

Design of a storm surge protection for the Port of Galveston

TU Delft research presentation: Anne Grooten

4-3-2025





About me

Context and Background

- Coastal ports are vulnerable to flooding
- Port of Galveston is the 4th biggest cruise port in the US
- Study flood risk reduction for the Port of Galveston

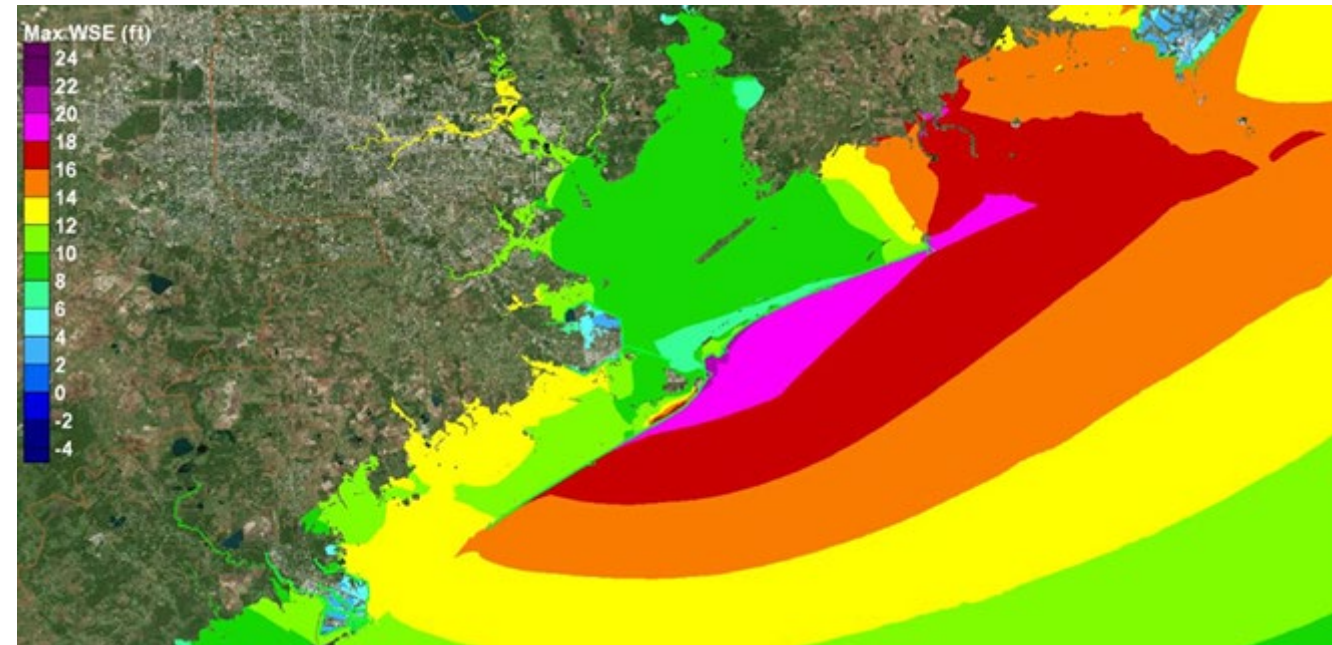
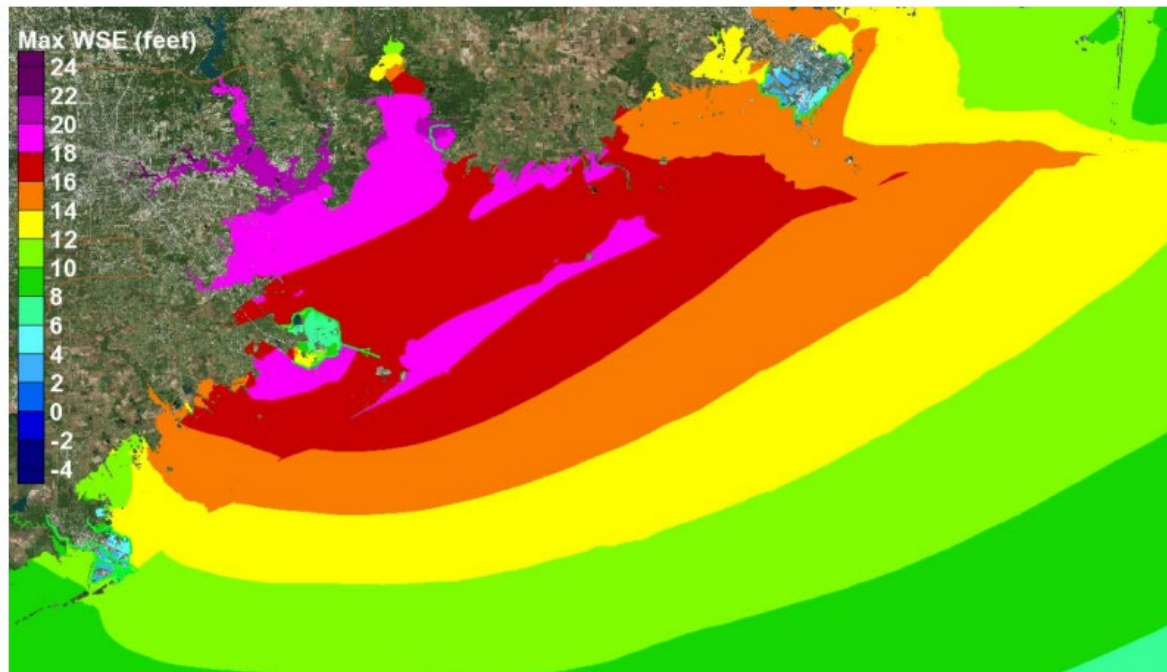


