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

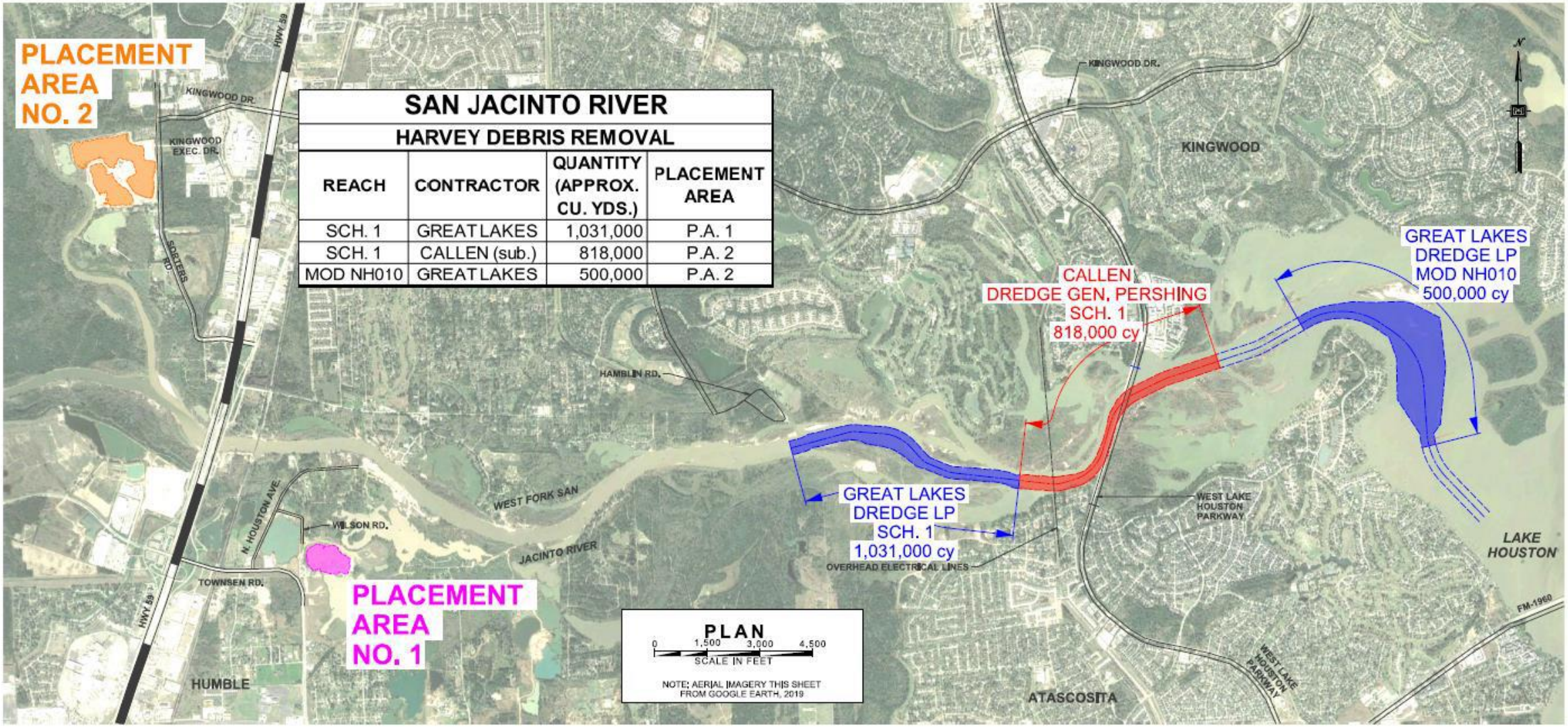
July 8, 2021

Lake Houston Dredging Operation

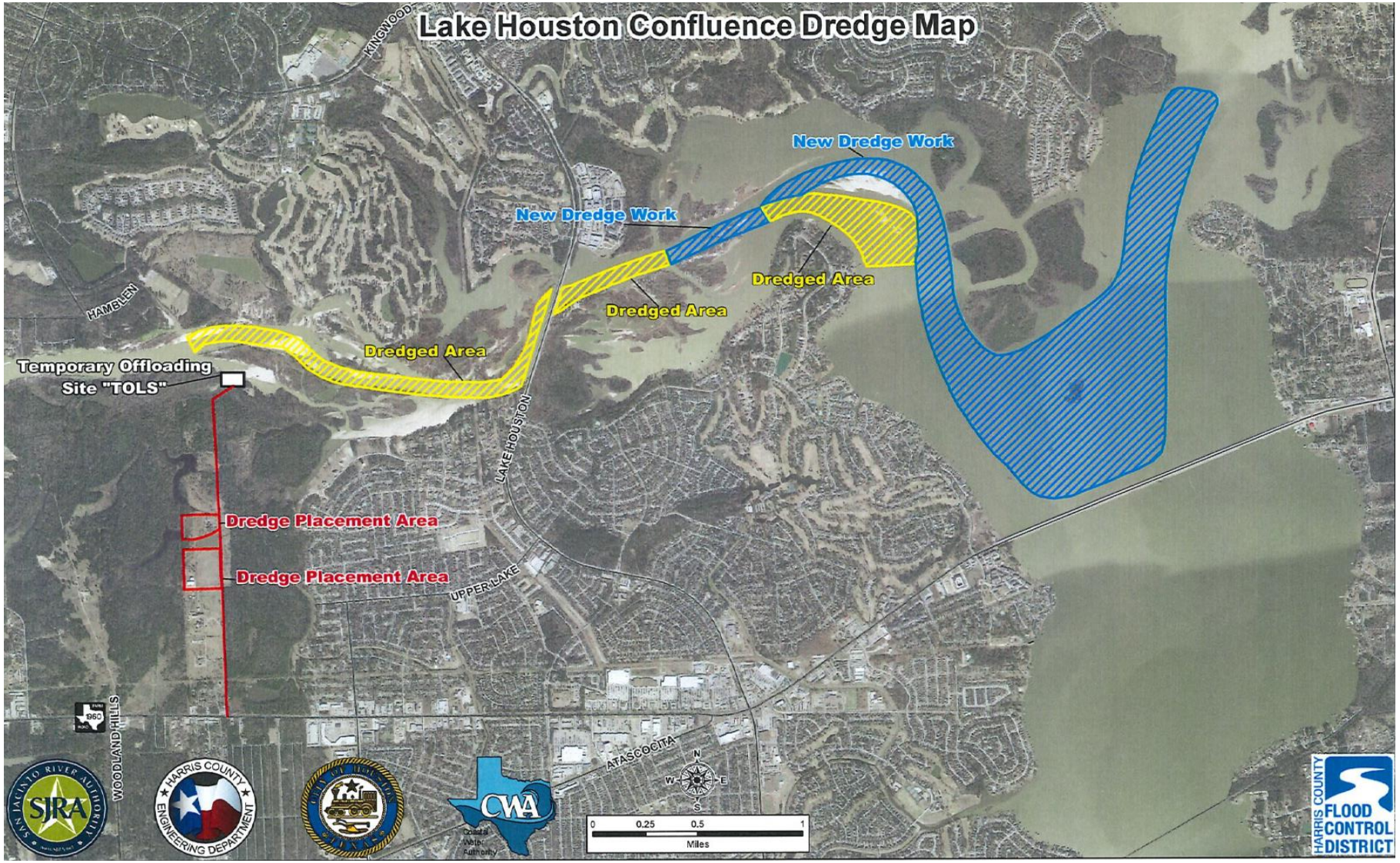
Stephen C. Costello, P.E., Chief Recovery Officer

