150 Years New Water Way Symposium
Compare and contrast: Houston/Rotterdam

Dr. Baukje 'Bee' Kothuis
Chief Representative
Netherlands Business Support Office Texas

Rotterdam - October 13, 2022
The Netherlands and Texas
The Netherlands and Texas
The Netherlands and Texas
Rotterdam and Houston

Image sources: Port of Rotterdam
Texas State Historical Association
The Netherlands and Texas

Nieuwe Waterweg | New Waterway

Houston Ship Channel
## Houston Ship Channel improvement projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Start Year – End Year</th>
<th>Width (Feet)</th>
<th>Width (Meter)</th>
<th>Depth (Feet)</th>
<th>Depth (Meter)</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1</td>
<td>1853 – 1857</td>
<td>185 ft</td>
<td>56.9 m</td>
<td>21 ft</td>
<td>6.4 m</td>
<td>First improvement Buffalo Bayou &amp; Galveston Bay - first time federal funding for state project</td>
</tr>
<tr>
<td>Project 2</td>
<td>1870 – 1874</td>
<td>4 ft</td>
<td>1.2 m</td>
<td>70 ft</td>
<td>21.3 m</td>
<td>Deepening and widening of the Ship Channel</td>
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<tr>
<td>Project 3</td>
<td>1877 – 1882</td>
<td>4.4 ft</td>
<td>1.3 m</td>
<td>9 ft</td>
<td>2.7 m</td>
<td>Deepening across Galveston Bay</td>
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<tr>
<td>Project 4</td>
<td>1897 – 1908</td>
<td>12 ft</td>
<td>3.6 m</td>
<td>5.5 ft</td>
<td>1.7 m</td>
<td>Deepening across Galveston Bay + Turning Basin in Buffalo Bayou</td>
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<tr>
<td>1900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>First oil discovered in Texas: Spindletop</td>
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<tr>
<td>Project 5</td>
<td>1912 – 1914</td>
<td>25 ft</td>
<td>7.6 m</td>
<td>150 ft</td>
<td>45.7 m</td>
<td>Port of Houston officially established as a deep-water port</td>
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<tr>
<td>1920</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>First oil discovered in the Permian Basin</td>
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<tr>
<td>Project 6</td>
<td>1925</td>
<td>30 ft</td>
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<tr>
<td>Project 7</td>
<td>1935</td>
<td>24 ft</td>
<td>7.3 m</td>
<td>400 ft</td>
<td>121.9 m</td>
<td>Deepening &amp; widening. Unprecedented growth of refining facilities</td>
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<td>Project 8</td>
<td>1944</td>
<td>36 ft</td>
<td>10.9 m</td>
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<td></td>
<td>Ship-channel war artery during World War II; birth of Port petrochemical industry</td>
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<td>Project 9</td>
<td>1958</td>
<td>40 ft</td>
<td>12.2 m</td>
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<td>Project 10</td>
<td>1960-1965</td>
<td>45 ft</td>
<td>13.7 m</td>
<td>500 ft</td>
<td>151.5 m</td>
<td>Manufacturing industries. Containers + first environmental projects with dredged material</td>
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<tr>
<td>Project 11</td>
<td>1970-1975</td>
<td>46.5 ft</td>
<td>14.2 m</td>
<td>700 ft</td>
<td>213.4 m</td>
<td>First-time public-private initiative</td>
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</table>
The Great Storm – 1900 Galveston Hurricane

- Deadliest natural disaster in U.S. history
- Destroyed more than 3,600 buildings
- Winds surpassed 135 miles per hour
- Estimated 8,000 to 12,000 fatalities
## Houston Ship Channel improvement projects

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<td>1890</td>
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<td>First oil discovered in Texas: Spindletop</td>
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<td>6</td>
<td>1892</td>
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<td>7.5 m</td>
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<td>16</td>
<td>1968-2005</td>
<td>45 ft</td>
<td>13.7 m</td>
<td>520 ft</td>
<td>161.5 m</td>
<td>Manufacturing industries / containers + first environmental projects with dredged material</td>
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<tr>
<td>17</td>
<td>2012-2025</td>
<td>46.5 ft</td>
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<td>700 ft</td>
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Nieuwe Waterweg | New Waterway

Images: Maritiem NL, Canon van Nederland, Nieuwsblad Transport, Bob van Bruggen
Flood protection strategy: Shortening of the coastline

Delta Works 1953 - 1997

Marsh restoration improves degraded marsh habitat or restores habitat that has become open water due to erosion, relative sea level rise and other coastal forces. Breakwaters interrupt erosion and provide barrier so sediment can be placed to create marsh within tidal ranges. Restoration also includes planting of native marsh vegetation to provide habitat and trap sediment, thus reducing erosion.

Oyster reef restoration includes placement of oyster cultch, which is material for new oysters to grow. Oyster reefs provide habitat for many other species and provide natural erosion reduction.

Beach restoration places sand on degraded gulf shorelines to restore dune and beach habitat.

