Duxbury Bay – Sea Level Rise Evaluation and Coastal Design Guidance

- Evaluation of available sea level rise projections

- Analysis of available coastal processes data

- Wave transformation modeling to determine wave conditions along Duxbury Bay shoreline

- Determination of appropriate coastal structure elevations to achieve present and future flood mitigation design conditions
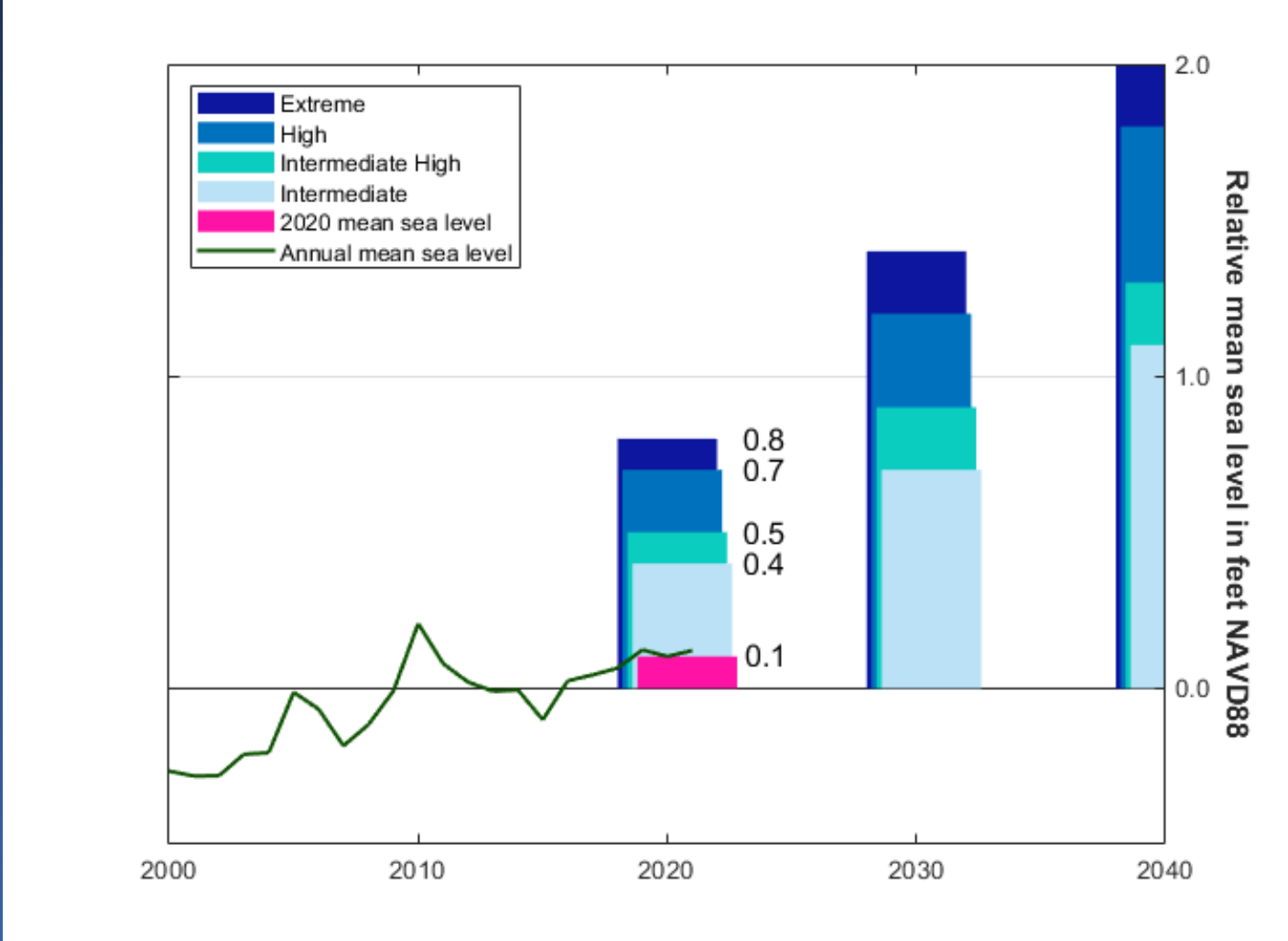
State SLR Information

Table 1. Relative mean sea level (feet, NAVD88) projections for Boston, MA as presented in DeConto and Kopp, 2017