July 8, 2021

USACE – FEMA Mission Assignment

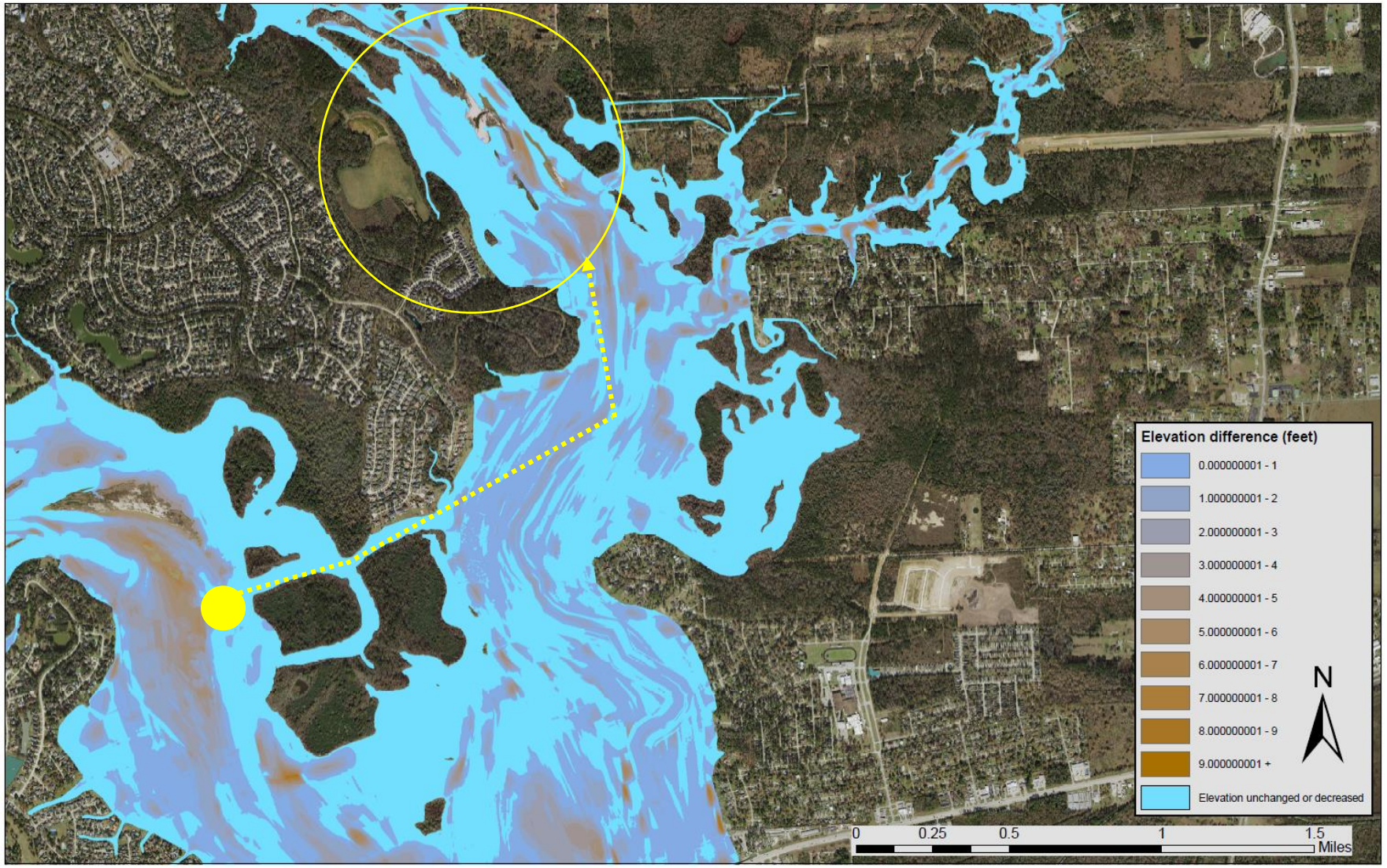


Office of the Governor's Grant | TWDB – Harris County Grant

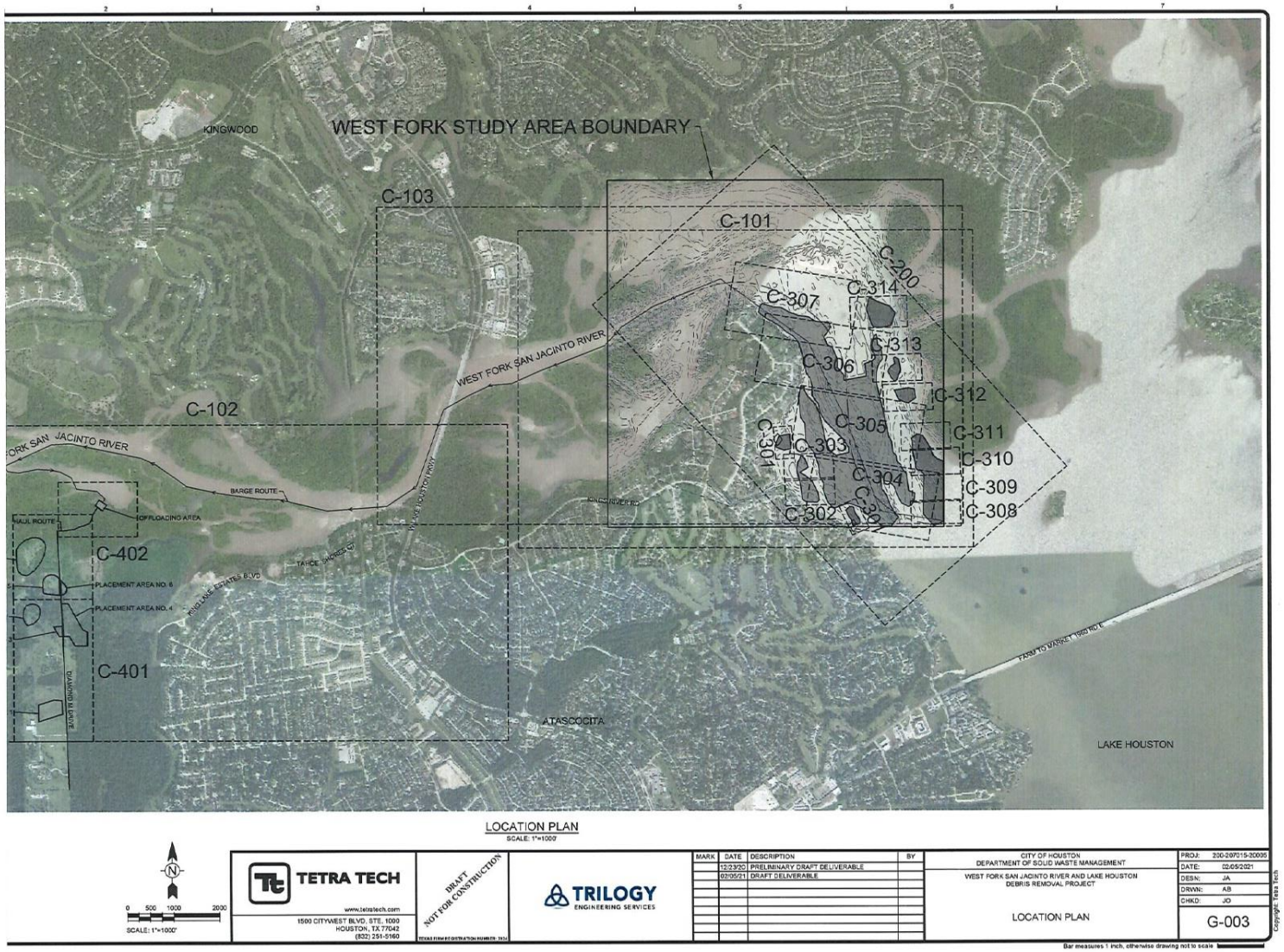


East Fork Dredging Phase

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



West Fork – FEMA Public Assistance



Lake Houston Dredging Operations

Lake Houston Long Range Plan

Dredging Summary

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

* 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

FEMA

- 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

Influent Pump Station on Lake Houston

Northeast Water Purification Plant Expansion

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)

