Bridge Field Services
• New Structural Engineer Position
  • RFA Emergency Contracts
  • Design
    • Steel Repairs
    • Concrete Repairs
    • Temp Supports
  • Constructability Reviews
  • Concrete Shop Drawing
  • Specialized Inspection Support
  • Construction Support
Bridge Field Services Resources

• Structural Analysis and Durability Engineer
  • Finite Element Analysis
  • New Material Evaluation
  • Complex Structural Design Support
  • Resolution of Field Issues
    • Construction Loadings
    • Temp Shoring
    • Staged Construction
  • Research
Alignment and Consistency

- Statewide Bridge Alignment Team (Bridge Committee)
- MDOT/MITA Bridge Operations
- MDOT/ACEC Bridge Committee
- Statewide Ancillary Structures Alignment Team
- Construction Conferences
- Maintenance Conferences
- Bridge Inspection Calibration Meeting
- Statewide Alignment Construction Team (SACT)
- Design Squad Leader Meetings
- Concrete Precaster’s Industry Meetings
Statewide Alignment Team for Ancillary Structures

- Design, fabrication, construction and specifications for foundations and support structures for:
  - Cantilevers,
  - Trusses,
  - Traffic Signal Mast Arms,
  - Light Standards,
  - CCTV Poles,
  - Dynamic Message Signs,
  - Retaining walls,
  - Sound walls, etc.

- 2016: Whitepaper, kick off meeting
  - Inspection frequency, inventory, and condition
  - New LRFD Specifications
  - Reuse Criteria
Training Classes

• **Structural Bolting Workshop**
  • 2\textsuperscript{nd} annual class to be held on March 23, 2016

• **Structural Welding Workshop**
  • Under development, 1\textsuperscript{st} annual class to be held spring of 2017

• **Bridge Deck Construction and Bridge Rehabilitation Inspection**
  • April 6\textsuperscript{th} and 7\textsuperscript{th}

• **Bridge Painting School**
  • March 10\textsuperscript{th} and 11\textsuperscript{th}
Structures Management
RFA Process

- Request for Actions
  - Whitepaper
  - Priorities 1-4
  - RFA Committee
  - MiBRIDGE
  - In-house
  - Emergency Contracts
  - Special Letting
  - Normal Letting

- Temp Support Left-In-Place
  - Welded connections
  - D1.5
  - No shimming
  - Longer term applications
Request for Action

• Loss of Bearing
• Abutment Spalls
• Concrete Beam End Deterioration
• Steel Corrosion
Temporary Supports
Priority Level 2 - Critical

- Severe section loss non-adjacent beams
- Required structural strengthening based on unsatisfactory load rating
- Moderate spalls or cracks below bearing assemblies at piers/abutments
- Concrete spalling PCI beams, non-adjacent
- Excessive bearing tilt
Steel and Concrete Repairs
Current Repair Options

- Statewide Bridge Repair Crew - $1 million operational budget
  - Immediately to 3 weeks turnaround time*
  - 3-4 weeks turnaround time
- Special Needs Design Contracts - $3 million
  - 3 month average turnaround time
- Programming Process
  - 3 to 5 year program

* Turnaround refers to time from repair decision at RFA Committee to beginning field work.
2015 Efficiencies

• RFA Committee and RFA Whitepaper revisions
  • Process is working in that repair needs are being recognized and communicated.
• New Position to assist with emergency design and contracting (Kyle Kopper) cradle to grave overseer
• Creation of Temporary Support Left In-Place specification for contract work
• Continual upgrading of MiBRIDGE to foster tracking or Priority Levels and RFA submittals
• MDOT partnership with MITA and contractors in establishing emergency bidding procedures and construction
Future Strategy

• Focus on repairs versus Temporary Support Left-In-Place when possible and economical.
  • Current project underway on 496 to test the theory that concrete repair costs are on par with Temp supports.
• Emphasis on expansion joint replacement and pavement relief joints with MDOT direct maintenance forces.
  • Possible log job to assist with joint replacements if funding available
• Immediate implementation of epoxy coated, stainless steel or carbon fiber shear stirrups for concrete beam design.
• Continued programming focus on poor bridges and those with current temporary supports.
Emergency Contract Temp Supports

- Collaborative effort between the following:
  - Bridge Field Services
  - Special Structures
  - Reachall Crew
  - Bridge Repair Crew
  - Crystal Falls TSC
  - CFS – Ground penetrating radar
  - Hardman Construction
Bridge Maintenance

- Bridge Maintenance Wiki
- NHI Bridge Maintenance Course
- Portable Signals
- Reachall Crew
- Shotblasting Contracts
- Pavement Relief Joints
- Innovative Materials
  - Joints
  - PRJs
  - Epoxies
Bridge Construction
Bridge Demo

- Unintentional bridge collapses during demolition across the nation
- Need to revise bridge demolition specifications
- AASHTO SCOBS (T-4) research project soliciting state data
- Results of survey and AASHTO recommendations will be used to guide spec revisions
Precast Concrete Curing

• MSE walls, PBES elements, Culverts, etc.
• 3 day wet cure or curing compound
• If receiving concrete surface coating – 3 day wet cure (or surface preparation)
• Aligns with 1,000 psi form removal and 4,000 psi shipping strengths
ACB Modifications

- Changes to require revetment cables OR interlocking system
- Non-interlocking must contain the cables
- Two approved suppliers for each system

b. Materials: Provide and manufacture all materials for the block system according to ASTM D 6684 unless specified otherwise in this special provision.

