70 significant items from seven decades of *PCI Journal*

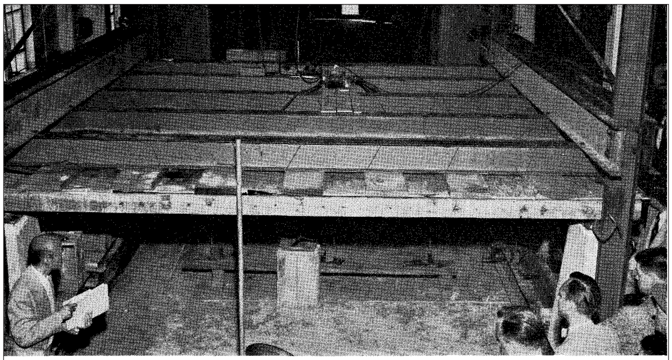


Fig. 2. Testing a 5-inch prestressed concrete slab, uniform load being applied by air pressure in plastic bags (University of California).

CAN WE DESIGN PRESTRESSED CONCRETE BY ALLOWABLE STRESSES

By Dr. T. Y. Lin

Associate Professor, Civil Engineering
University of California, Berkeley

(I) Introduction

Prestressed-concrete design has been made on the basis of the elastic theory, using working loads and allowable stresses. It has been also based on the ultimate strength theory, using factors of safety on the loads, often termed as load factors. For most countries in Europe, recommendations and codes for prestressed concrete permit design on either the ultimate or the elastic basis. In this country, our engineers, being used to the elastic theory for reinforced concrete, tend to prefer the elastic rather than the ultimate approach. While the elastic theory works beautifully for prestressed concrete before cracking, the strength after cracking can only be determined by the ultimate theory. Unless care is exercised in setting up variable allowable stresses to suit different conditions, design by the elastic theory will yield divergent degrees of safety.

Ultimate design is based on a set of given load factors. Hence, structures designed by that method will possess the desired degree of safety, although they may be overstressed or understressed if judged by the elastic theory. However, ultimate strength design gives no assurance of proper behavior under service conditions, unless the design is checked by the elastic theory or a suitable factor of safety is chosen for each case.

(II) What Should We Design Our Structures For?

Let us try to determine our basic requirements in design. First of all, it must be made clear that we should not design for fictitious or even real stresses unless we understand the significance of their values. Owing to the over-emphasis on stress calculations in our engineering training, our graduates do not know very much about real engineering although they do know how to compute stresses by theoretical and empirical formulas. They do not have sufficient idea of the actual behavior and strength of structures. The less they understand the structures, the more they tend to blindly follow certain codes of practice. It often ends up that we are simply designing our structures to satisfy certain code requirements which can be either too conservative or not sufficiently safe.

To experienced engineers, the real criteria for designing are:

1. We should design our structures so that they will perform satisfactorily under the usual service conditions. This means freedom from excessive camber, deflections, vibrations, cracks, etc.

May, 1956 3

"Can We Design Prestressed Concrete by Allowable Stresses" by T. Y. Lin ran in the first issue of *PCI Journal*, May 1956.

When a few innovative concrete experts in the 1950s realized the benefits and potential of prefabricated concrete (with or without prestressing), they banded together to improve the quality of precast and prestressed concrete and reduce the cost of concrete structures. These experts soon decided to share what they knew and what they were learning with their fellow professionals, and in 1954 the Prestressed Concrete Institute (PCI) was formed.

The first issue of the *PCI Journal* was published shortly after PCI's inception to share the relevant knowledge with a broader audience. The issue debuted at PCI's second annual conference in May 1956.

In honor of PCI's seven decades of success, PCI's Journal Editorial Advisory Committee has assembled a list of notable items that have been published in the *PCI Journal* since its first issue. This list is not meant to be comprehensive or definitive; rather, the articles and other items listed herein represent just some of the remarkable contributions that many devoted professionals have made to the precast and prestressed concrete industry's body of knowledge through the *Journal*.

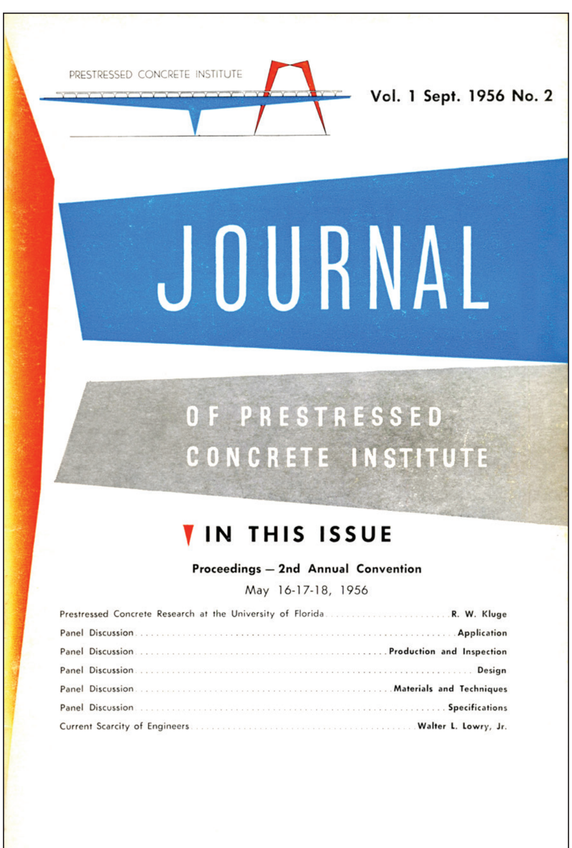
The choice of items to include in this list was based on a number of factors. Several prominent articles were identified by PCI members, who also supplied rationales for their inclusion. The list also includes articles that have been frequently cited by other researchers and engineers around the world. The sheer number of times that some of these articles have been referred to by other authors working in the precast concrete industry or other industries (timber, steel, etc.) is an indicator of their important contributions to the advancement of engineering and construction. Similarly, when an article serves as a point of reference in codes or standards published by an appropriate authority (for example, the American Concrete Institute or the American Association of State Highway and Transportation Officials), that article clearly can be perceived to have provided valuable knowledge.

Another sign of a vibrant industry journal is the discussion it engenders among its readers. Over the years, *PCI Journal* has published many pages of Reader Comments or, in more recent issues, Discussion. There also have been ongoing features, such as the Open Forum—Problems and Solutions series, in which industry practitioners share information and best practices. Several Open Forum pieces are on this list.

Many of the authors' names cited herein will be familiar to anyone who has been involved in the precast and prestressed concrete industry. Other names may be new discoveries. We hope that you enjoy diving into PCI's knowledge-sharing heritage.

Much appreciation is extended to the many people who suggested items for this list. It is our hope that although some truly worthwhile material has been passed over due to space constraints, we have presented a valuable overview of *PCI Journal*.

A note about DOI numbers: The URL following each article description makes it easy to find the article online. Another way to locate these resources is to search the PCI website, pci.org, where all of the issues of *PCI Journal* are available in electronic form.



When it was launched in 1956, PCI's quarterly magazine was known simply as the "Journal."

