AASHTO COBS T-8 Technical Committee on Moveable Bridges

Acrow Temporary Vertical Lift Bridge
SR 80 Bridge Replacement Project
West Palm Beach, FL

Presented by:
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Acrow Temporary Lift Bridge
SR 80 Bridge Replacement Project

• **Project Details**
  – Overview
  – Project Timeline
  – Project Map
  – Why Acrow?

• **Acrow SR80 Temporary Lift Bridge**
  – Temporary Bridge Details
    • Lift Span
    • Towers
    • Counterweights
    • Uphaul Downhaul System
    • Cross Head Beams
    • Gantry
    • Machinery Details

• **Acrow Temporary Moveable Bridges**
  – Vertical Lift Bridges
  – Bascule Bridges
SR 80 – Southern Boulevard Bridge Replacement Project

- Project Overview
  - Existing Bridge
    - Twin Leaf Bascule
    - 24 ft Vehicular Width
      - 2 x 10 ft Lanes with 2 ft Shoulders
    - 85 ft Navigable Channel
    - Constructed in 1950
    - Deemed Structurally Deficient
  - Bridge Replacement
    - Project Owner – Florida Department of Transportation
    - Project Design Engineer – AECOM Tampa, FL
    - Use of a temporary bridge was predicated by Flagler Memorial Bridge Replacement
    - Project Contractor – Johnson Brothers (Southland Holdings)
SR 80 – Southern Boulevard Bridge Replacement Project

• **Project Timeline**
  – Pre-Bid – Acrow worked with AECOM
    • July 2014 – April 2016
  – Bid Date – April 2016
  – June 2016 – Project Awarded to Johnson Brothers
  – April 2017 – Johnson Brothers began Construction
  – December 2017 – Temporary Bridge Assembly Began
  – March 2018 – Temporary Lift Bridge Commissioning
  – May 2018 – Temporary Lift Bridge Open to Traffic
  – Late 2020 – Projected removal of Temporary Bridge
SR 80 – Southern Boulevard Bridge Replacement Project

- Project Map

Port of Palm Beach
Intracoastal Waterway
Project Location
SR 80 – Southern Boulevard Bridge Replacement Project

• Why Acrow?
  – Safety
    • No staged construction
  – Constructability
    • Assembled off site
    • 4 Months
  – Low Public Impact
    • One 5 Day closure of channel for construction
    • Zero Road Closures
      – 2 Lanes of traffic
  – Acrow Experience
Acrow Temporary Lift Bridge

- Temporary Bridge Details
  - 30 ft Vehicular Width
    - 2 x 12 ft Lanes
    - 5 ft Shared Pedestrian Footwalk
  - 125 ft Wide Navigable Channel
    - 14 ft – Bridge Closed
    - 65 ft – Bridge Fully Raised
  - Openings every 30 Minutes (:15 and :45)
  - Total Lift Span Weight – 465,500 lbs.
    - Counterweighted for 1,000 lb. imbalance
Acrow Temporary Lift Bridge
Moveable Bridge Details

• Counterweight System
  – Precast Concrete Counterweights
    • Cast with Internal Counterweight Frames
    • Cross Section to fit within Acrow Towers
  – 1,000 lb. Imbalance per corner
  – 6 x 1 ¼” 6x36 WSC Fiber Core Ropes per corner
  – 12 x 60” McKissick Roll Forged Sheaves per corner
Acrow Temporary Lift Bridge
Counterweight Details

[Diagram showing counterweight details with measurements in inches and feet.]
Acrow Temporary Lift Bridge
Counterweight Rope Details

- Counterweight Sheaves at Cross Head
- Precast Concrete Counterweight Segments
- Lift Span Trusses
- Footwalk at North Fascia
- Counterweight Rope System
- Termination at Lift Span Brackets (Typ.)
Acrow Temporary Lift Bridge
Moveable Bridge Details

• Uphaul/Downhaul System
  – 2 x 1” 6x36 WSC Fiber Core Ropes per Corner
    • 1 each for Uphaul and Downhaul (8 total)
  – Operating Ropes tie into 4 drums located at center of the Overhead Gantry
  – Overload System in place for each Uphaul/Downhaul Rope
  – All drums operate off a single shaft
  – 40 HP @ 850 RPM Motor
  – 238:1 Reducer
  – Mechanical Designer/Supplier: Steward Machine Co. Birmingham, AL
Acrow Temporary Lift Bridge
Machinery Pallet Details
Acrow Temporary Lift Bridge
Operating Rope Schematic
Acrow Temporary Lift Bridge
Operating Rope Layout
Acrow Temporary Lift Bridge
Safety Arm Details
Acrow Temporary Lift Bridge
Structural Details

• **Towers**
  - 75 ft Towers at each corner
  - Bridge Counterweights move within towers
  - Towers are used as guides for the Lift Bridge while moving
Acrow Temporary Lift Bridge
Construction Sequence - Towers
Acrow Temporary Lift Bridge Construction Sequence - Towers
Acrow Temporary Lift Bridge
Construction Sequence - Towers
Acrow Temporary Lift Bridge
Structural Details

- **Cross Head Beam Assemblies**
  - Span from Tower to Tower at each end of the bridge
  - Support the Overhead Gantry
  - House the Counterweight Sheave Cassettes
  - Internal Sheaves for Uphaul/Downhaul System
Acrow Temporary Lift Bridge Construction Sequence – Cross Heads
Acrow Temporary Lift Bridge
Construction Sequence – Cross Heads
Acrow Temporary Lift Bridge
Construction Sequence – Cross Heads
Acrow Temporary Lift Bridge Structural Details

• Overhead Gantry System
  – 175 ft Overall Length
  – Span from Crosshead to Crosshead
  – Machinery Pallet at center of Gantry
  – Walkway/Access to Machinery Pallet
Acrow Temporary Lift Bridge
Construction Sequence – Overhead Gantry
Acrow Temporary Lift Bridge
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Construction Sequence – Overhead Gantry
Acrow Temporary Lift Bridge
Structural Details

- **Lift Span**
  - 170 ft Lift Span
  - DDR2SH Truss Configuration
  - 30 ft Vehicular Roadway
  - 5 ft Footwalk (North Side)
Acrow Temporary Lift Bridge
Construction Sequence – Lift Span
Acrow Temporary Lift Bridge
Construction Sequence – Lift Span
Acrow Temporary Lift Bridge
Construction Sequence – Lift Span
Acrow Temporary Lift Bridge
Current Photo
Acrow Moveable Bridges
Vertical Lift Bridges

- Fore River Bridge Quincy/Weymouth, MA
Acrow Moveable Bridges
Vertical Lift Bridges

• Fore River Bridge Quincy/Weymouth, MA
Acrow Moveable Bridges
Vertical Lift Bridges

- Bridge of Lions – St. Augustine, FL
Acrow Moveable Bridges
Brute Force Bascule Bridges

– Oak Bluffs, Martha’s Vineyard, MA
Acrow Moveable Bridges
Brute Force Bascule Bridges

- Beldon Bly Bridge, Lynn-Saugus, MA
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– Grand Isle - North Hero Bridge, North Hero, VT
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Brute Force Bascule Bridges

– Grand Isle - North Hero Bridge, North Hero, VT
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Questions?