



PORTLAND CEMENT ASSOCIATION

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BRIDGE DIVISION

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April 12, 1995

Mr. Dale F. Loe
Bridge Engineer
Arkansas State Highway and Transportation Department
P.O. Box 2261
Little Rock, AR 72203-2261

Review of AHTD Plans for Precast Prestressed Concrete Bridges

Dear Dale:

On behalf of the members of the Arkansas Area Prestressed Concrete Council, I would like to thank you for the opportunity to review plans of the two precast prestressed concrete girder bridges, which you sent me on September 1, 1994.

The Council members reviewed the plans during the fall. They indicated that the girders detailed in the plans were fairly standard and could be readily fabricated in their plants.

Following review of the plans by the Council members, I began to examine the continuity details of both bridges. My comments have been delayed as I continue to investigate general design procedures and details for these "continuous for live load" bridges. PCA intends to eventually publish design procedures and details, updating the recommendations published in 1969.

PCA is not the only organization evaluating design for continuity. The PCI Committee on Bridges continues to discuss this topic at its meetings. It is also my understanding that this topic will be on the agenda for the upcoming AASHTO T-10 Technical Committee meeting in Portland.

In spite of the continuing discussions and concerns, this simple bridge system has been used successfully for many years in many parts of the country as documented in NCHRP Report 322. The widespread use of bridges of this type can be attributed to the fact that they require little or no maintenance, have performed very well, and are durable. This system has provided an economical and competitive alternative to other construction materials.

The following comments regarding the detailing for continuity of the structures shown in the plans are offered for your consideration. Some of these comments may be addressed in the design computations, which I did not have. A few general comments are also presented.

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- Straight extensions of mild reinforcing bars are used for the positive moment continuity connection at the ends of girders for the Ouachita River bridge. The embedment of these bars into the continuity diaphragm appears inadequate to develop the strength of the bars. The use of hooks on the ends of the bars in the diaphragm would improve the behavior of the connection.
- The large number of bars used in the Ouachita River bridge continuity connection is not typical. This has apparently led to an unusual strand pattern in order to provide space to place the bars.
- The increased embedment lengths and staggered cutoffs of the continuity connection bars within the girders of the Ouachita River bridge are excellent details sometimes overlooked by designers.
- Details for the Red River Relief bridge are fairly typical for structures using bent strands for the continuity connection.
- The Ouachita River bridge has an unusually large number of draped strands (14). Draping this many strands to the highest possible location is generally unnecessary. The number and location of draped strands in the Red River Relief bridge girders are more representative of practice.
- Consider elimination of bearing insert plates in the girders and anchor bolts in pier caps. This simplifies fabrication and erection and eliminates expensive items that are generally not required. Girders with no embedded plates have been and continue to be used successfully by many states.
- Consider standardizing hold-down locations to 5 ft each side of midspan. This simplifies fabrication and has very little effect on the design.

If you or a member of your staff would like to discuss the above, please call.

Members of the Council and I would also like to offer our assistance to review plans for the North Belt project in Little Rock when they are completed. I can assure you that such a review would be completed in a more timely manner.

Sincerely,

Reid W. Castrodale

Reid W. Castrodale
Bridge Engineer
Engineering Services, Codes, and Standards

RWC:am

Copy to --
Members - Arkansas Area Prestressed Concrete Council
Basile G. Rabbat - PCA
John S. Dick - PCI

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AND
TRANSPORTATION DEPARTMENT

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September 1, 1994

Mr. Reid Castrodale
Portland Cement Association
5420 Old Orchard Road
Skokie, Illinois 60077-1083

Dear Mr. Castrodale:

As discussed recently, enclosed are details for prestressed concrete girder designs for the Ouachita River and the Red River Relief bridges for your review and comments.

We have used different design concepts on these bridges due to problems with cracking in the positive moment girder connection at the intermediate bents.

On the Ouachita River, the bridge was designed continuous for live loading. The positive moment connection was designed in accordance with PCA procedure. Additional reinforcing bars were added to make the connection.

On the Red River Relief, the bridge was designed simple and continuous for live loading. The positive moment connection was designed in accordance with PCA and PCI procedures. Strands were extended to make the connection.

Both of these bridges have recently been constructed. If you have any questions, please call us.

Yours truly,

Dale F. Loe
Dale F. Loe
Bridge Engineer

DFL:bw
Enclosure

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