1956

Can We Design Prestressed Concrete by Allowable Stresses

T. Y. Lin

This paper, by an author often referred to as the father of prestressed concrete and published in the first issue of the *PCI Journal*, introduced engineers to the basic technology for prestressed concrete design. It emphasized that the design of prestressed concrete members should be based on their behavior and strength.
https://doi.org/10.15554/pcij.05011956.3.5

1957

Wire and Strand for Prestressed Concrete

H. Kent Preston

Written by the preeminent consultant on prestressing strand for decades, and reprinted from the American Society of Civil Engineers' *Civil Engineering* magazine, this article explained the technology of prestressing strand for engineering use. The article discussed 7 wire uncoated strand for pretensioning and 1 in. diameter 19 wire galvanized strand for post-tensioning applications
https://doi.org/10.15554/pcij1.04-02

1959

Literature on Prestressed Concrete
T. Y. Lin

This article, which was among the first to list resources for prestressed concrete design, provided guidance for engineers pursuing knowledge about precast and prestressed concrete just as it was becoming a popular building system.
https://doi.org/10.15554/pcij4.2-04

Although Lin said that the resource list was not all-inclusive, it was a road map for finding critical resources from around the world at a time when locating information was not as simple as searching the internet. For example, Lin listed early specifications from organizations such as the Institute of Structural Engineers of London, translations by the Portland Cement Association, and, of course, PCI publications.

1960

Research on Torsion of Prestressed Members
Paul Zia

Addressing an issue that would not become part of code provisions until many years later, this article was the beginning of Zia's career work on shear and torsion in prestressed concrete beams. The investigation of torsion described herein is based on a comprehensive experimental program that was conducted in partnership with PCI.
https://doi.org/10.15554/pcij.09011960.35.40

1961

A New Concept for Prestressed Concrete
T. Y. Lin

Noting that prestressed members can be designed by various approaches (stress concept, ultimate strength concept, and others), the author introduced the load balancing concept of design for prestressed concrete members in this article, which is widely used today for designing girders and slabs.
https://doi.org/10.15554/pcij.12011961.36.52

1962

An Interpretation of Results of Fire Tests of Prestressed Concrete Building Components
A. H. Gustaferro and C. C. Carlson

This important study of the effects of fire on prestressed concrete building components described and analyzed the results of more than 50 fire tests by the National Bureau of Standards, Underwriters Laboratories, Portland Cement Association, and the Fire Prevention Research Institute. The authors also discussed various factors influencing the fire resistance of prestressed concrete flexural components.
https://doi.org/10.15554/pcij.10011962.14.43

1965

Connections in Precast Concrete Structures—Strength of Corbels
L. B. Kriz and C. H. Raths

This article furthered the design approach for reinforced concrete corbels and serves as a reference in the American Concrete Institute's building code (ACI 318).
https://doi.org/10.15554/pcij.02011965.16.61

Nearly every precast concrete structure uses corbels where columns are designed to support beams. Prior to the research by Kriz and Raths, the corbel was typically designed as a regular cantilever beam, subjected to typical beam requirements. This article established an alternative design approach based on the ratio of the corbel projection to the corbel depth, which permitted a higher shear strength than that used for beams. The approach presented in this article has been used for decades in the design of precast concrete structures. This early paper on corbels also formed the basis for code provisions and for later research on a vital precast concrete connection element.


PRESTRESSED CONCRETE INSTITUTE

Journal of the prestressed concrete institute

December, 1960 Vol. 5, No. 4

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By the end of the 1950s, PCI had relocated to Chicago, Ill., where it highlighted the importance of its technical publishing efforts by listing its "EXECUTIVE and EDITORIAL OFFICES."

With the 1960s came the formalization of the title as the "Journal of the Prestressed Concrete Institute." Also, the terms Architectural and Structural were added to the cover language.

1968

Plant Certification—A Program of Merit in the Prestressing Industry
Charles W. Wilson

In January 1967, a group within PCI voluntarily participated in a plant certification program. At the end of the first year's inspections, 35 plants exhibited the required capability to produce quality structural precast and prestressed concrete products, and the program was announced to the building industry (see program announcement in the article). This paper described the initiation of plant certification, which has become a core value and expectation for the industry.
https://doi.org/10.15554/pcij13.2-05

1972

Secondary Moment and Moment Redistribution in Continuous Prestressed Concrete Beams
T. Y. Lin and Keith Thornton

Lin and Thorton's article was among the first articles to illustrate the secondary moment and moment redistribution in continuous prestressed concrete beams. It introduced an approximate design method for determining the ultimate capacity of continuous prestressed concrete beams. This paper is cited in ACI 318-19(22) as well as in many other articles.
https://doi.org/10.15554/pcij.01011972.8.20

1972

Shear Transfer in Reinforced Concrete—Recent Research
Alan H. Mattock and Neil M. Hawkins

This pioneering paper on shear transfer in reinforced concrete was among the first articles to address shear transfer behavior in cracked and uncracked concrete. To date, this article has been cited by 641 publications, making it one of the most cited *PCI Journal* articles of all time. This third most cited article has also been referenced in ACI 318.
https://doi.org/10.15554/pcij.03011972.55.75

1972

Load Distribution Test on Precast Hollow Core Slabs with Openings
Ted Johnson and Zohair Ghadiali

This paper, which described extensive testing to investigate the load distribution on precast concrete hollow-core slabs with openings, was one of the first references to address the effect of openings on the behavior of hollow-core slabs, the capacity of hollow-core floor systems, and predicted failure mode. This article is referenced in ACI 318 and several PCI publications.
https://doi.org/10.15554/pcij.09011972.9.19

1973

Design of Prestressed Concrete for Fire Resistance
Armand H. Gustaferro

In this article, Gustaferro presented an introduction to rational methods for calculating the fire resistance of prestressed concrete structures; reviewed current fire test methods; and showed how design methods are developed using laboratory tests. Gustaferro's work was later used in PCI's *Design for Fire Resistance of Precast/Prestressed Concrete* (MNL 124) and *Specification for Fire Resistance of Precast and Prestressed Concrete* (PCI 124).
https://doi.org/10.15554/pcij.11011973.102.116

1974

Torsion Design of Prestressed Concrete
Paul Zia and W. Denis McGee

This classic paper gave the industry a methodology to design for torsion in prestressed concrete components at a time when an applicable methodology was not included in ACI 318. Based on a thorough review of available research data on torsion in prestressed concrete, Zia and McGee proposed an extension of the ACI design procedures for torsion in reinforced concrete members—which had been developed and included in ACI 318-71 but were not applicable to prestressed concrete—to cover torsion in prestressed concrete.
https://doi.org/10.15554/pcij.03011974.46.65

1975

Shear Transfer in Reinforced Concrete with Moment or Tension Acting across the Shear Plane

Alan H. Mattock, L. Johal, and H. C. Chow

This article presented part of a comprehensive study of the shear strength of reinforced concrete subject to cyclically reversing loading that simulated earthquake conditions, and included design recommendations. This paper is referenced in ACI 318 and has been cited more than 200 times.

