THE RIGOLETS PASS BRIDGE REPLACEMENT

LTRC BRIDGE STRUCTURES CONFERENCE 2008

STRUCTURAL DESIGN PRESENTATION

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BRIDGE DESIGN SECTION



Acknowledgements

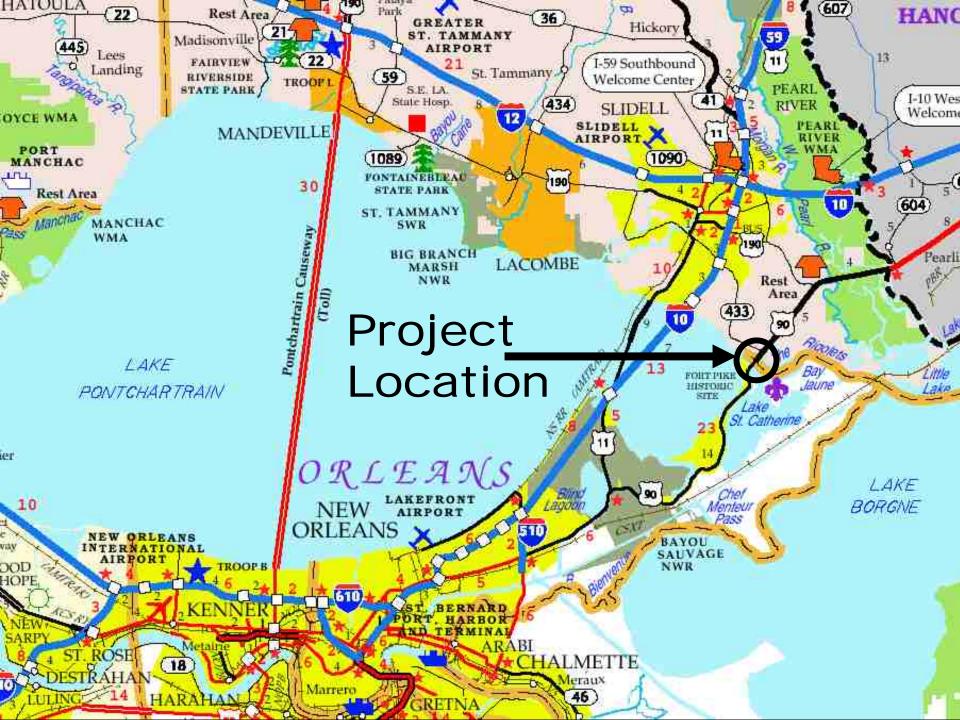
- ➤In-House: 4800' Bridge Approaches

 Bridge Design Sect. Gang 004 Staff

 Janice Williams Road Coordinator
- Consultants: 656' Main Spans & Roadway

 Consoer Townsend Envirodyne (CTE)

 Janssen & Spaans Engineering

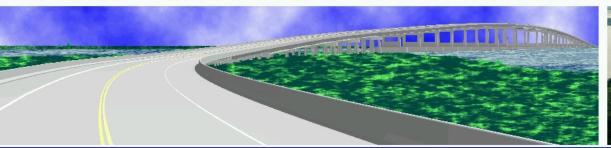


RIGOLETS PASS BRIDGE





BRIDGE DESIGN SECTION





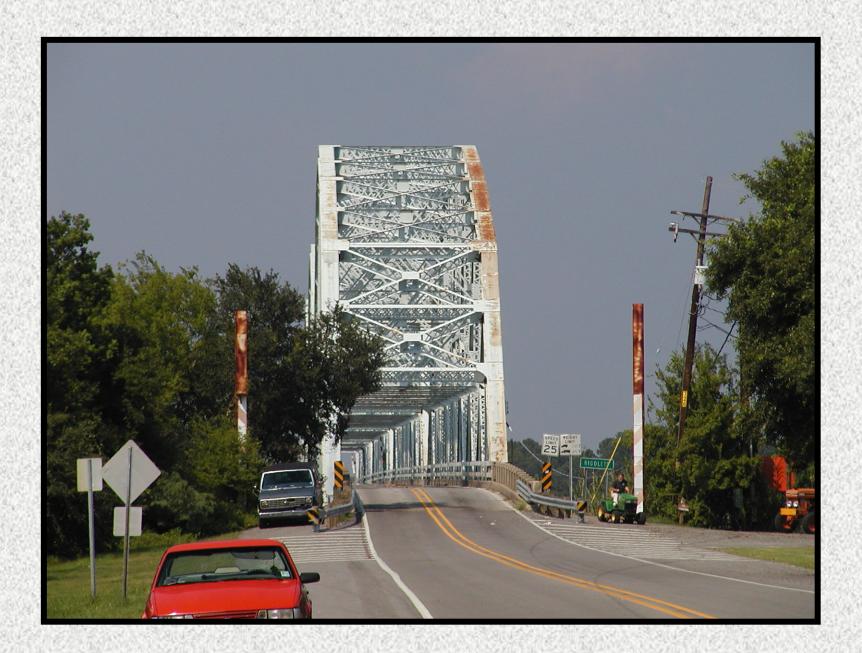
History of Existing Structure

During the Huey P. Long administration, US 11 was the only crossing of Lake Pontchartrain and was a toll facility. Governor Long failed in his negotiations to purchase the bridge. Determined to provide a toll free facility, Governor Long constructed US 90 (toll free) around the lake in 1930 constructing the bridge at **Chef Menteur and Rigolets Pass.**

Replacement Structure

Bridge Replacement Project funded by the Federal Bridge Replacement Program at 80 / 20 match. The bids were taken in June 2004 at a cost of \$50.6 million. The contractor, Massman Construction Company, was work ordered in March 2005. The new structure will be a Fixed High Level Bridge replacing a Steel High Truss Swing Bridge.