Figure: Bay Defenses (Coastal Texas Study, 2021)



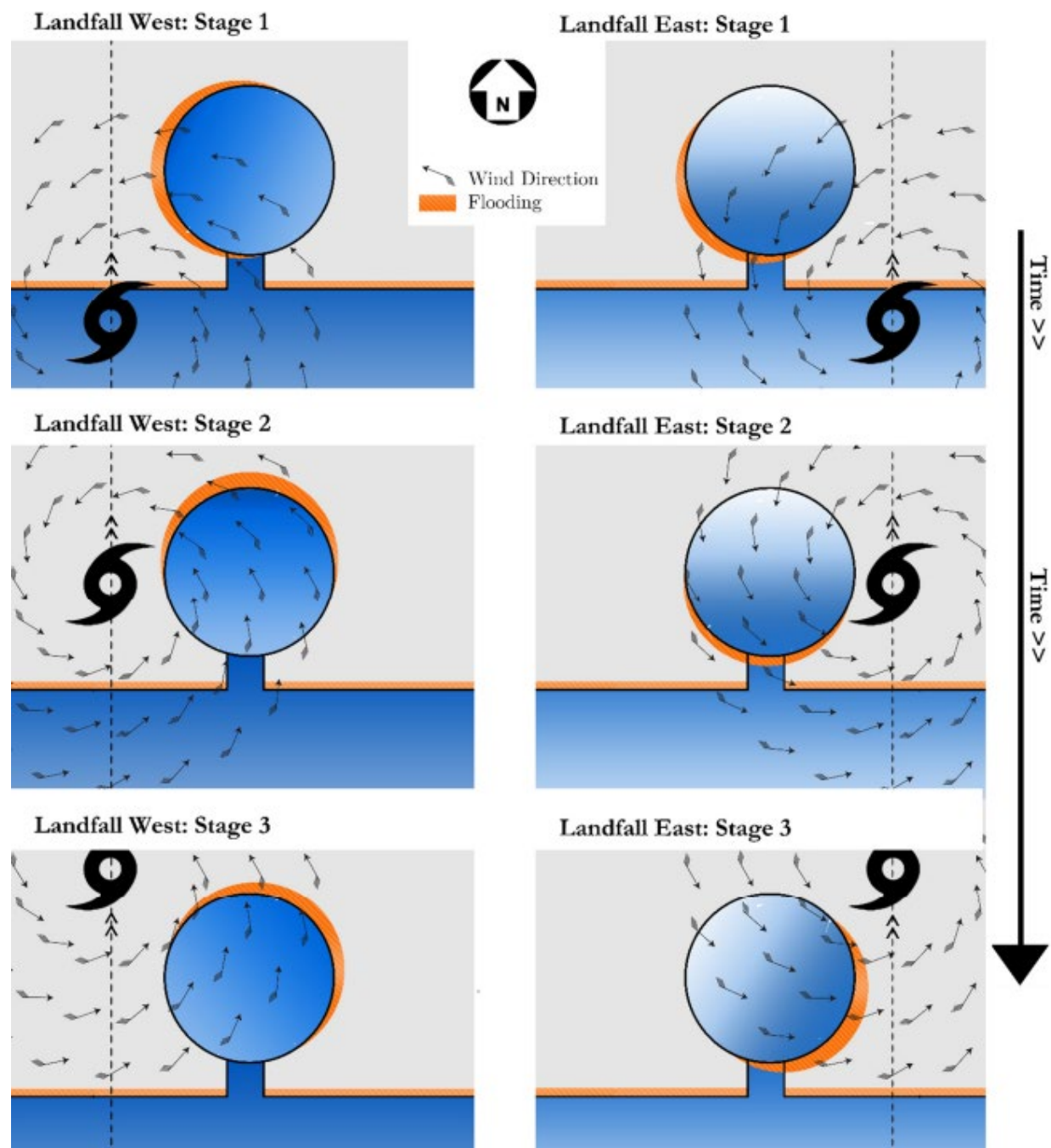
Figure: oil spills in Louisiana after Hurricane Ida (NOLA, 2021)

