



Beaucoup Creek Bridge

The Beaucoup Creek Bridge is located on TR233 in Perry County Road District 6-2. The structure was originally built by a coal mining company and dedicated to the county more than 35 years ago. Although the structure had a lane width so narrow as to allow only one-way traffic, the bridge still served as a primary access way across the creek for approximately 100 vehicles a day.

During a periodic inspection of the structure in February 1985, engineers found that the original timber bents on the east pier had become severely deteriorated and that immediate rehabilitation or replacement was needed. Further consultation between the inspecting structural engineer, the road commissioner and the Perry County Superintendent of Highways determined that replacement was the ideal solution. The Illinois Department of Transportation concurred and an engineering agreement for design services was entered into, with the state paying 80 percent of the cost and the county and the road district equally dividing the balance.

In keeping with the conclusions reached during the initial consultation, the county road district formulated the following design constraints:

1. The project must be economically feasible.
2. The bridge must be constructed in a short time span since a temporary detour structure could not be affordably built by the district and because there was a possibility of several residents becoming landlocked if flooding occurred after the old structure was removed.
3. The new structure must provide for minimal future maintenance.
4. A clear span structure was preferable since debris buildup adjacent to the old timber bents created maintenance problems in the past.

To satisfy the above criteria, a single span concrete bridge consisting of precast prestressed voided slab units was designed that would easily span Beaucoup Creek and provide for the necessary waterway opening. IDOT approved the bridge design and span length was set at 100 ft (30.5 m); bridge width was set at 24 ft (7.3 m).

Bids were opened on this project on December 3, 1985. A low bid of \$147,545.73 was received from R & H Construction Company of Du Quoin, Illinois. Shortly

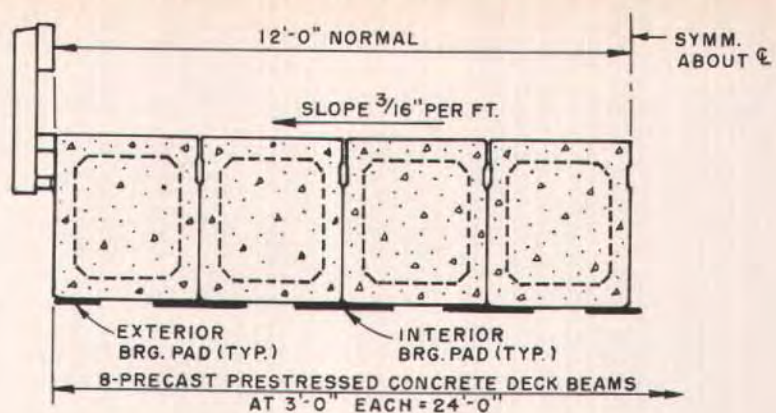


Old, narrow, single lane structure.

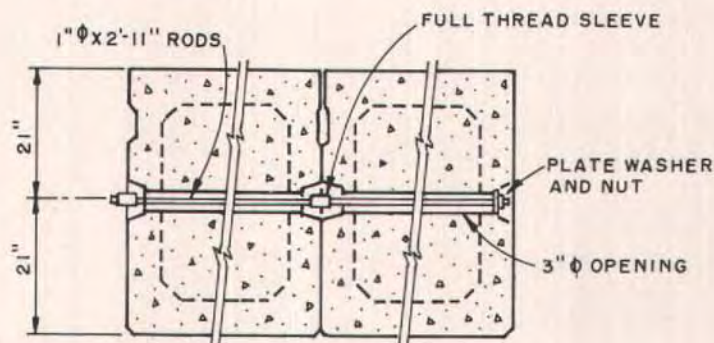
Precast prestressed concrete voided slab units proved to be the ideal design solution for the replacement of an old, deteriorated timber bridge in rural Perry County, Illinois.



Deteriorated east abutment/pier complex of old bridge.



Half cross section.



Typical section.

