I-44 Bridge Replacements with Buried Bridges

Lawrence County, Missouri

A Case Study For
The SSSBA Steel Bridge Essentials Webinar Series
*Designing Cost Effective and Resilient Bridges*
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Deep Corrugated Steel Buried Bridges

I-44 over Route 96 Entrance Ramp & CR1147 – Lawrence County, Missouri

Fabricator: Big R Bridge / Contech Engineered Solutions
Contractor: Emery Sapp & Sons
Design Engineer: Lochmueller Group / Parsons Engineering

Existing Structures to be replaced – Precast & Steel Beam Bridges
Deep Corrugated Steel Buried Bridges

• Design–Build team led by Emery Sapp & Sons
• Collaborative Design Process
• Key Structure Selection Factors
  o Accelerated Construction / staged construction / eliminate detours
  o Build new bridges without removing existing bridges
  o Installed cost & life cycle cost savings
  o 75 year design life
• Buried Bridges selected over concrete girder and precast structure options
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Development of Custom Structure Geometries (iterative process)
- Minimum inside clearance for vehicles
- Final top of road elevations, AASHTO cover requirements
- Avoid conflicts with existing bridge elements & site features
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Final Geometries: Box shape for Rt 96 & Arch for CR 1147
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Customized layouts & end treatments to accommodate site configurations:
Rte 96 – unbalanced step bevel to address skewed alignment with I-44
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Customized layouts & end treatments to accommodate site configurations:
CR1147 – step beveled ends to match fill slope
Deep Corrugated Steel Buried Bridges (Rte 96)

Assembly & backfilling took place with existing bridges in service
Deep Corrugated Steel Buried Bridges (CR 1147)

Assembly & backfilling took place with existing bridges in service
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• Structure Selection Factors
  o Weight vs. span capabilities
  o Limited head room to construct below existing bridges
  o Speed of construction
  o Lower cost of maintenance (no bridge deck, bearings, barrier walls, approach slabs, abutments, joints)
  o No head to head traffic during construction
  o Simpler / faster bridge inspection
  o Mowable slopes
  o Ability to extend to add future lanes

• Installed Cost & Time Comparisons
  o Anticipated construction time was 8 months for precast/conventional options vs. 5 months for buried bridges
  o $3.5 million estimated installed cost for precast/conventional options vs. $3.0 million for buried bridges
  o Foundation construction time & cost savings, advantages of spread footings vs. deep foundations
  o Reduction in long term maintenance costs
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Take-Aways – Buried Bridges

- Economical
  - Lighter Superstructure
  - Lighter Equipment
  - Lighter Foundations
- Ease of Erection
  - Modular & Simple
  - Accelerated Bridge Construction
  - No Specialty Contractors needed
- Sustainability / Resilience
  - 100% Recyclable
  - Steel consists of ~90% recycled materials
  - Flexible
  - Reduced Carbon Footprint
Thank You!

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"NEVER STOP DREAMING"
- Freddy Krueger