

Long-Term Sea Level Rise Adaptation Strategies for the

Southern Waterfront & Bridgeway Promenade

City of Sausalito Sustainability Commission Presentation - February 10, 2025

WRT

February 27, 2025

Agenda

1. Introduction
    - Sustainability Meeting – Purpose [DPW]
    - Some History [DPW]
2. Existing Conditions & Vulnerability Overview
3. Adaptation Opportunities
4. Implementation Strategy
5. Recommendation to Council

01

Introduction

Purpose

Sustainability Commissions Assistance and Guidance

- Concepts to address multiple issues
- Feedback regarding the Commission's thoughts and concerns
- Council concept recommendation to be pursued by the City



Some History

1961 – This section of Bridgeway was a 2-lane road

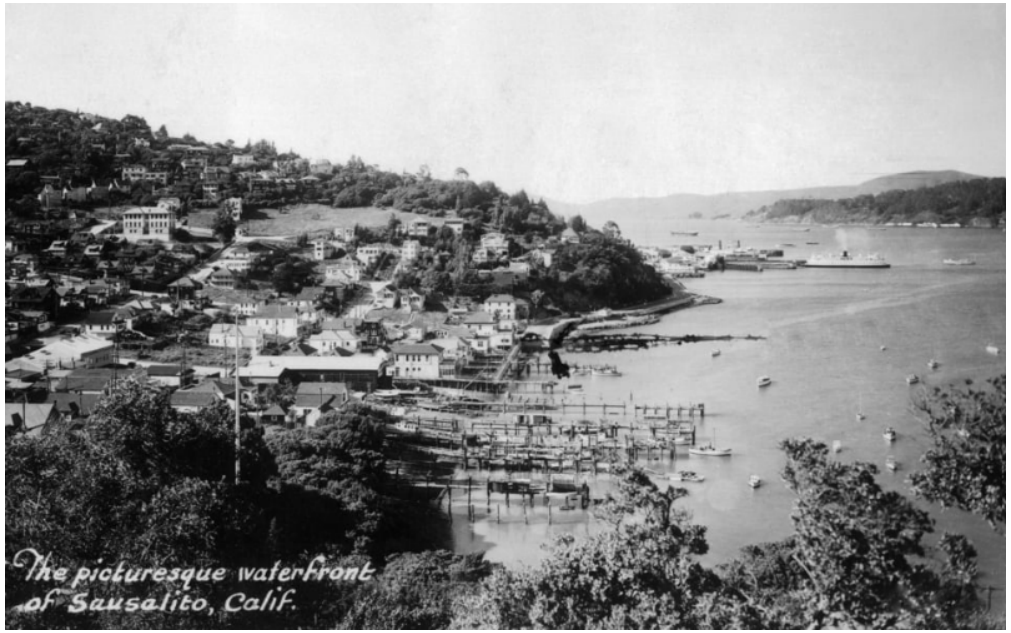
1964 - City considers widening roadway – Articles noted in the IJ that a new sea wall is needed

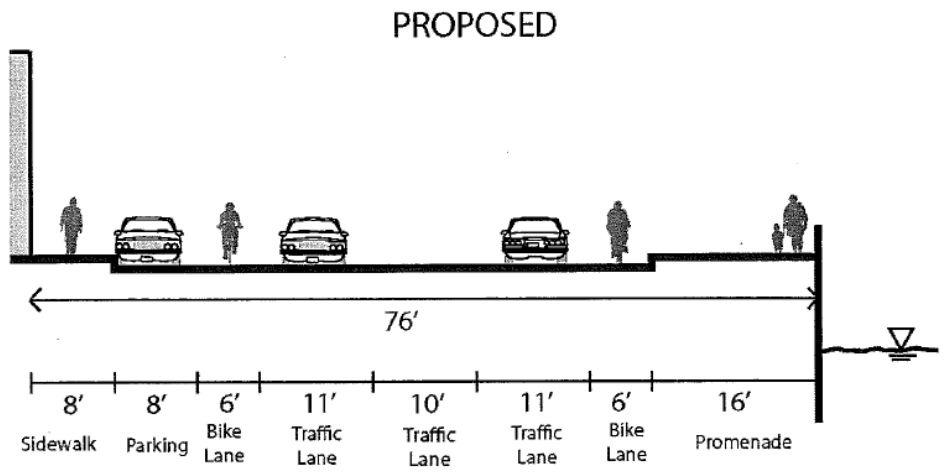
1965 – City considering widening – seeks state funds

1968 – Roadway widened to include a center raised median

2011 – Council Discussion related to non-motorized Transportation

2020 – PBAC initiated discussion of reconfiguring the geometry of the road





Some History

2022 – Staff applied for funding for multiple projects

2022 – City awarded funding to develop concepts related to transportation issues in this area

2022 – City notified OBAG3 construction funds available – predicated on removing the center lane

Present – Parametrix examining Transportation Alternatives

Transportation is **one** component.

From a sustainability perspective, this area is susceptible to climate change.

We are here to discuss the sustainability component.

Parametrix Study

Presented to the BPAC 12/9/24







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Existing Conditions & Vulnerability Overview

