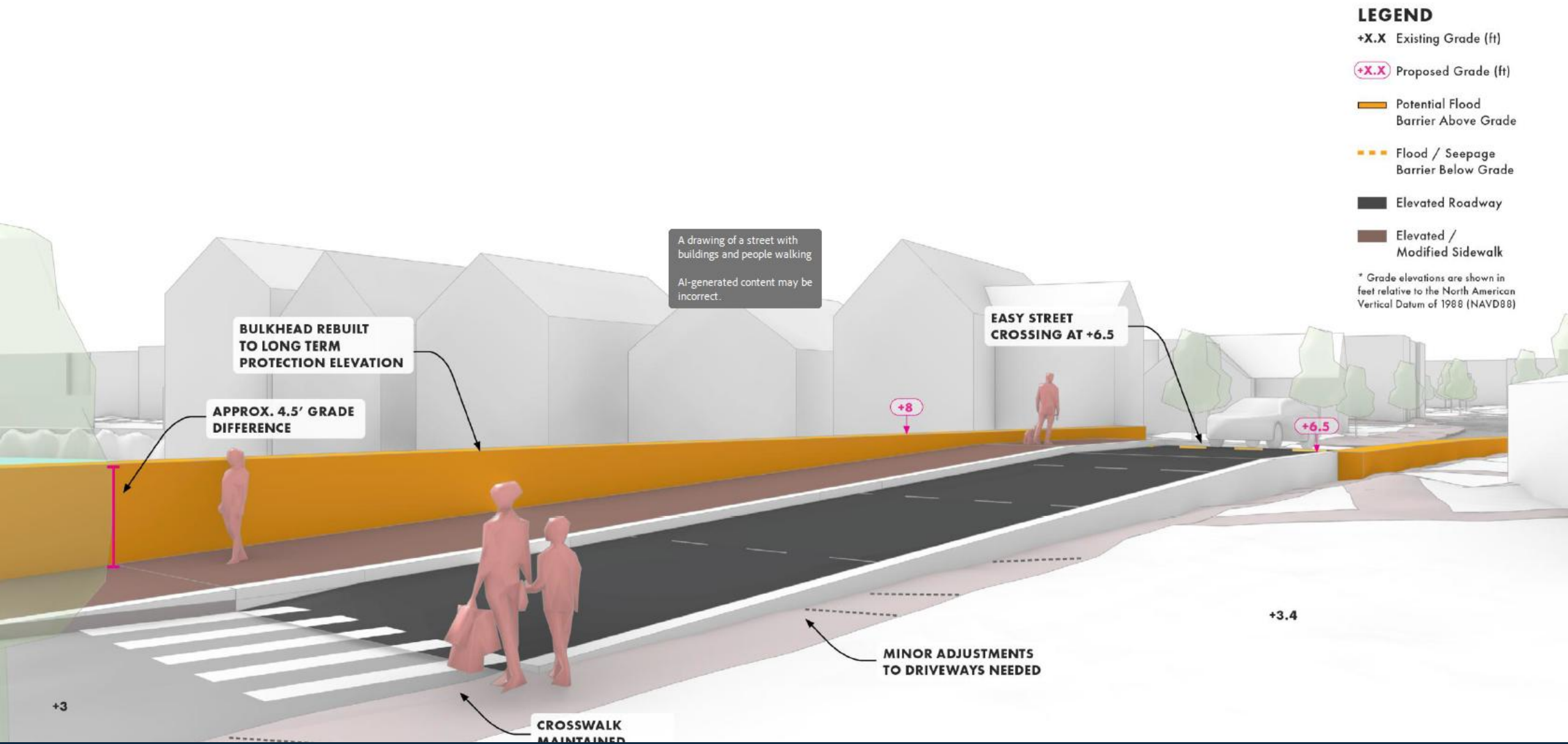
BROAD STREET

Bulkhead Expansion and Elevation



EASY STREET

Bulkhead Expansion and Elevation



OVERVIEW

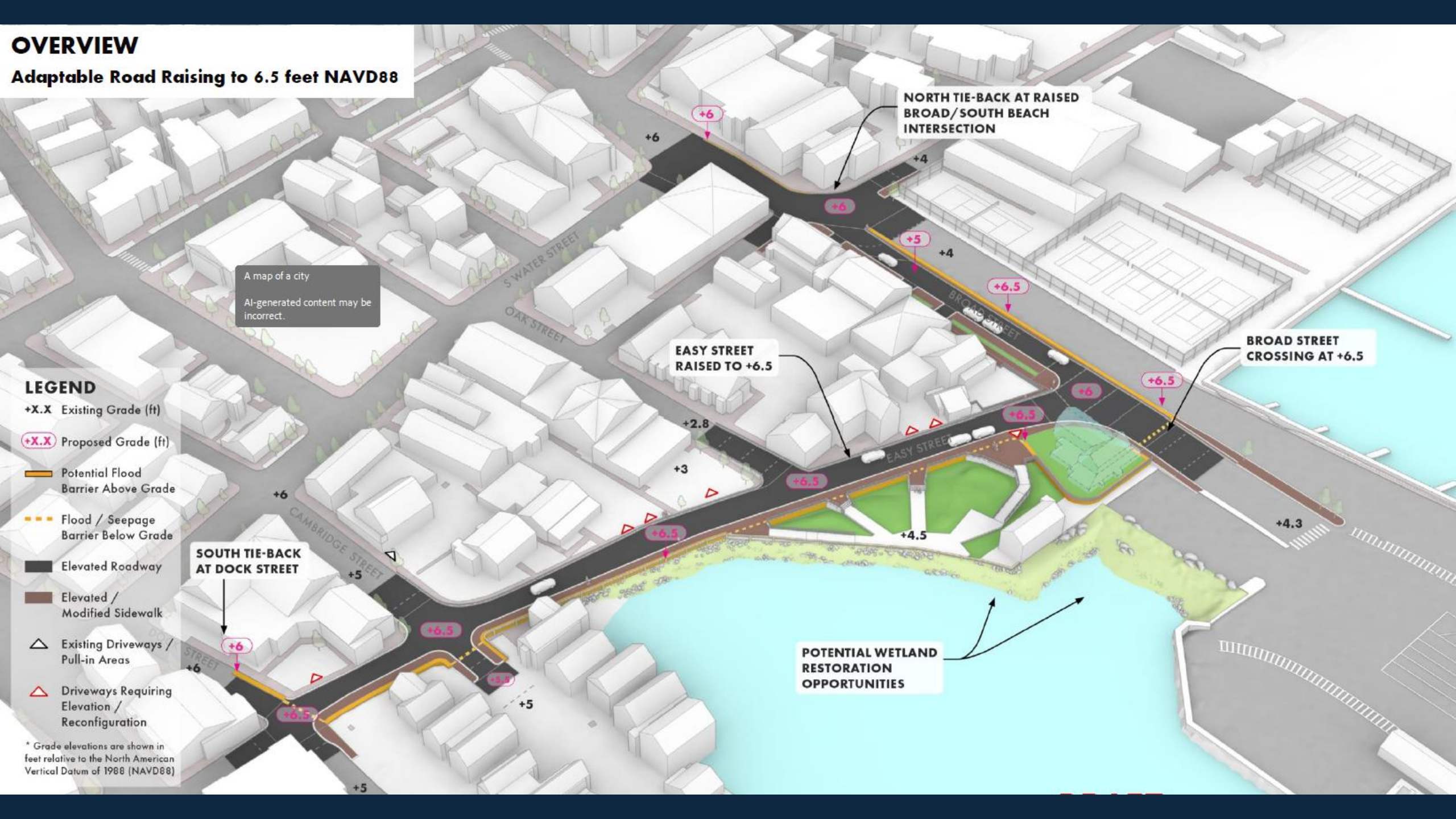
Adaptable Road Raising to 6.5 feet NAVD88