Scenario	Probabilistic projections	2030	2050	2070	2100
Intermediate	Unlikely to exceed (83% probability) given a high emissions pathway (RCP 8.5)	0.7	1.4	2.3	4.0
Intermediate - High	Extremely unlikely to exceed (95% probability) given a high emission pathway (RCP 8.5)	0.8	1.7	2.9	5.0
High	Extremely unlikely to exceed (99.5% probability) given a high emission pathway (RCP 8.5)	1.2	2.4	4.2	7.6
Extreme (Maximum physically plausible)	Exceptionally unlikely to exceed (99.9% probability) given a high emissions pathway (RCP 8.5)	1.4	3.1	5.4	10.2

Relative annual mean sea level and future scenarios: Boston, MA
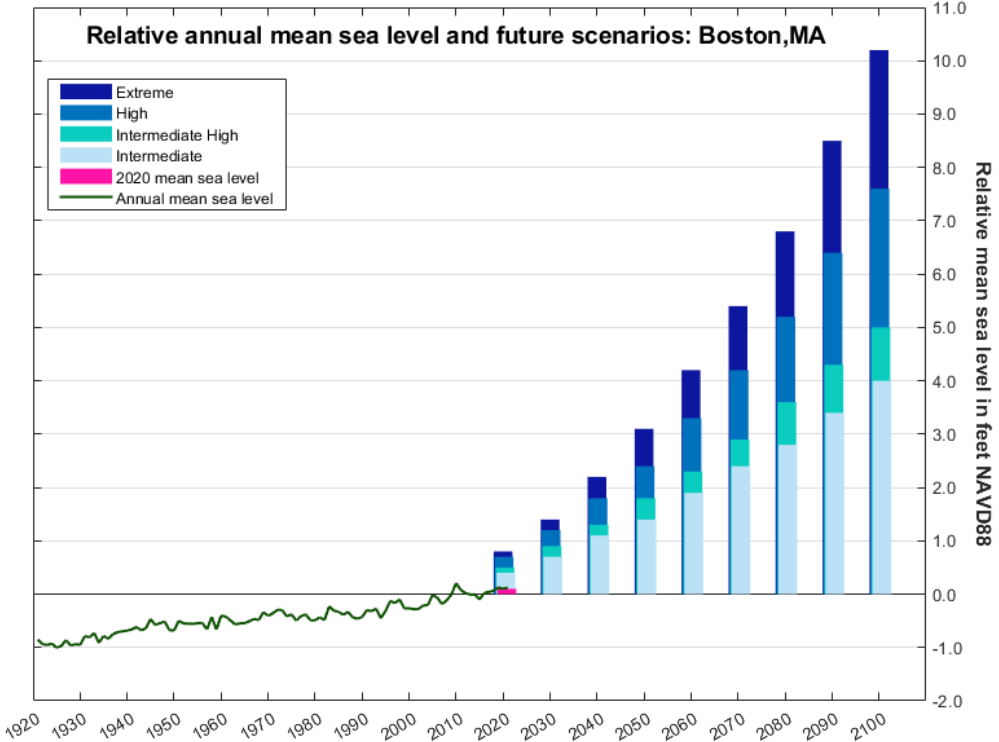
State SLR Information