Bridgeway Promenade Today





View south of Bridgeway business area between Yee Tok Chee Park and Scoma's



Delivery truck loading in center median



Lower path and public art



Yee Tok Chee Park Water Access

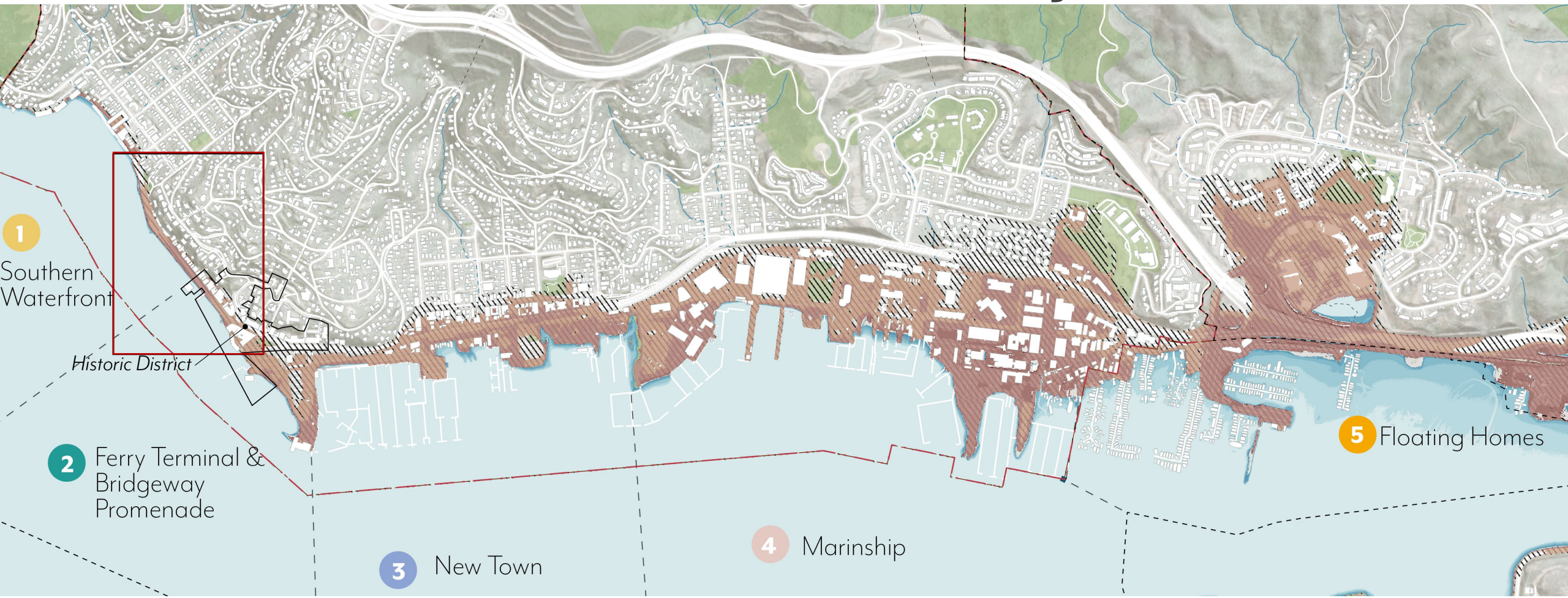


Existing sidewalk



Popular café sidewalk seating

Sausalito Sea Level Rise Vulnerability



Map Sources: *California State Lands Commission, City of Sausalito, County of Marin*

Map Author: *WRT, 2024*

Area of Focus

Base Map

- Sausalito City Boundary
- Sphere of Influence
- Parks

Sea Level Rise Scenarios

1. .8 feet
2. .8 feet + 100-yr Storm
3. 3.1 feet + 100-yr Storm

0 250 500 1,000 1,500 2,000 Feet

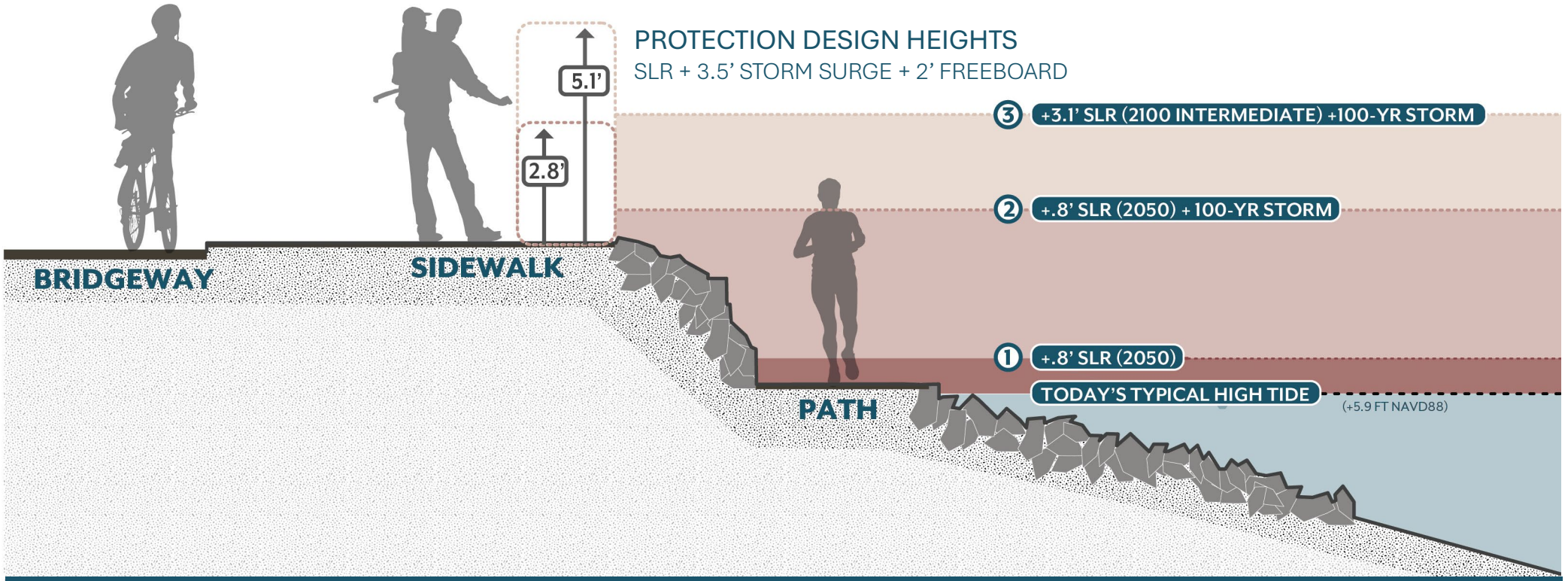
Bridgeway Promenade SLR Vulnerability





Design Height Guidance

EXAMPLE BRIDGEWAY PROMENADE SOUTH OF SCOMA'S



	Scenario	MHHW (NAVD)	SLR	Storm	Freeboard	TWL	Existing Sidewalk Elev. (NAVD)	Design Height of Strategy
1	**2050 (permanent)**	5.9'	0.8'	n/a	2'	8.7'	9.38'	n/a
2	**2050 (temporary)**	5.9'	0.8'	3.5'	2'	12.2'	9.38'	**2.8'**
3	**2100 Intermediate**	5.9'	3.1'	3.5'	2'	14.5'	9.38'	**5.1'**


Character Zones Along Bridgeway
Richardson St
2nd St
Atwood Ave
Bulkley Ave
Princess St
Tiffany Park
Park
Residential
Section South
Business
Section North
Sausalito Bakery & Cafe
Downtown Sausalito
Sea Lion Sculpture
The Trident
Scoma's
N
100'

03

Adaptation Opportunities

Project Considerations for Adaptation

- **Transportation:** All options can accommodate a center median and bike facilities.
- **Community Character:** What feels authentic to Sausalito?
- **Shoreline Connection:** Views, access, water adjacent uses
- **Ecological Opportunities:** Habitat and nature-based solutions
- **Economic Vitality:** Innovation, land use impacts, business continuity
- **Arts and Culture:** Community infrastructure and tourism
- **Cost-Benefit:** Who pays? Who benefits?
- **Permitability:** Changes to current and future regulation
- **Collective Action:** Shared benefits and trade-offs

World-class Waterfront Precedents



Circular Quay,
Sydney, Australia



Malmo, Sweden



Brooklyn, NY

World-class Waterfront Precedents



Lago di Como, Italy (Credit M. Orr)