BLACK & VEATCH

HALFF

Binkley & Barfield consulting engineers

MBROH ENGINEERING INC

HVJ ASSOCIATES

HOLLAWAY ENVIRONMENTAL + COMMUNICATIONS

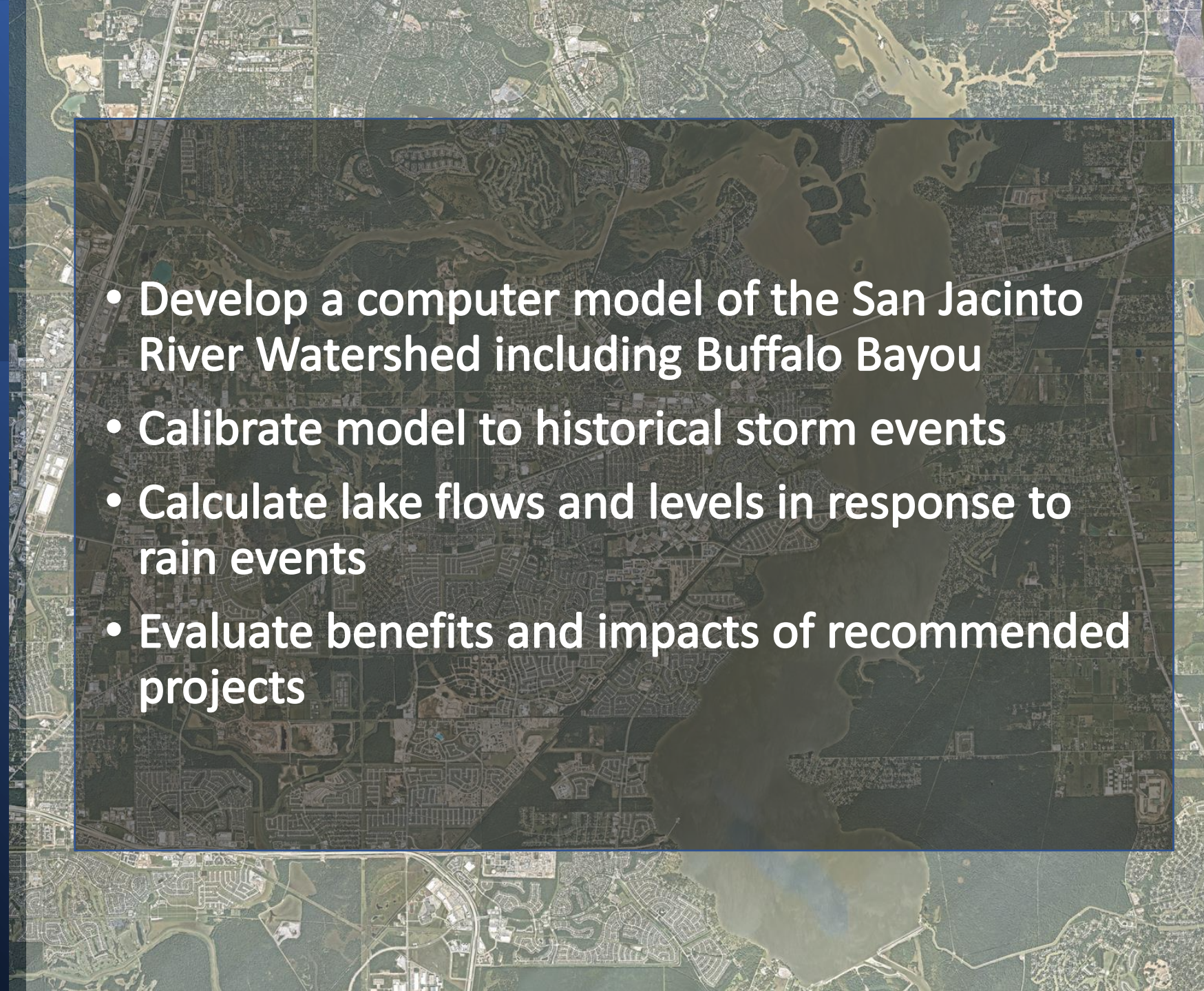
GRAY & PAPE, INC. ARCHAEOLOGY · HISTORY · HISTORIC PRESERVATION