A map of a city
AI-generated content may be incorrect.

LEGEND

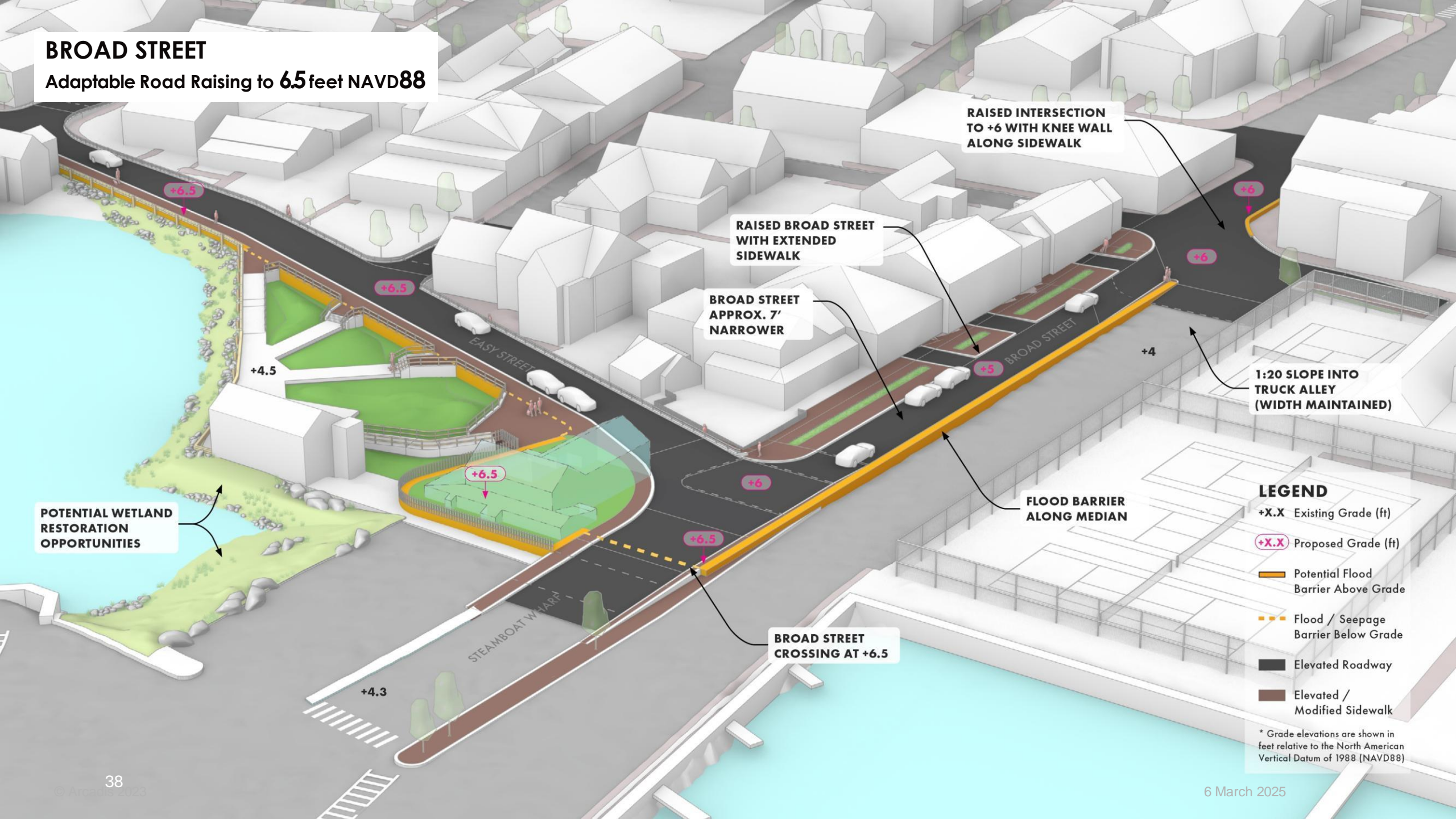
- +X.X Existing Grade (ft)
- +X.X Proposed Grade (ft)
- Potential Flood Barrier Above Grade
- Flood / Seepage Barrier Below Grade
- Elevated Roadway
- Elevated / Modified Sidewalk
- Existing Driveways / Pull-in Areas
- Driveways Requiring Elevation / Reconfiguration

* Grade elevations are shown in feet relative to the North American Vertical Datum of 1988 (NAVD88)



BROAD STREET

Adaptable Road Raising to **6.5** feet NAVD88



POTENTIAL WETLAND
RESTORATION
OPPORTUNITIES

RAISED BROAD STREET
WITH EXTENDED
SIDEWALK

BROAD STREET
APPROX. 7'
NARROWER

RAISED INTERSECTION
TO +6 WITH KNEE WALL
ALONG SIDEWALK

1:20 SLOPE INTO
TRUCK ALLEY
(WIDTH MAINTAINED)