Hoboken, NJ



Cavallino-Treporti, Venice, Italy



Sea Organ Steps, Zadar, Croatia



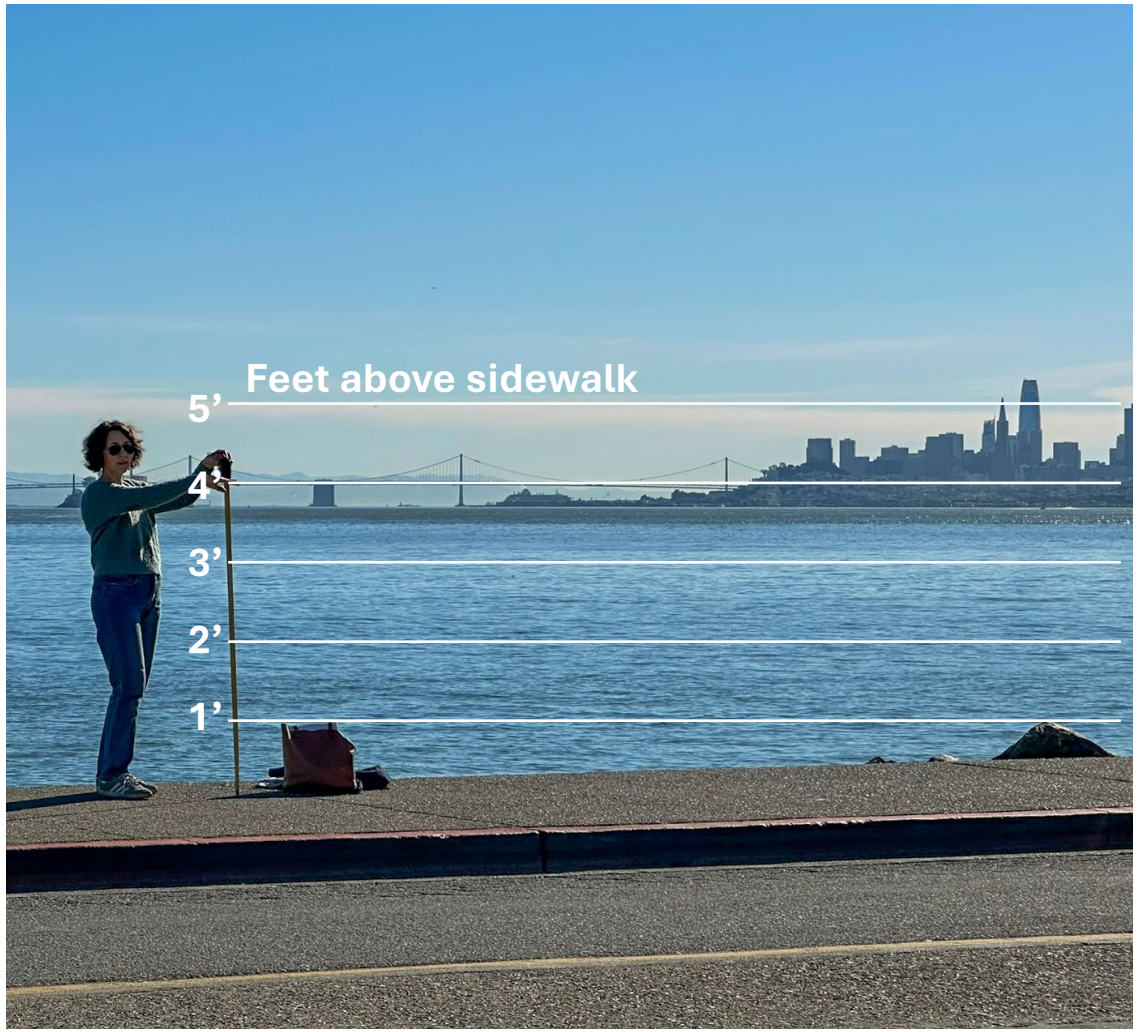
Oslo Fjord Promenade, Norway



Malmo, Sweden

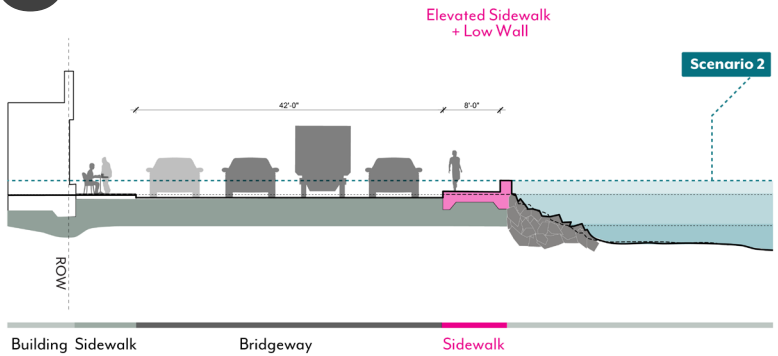
Skyline View from Sidewalk Seating





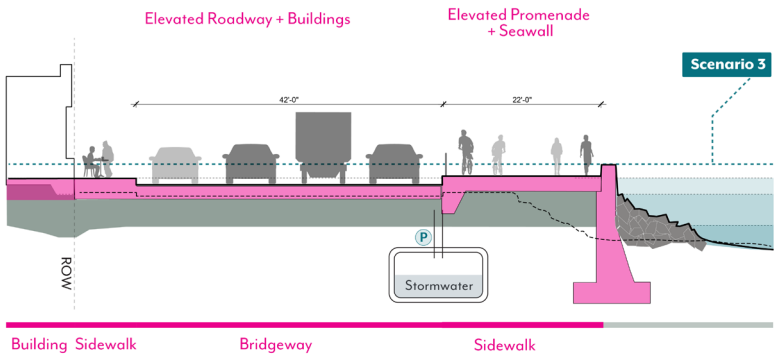
Adaptation Opportunity Overview

0 Mid-Century Approach: Sidewalk and Low Wall



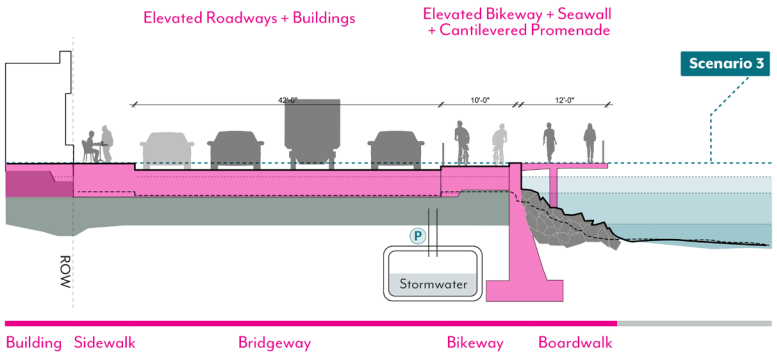
1 Elevated Roadway + Promenade

(Class IV Bikeway at Promenade Level, Elevated Roadway & Buildings)

