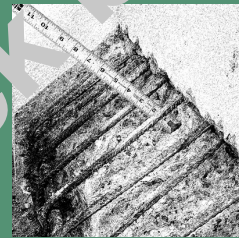


# Manual for the Evaluation and Repair of Precast, Prestressed Concrete Bridge Products

Including: Imperfections or Damage  
Occurring During Production, Handling,  
Transportation, and Erection

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**MANUAL FOR THE EVALUATION AND REPAIR  
OF PRECAST, PRESTRESSED CONCRETE  
BRIDGE PRODUCTS**

***including***

***Imperfections or Damage Occurring During  
Production, Handling, Transportation, and Erection***

MNL-137-06-E



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## **FOREWORD**

This manual has been developed for the purpose of promoting a greater degree of uniformity among owners, engineers, and industry, with respect to the evaluation and repair procedures for precast, prestressed concrete bridge beams, deck panels, and similar precast products.

In response to needs determined by the PCI Bridge Producers Committee, the PCI Bridge Committee established a subcommittee comprised of a cross section of its members representing academia, engineers, owners, and producers to prepare this manual. Contributors were:

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## **INTRODUCTION TO STANDARD REPAIRS**

|   |           |
|---|-----------|
| <b>CHAPTER 1 — INTRODUCTION .....</b>               | <b>1</b>  |
| <b>CHAPTER 2 — TROUBLESHOOTING GUIDE .....</b>      | <b>7</b>  |
| <b>CHAPTER 3 — STANDARD REPAIR PROCEDURES .....</b> | <b>31</b> |
| <b>CHAPTER 4 — METHODS OF PATCHING .....</b>        | <b>47</b> |
| <b>CHAPTER 5 — EPOXY INJECTION .....</b>            | <b>61</b> |
| <b>CHAPTER 6 — SELECTED REFERENCES .....</b>        | <b>65</b> |

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## CHAPTER 1—INTRODUCTION

|  |   |
|--|---|
| 1. <i>How to Use This Manual</i> .....   | 1 |
| 2. <i>Key Factors in Decision Making for No Repair, Repair, or Rejection</i> ..... | 2 |
| 3. <i>Disclaimer</i> .....   | 2 |
| 4. <i>General Comments on Cracking</i> .....                                       | 2 |
| 5. <i>Occurrence and Significance of Cracking</i> .....                            | 3 |
| 6. <i>Cracks Prior to Detensioning</i> .....                                       | 3 |
| 7. <i>Autogenous Healing of Cracks</i> .....                                       | 3 |
| 8. <i>Spalls and Voids</i> .....   | 3 |
| 9. <i>Durability of Repairs</i> .....  | 4 |
| 10. <i>Essential Issues to Be Considered in Engineering Evaluation</i> .....       | 4 |
| 11. <i>References</i> .....  | 5 |

## CHAPTER 1—INTRODUCTION

Plant-cast prestressed concrete bridge beams and similar products produced in PCI-Certified plants are manufactured in a quality-controlled environment. These facilities meet the minimum standards for processes and equipment. They have trained supervisory and certified quality control staff operating within published procedures that will consistently result in high quality products that meet project and customer requirements.

As with any manufacturing process, damage or defects can occur in precast concrete bridge products. Examples include voids and cracks in concrete, and improperly placed or damaged reinforcement and hardware. These fall into one of three categories:

- Products that can be accepted without repair
- Products that can be accepted with repair
- Products that must be rejected

This manual has been prepared to be a resource document to guide owners, designers, inspectors, and fabricators in reaching informed decisions regarding repair options. To this end, the engineering considerations related to individual defects are provided. The ultimate value of this guide depends on the sound engineering judgment of qualified individuals who use this document.

### HOW TO USE THIS MANUAL

The sections of this manual are organized as described below for easy reference:

**Chapter 2**, Troubleshooting Guide, contains descriptions, by category, of the defect being considered. Within each category, the reader can find the following in side-by-side columns:

- **Causes** – an extensive list of possible causes of specific types of defects
- **Prevention** – corresponding corrective actions to prevent each type of defect
- **Engineering Effects** – a thorough discussion of the engineering implication of the specific type of defect to provide the basis for decisions regarding repair or rejection
- **Repair Considerations** – suggested repair options that flow from the Engineering Effects discussion, with cross-references to Standard Repair Procedures (Chapter 3).

**Chapter 3**, Standard Repair Procedures, contains specific instructions to implement state-of-the-art repairs to the various types of defects.

**Chapter 4**, Methods of Patching, is an in-depth discussion of the materials and procedures for addressing the most common types of defects found in precast, prestressed concrete products.

**Chapter 5**, Epoxy Injection, provides a thorough discussion of the proper procedures to ensure successful and effective injection repairs.

**Chapter 6**, Selected References, lists sources for additional information on fabrication, materials, and repairs of precast, prestressed concrete products.

### KEY FACTORS IN DECISION MAKING FOR NO REPAIR, REPAIR, OR REJECTION

#### Disclaimer

Every effort has been made to provide a complete list of the common types of damage or defects that may occur in precast, prestressed concrete products during production, handling, transportation, and erection (pre-service damage). Other types of defects or damage may occur, however. There may also be other causes for the types of occurrences listed in this report, other methods for prevention, and other issues to be considered in the engineering evaluation of the damage. Engineering judgment should be exercised in these situations. In addition, the approaches illustrated in this manual can be applied to other similar situations that may arise.

#### General Comments on Cracking

Cracks may occur in sections of prestressed concrete girders where the effects of the prestressing force do not directly act to close such cracks. It should be understood that girders are prestressed in their long, axial direction. Therefore, in general, any cracks that form in the girder that are not perpendicular to the long axis of the member will not close under the effect