



**ENGINEERING OPERATIONS COMMITTEE
MEETING MINUTES
APRIL 10, 2008 – 9:00 A.M.
SLEEPING BEAR CONFERENCE ROOM**

Present: L. Tibbits J. Friend J. Polasek
B. O'Brien M. Van Port Fleet J. D. Culp
T. Kratofil T. Fudaly C. Bleech
E. Burns

Absent: J. W. Reincke C. Roberts

Guests: R. Curtis R. Till L. White (for J. Reincke)
P. Corlett B. Krom S. R. Kulkarni (for C. Roberts)
M. Eacker

OLD BUSINESS

1. Approval of the February 6, 2008, Meeting Minutes – L. Tibbits

The February 6, 2008, meeting minutes are approved.

NEW BUSINESS

1. Pavement Demonstration Candidate Projects – C. Bleech

2001 PA 259 allows the department to build up to four demonstration projects per year that are not subject to life-cycle cost analysis (LCCA). The LCCA process is a tool to select the lowest cost pavement design over the expected life of the pavement. The LCCA process must include, by law, historical information for initial construction and maintenance costs, and performance (service life). This information may not be available for new pavement designs, thereby precluding them from being chosen as an alternate. Also, new pavement designs and new technologies are generally more expensive than the standard methodologies, which may reduce their chance of being selected as the lowest cost alternative. The pavement demonstration legislation provides an avenue to try new and innovative ideas.

Two projects have been proposed as demonstration candidates. These projects have the support of both paving industries and MDOT's Pavement Committee.

- A. M-1, CS 82131, JN 79673 – Thin PCC overlay on an existing composite pavement. One similar project has been built to date. This project will allow MDOT to gather additional performance data for this type of fix as we pursue incorporating it into our standard mix of fixes.
- B. I-75, CS 16091, JN 90279 – Perpetual pavement over rubblized concrete. We have built three perpetual pavement demonstration projects to date, but none have been on a rubblized concrete base. This project will allow MDOT to gather performance data for this type of fix.

EOC approval for the proposed demonstration projects is requested.

ACTION: EOC approves the request to add the two projects to the demonstration program.

2. **Pavement Selections – B. Krom**

a. **I-94 Reconstruction: CS 50112 and 77111, JN 100701**

The rehabilitation alternatives considered were a hot mix asphalt (HMA) (Alternative 1 – equivalent uniform annual cost [EUAC] \$89,536/directional mile) and a jointed plain concrete pavement (Alternative 2 - EUAC \$69,484/directional mile). A life cycle cost analysis was performed and Alternative 2 was approved based on having the lowest EUAC. The pavement design and cost analysis are as follows:

10.5”	Non-Reinforced Concrete Pavement, P1 Modified, with 14’ joint spacing
16”	Open Graded Drainage Course Geotextile Separator
6” dia.	Open-Graded Underdrain System
26.5”	Total Thickness
Present Value Initial Construction Cost..... \$819,071/directional mile	
Present Value Initial User Cost..... \$375,461/directional mile	
Present Value Maintenance Cost \$76,707/directional mile	
Equivalent Uniform Annual Cost \$69,484/directional mile	

b. **I-96 Reconstruction: CS 63022, JN 88947 and 47171**

The reconstruction alternatives considered were a HMA pavement (Alternative 1 – EUAC \$92,265/directional mile) and a jointed plain concrete pavement (Alternative 2 - EUAC \$78,503/directional mile). A life cycle cost analysis was performed and Alternative 2 was approved based on having the lowest EUAC. The pavement design and cost analysis are as follows:

11.5”	Non-Reinforced Concrete Pavement, P1 Modified, with 14’ joint spacing
16”	Open Graded Drainage Course Geotextile Separator
6” dia.	Open-Graded Underdrain System
27.5”	Total Thickness
Present Value Initial Construction Cost..... \$1,319,971/directional mile	
Present Value Initial User Cost..... \$0/directional mile*	
Present Value Maintenance Cost \$116,270/directional mile	
Equivalent Uniform Annual Cost \$78,503/directional mile	

* Bridge work dictates and controls the construction schedule for this project. Thus, user delay costs are assumed equal, regardless of the reconstruction alternative, and are not included in this analysis.