FLOOD BARRIER
ALONG MEDIAN

BROAD STREET
CROSSING AT +6.5

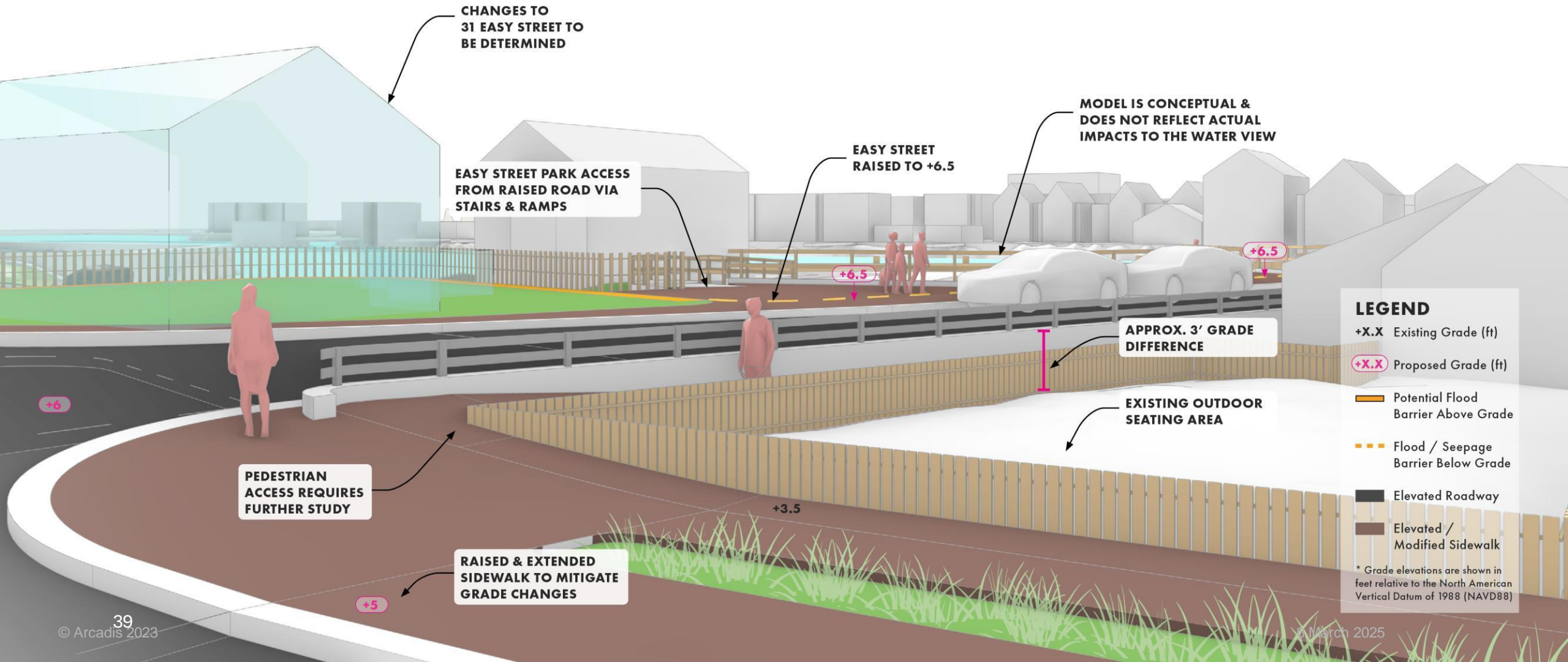
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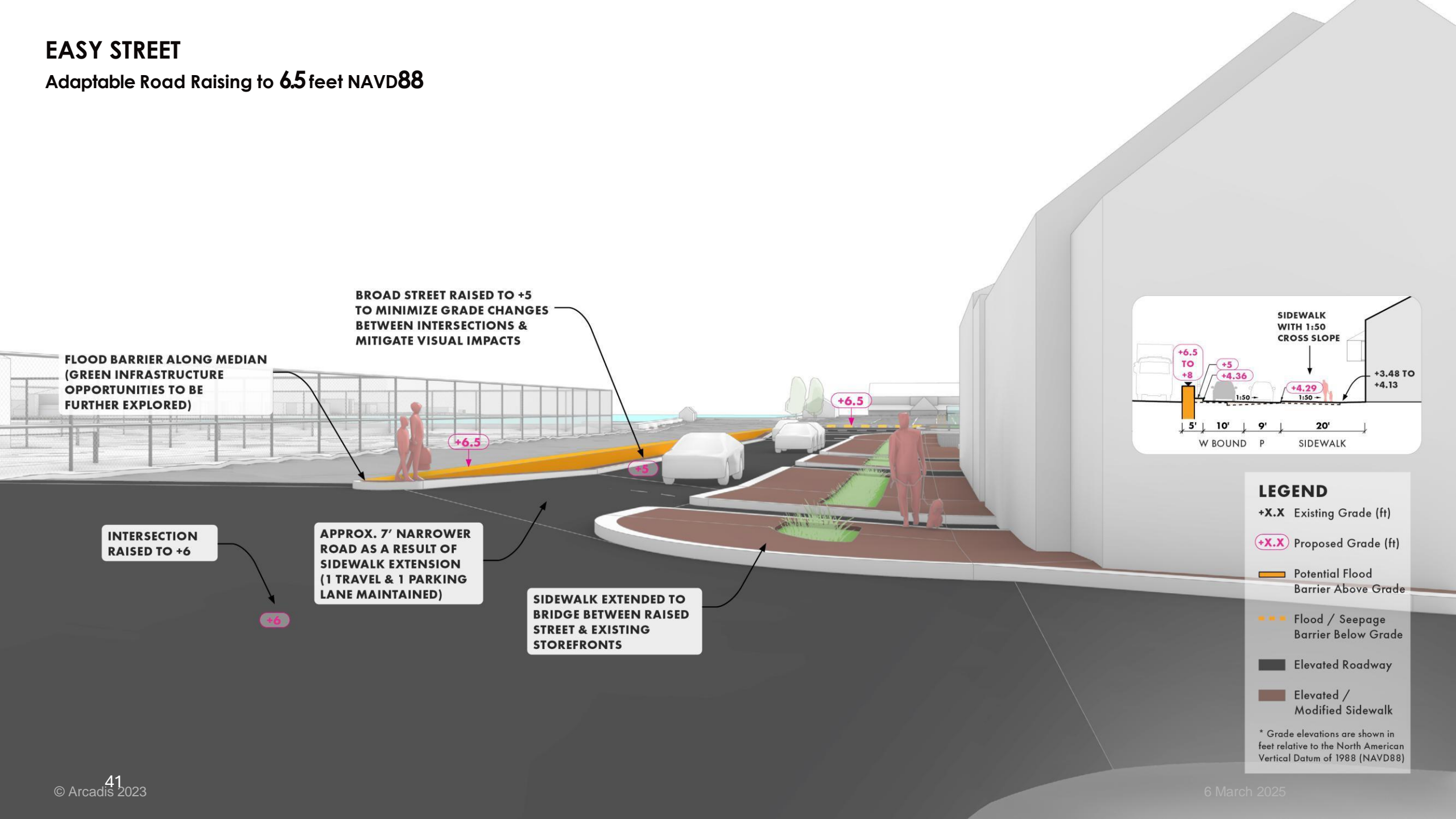
EASY STREET

