

**TRANSPORTATION POOLED-FUND STUDY:
OHIO REGIONAL STATES POOLED FUND ROADSIDE SAFETY ANALYSIS
AND TEST PROGRAM**

DESCRIPTION OF WORK

OBJECTIVE

The objective of this program is to provide the technical resources to evaluate and, when necessary, conduct appropriate testing of candidate hardware products intended as solutions to roadside safety problems or to address roadside safety needs. Currently, other similar programs have a backlog of project work which has resulted in a slow down for evaluation of potential solutions and implementation of new technologies to roadside safety problems.

BACKGROUND INFORMATION

Crash testing of bridge rails, guardrail, and sign supports is required before they are used on Federal-aid highway projects in accordance with NCHRP Report 350. Other highway appurtenances and traffic control devices, having potential for injury to highway users, are also recommended for crash testing. In general and in accordance with the requirements set forth by FHWA* : “Design Standards for Highways: Requirements for Roadside Barriers and Safety Appurtenances, crash testing per NCHRP Report 350 is necessary for acceptance of candidate safety products for use on the National Highway System (NHS)”. There exist regional pooled fund studies, which have broad based national interest, that are presently in progress to crash test some of these devices.

Not all evaluations and testing can be included in regional programs. Some highway devices or conditions for crash testing may/can be unique to a state or region. Additionally, a national pooled fund study requires agreement among the many participating states which sometimes results in delays in priorities which may not be optimum for individual states or regions.

The establishment of an Ohio Regional State Pooled Fund for Roadside Safety Analysis and Test Program will fulfill the need for prompt response and addressing projects of interest to possibly the New England, Mid-Atlantic and Southern states. The intent of this regional program is not to duplicate other programs, but to supplement and provide a faster response to urgent regional safety problems or needs. States will still have the flexibility to analyze and test their individual designs outside of this proposed program if mutual support from other states is lacking.

Battelle Memorial Institute (Battelle) was awarded a Center of Excellence in Finite Element Crash Analysis by the Federal Highway Administration (FHWA) in June 2002.

* Federal Register / Vol. 58 No. 135 / Friday July 16, 1993 / Rules and Regulations

The web site for the COE is www.roadsidesafetycoe.com. This award is based on proven ability to perform the required analysis and crash testing of roadside safety hardware that are potential solutions for roadside safety problems and needs. Recently completed projects by COE personnel that support these required capabilities include: “Evaluation and Design of ODOT s Type 5 Guardrail with Tubular Backup”, State Job Number 134161; “Development of an NCHRP Report 350 TL-3 New Jersey Shape 50-inch Portable Concrete Barrier”, State Job Number 134162; “Enhanced Finite Element Analysis Model of the Single Unit Truck”, TDFH61-03-X-00030, September 2005.

There are currently 5 COE’s located strategically throughout the U.S. to help state and local transportation agencies and manufacturers and vendors of roadside safety products address their needs in this technical area. Battelle has the necessary computational tools (software and hardware) and experienced staff (note the referenced projects above) to perform the level of analysis required to evaluate candidate solution strategies for roadside safety problems and needs. Additionally, Battelle is teamed with the Transportation Research Center (TRC) in East Liberty, Ohio to conduct full scale crash testing when required per NCHRP Report 350. TRC has a long history of testing of vehicles over a broad range of areas and has conducted NCHRP 350 type crash testing over the past 10 years. TRC has a unique capability to perform certain types of impact testing completely undercover and thus can avoid delays in conducting testing events due to inclement weather. This same facility can be used in other levels of NCHRP Report 350 type testing by using the completely covered vehicle launch/propulsion system to propel the vehicle to a target on an outdoors pad even in winter time because all set up of the vehicle and launch parameters can be done undercover and the target can be moved outdoors for test completion when a day or so break in the weather occurs. Additionally, TRC has expanded its testing area that includes an enlarged soil space for testing articles that need to be anchored/tested in soil (guardrail systems, cable barriers, etc.). This is particularly important and timely because the re-write of NCHRP Report 350 will cause many current roadside safety articles to be re-tested to satisfy new requirements and the burden on approved testing facilities and subsequent back up of testing activities could cause delay in use of roadside safety features on the NHS.

