Research Project Statement

Fiscal Year: FY2005 **Project Statement Date:** March 5, 2004

Project Number: 0-4973 (Revised) **RMC Number:** 5

Title: Guidelines for Designing Bridge Piers and Abutments for Vehicle Collisions

Developed By: Mark J. Bloschock, P.E.

TxDOT Project Personnel	Name	Office	Area Code/ Phone Number	Email	Fax Number
Program Coordinator (PC)	Alfredo Valles, P.E.	FTW	817-370-6704	fvalles@dot.state.tx.us	817-370-6848
Project Director (PD)	Mark Bloschock, P.E.	BRG	512-416-2178	mbloscho@dot.state.tx.us	512-416-2354
Project Advisors (PAs) – Optional	Peter Forsling, P.E.	FHWA	512-536-5973	peter.forsling@fhwa.dot.gov	512-536-5990

Duration (# of years): 2

	Total Budget:	$ 425,000
First Year	**FY 2005**	$ 125,000 (est)
Second Year	**FY 2006**	$ 190,000 (est)
Additional FYs	**FY 2007**	$ 110,000 (est)

Project Description:

The AASHTO LRFD Bridge Design Specifications require that "abutments and piers located within a distance of 30.0 FT of the edge of the roadway, or within a distance of 50.0 FT to the centerline of a railway track, shall be designed for an equivalent static force of 400 KIP…" Supporting documentation for this design requirement, both its applicability and the magnitude of the design force, is not extensive. Further detailed guidance for the design engineer is not available.

Two issues need to be addressed: 1. What risks warrant application of this requirement? and, 2. Is the magnitude of design force (400 KIP) appropriate?

Traffic counts, traffic mixes and site geometry combine to influence the probability of a collision and the magnitude of the consequences of a collision and are not included in the Specification. A probabilistic risk analysis for determining the design requirements should be considered/developed for designing piers and abutments for vehicle collisions.

Magnitude of the design force (400 KIP) was established from data available at the time the LRFD Specification was prepared. Additional data/information are now available and more are needed to address whether the magnitude of the 400 KIP design force should be changed. Recent tests with single unit trucks colliding with fixed bollards and concrete walls have yielded data that will be applicable. More information for heavily loaded articulated vehicles is still needed. Some helpful information might be obtained from reconstruction of recent collisions of such vehicles that have occurred in the field.

This project will be conducted in two phases, as listed below. All Phase 1 work shall be completed, and recommendations for Phase 2 work (if any) approved by the project sponsors, prior to commencement of any Phase 2 research activities.

Phase 1 (18 months, $300,000 estimated) will include the following tasks:
1a. Literature review,
1b. Computer simulations of vehicle/bridge column and abutment collisions,
1c. Accident survey and analysis study,

1d. Development of a risk analysis methodology for vehicle/bridge column and abutment collisions (analogous to AASHTO LRFD vessel impact requirements).
1e. Detailed justification and work plan for research (if any) to be conducted under Phase 2 of the project.
1f. Provide facilities and host a meeting to present Phase 1 results to project sponsors, including pooled fund project contributors from other state DOTs. Include $20,000 in project budget for reimbursement of travel expenses for out-of-state particiapants.

Phase 2 (6 months, $125,000 estimated) may include the following tasks:
2a. Crash testing with a single unit truck to verify loading from Phase 1 literature survey and computer simulations.
2b. Crash testing of a 5-axle tractor trailer rig to verify loading from Phase 1 literature survey and computer simulations.

Deliverable Products And Reports:

The following are minimum products and reports to be submitted:

Products

P1 Guidelines supplementing current AASHTO LRFD Specifications for collision loads on piers and abutments, including example utilizing proposed methodology.

P2 Presentation materials in suitable format (PowerPoint) for use in introducing concepts and new methodology to bridge design engineers.

Reports

R1 Research report comprehensively documenting all Phase 1 work performed, including recommendations for Phase 2 work (if any).

R2 Research report comprehensively documenting all Phase 2 work performed (if Phase 2 is conducted).

PSR Project Summary Report

Implementation: Implementation of results would ultimately be accomplished through revisions to the AASHTO LRFD Bridge Design Specifications.

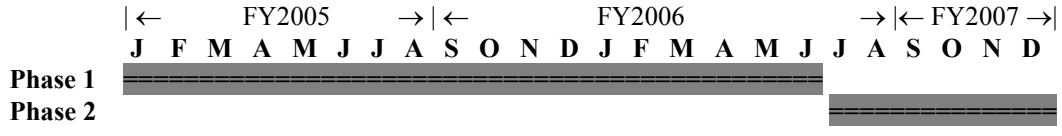
Pre-proposal Meeting: ☐ **Yes** ☒ **No**

Sole Source Justification, if applicable:

Additional Information: This project is proposed as a Pooled Fund Study, with Texas as the lead state. Activation date of project will depend on receipt of financial commitments from other states which may participate in the project.

Proposals should include budget for both Phase 1 and Phase 2. Phase 2 work shall not commence until and unless sponsors approves Phase 1 results, including recommendations for Phase 2 workplan.

Project Phase Timeline



Note: Timeline assumes January 1, 2005 start date for project. Actual start date will be dependent on pooled fund commitments from participating state transportation agencies. FY dates refer to TxDOT fiscal year, September 1 thru August 31.

Proposal Submission:

- Proposals are required to be submitted in PDF format, 1 PDF file per proposal. Please name this file with the project number and university acronym.

- The "Background and Significance" portion of the proposal should be limited to 10 pages.
- All proposals from researchers should be sent directly to your university's Research Liaison for submission to RTI. The Research Liaison is TxDOT's official contact with the university.

Deadlines (for RTI use only)**:**

1. All individuals interested in proposing are encouraged to contact the PC or PD by **date**.
2. Proposals are due to RTI by 4:00 p.m. CST on **date.**