
HISTORIC BRIDGE ALTERNATIVES ANALYSIS

MERCER COUNTY BRIDGE No. 214.2
BEAR TAVERN ROAD OVER JACOB'S CREEK
TOWNSHIP OF HOPEWELL, MERCER COUNTY

APRIL 2009

REPAIRED FOR:

COUNTY OF MERCER
DEPARTMENT OF TRANSPORTATION & INFRASTRUCTURE
Division of Engineering
McDade Administration Building
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PREPARED BY:

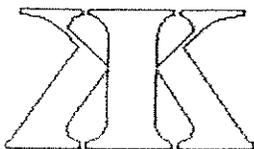
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INTRODUCTION

Bear Tavern Road Bridge (Mercer County Bridge No. 214.2) carries CR 579 over Jacob's Creek, near the intersection of Jacob's Creek Road in Hopewell Township. The six panel, pin-connected Pratt thru truss with a wood deck and steel tread plates is supported on ashlar cut stone abutments. The bridge is currently posted for 3 tons and is narrow in width to carry two way traffic.

Designed and build by the King Iron Bridge and Manufacturing Company of Cleveland, Ohio in 1882, this bridge is an excellent example of a standardized pin-connected Pratt design, the most common late-19th century bridge type. The NJ Historic Preservation Office issued an opinion in 1991 that the Bear Tavern Road Bridge is eligible to be listed in the National Register of Historic Places, and in 2001, Hopewell Township designated the bridge as a local historic landmark.

Efforts to provide a corrective solution to this crossing began in the 1960's. In 1991, interim truss repairs were recommended by an engineering consultant to maintain the crossing. An Alternatives Analysis was prepared by another consultant around 1995 as part of a Federally funded scoping program to evaluate various alternatives for this project. Various environmental and cultural resource studies were initiated. Between 1997 and 2001, the project was de-federalized.

In 2004, the mayor of Hopewell Township established an ad-hoc Task Force to evaluate the bridge. A report and presentation of their findings, including a matrix prepared by the Township's Task Force recommends various ranked alternatives based on their evaluation to address the project needs.

Mercer County has retained Keller & Kirkpatrick to develop a refined project needs statement and prepare a comprehensive Historic Bridge Alternatives Analysis which will be used to satisfy Section 106 requirements. Previous studies and reports were reviewed and utilized as appropriate. As part of the supporting documentation for the Historic Bridge Alternative Analysis, Keller & Kirkpatrick also performed an in-depth inspection of the structure to assess the existing bridge for the purpose of evaluating the feasibility of truss strengthening options for the various rehabilitation alternatives, as well as prepared a traffic needs assessment. The findings are presented in the following report.

The preferred alternative is to relocate the existing bridge to a new site (initial preference is Alliger Tract in Hopewell Township) and rehabilitate the bridge for pedestrians. Then construct a new single span bridge on a new alignment along Bear Tavern Road to improve traffic flow. Alternatives 5A and 5B can accomplish the project needs. The preferred roadway alignment of Bear Tavern Road is depicted in Alternative 5A/5B Modified 3.

PROJECT LOCATION

The Bear Tavern Bridge carries Bear Tavern Road over Jacob's Creek, in close proximity of the Hopewell-Ewing border (refer to Plate 1 for a Project Location Map). Within Hopewell Township, Bear Tavern Road (CR 579) is a Minor Arterial Roadway under the jurisdiction of Mercer County. Bear Tavern Road (CR 579) functions as a bypass route for Route 31, particularly during peak periods, when Route 31 operates with considerable delay. The project site is located between Routes 29 and 31, and is about 1 mile north of Interstate I-95.

Bear Tavern Road (CR 579) carries one lane of traffic both north and southbound. The roadway extends to the north to Pennington Road and Washington Crossing State Park, and extends to the south to Mercer County airport and West Trenton (refer to Plate No. 2 – Key Map and Plate No. 3 – Plan).

Jacob's Creek generally flows east to west, extending to the Delaware River about one mile to the west.

