West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana
East of Harvey Canal Hurricane Protection Project
Cousins Pumping Station Complex
Jefferson Parish, Louisiana

Waterline Support Failure: A Case Study

by
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Sieur de Bienville
Founded New Orleans in 1718
WEST BANK AND VICINITY, NEW ORLEANS, LA
HURRICANE PROTECTION PROJECT

TROPICAL STORM FRANCES SEPTEMBER 1998
West Bank & Vicinity, New Orleans, LA

Facts

- **WRDA 1986**
  - Authorized Westwego to Harvey Canal

- **WRDA 1996**
  - Modified project to add Lake Cataouatche
  - Also authorized East of Harvey Canal

- **WRDA 1999**
  - Combined the 3 projects into one

- **Cost shared**
  - 65% Federal / 35% Non-federal

- **Sponsor**
  - LADOTD for construction & WJLD for O&M

- **Current estimated total project cost:** $340M
West Bank & Vicinity, New Orleans, LA
Summary

- Will protect approximately 250,000 citizens
- Will protect over 65,000 homes and businesses in Orleans, Plaquemines and Jefferson Parishes
- When complete, will cover over 65 miles of levees, floodwalls and floodgates in the tri-parish area
- Through the end of 2004, federal & local sources have spent over $150 million
- Project is 38% complete; completion date 2018
First Ave. Canal & Cousins Pumping Station
Cousins Pumping Station Complex
Modifications to Exist. 36" Line
PLAN

Cousins Pumping Station Complex
Original Waterline Crossing
(Waterlines "A" and "B")
EL. -12.00
EL. -11.50
TOP OF CAP
BENT 1
BENT 2
BENT 3
BENT 4
BENT 5
BENT 6
TOP OF FLOODWALL
CL EL. -4.50
TIP EL. -98.0
14" DIA. STEEL PIPE PILE
TIP EL. -53.0
TIP EL. -53.0
16" SQUARE CONCRETE PILE (TYP)
TIP EL. -75.0
EL. -60.0 +/-
SOFT CLAY
SAND

PROFILE

COUSINS PUMPING STATION COMPLEX
ORIGINAL WATERLINE CROSSING
(WATERLINES "A" AND "B")
Pile Driving by Waterline “A”
Waterline Segment
COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"

PLAN
PROFILE

COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"
Event Timeline - 2004

- Jan 8 & 9 – Contractor pulls cofferdam sheet piling around bent A-3
- Jan 12 – Contractor reports settlement of bent A-3. Bent surveyed. Settlement = 1’-6”
- Jan 26 – First Modification issued
Potential Cause

- Soil Wedge Filled the Void Caused by Cofferdam Removal
- Permanent Piles were COMPLETELY in the Soil Wedge that Moved
Cousins Pumping Station Complex
WATERLINE CROSSING "A"
TRPS 1

Cousins Pumping Station Complex
Waterline Crossing "A"
COUSINS PUMPING STATION COMPLEX
WATERLINE CROSSING "A"

PLAN
Pile Integrity Test – Bent A-6
Event Timeline - 2004

- Late Nov 2003 – Contractor pulls TRS-2 cofferdam sheet piling.
- Dec-Jan – Contractor drives permanent sheet piling and battered pipe piles for the braced wall.
- Jan 22 – Contractor reports waterline pipe on bent A-1 out of alignment
- Feb 4 – Contractor exposes and surveys bent A-1. Settlement = 1’-6”
- Mar 10 – Pile Integrity Test performed on bents A-1 and A-6
- Mar 19 – Second Modification issued
- May – First Waterline Complete and In Service
Potential Causes

• Soil Wedge Filled the Void Caused by Cofferdam Removal.
• Permanent Piles were COMPLETELY in the Soil Wedge that Moved.
• Vibrations from Driving the Adjacent Permanent Sheet Piling and Steel Pipe Piles for the Braced Wall.
Cousins Pumping Station Complex
Waterline Crossing "A"
Bent A-1
Pile Integrity Test – Bent A-1
Bent A-2
Cousins Pumping Station Complex

Profile

Waterline Crossing "B"

- Top of Floodwall EL. 11.50
- CL EL. -4.50
- TIP EL. -98.0
- TIP EL. -75.0
- TIP EL. -73.0
- TIP EL. -53.0
- Channel Bottom EL. -12.0
- 16" Square Concrete Pile (Typ)
- 14" Dia. Steel Pipe Pile
- Soft Clay

Profile
Waterline “A”
Lessons Learned

• During Pile Design, Carefully Consider the Effects of Adjacent Construction, INCLUDING Temporary Construction.
• Compare Tip Elevations of Permanent Piles and Temporary Piles.
• Permanent Pile Tip Elevations Should ALWAYS be Lower than the Active Wedge of Temporary Piles.
• Don’t Design with Blinders On.
• Communicate, Communicate, Communicate!
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THANKS...