Considerations

- Alignment Selection
- Environmental
- Design
- Construction

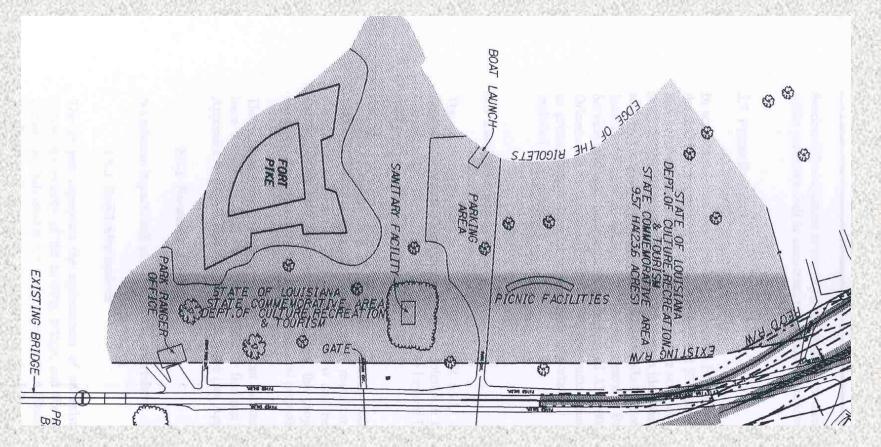
Alignment Considerations



Environmental Considerations

• State Park 4f-Property Fort Pike State Historic Site

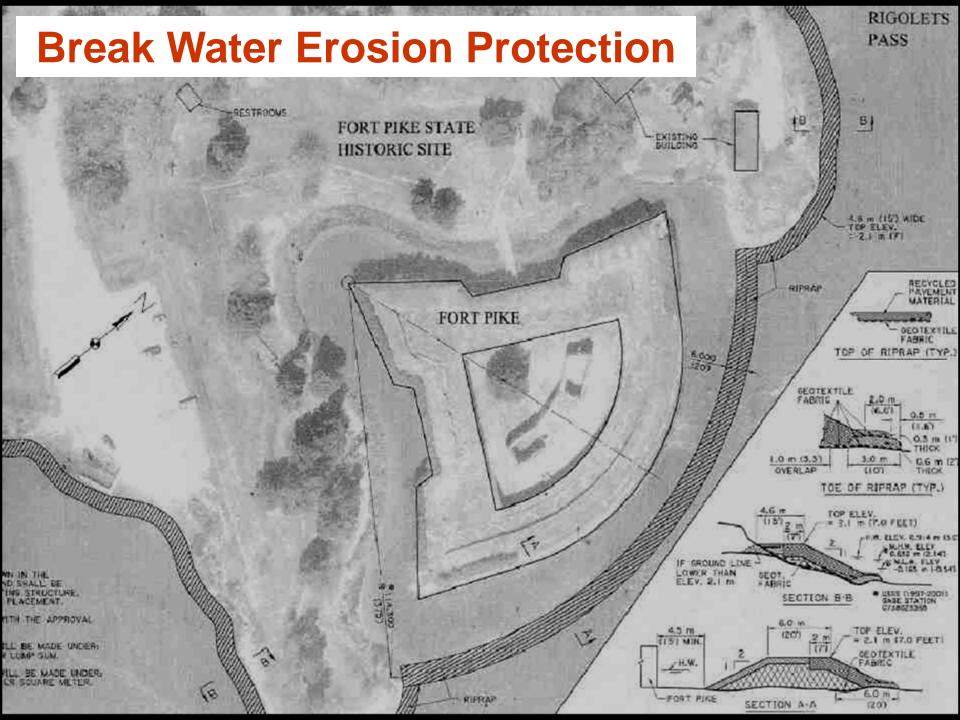
Constructed after the British attack on New Orleans during the War of 1812 as a coastal defense system.











Vibration Monitoring

Peak particle velocity

- not exceed 0.1 inches for historic structures
- not exceed 0.25 inches for non-historic structures









Threatened Species

Gulf Sturgeon



Endangered Species

West Indian Manatee



Sea Turtle



- Precautionary Measures
 - > Close coordination with permit agencies.

➤ On site meetings with the COE and DNR provided better communication of construction activities.

Precautionary Measures Cont'd

Bucket Dredging Operations

- Water depths <5 feet</p>
 Silt fences around dredging and deposition
- Water depths >40 feet
 Open-water disposal will be allowed

Hydraulic Dredging Operations

- ➤ November 1 March 1
- > Surface water discharge water > 40 feet.

Precautionary Measures Cont'd

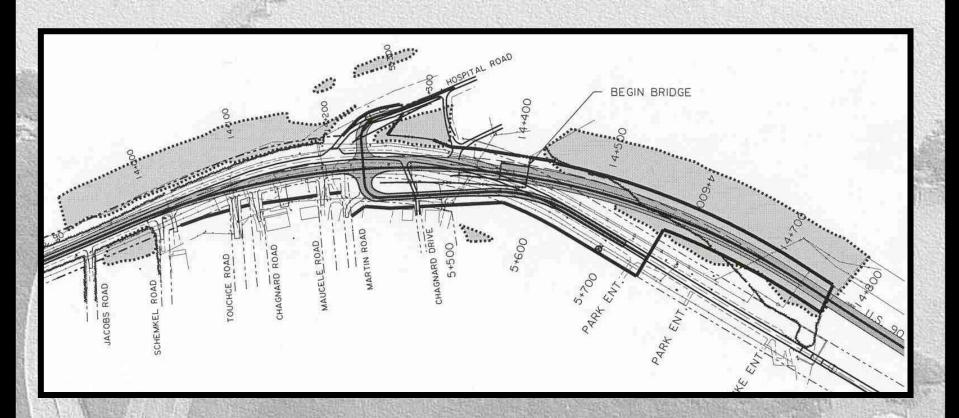
Demolition (General)

> Scare Charges

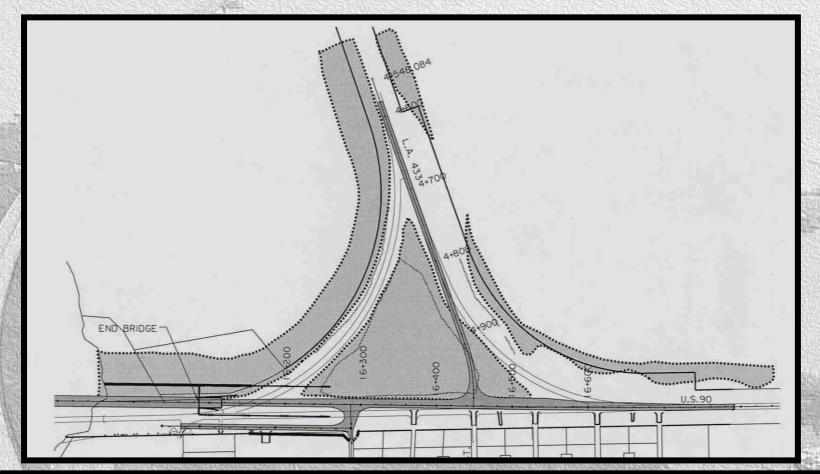
Underwater Demolition

- ➤ November 1 March 1
- Explosive charges placed in holes in caisson.
- > Air bubble curtains required around each caisson to reduce blast pressure.

Wetland Delineation



Wetland Delineation





Brackish Marsh Grass

- Wetland Mitigation Plan
 - ➤ Brackish Marsh Grass 1.0 acres 1.0 acres
 - ➤ Wetlands 0.6 acres 1.5 acres

- Historical Bridge
 - Eligible for National Register of Historic
 Places
 - Make Bridge Available to Public
 - Mitigation HAER Documentation(Historic American Engineer Record)

- Permitting Agencies
 - > U.S. Coast Guard
 - > U.S. Army Corps of Engineers
 - ➤ La. Dept. of Natural Resources (Coastal Management Division)

- Resource Agencies
 - > National Marine Fisheries Service
 - > U.S. Fish and Wildlife Service
 - > La. Dept. of Wildlife and Fisheries
 - > Environmental Protection Agency
 - > La. Dept. of Environmental Quality
 - > State Historic Preservation Office

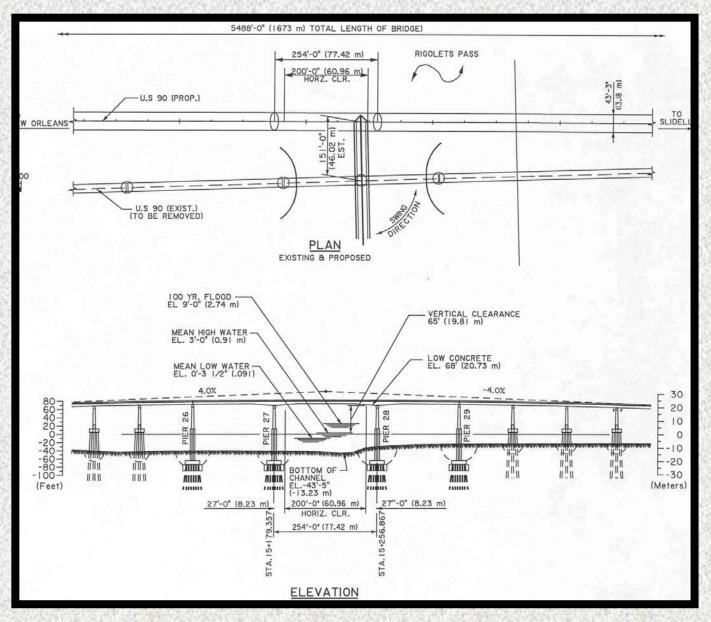
- Partnering Agency
 - ➤ La. DCRT, Office of State Parks
 - > Federal Highway Administration
 - > U.S. Army Corps of Engineers
 - > U.S. Coast Guard

Design Considerations

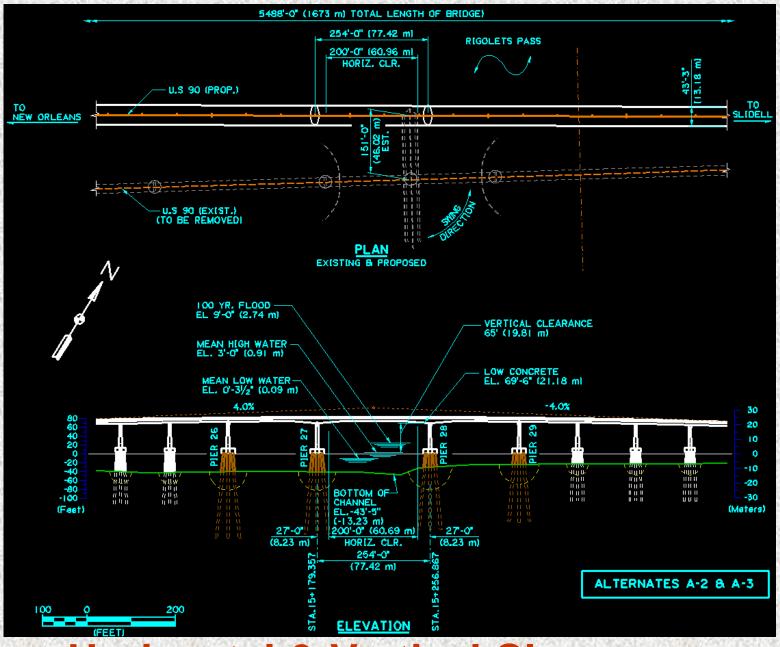


- Vertical & Horizontal Clearances
- Marine Navigation during

construction



Horizontal & Vertical Clearances



Horizontal & Vertical Clearances

Superstructure Selection

Approach Spans:

>BT-78 PPC Girders (22,125 linear ft)

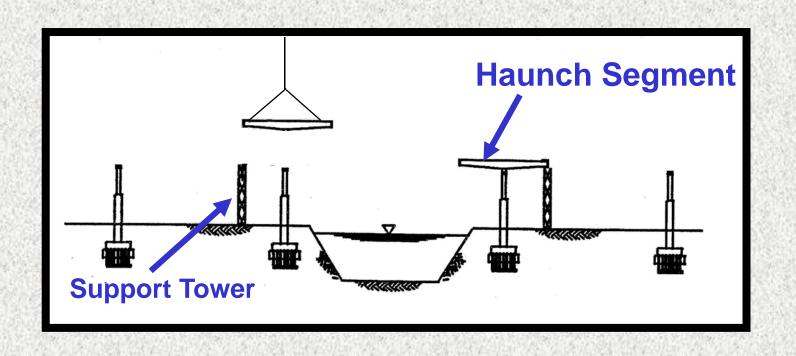
f'ci = 6,000 psi f'c = 7,500 psi

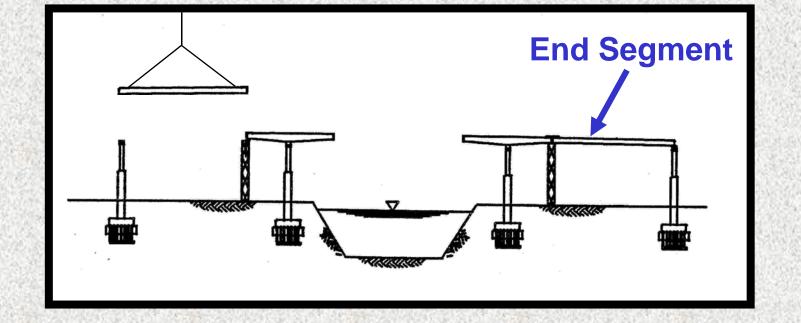
>Two BT-78 HPC PPC Girder Spans (1046 linear ft)

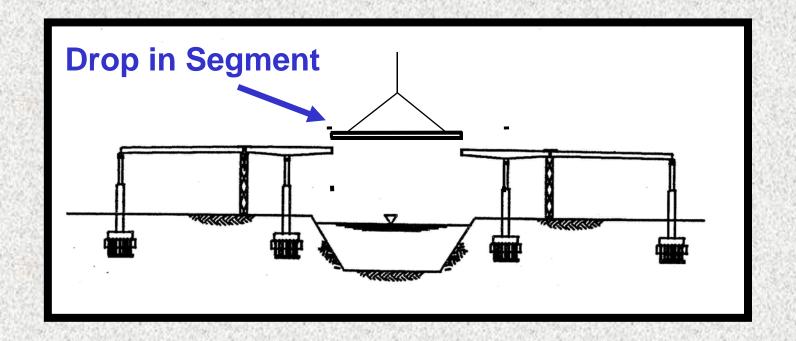
f'ci = 6,800 psi f'c = 10,000 psi

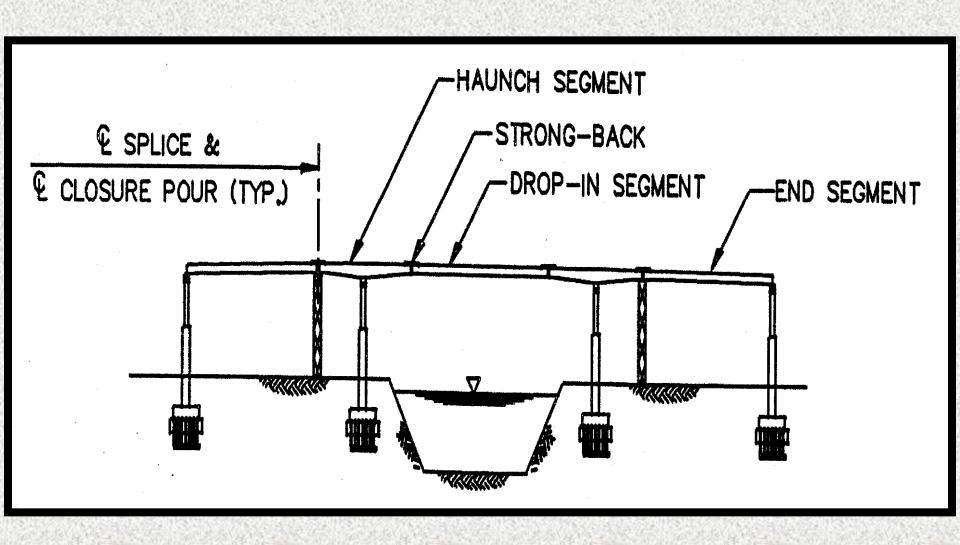
- Superstructure Selection
 Main Span Unit:
 - >Steel Plate Girders with Metalizing
 - ➤ Spliced Precast Prestressed Concrete Girders (Post-Tensioned Continuity)

Spliced Precast Prestressed Concrete Girder Construction









- Substructure Selection & Design
 - ➤ Rigolets Pass is 3900' wide
 - ➤ Vessel Impact AASHTO Method II
 - Zero probability of collapse for four main piers.

Contractor Concerns

- Depth of the Cofferdams
- Weather and Storm Surge
- Construction time
- Delivery of Precast Members

Engineering Alternatives

- Alternate Pier Design for Main Piers
- Alternate Foundation Piling (size & type)
- Alternate Precast Girder Sections
- Review Vessel Loads and Load Groups
- Reduce # of Battered Piles

- Substructure Selection & Design
- ➤ Alternate 1: Deep Cofferdam Construction 90' Head (Water Surface Bottom Seal)
- ➤ Alternate 2: Low-water footing bent with66" diameter concrete cylinder pile
- ➤ Alternate 3: Low-water footing bent with
 - 66" diameter steel pipe pile, t= 0.75"