3. **Research Report R-1511, Recommendations for Michigan Specific Load and Resistance Factor Design Loads and Load and Resistance Factor Rating Procedures – D. Juntunen, R. Curtis, and R. Till**

The Load and Resistance Factor Design (LRFD) code for designing bridges is now required for the design of all new bridges. The Load and Resistance Factor Rating (LRFR) code will be required to determine the operational capacity of these new structures. These are significant changes to current practice of Load Factor Design and Load Factor Rating (LFR). These changes affect the relationship between design and operation. If left unaddressed, truck traffic on new structures could be restricted as compared to current levels.

Revised LRFD and LRFR live load factors and other LRFR recommendations are needed to meet the operational needs of MDOT. While the FHWA does not intend to mandate re-rating existing and valid bridge load ratings by LRFR, they are requiring that beginning in 2010 all structures designed by LRFD code must also be rated using LRFR.

As cited in Research Report R-1511, the following LRFR code modifications/refinements are recommended:

- The calculation of LRFR Federal Inventory and Operating Ratings remain at the unmodified HL-93 loading using load factors identified in the Manual for Bridge Evaluation Table 6A.4.3.2.2-1.
- That MDOT base the load factor on the gross vehicle weight (GVW) for a standard analysis, and base the load factor on the portion of the vehicle on the span for load postings and superload analyses.
- Use the Live Load Factors for legal and permit load given in Tables 7 through 10, and Appendix E of MDOT Research Report R-1511.
- LRFR loading configurations be according to Table 11 of MDOT Research Report 1511. The loads (using the legal, legal-heavy, or permit truck being analyzed) should be applied in each lane as required to produce the maximum load effect with corresponding multiple presence factors applied. Where truck and lane loads are applied coincidentally, the lane load may either be applied across the entire span for simplicity of analysis or may be excluded from the portion of the span occupied by the truck or trucks. Live load factors based on the GVW of the truck being rated should be applied to the total load.
- These recommendations are limited to spans less than 400 ft. Spans greater than 400 ft may require a site-specific analysis to determine the appropriate loading configuration and live load factors.

Additionally, modifications to the LRFD code are cited in the report as follows: Creating the HL-93-mod loading that replaces the 25-kip tandem axle with a single 60-kip axle and adds a 1.2 factor to the lane and maximum of the truck or axle loading.

ACTION: EOC approves Research Report 1511, which contains the following action plan –

Design Division's Structures Section

- Implement the LRFD HL-93-mod loading that replaces the 25-kip tandem axle with a single 60-kip axle, and adds a 1.2 factor to the lane and maximum of the truck or axle loading.

Construction and Technology Division's Bridge Operations Section

- Rate LRFR structures according to the modifications given in R-1511, including the modified live load factors and loading configurations.
- Engage a university consultant to review current practice and recommend a loading procedure for spans greater than 200 feet based on a reliability method. This issue is already an approved State Planning and Research project.

Construction and Technology Division's Structural Section

- Research and recommend a method for adjusting permit loads for gage widths greater than 6 ft in a manner that would provide consistent results, regardless of the method of rating of the structure (LFR or LRFR).
- Investigate loading scenarios and recommend a method for rating decks for overloads and superloads.

4. Case Sign Installations – J. D. Culp and P. Corlett

MDOT installs illuminated case signs for supplemental information at signalized intersections. Historically case signs were internally illuminated with mercury vapor lighting. Starting January 31,

2008, mercury vapor lighting is no longer available due to environmental concerns and energy inefficiency. There are no specific requirements for providing lighted case signs for signalized intersections. A nationwide survey showed there were few agencies outside Michigan that used any type of case signs. Manufacturers of light emitted diode (LED) case signs are difficult to find due to the lack of a market. A couple of manufacturers have submitted prototype LED case signs, but power consumption savings are not substantial, as LED signal heads and estimated costs are high. MDOT developed a non-illuminated case sign alternative with diamond sheeting panels installed in the current case sign housing. This type of case sign would work well at locations with ambient lighting, but may not be adequate at rural areas with minimal ambient lighting.

It is recommended to use non-illuminated case signs at locations with high ambient lighting and use LED type case signs only at locations that have little ambient lighting (i.e. rural, isolated intersections). Over time it is anticipated that LED case sign costs will decrease. If this anticipated decrease in costs becomes a reality, it is recommended to allow statewide use of LED case signs.

ACTION: EOC approves these recommendations.

(Signed Copy on File at C&T)

Brenda J. O'Brien, Secretary
Engineering Operations Committee

BJO:kar

cc:	K. Steudle	S. Mortel	J. Steele (FHWA)
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