As it turns out, 3 of the 5 COE’s, Texas Transportation Institute (Texas A&M), Midwest Roadside Safety Facility (U. of Nebraska) and Worcester Polytechnic Institute are university affiliated. Battelle is a non-profit research institute whose primary goal is to provide solutions to technical problems and assist when appropriate (government and industry) bring that technology to the marketplace. As such, Battelle, being somewhere between academia and industry, has a long and successful experience in the conduct of consortium types of projects (like the pooled funds arrangement) to help solve the consortium partners problems. Additionally, Battelle has access to the other 4 COE’s and the FHWA sponsored National Crash Analysis Center (NCAC) to bring, when appropriate, existing knowledge and experience to the roadside safety technology area. The 5th COE resides with Applied Research Associates (ARA) in Sacramento, California. It is important to note that most significant research and development in the roadside safety area are being performed at the 5 COE’s and NCAC so access to these resources is essential for timely and cost effective solutions for our partners problems and needs.

SCOPE OF WORK

In order to accomplish the objectives of this program, the following tasks will be conducted:

Task 1

Work with the Lead Agency, the Ohio Department of Transportation (ODOT), and the FHWA Technical Liaison to finalize membership of participating states into this pooled funds program. Battelle has taken the lead in visiting states in the region to explain the objectives and strategies of the pooled funds program. The fact that Battelle is a Center of Excellence in Finite Element Crash Analysis (awarded by the FHWA) and that ODOT, together with the FHWA, have extensive experience with the pooled funds process brings together the necessary resources to create an effective and efficient pooled funds program in the roadside safety technology area.

Task 2

Establish a Technical Advisory Committee (TAC). Each project partner will have the opportunity to have a technical expert serve on the TAC. The roles of the committee would include attending annual and/or semi-annual meetings/briefings wherein problem definitions and prioritization are performed, then subsequently review of program reports and annual reports, acceptance of project deliverables and final reports, and assisting in implementation activities. Battelle will be responsible for planning, coordinating and hosting the TAC meetings.

Battelle will be responsible for all contracts and/or subcontracts associated with work performed by organizations outside of the pooled funds members. For example, Transportation Research Center (TRC) in East Liberty, Ohio is Battelle's testing laboratory of choice and when crash testing is to be performed, Battelle will arrange for conduct of testing through the appropriate contracting mechanisms with this testing laboratory.

The TAC will develop the criteria to select and prioritize the pooled funds projects. The TAC will also determine the overall annual budget for the pooled funds, identify the contributions to be requested from the participating states and establish an annual work plan. The TAC will approve the scope of work for each project and requests for modification to scope when necessary.

Travel and communication expenses for project partners associated with participants of the TAC will be paid out of the project fees unless stated otherwise for an individual project.

Task 3 – Reporting

Quarterly Progress Reports- On a calendar quarter basis, Battelle will provide program status and progress reports. If necessary, the lead agency or the TAC may request that these reports be issued more frequently. These periodic reports are integral to successful communication with program partners about the progress of each project and to communication with the transportation community at large about research in progress. The progress reports will include project and funding status information and any preliminary findings. The investigator should also include a review of tasks completed on the previous quarter and a plan of tasks to be completed in the upcoming quarter. The report may include, at the request of the lead agency and the TAC members, an interactive information item for review of any concerns, issues, or problems arising as the project develops. All progress report information will be posted on the pooled fund program website and may be password protected if a project is of a confidential nature. Battelle will distribute the Quarterly Reports to ODOT and the TAC members.

Annual Report-An Annual Report will be made of each project on or about the yearly anniversary date of the programs initiation. This web-based report should include the information contained in the Quarterly Progress Reports, as well as expanded information on each project findings or conclusions and recommendations as projects are completed. The investigator is obligated to complete the project within the timeline prepared in the plan of work, unless granted an extension by the lead agency. The financial summaries related to the entire program as well as the individual projects will be included in the Annual Report.