https://doi.org/10.15554/pcij.07011975.76.93

1976

Shear Transfer in Lightweight Reinforced Concrete

Alan H. Mattock, W. K. Li, and T. C. Wang

In the mid-1970s, lightweight concrete was increasingly being used in precast concrete construction. This paper provided more and better data for designing connections with lightweight concrete by reporting the results of push-off tests carried out on specimens made from sand lightweight concrete, two types of all-lightweight concrete, and sand-and-gravel concrete. The shear transfer strength of lightweight concrete was determined to be less than that of sand-and-gravel concrete with the same compressive strength. Mattock and colleagues proposed factors to account for this difference when using ACI 318-71. This paper is referenced in ACI 318-19(22).

https://doi.org/10.15554/pcij.01011976.20.39

1976

Considerations for the Design of Precast Concrete Bearing Wall Buildings to Withstand Abnormal Loads

Irwin J. Speyer

Speyer's paper brought together key points from 11 research reports from PCA and others on structural integrity and progressive collapse of large panel systems and presented design guidelines for precast concrete bearing wall buildings subject to abnormal loadings. Many of the integrity force requirements included in this article became part of ACI 318 and are still used today. The paper also emphasized vertical, horizontal, and peripheral ties that would be sufficient to provide interaction between all building elements.

https://doi.org/10.15554/pcij21.2-05

By mid-1976, the institute's name had become part of the magazine name. A special 226-page issue of *PCI Journal* marked the retirement of T. Y. Lin from the University of California, Berkeley.

1976

The Behavior of Reinforced Concrete Corbels

Alan H. Mattock, K. C. Chen, and K. Soongswang

Mattock and colleagues' research on corbels provided the methodology we still use today. This paper, which is referenced in ACI 318-19(22), reported on an experimental study of the behavior of reinforced concrete corbels subjected to both vertical and horizontal loads. Twenty-eight corbel specimens, including 26 that contained horizontal stirrup reinforcement, were tested. Variables included in the study were the shear span–to–effective depth ratio, the ratio of the vertical load to the horizontal load, the amounts of main tensile and stirrup reinforcement, and the type of aggregate. From the study findings, criteria for the design of horizontal stirrup reinforcement were developed.

https://doi.org/10.15554/pcij.03011976.52.77

1977

Ultimate Analysis of Prestressed and Partially Prestressed Sections by Strain Compatibility

Antoine E. Naaman

Most computer programs used for the design of prestressed beams are now based on the strain compatibility method, which gives engineers an accurate and efficient way to assess ultimate strength of combined prestress and mild steel. Naaman's paper presented a simplified procedure for analyzing the behavior at the ultimate of bonded prestressed and partially prestressed concrete structural elements that fully accounted for the nonlinear behavior of the prestressing steel.
https://doi.org/10.15554/pcij.01011977.32.51

1977

Cyclic Load Tests on Prestressed and Partially Prestressed Beam-Column Joints

Robert Park and Kevin J. Thompson

The work described in this paper was part of an investigation executed in the Civil Engineering Department of the University of Canterbury, New Zealand, by Thompson during his doctoral studies, which were supervised by Park. Tests were conducted on 10 concrete beam-interior column frame assemblies subjected to static cyclic loading that simulated the effect of severe earthquake loading. The test results demonstrated the importance of transverse steel in the plastic hinge zones of flexural members and in beam-column joint cores.
https://doi.org/10.15554/pcij.09011977.84.110

1977

Behavior and Design of Prestressed Concrete Beams with Large Web Openings

George B. Barney, W. Gene Corley, John M. Hanson, and Richard A. Parmelee

Reporting the results of tests on 18 full-size precast, prestressed concrete T beams (13 long-span beams and 5 short-span beams), Barney et al. showed that large web openings in prestressed concrete components could be accommodated while maintaining full strength and satisfying serviceability requirements.
https://doi.org/10.15554/pcij.11011977.32.61

1978

Proposed Revisions to Shear-Friction Provisions

A. Fattah Shaikh

Based on a review and analysis of published research, Shaikh suggested revisions to the shear-friction provisions contained in section 2.2 of the *PCI Manual on Design of Connections for Precast Prestressed Concrete*. The proposed revisions were considered to be more realistic and likely to lead to a more economical design. This paper gave us the basis for the effective shear friction coefficient used in the *PCI Design Handbook*.
https://doi.org/10.15554/pcij23.2-04

1980

Shear and Torsion Design of Prestressed and Non-Prestressed Concrete Beams

Michael P. Collins and Denis Mitchell

Motivated by complex and restrictive empirical equations in the ACI 318 provisions for shear and torsion design, this article presented rational shear and torsion design recommendations based on compression field theory. Collins and Mitchell illustrated the proposed design recommendations in several design examples, and compared the results with those derived from other design methods. This is among the top 10 most-cited *PCI Journal* articles.
https://doi.org/10.15554/pcij.09011980.32.100

1983

Tests to Determine the Lateral Distribution of Vertical Loads in a Long-Span Hollow-Core Floor Assembly

Donald W. Pfeifer and Theodore A. Nelson

Pfeifer and Nelson reported on a test program whose purpose was to experimentally determine the distribution of resisting internal moments within 8-ft- (2.44-m-) wide, long-span, untopped hollow-core slabs. A full-scale, five-slab assembly was subjected to nine different vertical loading conditions. Test results showed good lateral load distribution; two to three slabs participated significantly, with the width of significant distribution ranging from 36% to 54% of the span length.
https://doi.org/10.15554/pcij.11011983.42.57

1984

Spandrel Beam Behavior and Design

Charles H. Raths

In this article, Raths addressed important considerations for slender spandrel beam design, including common causes of distress in precast concrete spandrel beams; types of loads applied to spandrel beams and overall torsion equilibrium requirements; design relationships for spandrel beams; and design criteria for spandrel beam connections. This paper provided basic good design practices for spandrel beams and demonstrated them through design examples.
https://doi.org/10.15554/pcij.03011984.62.131

1985

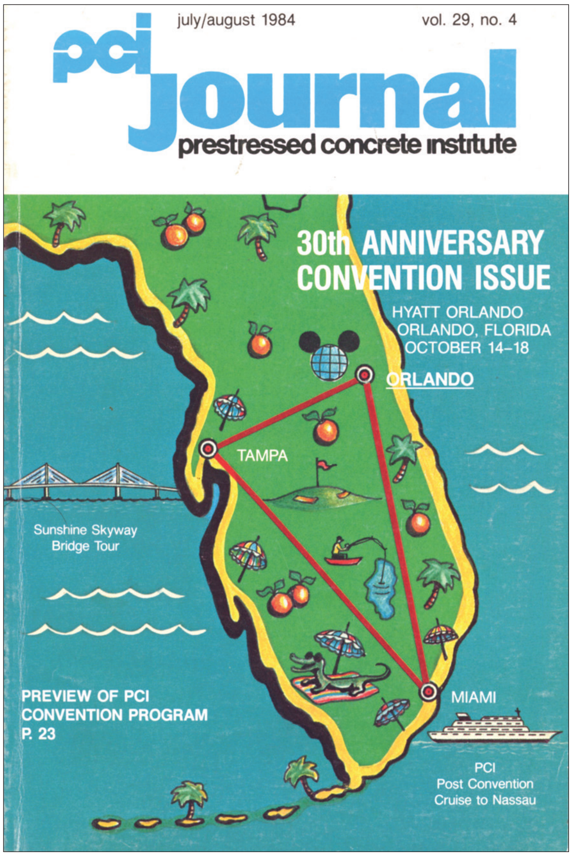
Shear Tests of Extruded Hollow-Core Slabs
Roger J. Becker and Donald R. Buettner

This article described research undertaken to determine the applicability of ACI 318 provisions for prestressed concrete to the design of hollow-core slabs. Becker and Buettner reported observations from a study of shear in dry cast, extruded hollow-core slabs using zero slump concrete and concluded that those slabs met the ACI 318 criteria.
https://doi.org/10.15554/pcij.03011985.40.54

1986

Evaluation of Transverse Flange Forces Induced by Laterally Inclined Longitudinal Post-tensioning in Box Girder Bridges
Walter Podolny, Jr.