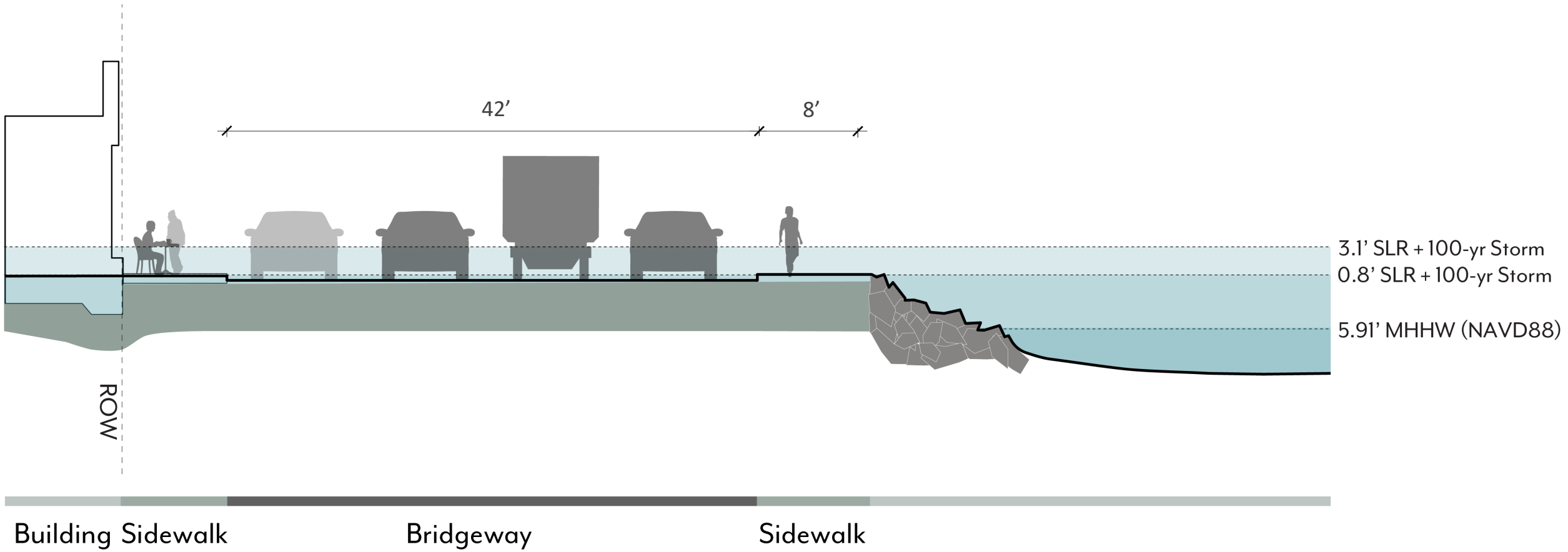


2 Elevated & Cantilevered Promenade

(Class IV Bikeway, Elevated Roadway & Buildings)

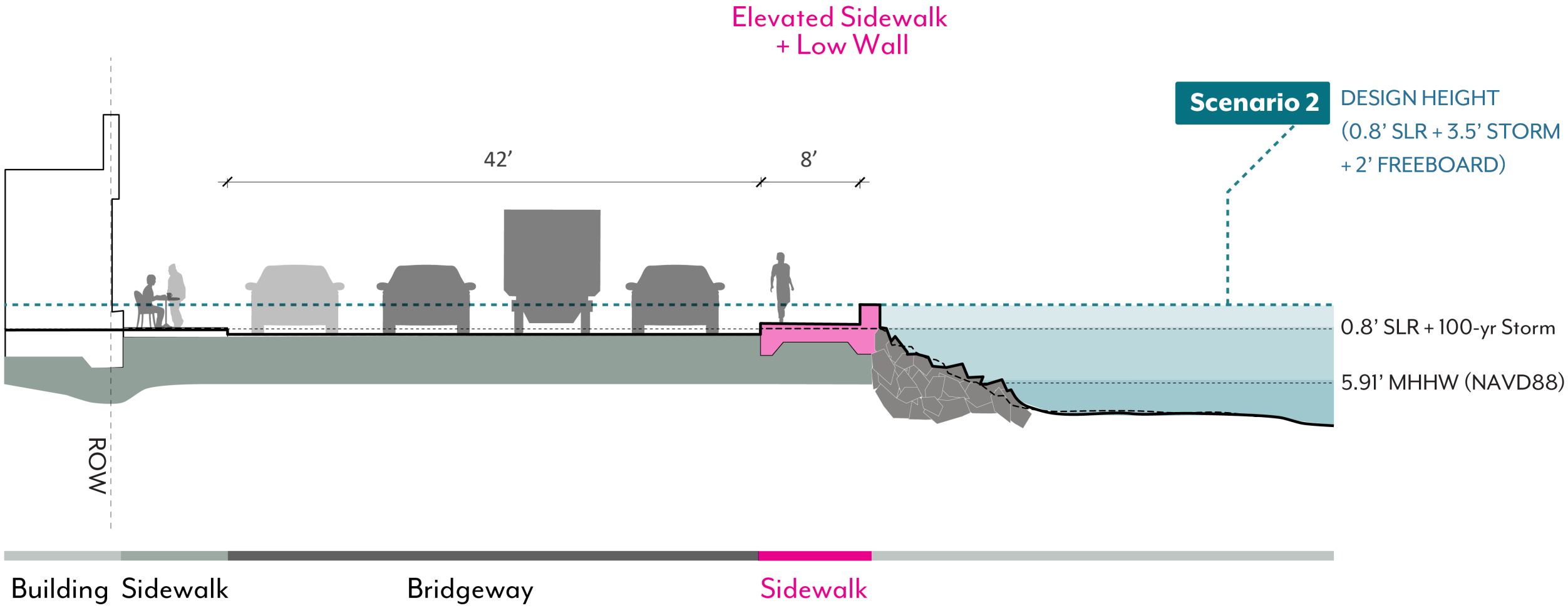


Existing


42’
8’
3.1’ SLR + 100-yr Storm
0.8’ SLR + 100-yr Storm
5.91’ MHHW (NAVD88)
ROW
Building Sidewalk
Bridgeway
Sidewalk