The following block systems are acceptable for use, or Engineer approved equal:

- Tri-Lock 4015 and 4020
  Midwest Construction Products
  Office: (947) 829-2090
  Local: (262) 794-7573
  Website: http://www.mideastconstruct.com

- Amortext
  Contech Engineered Solutions
  9025 Centre Point Drive, Suite 400
  West Chester, OH 45069
  Corporate: (800) 338-1122
  Local: (616) 403-5525
  Website: http://www.conteches.com

- Amortec 4511 and 5011
  Contech Engineered Solutions
  9025 Centre Point Drive, Suite 400
  West Chester, OH 45069
  Corporate: (800) 338-1122
  Local: (616) 403-5525
  Website: http://www.conteches.com

- Cabled Concrete
  International Erosion Control Systems, Inc.
  3030 N. Rocky Point Drive Suite 150
  Tampa Bay, FL 33607
  Corporate: (855) 768-1420
  Local: (517) 348-8450
  Website: http://www.ereusa.com
Hand Chipping

- Shallow
  - Mid point of top bar
- Deep
  - ¾” below top bar
- Full Depth
  - Full depth
  - Used to address bottom spalls with sound overlay
• Above Ground Level (AGL) heights of 200’ or greater require permit
• Less than 200’ dependent upon proximity to airport
• FAA Notice Criteria Tool
• Run tool for 199’ with bridge coordinates. Pull permit if needed.
Shotcrete

• Often get requests in field to use shotcrete in lieu of latex modified concrete (LMC) for substructure patches
• Reliance on a 2008 SP and added through contract modification
• New 2012 Spec Book version coming soon and will be available for inclusion into design packages
• Guidance on when to design for shotcrete vs. LMC patches.
• DEQ must be notified every time we renovate or demolish a structure
  • Not just asbestos
• Anything beyond surface treatment
• DOT/Industry is working with DEQ to update form for our work
• Planned Renovation or Scheduled Demolition
• Work with Contractor to obtain verification of notification
Expansion Joint Updates

- Added new joint device – OnFlex 40 SSA from Structural Rubber Products Co.
- Place device 1/4” +/- 1/8”
- Added note reminding Contractor to remove the shipping bolt prior to placement of concrete
- Remember to tie the device to the steel reinforcement
Temporary Structures

- Allows for the maintenance of traffic while utilizing conventional construction methods
- The Department is currently working on any necessary SPs and guidance documents
Structure Technical
New(er) Structure Types

- **Decked Beams**
  - Bridge deck cast onto I-Beams or Box Beams at an offsite location
  - Longitudinal closure pours
  - Beams per 708
  - Deck per 706
  - Qualifications in Bridges and Special Structures (Fa)
  - Deck could be cast at the precaster’s yard, on-site, or at another location
New(er) Structure Types

- **LowSpan**
  - *Prestressed* 3-sided culvert
  - Combines advantages of prestressed beams and 3-sided culverts
    - Buried Structure = no bridge deck
    - Prestressing increases capacity without inefficient concrete member thicknesses
  - Up to 60 ft spans with rises as low as 3 ft
Three-Sided Culvert Changes

• Delete MDOT Approved Manufacturer’s List subsection 909.04G

• Create QPL subsection 909.04G and 909.04H
  • 909.04G includes Concrete Arch, Concrete Box-Arch, Concrete Flat-Top

• 909.04H includes Composite Arch Culvert (“Bridge in a Backpack”)
  • To be used with Previously Approved Special Provision

• Contractor uses shape shown on the plans or submits value engineering proposal to change culvert shape
New MDOT Forms - Field Welding Plans

• MDOT Form 0394 – D1.1 Field Welding Plan

• MDOT Form 0395 – D1.5 Field Welding Plan
  • Detailed fields for all the necessary information
  • Creates consistency for MDOT and Contractors
  • Streamlines review and approval processes
Shop Drawing Review & Other QA Procedures

- Structural Fabrication Quality Assurance Guidance Document
- Shop Drawing Review Process
  - A team effort to facilitate accurate and timely construction
  - E-construction
- Structural Fabrication Nonconformance Process
  - MDOT Forms 0559 and 0560
- Structural Fabrication Request for Information Process
  - MDOT Form 0558
MDOT Shop Drawing Dynamic Stamps

- **Approved** - shop drawings appear to be in general conformance with the contract plans. All sheets are required to be stamped “Approved”

- **Approved subject to correction** - shop drawings appear to be in general conformance with the contract plans, but there are very minor corrections needed for historical records that will not affect fabrication of the elements. Only the first sheet is stamped “Approved Subject to Correction” and the drawings must be resubmitted for review and approval

- **Revise and resubmit** - shop drawings are not in general conformance with the contract plans and approval could result in elements being incorrectly fabricated. Only the first sheet is stamped “Revise and Resubmit”. The Fabricator would be working at their own risk if they began fabricating and the Structural Fabrication Unit would notify the ENGINEER immediately and recommend fabrication wait until after drawings are stamped approved
US-131 Over the Muskegon River

Corey E. Rogers, P.E.
Engineer of Bridge Field Services
External Post Tensioning

• Tendon size – 12 - .06” dia. Strands
  – 270 ksi low relaxation strands
• Spans 1-3 – 4 tendons, Span 2 – 8 tendons
• Stressed to 560 kips
  – Maintain approx. 450 kip load after anchor set
• Pressure grouting of ducts after stressing
  – Distances of 60’ at a height of 9’
  – Mock-up
• Full detour during PT grouting.
External Post Tensioning

- Dual end stressing
- In-place Friction Testing
- Calculated elongations and stress losses
  - Approx. 36” of elongation
  - Calculated elongations and stressed verified with load cells.
- Lost one strand of one tendon during stressing NB.
- Used graphite on SB to reduce friction.
External Post Tensioning
Project Completion
Project Completion
Project Completion
Project Completion
Ahead of Schedule and Under Budget
Project Completion
Questions?

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