Adaptable Road Raising to 6.5 feet NAVD88



EASY STREET

Adaptable Road Raising to 6.5 feet NAVD88





Adaptable Road Raising to 6.5 feet NAVD88

Adaptable Road Raising to 6.5 feet NAVD88


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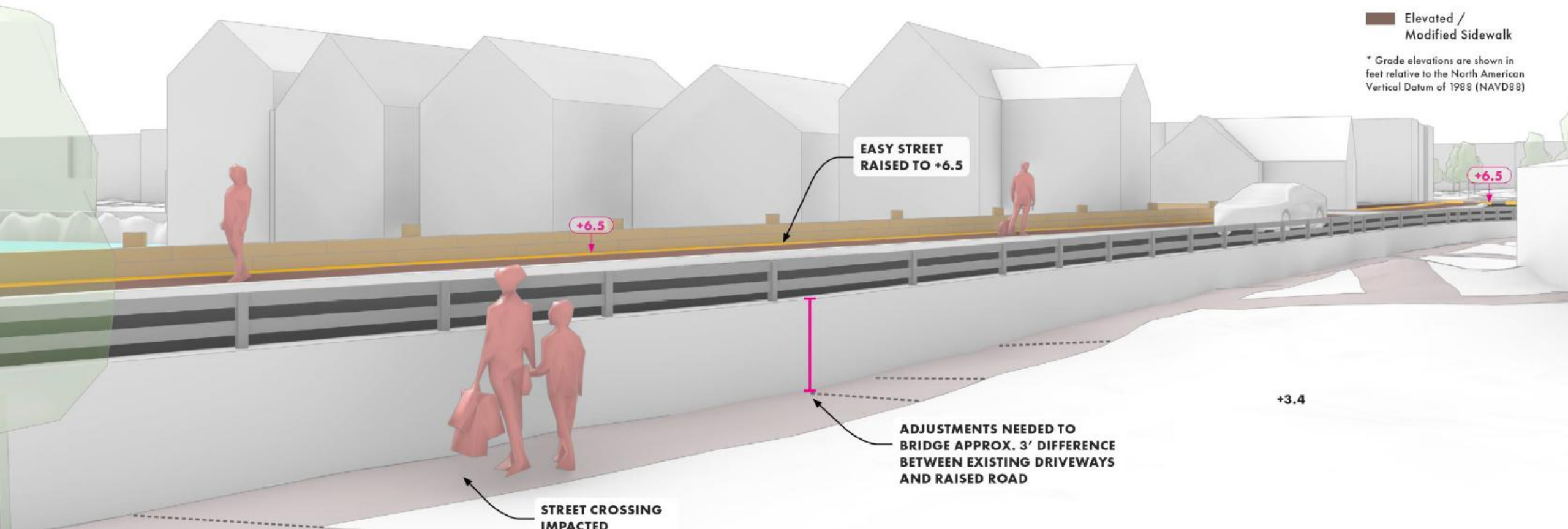
 Potential Flood Barrier Above Grade

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■ Elevated Roadway

 Elevated /
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OVERVIEW

Road Raising to 8.0 feet NAVD88

A map of a city

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BROAD STREET

Road Raising to 80 feet NAVD88



RAISED INTERSECTION TO +6 WITH KNEE WALL ALONG SIDEWALK

RAISED BROAD STREET WITH EXTENDED SIDEWALK

BROAD STREET APPROX. 7' NARROWER

1:20 SLOPE INTO TRUCK ALLEY (WIDTH MAINTAINED)

POTENTIAL WETLAND RESTORATION OPPORTUNITIES

FLOOD BARRIER ALONG MEDIAN

BROAD STREET CROSSING AT +8

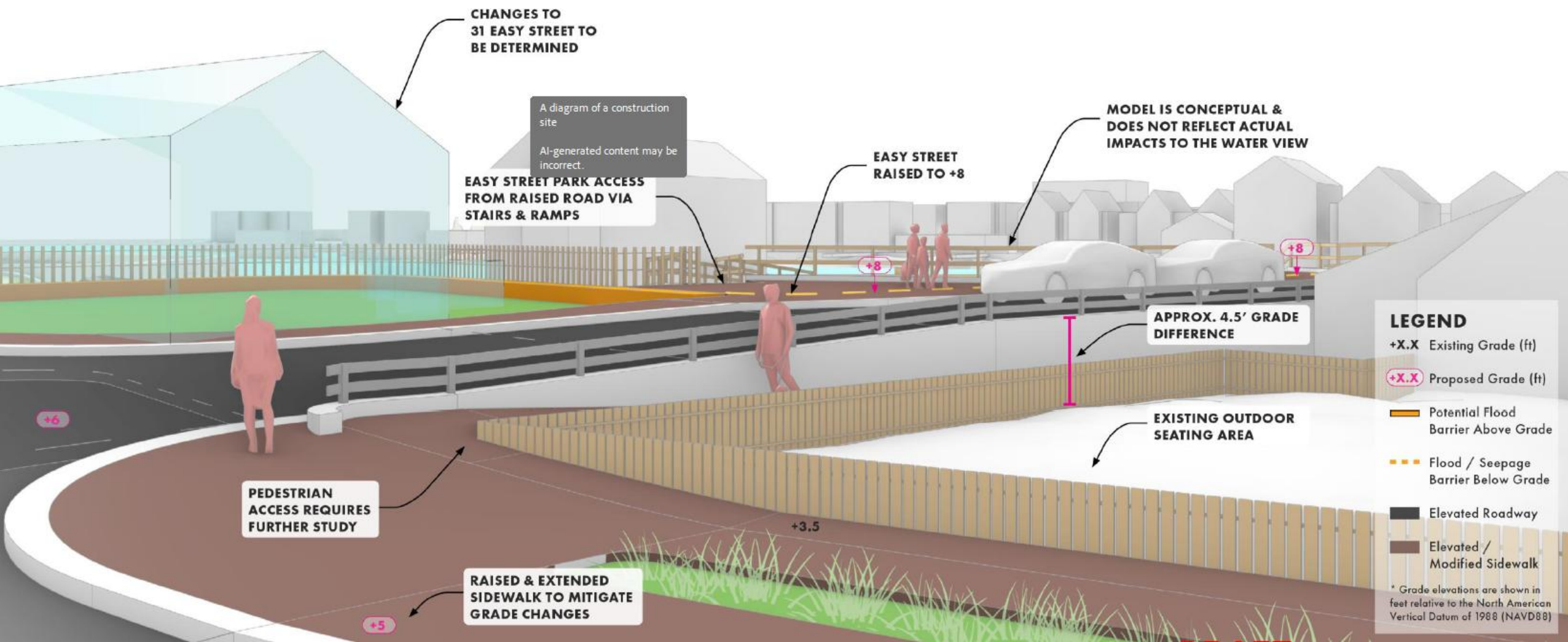
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EASY STREET