Mid-Century Approach: Sidewalk & Low Wall

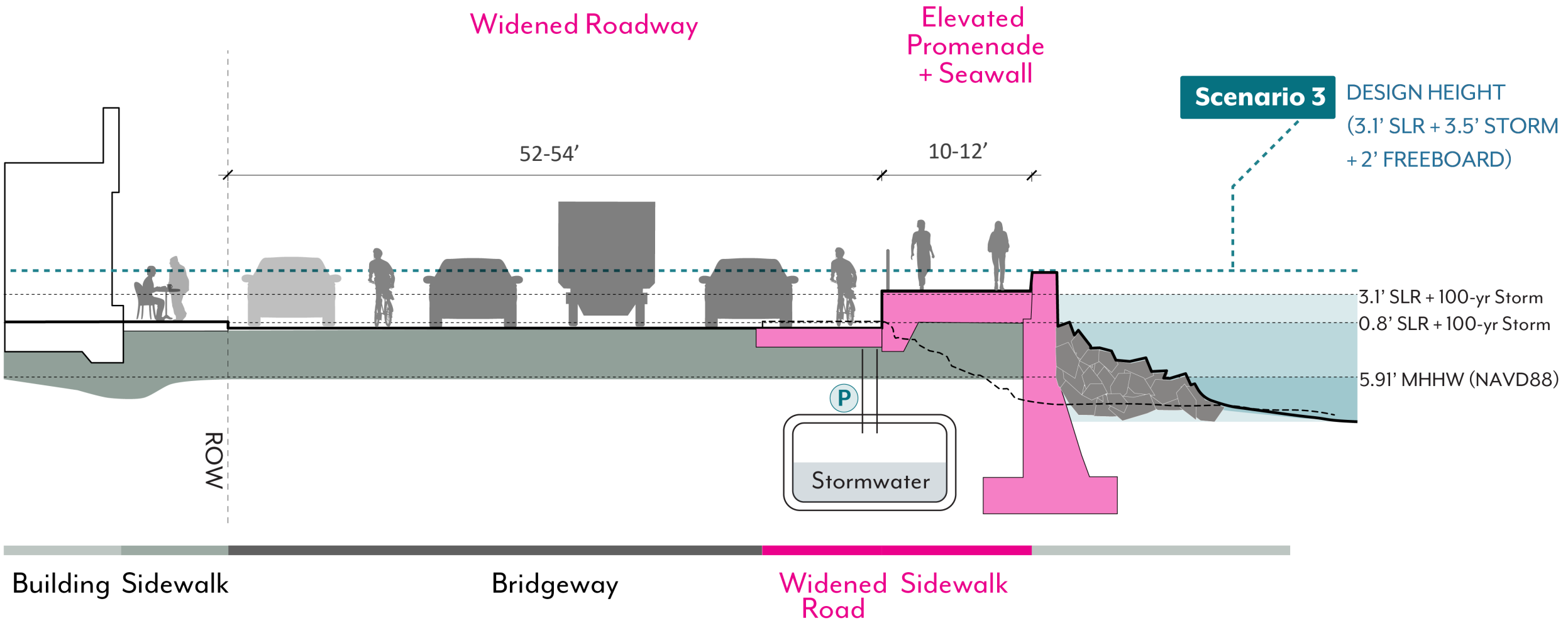
Note: The low wall will not be considered a US Army Corps of Engineers certified structure that fulfills FEMA National Flood Insurance Program (NFIP) requirements.



Expanded & Elevated Promenade

(Class II Bike Lanes at Roadway Level)

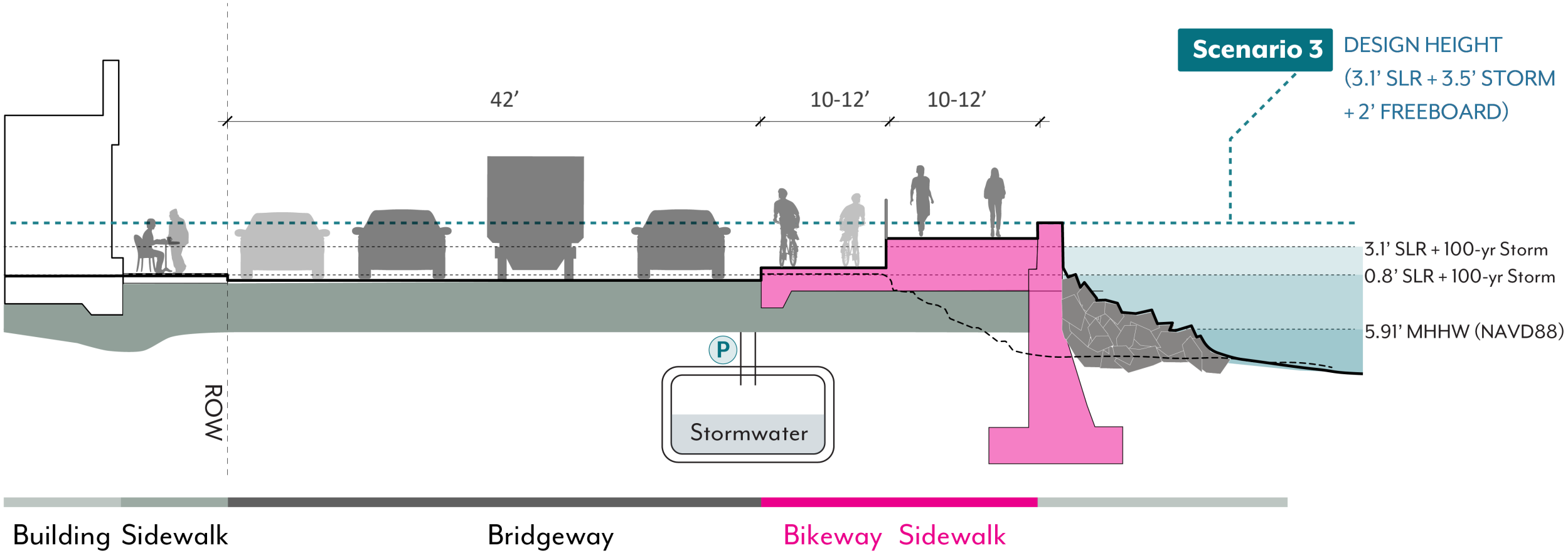
1A



Expanded & Elevated Promenade

(Class IV Bikeway at Roadway Level)

