Welcome to Mayor Pro Tem Dave Martin’s Lake Houston Dam Spillway Improvement Project Public Meeting

July 8, 2021
USACE – FEMA Mission Assignment

Lake Houston Dredging Operations

<table>
<thead>
<tr>
<th>REACH</th>
<th>CONTRACTOR</th>
<th>QUANTITY (APPROX. CU. YDS.)</th>
<th>PLACEMENT AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCH. 1</td>
<td>GREAT LAKES</td>
<td>1,031,000</td>
<td>P.A. 1</td>
</tr>
<tr>
<td>SCH. 1</td>
<td>CALLEN (sub.)</td>
<td>818,000</td>
<td>P.A. 2</td>
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<tr>
<td>MOD NH010</td>
<td>GREAT LAKES</td>
<td>500,000</td>
<td>P.A. 2</td>
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</tbody>
</table>

PLACEMENT AREA NO. 2

SAN JACINTO RIVER

HARVEY DEBRIS REMOVAL

GREAT LAKES DREDGE GEN., PERSHING SCH. 1 818,000 cy

GREAT LAKES DREDGE LP SCH. 1 1,031,000 cy

GREAT LAKES DREDGE LP MOD NH010 500,000 cy

NOTE: AERIAL IMAGERY THRU SHEET FROM GOOGLE EARTH 2015
Lake Houston Dredging Operations

East Fork Dredging Phase

Change in Lakebed Elevation between 2011 and 2018 at the East Fork of the San Jacinto River
Lake Houston Dredging Operations

West Fork – FEMA Public Assistance
Lake Houston
Long Range Plan
## Lake Houston Dredging Operations

### Dredging Summary

<table>
<thead>
<tr>
<th>DREDGING PROJECT</th>
<th>AGENCY</th>
<th>FUNDING SOURCE</th>
<th>MATERIAL DREDGED (CY)</th>
<th>COST (M)</th>
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</thead>
<tbody>
<tr>
<td>West Fork</td>
<td>USACE</td>
<td>FEMA-PA</td>
<td>1,849,000</td>
<td>$73.7</td>
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<tr>
<td>West Fork</td>
<td>USACE</td>
<td>FEMA-PA</td>
<td>500,000</td>
<td>$17.1</td>
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<tr>
<td>Mouth Bar</td>
<td>City of Houston</td>
<td>Governor Grant TWDB/HC Grant</td>
<td>442,976</td>
<td>$16.6</td>
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<tr>
<td>Mouth Bar North</td>
<td>City of Houston</td>
<td>TWDB/HC Grant</td>
<td>175,895</td>
<td>$6.6</td>
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<tr>
<td>East Fork*</td>
<td>City of Houston</td>
<td>TWDB/HC Grant</td>
<td>36,137</td>
<td>$18.0</td>
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<tr>
<td>West Fork**</td>
<td>City of Houston</td>
<td>FEMA-PA</td>
<td>1,000,000 (EST)</td>
<td>$40 (EST)</td>
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<tr>
<td>Lake Houston***</td>
<td>City of Houston</td>
<td>TWDB/CoH Grant</td>
<td>- -</td>
<td>$50 (EST)</td>
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<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td></td>
<td>4,004,008</td>
<td>$222</td>
</tr>
</tbody>
</table>

* Ongoing Estimate Approx. $18M total dredging costs
** Construction Documents for bidding in progress
*** Scope of work pending development of long range plan
Lake Houston Dam Spillway Improvement Project

• Presented by: Chris Mueller, PhD, PE of Black & Veatch
• Public Meeting, July 8th, 2021
AGENDA

Project Background
Planning Study Findings
Preliminary Engineering
Implementation Schedule
Questions & Answers
Project Stakeholders

- City of Houston, Coastal Water Authority, and Their Customers
- Harris County Flood Control District and Harris County Residents
- Upstream Residents
- Downstream Residents
- Federal Emergency Management Agency
- Texas Division of Emergency Management
Project Background/Purpose

- Increase Outflow Capacity of the Reservoir
- Provide a Flood Risk Reduction to Adjacent Communities and w/o Impact to Reservoir Operations OR Downstream Property
- Preserve (or improve) Dam Safety
- “Fit” the Project within the Grant Fund Budget
Lake Houston: Water Supply Reservoir First

Lake Houston’s Importance as a Drinking Water Reservoir

• Examined Water Quality Impacts at Lake Houston Related to Operational Flow Releases

