US 36 Truss Bridge Rehabilitation

Schedule-Critical Deadline Met with Teamwork and Innovation

March 7, 2018
Who We Are

• Dave Day, PE
  – Senior Project Manager
  – 34 years with American Structurepoint, Inc.
  – Purdue University grad 1984
  – Indiana native
Who We Are

• Liz Kokosinski, PE
  – Project Engineer
  – Recently earned PE licensure
  – 5 years with American Structurepoint, Inc.
  – Involved with ASCE Younger Members (Secretary)
  – Purdue University grad 2013
  – From Chicagoland area
Setting the Stage: Location

- Project Location:
  - Montezuma, IN
  - US 36 over Wabash River crossing
  - 8.5 miles from IL-IN state line
  - Parke/Vermillion Counties
Setting the Stage: Existing Conditions

• Built 1949

• 1270’-9 ½” Out-to-out bridge floor
  – (2) Approach Spans @ 28’-9”
  – (6) Main Spans @ 200’-0 ¾”

• 32’-0” Out-to-out Coping (29’-4” Clear Roadway)
  – Two lanes of traffic, one each direction
Setting the Stage: Existing Conditions

• Load Rating
  – Posted for Load Capacity Restriction
  – Inventory H-rating = 15 tons
  – Inventory Rating = 28 tons
  – Operating Rating = 48 tons

• 7” deck rated 4 (Poor)

• Fracture-Critical Inspection – Fair Condition

• Rehabilitated twice in past (1987, 2005)
Setting the Stage: Scope

• Project Scope: Work Items
  – “Spot Improvement”
  – Rehabilitation (3R standards)
  – Slab and Concrete Barrier Replacement
  – Clean steel members
  – Expansion Joint Replacement
  – Overlay Approach Spans
  – Substructure patching
  – Resurfacing as needed on road approach
  – Update/Replace guardrail
  – Scour Protection
  – Cleaning/painting gusset plates behind proposed barrier rail (Change Order)
Setting the Stage: Scope

- Project Scope: Environmental
  - Historic structure
- Section 106
- Alternatives analysis
- CE-4
  - Wetlands delineation – west bank
  - Scour protection

Wetland A
Approximately 1.2 acres within project boundaries
Approximately 6.0 acres delineated
Extends beyond project limits, north and south along the river

Escarpment
Extends north and south along river bank
Setting the Stage: Uniqueness

- Unique Characteristics
  - Wide floodplain
  - Critical access over Wabash River
  - Truss bridge circa 1949—narrow, design exception, vertical clearance
Project Concerns

• Schedule/Timeline
   – Parke County Covered Bridge Festival – October 2017

• Maintenance of Traffic
   – Closure highly undesirable
   – Temporary signal
     • Narrow width
     • Long phases due to bridge length
     • Emergency vehicle passage
Project Concerns

• Environmental Impact
  – Scour protection required access through stretch of overbank with wetlands
  – Installation of scour protection at piers immersed in channel

• Load Rating
  – Structural analysis not part of scope – relied on results at Final Plans with Load Rating
  – Submitted load rating request early on (expedite necessary design)
  – Some stringer, floorbeam locations deficient in structural capacity – coordination with Load Rating Engineer
Project Solutions

• Schedule/Timeline
  – Early push to expedite critical path of project development
  – Coordination with permitting agencies to begin early in design process

• Maintenance of Traffic
  – Temporary signal utilized to avoid closure despite other challenges with this MOT scheme
  – Wide-load detour
  – Detection zone for traffic to mitigate delays
  – Semi-actuated signal and preemption for emergency vehicles
  – Notification of local emergency response during construction activity
  – Weekend evening closures permitted to minimize LL deflections during deck pour
Project Solutions

• Environmental Impact
  – Aggregate path installed for access to place riprap at exposed substructure elements
    • Required to be completely removed at end of construction
    • Temporary impact – did not need to mitigate
  – Temporary aggregate loading platform
    • Barge installation of scour protection
**Project Solutions**

- **Load Rating**
  - Included quantity of structural steel for replacement at direction of Engineer
    - Structural replacement requires longer duration for fabrication
  - Load rating results indicated some members may require strengthening…replacement?
  - Alternate solution: Shear stud connectors in deficient areas
    - Raised rating sufficiently
    - Weldable steel or not? (Bolted vs. welded shear connectors)
Project Solutions

• Load Rating
  – Approximate time/schedule savings:
    4-6 weeks minimum ("unrealized" savings)
    (fabrication, shop drawing review, installation)
  – Inventory H-Rating = 33 tons (from 15 tons)
    Inventory Rating = 43 tons (from 28 tons)
  – Structural Steel included for replacement = $163,000 in low Construction Bid
  – Shear Stud Connector cost = $30,000
    • Hard to directly quantify exact cost savings, but stud installation eliminated full need for any structural steel replacement
Project Completion

• Letting = February 8, 2017
• Intermediate Completion Date (open to unrestricted traffic) = Sept 15, 2017
• Contract Completion Date = September 30, 2018 (bundled contract)

• Parke County Bridge Festival October 13-22, 2017

SUCCESS!
General Project Management “Quick Tips”

• Identify unique elements early in project that may affect schedule, cost
  – Environmental elements, concerns – Red Flag of key importance
  – Constructability
  – Design Exceptions
  – Level One Checklist – first, not last!

• Begin permitting process, impact discussion in initial development of project
General Project Management “Quick Tips”

• Plan for the worst, Hope for the best
  – Comprehensive plan detailing for variable conditions
  – i.e. Welded vs. bolted shear stud connector details, quantity for structural steel for replacement

• Be prudent
  – “Open Roads” mentality
General Project Management
“Quick Tips”

• Key word is COMMUNICATION
  – Coordination with other agencies (ADA Committee, local and District Traffic, Storm Water)
  – Include INDOT PM on emails pertinent to design prior to submittals
  – Provide weekly/monthly status reports (if not requested)

• Never just follow the mentality, “Well, it’s what we did on that project…”
  – Constantly evaluate design approach for improvement, ingenuity, cost savings
THANK YOU!

Questions?