Knudson, LP

5Engineering

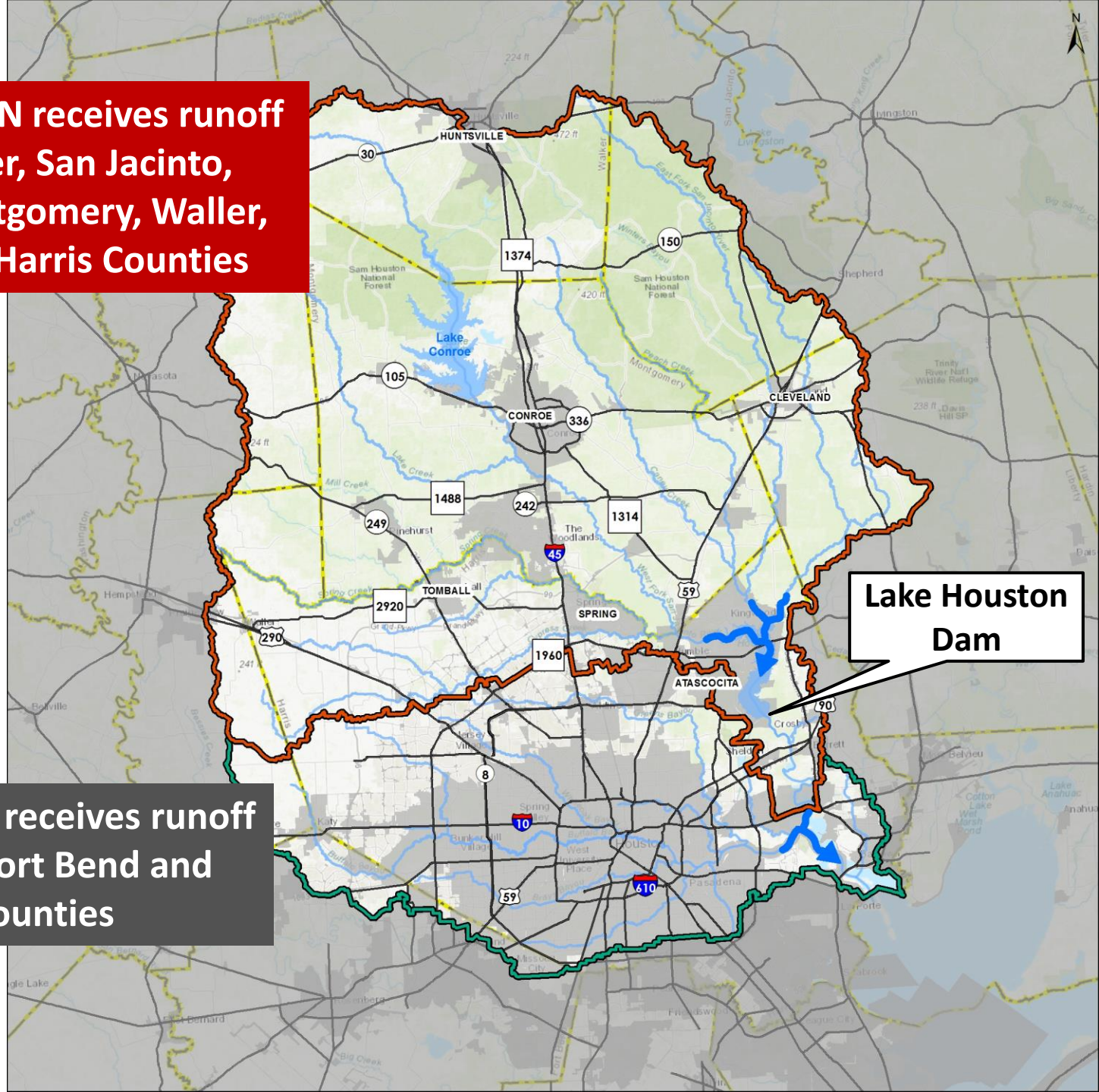
Concentric Construction

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



Hydrologic & Hydraulic Analyses