Final Report and Summary-A final report of work progress, findings, and recommendations will be provided for each project. An executive summary will accompany each final report. The summary may be in a format proposed by the lead agency, e.g., short multi-page report, flyer, etc., but should always provide concise and useful information on the study and provide direction on how readers may easily gain access to the full report and to information on other individual deliverables. When appropriate, the final report should include: a discussion of the problem that was researched, review of current practices, in-depth review of the procedures and processes used to conduct the project, conclusions and recommendations, references, bibliography, and acknowledgements with a listing of TAC members for the project. The lead agency and the TAC members, consistent with the project plan of work, may request additional elements. All published reports will be included in the TRIS database and all active studies will be included in the RIS database.

PROGRAM

The program (pooled funds program) is envisioned as being conducted on an annual or yearly basis as far as defining problem statements and prioritizing the conduct of projects. As noted previously, the TAC will meet on a semi-annual or annual basis to establish problem statements and prioritizing of projects. The intent of this program is to provide timely and cost effective solutions to identified projects. While it is not possible to know

the exact time period for project completion, we anticipate that typical solutions can be realized in a 12- to 18- month timeframe. In this context, identification of projects that are significantly more difficult may need an extended timeframe for completion. These types of projects need to be carefully planned so that effective and efficient use of COE resources is achieved. This strategy will provide the necessary project planning and management to handle the more difficult and complex problems and utilize the full resources of the 5 COE's and NCAC on an integrated basis.

It is also important to realize that there must be a limitation on the number of projects that are undertaken in any given period of time. Battelle has a long history of project/program management in the group program setting and is well aware of the pitfalls of "biting off more than it can chew", and will exercise sound management judgment in enlisting the program partners and projects, particularly during the initial few years of the program.

BUDGET

The Technical Advisory Committee will establish the overall program of projects. An annual budget will be prepared and each participating state will be required to share in the agreed on budget and will sign a financial commitment form.

Sources of funds could/may include Federal-aid highway funds available to the states and other sources that may be made available. As agreed through the TAC, cost for each year's program will be shared by each and all of the participants.

It is also intended that the funds agreed to and committed by each of the participants is the total dollar amount required by each participant (states) per year. No additional funds will be solicited from any one or number of states in a given year or period.

Battelle/ODOT will comply with Federal audit requirements and its records will be available for review by the participating states and FHWA. All records relating to the performance of any work accomplished under this program will be retained for an agreed on period of time after payment.

For budgetary purposes, it is anticipated that the cost of a typical project, involving up-front engineering analyses (including finite element analysis when required) plus full scale crash testing, will be in the \$75,000 to \$150,000 range if the minimum number of crash tests is performed (viz., one). This estimate is based on the fact that a typical crash test costs somewhere between \$25,000 and \$35,000 depending on test specifics. Additionally, typical analysis costs are in the \$50,000 range, again depending on the degree of analysis required. With these cost estimates at hand, our (Battelle's) experience suggests that around 2 projects could be performed per year, at least during the first few years of the program. This also translates to an annual budget of about \$150,000 and that would be needed to support this level of project activity. Battelle has the facilities and personnel resources to carry out this level of project work on an annual basis.

These budgetary estimates do not include those project situations where significant research and development would be required to create models of structural elements that are not totally or partially available. That is, the data base for models (variety of appurtenances and vehicles) that exist within the 5 COE's and NCAC is fairly extensive and continually being added to. However, there can be models of structural elements (e.g., cable systems) that are far from sufficient maturity (by validated/verified testing). Problems that involve models of these non-established elements would require additional funding. However, problems of this nature would be identified and pointed out early in the project formulation process so that important first steps can be put into motion to address such special situations. But this is a good example of how and where the synergy between the 5 COE's and NCAC can be brought to bear to solve problems and needs in the roadside safety technology area that require additional research and development.