This paper proposed a design procedure to address the secondary lateral and vertical component forces in longitudinally post-tensioned box-girder bridges designed with inclined webs. Podolny included two numerical examples, one for a simple-span girder and one for a continuous girder with the special case of external tendons.
https://doi.org/10.15554/pcij.01011986.44.61



The colorful cover illustration on this issue was again an incremental step in the evolving look of the *PCI Journal*.

1987

Influence of Concrete Strength and Load History on the Shear Friction Capacity of Concrete Members
Joost Walraven, Jerome Frénay, and Arjan Pruijssers

Based on existing test data and the results of recent experiments conducted at the Delft University of Technology, Walraven and coauthors proposed new shear friction equations for determining the shear capacity at the cracked interface of reinforced concrete members. This frequently cited paper has been referenced in AASHTO specifications.
https://doi.org/10.15554/pcij.01011987.66.84

1987

Toward a Consistent Design of Structural Concrete
Jörg Schlaich, Kurt Schäfer, and Mattias Jennewein

In this paper, Schlaich and coauthors established a fundamental and comprehensive basis for strut-and-tie modeling for structural concrete that is applicable to reinforced concrete, precast prestressed concrete, and partially prestressed concrete components. This article helped lay the foundation for the strut-and-tie design of structural concrete.
https://doi.org/10.15554/pcij.05011987.74.150

Presentations on the strut-and-tie model frequently refer to this article by Schlaich et al., which explains not just the mechanics of the model but also its conceptual basis and the "art" that is necessary when using the strut-and-tie method. This article may be the most frequently cited *PCI Journal* article; it is referenced in ACI and AASHTO documents.

Strut-and-tie modeling is permitted in design codes. The technique is extremely effective for designing the disturbed (D-) regions of structural components where beam theory is not applicable.

1987

Cable Stayed Bridges with Prestressed Concrete
Fritz Leonhardt

This paper introduced cable-stayed bridges to the precast concrete community in the United States in a comprehensive way. The construction of cable-stayed bridges, with extensive use of precast concrete segments for bridge decks, took off in the United States around the time that this article was published.
https://doi.org/10.15554/pcij.09011987.52.80

1988

Ductility of Reinforced and Prestressed Concrete Flexural Members

Brian C. Skogman, Maher K. Tadros, and Ronald Grasmick

This article proposed a unified ductility formula for both reinforced and prestressed concrete flexural members. Relatively easy to use, this equation was intended as a substitute for the maximum tensile reinforcement provisions in the 1983 edition of ACI 318 for both types of construction. Skogman and colleagues provided numerical examples as well as proposed ACI 318 code and commentary revisions.
https://doi.org/10.15554/pcij.11011988.94.107

1988

A General Equation for the Steel Stress for Bonded Prestressed Concrete Members

Robert E. Loov

Various approximate equations for predicting the stress in the prestressing steel corresponding to flexural failure have been proposed or adopted by codes. In this paper, which is referenced in the 9th edition of the AASHTO LRFD specifications, Loov compared stress-strain curves based on the equations to experimental curves and to curves based on the minimum standards specified. The comparisons demonstrated the inadequacies of the present equations.
https://doi.org/10.15554/pcij.11011988.108.137

Adjusting the Name

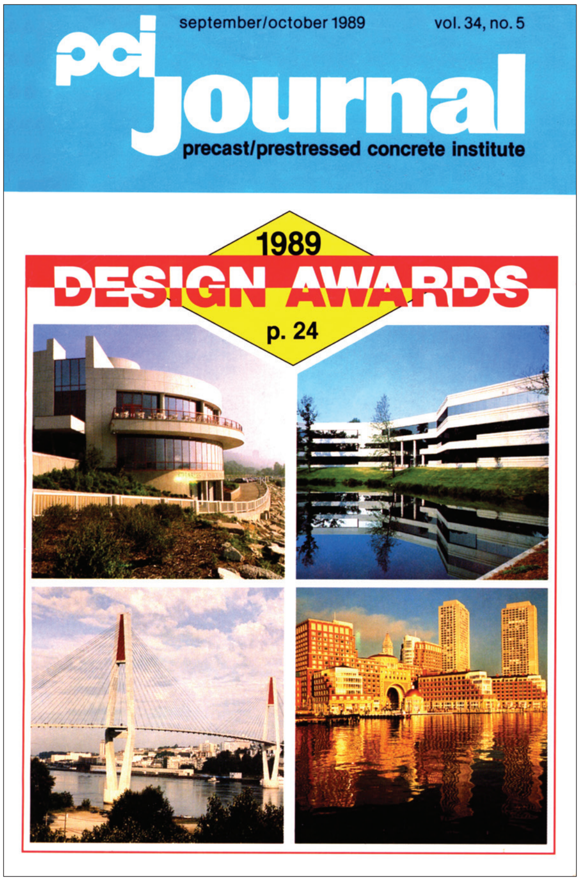
In early 1989, after much discussion, the term precast was officially added to the PCI name to recognize "the growing participation of the architectural precast and GFRC segments in the institute." The March–April 1989 issue of the *Journal*, wherein the announcement was made, was the first time Precast/Prestressed Concrete Institute appeared as a subheading on the *Journal* cover.

1989

Lateral Stability of Long Prestressed Concrete Beams—Part 1

Robert F. Mast

This landmark paper established the requirements for safely handling and shipping long, slender prestressed concrete flexural components. It was the first of two papers by Mast (the second was published in 1993) to set forth the analysis methodology for evaluating the lateral stability of long prestressed concrete flexural components. These two papers served as the basis for PCI's *Recommended Practice for Lateral Stability of Precast, Prestressed Concrete Bridge Girders*, and facilitated a significant expansion of the bridge product market nationwide.
https://doi.org/10.15554/pcij.01011989.34.53



With its colorful cover featuring photos of four award-winning precast concrete projects, the September–October 1989 issue of *PCI Journal* was one of the last issues to be printed in trade size format.

