23 CFR 667 Report
November 2018

Maintenance Division

Introduction

FHWA rule 23 CFR 667 requires that state DOTs identify assets repeatedly damaged by emergency events. Specifically, state transportation agencies "shall conduct statewide evaluations to determine if there are reasonable alternatives to roads, highways, and bridges that have required repair and reconstruction activities on two or more occasions due to emergency events." The aim of this report is to outline TxDOT's method of compliance with Part 667.

The Texas Department of Transportation (TxDOT) Maintenance Division leads the effort to identify assets addressed by Part 667. Other divisions and districts are contacted when there are assets meeting the evaluation criteria.

Any asset that has required repair as a result of a declared disaster, from January 1997 to the time of evaluation, is to be considered in the analysis. In case of repeated failure-repair events of a similar nature, the repairs are to be reported and alternative strategies are to be considered in order to mitigate recurring damage costs.

TxDOT routinely considers recurring events in the planning, development, and design phases of a project. Resiliency is built into bridges and pavements to maintain safe, navigable roadways at the lowest practicable cost over the life cycle of those assets.

At this time, using the data and criteria discussed in this report, TxDOT is unaware of any National Highway System (NHS) assets that have been subjected to recurring damage and repairs as a result of emergency events. Maintenance Division staff will continue to review emergency repair projects as soon as data are available after the occurrence of a qualifying event.

Qualifying Recurring Events

TxDOT maintains well-categorized databases containing construction, maintenance and repair records. The history of projects in these systems is sufficient to satisfy the scope of Part 667 requirements. One challenge when using this historical data: projects are not categorized or organized by disaster declaration from the Texas Governor or US President of the United States. However, there are many projects marked "Emergency Response," a category that includes projects resulting from declared disasters. One can examine the time, place, and summary description of a project to determine whether it qualifies for Part 667 consideration.

Recurring events corresponding to NHS highways and bridges are included in this report. TxDOT acknowledges that other roadways will be included in analyses beginning in 2020, regardless of ownership or NHS classification.

TxDOT oversees many emergency response projects that are important to the transportation system, but are not considered road or bridge projects. A great volume of emergency work is related to debris removal, flagging, motorist assistance, contraflow operations and other support functions necessitated by an event. This type of emergency response is not included in this analysis.

Though Part 667 applies to roads and bridges, other emergency work is performed on appurtenances such as signs, signals, electronics cabinets, and light masts. Repairs to these accessories are also not included in the analysis. However, projects that involve railings or other accessories immediately adjacent to the roadway are considered if the project addresses erosion of the shoulders or the edges of driving lanes. This evaluation considers many such assets that were damaged by Hurricane Harvey in 2017.

Qualifying Part 667 repairs can be easily identified for discrete assets such as bridges. Other assets such as a continuous roadway, where the length that constitutes a distinct asset has not been defined, are more difficult to delineate for recurrence consideration. This problem is addressed by first considering repairs that were performed on a particular combination of roadway and county. Where a county/roadway pair is found to be the subject of recurring repairs, more details are investigated to find the precise location of the failures and repair work. The location is typically at an intersection, culvert, bridge abutment, or other vulnerable feature. Investigation of the location and nature of response projects leads to the final determination of whether there is a true Part 667 recurrence.

The intended purpose of each repair is also taken into consideration. If two repairs were performed at the same location, on separate occasions, but were performed to repair different features of the asset, they are not considered recurrences. For example, if the southern abutment of a bridge was damaged and repaired as a result of flooding, and then the northern abutment was later damaged and repaired as a result of flooding, this pair of events would not be considered a true recurrence. Similarly, a pavement or bridge structure that is first damaged and repaired as a result of seismic activity, and then later damaged and repaired as a result of flooding would not be considered a true recurrence.

The criteria used to qualify assets and events are summarized below.

- Asset is a road or bridge on the National Highway System.
- Asset damage resulted from an emergency event declared by the Governor or U.S. President.
- Asset was damaged on two or more occasions by similar emergency events.
- Repeated damage occurred to the same discrete asset.
- Mode of asset damage and intent of repairs was similar in both events.

Improvements in Response to Events

Following an emergency event, TxDOT engineers make assessments as to the likelihood of similar damage occurring again. Where the likelihood and severity of the risk warrants a preventive or resilience improvement measure, an effort is made to implement the improvement. These improvements may or may not be considered part of the emergency response. Some resiliency enhancement projects may be labeled 'emergency response' though the project goes beyond restoration of the asset to its condition before the event within economic reasonability. For example, a bridge that has been subjected to severe channel erosion and damage to its embankment concrete riprap will often be repaired using stone riprap, gabion mattresses, sheet piling, or other channel stabilization features that add resiliency to the structure. Other projects, such as minor repairs to concrete riprap that address localized damage, are executed to simply restore the asset back to its original condition.

Occasionally, more than one project is performed in response to the same event. For example, following the collision and damage to the Queen Isabella Causeway in 2001, primary bridge elements were replaced immediately. In 2003, a collision prevention system was installed. Though these projects involve the same asset at different times, the second is considered an improvement. The projects are not considered recurrences because they were necessitated by the same event.

Initial Part 667 Analysis for the Initial TAMP

TxDOT's Maintenance Division submits damage reports and reimbursement requests for projects and other expenses to FHWA following a declared disaster. FHWA determines reimbursement eligibility and a project's disposition. For the initial analysis, a table of emergency repair projects spanning from 1997 to mid-2017 was utilized to determine if these projects met the criteria discussed.

These projects were narrowed to instances where work was performed on a NHS asset, and additional steps were taken to determine whether each asset had been included in prior emergency repair projects. Further filtering of projects was performed to determine if projects addressing a particular asset were in response to separate events and if so, whether the mode of failure and the emergency event were similar. An asset exhibiting failure more than once would be a candidate for reporting in accordance with Part 667.

DCIS / MSAR Analysis

For proper recurrence analysis, it is imperative that the project data source be complete, reliable and current. Rule §667.5 requires that the evaluation period carry through December 31 of the year preceding the year in which an evaluation is due. This 2018 report considers projects necessitated by Hurricane Harvey, some of which extended beyond

December 2017. The most current data can be obtained from the Mobile Solutions for Assessment Reporting (MSAR) system. The data processed for this report includes the Hurricane Harvey damages that were entered into MSAR as of October 2018. However, MSAR was not used for Texas assessments until March of 2016. Therefore, it must be supplemented with records reaching back to January 1997.

TxDOT's Design and Construction Information System (DCIS) contains the older, historical data needed for this report. Emergency response projects were pulled from DCIS and filtered to road and bridge items. The MSAR data was similarly filtered and added to the DCIS results. The data from both sources was then summarized by roadway and county. Several instances of repeated emergency work were found and manually investigated, to determine if the facility (i.e. the road or bridge at the same location) was affected both times.

Dozens of roads, bridge embankments and other facilities suffered damage and required repairs for the first time due to Hurricane Harvey, particularly in Harris County. This report does not include the extensive list of those first occurrences.

At this time, using the data and criteria discussed in this report, TxDOT is unaware of any NHS assets that have been subjected to recurring damage and repairs as a result of emergency events. Maintenance Division staff will continue to review emergency repair projects as soon as data are available after the occurrence of a qualifying event.

As this report is updated with new data, it will be distributed to the appropriate district personnel responsible for the design, maintenance and repair of assets. The affected districts will be notified so that appropriate project level design criteria and resiliency actions may be considered in future projects. This will afford each district the opportunity to program and potentially construct feasible solutions to reduce the probability of future damage.