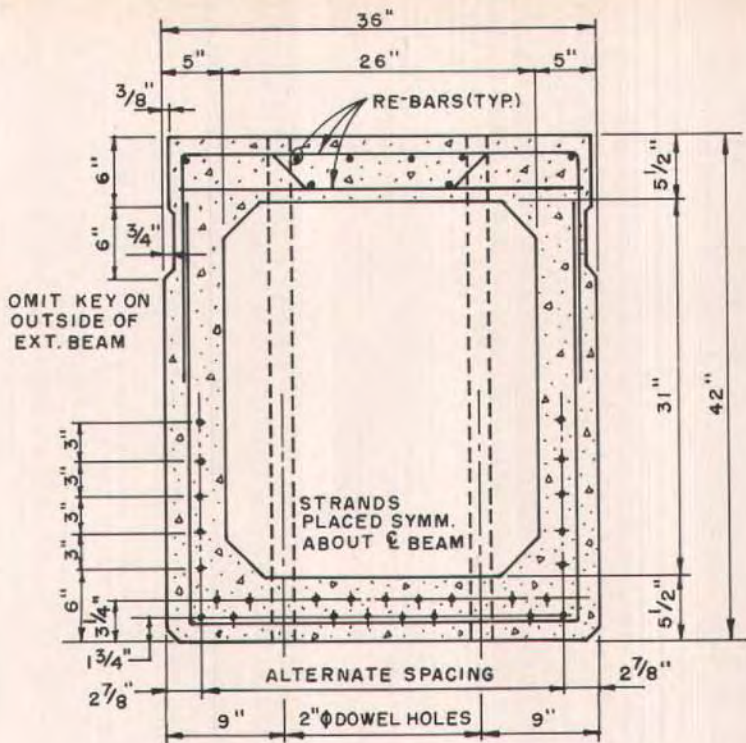
thereafter, it was approved by all concerned parties.

The beams were fabricated by Egyptian Concrete at their plant in Salem, Illinois. The precast units were 102 ft 4 in. (31.2 m) long, 3 ft (0.9 m) wide and 42 in. (1.1 m) deep. The voids of the slab were 31 in. (0.8 m) deep and 26 in. (0.7 m) wide. For beam details, see typical section, half cross section and transverse tie assembly.

Once the precast units were fabricated, they were transported, unloaded and stockpiled adjacent to the old bridge. On April 7, 1986, the road was closed to traffic and demolition of the timber structure began. Construction of the new bridge immediately followed.

The substructure consists of HP 12 x 74 steel piles driven to bed rock with a concrete breastwall approximately 8 ft (2.4 m) high and 14 in. (0.4 m) wide constructed over them. Parallel concrete wing walls cantilever from the foundation into the abutment walls to provide embankment protection on the approach roadway. Rip rap was used for channel protection under the new structure.

When the substructure work was completed, the bridge superstructure was constructed at a zero degree skew angle. Two cranes were used to place the eight, 40 ton (36 t) precast prestressed concrete deck units side by side, leaving about 1/2 in.



27-1/2" ϕ STRANDS, EACH STRAND STRESSED TO 31,000 LBS.

Transverse tie assembly.



Form for deck beam with cardboard voids stacked at left.



Interior of forms showing placement of strands and reinforcing steel for bottom and sides.



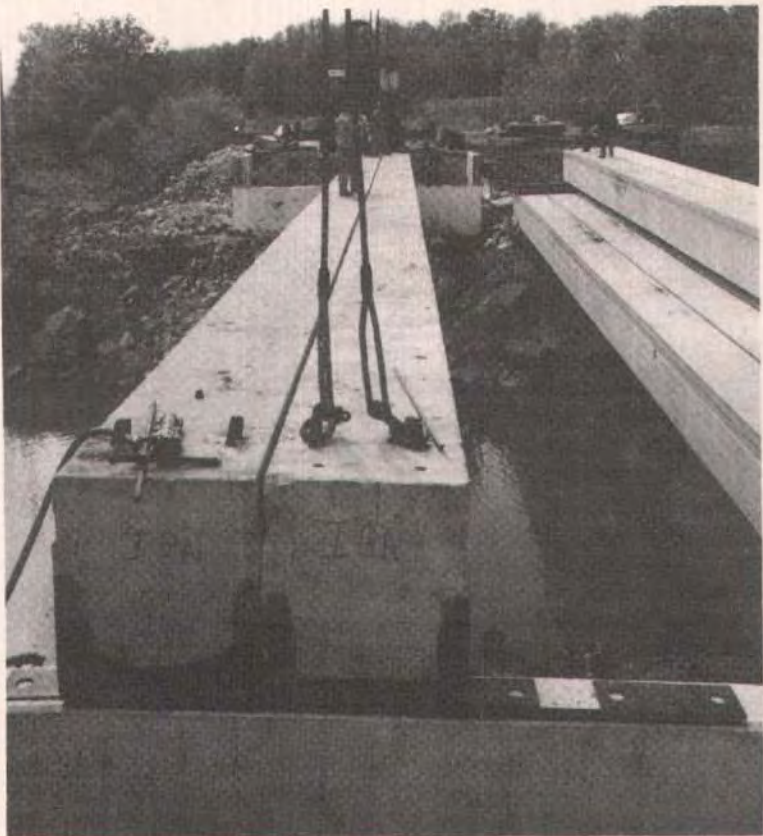
The logistics of transporting the precast prestressed concrete units presented very few problems.



