ICRI Committee Addresses Post-Tensioning Issues

By Kelly M. Page

Repairs of post-tensioned concrete structures are fairly common, but can bring a higher level of complexity to a repair project. Because this is an important subject matter for the industry, ICRI's Repair Materials and Methods Committee has had a subcommittee working on documents dealing with post-tensioning for several years now. ICRI members Scott Greenhaus, Dick Bonin, and Michael Tabassi are co-chairs of this subcommittee.

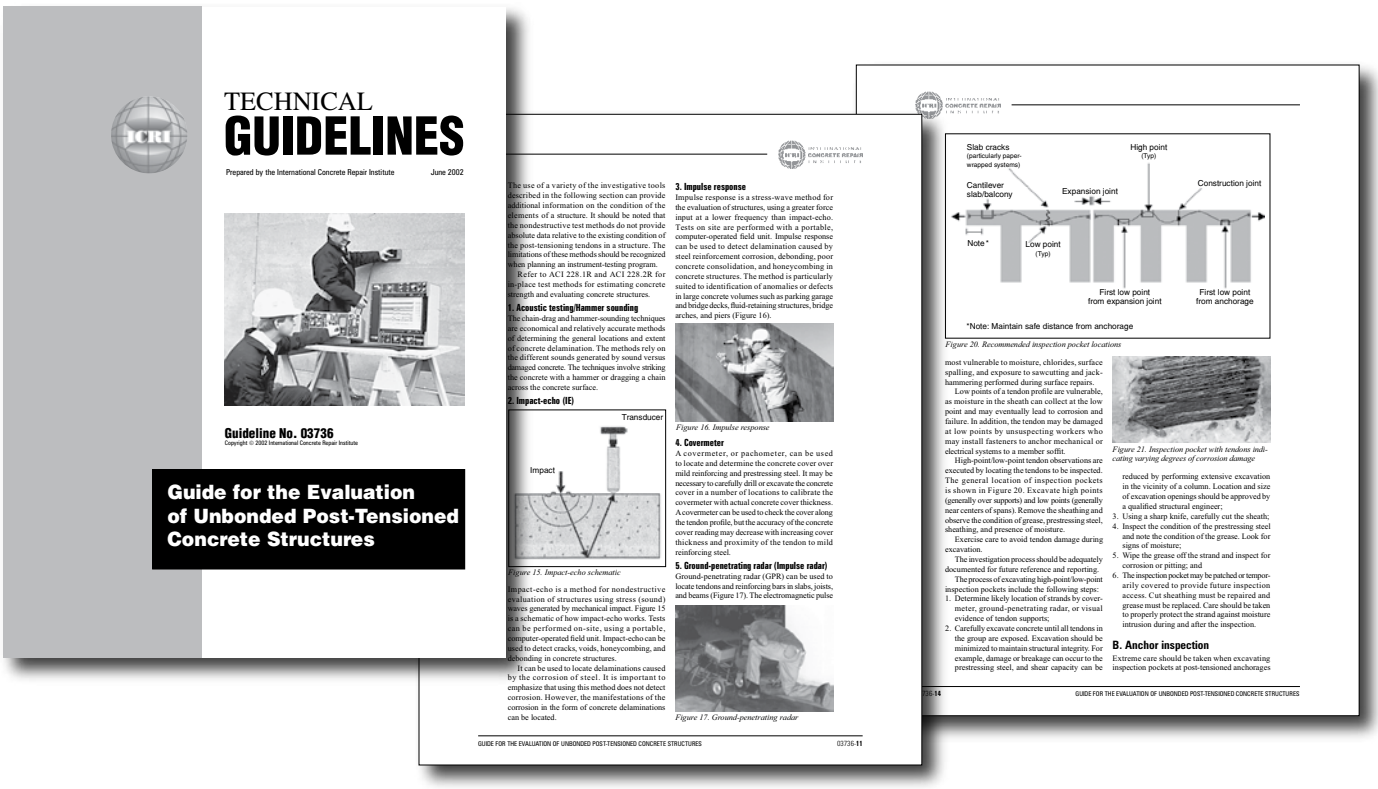
The subcommittee's first work product was introduced in the fall of 2002, titled "Guide for the Evaluation of Post-Tensioned Concrete Structures." The guideline is intended to provide an introduction to the procedures, tests, equipment, and processes used to evaluate post-tensioned concrete structures. It includes a review of the history of the structural system, and describes evaluation procedures, field and laboratory investigation techniques, engineering analysis, a summary of investigative results, and report development (see sidebar for full Table of Contents).

