


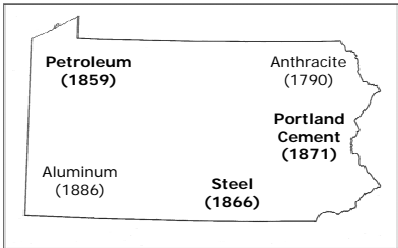
# Recent Construction Material Cost Changes and Concrete Pavement Updates

  
**The World has Changed**  
 ASHE Harrisburg Section  
 April 2, 2007  
 Construction Material  
 Cost Changes & Concrete  
 Pavement Updates

## Outline

- Materials Economics
- Alternate Pavement Solutions
- Mix-of-Fixes
- Concrete Pavement Research
- New Tools
- Go Home, Enjoy the Evening

## Manufacturing Industries with U.S. Roots in Pennsylvania

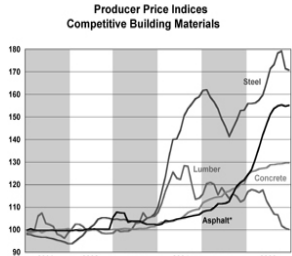


## U.S. Producer Price Index

Published reports show construction materials have increased 36% in past two years.

Let's dissect this number using the December 2006 Producer Price Index:

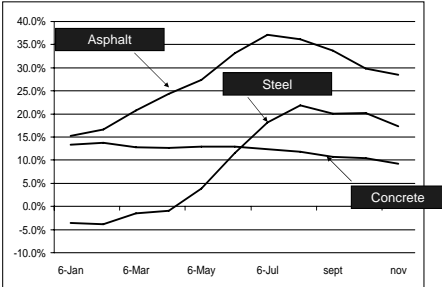
- Concrete products rose 18.9% over two years (up 10.1% for 2006)
- Asphalt prices rose 44.7% over same period (up 27.4% in 2006 alone)



Source: U.S. Department of Labor, Bureau of Labor & Statistics (Jan 2001 = 100)

## Competing Material Prices

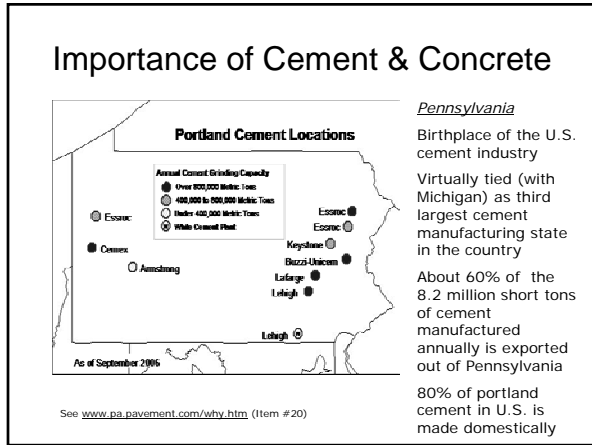
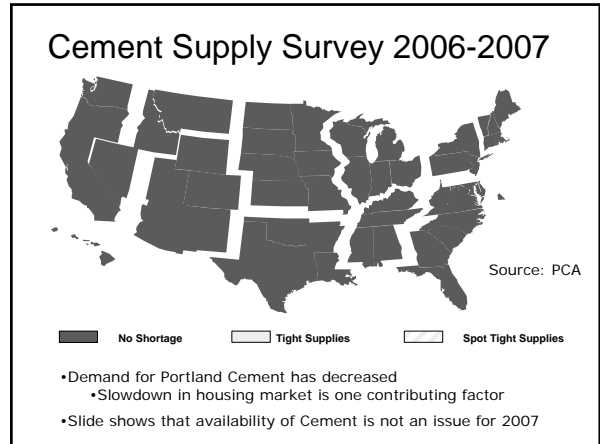
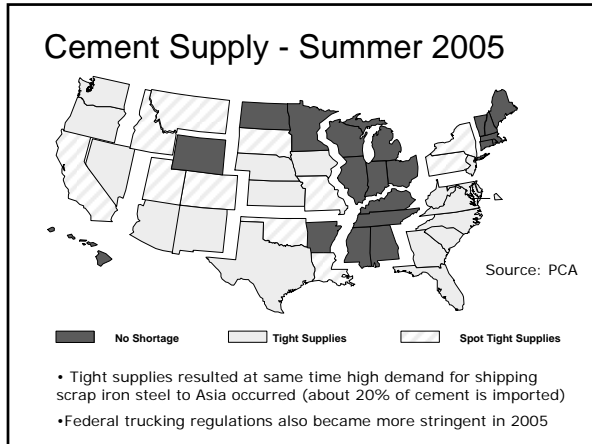
Annual Percent Change, PPI, U.S. Bureau of Labor Statistics, 2006



