Comite River Diversion Project

Presented to

NDIA Tri-Services Infrastructure Conference

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Picture of the Comite River, Louisiana in Flood Source: T. Davison 1983
Project Sponsors
Non-Federal Sponsors

Louisiana Department of Transportation and Development (LADOTD)

City of Baton Rouge, Parish of East Baton Rouge (CITY-PARISH)

Amite River Basin and Water Conservation District (ARBC)
Project Location
Project Purpose
Project Purpose

- To provide flood protection for the residents of the Comite and Lower Amite River Basins

- The authorized project will reduce stages:
  - On the Comite River from the diversion point to the confluence with the Amite River
  - On the Amite River from the confluence with the Comite River near Denham Springs to Port Vincent
  - On White Bayou, Cypress Bayou, and Bayou Baton Rouge

- Total Cost = $165 million
Overview of Project Features
COMITE RIVER DIVERSION
PROJECT FEATURES

Drop Structures & Drainage Structure
Lilly Bayou Control Structure
Comite River Diversion Structure
Channel Reaches
Highway & Railroad Bridges

Brooks Lake Closure
Mitigation Area

Mississippi River
Comite River Diversion Channel
Channel Profile

Direction of Flow

EL. 65.0
EL. 60.0
EL. 58.0 +/-
EL. 65.0
EL. 43.0
EL. 53.0 (Normal Pool)
EL. 35.1
EL. 3.00
Mississippi River

Lilly Bayou Control Structure
Comite River Diversion Structure
Comite River

EL. VARIES
Comite River Diversion Channel

- Drainage Area of Approximately 308 Square Miles
- “Wet” Channel
- Area of Impoundment of Approximately 102 Acres (At Normal Pool)
- Reason for a “Wet” Channel:
  - Improved Slope Stability
  - Less Maintenance
Comite River Diversion Channel

CHANNEL CROSS-SECTION
Lilly Bayou Control Structure
Purposes of the Lilly Bayou Control Structure

1. To dissipate energy resulting from substantial drops in both water surface elevation and channel invert to minimize costs of erosion protection downstream.

2. To provide a hard point at which head-cutting erosion is prevented from moving further upstream.

3. To limit the velocity of flow of the Comite River Diversion Canal to acceptable levels during design floods.

4. To impound water in the Comite River Diversion Canal to prevent slope failures.

5. To prevent the intrusion of Mississippi River floodwaters into the Comite River Diversion Canal.
Lilly Bayou Control Structure
Original Design - RCC

HALF PLAN
Lilly Bayou Control Structure
Original Design - RCC

SECTION
Lilly Bayou Control Structure: From RCC to CIP

- Not typical application of RCC:
  - Atypical RCC structure geometry
  - Highly-erodible soil foundation (not rock)
  - RCC not widely used in this region
  - Relatively “thin” for an RCC structure
    - Concerns with cracking causing loss of foundation material, risking failure of structure

- Costs
  - Seepage-prevention measures between lifts increased costs
  - No in-situ aggregates available for mixture, so not optimum site for RCC (i.e. limestone would have to be hauled in)
Lilly Bayou Control Structure: From RCC to CIP

- **Major Concerns:** Uplift and Slope Stability

- **Alternatives investigated:**
  - Piles or Drilled Shafts
  - Ground Anchors
  - Heavy-Weight Concrete (250 pcf)
Lilly Bayou Control Structure Final Design

CENTERLINE PROFILE
Lilly Bayou Control Structure
Final Design

HALF PLAN
Lilly Bayou Control Structure
Final Design

STA. 1+51.00

SECTION
Lilly Bayou Control Structure Final Design

STILLING BASIN
Flotation Stability

CENTERLINE PROFILE
Flotation Stability

Clay Cap
Elevation Varies
57.0' +/- 0.5'

Slurry Trench

SLURRY TRENCH DETAIL
N.T.S.
Flotation Stability

Outflow Monolith

Stilling Basin

Spillway Slope (To Weir Crest)

Slurry Trench, West End

Underdrain System

Slurry Trench, East End
Flotation Stability

Section at Edge of Monolith

Section at Well Screen
Concrete Considerations

- **Mass Concrete**
  - Some base slabs in excess of 10 feet thick
  - Thermal cracking a concern
  - ERDC performed materials investigation and thermal study

- To assist in providing the “coolest” mix possible:
  - Design $f'c = 3000$ psi
  - Limestone required for aggregate
  - Combination of GGBF Slag and Fly Ash required
Cavitation-Resistant Concrete

V > 60 fps

1’-0” Thick Cavitation-Resistant Concrete Overlay

CENTERLINE PROFILE
Abrasion-Resistant Concrete

Flow + Sediment Load = “Grinding Effect”

1’-0” Thick Abrasion-Resistant Concrete Overlay
Lilly Bayou Control Structure

- Construction proceeding in two phases:
  - Phase I
    - Consisted of site grading, initial excavation and slurry wall construction
    - Awarded March 2003 to James Construction Group, Inc for $2.4 Million
    - Completed in December 2003
  - Phase II
    - Consists of completing the excavation and constructing all remaining features
    - Design complete
    - Awarded September 2004 to B&K Construction, Inc., for $27.6 Million
Lilly Bayou Control Structure: Phase I
Lilly Bayou Control Structure: Phase I
Lilly Bayou Control Structure: Phase I Complete
Lilly Bayou Control Structure: Phase II
Lilly Bayou Control Structure: Phase II
Lilly Bayou: Lessons Learned
Some Lessons Learned: Virtual Teaming & Other “Stuff”

- Communicate, Communicate, Communicate
- Virtual Teaming Software (Groove, etc.)
- Drafting Contracts
- Maintain independence of ITR Team and ensure ITRs performed in timely manner
- Start materials investigations as early as practicable
- Keep PDT engaged
Questions?