1992

Behavior of Hollow-Core Slabs Subject to Edge Loads

Alex Aswad and Francis J. Jacques

Aswad and Jacques presented the results of a comprehensive series of tests on a particular brand of 8-in.- (203-mm-) thick extruded hollow-core slabs. Based on those results and a review of existing literature, they recommended a range for allowable edge service loads.
https://doi.org/10.15554/pcij.03011992.72.84

The End of an Era

In the November-December 1989 issue of the *PCI Journal*, editor George D. Nasser wrote, "This is the last issue of the *PCI Journal* in its current 6 × 9 in. format. Starting with the January-February 1990 issue the JOURNAL will assume the standard 8-1/2 × 10-7/8 in. size." In that perspective column, entitled *End of an Era—Beginning of a New Venture*, Nasser noted that the old format had a distinctive look, "a kind of 'technical' Readers Digest," and then explained the numerous reasons for the change. And the new venture began.

1992

Evaluation of Degree of Rusting on Prestressed Concrete Strand

Augusto S. Sason

This article provided a procedure to evaluate the degree of rust on prestressing strands, with reasoning for acceptance or rejection for use in prestressed concrete structures. The suggested procedure has allowed precast concrete producers to salvage large amounts of strands that could still be deemed acceptable.
https://doi.org/10.15554/pcij.05011992.25.30

"I am not an engineer, just a quality/safety guy, but this article saved us from scrapping massive amounts of strand and determining pitting within the strand. I am sure others have used the same approach."

"It is most fitting that this inaugural issue of the *PCI JOURNAL* (in the new 8-1/2 × 10-7/8 in. format) is also PCI's contribution to the 11th FIP Congress to be held in Hamburg, West Germany, from June 4-9, 1990," wrote John G. Nanna in the Chairman's Message. He also noted, "We are proud of the fact that during the last 30 years there have been so many significant papers published in the *PCI JOURNAL* by authors from other countries."

1992

Response of Hollow-Core Slab Floors to Concentrated Loads

John F. Stanton

This article provided an analytical program, validated by test results, to determine the response of hollow-core floor slabs subjected to concentrated and line loads. Stanton also provided simplified analysis rules and demonstrations of these rules through examples. The proposed approach was to improve the methodology included in the PCI *Manual for the Design of Hollow-Core Slabs*.
https://doi.org/10.15554/pcij.07011992.98.113

1993

Seismic Response of Precast Prestressed Concrete Frames with Partially Debonded Tendons

M. J. Nigel Priestley and Jian Ren Tao

In this article, Priestley and Tao conceptualized a means to frame precast concrete columns and beams using beam prestressing tendons debonded through the joint and a distance on either side of the column. Their intent was not only to provide a robust connection but also to ensure that residual displacements of the frame would be negligible and its residual stiffness would be relatively unchanged even after being subjected to loading representative of a design-level earthquake. The information in this article established the basis for jointed connections for the use of precast concrete structures in earthquake-resistant design.
https://doi.org/10.15554/pcij.01011993.58.69

1993

Lateral Stability of Long Prestressed Concrete Beams—Part 2

Robert F. Mast

This article—the second of two papers by Mast that established the requirements for evaluating the lateral stability of long, slender prestressed concrete flexural members—provided modifications to the first paper as well as guidance for assessing members supported from below. In this paper, Mast developed the theory of lateral stability of long prestressed concrete girders, a theory that is one of the key foundational elements of extending girder spans.
https://doi.org/10.15554/pcij.01011993.70.88

Mast's two-part series on the lateral stability of long prestressed concrete beams served as the basis of PCI's *Recommended Practice for Lateral Stability of Precast, Prestressed Concrete Bridge Girders.* As previously noted, these papers facilitated a significant expansion of the bridge product market nationwide. The theoretical framework for evaluating the stability of long-span girders established by Mast is widely used in industry today for extending girder spans. Without Mast's contribution to the body of knowledge, girders in excess of 220 ft in length would not be possible.

1993

Recommended Practice for Design, Manufacture and Installation of Prestressed Concrete Piling

PCI Committee on Prestressed Concrete Piling

This article provided important recommended practice guidelines for prestressed concrete piles, including design provisions, materials, manufacturing, transportation, and installation recommendations.

https://doi.org/10.15554/pcij38.2-05

1994

Development Length and Lateral Spacing Requirements of Prestressing Strand for Prestressed Concrete Bridge Girders

J. Harold Deatherage, Edwin G. Burdette, and Chong Key Chew

Deatherage and colleagues wrote this article in response to a Federal Highway Administration memorandum restricting the use of certain seven-wire strands in prestressed concrete bridge girders. Based on findings from a subsequent PCI-sponsored research program, the authors recommended that the use of 0.6 in.-diameter strand should not be prohibited. They also proposed methods for calculating transfer and development lengths, and for determining acceptable center-to-center spacing requirements for strands.

https://doi.org/10.15554/pcij.01011994.70.83

1994

The NU Precast/Prestressed Concrete Bridge I-Girder Series

K. Lynn Geren and Maher K. Tadros

This was the inaugural paper on the development of modern cross sections that significantly extend the span capability of prestressed concrete bridge girders. The Nebraska University (NU) bridge girder sections presented in this paper were not only adopted in Nebraska but also led to the development of similar cross sections across the United States, including the Washington State WF girder series that currently holds the national record for pretensioned concrete girder length at 223 ft.

https://doi.org/10.15554/pcij.05011994.26.39

1994

Fatigue Tests on Prestressed Concrete Beams Made with Debonded Strands

Bruce W. Russell and Ned H. Burns

In this paper, Russell and Burns presented the results of fatigue testing on prestressed beams with debonded strands. The testing demonstrated that debonding had a very small detrimental effect on the strength of beams, even after 1 million cycles emulating truck loading, as long as the debonded strand regions were located where the cracking moment was not exceeded.

https://doi.org/10.15554/pcij.11011994.70.88

1995

Horizontal Connections for Precast Concrete Shear Walls Subjected to Cyclic Deformations—Part 1: Mild-Steel Connections

Khaled A. Soudki, Sami H. Rizkalla, and Bill LeBlanc

This article reported on testing of the behavior of horizontal joints of precast concrete shear walls. Five configurations of joint geometry and mechanical connectors for splicing the vertical reinforcement across the joint were investigated. The test results, which were used to determine strength, stiffness, ductility, energy dissipation, modes of failure, and component contribution, provided insights into the modes of failure and the type of damage associated with them. In the paper, Soudki and coauthors proposed a design procedure for calculating the connection flexural strength. The methodology also covered connection deformation, distinguishing between rocking and shear slip deformation, and the authors provided recommendations for detailing shear wall joints to improve their seismic response.

https://doi.org/10.15554/pcij.07011995.78.96

1995

Tests on Connections of Earthquake Resisting Precast Reinforced-Concrete Perimeter Frames of Buildings

José I. Restrepo, Robert Park, and Andre H. Buchanan

In this paper, Restrepo et al. presented the results of a test program that investigated the behavior of precast concrete moment frames that emulate cast-in-place concrete. The novel system used columns with beam stub joints cast-in-place at midspan of the beams where the beam longitudinal reinforcement was spliced. This midspan placement allowed for a conventional design of the beam-column frame joint to be cast monolithically. Six configurations of the beam splice-joint reinforcement were investigated. The test results proved that the performance of the precast concrete moment frames was satisfactory, with predictable development of plastic hinges and achievement of high ductility ratios.