• Ongoing Water Quality Coordination with City of Houston
FEMA Benefit Cost Ratio >1 Required

**Benefits**
- Reduction in water surface elevation
- Reduction in building flooding
- Reduced streets inundated
- Lessened societal impacts
- Lowered impacts to business revenues

**Costs**
- Construction Cost
- Annual Operation and Maintenance Cost

- Calculate benefits over lifetime of proposed project
  - Benefit Cost Ratio = \( \frac{\text{Net Present Value Benefits}}{\text{Project Cost}} \)
  - Project Cost = (Capital Cost) + (Net Present Value Operations and Maintenance Costs)
Phase 1 Planning Services

• FEMA Hazard Mitigation Grant Award - $4,375,199
• Hydrologic & Hydraulic Modeling
• Geotechnical Investigations
• Environmental Field Studies (Wetlands, Threatened & Endangered Species)
• Preparation of Permit Applications (COE 404 Permit)
• Development of Engineering Alternatives
• Evaluation of Engineering Alternatives (Cost/Benefit, Non-Cost Factors)
Hydrologic & Hydraulic Analyses

- Develop a computer model of the San Jacinto River Watershed including Buffalo Bayou
- Calibrate model to historical storm events
- Calculate lake flows and levels in response to rain events
- Evaluate benefits and impacts of recommended projects
Hydrologic & Hydraulic Analyses

LAKE HOUSTON receives runoff from Walker, San Jacinto, Grimes, Montgomery, Waller, Liberty and Harris Counties

BUFFALO BAYOU receives runoff from Waller, Fort Bend and Harris Counties

Lake Houston Dam
Hydrologic & Hydraulic Analyses

Inundation Analysis 100-Year Storm Event

- Peak 100-year inflow is 286,000 ft³/s
- This inflow would fill the Astrodome in three minutes
- This inflow causes the lake water elevation to rise 10 feet above normal pool
  - 42.4 ft to 52.4 ft

*100-year storm event: a rainfall event that has a 1 percent chance of happening in any year (USGS) most recently Tropical Storm Imelda
Additional spillway capacity of 45,000 ft³/s (25%)

Maximum benefit will be closest to the Lake Houston Dam of 11 inches

*100-year storm event rainfall is similar to Tropical Storm Imelda
Planning Study Phase - Engineering Concepts

Alternative 1A

Addtl. Six Tainter Gates (Bright Rendering)

Portion of Ambursen Spillway Modification Obermeyer Crest Gates

Alternative 4A

Expanded Stilling Basin

Alternative Proposed Design Locations
Planning Study Phase - Engineering Concepts

- **Cost Factors**
  - Construction Costs (AAEC, Class 5)
  - O&M Costs
  - Cost Uncertainty (Risks)
  - Benefit Cost Ratio (FEMA Toolkit)

- **Non-Cost Factors**
  - Dam Safety
  - Environmental Impacts & Permitting
  - Water Supply/Water Quality
  - Reservoir Operations & Maintenance
  - Flood Risk Reduction Benefits
  - Downstream Impacts
  - Constructability
  - Construction Schedule
  - Stakeholder Consensus
Recommended Engineering Alternative
Computer Simulation of Proposed Improvements

Note: Proposed modifications highlighted in yellow
Cedar Falls, WI - Obermeyer Gates

Crest Gates Closed
Ozark Beach, MO - Obermeyer Gates

Crest Gates Closed

Crest Gates Open
Preliminary and Detailed Design

• Evaluate Construction Impacts to Stability of Existing Concrete Dam
• Evaluate Downstream Hydraulics
• Determine Gate Operations Protocols that Maximize U/S Benefits and Limit D/S Impacts
• Mitigation of D/S Impacts
Project Schedule

<table>
<thead>
<tr>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
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<tbody>
<tr>
<td>Preliminary Engineering</td>
<td>Detailed Design Engineering</td>
<td>Environmental Clearance &amp; Permitting</td>
<td>Bid Phase and Award</td>
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<tr>
<td>Construction</td>
<td>Construction</td>
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<td>Construction</td>
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- Preliminary Engineering:
  - March to June 2021

- Detailed Design Engineering:
  - July to September 2022

- Environmental Clearance & Permitting:
  - October 2022 to December 2023

- Bid Phase and Award:
  - January 2024

- Construction:
  - Full duration 2021 to 2024
Thank You

Contact Us
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