

National Cooperative Highway Research Program

# RESEARCH RESULTS DIGEST

November 1998—Number 234

Responsible Senior Program Officer: David B. Boal

## Manual for Bridge Rating Through Load Testing

*This NCHRP digest describes the research findings from NCHRP Project 12-28(13) A, "Bridge Rating Through Nondestructive Load Testing," conducted by A.G. Lichtenstein and Associates, Inc. The project developed and documented processes for performing load tests and using the test results to calculate bridge ratings. The research results are presented in the form of a manual, which provides guidelines for integrating the load testing of bridges with their load rating. The manual is supplemented with a technical report, which presents detailed data on two major technical areas—evaluating unintended composite action and establishing target proof load levels.*

### FOREWORD

This manual presents the results of a study on the use of nondestructive load testing to evaluate the carrying capacity of bridges. Recommended procedures for performing load tests and for using the results to calculate load ratings are included. The contents of this manual will be of immediate interest to bridge and structural engineers, bridge inspectors, traffic engineers, and others interested in bridge safety and the movement of traffic across bridges.

Nondestructive load testing of bridges has been used primarily as a research tool to provide better understanding of the way in which loads are carried by, and distributed through, the bridge structure. In some cases, load testing has been used to assist in the determination of bridge load-carrying capacity. From such tests, some structures have been found to possess greater load-carrying capacity than predicted by conventional analytical load rating procedures. Load-rating procedures that incorporate load test results have potential for demonstrating higher load capacity for many structures that would otherwise be determined to require load-posting based on conventional analysis alone.

NCHRP Project 12-28(13), "Nondestructive Load Testing for Bridge Evaluation and Rating," was initiated in 1987 with the objective of developing guidelines for nondestructive load testing of highway bridges to augment the analytical rating process. A 1990 follow-on project, NCHRP Project 12-28(13)A, "Bridge Rating Through Nondestructive Load Testing," developed and documented processes for performing load tests and using the test results to calculate bridge ratings. Project 12-28(13)A is the basis for this manual. The research was performed by A.G. Lichtenstein and Associates, Inc., of Paramus, New Jersey.

The research results are presented in the form of a manual that introduces the concept of nondestructive load testing (including the two major types of tests: diagnostic tests and proof tests), describes the appropriate selection of candidate bridges, provides detailed procedures for load testing, and describes how to use load test results to develop a load rating for a bridge. The manual also includes illustrative examples of both diagnostic-load-test and proof-load-test procedures. Finally, information on special topics, including evaluations for live load impact; fatigue life testing of steel bridges; and unintended composite action of bridges

# Manual For Bridge Rating Through Load Testing

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## **Table of Contents Manual For Bridge Rating Through Load Testing**

1. Understanding the eBook Manual For Bridge Rating Through Load Testing
  - The Rise of Digital Reading Manual For Bridge Rating Through Load Testing
  - Advantages of eBooks Over Traditional Books
2. Identifying Manual For Bridge Rating Through Load Testing
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Manual For Bridge Rating Through Load Testing
  - User-Friendly Interface
4. Exploring eBook Recommendations from Manual For Bridge Rating Through Load Testing
  - Personalized Recommendations
  - Manual For Bridge Rating Through Load Testing User Reviews and Ratings
  - Manual For Bridge Rating Through Load Testing and Bestseller Lists
5. Accessing Manual For Bridge Rating Through Load Testing Free and Paid eBooks

- Manual For Bridge Rating Through Load Testing Public Domain eBooks
  - Manual For Bridge Rating Through Load Testing eBook Subscription Services
  - Manual For Bridge Rating Through Load Testing Budget-Friendly Options
6. Navigating Manual For Bridge Rating Through Load Testing eBook Formats
    - ePub, PDF, MOBI, and More
    - Manual For Bridge Rating Through Load Testing Compatibility with Devices
    - Manual For Bridge Rating Through Load Testing Enhanced eBook Features
  7. Enhancing Your Reading Experience
    - Adjustable Fonts and Text Sizes of Manual For Bridge Rating Through Load Testing
    - Highlighting and Note-Taking Manual For Bridge Rating Through Load Testing
    - Interactive Elements Manual For Bridge Rating Through Load Testing
  8. Staying Engaged with Manual For Bridge Rating Through Load Testing
    - Joining Online Reading Communities
    - Participating in Virtual Book Clubs
    - Following Authors and Publishers Manual For Bridge Rating Through Load Testing
  9. Balancing eBooks and Physical Books Manual For Bridge Rating Through Load Testing
    - Benefits of a Digital Library
    - Creating a Diverse Reading Collection Manual For Bridge Rating Through Load Testing
  10. Overcoming Reading Challenges
    - Dealing with Digital Eye Strain
    - Minimizing Distractions
    - Managing Screen Time
  11. Cultivating a Reading Routine Manual For Bridge Rating Through Load Testing
    - Setting Reading Goals Manual For Bridge Rating Through Load Testing
    - Carving Out Dedicated Reading Time
  12. Sourcing Reliable Information of Manual For Bridge Rating Through Load Testing
    - Fact-Checking eBook Content of Manual For Bridge Rating Through Load Testing
    - Distinguishing Credible Sources
  13. Promoting Lifelong Learning
    - Utilizing eBooks for Skill Development

- Exploring Educational eBooks

#### 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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