Road Raising to 8.0 feet NAVD88

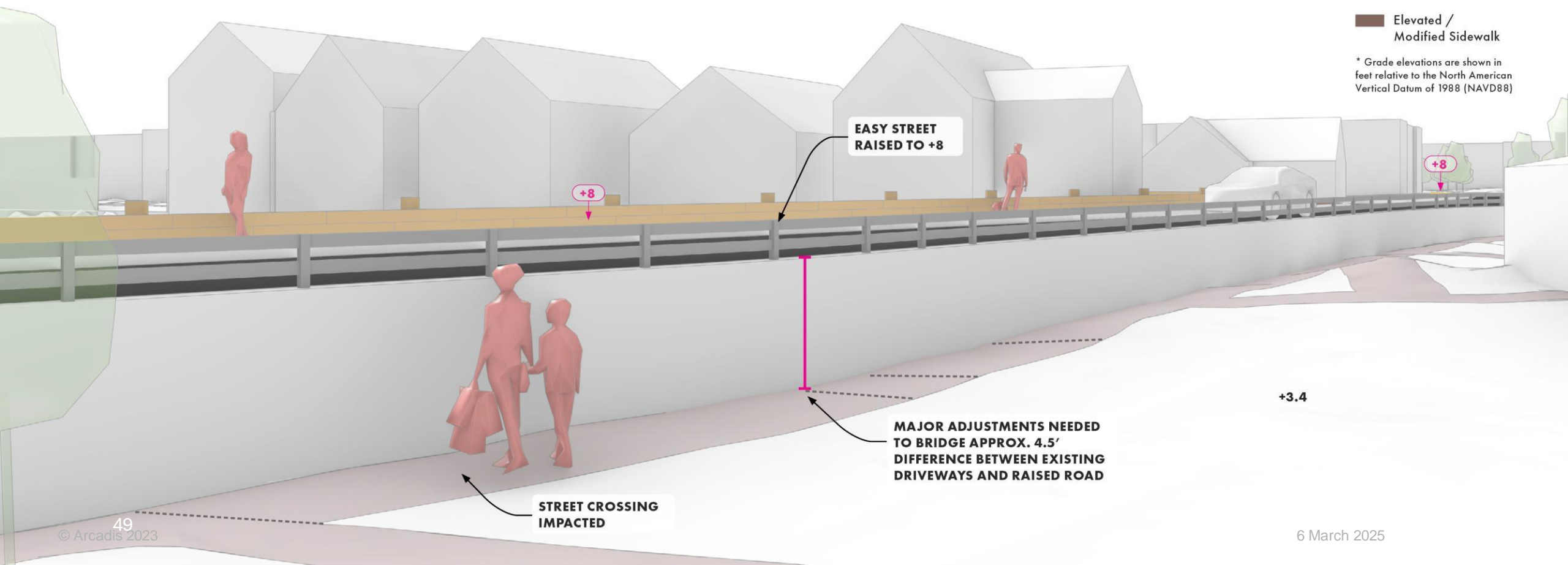


EASY STREET

Road Raising to 8.0 feet NAVD88

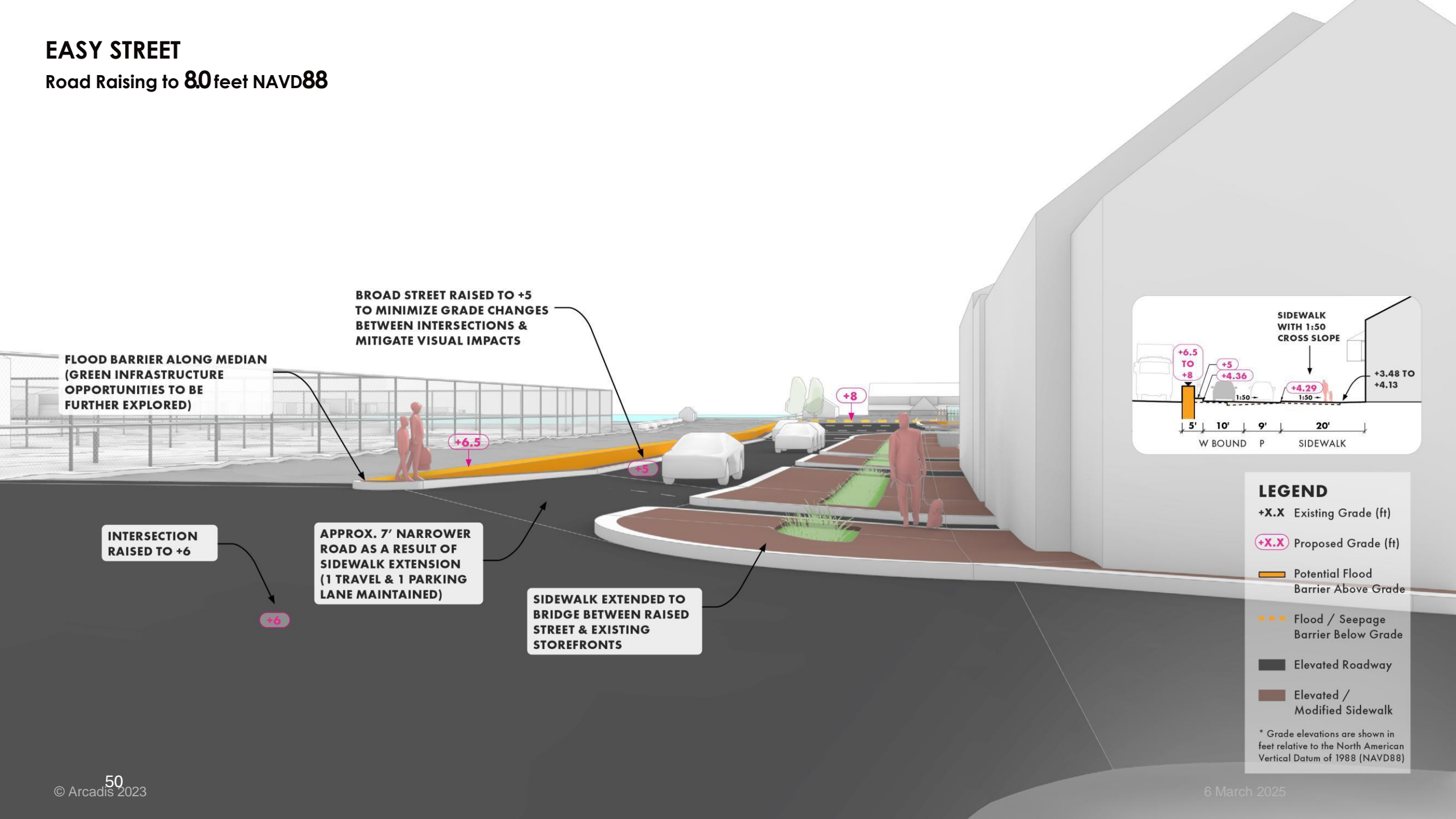
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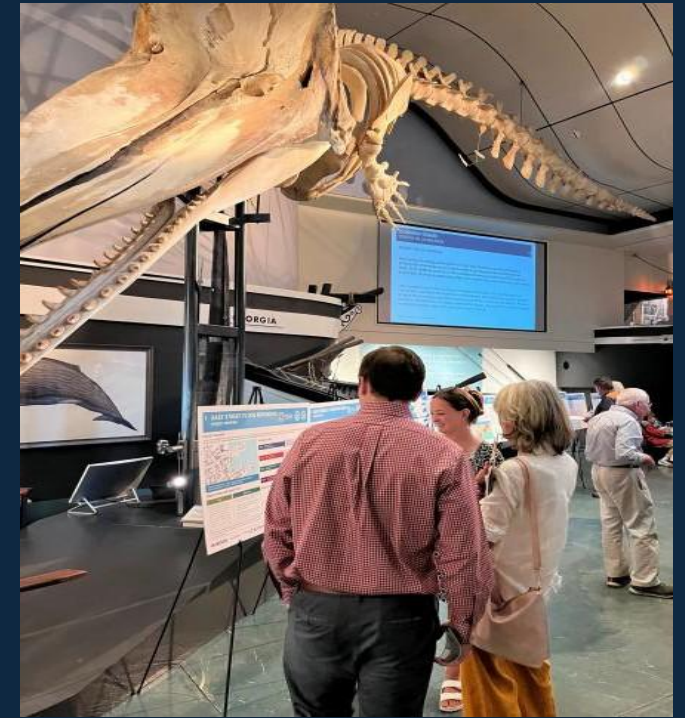
Road Raising to 8.0 feet NAVD88