https://doi.org/10.15554/pcij.07011995.44.61

1995

Design of Connections of Earthquake Resisting Precast Reinforced Concrete Perimeter Frames

José I. Restrepo, Robert Park, and Andre H. Buchanan

In this follow-up to their previous paper reporting the test results for precast concrete moment frames that emulate cast-in-place concrete, Restrepo et al. offered a design methodology for the cast-in-place joints at midspan of the beams. The rational procedure covered strut-and-tie models that allow for the calculation of forces and stresses, as well as development length and details of reinforcement of the reinforcement within the joint. An appendix presented design examples to illustrate the design methodology.

https://doi.org/10.15554/pcij.09011995.68.80

1996

Seismic Tests of Precast Beam-to-Column Joint Subassemblages with Unbonded Tendons

M. J. Nigel Priestley and Gregory A. MacRae

As part of the Precast Seismic Structural Systems (PRESSS) research program, two ungrouted post-tensioned, precast concrete beam-to-column joint subassemblies were tested under cyclic reversals of inelastic displacement to determine seismic response. In this article, Priestley and MacRae showed that satisfactory seismic performance can be expected from well-designed, ungrouted precast, post-tensioned concrete frames.

https://doi.org/10.15554/pcij.01011996.64.81

1996

The PRESSS Program—Current Status and Proposed Plans for Phase III

M. J. Nigel Priestley

In this paper, Priestley summarized the results of phases I and II of the PRESSS research program, and outlined plans for phase III. The ultimate goal of the program was to establish the notion that properly designed precast concrete buildings would perform predictably and dependably under seismic loading, and would offer advantages, including reduced damage levels, when compared with equivalent reinforced concrete or steel structures.

https://doi.org/10.15554/pcij.03011996.22.40

1996

Measured Transfer Lengths of 0.5 and 0.6 in. Strands in Pretensioned Concrete

Bruce W. Russell and Ned H. Burns

Applying a wide variety of research variables, investigators measured transfer lengths for both 0.5- and 0.6-in.-diameter strands. The results demonstrated that 0.6-in. strands with 2-in. spacing can be safely used in pretensioned concrete members, and Russell and Burns recommended a formula for estimating the transfer length.

https://doi.org/10.15554/pcij.09011996.44.65

1997

A Hybrid Reinforced Precast Frame for Seismic Regions

John Stanton, William C. Stone, and Geraldine S. Cheok

In this paper, Stanton et al. described a precast, prestressed concrete framing system for resisting earthquake loads that used both unbonded post-tensioned reinforcement and bonded mild steels bars as an energy dissipating element. They noted that the test performance of the hybrid frame was equal or superior to that of a conventional cast-in-place moment frame, and discussed the design criteria and code implications of the findings. Due to the benefits of the hybrid frame, the concept has also been used in frame steel and timber structures.

https://doi.org/10.15554/pcij.03011997.20.23

1997

Acceptance Criteria for Bond Quality of Strand for Pretensioned Prestressed Concrete Applications

Donald R. Logan

Documenting the results of 216 strand bond performance tests, this paper set the stage for much of the subsequent research in this important field.

https://doi.org/10.15554/pcij.03011997.52.90

1997

Maximum Reinforcement in Prestressed Concrete Members

Mohsen A. Saleh

In this contribution to the journal's Open Forum, Saleh explained how to use a strain compatibility approach to apply a portion of ACI 318-95 to a prestressed concrete component.

https://doi.org/10.15554/pcij42.2-pands

1997

Investigation of Standardized Tests to Measure the Bond Performance of Prestressing Strand

Dallas R. Rose and Bruce W. Russell

In this article, Rose and Russell described an experimental program in which simple pull-out tests, tensioned pull-out tests, and measured strand end slips were compared to companion transfer length measurements for 0.5-in.- (12.7-mm-) diameter, Grade 270 low-relaxation strands with varying surface conditions. Strand end slips were determined to be the best predictor of pretensioned bond.

https://doi.org/10.15554/pcij.07011997.56.80

1998

Analysis of Cracked Prestressed Concrete Sections: A Practical Approach

Robert F. Mast

In this paper, Mast synthesized previously published work on the behavior of cracked prestressed concrete components into a practical analytical procedure to facilitate the analysis of critical aspects of service load behavior of such components. The article has been referenced in ACI 318.

https://doi.org/10.15554/pcij.07011998.80.91

1998

New Deep WSDOT Standard Sections Extend Spans of Prestressed Concrete Girders

Stephen J. Seguirant

This paper provided the rationale for the Washington State Department of Transportation's (WSDOT's) decision to adopt a series of new wide-flange (WF) girder sections. Subsequent papers by Seguirant and others (2002, 2005, and 2009) addressing issues identified in this paper are also included in this list of notable *PCI Journal* articles.

https://doi.org/10.15554/pcij.07011998.92.119

1998

Restraint Moments in Precast/Prestressed Concrete Continuous Bridges

Zhongguo (John) Ma, Xiaoming Huo, Maher K. Tadros, and Mantu Baishya

This paper presented the results of a parametric study of the effects of creep and shrinkage of concrete in a continuity analysis of I-beam bridges. Based on the study's findings, Ma and coauthors proposed a new continuity detail using high-strength threaded rods.

https://doi.org/10.15554/pcij.11011998.40.57

1999

An Overview of the PRESSS Five-Story Precast Test Building

Suzanne Dow Nakaki, John F. Stanton, and S. (Sri) Sritharan

This paper promoted the use of jointed connections, as opposed to emulative connections, for the seismic design of precast concrete structures. In phase III of the PRESSS program, a five-story precast building was designed and tested under various earthquake loading. All jointed connection details used in the test building were included in the paper. With the use of the jointed connections, the test building was expected to minimize damage and maintain negligible residual displacements when subjected design-level earthquakes.

https://doi.org/10.15554/pcij.03011999.26.39

1999

Seismic Behavior and Design of Unbonded Post-Tensioned Precast Concrete Walls

Yahya Kurama, Stephen Pessiki, Richard Sause, and Le-Wu Lu

As part of the PRESSS phase II program, this paper proposed a performance based design approach for precast concrete walls with unbonded strands; described performance objectives, limit states, and design criteria for these walls; and demonstrated their self-centering capability.

https://doi.org/10.15554/pcij.05011999.72.89

1999

Seismic Behavior and Design of Unbonded Post-Tensioned Precast Concrete Frames

Magdy T. El-Sheikh, Richard Sause, Stephen Pessiki, and Le-Wu Lu

This paper proposed design criteria for precast concrete frames with unbonded strands that were developed as part of the PRESSS phase II program. It showcased how the prototype precast concrete frames behaved under seismic loading.

https://doi.org/10.15554/pcij.05011999.54.71

1999

A Precast Segmental Substructure System for Standard Bridges

Sarah L. Billington, Robert W. Barnes, and John E. Breen

This paper put a spotlight on precast concrete bridge substructures for short- to medium-span bridges as the authors presented a segmental, standard precast concrete pier system that considered practicality, economy, construction speed, and aesthetics.