Inundation Analysis 100-Year Storm Event

- Peak 100-year inflow is 286,000 ft^3/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

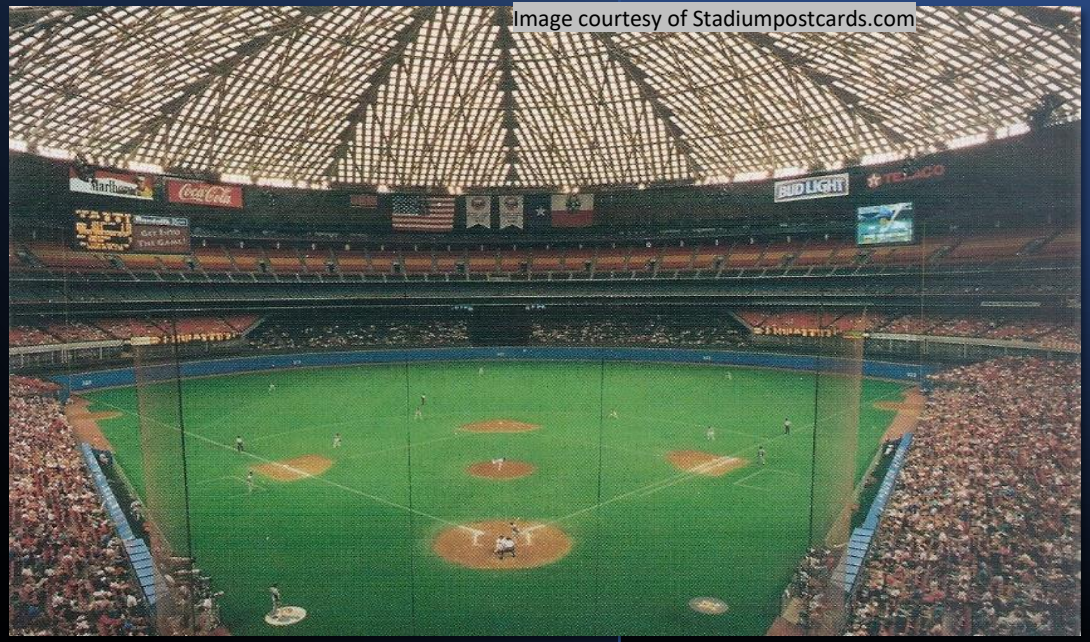
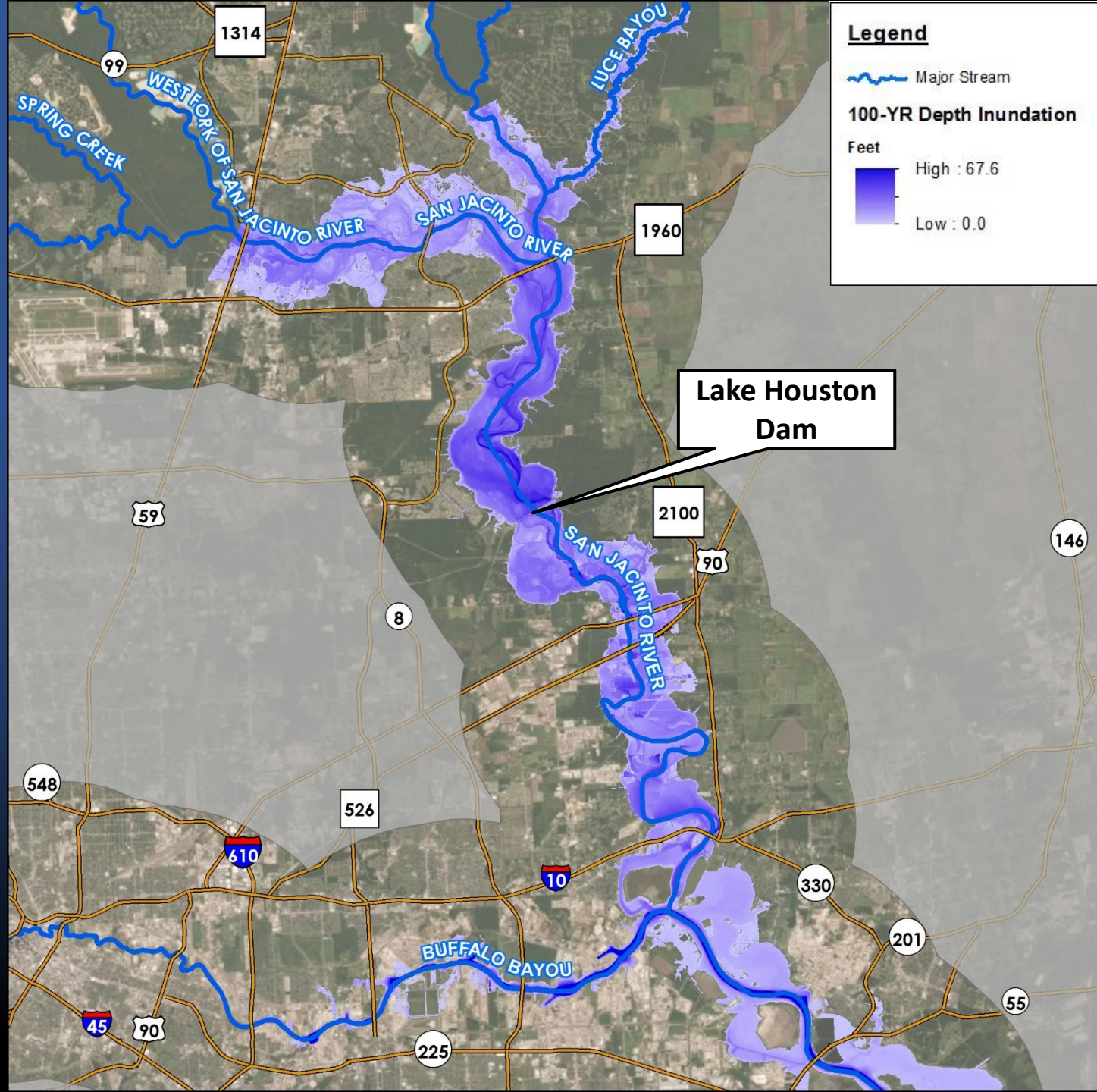


