

MOVING FORWARD



"He who does not look ahead, remains behind." (Spanish Proverb)

Ohio Department of Transportation, Office of Research and Development

Summer 2004

Research at the Battelle Center of Excellence

A Center of Excellence in Finite Element Crash Analysis was awarded to Battelle by the U.S. Department of Transportation, Federal Highway Administration (FHWA) in June 2002 as a three-year contract, which requires renewal.

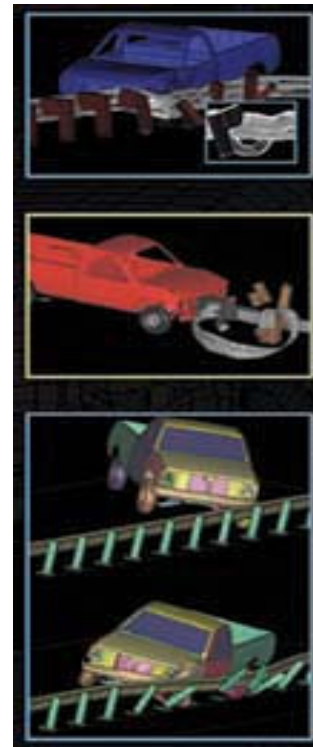
The purpose and main objective of the Center of Excellence (COE) is to provide technology resources to state and local transportation agencies, vendors and manufacturers of roadside safety hardware to help solve problems and issues concerned with roadside (highway) safety.

Until recently, hardware used on the nation's highways to mitigate the level of severity associated with an errant vehicle leaving the roadway was approved for use by full scale crash testing. Each of these tests costs about \$30,000 and it is sometimes time consuming and difficult to effectively critique a candidate hardware design by testing alone. However, the strides made over the past years using simulation methods have been significant in the ability to analyze and help design roadside safety hardware.

FHWA has established five Centers of Excellence, strategically located throughout the United States, to help provide the resources necessary to accomplish the objective stated above. The five COEs are:

- Worcester Polytechnic Institute, Worcester, Massachusetts;
- Texas Transportation Institute (TTI), Texas A&M University;
- Midwest Roadside Safety Facility (MwRSF), University of Nebraska (Lincoln);
- Applied Research Associates, Sacramento, California; and
- Battelle, Columbus, Ohio.

Only three of the five COEs provide testing capability along with design analysis and evaluation. The three are located at: TTI, MwRSF, and Battelle. Battelle has a relationship with Transportation Research Center (TRC), East Liberty, Ohio making TRC their preferred testing laboratory for this activity.



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Battelle COE Continued

Thus, the COE provides analysis and evaluation of candidate safety products using finite element analyses (FEA) to converge to hardware final design prior to full scale testing. The intent is to then perform only the minimum full-scale tests for product qualification. In this way, the time and costs for design, testing and qualification are significantly reduced, which also translates to a shorter product path to the marketplace.

Currently, the Battelle COE is performing two projects for ODOT: “Evaluation and Design of ODOT’s Type 5 Guardrail with Tubular Backup”, and “Development of an NCHRP Report 350 TL-3 New Jersey Shape 50-inch Portable Concrete Barrier.”

Under the study “Evaluation and Design of ODOT’s Type 5 Guardrail with Tubular Backup,” the existing design for guardrail and the associated transition will be analyzed, and any modifications necessary to meet appropriate NCHRP 350 crash testing criteria will be proposed. ODOT currently has a generic w-beam guardrail system with tubular steel backup installed on many culverts throughout the state. This system was derived from a deep beam bridge railing that is no longer approved for that use; however, it is believed that this system, perhaps with slight modifications, will be capable of meeting the crash testing criteria of NCHRP Report 350 for roadside barriers. The proposed research is to be done in three phases, with each subsequent phase being contingent on promising results from the previous one. If the research from the first two phases proves beneficial, then a third phase would be authorized. Under Phase 3, both the tubular backup and transition designs would be crash tested using NCHRP Report 350 criteria.

In the second study, “Development of an NCHRP Report 350 TL-3 New Jersey Shape 50-inch Portable Concrete Barrier,” the existing approved 32-inch barrier will be analyzed, and a design for a 50-inch barrier will be developed to use as much of the existing cross section (NJ shape) and pin and loop connection as possible. The upper portion will function as an integral, low maintenance glare screen. Creation of the 50-inch barrier is needed because the current design does not meet NCHRP 350 requirements, and previous testing of the 32-inch barrier indicated potential snagging problems for taller versions.