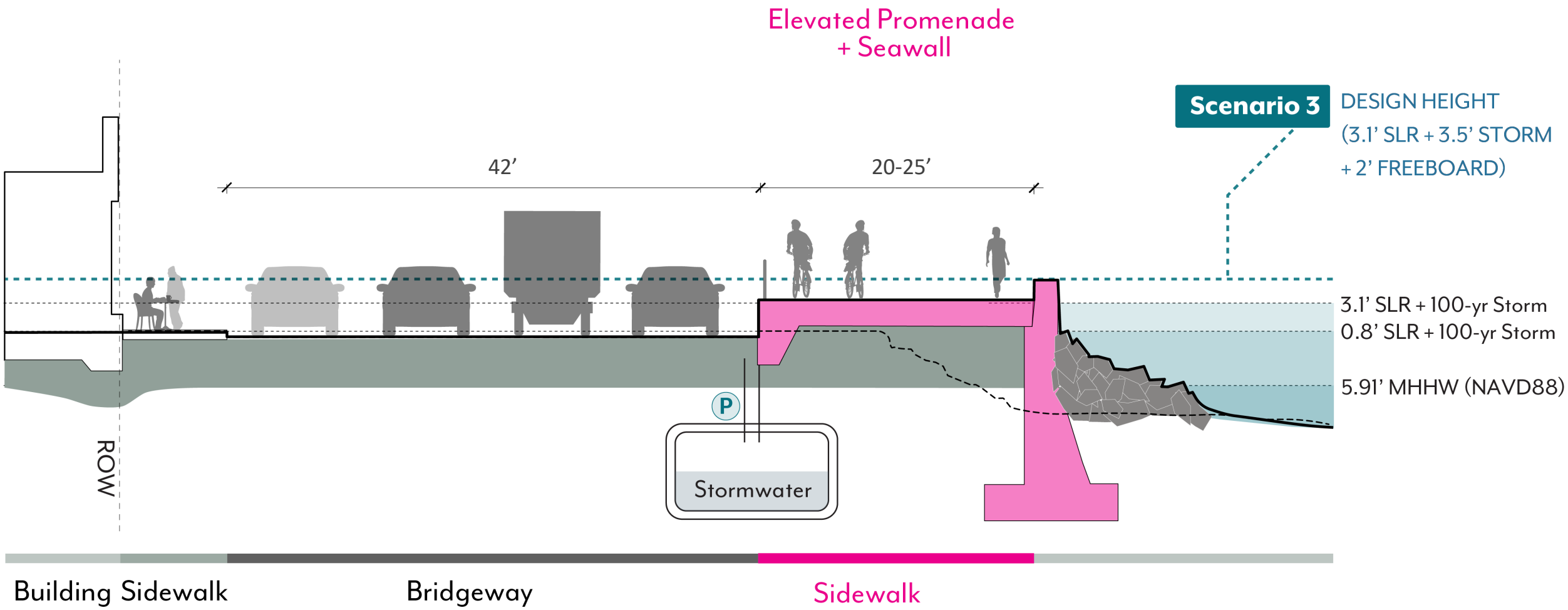
1B



Elevated Promenade

(Class I Bikeway at Promenade Level)

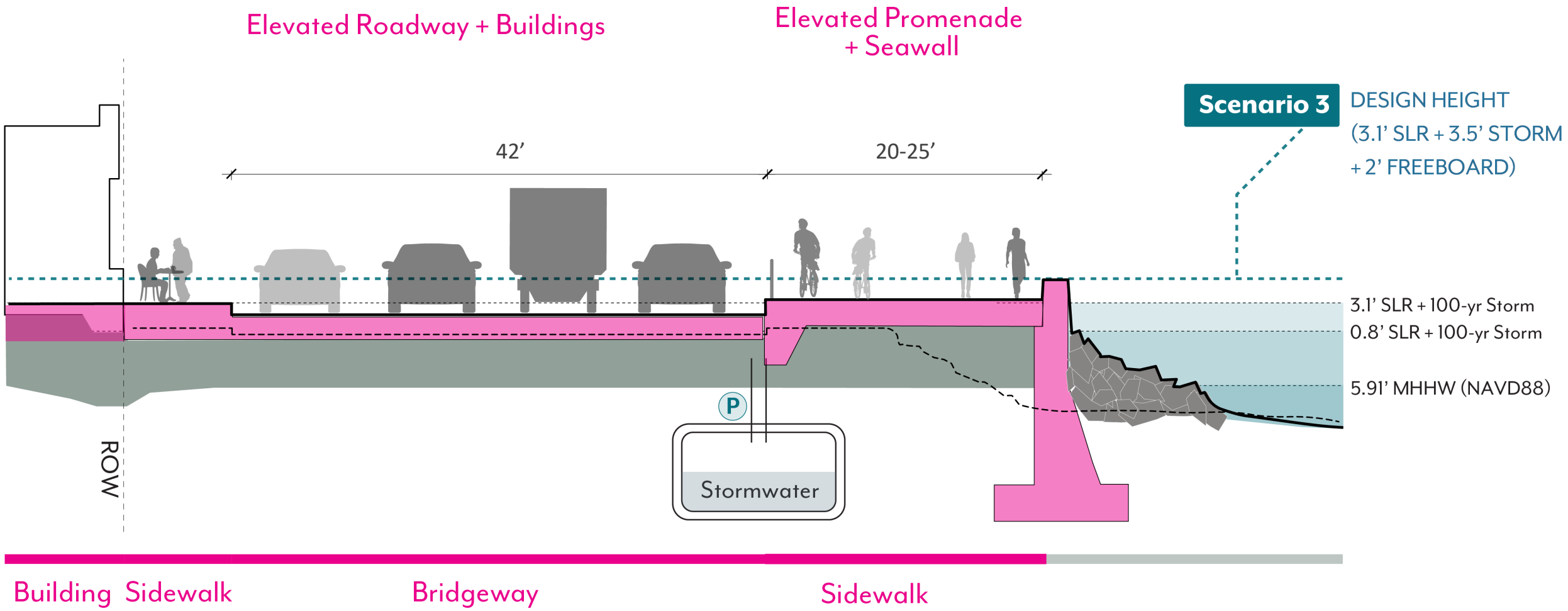
1C



Elevated Roadway & Promenade

(Class IV Bikeway at Promenade Level, Elevated Roadway & Buildings)