Engagement Themes

Open House #1 (in person)

- Broad support for addressing flooding issues on Easy Street
- Concerns for stormwater flooding during heavy rain events, in addition to tidal flooding
- Desire to incorporate nature-based solutions into design
- Interest in exploring new alternatives including a raised Easy Street



Thank you NHA!!!

Open House # 2 (virtual)

- Goal: Reduce flood risk to places critical to Nantucket's long-term vitality
- Groundwater is a significant issue Downtown
- The higher the level of protection, the better
- Road raising is too dangerous or out of character for Nantucket
- Pumping is needed Downtown to avoid flooding private properties
- Concerns about impacts to historic character and setting; access to private properties



Next Steps

- Update modeling
- Groundwater data collection & modeling
- Enhance graphics to picture how project area may look
- Cost estimate for 3 alternatives

- Pump station study
- Updates on stormwater data
- Historic structures review
- Public outreach dynamic plan

**CZM Grant Ends
June 2025**

**CONCEPTUAL
PLANNING**

**PRELIMINARY
DESIGN**

**FINAL
DESIGN,
FUNDING,
PERMITTING**

Funding approved

CONSTRUCTION

**OPERATIONS &
MAINTENANCE**

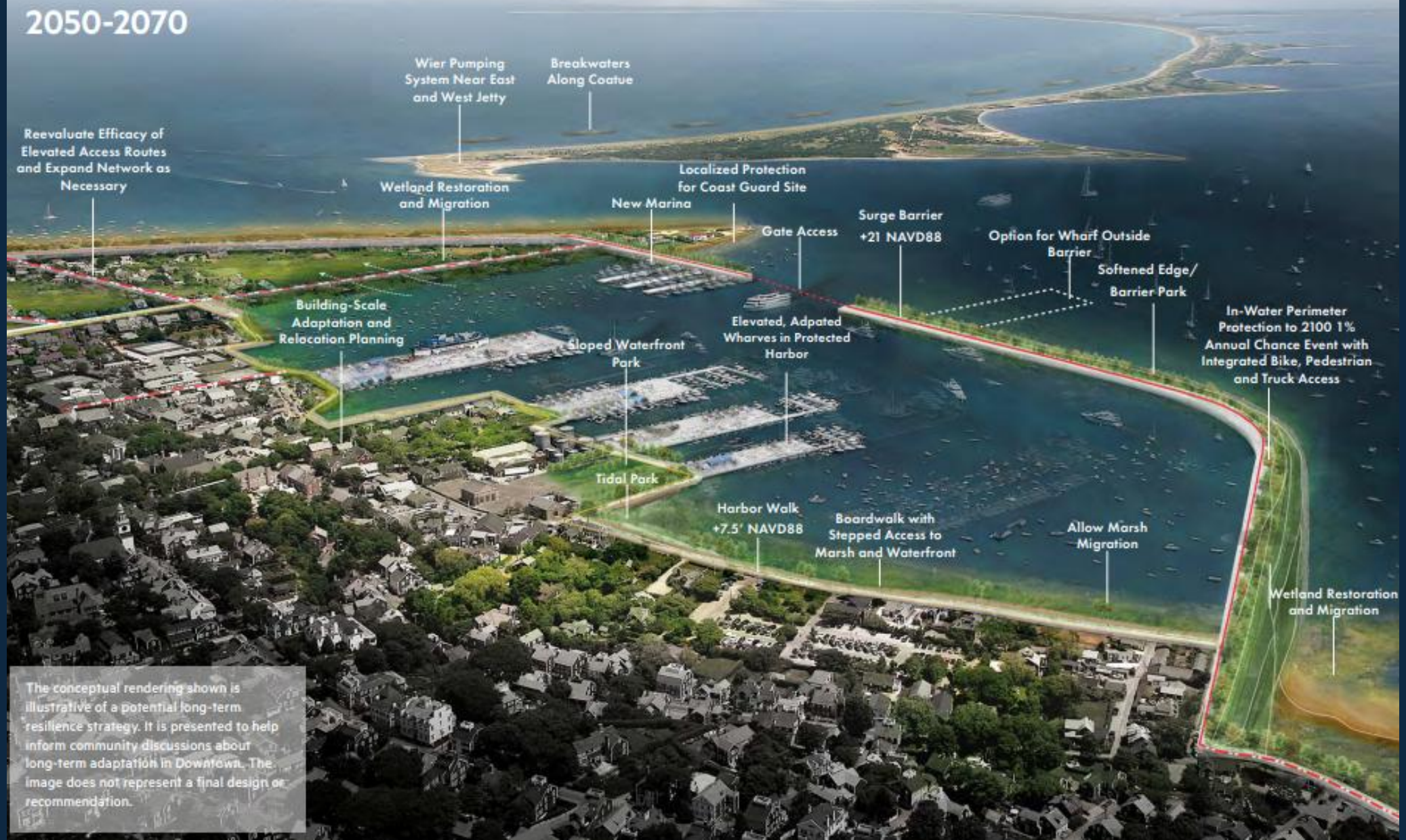
ONGOING STAKEHOLDER AND COMMUNITY ENGAGEMENT

Learn more!



