Plaquemines Parish Ridge Restoration Program

Imagine the result
OVERVIEW-PLAQUEMINES RIDGE RESTORATION PROGRAM

1. Existing Conditions.
2. Program Objectives.
4. Modelling and Research Results.
5. Program Shift and Revisions.
6. Revised Program.
7. Questions & Discussion.
EXISTING CONDITIONS

- Large surge + wave overtopping issues in Eastern and Southern Areas of Parish.
- $1.4B in USACE Flood Protection, 15 Active Construction Projects, 17 Projects in Design.
PROGRAM OBJECTIVES

Main Program Objective: Invest in coastal restoration projects that have the greatest impact in reduction of surge and wave heights.

Additional benefits:

- Complementary to State Coastal Master Plan.
- Efficient to permit.
- Constructability.
- Restores historic coastal ridge and marsh habitat.
ORIGINAL CONCEPTS

- Wave reduction berms detached from the “back” levee faces were conceptualized to reduce surge/wave overtopping.
- Reaches corresponded to ongoing New Orleans – to-Venice (NOV) levee enhancements.
RESTORATION OF Ridges = IMPROVED STORM PROTECTION

1. Existing conditions: High wave energies on levee faces
2. Historic ridge restored using Mississippi River sediments
3. Vegetation can offset subsidence elevation losses over time
4. Vegetated ridge will reduce wave energy and wave overtopping
PROGRAM REVIEW AND SHIFT

- Reviewed existing surge/wave conditions & studies.
- Reviewed previous project lessons learned and known constraints.
- Reviewed concepts identified in CPRA Master Plan + Plaquemines Parish Master Plan.
- Modelling using WHAFIS & FUNWAVE.
  - Field collection of vegetation data for WHAFIS friction coefficient.
Program Review: Surge + Wave Conditions

- Existing ADCIRC runs used to verify baseline conditions.
PROGRAM REVIEW: SURGE + WAVE CONDITIONS
• Previous studies by ERDC & ARCADIS.

Surge and Wave Modeling for the Louisiana 2012 Coastal Master Plan
Zachary Cobell, Haihong Zhao, Hugh J. Roberts, E. Ryan Clark, and Shan Zou

Interaction of Coastal Storms and Natural Coastal Features
Ty Wamsley
U.S. Army Research and Development Center
Coastal and Hydraulics Laboratory

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PROGRAM REVIEW: LESSONS LEARNED

• Large database of previous project lessons learned assembled.

• Notable Nearby Projects:
  • Bayou Grand Liard.
  • Long Distance Sediment Pipeline.
  • Port Fourchon Maritime Ridge.
  • Scofield + Pelican Islands.
  • Barataria Land Bridge & Lake Hermitage marsh creation projects.

• A host of applicable articles, reports, & presentations discussing the biology, geology, hydrology of ridge restoration in S. LA.
PROGRAM REVIEW: KNOWN CONSTRAINTS

• Previous & ongoing efforts in ridge restoration have shed light on various constraints to consider:
  • Need to minimize local marsh impacts/construction footprint.
  • Poor underlying soils = point of diminishing returns on size/volume of ridge cross section vs. sustainability.
  • Oyster leases, existing hydrologic patterns, O&G infrastructure, and deep water constrain possible footprint locations.
PROGRAM REVIEW: HISTORIC RIDGES

- Natural levees of abandoned distributaries.
- Better soils.
- Highest existing elevations.
Imagine the result

PROGRAM REVIEW: WHAFIS MODELING

• Field measurements on spoil banks to calculate Cd.
PROGRAM REVIEW: WHAFIS & FUNWAVE MODELING

- Wave memo created as guide to optimize ridge template based on local surge + wave conditions.

- Notice that the smaller the wave, the larger the ridge needed to continue breaking.

- Diminishing returns on $ spent/material req.
Notice waves ‘re-set’ after ridge due to wind, limiting the effective distance in front of levee that a single feature’s effects can be felt.
PROGRAM REVIEW AND SHIFT

• Key Findings:
  • Surge + Wave Heights on East Bank extremely high; ridges provide little reduction in surge and wave heights.
  • Surge + Wave Heights on Upper West Bank lowest; no ridges required.
  • Environmental, geological, and regulatory concerns restrict ridge possibilities.
Key Findings Continued:

- Dense vegetation contributes significantly to wave attenuation.
- With sparse veg., ridge must be high enough to induce wave breaking to provide significant attenuation.
- For ridges with high crests, wave breaking dominates; a wide crest with veg. is unnecessary to reduce wave height further.
- For ridges with lower crests, veg. over a wide crest can play role in reducing wave height.
REVISED RIDGE RESTORATION PROGRAM PROJECTS
REVISED RIDGE RESTORATION PROGRAM-SAMPLE X-SECTION

- Interior containment, over-fill using MR sand to account for settlement, reform after 6mo to achieve final elev., fold in-situ organics over top to promote veg. growth.
NEXT STEPS

- FEMA Levee Analysis and Mapping Procedures (LAMP)
  - Coordinating with FEMA Region VI to potentially evaluate coastal restoration projects that provide protection.

- Coordination Meetings already held with CPRA, USFWS, USACE, and DNR-OCM.

- TBD/Continuing Coordination with USACE, CPRA, NMFS, EPA, LDEQ, and MNSA as needed.

- Pre-App Meetings: USACE, DNR.

- Required Permits – CUP & Sec. 10 / Sec. 404.

- Permitting Timeline – 1 or 2 projects at a time.
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PLAQUEMINES PARISH RIDGE RESTORATION PROGRAM

Questions & Discussion