## Construction Materials Price Indexes

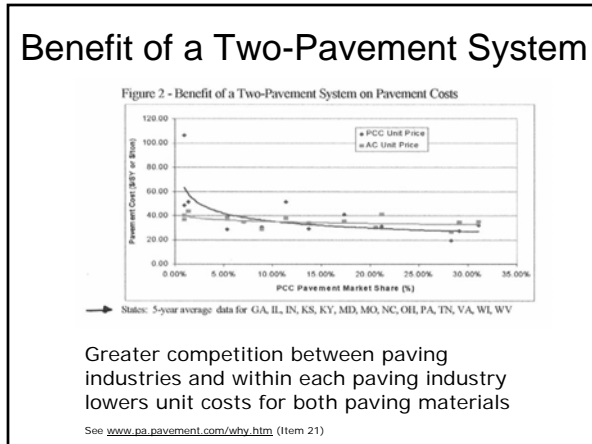
- Monthly reported data from ENR consistent with Department of Labor statistics (previous slides)
- Development of cement price escalator unsupported using ENR data.
- Asphalt price escalators, included in most contracts (using indexes as specified), have cost millions of dollars over and above the price bid for paving work.

# Recent Construction Material Cost Changes and Concrete Pavement Updates



### So how can a public agency combat this price trend?

- Recognize that the world has changed; emerging economies are here to stay
- Make market forces work for you rather than against you ... strong support for two-pavement systems and/or open and fair competitive bidding on major projects.
- Help reduce America's dependence on imported petroleum purchases by using more domestic products.



### Alternate Bid Results, 2006

- I-99 (Pennsylvania)
  - Let using A+C format (used extensively by Louisiana)
  - C = \$2m for PCC, \$2.5m for PCC with AC shoulder, \$4m for AC
  - PCC with AC shoulder \$1.7m (5%) under AC bid (first cost, A component)
  - With A+C, PCC w/AC shoulder \$3.2m (9.5%) below AC
- I-90 (Ohio)
  - A+C method used, PCC option was approximately \$1m below AC on first cost. C factor differential was \$340K.
- Ontario
  - 3 projects with alternate bid, all went PCC on first cost.

*Concrete Not Always the More Expensive First Cost Material!*

# Recent Construction Material Cost Changes and Concrete Pavement Updates

## Long Term View on Infrastructure

- Bridges
  - Pennsylvania bridges are on average over 50 years old (third oldest in Nation)
  - 23% of 25,313 bridges in Pennsylvania are structurally deficient
  - To address this problem, PENNDOT currently pursuing 100+ years of service as a must for bridge replacements
  
- How can we also incorporate longer-term solutions for our aging pavements?

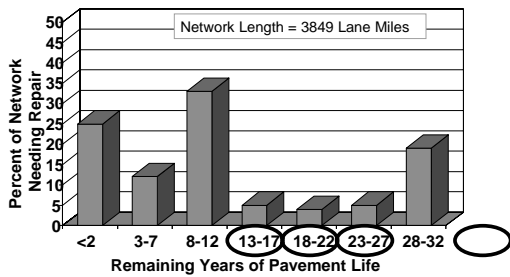
## Long Term View on Infrastructure

- Longer-Life Pavements
  - Deeper foundations
  - Denser bases
    - Permeable bases used only in United States
  - Two-lift construction
    - Possible solution for addressing long-term availability of high quality aggregates
  - Design Catalogues
    - To highlight and incorporate the best practices for long-life pavements
  - Get In, Do it Right, Get Out, Stay Out
    - Reduce traffic disruptions (day and night) by interrupting the traveling public less often