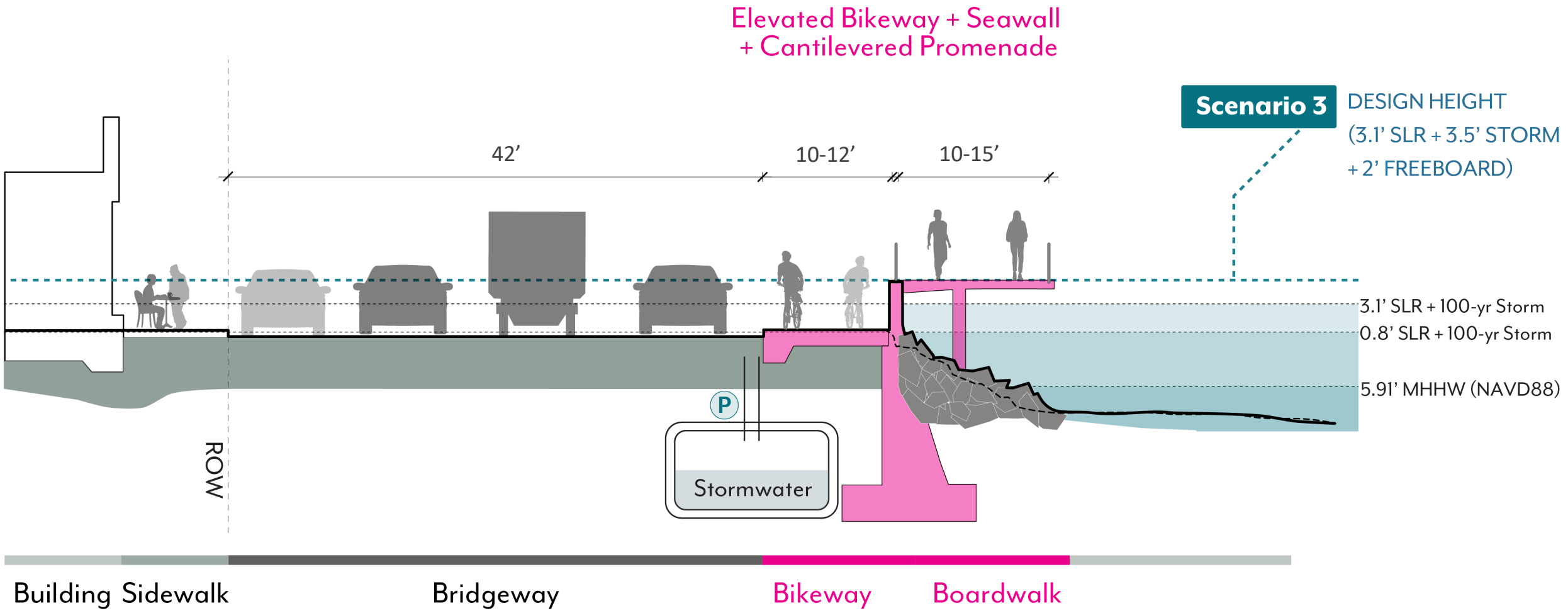
1D



Expanded & Cantilevered Promenade

(Class IV Bikeway at Roadway Level)

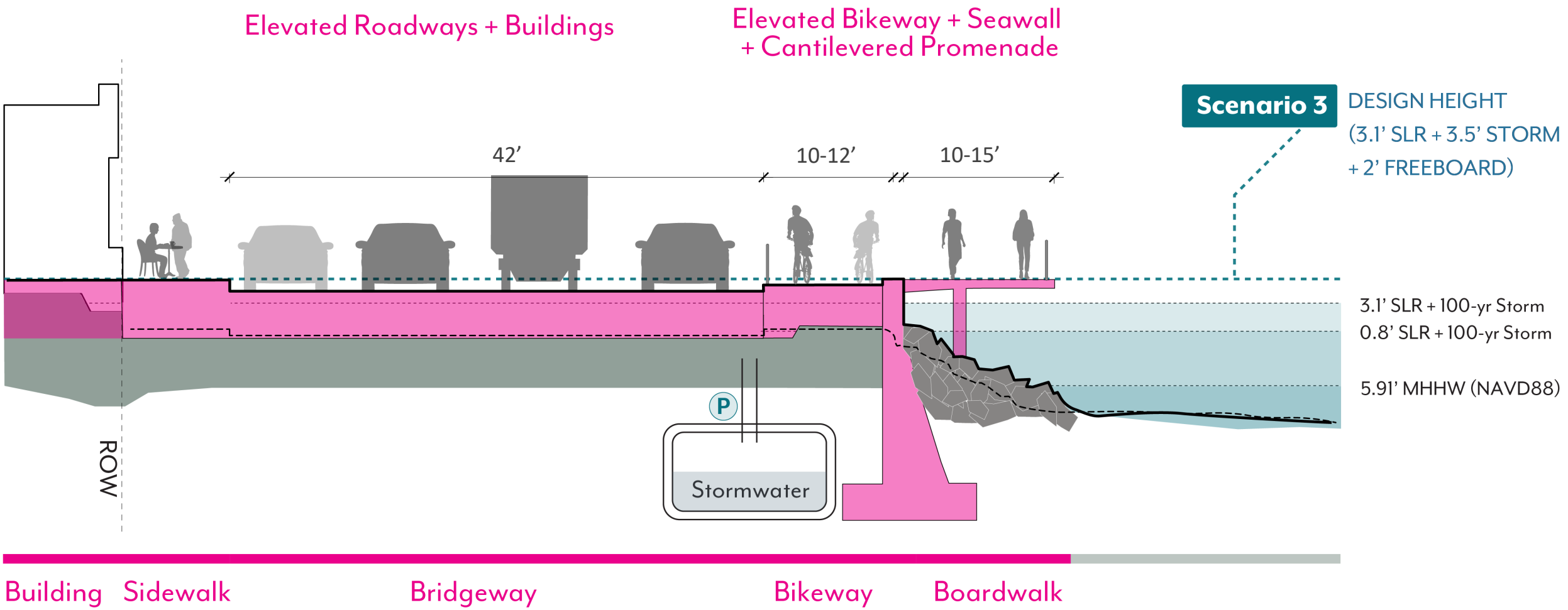
2A



Expanded & Cantilevered Promenade

(Class IV Bikeway, Elevated Roadway & Buildings)