Close-Up of Previous Slide
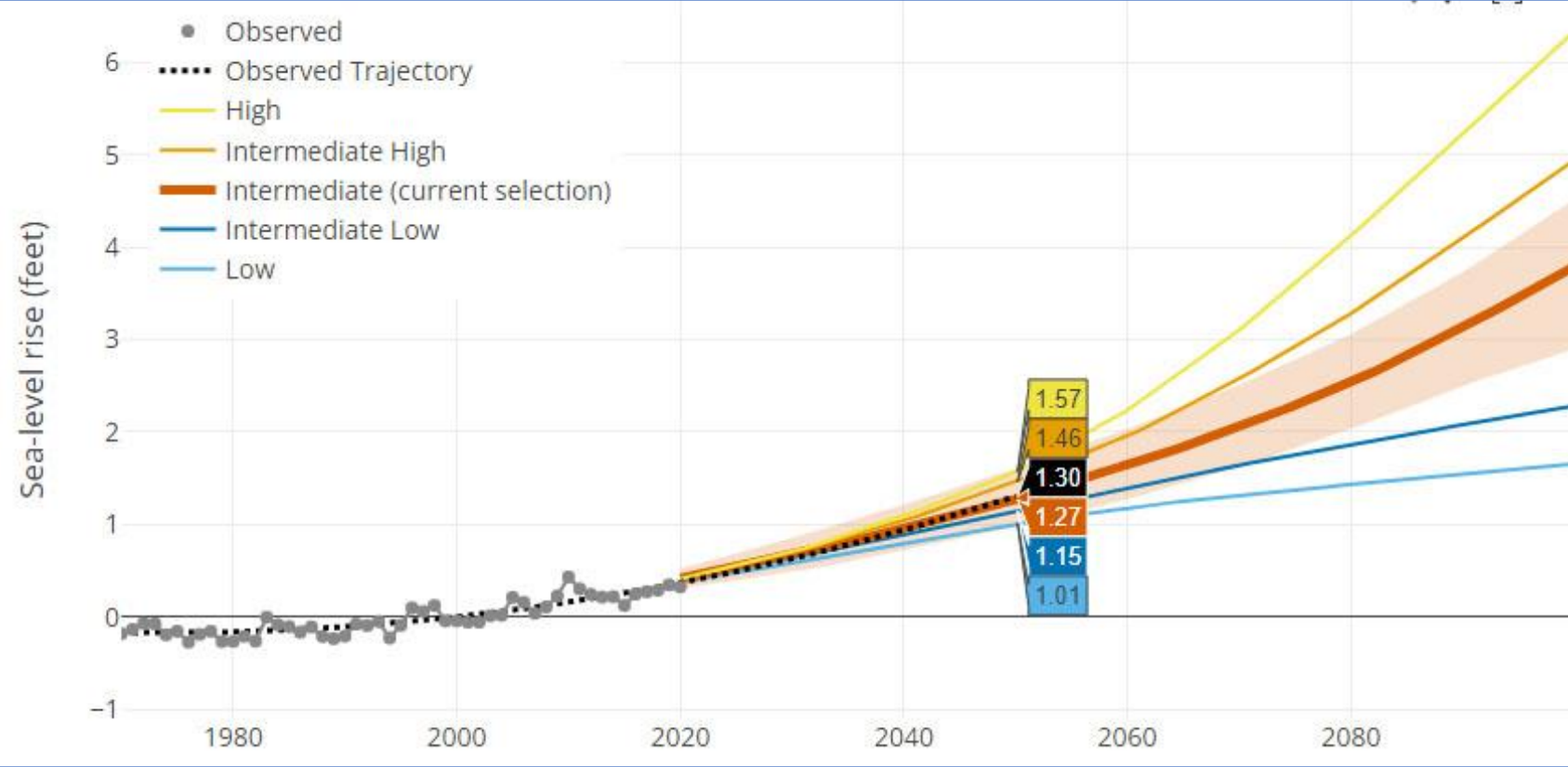

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Updated Federal SLR Projections (NOAA, 2022) Used as Guidance

Table 2. Relative mean sea level (feet, NAVD88) projections for Boston, MA as presented in Sweet, et al., 2022					
Scenario	Probabilistic projections	2030	2050	2070
NOAA - Intermediate	Conditions that are about as likely as not to occur or, in other words, a 50% chance of occurrence (RCP 8.5)	0.4	1.0	1.8