Substructure Selection & Design

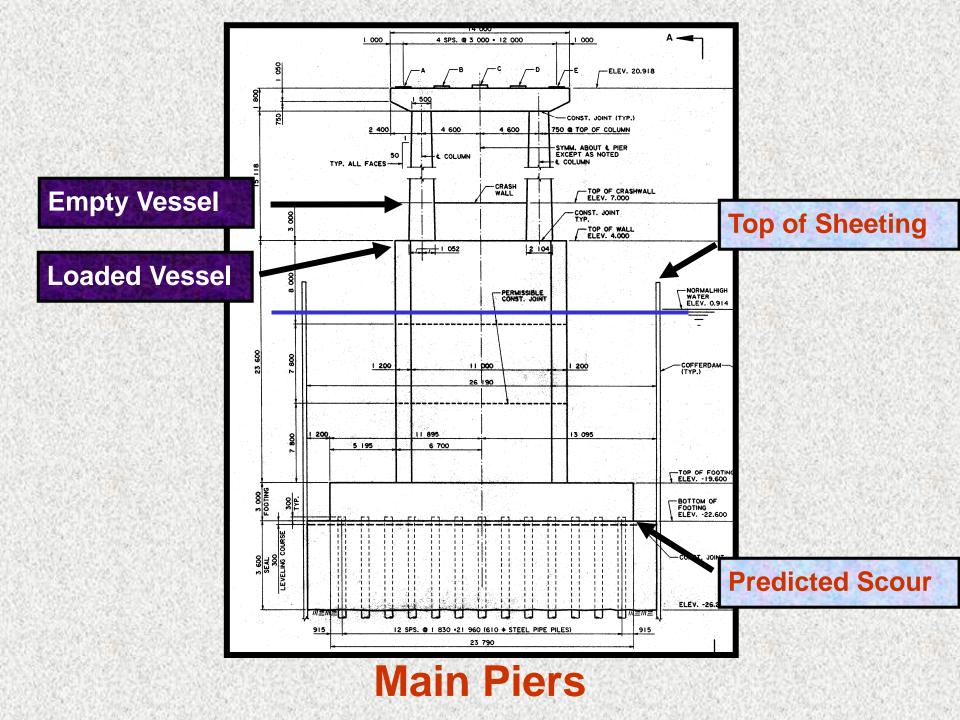
Previous Marine Accident Damage

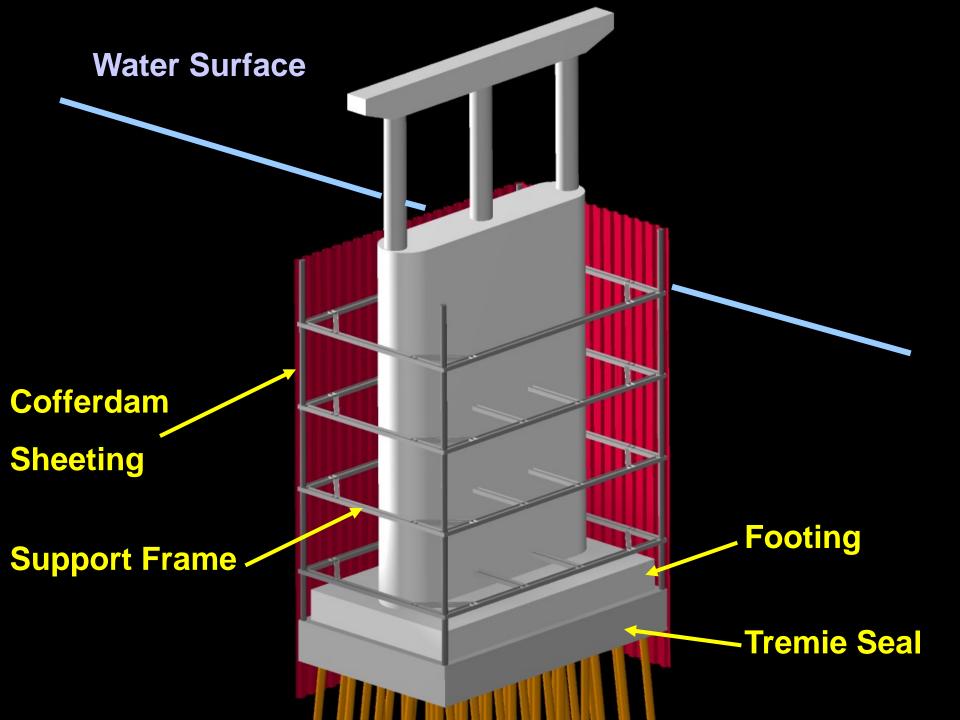






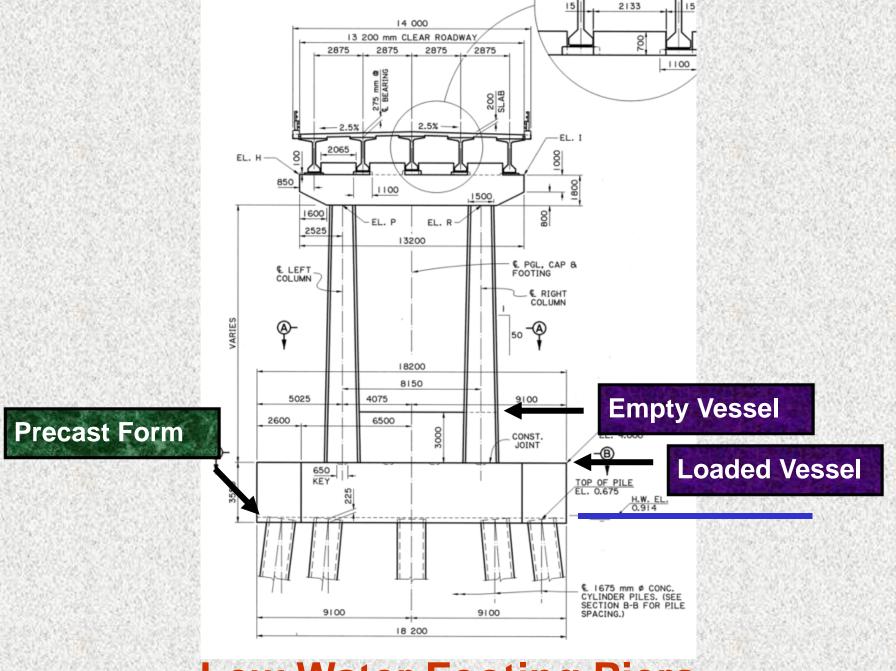
Substructure Controlling Elevations
 Cofferdam Construction