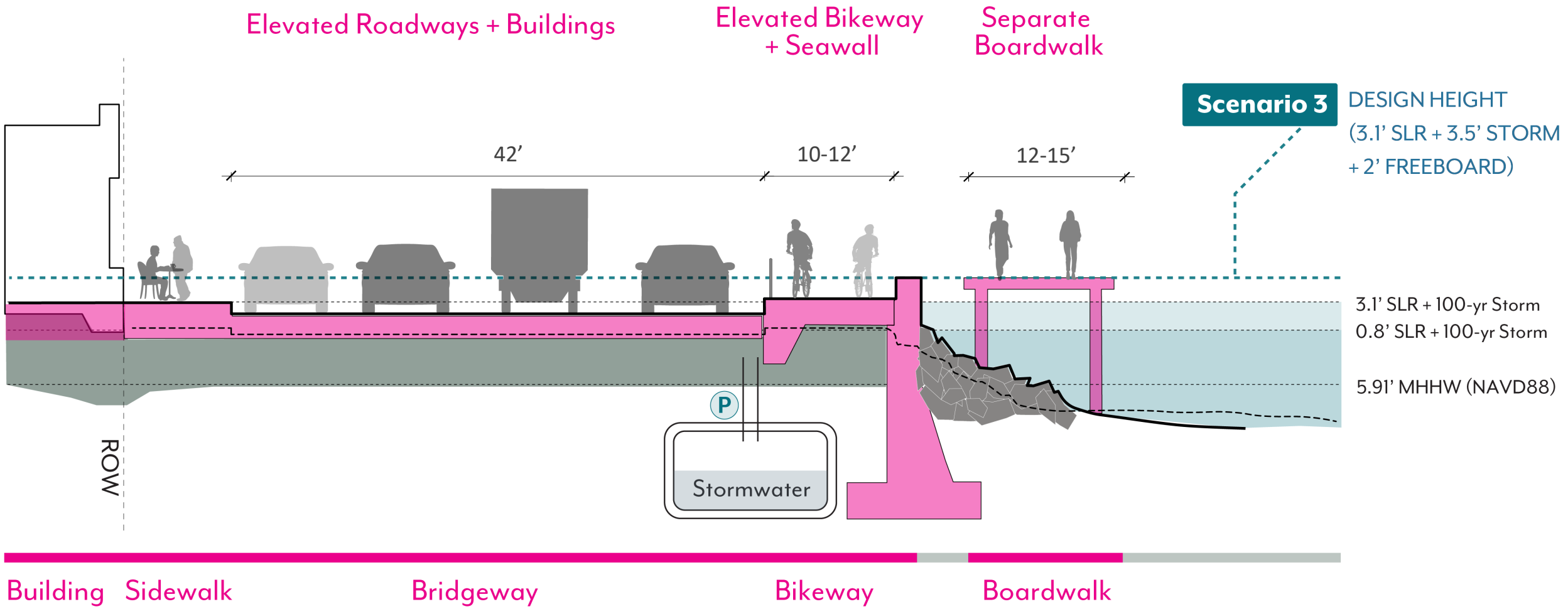
2B



Expanded & Separated Promenade

(Class IV Bikeway, Elevated Roadway & Buildings)

3



Greening the Gray









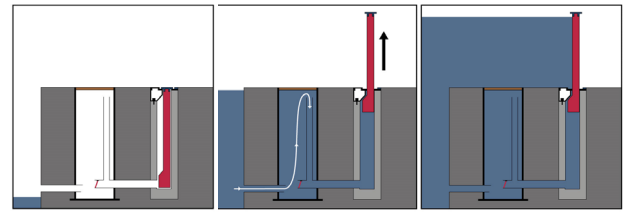
ECOncrete, living sea wall tiles, reef balls

Adjustable Flood Protection

Adjustable flood protection systems may be beneficial in combination with permanent treatments to address storm and freeboard levels while allowing views to remain unobscured.



Self-rising Flood Barriers





Wave Bumper Removeable Flood Barrier, Vallauris, France



Flood Doors



Demountable Flood Barrier

04

Implementation Strategy

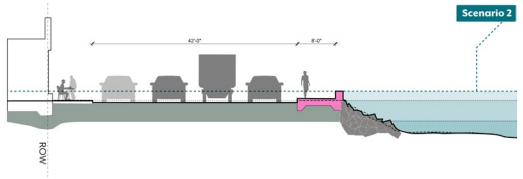
Implementation Strategy

- **Funding opportunities and how to align the project to be eligible**
- **Phasing approach (near term vs long term planning and implementation)**
- **Project to address multi-modal transportation (GHG reduction), SLR protection, ecological opportunities**
- **Explore feasibility of options other than sea walls i.e. breakwater, tide pools**

Rough Order of Magnitude (ROM) Cost Estimate

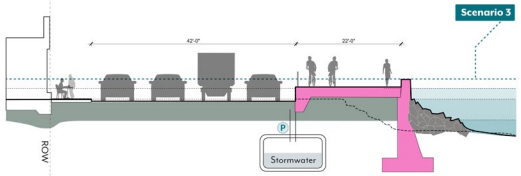
ARUP WRT

0 Mid-Century Approach: Sidewalk & Low Wall



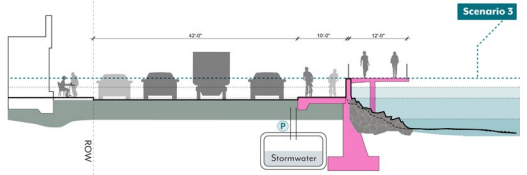
$ 2.4-2.8M

1C Elevated Promenade
(Class I Bikeway at Promenade Level)



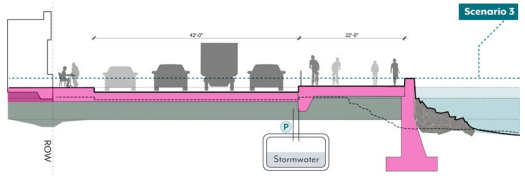
$ 55 - 160M

2A Expanded Roadway & Cantilevered Promenade
(Class IV Bikeway at Roadway Level)



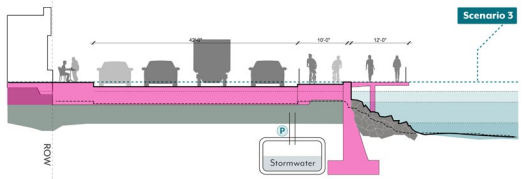
$135 - 385M

1D Elevated Roadway & Promenade
(Class IV Bikeway at Promenade Level, Elevated Roadway & Buildings)



$60 – 175M

2B Expanded & Cantilevered Promenade
(Class IV Bikeway, Elevated Roadway & Buildings)



$140 - 405M

Rough Order of Magnitude (ROM) Cost Estimate

ARUP WRT

About ROM Cost Estimate:

- **Standard**: Class 5 per AACEI standards
- **Accuracy**: range from -40% to +75%
- **Purpose**: Compare cost differences between various adaptation options

Included in this exercise:

- Indirect costs
- Contractor costs
- Contingency
- Soft costs

Excluded in this exercise:

- Escalation of construction costs
- Discount rate

05

Recommendation to Council

DRAFT Recommendation to Council

Request Sustainability Commission support to continue exploring designs for the "Long-Term Sea Level Rise Adaptation Strategies for Southern Waterfront and Bridgeway Promenade."

After discussion, the committee may recommend approaches that prioritize:

- **world-class waterfront**
- **nature-based adaptation**
- **long-term strategies**
- **alignment with future funding needs**
- ***others?***

Sustainability Commission Recommendations

- **The Commission recommends considering a mid-century option that provides FEMA accredited protection and discussion of how this option could be adapted for the end of century.**
    - Considering this option and phasing will be useful for understanding when the City needs to commit to a selected seawall location, and corresponding corridor width, in order to avoid stranded investments. The SLR consultant would compare phasing for a seawall raised in place with phasing that moves (demolishes and rebuilds) the seawall to another alignment.
- Of the end of century options considered, the Commission notes the environmental and shoreline connection benefits of options that include an over-water walkway. The Commission supports exploring more affordable overwater options.
- The Commission supports approaches that prioritize nature-based features, multi-modal transportation, emergency evacuation, connection to the water, sea-level rise resilience, and alignment with future funding needs.