

**Precast/Prestressed Concrete Institute
(PCI)**

**Highways for LIFE
Fairfax, Va
September 2009**

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Precast Concrete Pavements

Agenda

**FHWA/AASHTO and Accelerated Construction
Techniques and Technologies (ACTT)**




PCI Plant Certification





**Cooperative Agreement with
FHWA and PCI**





**FHWA - AASHTO
SCANNING PROGRAM -
2004**

**Prefabricated Bridge Elements and
Systems**



SCAN MISSION

To investigate and document the applications and experience with prefabricated bridges in Japan and selected European countries, with emphasis on:

- Routine bridges with 20 ft – 140 ft spans
- Innovative systems
- Replacement and new highway and railroad bridges
- Including seismic considerations and emergency work

TOPICS OF INTEREST

- Minimized traffic disruption (Congestion)
- Improved work zone safety
- Minimized environmental impacts
- Improved constructibility
- Improved product quality
- Lower life-cycle costs

SCAN COUNTRIES



Netherlands



Japan



Belgium

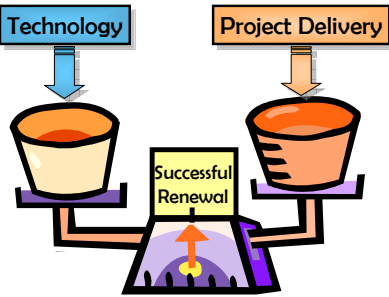


France



Germany

Integrated approach



SHRP2
STRATEGIC HIGHWAY RESEARCH PROGRAM

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES


PCI **About PCI**

- PCI is an international trade association and Technical Institute
 - Promotes technical understanding and use of high-quality precast and prestressed concrete
 - Full staff of technical and marketing specialists



PCI **About PCI**

- Over 350 Producer Member plants
 - Architectural, structural, and specialty precast concrete products and structures
 - Every U.S. PCI Producer Member plant must be PCI Certified
 - PCI Membership is not required to be PCI Certified
 - Over 80 Technical Committees



PCI **About PCI**





- Approximately 200 Supplier Associate Members
- 100 Erector Associate Members
 - PCI Qualified/Certified Erector Program
- Over 1,300 Professional Members
 - Academics, design professionals, and other industry stakeholders
 - Provide much of the technical knowledge contained in PCI design guides and other technical publications



PCI **About PCI**

PCI Publications

- Design Manuals and Guidelines
- Quality Control Manual
- PCI Journal, Ascent, and Aspire Magazines

PCI **About PCI**


- Codes and Standards
 - PCI works very closely with code bodies, such as ACI, ICC, ASTM, AASHTO, etc.
- Industry Events
 - PCI works with FHWA in producing the National Bridge Conference







PCI **About PCI**

- Research & Development
 - DSDM Seismic Project
 - FHWA Precast Pavement Project




PCI **About PCI**

- PCI Regional Representation
 - 11 Regional Associations Affiliated with PCI
 - Mid-Atlantic Precast Association (MAPA)





PCI **PCI Certification Programs**

PCI has 3 Different Certification Programs:

- Plant Certification Program – 1967
- Personnel Training & Certification – 1985
- Erector Qualification and Certification - 1999






PCI Plant Certification

Program History:


- Plant Certification Program established in 1967
- Began with 36 Plants
- Voluntary membership until 1991
- Mandatory for PCI Producer Members after 1991 – PCI Membership is not required
- Approximately 300 Plants Currently Certified

PCI Plant Certification






Purpose:

- Provide a means for project owners/specifiers to select producers who demonstrate compliance to nationally recognized standards of engineering, production and quality control
- To permit certified producers to distinguish themselves from non-compliant/non-participating producers



PCI Plant Certification

Product Groups and Categories:

- A — Architectural Products (MNL-117)
- B — Bridge Products (MNL-116)
- C — Commercial (Structural) Products (MNL-116)
- G — Glass Fiber Reinforced Concrete (GFRC) Products (MNL-130)

PCI Plant Certification




Product Groups and Categories:

- Supplemental, Non-Prestressed, Non-Architectural Products
- MNL-118 will be released and program launched in 2009




