Title:	Develop Guidelines for Inspection, Repair, and Use of Portable Concrete Barrier
The Problem:	TxDOT installs portable concrete barriers (PCBs) in temporary work zones, as well as in permanent locations. PCBs are stored in stock yards and frequently transported to and from work zones. PCB segments accumulate damage from transportation, placement, as well as from vehicle impact. This damage often occurs at the ends of the barrier segments at the corners or toe of the barrier. Sufficient damage can change barrier deflections or compromise barrier crashworthiness. TxDOT, as well as other transportation agencies, routinely must make subjective decisions on-site during construction projects to evaluate the acceptability of portable concrete barriers. In addition, with the approaching sunset date for tested NCHRP 350 concrete barriers, it is imperative for TxDOT to have the tools to evaluate its existing stock of barriers. It is important for TxDOT to know when a barrier has been damaged beyond repair and requires replacement to ensure the traveling public is protected and has the safest roads possible. TxDOT requires inspection of these barriers before installation on each job to ensure the barriers are in good condition and acceptable for use; however, there is very little information on what constitutes “good condition.” Currently, there is no guidance to be followed to determine life expectancy for PCBs. There is a lack of research defining the type and extent of barrier damage that would constitute replacement of the segment. Without this research, TxDOT is left to make a judgment call on whether to repair or replace segments without sufficient information, which could lead to unsafe barriers on TxDOT roadways. Per FHWA requirement, TxDOT is urged to establish a process to replace existing highway safety hardware that has not been successfully tested to NCHRP Report 350 or later criteria. Under the Manual for Assessing Safety Hardware (MASH) implementation era, FHWA requires that temporary work zone devices, including PCBs manufactured after December 31, 2019, must have been successfully tested to the 2016 edition of MASH. However, such devices manufactured on or before this date, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH may continue to be used throughout their normal service lives. This is another important reason for which there is a need to investigate and develop quantitative guidelines for TxDOT to determine whether a PCB needs to be repaired or replaced with a new barrier segment.
Technical Objectives:	The objective of this research is to outline what damage to the barriers establishes a need for replacement; i.e., damage that renders the barrier obsolete. This research should provide guidance to TxDOT officials on what types of damage caused by either impacts or handling should be considered “damaged beyond repair.” The researchers shall address the following: 1. Evaluate if there are any known or acceptable repair methods TxDOT can use to repair surface defects in the barriers. 2. Establish benchmarks that define the “normal service life” of portable concrete barriers. 3. Further define criteria for replacement of PCBs where more nuanced types of damage may be present; i.e., surface defects or spalling that may constitute snagging hazards. 4. Conduct component testing to investigate and determine residual capacity and relative rotation of PCB segments with various types and level of damage. 5. Use preliminary results to develop proposed recommendation and guidelines, which will ultimately be verified through full-scale crash testing, per MASH requirements. 6. Conduct full-scale crash tests to evaluate the performance of PCB segments with existing levels of damage. In order to consider realistic damage levels, the PCB segments evaluated during the crash tests will either originate from the full-scale crash tests, or will be supplied by TxDOT districts from various on-site deployments. 7. Develop a visual guidebook with qualitative and quantitative information supporting guideline implementation with respect to repair and replacement criteria for PCB segments. The expectation of this project is that the end product will obtain a TRL level 8.

Desired Deliverables:	1. Technical memorandum for each task completed. 2. Monthly progress reports. 3. Value of Research (VoR) that includes both qualitative and economic benefits, to be included in the final research report. 4. Research report documenting the findings of the research, including: a. Documentation of current TxDOT and other transportation agencies practices with respect to management of repairing or replacing PCB segments. b. Documentation of research, testing and findings for identification of repair and replace criteria to improving management of PCB segments statewide. c. Development of a visual guidebook with qualitative and quantitative information supporting guideline implementation with respect to repair and replacement criteria for PCB segments. 5. Project Summary Report.
Proposal Requirements:	1. Utilize the “Proj/Agre” and “PA_Form” templates located at the TxDOT RTI website. 2. Proposals will be considered non-responsive and will not be accepted for technical evaluation if they are not received by the deadline or do not meet the requirements stated in RTI's University Handbook, which is also located at the RTI website. 3. Proposals should be submitted in PDF format, 1 PDF file per proposal. File name should include project name and university abbreviation. 4. This project will be tracked during the life of the project using a Technology Readiness Level (TRL) scale. For more information about the use of a TRL, click.