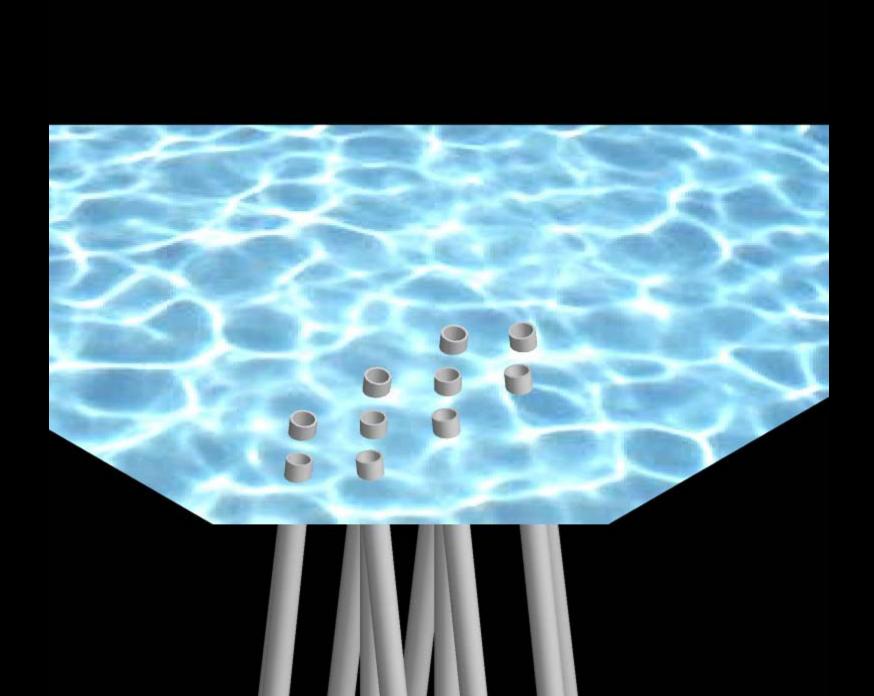


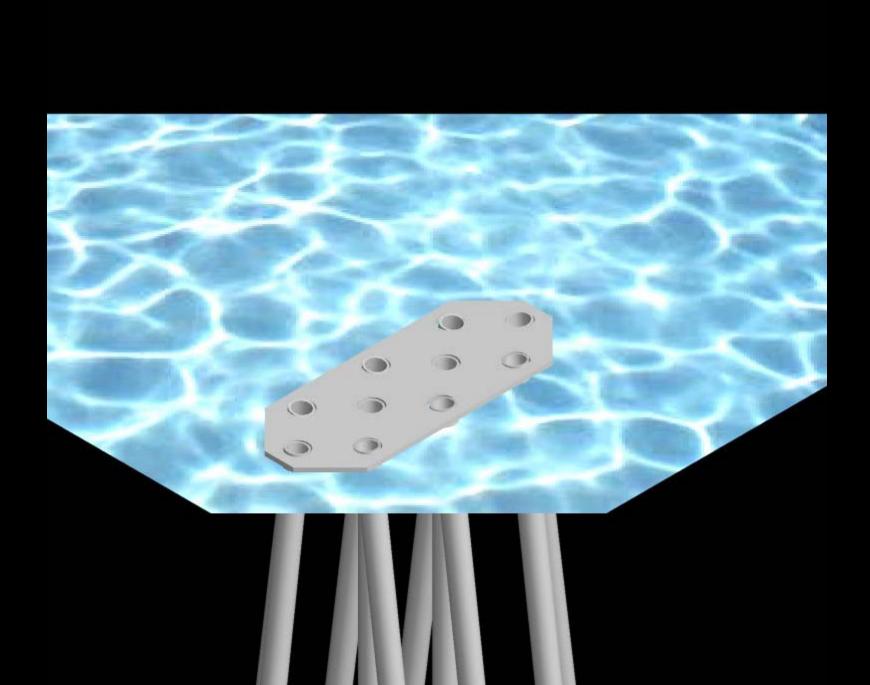


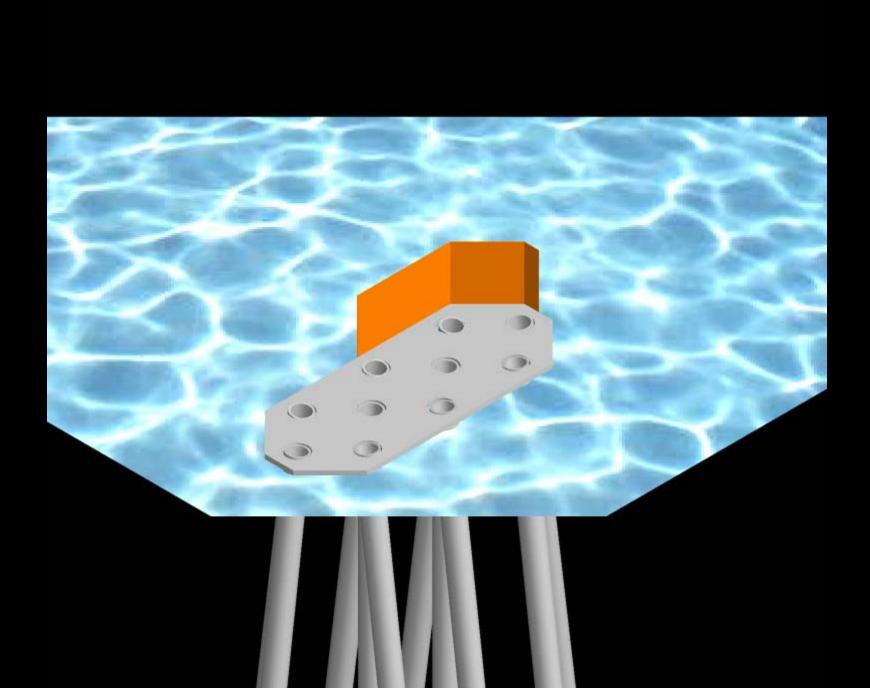
Substructure Controlling Elevations
 Low-water Footing Bent Construction