PCI Plant Certification




Program Recognition

- AIA MASTERSPEC
- Unified Facilities Guide Specifications (UFGS)
 - A joint effort of the U.S. Army Corps of Engineers (USACE), the Naval Facilities Engineering Command (NAVFAC), the Air Force Civil Engineer Support Agency (AFCESA) and the National Aeronautics and Space Administration (NASA)
- US Department of Agriculture – FSIS

PCI Plant Certification






Program Recognition

- US Department of Transportation - Federal Aviation Agency  Federal Aviation Administration
- Federal Bureau of Prisons 
- General Services Administration (GSA)
- Federal Highway Administration 
- 31 state Departments of Transportation
- Houston, Las Vegas, Phoenix, Seattle, and Portland

PCI Plant Certification

State DOT-Specific Certification


- PCI Working with other DOTs in developing programs specifically tailored to their needs
- Auditors will provide a special report specifically addressing DOT-specified criteria
- IL DOT, TX DOT, Mass Highways

PCI Plant Certification

QC Criteria

- Detailed quality control and audit criteria
- Drawings and Calculations Reviewed
- Comprehensive Tolerance Manual
- Detailed Quality System Manual (QSM) must be approved by PCI



PCI Plant Certification

Program Oversight

- Overseen by a diverse and balanced Quality Assurance committee
 - design professionals, consultants, producers, and materials suppliers.
- Further oversight provided by PCI Technical Activities Committee




PCI **PCI Plant Certification**

Audits and Auditor Qualification

2-day, twice per year audits




- All audits unannounced
- IAS Accredited
- Audit firm has over 40 years of experience





PCI **Conclusion**

- PCI wrote the book
- PCI has 40+ year track record for precast and precast / prestressed quality control and quality assurance programs
- PCI will work to tailor the program to each states' needs

Precast Concrete Pavements



**Engaging Industry –
A Cooperative Approach**




Precast Concrete Pavements

**Precast/Prestressed Concrete Institute
(PCI)**

**Federal Highway Administration
(FHWA)**





Precast Concrete Pavements

PRECASTING PLANTS

A manufacturing operation...



...not off-site construction!



Precast Concrete Pavements

PCI-FHWA Cooperative Agreement

**“Advancement of Precast Prestressed
Concrete Pavement System
through
Technology Transfer
and
Development of Industry Guidance
for
Design and Engineering”**



Precast Concrete Pavements
PCI-FHWA Cooperative Agreement

This is a 4 year PROGRAM

Part A: Strategy for technology transfer

- agency/owner
- industry communities



Part B: Development of industry guidance for design and engineering






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Precast Concrete Pavements
PCI-FHWA Cooperative Agreement

- **The Transtec Group**
 - David Merritt
 - TxDOT Demonstration Project
 - Was also involved with the CalTrans I-10 in El Monte, CA



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Precast Concrete Pavements
PCI-FHWA Cooperative Agreement

- **Non-Proprietary**
- **Manufactured in PCI-Certified Plants**
- **“Precast Prestressed Concrete Pavements” (PCCP)**





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Precast Concrete Pavements

What is PPCP?


- **Precast Prestressed Concrete Pavement**
 - “Standardized” full-depth precast panels
 - Keyed panel joints for vertical alignment during assembly (generally, not match-cast)
 - Constructed over a prepared base (HMA, LCB, Aggregate Base, etc.)

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Precast Concrete Pavements

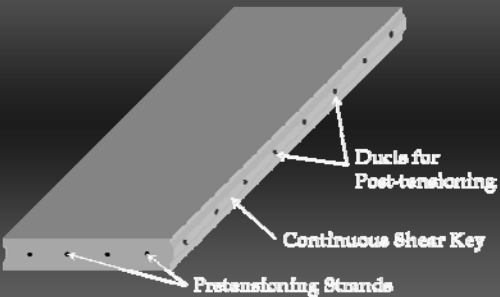
What is PPCP?