Water levels without and with a barrier at Bolivar Roads



*Figures: water levels at Galveston Bay for 100-year storm
with mean sea level at +3.31 ft NAVD88 (Ebersole et al, 2018)*

Back Surge due to hurricanes



Coastal Texas Protection and Restoration Feasibility Study

City of Galveston Ring Barrier

- Drainage Structure
- Combiwall
- Seawall Improvement
- Circulation Gate
- Navigation Gate
- New Channel
- Levee
- Transportation Access
- Access Gate
- Rail Closure
- Road Closure
- Floodwall
- *Approx.* Stick Up Height
 - 0 - 2 ft
 - 2 - 4 ft
 - 4 - 6 ft
 - 6 - 8 ft
 - 8 - 10 ft
 - 10 - 12 ft
 - 12 - 14 ft



- Drainage Mitigation
- Elevated Roadway
- Nonstructural Improvements

- Permanent Easement
- Temporary Easement
- Pump Station

- Breakwater
- Cofferdam
- Temporary Staging



0 0.5 1 Miles

Date: 29 April 2020

DATUM: NAD 1983
PROJECTION: STATE PLANE
ZONE: TX-SC 4204

Map: Defacto Urbanism, based on Texas Coastal Study

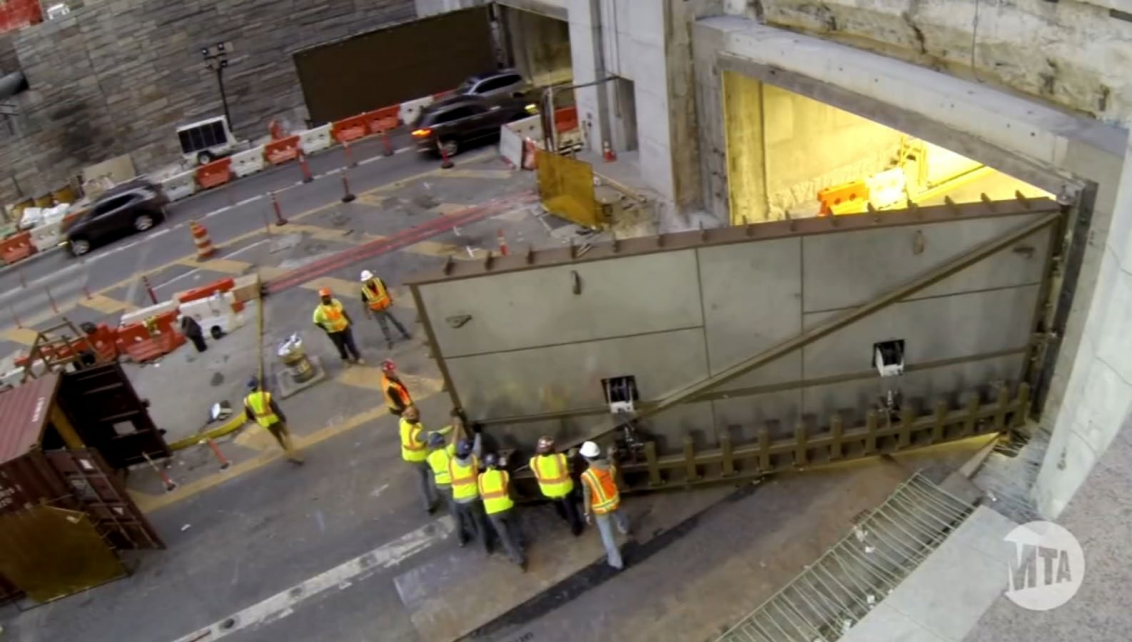
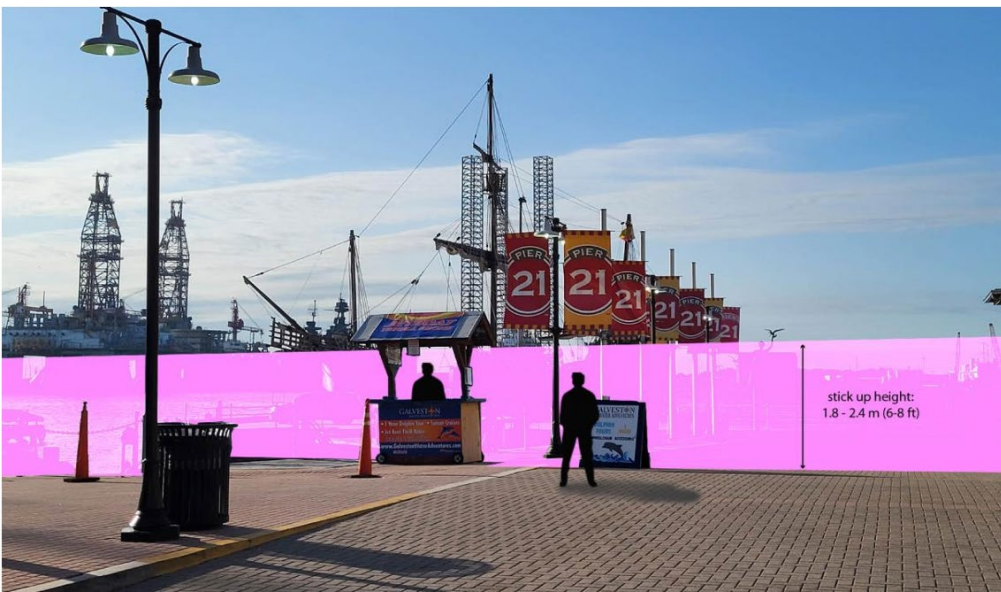


Figure: Hugh L. Carey tunnel flood door test, MTA

Figure: Spatial assessment collage of USACE ring barrier near historical city centre (Defacto Urbanism)



Gates and floodwall



Figure: Texas Coastal Study, 2021

Looking ahead at possible measures



"Harborside Drive Levee"

- Seawall
- Pump
- Raised roadway / dike

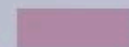
Alternatives for Harborside Drive Levee

- [Maasboulevard](#), Rotterdam





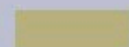
"Pelican Island Levee"



Seawall



Environmental/navigational



Levee/floodwall



Levee



Pump



Navigation Gates



Figure: IHNC Barge gate (USACE NOLA)

- Fit a cruise ship of 300+ m (1000+ ft) length and 50 m (165 ft) beam



Figure: Maeslantkering (Rijkswaterstaat)

Environmental Gates



Figure: Oosterscheldekering (Rijkswaterstaat)

Thank you

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