CONCLUSION AND RECOMMENDATIONS

The preferred alternative is to relocate the existing bridge to a new site (initial preference is Alliger Tract in Hopewell Township) and rehabilitate the bridge for pedestrians. Then construct a new single span bridge on a new alignment along Bear Tavern Road to improve traffic flow. Alternatives 5A and 5B can accomplish the project needs. The preferred roadway alignment of Bear Tavern Road is depicted in Alternative 5A/5B Modified 3.

As requested by the Hopewell Township officials and Historic Preservation Commission, the selection of the new bridge superstructure type will be determined during final design (refer to the Township resolution in Appendix B). During final design, a structural steel stringer bridge and a steel pony truss bridge will be discussed between the interested parties. A precast concrete stringer/box beam superstructure alternative will not be considered due to geometric concerns and a radical change in material type from the existing truss bridge (metal) to concrete.

Finding of Effect

The relocation of the bridge and the change in intended users of the bridge (vehicles vs. pedestrians) will impact the historic fabric of the bridge and may have an adverse effect. A Memorandum of Agreement (MOA) may be required to be prepared prior to construction.

Measures to Minimize Harm

To mitigate the potential adverse effect, the following is recommended:

- Existing conditions of County Bridge 214.2 be recorded to Historic American Engineering Record standards prior to beginning the construction phase.
- The rehabilitation / strengthening of superstructure members will be performed as required to rehabilitate the bridge. The final design for rehabilitation of the historic trusses shall follow the guidelines set forth by the *Secretary of the Interior's Standards for Rehabilitation*.
- Interaction with the Historic Preservation Office during the final design and construction phase. Interaction to include meetings and submission of design drawings and calculations.
- The removal of prior repairs and replication of existing members only when replacement is necessary will render the structure as a better representation of the original construction of Bridge No. 214.2 than the present condition.
- The existing stone abutments will be used for the new abutments or as stone-facing for the new abutments.
- The proposed relocation site will be further examined. A complete description of the new setting and environment of the proposed site including evidence that the proposed site does not possess historical or archaeological significance that would be adversely affected by the proposed relocation.

