ASCE-INDOT
Structural Subcommittee
Meeting No. 34 Minutes
October 5, 2006

The meeting was called to order at 9:15 A.M., at the INDOT room N-642 conference room. Those in attendance were:

Stephen Weintraut	Butler, Fairman and Seufert, Inc.
Tom Walker	Butler, Fairman and Seufert, Inc.
Bill Dittrich	INDOT, Program Development
Jason Yeager	Gohman Asphalt Company
Greg Klevitsky	INDOT, Bridge Engineering
Anne Rearick	INDOT, Structural Services
Tony Zander	INDOT, Materials and Tests Division
Mike Wenning	American Consulting
Mike Obergfell	USI Consultants
Dick O'Connor	RQAW Corporation
Robert Frosch	Purdue University

In addition to the attendees, these minutes will be sent to the following:

Naveed Burki	INDOT, Bridge Engineering
Keith Hoernschmeyer	FHWA, Bridge Engineer
George Snyder	INDOT, Bridge Rehabilitation & Rating
Chris Hill	Prestress Services

A meeting agenda had previously been distributed and the following items were discussed:

1. **Review and approve minutes of Meeting No. 33**
Minutes from Meeting No. 33 were e-mailed to all members and approved at this meeting.

2. **Discussed possible topics for the County Bridge Conference.**

3. **JTRP Recommendations on Integral End Bend Structures (Frosch)**
Robert Frosch opened this discussion by explaining the details of the research being conducted on several bridges in the Indiana area while focusing his efforts using a Power Point presentation on the bridge on state highway 18 that crosses the Mississinawa reservoir. The research was to determine how bridges would react to changes over the next 25, 50, and 100 years. He stated that his findings were available on the Purdue University website (http://rebar.ecn.purdue.edu/JTRP /) and were in PDF format for anyone to read. The research showed that the embedment of the piles should be extended from 15 to 24 inches, and that the orientation should be about their weak axis. It was agreed that the use of the Polystyrene wrap be dropped and the depth of

the cap be increased by an additional 9 inches. It was also recommended that the maximum length of an empirically-designed integral end bent bridge be extended to 500 feet (250' from point of zero movement) for bridges with skews of less than 30 degrees. For bridges with skews between 30 degrees and 45 degrees, the maximum length will be limited to 250' (125' from point of zero movement). These recommendations were approved by the committee along with the 24-inch pile embedment. Mr. Frosch recommended that the Minimum Pile Length Table 8.1 shown as part the study recommendations be added to the Design Manual. He also recommended that 67-1.03(03), Item 2, last sentence, be changed to read, "Piles shall only be driven in one row". It was also noted that some guidance should be given to the designer when minimum pile length can't be met. There should be instructions to take appropriate action to prevent pile tip movement.

Another area of discussion was the use of metal tie-wires used to secure the epoxy rebar together in bridge decks. The wire is supposed to be plastic- or epoxy-coated in order to isolate the mats of reinforcing steel and reduce the likelihood of future corrosion due to battery action between mats of steel in the deck. This coating practice is not being enforced for the construction of concrete decks and is a cause for concern. Therefore; Steve Weintraut asked Tony Zander to determine if Indiana requires the use of coated chairs and tie-wires. Steve also asked Tony to find out if Materials and Tests has any research or literature on various types of coated wire and support chairs. Tony was asked to report his findings at the next meeting.

4. **Limits of Semi-Integral End Bent Structures (Rearick)**
Mrs. Anne Rearick stated that new semi-integral design details will probably be on the October INDOT standards meeting agenda. As of today no length or skew limits are currently set. Steve Weintraut suggested a note be added to the Design Manual advising designers to look at the rotation and racking of the end of the bridge for skews greater then 30 degrees and lengths of 500 feet or greater. After further discussion of empirically-designed semi-integral end bent bridges, it was decided to adopt the same length and skew requirements as that used for empirically-designed integral end bent bridges. This recommendation was approved by the committee.

5. **Newly Developed Semi-Integral End Bent Details (Rearick)**
This topic was held over until the next meeting.

6. **Bottom Strand Debonding Criteria (McCool & Weintraut)**
Steve Weintraut asked if 25% is OK, and Robert Frosch responded that he does not like to set limits on this issue, and that it should be up to the designers to work out. It was suggested that further research be conducted to help determine if the current criteria should be changed. Until further research is completed, we should leave the criteria as are.

7. **Semi-Light Weight Concrete Specification Update (Zander)**
No Update available

8. **Status of Precast Concrete Box Beam Standards (Burki)**
These standards were submitted to the INDOT Standards Committee and are expected to be discussed at the October meeting.

9. **Design Standards for the Rehabilitation of Historic Bridges on Low Volume Roads (Hoernschmeyer)**
The MOA has been signed by the major players and is awaiting buy-in. The design standards have been sent to all interested parties, and a meeting with all parties will be held the week of October 9th.

10. **Concrete Pour Detail for Approach Slabs (Zander, Yeager, & Burki)**
Jason was asked to put together a presentation on this issue for the next meeting. It was recommended that the thickness of the ledge be increased from 6 inches to 9 inches. It was decided that INDOT will investigate to see what negative consequences there are before implementing this change.