*Observations from the 2005 Scanning Tour on Long-Life Pavements*

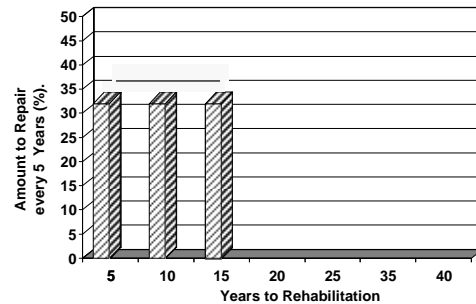
## Network Impact, Mix-of Fixes

Look for the "Structural Holes" and fill them



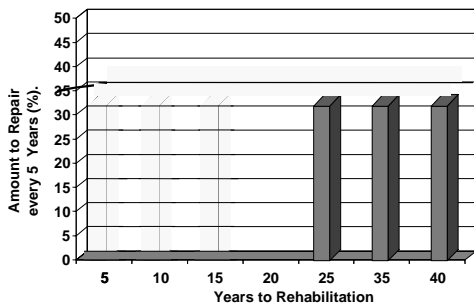
Michigan DOT: District 8 - Current Condition

## Network Impact: (Short-lived solutions)



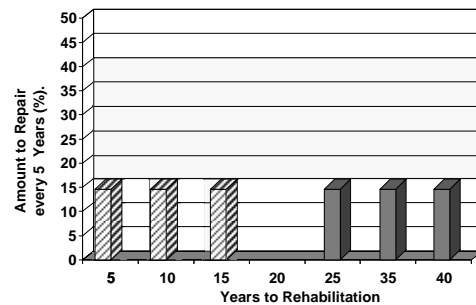
*Future infrastructure challenges and burdens are passed on to our children*

## Network Analysis: (Long-term solutions)



*Infrastructure challenges and burdens are solved for the next two generations*

## Network Analysis: (Mix of Fixes)



*Infrastructure challenges & burdens are spread across three generations*

# Recent Construction Material Cost Changes and Concrete Pavement Updates

## Long-Term CP Research Plan

### CP Road Map

- Finalized in 2005
- Co-developed by FHWA and the PCC Center, **with industry input**
- Roughly a 10-year concrete pavement research program.
- 250 research problem statements in 12 tracks
- \$250M in needs identified.



## Hallmarks of the CP Plan

- Not owned by any one organization
  - Not tied to any one funding source
  - To be cooperatively conducted by researchers across the country
  - Leverages ideas and funds
  - Promotes cooperation and synergy
  - Merges research and implementation
- Unity through common goals***

## The CP Tech Center

- Located at Center for Transportation Research & Education (CTRE) at Iowa State
- Started as PCC Center in 2000
- Partnership with ACPA
- Collaborative guiding philosophy
- Administrative and support capabilities

## Federal Appropriations

- 2005-2009 concrete pavement research funding in SAFETEA-LU (administered by FHWA):
  - \$10M through CP Tech Center
  - \$16.4M additional research
- Other funding sources to be leveraged with this funding

## What the CP Center Will Do


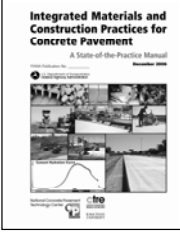
- Support the principles of the National CP Road Map
- Coordinate research through sharing of information
- Help researchers across the country access the right resources and partnerships
- Provide tech transfer
- Accelerate implementation



[www.cptechcenter.org](http://www.cptechcenter.org)

# Recent Construction Material Cost Changes and Concrete Pavement Updates

**New CP Tech Center Tool**  
INTEGRATED MATERIALS AND  
CONSTRUCTION PRACTICES:  
*A State-of-the-Practice Manual*

**IMCP MANUAL**  
[www.cptechcenter.org](http://www.cptechcenter.org)

## Goals for the IMCP User


- Understand concrete pavement construction as an integrated system
- Understand and implement new technologies, tests, and best practices.
- Appreciate factors that lead to premature distress in concrete, and learn how to avoid or reduce them.
- Obtain how-to, troubleshooting info quickly.