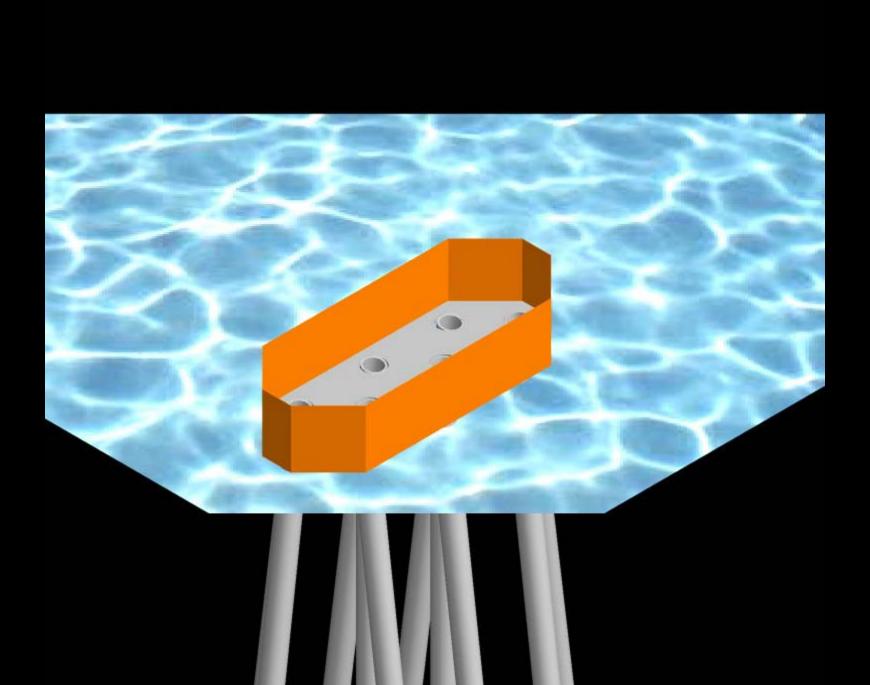


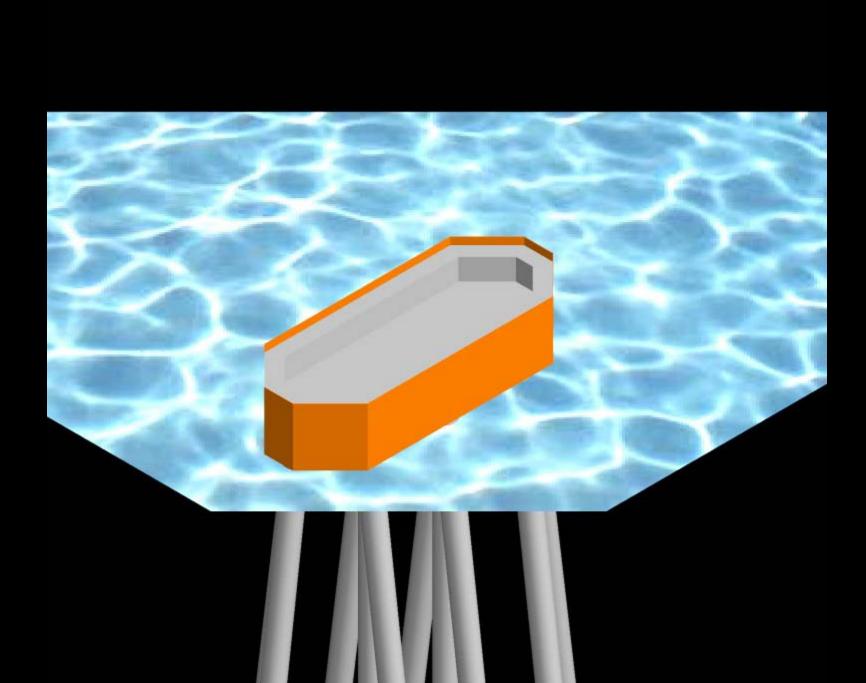
Low Water Footing Piers

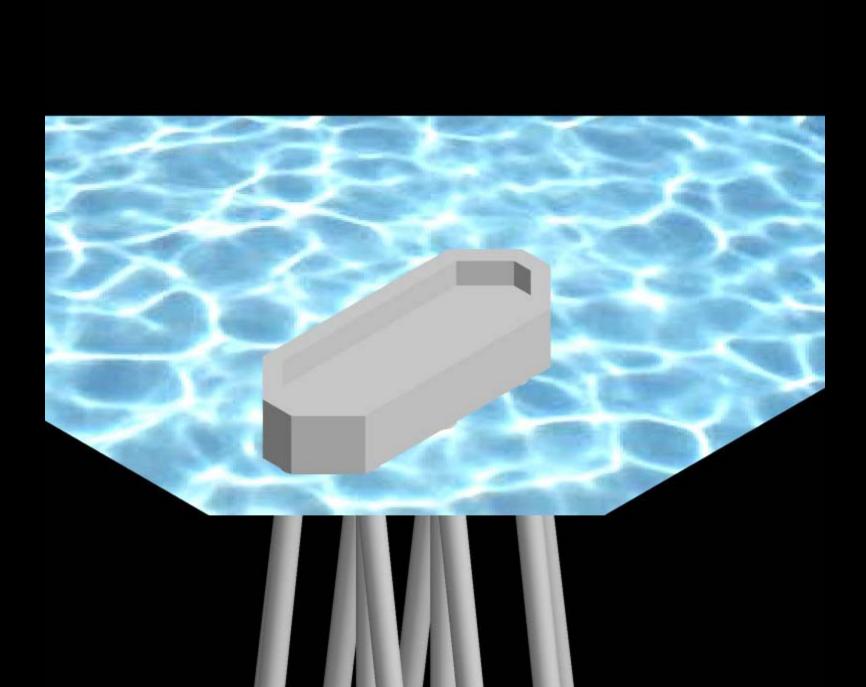


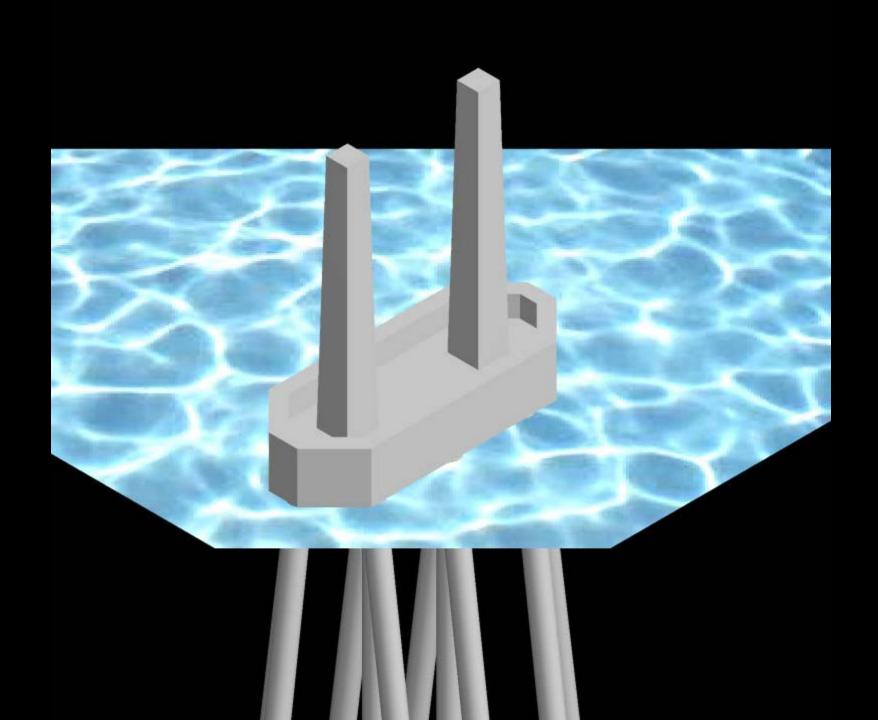


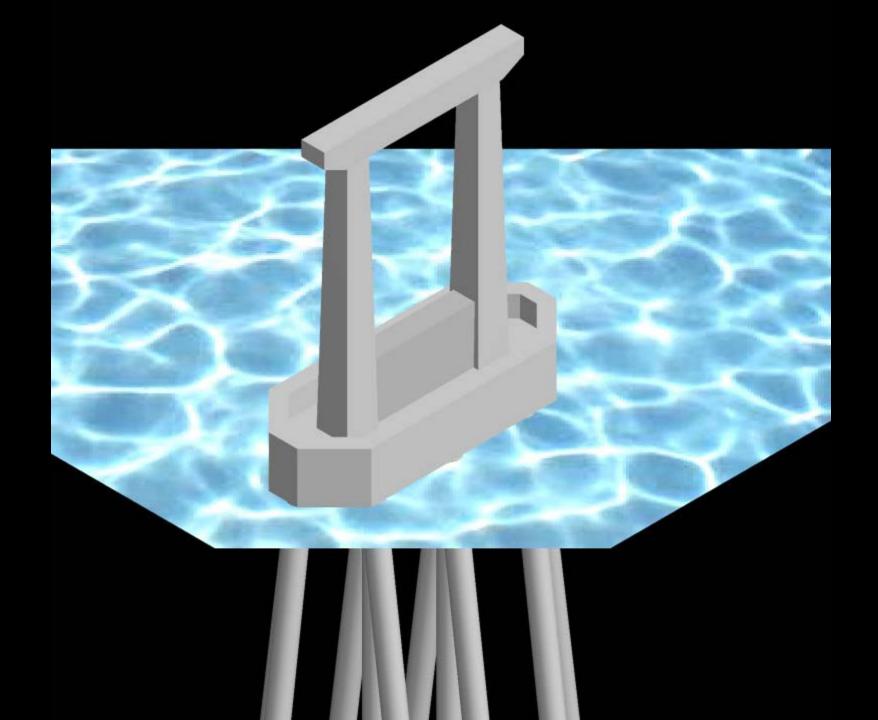


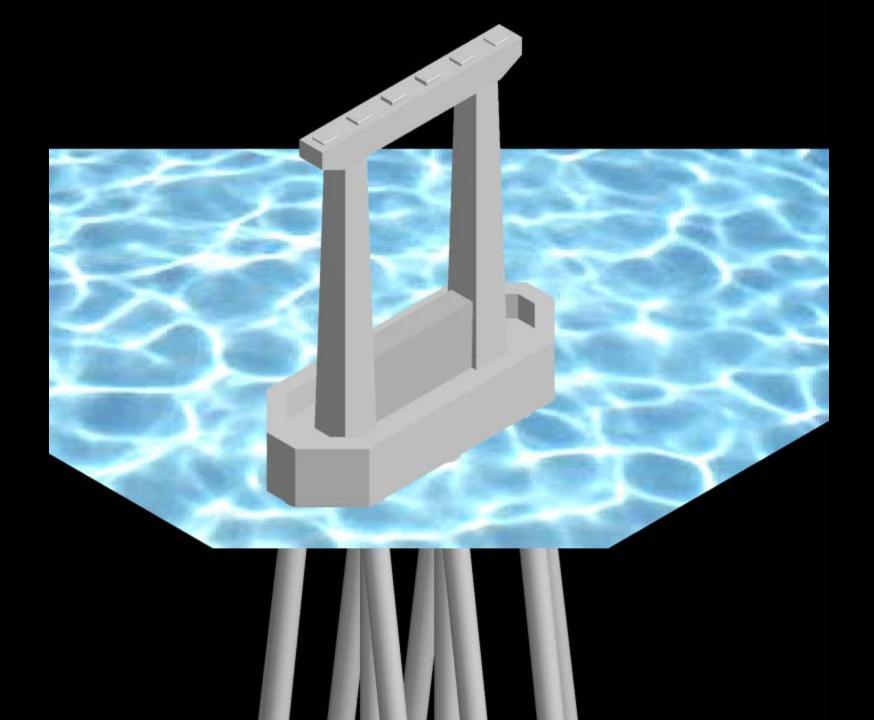






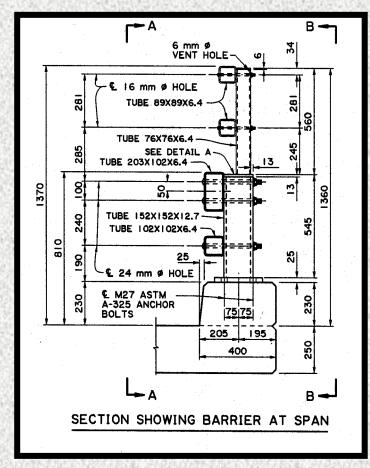






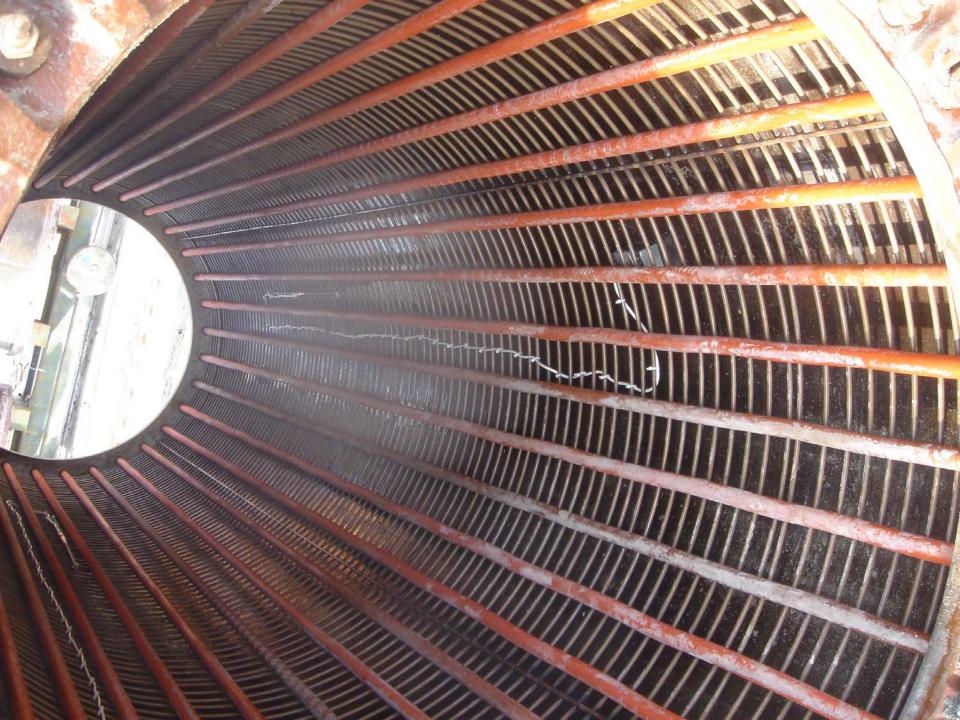
- Corrosion Prevention Plan
 - >3" Cover on Substructure
 - > Chloride Permeability Rating
 - < 2000 Coulombs @ 56 days