MERCER COUNTY BRIDGE No. 214.2 (BEAR TAVERN ROAD BRIDGE) – HBAA ALTERNATIVES COMPARISON MATRIX

ALTERNATIVES		1	2	3A	3B	4A	4B	5A	5B	5A/ 5B – Modified 1:	5A / 5B – Modified 2:	5A / 5B – Modified 3:	5A / 5B – Modified 4:	5A / 5B – Modified 5:	6A	6B	7A	7B	
PROJECT GOALS AND CONCERNS		No Build	Rehab (H15)	Mod. rehab. widen truss	New 2 span w/ truss facade	Par. struct. one-way each.	New 2-span bridge; truss as ped. bridge	Conv. new 2 span bridge, relocate truss	CSD new 2 span bridge, relocate truss	5A/ 5B – Modified 1: New single span, r=425'; relocate truss	5A / 5B – Modified 2: New single span, r=300'; relocate truss	5A / 5B – Modified 3: New single span, r=350'; relocate truss	5A / 5B – Modified 4: New single span, r=700'; relocate truss	5A / 5B – Modified 5: New single span, r=850'; relocate truss	6A Conv. new 2 span bridge, demolish truss	6B CSD new 2 span bridge, demolish truss	7A Complete realignment to the West	7B Complete realignment to the East; truss local traffic	
STRUCTURAL/ TRAFFIC	Load Capacity	Substandard	Standard: H15	Standard: H15	Standard: H15 Standard: HS25	Standard: H15 Standard: HS25	Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: Ped/H5 Standard: HS25	Standard: HS25	Standard: HS25	Standard: HS25	Standard: H15 Standard: HS25	
	Weight Limit	3 Tons	15 Tons	15 Tons	15 Tons / None	15 Tons	None	None	None	None	None	None	None	None	None	None	None	None	15 Tons / None
	Lane Width	Substandard	Substandard	Standard	Standard	Improved / Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	15 Tons / None
	Alignment / Approach	Substandard	Substandard	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
HISTORIC PRESER- VATION	Overhead Clearance	Substandard (12'6")	Substandard (12'6")	Substandard (14'0")	Substandard (14'0")	Subst. 14'0" / Stand- unlimited	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (unlimited)	Standard (Unlimited)	Standard (Unlimited)	Standard (Unlimited)	Subst. 14'0" / Standard (Unlimited)
	Speed Limit	15 mph	15 mph	25 mph	25 mph	25 mph	30 mph	35 mph	35 mph	30 mph	25 mph	35 mph	35 mph	25 mph	35 mph	35 mph	40 mph	15 mph / 40 mph	
	Traffic Flow	Stop	Stop	Stop	Stop	Stop	Stop	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Stop
	Truss Bridge	No Change (No Effect)	Major Alteration Adverse Effect – Visual	Extreme Alteration Adverse Effect	Major Alteration Adverse Effect – Use	Major Alteration Adverse Effect	Minor Alteration Adverse Effect	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Minor Alteration Adverse Effect – Relocation	Demolished - Major Impact Adverse Effect	Demolished - Major Impact Adverse Effect	Demolished - Major Impact Adverse Effect	Major Alteration Adverse Effect – Visual
Historic Setting	No Change	Minor Impact - Visual	Minor Impact - Visual	Minor Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual	Impact - Visual
Archaeological Resources	No Impact	No Impact	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd	Phase IB Invest. Req'd
Complies w/ SOI Standards	N/A	Marginal	No	No	Marginal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Marginal	
ENVIRON- MENTAL	Freshwater Wetlands	No Disturbance	Temporary Disturbance	Minor Disturbance	Minor Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance	Major Disturbance
	Floodplain	No Encroachment	Minor Encroachment	Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment	Major Encroachment
	Permits (Flood Haz. / Wetlands only)	None Required	Viable	Viable	Viable	Viable	Marginal	Marginal	Marginal	Viable	Viable	Viable	Viable	Viable	Marginal	Marginal	Viable	Marginal	
LAND USE	Acquisitions / Easements	No Change	No Change	No Change	No Change	No Change	Minor	No Change	No Change	No Change	No Change	No Change	Significant	Significant	No Change	No Change	Significant	Significant	
COSTS	Construction Cost	\$155,000	\$900,000	\$1.65 Million	\$2.10 Million	\$2.39 Million	\$3.92 Million	\$5.23 Million	\$4.93 Million	\$4.6 Million	\$4.5 Million	\$5.0 Million	\$5.7 Million	\$5.9 Million	\$4.4 Million	\$4.1 Million	\$5.4 Million	\$6.2 Million	
CONSTRUCTION DURATION		1 Month	10 Months	12 Months	12 Months	15 Months	18 Months	18 Months	18 Months	15 Months	15 Months	18 Months	22 Months	24 Months	15 Months	20 Months	15 Months	16 Months	
DETOUR DURATION		1 Month	10 Months	12 Months	12 Months	2 Months	2 Months	2 Months	2 Months	6 Months	14 Months	4 Months	8 Months	8 Months	2 Months	2 Months	2 Months	2 Months	

Right-of-way acquisition costs are not included in the Construction Cost.
 Construction Costs are comparative costs based in 2009 dollars.
 For Permits, the viability of an alternative is for Flood Hazard Area and Wetlands conditions only. HPO's review during the NJDEP review is excluded; refer to SOI compliance.

Legend

Structural / Traffic

Substandard – Alternative does not meet current AASHTO design criteria.

Standard – Alternative does meet current AASHTO design criteria.

Improved – Alternative improves existing substandard feature, but does not meet current AASHTO design criteria.

Historic Preservation

Yes – Alternative complies with Secretary of the Interior Standards, but may require a Memorandum of Agreement (MOA).

Marginal – Alternative nearly infeasible to comply with Secretary of the Interior Standards

No – Alternative does not comply with Secretary of the Interior Standards

Environmental Permits

Viable – Alternative proposes regulated activities where the issuance of flood hazard area and wetlands permits are feasible (note: if alternative is SOI non-compliant, then permit may not be viable).

Marginal – Alternative proposes regulated activities where the issuance of flood hazard area and wetland permits are possible, but extensive mitigation required.

Not Viable – Alternative proposes regulated activities where issuance of flood hazard area and wetland permits are highly improbable.