The old structure, with the assistance of a crane, permitted new beams to be stacked adjacent to the old structure.



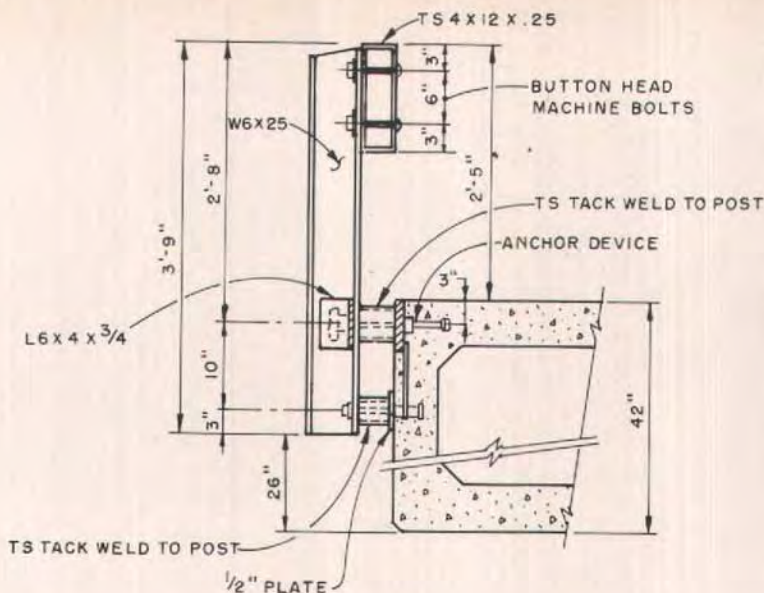
The new beams were stacked adjacent to the old structure because two cranes were required for final beam placement.



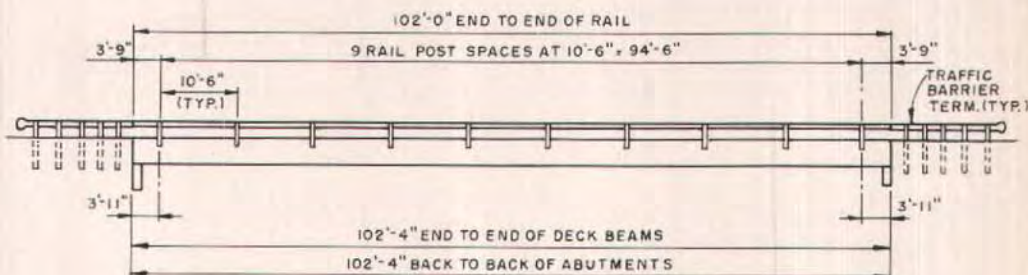
Placing beams on new abutments.



Deck beams in place, ready for grout.



Section at rail post.



Rail post layout.

(13 mm) of the beam to rest on each side of the spanned area. After the transverse tie assemblies were in place, the concrete blockouts were filled at each abutment to secure the precast units. The shear keys were then filled with non-metallic, non-shrink grout to provide for load transfer from beam to beam. Type S-1 steel bridge railing was installed using anchoring devices cast into the two exterior deck units. (See rail post layout and section for details.)

The roadway approach work was quickly completed and the structure was reopened to traffic on May 19, 1986, just 43 days after demolition of the original structure. Had the contractor not experienced a one week delay waiting for other materials, the bridge could have been completed in only one month.

Since its completion, the Beaucoup Creek Bridge has attracted the interest and imagination of bridge engineers from all over the area. The reason: The project marks the first time that precast prestressed concrete box beams of more than 100 ft (30.5 m)



Structure with approach completed and open to traffic.

have been used on an Illinois bridge project. According to the structure's designer, the creek's depth and various curves made typical, multi-unit construction impractical and financially impossible. Therefore, the design team had to develop an innovative approach to make replacement of the original timber bridge a reality.

The new bridge has been operating well since completion and it appears that future maintenance will be very low-cost. Total cost for the project was \$156,200, including \$7,600 for design engineering and \$83,725.00 for the precast prestressed concrete. Cost per sq ft was approximately \$34.00.

Credits

Owner: Perry County Road District #6-2, Du Quoin, Illinois.

Construction Agents: State of Illinois Highway Department District 9, Carbondale, Illinois and Perry County Highway Department, Pinckneyville, Illinois.

Structural Engineer: The Pyle Company, Centralia, Illinois.

Project Resident Engineer: Roy A. Smith, Sr., Perry County Superintendent of Highways.

Precast Prestressed Concrete Manufacturer: Egyptian Concrete Company, Salem, Illinois.

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