Steel and Concrete Bridge Railing



- Open Bridge Rail for Aesthetics
- Potential for Bicycle Traffic

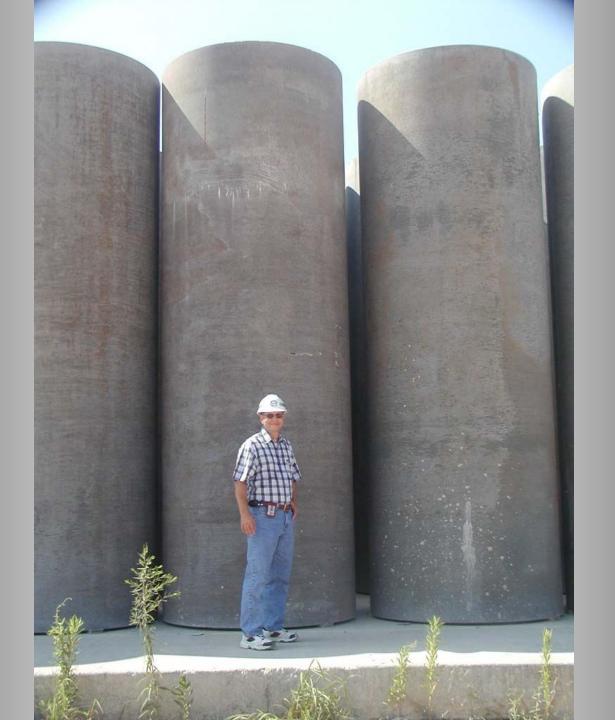
Construction











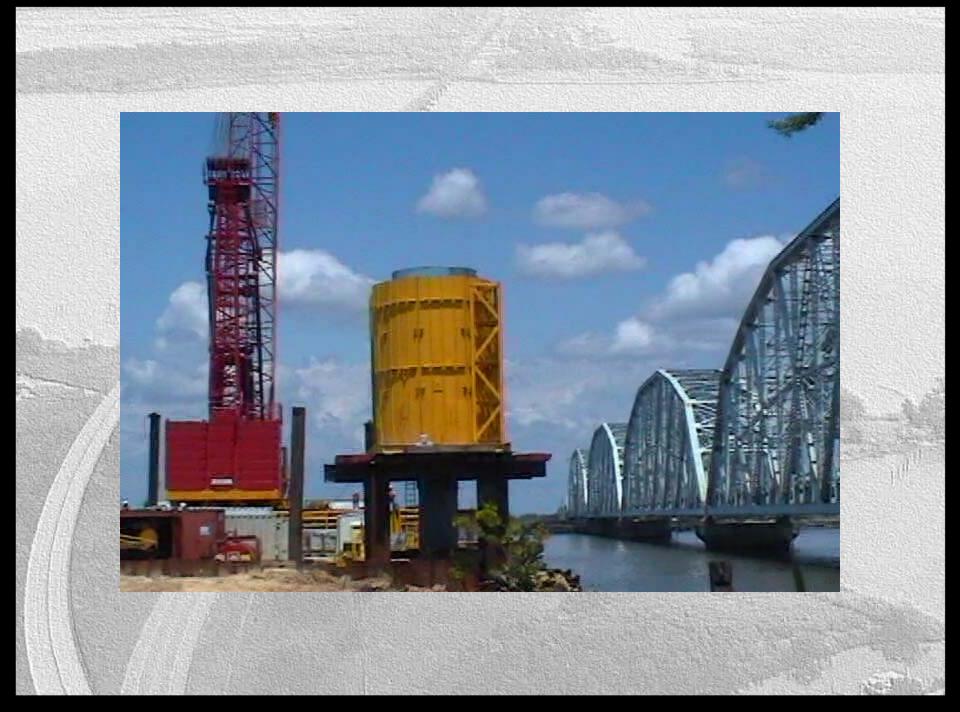








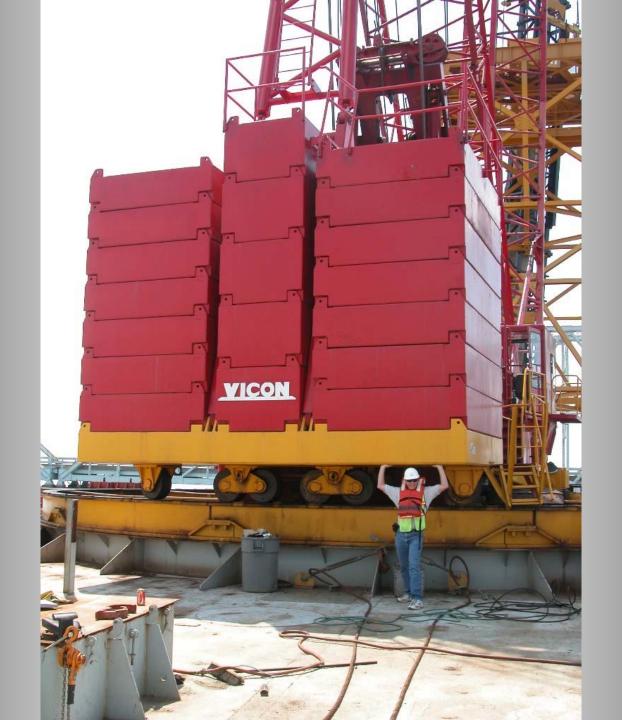








































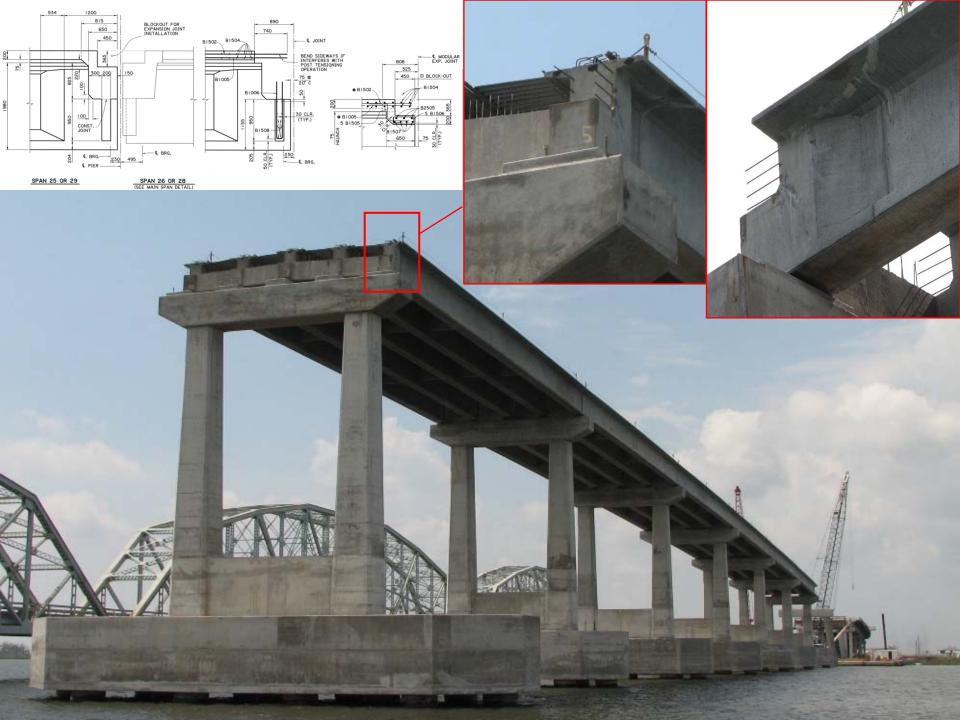




















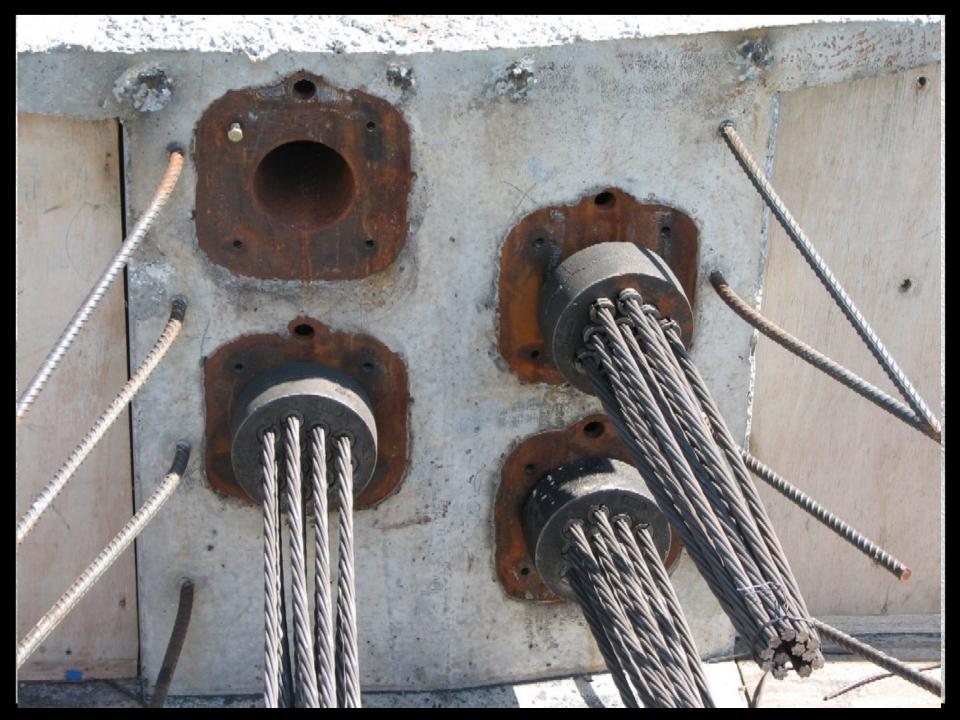














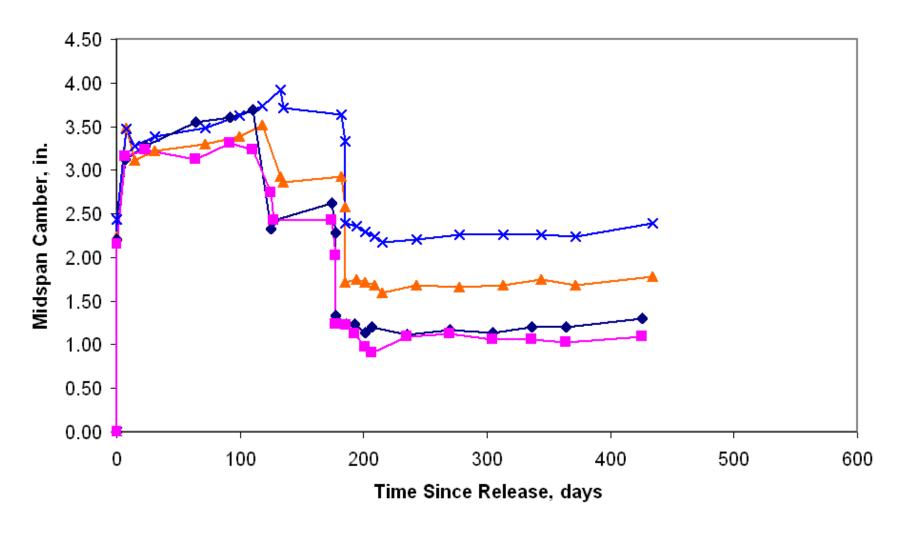








			Camber Me	easurements for (Girder 4	3 -A			
		Instru	mentation and	Monitoring of the	Rigolet	s Pass I	Bridge		
		motra	nontation and	nonkoning or the	nigolot	J 1 433	Jiiago		
Cast Date:	10/31/06	15:00							
Date/Time	Days	Ambient	Weather	Comments		Elevations		Girder	Net
		Temp., F	Conditions		East	Center	West	Camber	Camber
11/1/06 11:25	0	86	Sunny	Before Release	32.0000	31.8125	32.1250	-0.2500	0.0000
11/1/06 13:00	0	86	Sunny	After Release	33.9063	31.5938	34.2500	-2.4844	2.2344
11/8/06 14:45	8	72	Sunny	After storage	30.6563	27.5938	32.0000	-3.7344	3.4844
11/15/06 14:10	15	70	Cloudy	After storage	27.8438	25.1563	29.1875	-3.3594	3.1094
12/1/06 12:10	31	53	Clear / Windy	28 days after cast	9.2188	6.4688	10.6563	-3.4688	3.2188
1/11/07 10:00	72	58	Partly Cloudy	2 months after cast	25.2500	22.5000	26.8438	-3.5469	3.2969
2/8/07 9:50	100	65	Clear / Sunny	3 months after cast	8.4063	5.5938	10.0625	-3.6406	3.3906
2/26/07, 11:10	118	69	Clear / Sunny	Before shipping	9.3125	6.4063	11.0313	-3.7656	3.5156