11. **New Business**

A. Mike McCool asked why INDOT sent out the recent memo on Transformed Beam Section Design. Anne Rearick responded that it was because of recent Inventory and Overload Ratings performed by INDOT on in-service bridges that were failing to meet loading standards. It was stated several times in the meeting that the prestressed beams in several new bridges were failing to have the proper load rating and that INDOT was concerned with some of the bridges in Indiana, especially on the Interstate system. Currently, INDOT's rating program cannot easily model the transformed beam section properties, and INDOT is not made aware anywhere on the plans that these properties were utilized in the original design. She stated that more and more requests for overloads are coming into INDOT and she feels it necessary to keep the memo in place so that INDOT can get a feel for how many designers would like to utilize the transformed beam section properties and determine if this is a policy that they want to eliminate or adopt as standard practice. Currently, INDOT is willing to look at these situations on a case-by-case basis, but most importantly wants the note added to the plans that the transformed beam section properties were utilized in the design.

   An example of wording for the Design Data displayed with the general notes was distributed to all the members and discussed. It was determined that Mike Wenning, Mike McCool, and Anne Rearick will be on a committee to look at new wording for projects that will be using LRFD design. Mike McCool stated that West Virginia had design data sheets for all bridge types and that he is supposed to get copies of them and distribute them to the other two committee members for future discussion.

B. Mike Obergfell brought up a concern on the costs of inspecting steel and/or post- or pre-tensioned box girder structures that require confined space entry inspection operations. He asked if the cost of inspection is ever considered when the SS&T analysis is performed. All members expressed their opinions that these costs are not being considered. It was mentioned that Context Sensitive Solutions typically are driving many of the decisions to use a box girder type structure.

   Most people agreed the extra cost to inspect these bridges should be considered in the cost analysis that is performed at the SS&T plan development stage. One person mentioned the hardest part of considering the extra cost of inspection was to determine what dollar amount should be used in the analysis. Most designers do not have ready access to this information. It was suggested that someone at

INDOT who is in charge of bridge inspections provide some guidelines to use for these costs.

C. Mike Obergfell stated that USI recently received a review that requested a resubmission of SS&T analysis in order to look at the economics of a modified bulb-tee section that the review consultant used on a recent project. He stated that If the wide-bottom flange prestressed beam section is an economical section for reducing the structure depth, then we all should be considering it in our designs, and it should be added to the Standards and in the Design Manual, or at least published in an official design memo. Anne Rearick agreed to look into this issue and hopefully get a memo out to the review consultants.

Steve Weintraut scheduled the next meeting for February 8, 2007 at 9:00 A.M. at the INDOT N642 conference room. He then closed the meeting.

Respectfully submitted,
BUTLER, FAIRMAN and SEUFERT, INC.

Michael Matel, P.E.
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Attachment

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Attached to these minutes are additional concerns that were e-mailed to Stephen Weintraut by Mike Obergfell on October 14, 2006.

Additional concerns for inspection of box girder bridges submitted by Mike Obergfell (USI) on Oct. 14, 2006

I would also like to add our concerns that most of these box girder bridge types are or will be considered complex bridges and will require complex bridge inspection qualifications, thus adding to the inspection costs. From our experience, these bridge types are also experiencing in-service problems due to poor design details, such as deck drains running through the box girders that will most certainly always leak, thus causing corrosion and/or severe leaching and deterioration of the reinforcing steel in concrete girders or advanced deterioration of the post tensioning strands. The steel box girders almost always contain fracture-critical details that are experiencing in-service cracks due to high secondary stresses causing reduced fatigue life, thus leading to expensive rehabilitation measures after very few years in service. Most past and even recent catastrophic bridge failures have been due to fracture-critical member failures due to poor fracture-critical-design details. The previously-constructed INDOT post-tensioned segmental concrete box structures (I think INDOT has about 10 of these structures that are all major structures) are having major cracking issues that INDOT has spent millions of dollars inspecting, studying, and trying to come up with rehabilitation measures on. These issues need to be dealt with by the designers, or realistic economic justification needs to be provided to justify the use of these bridge types. In addition, these complex structures also have much higher up-front design costs that are also not considered in the SS&T analysis.

As for costs to inspect, they vary widely on the structure length, bridge type, and number of girders involved. I'm sure Bill Dittrich could come up with rough estimated costs per linear foot of girder involved by girder type, based on recent inspection fees. On new designs, Bill's group could work with the designer to come up with inspection fees at the SS&T stage. I would be more than happy to help on these estimates, as I'm sure some of INDOT's other inspection consultants would as well. I guess from our experience we are spending about 6 hours per inspection team member per girder line for steel box girders, which includes administration, inspection team planning, setup, field inspection, and reporting. We use a three-person confined-space-entry certified field inspection team. An average estimated cost would thus be approximately 6 hours x 3 persons x $100/hr average, which would equate to $1,800/girder. Therefore if you have a 6 girder-line bridge, the cost every two years would be $10,800. Over a 75-year structure life, we're talking about an additional $800,000±. These costs are in addition to the regular inspections that still have to take place on these structures, whether they are this structure type or a typical beam type structure. Of course, the cost would vary widely based on structure length, number of girders, girder type, etc., but this should give some idea of the magnitude of the costs involved. I can't imagine that this magnitude of cost, added to the design costs and field problems that are occurring with these structures, can be justified just by context sensitive design issues. At the very least, it is our opinion that INDOT should carefully scrutinize these structure types at the early stages of project development and make sure that the life cycle costs are considered versus the added benefits of "Context Sensitive Design". False fascias could be designed that would certainly be much less expensive over the life of the structure.