Coastal Analysis – Modeling of Nearshore Wave Conditions
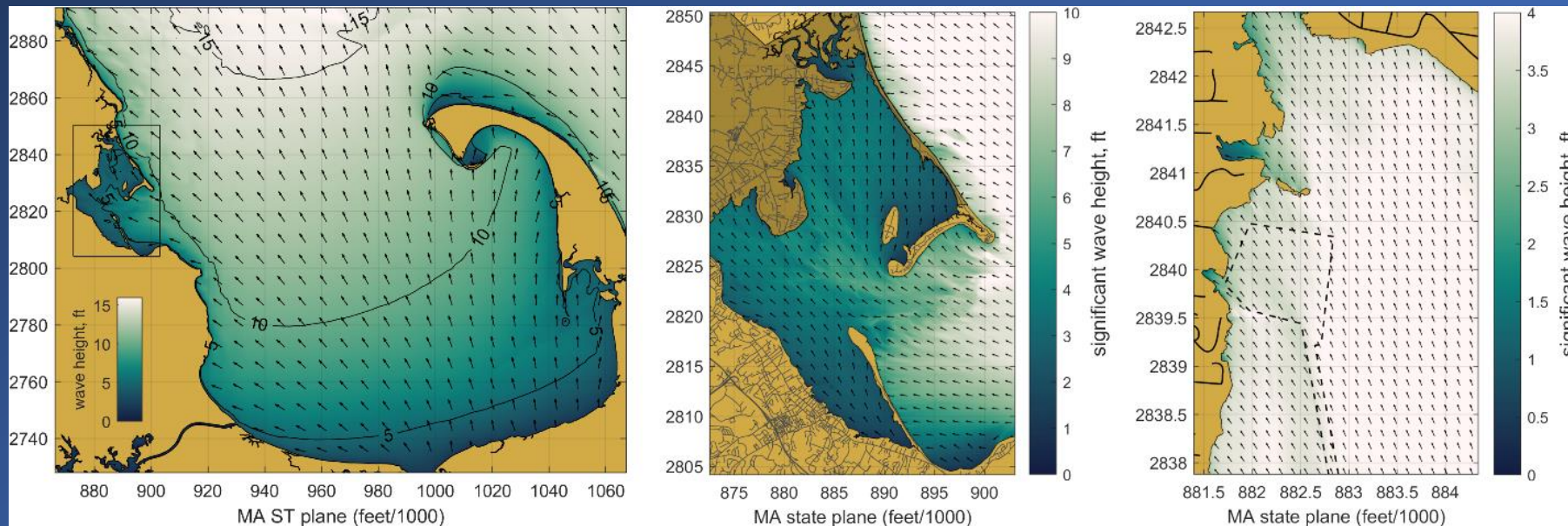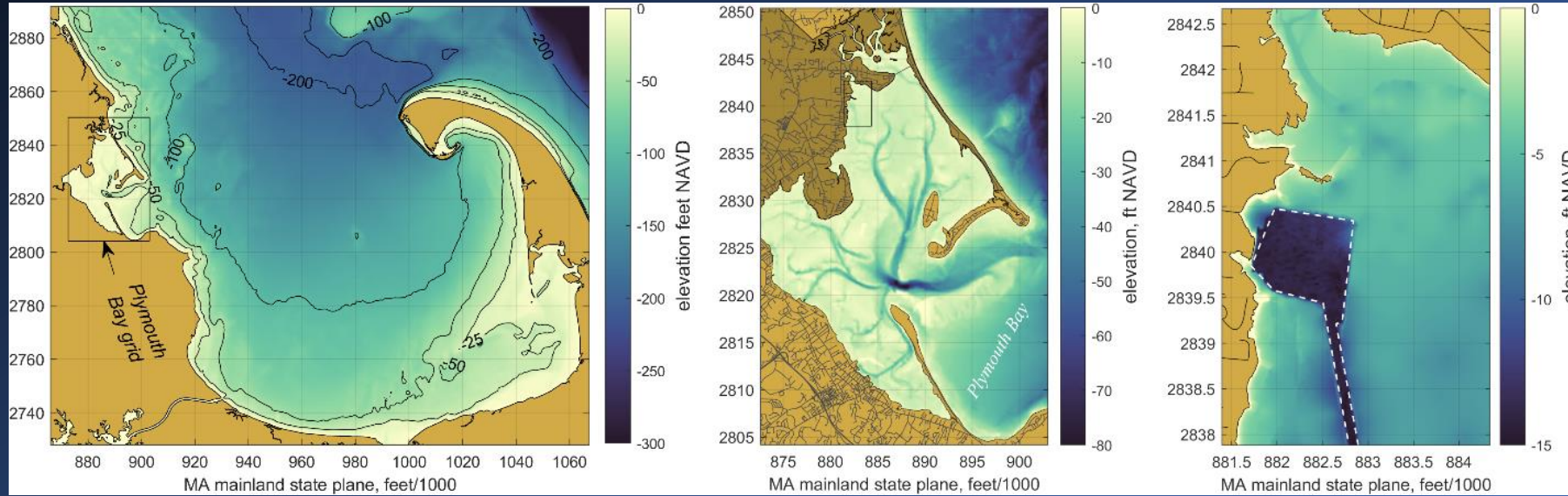
Coastal Analysis – Required Coastal Structure Height

- Goal: reduce wave overtopping to ensure paved surfaces are not damaged
- Much of the present site is 7–9 feet NAVD

Storm wind and wave characteristics (1% return frequency or 100-year storm) used in the runs of the Duxbury Harbor (DH) SWAN wave model.			
Year	Present	2050	2070
Mean sea level, feet NAVD	0.0	1.0	1.8
100-year water level, ft NAVD	9.5	10.5	11.3
DH anchorage wave height, ft	3.5	3.6	3.7
Wall crest elevation, feet NAVD	11.6	12.6	13.6

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