Long- Term Adaptation Pathway 1: PROTECT

Long-Term Strategy: Protect/Defend Option 1 2050-2070



The conceptual rendering shown is illustrative of a potential long-term resilience strategy. It is presented to help inform community discussions about long-term adaptation in Downtown. The image does not represent a final design or recommendation.

Long- Term Adaptation Pathway 2: LIVE WITH WATER

Long-Term Strategy: Adapt/Live with Water 2050-2070



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Long- Term Adaptation Pathway 3: RELOCATE

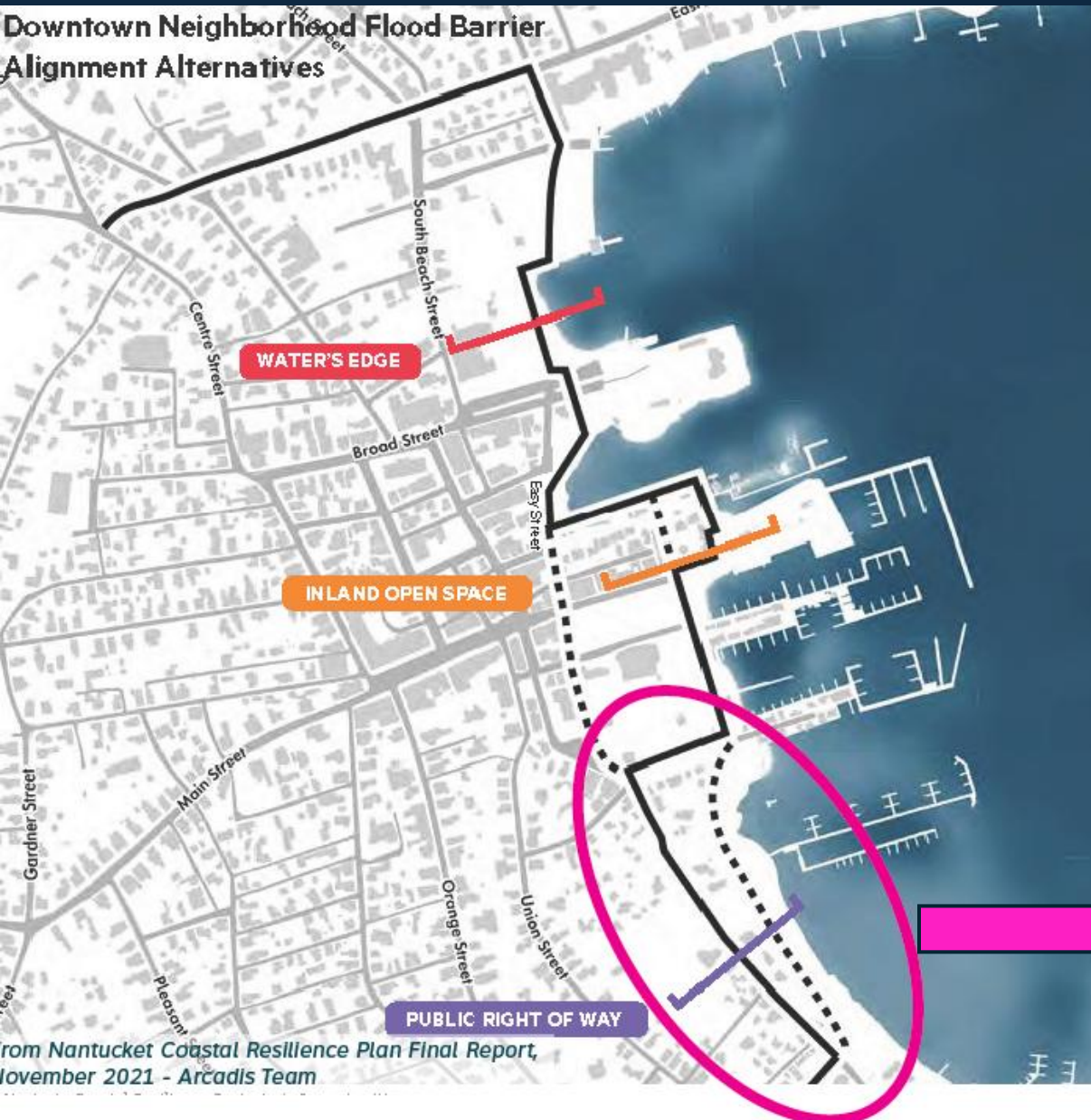
Long-Term Strategy: Relocate 2050-2070



The conceptual rendering shown is illustrative of a potential long-term resilience strategy. It is presented to help inform community discussions about long-term adaptation in Downtown. The image does not represent a final design or recommendation.

Francis St. Beach Improvement Project

Downtown Neighborhood Flood Barrier Alignment Alternatives



from Nantucket Coastal Resilience Plan Final Report,
November 2021 - Arcadis Team

ENVIRONMENTAL GOALS

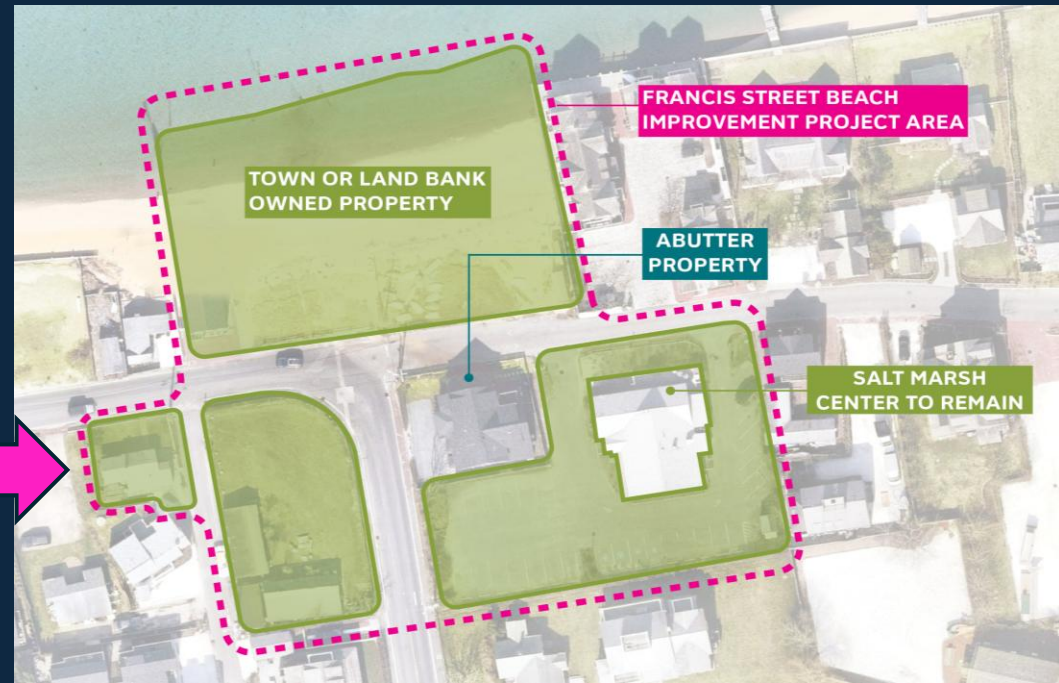
- Improve the capacity of natural ecosystems to adapt to sea level rise and reduce adverse impacts to them
- Absorb, buffer, and manage water

