Precast/Prestressed Concrete Institute (PCI)

Highways for LIFE
Fairfax, Va
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Precast Concrete Pavements

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

PCI Plant Certification

Cooperative Agreement with FHWA and PCI

Agenda

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
- Belgium
- Japan
- France
- Germany
Integrated approach

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

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
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

About PCI

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

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
• Research & Development
  – DSDM Seismic Project
  – FHWA Precast Pavement Project

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

PCI Certification Programs

PCI has 3 Different Certification Programs:
  – Plant Certification Program – 1967
  – Personnel Training & Certification – 1985
  – Erector Qualification and Certification - 1999
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

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

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)
Product Groups and Categories:
- Supplemental, Non-Prestressed, Non-Architectural Products
- MNL-118 will be released and program launched in 2009

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

Program Recognition
- US Department of Transportation - Federal Aviation Agency
- 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 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

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/Prestressed Concrete Institute (PCI)

Federal Highway Administration (FHWA)

Precasting Plants

A manufacturing operation...

...not off-site construction!

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

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

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

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

**Typical PPCP Panel**

- Ducts for post-tensioning
- Continuous shear key
- Pretensioning strands
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
Precast Concrete Pavements

Picture of Connection details

Getting ready to post tension the PC pavement

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
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

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

Precast Concrete Pavements

PCI-FHWA Cooperative Agreement

Selecting Applications for Precast Concrete Pavements (Volume 1 of 4)
- Considerations for Selection
- Types of Applications
- Site Selection
- Agency Considerations
- Resources
- Appendix - Projects
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

Precast Pavement Panel Fabrication
Recommendations (Vol. 3 of 4)
- Producer Qualifications
- Formwork
- Materials
- Prestressing
- Expansion Joints
- Concreting
- Lifting/Handling
- Acceptance Testing

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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Cooperative Effort to Engage Industry and Agencies

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