Image courtesy of Stadiumpostcards.com

**100-year storm event: a rainfall event that has a 1 percent chance of happening in any year (USGS) most recently Tropical Storm Imelda*

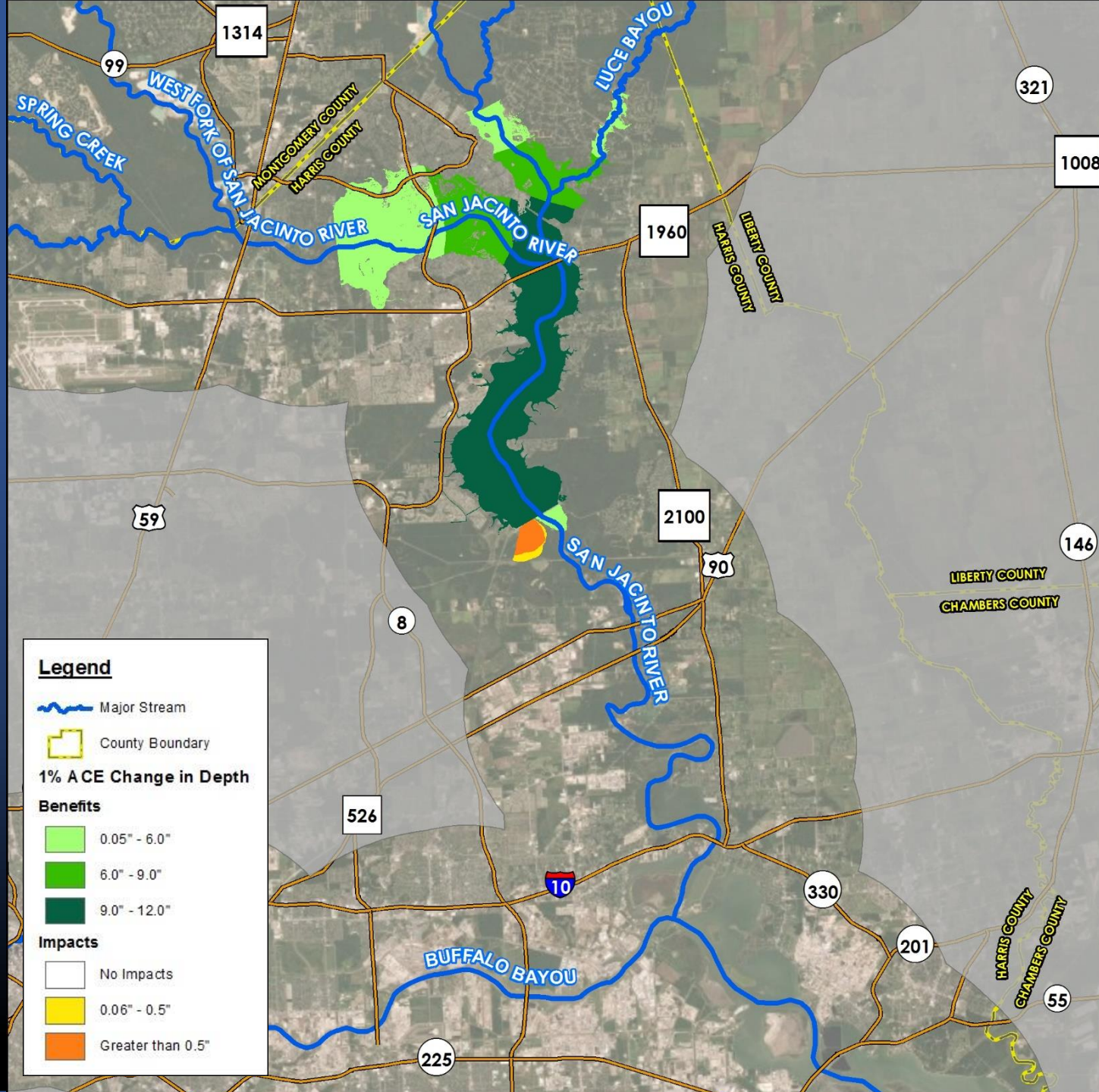


Hydrologic & Hydraulic Analyses

Benefits and Impacts
100-Year Storm Event

- Additional spillway capacity of 45,000 ft ^{3}/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 Proposed Design Locations

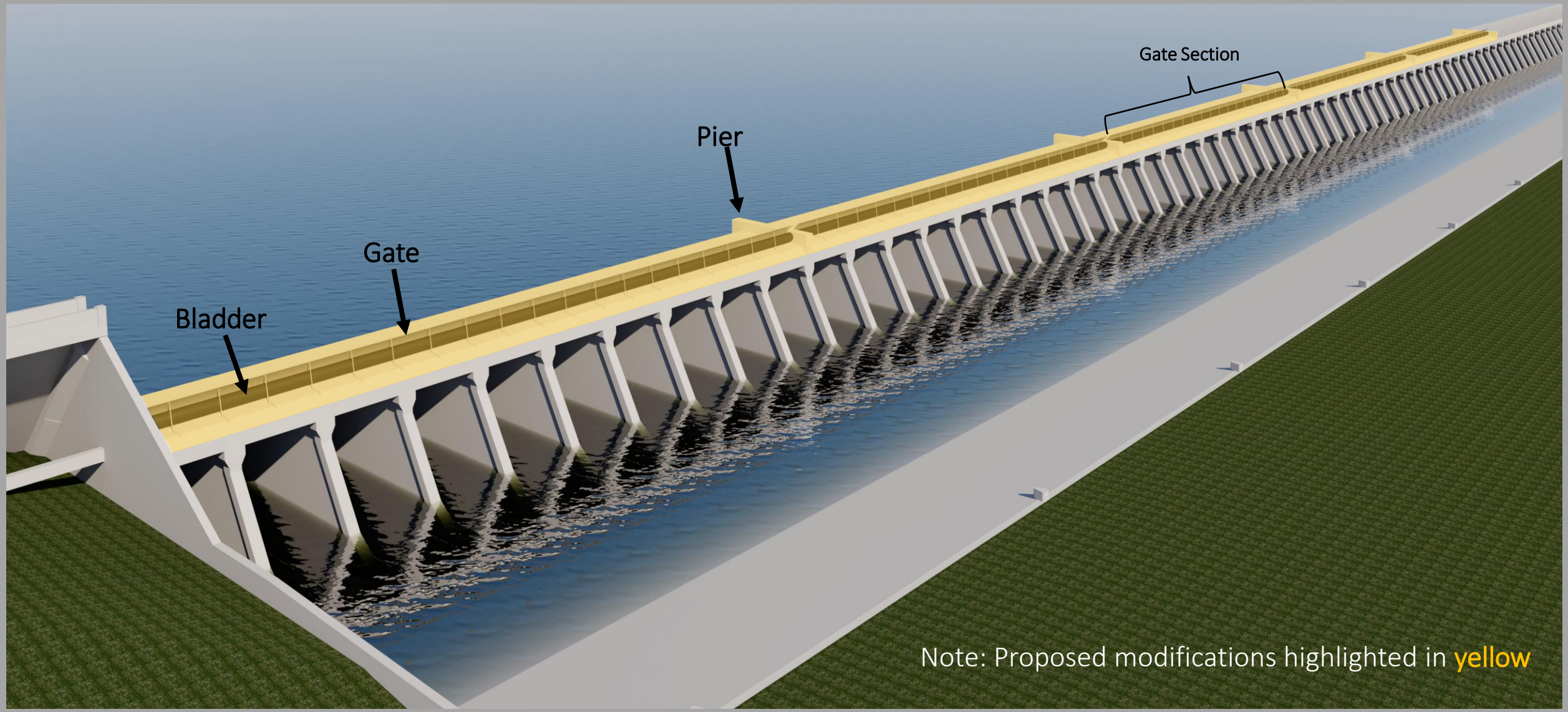
Planning Study Phase - Engineering Concepts