Island restoration includes placement of sediment to increase the elevation of degraded islands. These restored islands include shoreline stabilization along the Gulf Intracoastal Waterway to withstand erosion and will provide bird nesting habitat. To increase the diversity of habitat and provide natural erosion control, the bay side of the islands will slope to a created marsh and oyster reef.

Hydrologic restoration is the reestablishment of a connection between water bodies to maintain salinity balances that sustain habitats.

Ecosystem Restoration Features:

- G-28: Bolivar Peninsula and West Bay Gulf Intracoastal Waterway (GIWW) Shoreline and Island Protection
- B-2: Follets Island Gulf Beach and Dune Restoration
- B-12: Bastrop Bay, Oyster Lake, West Bay, and GIWW Shoreline Protection
- M-8: East Matagorda Bay Shoreline Protection
- CA-5: Keller Bay Restoration
- CA-6: Powderhorn Shoreline Protection and Wetland Restoration
- SP-1: Redfish Bay Protection and Enhancement
- W-3: Port Mansfield Channel, Island Rookery, and Hydrologic Restoration of the Laguna Madre System

Coastal Texas Protection Plan 2021 - ????

Galveston Bay Storm Surge Barrier System:
Bolivar Roads Gate System, Bolivar and West Galveston Beach and Dune System, Galveston Ring Barrier System, Galveston Seawall Improvements, Clear Lake and Dickinson Bay Gate Systems, Nonstructural Measures
MULTIPLE LINES OF DEFENSE ON THE TEXAS COAST

Source: USACE Galveston Coastal Texas Study
MULTIPLE LINES OF DEFENSE ON THE TEXAS COAST
MULTIPLE LINES OF DEFENSE ON THE TEXAS COAST

Dickinson Bay Gate System and Pump Station
Nonstructural Improvements
Clear Lake Gate System and Pump Station

Galveston Ring Barrier System

Galveston Seawall Improvements

Bolivar Roads Gate System

Bolivar and West Galveston Beach and Dune System

Ecosystem Restoration

Illustration is representational and not to scale

Source: USACE Galveston Coastal Texas Study
BOLIVAR ROADS GATE SYSTEM

GATE SYSTEM OVERVIEW

VERTICAL LIFT GATES

DEEP-DRAFT NAVIGATION GATES

SHALLOW WATER ENVIRONMENTAL GATES

Bolivar Peninsula

Galveston Bay

Gulf of Mexico

Galveston Island

© Stefanutter.com
MarineTraffic.com

Figure ES-7: Bolivar Roads Gate System
A VISION
LET’S DO SOMETHING AMAZING, AGAIN

On November 10, 1914, the Houston Ship Channel opened to great fanfare. Rightly so, as the occasion was to be a pivotal one for the future of the region, shifting the Gulf’s commercial power to Houston and creating a port that would transform a small town into a global energy leader. This catalytic moment was about a decade in the making and resulted from strong civic leadership. Funding was assembled from a mix of federal and local dollars via private sector leadership from the likes of Jesse Jones to clear the path to implementation.

Today, in the face of a highly probable direct hit by a deadly hurricane to this critical economic infrastructure and the bayfront communities that surround it, the region once again has the opportunity and cause to initiate and demonstrate what transformational public and private investment can do. Without action, the Houston and Galveston Bay region remains on the precipice of eminent devastation. With the support of public and private local leadership, we can protect and bolster the vitality, economy, and health of the vibrant and important community by implementing a regional surge protection system that also provides recreational opportunities for all to enjoy. It’s time to act, again.
Corps/Port of Houston Project 11
Widening to 700’

Source: Port of Houston
A 100 YEAR PLAN
A VISION FOR THE FUTURE

In order to serve the region in the most effective way, the new surge protection system will begin with achievable goals, while at the same time be proactive and forward looking to care for the needs of future generations. Understanding that the ship channel will continue to be dredged, the plan anticipates and provides locations for the deposition of dredge material towards a productive use. For the next 100 years, the port will know where the dredge product goes, and the community will see it used to create and sustain bay habitat and recreational facilities. Silt build-up in the channel is a natural process that is exacerbated by runoff from the region’s high rainfall flood events. Galveston Bay Park envisions a symbiotic relationship between the economic drivers of the region and its natural environment.

As part of a comprehensive coastal plan, the mid-bay barrier is an essential early action line of defense in a generational plan for Galveston Bay resiliency.
PORT HOUSTON
MOVING LANDSCAPE

Summer 2017

Source: SWA Group, Houston Studio
'Ship Channel' mega projects: multi-value, multi-stakeholders, multi-disciplinary expertise
Houston Ship Channel Expansion

Project 11

Dredging Kick-Off

June 1st, 2022

Images source:
Port of Houston Authority, USACE
Verondieping Rijnmonding

principe:

depth: 9m, 12m, 16m
water level: 20m
vessel traffic
historical areas
riverbed

Source: Bureau Stroming
Resilient future?
Thank you!

bee.kothuis@nbso-texas.com