The Battelle COE in cooperation with the Ohio Department of Transportation (ODOT) is also attempting to establish a pooled fund research study, soliciting neighboring states for participation. ODOT has agreed to be the lead state and Pennsylvania has recently joined this endeavor. The objective of the pooled fund study is to provide the technical resources to evaluate, and if necessary, test candidate hardware products intended as solutions to roadside safety issues; and to address roadside safety needs. This program will serve states that are regional to Ohio so that a quicker response to urgent regional problems may be provided to the member states. For more information, please visit <http://www.pooledfund.org/projectdetails.asp?id=832&status=1>

Additionally, the COE is involved in assessment and evaluation of designs of roadside products for vendors and/or manufacturers of safety hardware. The COE is under the directorship of:

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Getting The Maximum Benefit from Research

One major goal of all research is to provide results that can be implemented. At the start of a research study, enthusiasm is high. Hope springs eternal that this time, we will find a resolution for all our problems. But as the months of study wear on and given all the current demands on time and resources, it becomes very easy to complete a research project and simply shelve the final report to be revisited in some future nebulous timeframe. ODOT's new research implementation program intends to avoid that kind of ignominious project wrap-up.

The new implementation program aims to keep implementation planning as one of the main focal points throughout the study. The first step begins at the proposal stage. Researchers are now required to include a preliminary implementation plan with each proposal. The preliminary plan should include recommendations for how to best facilitate implementation and should give some perspective to elements that will influence the decision to implement results.

As the project proceeds, the ODOT technical liaison should keep in mind the need to continually assess interim findings of the study. Frequent contact between the researcher and the technical liaison is essential to this assessment. The Office of Research and Development (R&D) will also stay involved in this process, checking in with the liaison to see how things are progressing, as well as providing assessment guidelines to evaluate the feasibility of implementation.

If at any point throughout the project it is determined that there would be value in implementing any of the results, a detailed implementation plan should be developed. The detailed plan should include a description of all processes involved, estimated time frames, and specific responsibilities of sponsors and stakeholders. Risks and benefits should be evaluated, as well as costs, funding sources, and training required. The final implementation plan will need to be approved by the sponsoring Office Administrator(s) and Deputy Director(s). If the results of the study show that proceeding with implementation activities would not be beneficial, this should also be documented in a final implementation plan, citing supporting rationale. Either conclusion is value added through research.

Finally, when implementation activities begin, it will be important to track the progress. Implementation monitoring will be reported on a quarterly basis, with annual summaries being prepared by R&D. The annual summary will include implementation activities for that year, focusing on the accomplishments and benefits of each study, and any problems that may have been encountered. In this way, we hope to avoid the "dead weight on a shelf" phenomenon that affects some research reports, and keep our vision focused on moving forward.

For more information and guidelines on R&D's implementation program, please see the Research, Development & Technology Transfer Manual of Procedures (R&D Manual, Chapter 5) now available on our website at: <http://www.dot.state.oh.us/divplan/research/>

Calendar of Events

September - 2004

September 3 - Deadline for FY2007 Proposals (4:30 PM)

September 3 - Research Technical Liaison Training

For more information go to <http://www.dot.state.oh.us/divplan/research/announcements/announcements.htm>

September 7 - Geotechnical Methods Revisited. For more information go to <http://www.hgs55.com>

September 8 - Creating Rural Freight Transport Opportunities in a Global Market - For more information go to http://www.trb.org/conference/2004_Rural_Freight.pdf

September 14-17 - Structural Materials Technology (SMT): NDE/NDT for Highways and Bridges. For more information go to <http://www.azom.com/details.asp?articleID=2171>

September Continued - 2004

September 24 - Research Technical Liaison Training

For more information go to <http://www.dot.state.oh.us/divplan/research/announcements/announcements.htm>

September 26-29 - 2nd International Conference on Accelerated Pavement Testing - For more information visit http://www.cce.umn.edu/engineering/accelerated_pavement

September 30 - Quarterly Reports Due on all projects

October - 2004

October 26-27 - Ohio Transportation Engineering Conference - Columbus, Ohio

For more information visit: <http://www.otecohio.org/>

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