SOCIAL GOALS

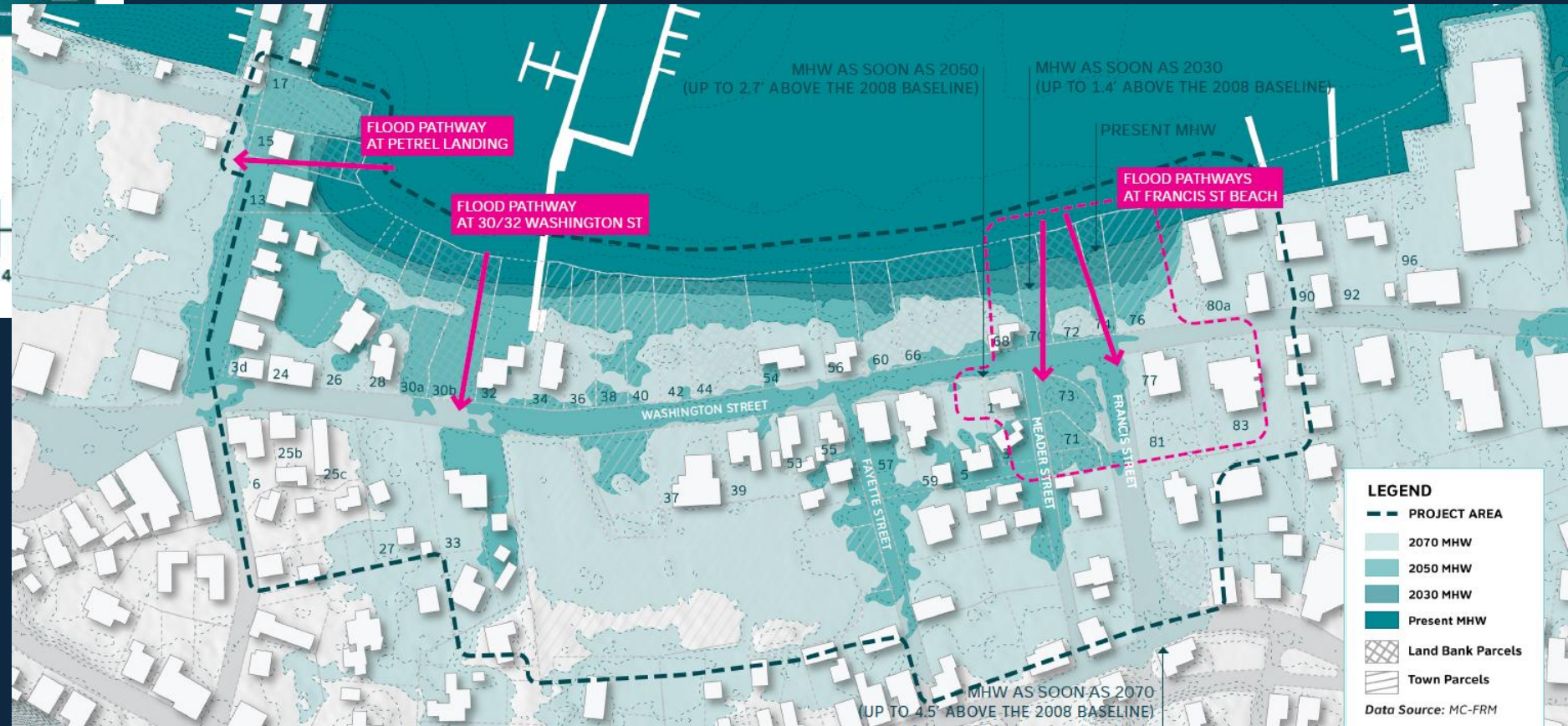
- Reduce flood risk to cultural and community assets
- Create public, universally accessible waterfront experiences for people
- Engage in dialogue with community members about climate risks and adaptation pathways

OPERATIONAL GOALS

- Reduce flood risk to sustain the long-term use of Washington Street
- Enhance multi-modal transportation infrastructure, critical to mobility and safety
- Develop feasible, adaptable, maintainable, and permissible solutions
- Clearly communicate economic benefits and anticipated project costs



Previous Work by Land Bank and Remain



Previous Work Continued

A CATALYTIC PROJECT: PRELIMINARY CONCEPT FOR FRANCIS STREET



BEACH DECK RENDERING



RAIN GARDEN OVERLOOK



Alternatives Summary

ALTERNATIVE 1 | DUNE SWOOP



Form

Curvilinear, organic

Integrated seated edges along boardwalk extents

Boardwalk + Natural Paths

Mostly concealed by dune vegetation

Yes

ALTERNATIVE 2 | BEACH OVERLOOK



Angular, maritime port

Overlook bumpout with stand-alone benches along boardwalk extents

More extensive boardwalk

Mostly concealed by dune vegetation

Yes

Program

Materiality

Floodwall

Adaptable

DUNE SWOOP | BIRD'S EYE



SALT MARSH
SENIOR CENTER

PARKING LOT
IMPROVEMENTS

FUTURE STORMWATER
IMPROVEMENTS

FUTURE STORMWATER
IMPROVEMENTS

COASTAL FLOOD BARRIER
ELEV. 8'

KAYAK RENTAL

COASTAL FLOOD BARRIER
ELEV. 8'

LAND BANK
BULKHEAD WALL



DUNE SWOOP | BEACHSIDE



DUNE SWOOP | OVERLOOK



BEACH OVERLOOK | BIRD'S EYE



BEACH OVERLOOK | BEACHSIDE



BEACH OVERLOOK | OVERLOOK



Next Steps

- Hiring waterfront structural engineer
- Workgroup decide which alternative to move to 30% design
- Update modeling to determine flood risk for neighbors based on 2 concept designs
- Benefit/cost analysis
- Operation and maintenance plan



Learn more



QUESTIONS?

Leah Hill

lhill@nantucket-ma.gov

508-228-7200 ext. 7603

