Project Summary RES2013-27
Title: All Hazards Risk Assessment of Critical Transportation Infrastructure in the State of Tennessee
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Purpose of the Project:
The project was performed to identify and perform all hazard risk assessments of the top ten critical transportation assets in the State of Tennessee to analyze the threats, vulnerabilities, consequences of loss, and overall risk to the assets. This project had as its goal to inform policymakers and TDOT personnel to enable risk-sensitive design and retrofit decisions to be made to mitigate incidents, man-made, accidental, and natural.

Scope and Significance of the Project:
Transportation infrastructure is critical for the continued operation and economic well-being of the State of Tennessee. Threats, both natural and man-made, exist to critical infrastructure of all types throughout the nation. Historically, transportation infrastructure has been a target of terrorist attacks. Currently operating terrorist groups have indicated their intention to attack critical transportation infrastructure in the future. The possibility of terrorism against our nation's bridges is an ever-increasing threat in today's society. Globally, between 1980 and 2006, 53 terrorist attacks specifically targeted bridges. Approximately 60% of these attacks were bombings. There is general agreement that the threat of terrorist attack to the transportation sector is growing; "…there is a growing concern that within this sea of moving parts lay critical security gaps and a lack of operational resiliency that could cause tremendous damage from any significant disruptive event, whether man-made or natural." Perhaps most disturbing is the recent report that an anonymous caller informed the FBI of a plot by ISIS to blow up a Memphis bridge.
There are 19,519 bridges in Tennessee, of which 8,113 are maintained by the Tennessee Department of Transportation (TDOT). These bridges represent various designs, sizes, level of historical significance, Average Daily Traffic (ADT), and vulnerability. Bridges are attractive targets of terrorists, offering a "concentrated point of attack" in which a disruption could offer a spectacular impact to freedom of movement and the economy.
A significant amount of work has been done since 9/11 to prepare critical transportation infrastructure for the eventuality of a terrorist attack. The overriding government publication from the Federal level is the National Infrastructure Protection Plan (NIPP), with the Transportation Sector-Specific Plan annex. Among the suggested methods to approach risk assessment is the RAMCAP process. The RAMCAP process is a systematic, probabilistic approach to inform levels of threat, vulnerability, and consequence, ultimately leading to a calculation of overall risk. Risk Assessment can be generalized with the following equation:

Risk = Threat x Vulnerability x Consequences

Outcomes:

The analysis relied on a survey to identify the top ten critical transportation assets in Tennessee that were then subjected to the RAMCAP risk management process. Site visits were made to assess the

assets' vulnerability, and extensive research was conducted to evaluate potential threats and consequences of the loss of the assets.

In general, the vulnerabilities found present in many of the assets primarily were concerned with unrestricted or lightly restricted access to the under-deck columns and abutments. Many threats were considered, with natural and man-made accidental being set aside due to their consideration in design of the bridges. The man-made intentional, or terrorist threat was then decided to be the primary threat package that affected the assets' risk equation. The RAMCAP process involves using the worst case scenario of a likely threat; the terrorist threat meets that criteria as well as the distinction of being the threat vector that can be mitigated against most easily by adjustments in Department policies and designs.

Of the sources of terrorist attack considered, it was determined that an active shooter or explosive attack by home-grown al-Qaeda/ISIS sympathizers is the most likely Potential Threat Element (PTE). Domestic-issue groups were also considered, but found not to be as likely a threat.
A wealth of information on blast resistant bridge design has been published, but increasing standoff distance from bridge columns and abutments to vehicle access remains the most effective means of defending against a terrorist attack on bridges. Some consideration to limiting access to small-arms fire was also discussed. Recent well-publicized terrorist threats to bridges in the State have called attention to the need to be prepared for the unfortunate eventuality of a terrorist attack. The attacks of 7/16/15 on the military recruiting center and Naval Operations base in Chattanooga have also called attention to the need for securing critical infrastructure. This risk assessment project is not the end of that process. Rather, it is the beginning of the work to be done to ensure that the critical transportation infrastructure in the State of Tennessee and those people that watch over its well-being are prepared.

Time Periods and Status of the Project: 8/1/13 to 4/13/16, complete

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