ASCE Manuals and Reports on Engineering Practice No. 157

Bridge Demolition Engineering

Best Practices

Bridge Demolition Subcommittee

Edited by:

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Bridge Demolition Engineering

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Bridge Demolition Subcommittee of the
Temporary Works Committee of the
Construction Institute of the
American Society of Civil Engineers
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PREFACE

There is a growing need to replace our existing infrastructure as our country's bridge inventory ages. To meet this need, safe and controlled bridge demolition planning is of the utmost importance.

Most engineers and owners would acknowledge that additional considerations are required to analyze a structure as it is being constructed. During partial stages of erection, there are unique and potentially governing load cases that need to be considered beyond the final design of the permanent structure. A growing number of resources are available that have been developed as engineering guides for bridge construction.

During demolition, the structure will again experience temporary load cases while the structural system is being removed, creating changes to the structure capacity and potentially creating instabilities. Despite the similarities between bridge erection and demolition engineering, there is currently little to no formal guidance on engineering for safe and controlled demolition. This lack of consensus requires engineers to rely heavily on engineering judgment, which results in widely varying demolition design criteria and construction practices.

This document is a combined effort of specialty engineers and contractors who regularly work on bridge demolition projects. Together, this group has assembled the information included herein to document the current state of practice in the industry, with hopes of raising the bar on future work. The intent of this document is to work toward establishing consistent industry standards, by setting minimum expectations for what is included in a safe and effective demolition plan. This document is also intended to be a resource for engineers (both those performing and those reviewing the demolition analysis) to recognize that a bridge coming out of service need not be held to the same design standards as a permanent structure.

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DISCLAIMER

Although the Temporary Works Committee does its best to ensure that any advice, recommendations, or information it may give, either in this publication or elsewhere, is accurate, no liability or responsibility of any kind (including liability for negligence) is accepted by the committee.

Readers should note that the references are subject to revision occasionally and should ensure that they have the latest versions.

CHAPTER 1
BRIDGE DEMOLITION ENGINEERING

1.1 NEED FOR AN ENGINEERED DEMOLITION PLAN

According to the US Department of Transportation, there are more than 590,000 highway bridges in the United States of varying age and condition. This figure does not include the number of railroad bridges in service. Updating, repairing, and replacing the national bridge inventory involves a variety of bridge demolition activities ranging from deck repair to complete structure replacement.

Demolition activities often occur near other structures, infrastructure, and public spaces. Poorly planned demolition activities have caused property damage, resulting in additional cost to the contractor and the owner to repair or replace the damaged property. A properly engineered demolition plan considers adjacent structures to minimize risk and impacts and provides protection where warranted.

Unfortunately, demolition activities have occasionally resulted in worker injuries and/or fatalities, emphasizing the need for properly engineered demolition plans and procedures. Even in the absence of injury, demolition accidents bring about added project costs, construction delays, traffic inconvenience, and adverse publicity for the contractor and the owner. This demonstrates the need for engineered demolition plans and work sequences tailored to the specific project.

1.2 DEFINING ROLES AND RESPONSIBILITIES

Each demolition project has its own unique challenges, limits, and requirements. Demolition activities are normally a part of a larger project