3/13/07, 10:45	133	78	Partly Cloudy	After erection	61.6800	35,4000	15.4800	-3.1800	2.9300
3/15/07 9:40	135	73	Cloudy	After erection	53.7188	27.5000	7.5000	-3.1094	2.8594
5/2/07, 17:15	182	82	Partly Cloudy	Before extension	68.8438	42.6250	22.7500	-3.1719	2.9219
5/2/07 , 17:15	182	82	Partly Cloudy	After extension	59.9063	36.8125	13.3125	0.2031	2.9219
5/5/07, 08:00	185	80	Clear / Sunny	Before deck casting	64.9688	42.2188	18.3750	0.5469	2.5781
5/5/07 , 16:30	185	87	Partly Cloudy	After deck casting	70.7500	48.8750	24.1875	1.4063	1.7188
5/14/07, 10:50	194	91	Clr/Windy	1 weeks after deck	63.4375	41.5000	16.8125	1.3750	1.7500
5/21/07,10:45	201	87	Clr/Sunny	2 weeks after deck	71.0625	49.1875	24.5000	1.4063	1.7188
5/29/07, 10:33	209	83	PC/Windy	3 weeks after deck	63.2500	41.3750	16.6250	1.4375	1.6875
6/4/07 , 10:55	215	85	Cloudy	4 weeks after deck	64.2500	42.4375	17.5625	1.5313	1.5938
7/2/07, 10:30	243	83	Cloudy	2 months after cast	69.6875	47.8750	23.1875	1.4375	1.6875
8/6/07, 10:25	278	88	PC	3 months after cast	69.8125	48.0000	23.2500	1.4688	1.6563
9/10/07, 10:15	313	93	PC	4 months after cast	70.1875	48.3750	23.6875	1.4375	1.6875
10/11/07,10:53	344	80	CLR	5 months after cast	71.3750	49.5000	24.8750	1.3750	1.7500
11/8/07, 10:55	372	63	CLR	6 months after cast	68.5000	46.6250	21.8750	1.4375	1.6875
1/9/08, 1:00	434	67	Cloudy/Windy	Before DDAS connection	67.4375	45.5000	20.8750	1.3438	1.7813
				Before DDAS connection					



→ Girder A → Girder B → Girder C — Girder D