https://doi.org/10.15554/PCIJ.07011999.56.73

1999

Preliminary Results and Conclusions from the PRESSS Five-Story Precast Concrete Test Building

M. J. Nigel Priestley, S. (Sri) Sritharan, James R. Conley, and Stefano Pampanin

The testing described in this article summarizes the excellent seismic performance of the precast building designed with several joined connections previously described by Nakaki et al. using the direct displacement-based design method described in the article by Priestley. The test was conducted using the pseudo-dynamic method (now known as the hybrid test) and evaluated four different frames, one wall system, and two precast floor assemblages. In all tests, the test building exhibited little or low damage and an insignificant amount of residual drifts. This is the second most cited PCI article.
https://doi.org/10.15554/pcij.11011999.42.67

2000

New Seismic Design Provisions for Diaphragms in Precast Concrete Parking Structures

Sharon L. Wood, John F. Stanton, and Neil M. Hawkins

The new seismic design provisions presented in this article were based on the observed behavior of precast concrete parking garages during the 1994 Northridge, Calif., earthquake. This paper is cited in ACI 318-19(22).
https://doi.org/10.15554/pcij.01012000.50.65

2001

Nonlinear Continuity Analysis of Precast, Prestressed Concrete Girders with Cast-in-Place Decks and Diaphragms

Amir Mirmiran, Siddharth Kulkarni, Reid Castrodale, Richard Miller, and Makarand Hastak

In this article, Mirmiran et al. explained how positive moment reinforcement affects the continuity connections between prestressed beams made continuous for live loads. This information has helped designers take advantage of the redundancy, durability, and structural efficiency provided by continuous prestressed concrete bridges.
https://doi.org/10.15554/pcij.09012001.60.80

2001

Vibration of Precast Prestressed Concrete Floors

Robert F. Mast

This article reviewed the existing publications on resonant vibration models for floor vibrations and provided a rational basis for addressing vibrations in precast and prestressed concrete floor design. The information derived from the review was used to update relevant sections of the *PCI Design Handbook*.
https://doi.org/10.15554/pcij.11012001.76.86

2002

Effective Compression Depth of T-Sections at Nominal Flexural Strength

Stephen J. Seguirant

In this Open Forum submission, Seguirant used strain compatibility to highlight an inconsistency in methods used to calculate the nominal flexural strength of T sections. After demonstrating that methods from the AASHTO LRFD specifications and the AASHTO standard specifications produce noticeably different results, Seguirant proposed appropriate modifications to the LRFD approach. The article is referenced in the 9th edition of the AASHTO LRFD specifications.
https://doi.org/10.15554/pcij47.1-pands

2002

Rectangular Stress Block and T-Section Behavior

Antoine E. Naaman

In this contribution to the journal's Open Forum, Naaman clarified how to use the simplified rectangular stress block that was developed for rectangular sections to quantify T-section behavior. This paper is referenced in the 9th edition of the AASHTO LRFD specifications.
https://doi.org/10.15554/pcij47.4-pands

Utah Used Them First

The first use of the new, deeper WSDOT girders was actually in Utah, not Washington. When the Utah Department of Transportation had a large design-build project on Interstate 15 through Salt Lake City for the 2002 Olympics, the agency allowed the contractor to select the most economical girder option. The precast concrete producer sent the contractor an engineer's hand-drawn sketches of the WSDOT WF girder, and during a presentation by the Utah designer, both that engineer and the WSDOT lead engineer were surprised to learn that the girder efficiency applied to girders as shallow as 42 in. Subsequently, a local project was redesigned to use the WF girders, and compared with the original design, the number of girders was halved. Although the WF girders were more expensive per lineal foot than the original girders, they did not cost twice as much. Therefore, the design using WSDOT girders was clearly the more economical solution.

2002

Direct Displacement-Based Design of Precast/Prestressed Concrete Buildings
M. J. Nigel Priestley

This article introduced the direct displacement-based design method for precast prestressed concrete buildings. This methodology has been gaining preference over the force-based design as it produces a consistent design outcome with a reduced amount of design base shear force.
https://doi.org/10.15554/pcij.11012002.66.79

2003

Seismic Performance of Precast Segmental Bridges: Segment-to-Segment Joints Subjected to High Flexural Moment and Low Shears
Sami Megally, Frieder Seible, and Robert K. Dowell

Megally and coauthors presented experimental and analytical results from an investigation of the seismic performance of superstructure segment-to-segment joints close to the supports in regions with negative flexural moments and high shears. The paper included details on the development of crack patterns and failure modes.
https://doi.org/10.15554/pcij.05012003.72.90

2004

Load Testing of Prestressed Concrete Double Tees without Web Reinforcement
Alex Aswad, George Burnley, Ned M. Cleland, David Orndorff, and Charles Wynings

This paper described load testing of double tees that omitted web reinforcement for shear near the ends of the components. The authors provided recommendations related to the omission of web reinforcement in prestressed concrete double tees of similar geometry.
https://doi.org/10.15554/pcij.03012004.66.77

2004

Design for Torsion and Shear in Prestressed Concrete Flexural Members
Paul Zia and Thomas T. C. Hsu

An accurate, yet simple unified method for the torsion and shear design of prestressed and nonprestressed concrete flexural members was introduced through this article. This methodology provided the basis for shear and torsion provisions in the *PCI Design Handbook* and ACI 318.
https://doi.org/10.15554/pcij.05012004.34.42

Double Tees

Double tees are the most common precast concrete components used in precast concrete parking structures in the United States. The elimination of shear reinforcement near the ends of double tees makes precast concrete parking structures more economical and competitive than parking structures constructed of cast-in-place concrete or steel. It is common industry practice for double tees to be designed with shear reinforcement omitted near the ends, in accordance with the design recommendations included in the paper by Aswad et al., and this practice reduces the amount steel required in a flange.

2005

Analysis of the Flexural Strength of Prestressed Concrete Flanged Sections
Eray Baran, Arturo F. Schultz, and Catherine E. French

In this paper, Baran and colleagues compared provisions of the 2002 AASHTO standard specifications and 1998 AASHTO LRFD specifications to results from strain compatibility analyses of nonrectangular reinforced and prestressed concrete sections. The investigators used realistic stress-strain models for the constituent materials to identify design procedures that would more accurately represent the actual behavior of such members. Based on the findings, the authors proposed modifications to the LRFD procedure.
https://doi.org/10.15554/pcij.01012005.74.93

2005

Flexural Strength of Reinforced and Prestressed Concrete T-Beams
Stephen J. Seguirant, Richard Brice, and Bijan Khaleghi

This paper examined the fundamentals of T-beam behavior at nominal flexural strength. Seguirant and coauthors compared the results derived from the AASHTO LRFD specifications and AASHTO standard specifications with results from more rigorous analyses, including the *PCI Bridge Design Manual* method and a strain compatibility approach using nonlinear concrete compressive stress distributions. Revisions to the relevant sections of the AASHTO LRFD specifications were proposed.
https://doi.org/10.15554/pcij.01012005.44.73