- 2-way prestressing
- Combination of pretensioning/post-tensioning
- Or 2-way post-tensioning
- Bonded/grouted P-T system

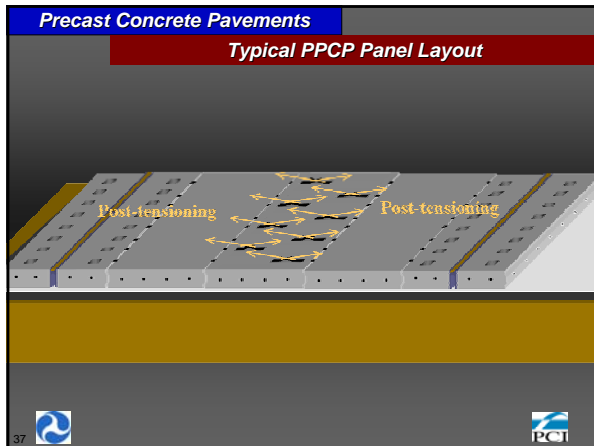
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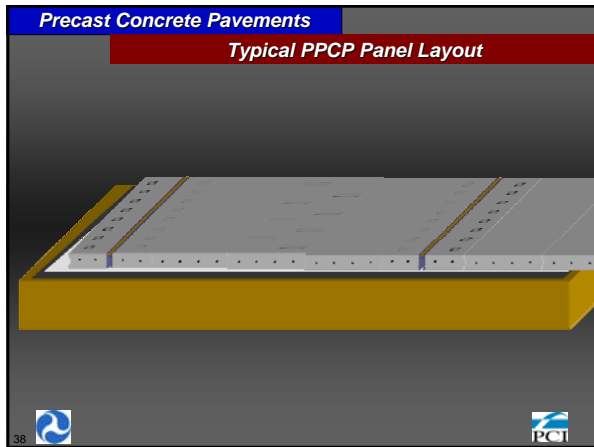
Precast Concrete Pavements

Typical PPCP Panel



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Precast Concrete Pavements
Benefits


WHY PRESTRESSED CONCRETE?

- Reduces/eliminates slab cracking (maintenance)
- Reduced number of joints (maintenance/smoothness)
- Reduced Slab Thickness (8" vs. 12")
 - Material savings
 - Allows for replacement of pavement in-kind
- Ability to span voids/unsound support layers
- Proven Long-Term Performance
 - 6" CIP post-tensioned pavement constructed in 1985 (near West, Texas)
 - Virtually no maintenance in 23 years



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Precast Concrete Pavements

Picture of Connection details



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Precast Concrete Pavements

Getting ready to post tension the PC pavement



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Precast Concrete Pavements

PCI-FHWA Cooperative Agreement



- Program Activity 1
 - Create contacts lists
 - ETG
- Program Activity 2
 - Create the "The National Center for Prestressed Concrete Highway Pavements"
 - Board of Advisors
- Program Activity 3
 - Informational Literature
- Program Activity 4
 - Showcases and workshops

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Precast Concrete Pavements
PCI-FHWA Cooperative Agreement



- Program Activity 5
 - Guidance Documents, Sample Plans, Specifications
- Program Activity 6
 - PCI Pavement Committee
 - Develop "action items"
 - Develop a detailed timeline
 - Industry "guidance" documents for "design and engineering" of the PPCP System

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Precast Concrete Pavements
PCI-FHWA Cooperative Agreement

Four "Guidance Documents"



- 1) Selecting Applications for Precast Concrete pavements
- 2) Design, Layout and Maintenance of Precast Concrete Pavements
- 3) Precast Pavement Panel Fabrication Recommendations
- 4) Construction Recommendations for Precast Concrete Pavements

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Precast Concrete Pavements
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Selecting Applications for Precast Concrete Pavements (Volume 1 of 4)


- Considerations for Selection
- Types of Applications
- Site Selection
- Agency Considerations
- Resources
- Appendix - Projects

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Precast Concrete Pavements
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Design, Layout and Maintenance of Precast Concrete Pavements (Vol. 2 of 4)


- Key Features
- Design Considerations
- Pavement Management Considerations
- Performance Monitoring
- Appendix – Details and Specifications

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Precast Pavement Panel Fabrication Recommendations (Vol. 3 of 4)


- Producer Qualifications
- Formwork
- Materials
- Prestressing
- Expansion Joints
- Concreting
- Lifting/Handling
- Acceptance Testing

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Precast Concrete Pavements
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Construction Recommendations for Precast Concrete Pavements (Vol. 4 of 4)

- Installation-Staging
- Base Preparation
- Materials
- Installation-Equipment & Methods
- Post-Tensioning
- Final Surface Finish
- Final Inspection

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Precast Concrete Pavements

PCI-FHWA Cooperative Agreement

Cooperative Effort to Engage Industry and Agencies





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