The Hawthorne Street Bridge Rehabilitation of an Historic Phoenix Truss and Use of a Fiber-Reinforced Polymer Deck

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The Hawthorne Street Bridge

- Pratt through-truss, Phoenix columns; one of five Phoenix-truss bridges in Virginia
- Built ca. 1885-1900; Phoenix Bridge Co.
- Crosses CSX railroad line; urban, utilitarian, little ornamentation
- Contributing structure to National Register-listed Covington Historic District; considered individually-eligible for NR
Rehabilitation Scope

- Fiber-reinforced polymer deck, first in Virginia (2006); epoxy mortar overlay
- Replace floorbeams and stringers
- Exclusive one-way use (signalized)
- New railing to protect truss (modified Illinois rail-and-post), rehabilitate historic pedestrian railing
- Paint truss
- Cost: $1,238,921
- Estimated replacement cost: $650,000
- Section 106: No adverse effect to historic properties
- No 4(f) use (rehabilitation found to be feasible and prudent)
FRP Deck

- Research and preliminary design by Virginia Polytechnic Institute and State University, under contract to Virginia Transportation Research Council (Liu et al 2007)
- Panels consisting of adhesively-bonded, fiberglass-reinforced polyester resin tubes and plates
- Manufactured by Strongwell Corp., Bristol, Tennessee
- Weight (figures approximate)
  - 30 psf (52,800 lbs., comparable to timber deck) vs. 75 psf (135,000 lbs. for concrete deck)
  - fewer stringers for FRP deck also reduces weight
- Cost: $210,000 vs. $34,000 for timber deck
Measuring Sustainability

- Financial sustainability for Virginia
  - With Federal participation (80%): $247,784
  - Without Federal participation: $650,000
- Conservation of materials/energy (?)
- Conservation of historic bridge and larger historic community (?)
Reference

Liu, Zihong, Prasun K. Majumdar, Tommy Cousins, and John J. Lesko
