

**PROJECT SUMMARY REPORT**

## **0-7146: Develop Guidance for Local Government Building Codes for Bridges**

### **Background**

Design, construction, and maintenance of off-system bridges in Texas vary among local governments. Current bridge codes or standards put in place by local governments have not been synthesized and well-documented, making it challenging for the Texas Department of Transportation to provide the necessary guidance in their continued partnerships with cities and counties. Therefore, it is essential to thoroughly synthesize the current state of practice on the design, construction, and maintenance procedures of off-system bridges within local governments, including the building codes utilized and the procedures followed to acquire the engineering plans after the construction is completed. This synthesis documents the existing practices regarding the design, construction, and maintenance of off-system bridges within local governments. It also identifies the most effective practices that can enhance the overall performance of off-system bridges in Texas. Based on the findings, actionable recommendations are provided to enhance these procedures within local governments.

### **What the Researchers Did**

The research findings were obtained through an extensive literature review, fact-finding surveys, structured follow-up interviews, and case studies. Through the literature review, a detailed understanding was obtained of the procedures followed for the design, construction, and maintenance of off-system bridges in Texas. By conducting three surveys (one for local governments, one for engineering consulting firms, and one for TxDOT districts), responses were collected from forty-nine (49) local governments, ten (10) engineering consulting firms, and three (3) TxDOT personnel with bridge experience. The surveys were followed by interviews with interested respondents from local governments and engineering consulting firms. The interview participants were asked to provide detailed information on the procedures they follow to design, construct, and maintain off-system bridges within their respective jurisdictions. Upon conducting a critical analysis of the results from the interviews and the surveys, actionable recommendations for

enhancing the design, construction, and maintenance of off-system bridges in Texas were provided.

### **What They Found**

The information collected from literature, survey questionnaire, and interviews were analyzed to present recommendations for enhancing the procedures related to the design, construction, and maintenance of off-system bridges in local governments. Some of these recommendations are summarized as follows:

- Adopting TxDOT manuals and guidelines for off-system bridges within local governments will promote standardized design procedures and alleviate confusion among engineering firms in Texas.
- Organizing training workshops or educational courses specifically designed for city/county engineers would enhance local governments' knowledge and understanding of the building design codes and standards applicable to off-system bridges.
- A standard communication and coordination guideline for local governments and TxDOT streamlines the communication on essential requirements

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concerning off-system bridges, encompassing the Preliminary Bridge Layout Review (PBLR) process and the requirement of submitting final bridge plans to TxDOT. This will ensure that city/county engineers are well-informed about the necessary prerequisites for this aspect.

- Providing repair options and maintenance guides for the issues identified in the inspection report is beneficial, as it enables city/county engineers to implement appropriate measures for resolution.
- Incorporating supplementary requirements into bridge design manuals to address specific local needs, such as ensuring adequate width to accommodate farming equipment in rural areas, is recommended.
- Developing comprehensive guidelines for developers regarding the requirements for off-system bridges is recommended for local governments. These guidelines provide developers with clear information about the necessary procedures, including the applicable design codes, to be followed during the design, construction, and maintenance of off-system bridges within the local government’s jurisdiction.
- Arranging follow-up meetings between local governments and TxDOT facilitates face-to-face discussions concerning bridge issues outlined in inspection reports. This proactive step would be advantageous for local governments, as it allows for direct engagement on matters related to bridges.
- Adopting and implementing appropriate hydraulic design criteria specified in the state’s (e.g., TxDOT Hydraulic Design Manual) and the national’s (e.g., HEC-18) design codes mitigate the potential risks associated with flooding or scour of off-system bridges

within local governments.

- Coordination between different entities that provide reviews about off-system bridges, such as the Corps of Engineers and TxDOT, is essential to ensure non-conflicting assessments and evaluations.
- Enhancing the clarity and comprehension of TxDOT bridge inspection reports for city/county engineers would contribute to a better understanding of the content of reports. This can be achieved by incorporating additional visual aids, such as pictures and diagrams, in the reports to clearly illustrate the precise locations of deterioration and deficiencies.

**What This Means**

The unprecedented growth in Texas demands not only the construction of new infrastructures, including bridges, but also urgent attention to the maintenance and improvement of existing bridges. To effectively address these challenges, it is crucial for local governments and the Texas Department of Transportation (TxDOT) to work together collaboratively, in building new bridges as well as rehabilitating and upgrading the existing ones. The findings of this research effort provide recommendations that can enhance the procedures involved in the design, construction, and maintenance of off-system bridges in Texas, leading to improved infrastructure and increased public safety. This set of recommendations offers potential advantages to the Texas Department of Transportation and local governments, encompassing both qualitative and economic benefits, such as safety improvements, and savings achieved through reduced maintenance costs after implementation.

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