## What is in the IMCP Manual?

1. Introduction  
*Why bother reading this manual?*
2. Pavement Design  
*What will the pavement look like?*
3. Materials  
*What materials do I have to work with?*
4. Chemistry of Hydration  
*What happens during the formation of the concrete matrix ?*
5. Critical Properties  
*What do I need?*

## What is in the IMCP Manual?

6. Mix Proportioning  
*How do I Get What I Want?*
7. Preparation  
*What is Underneath?*
8. Construction  
*Doing It !*
9. Quality and Testing  
*Have I got it right?*
10. Troubleshooting  
*Oh 🙄🙄🙄🙄🙄 Darn!*

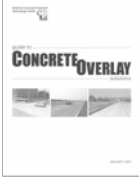




On the web at [www.cptechcenter.org](http://www.cptechcenter.org)

## New CP Tech Center Tool

### -Concrete Pavement Overlays Document

- Interest in PCC overlays has grown tremendously in last decade
- Significant recent research
  - FHWA (ISTEA Section 6005)
  - NCHRP and ACPA Studies
  - State studies
  - LTPP
- ACI-325 is a comprehensive document on overlays but not in user friendly format








## Why are we not using Concrete Resurfacing Technology more?

**Perception:**

- Pavement design theories for bonded and unbonded overlays (resurfacing) are difficult to understand
- There is lack of confidence in overlays because many don't understand how they work







# Recent Construction Material Cost Changes and Concrete Pavement Updates


### CP Technology Center Advisory Board

- Develop a user friendly “go to” manual with training
  - provide the user with a simple, but educated choice
- Form partnerships between states
  - Share experiences and knowledge
  - Provide assistance
- One single comprehensive document

### Concrete Overlays Program


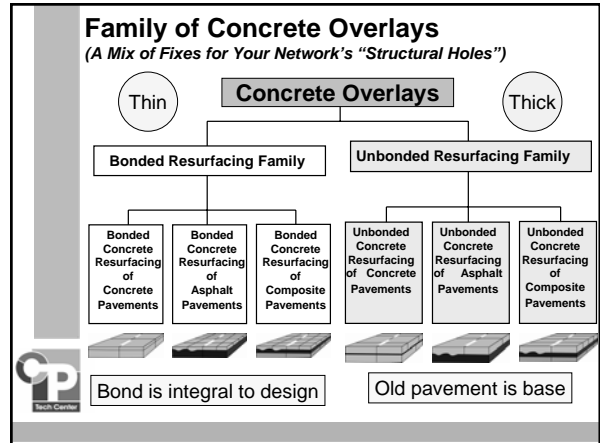
	Products	Schedule	Funding
<b>Phase 1. Overlay Guide</b>	28- Guide to Concrete Overlays	2006 develop 2007 print	CP Tech Center
<b>Phase 2. State Projects/Support</b>	<ul style="list-style-type: none"> <li>□ 8 state projects</li> <li>□ Technical Assistance</li> <li>□ Lessons learned</li> <li>□ Workshops</li> </ul>	2007/2009	FHWA/ISU Cooperative Agreement
<b>Phase 3. Overlay Manual</b>	150+ page overlay manual	2008/2009	Undetermined at this time



### Why Concrete Overlays?

#### Advantages

- Do not require extensive repairs of existing pavement
- Quick to construct
- Long performance lives
- Low maintenance requirements
- Withstands heavy truck traffic
- Effective life-cycle costs
- Recyclable

### Training & T2 Opportunities

- Concrete Pavement Restoration
  - Three Sessions Presented in Early 2007
- Concrete Paving Best Practices
  - May 30 or 31 (Uniontown)
- Concrete Pavement Bus Tour
  - June 27-28 (Uniontown)
- IMCP Training
  - Fall 2007 (TBD)
- Annual PA Concrete Conference
  - January 29-31, 2008 (Grantville)

www.pa.pavement.com

## Thank You!

www.pa.pavement.com

Please also visit  
**PAVEMENTS4Life.com**