Main Features of GulfQuest

- GulfQuest is a Maritime Museum that emphasizes the rich seafaring history of the Gulf Coast
- Unique building shape, a concrete ship
- On the waterfront
- Small footprint, floor space increases on higher floors
- Bridge, Dome
- Exterior hanging stairs
- Ships bridge and roof, great view of Mobile River waterfront
Main Features of GulfQuest

- Within the 90,000 sq. ft. enclosure:
  - Rotunda (3 stories, globe, and grand entry point)
  - Theater
  - Café
  - Store
  - Atrium
Main Features of GulfQuest

- Within the 90,000 sq. ft. enclosure (continued):
  - Discovery dock and water feature
  - Full size replica of a container ship
  - Museum displays in container ship
  - Visitor access to museum displays utilizes ramps hung from atrium roof
  - Ships bridge
Construction Program Management: Hoar Construction

First contract: surcharge material for north slab on grade (El. 16.0) – surcharge from El. +8.0 to +16.5

- Contract cost: $92,000
- Contractor: Adams and Son Construction
- Surcharge height: 8’6”
- 82 days
- 1”-3” settlement, greatest toward the river
- Piling and dewatering contract, $2.5-million
- General Contractor – Vance McCown
- Subcontractor – Berkel & Company (drilled displacement piles)
- Subcontractor – Burns (dewatering)
- Founded on 866, 16-inch diameter drill displacement piles
- First floor north (El. 16.) floor slab on compacted fill (surcharged)
Foundation

Pile – 115 Tons Compression – 20 Tons Tension
Foundation

- Shoring
- Well points and dewatering system
- Drill displacement piles
- Basement floor elevation at +6”, outside grade is +8.0 ft.
- Basement floor is water proofed to prevent water intrusion
Foundation

- Drill displacement piles
- Interference of existing timber, Tangent Pile Wall beneath on east side.
- Pile cap reinforcement was increased from 60 to 75 KSI
Framing System at Atrium

- Structural Contract: W.G. Yates, $14.4M
- Original design used some post tension. Changed to CIP at recommendations of precast manufacturer.
- Atrium east and west walls were unstable, overturning outward.
- Complicated formwork and shoring, rakers
- Diaphragms at floors, El. 30.0’, El. 44.0’ and roof were considered.
Framing System at Atrium

- Stair cut into diaphragm.
Col. Lines 10-13
- Used roof truss lower chord to tie East wall to West wall. The original roof design used an arch.
- East and West wall shoring left in place until roof was in place.
Framing System at Atrium
The circular bridge was originally designed out of concrete – problems with shoring on three columns at Northside; no visible means of support.
Bridge Framing

- Design changed from concrete to steel
- Installation challenges
- Steel fabricator (Steel, Inc.) and steel erector (Atlanta Steel Erectors)
Hanging Ramps

- Access to three story museum venues by ramps hanging from rods
- Ramps are more complicated than illustration
Hanging Ramps

- Design – 5-foot wide walkway
- 3½-inch concrete deck on metal deck
- 8-inch channel framing (MC 8X18.7)

- Hanger assembly
  - 1½-inch dia. rods, ASTM A-449
  - 12-feet on center
Hanging Ramps

- Installation challenges
- Precast or CIP?
- Pumped concrete
Hanging Ramps

HANGAR ASSEMBLY

RAMP AFTER CONCRETE PLACEMENT

HANGER ASSEMBLY

RAMP AFTER CONCRETE PLACEMENT
Hanging Stairs

- Six (6) exterior hanging stairs
- Resemble hanging life boats
- Precast concrete stairs hung by SS rods
Hanging Stairs

- Design
- Details
- 1 ½-inch diameter rods
- AISI 316 (SS) Strain Hardened
- $F_y$ (min) = 50 KSI
- $F_u$ (min) = 90 KSI
- Stair connected to floor

Hanging Stairs
- 1 ½-inch diameter rods
- AISI 316 (SS) Strain Hardened
- $F_y \text{ (min)} = 50 \text{ KSI}$
- $F_u \text{ (min)} = 90 \text{ KSI}$
- Stair connected to floor
Hanging Stairs

- Stability at intermediate landings, stabilizing pipe

STAIR NO. 2
PLAN - EL. 37.00'

DETAIL OF STAIR
NO. 3 & 6 EL. 37.00'
Hanging Stairs

- Installation challenges – holes in concrete beams/Rakers for SS rods

HOLE OMITTED – RETROFIT BRACKET FOR ROD

HOLES OMITTED – SOME RAKERS WERE DRILLED FOR ROD
Hanging Stairs

- Installation challenges
- Heavy stair loads
- Landing 6-11 Kips
- Stair Stringer 11 Kips