2005

Pryout Capacity of Cast-In Headed Stud Anchors

Neal S. Anderson and Donald F. Meinheit

In this review of the known data on the pryout capacity of cast-in headed studs and anchor bolts, Anderson and Meinheit included push-off test results from the 1960s and early 1970s that were used in the early development of composite beam design. Those results greatly expanded the test data available on pryout behavior and provided additional insight into failure behavior.

https://doi.org/10.15554/pcij.03012005.90.112

2007

A Review of Headed-Stud Design Criteria in the Sixth Edition of the *PCI Design Handbook*

Neal S. Anderson and Donald F. Meinheit

After new provisions related to headed-stud design were introduced in ACI 318–02, PCI sponsored a comprehensive research program to assess the shear capacities of groups of headed-stud anchors. This test program, which was conducted by Wiss, Janney, Elstner Associates Inc., examined headed-stud connections in several geometric configurations and edge conditions. This paper summarized the background studies and the research that culminated in the design equations presented in section 6.5 of the sixth edition of the *PCI Design Handbook*.

https://doi.org/10.15554/pcij.01012007.82.100

2007

A Case for Increasing the Allowable Compressive Release Stress for Prestressed Concrete

Charles W. Dolan and Jason J. Krohn

The authors conducted a survey of PCI members and performed a literature review to determine the current states of research and practice regarding compression transfer stress of prestressed concrete elements. Based on their findings, Dolan and Krohn concluded that compression transfer stresses up to $0.70f'_{ci}$ would be acceptable and recommended that the permissible compression transfer stress in ACI 318 be raised to $0.70f'_{ci}$ to align with the limit recommended in the *PCI Design Handbook*.

https://doi.org/10.15554/pcij.01012007.102.105

2009

Volume-Change Response of Precast Concrete Buildings

Gary J. Klein and Richard E. Lindenberg

In this article, Klein and Lindenberg summarized a study on the volume-change response of precast concrete buildings and recommended revised design procedures. They reported that deformations of flexible connections reduced volume-change movement. Although the authors suggested that procedures recommended in the *PCI Design Handbook* were mostly conservative, they identified certain unconservative aspects. This paper is cited in ACI 318-19(22).

https://doi.org/10.15554/pcij.09012009.112.131

2009

Design Optimization for Fabrication of Pretensioned Concrete Bridge Girders: An Example Problem

Richard Brice, Bijan Khaleghi, and Stephen J. Seguirant

In this article, Brice et al. focused on designing the permanent pretensioned strand configuration for pretensioned concrete bridge girders. They provided updated practices, including a step-by-step design procedure to optimize the pretensioning configuration for maximum production efficiency while ensuring compliance with safety requirements, and presented an example problem. This paper—which was part of WDOT's efforts to enhance the fabrication of precast concrete bridge girders by reducing costs, improving schedules, and achieving higher quality—is cited in ACI 318-19(22).

https://doi.org/10.15554/pcij.09012009.73.111

AASHTO Endorses Certification by Technical Institutes

Technical articles are not the only significant items found in the archives of *PCI Journal*. For example, the Winter 2010 issue included a news item in the From PCI Headquarters section (on page 18) about an AASHTO resolution that has had a major effect on the industry.

Under the headline "AASHTO Endorses Certification by Technical Institutes," the news item provided the rationale for AASHTO's endorsement of technical institute certifications. It also noted that PCI and the American Institute of Steel Construction (AISC) had jointly issued a white paper to explain why the technical institute that develops and maintains the body of knowledge for a specific industry should deliver certification programs for that industry. That white paper described in detail the essential requirements highlighted in the AASHTO resolution, clearly defining what it takes to provide certification.

The *PCI Journal* news item is available athttps://doi.org/10.15554/pcij55.4-HQ. The AASHTO resolution (https://doi.org/10.15554/pci.doc-2009-01) and the *PCI/AISC White Paper on Quality Systems in the Construction Industry* (https://doi.org/10.15554/pci.wp-2010-01) are also available online.

2011

Development of a Rational Design Methodology for Precast Concrete Slender Spandrel Beams: Part 1, Experimental Results

Gregory Lucier, Catrina Walter, Sami Rizkalla, Paul Zia, and Gary Klein

The paper summarized results from an experimental program for designing precast concrete beams and introduced simplified detailing requirements to reduce congestion from heavy reinforcing cages. Lucier and coauthors concluded that open web reinforcement is a safe and efficient alternative to traditional closed stirrups for slender spandrel beams with an aspect ratio of 4.6 or greater. This paper is referenced in ACI 318-19(22).
https://doi.org/10.15554/pcij.03012011.88.112

2011

Composite Behavior of Precast Concrete Bridge Deck-Panel Systems

Sean R. Sullivan, Carin L. Roberts-Wollmann, and Matthew K. Swenty

In this paper, Sullivan and coauthors summarized findings from experimental and analytical studies that investigated the composite behavior of precast concrete bridge deck-panel systems. Based on those results, the authors recommended construction details and proposed best design practices. This paper is referenced in the 9th edition of the AASHTO LRFD specifications.
https://doi.org/10.15554/pcij.06012011.43.59

2011

Development of a Rational Design Methodology for Precast Concrete Slender Spandrel Beams: Part 2, Analysis and Design Guidelines

Gregory Lucier, Catrina Walter, Sami Rizkalla, Paul Zia, and Gary Klein

The paper summarized an analytical research program for developing a rational design procedure for precast concrete slender spandrel beams. Lucier et al. proposed a simplified design procedure using open web reinforcement as an efficient alternative to traditional closed stirrups. This paper is referenced in ACI 318-19(22).
https://doi.org/10.15554/pcij.09012011.106.133

2016

Minimum Confinement Reinforcement for Prestressed Concrete Piles and a Rational Seismic Design Framework

Sri Sritharan, Ann-Marie Cox, Jinwei Huang, Muhannad Suleiman, and K. Arulmoli

This paper presented a new rational method for sizing confinement reinforcement in prestressed concrete piles designed for seismic regions. Identifying shortcomings of the previous empirical approaches, Sritharan et al. provided a rational expression for quantifying the confinement reinforcement quantity for rectangular and octagonal piles. The article has been referenced in ACI 318.
https://doi.org/10.15554/pcij.01012016.51.69

Spiral Reinforcement

The rational method presented by Sritharan and colleagues results in a reasonable quantity of spiral reinforcement. In the applicable building codes, this method has replaced a codified method that was developed for other purposes and resulted in unreasonable quantities of spiral reinforcement, as well as a PCI method that was not technically justifiable. The rational method has also been adopted in the *Specification for Precast, Prestressed Concrete Piles* (ANSI/PCI 142).

Over the years, online availability of the *PCI Journal* advanced with incremental improvements moving forward. Beginning with the November–December 2015 issue, an interactive version of *PCI Journal* has been available online.

Publishing details

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Reader comments

Please address any reader comments to *PCI Journal* editor-in-chief Tom Klemens at tklemens@pci.org or Precast/Prestressed Concrete Institute, c/o *PCI Journal*, 8770 W. Bryn Mawr Ave., Suite 1150, Chicago, IL 60631.

And so, here we are, celebrating 70 years of PCI's building the body of knowledge through the *PCI Journal* as well as all of the institute's other publications.