Once this evaluation document was published, the committee got back to work on their next effort, a document dealing with the actual repairs. The document, "Guide for the Repair of Unbonded Post-Tensioned Concrete Structures," is now in the final phases of review, and should be published within the next 6 to 12 months.

This new guideline will provide an introduction to the repair of unbonded post-tensioned structures. It reviews the typical unbonded post-tensioning systems, repair design considerations and specifications, contracting methods, repair procedures and techniques, safety issues, durability, and maintenance considerations of post-tensioned repair projects.

Both guidelines are intended to help familiarize owners, design professionals, contractors, suppliers, and other interested parties with the procedures, equipment, risks, and other aspects of post-tensioned repair projects.

As ICRI and the concrete repair industry looks to the future, we will seek repair methods and procedures that enhance the quality of the repair, are less labor intensive, and improve the work environment. Our committees are constantly working on projects and documents that reflect these commitments. They are open to all—why not attend a meeting at the ICRI 2005 Fall Convention in New Orleans so you can start giving your input to these important concrete repair industry projects.



Contents

Purpose 1
Safety 1
Introduction 1
Evaluation process 2
I. History of the structure 4
A. Document review 4
B. Service conditions 4
1. Environment 4
2. Use of structure 6
II. Field investigation (Nondestructive evaluation) 6
A. Visual examination 6
1. Construction and expansion joints 6
2. Anchor zones 7
3. Delamination and spalling 7
4. Tendon eruptions 8
5. Exposed tendon sheathing 8
6. Grease staining 8
7. Cracks 8
8. Efflorescence, leakage 9
9. Rust staining 9
10. Deflections 9
11. Concrete penetrations and modifications 10
12. Previous repair 10
13. Overlays 10
14. Freeze-thaw damage 10
15. Curing compounds, coatings, and waterproofing 10
B. Instrument testing 10
1. Acoustic testing/Hammer sounding 11
2. Impact-echo (IE) 11
3. Impulse response 11
4. Covermeter 11
5. Ground-penetrating radar (Impulse radar) 11
6. Radiography (X-ray) 12
7. Rebound hammer (ASTM C 805)/Windsor probe (ASTM C 803)/Pulse velocity (ASTM C 597)/Pullout (ASTM C 900) 12
8. Corrosion potential testing (ASTM C 876) 12
9. Acoustic monitoring 12
III. Field investigation (Exploratory evaluation) 13
A. High-point/Low-point inspections 13
B. Anchor inspection 14
C. Lift-off testing 15
D. Strand extraction 15
E. Screwdriver penetration test 16
F. In-situ strand tension test 16
G. Grease inspection and testing 16
1. Visual 16
2. Crackle test 17
H. Borescope 17
I. Corrosion potential evaluation (CPE) (Gas purge) 17
J. Core sampling 17
K. Load test 17
IV. Laboratory testing and analysis 18
A. Concrete 18
1. Compression strength (ASTM C 39/C 42) 18
2. Petrographic examination (ASTM C 856) 18
3. Chloride content (ASTM C 1152, C 1218, AASHTO T 260, FHWA-RD-77) 18
4. Carbonation 19
B. Prestressing steel strand 19
1. Visual inspection 19
2. Tensile testing 20
3. Chemical analysis/Metallurgical testing 20
4. Metallography 21
5. Hydrogen-embrittlement testing 21
6. SEM/EDS analysis 21
7. Grease inspection and testing 21
V. Structural analysis 21
VI. Summary 21
A. Scope of investigation and frequency of testing 22
B. Final report 22
VII. References 23