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

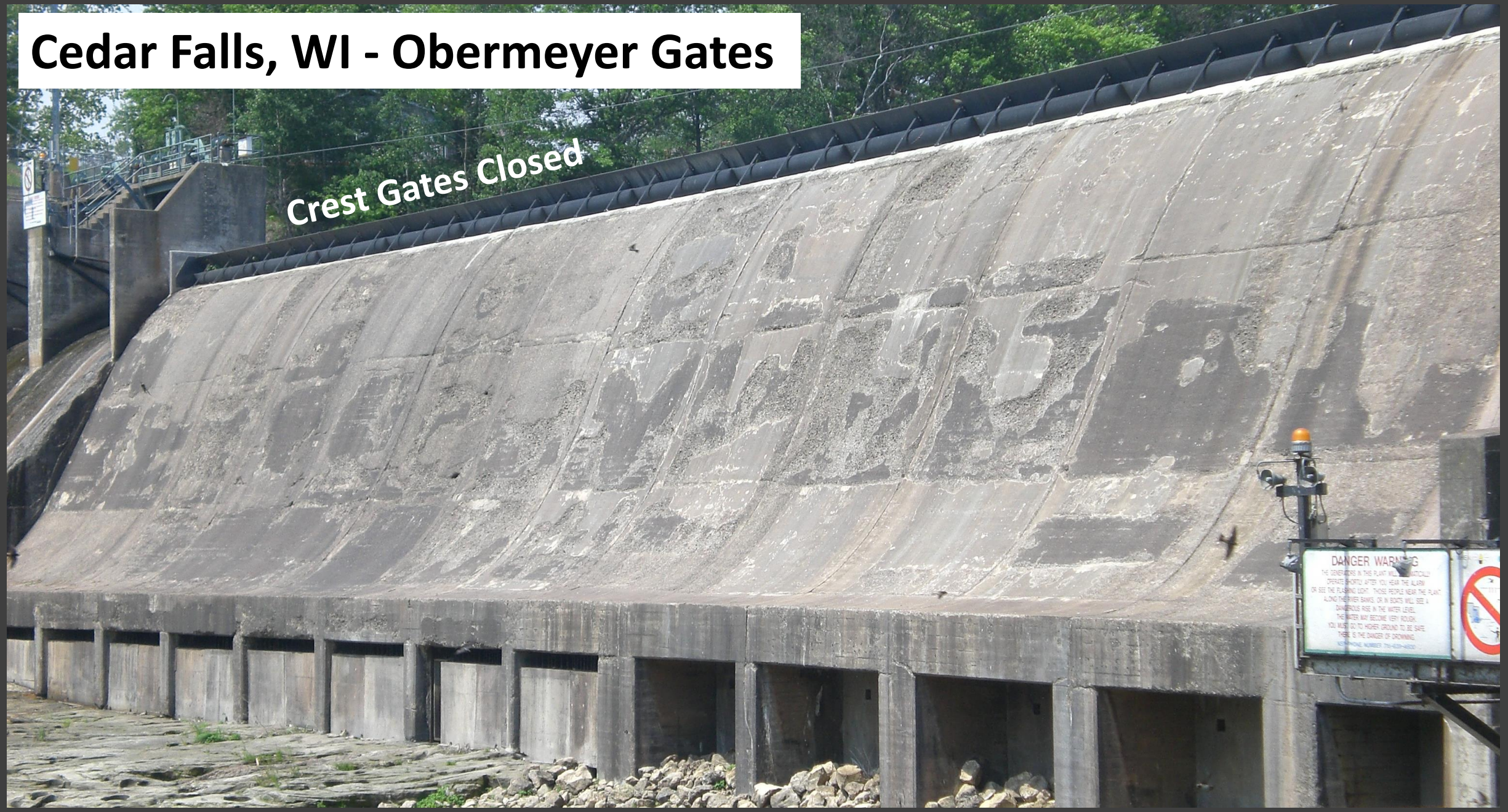
- Non-Cost Factors
  - Dam Safety
  - Environmental Impacts & Permitting
  - Water Supply/Water Quality
  - Reservoir Operations & Maintenance
  - Flood Risk Reduction Benefits
  - Downstream Impacts
  - Constructability
  - Construction Schedule
  - Stakeholder Consensus

Recommended Engineering Alternative

Computer Simulation of Proposed Improvements



Cedar Falls, WI - Obermeyer Gates

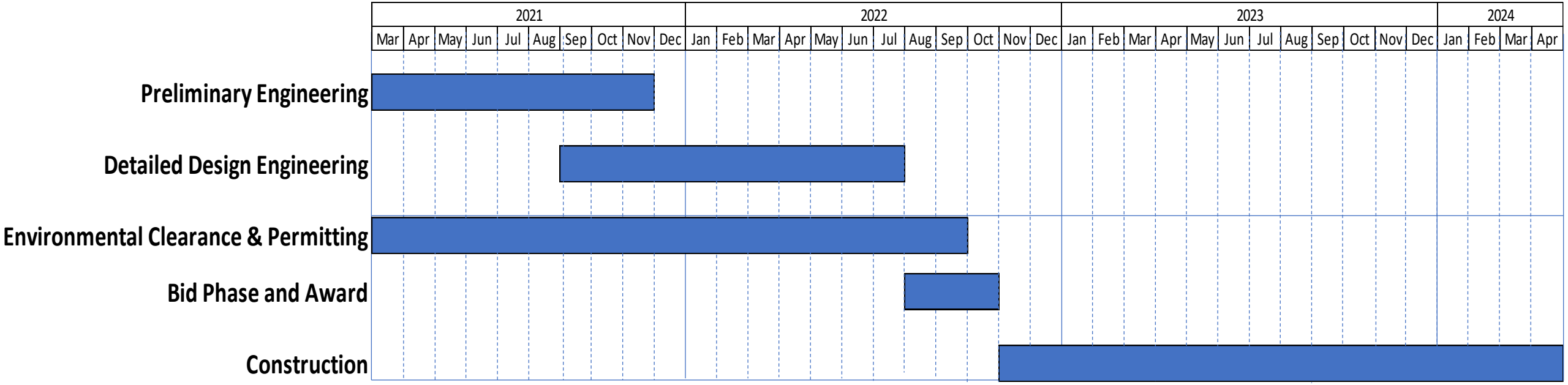


Ozark Beach, MO - Obermeyer Gates

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



Thank You

Contact Us

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