WHITETOPPING

Doing it Right the Second Time

A Brief Review of Whitetopping, Ultra Thin Whitetopping and Selected Indiana Projects

Indiana Ready Mixed Concrete Association
Today’s Program

- "In a perfect world...."
- The "Infrastructure Problem"
- A New yet Proven Alternative
- Whitetopping Projects
- UltraThin Project
- INDOT Overlays

Benefits of Concrete

- Lower Life Cycle Cost
- Superior skid resistance
- Brighter night lighting
- Resist rutting
- Carry heavier load
- Longer service life
- Lower maintenance

"Life Cycle Cost"

Initial Cost to Construct the road

PLUS

Maintenance Cost over the expected life of the road

Enter the Real World

- Existing Roads
- Designed by others with other considerations
- Limited Budget
- Changing Conditions
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**The Cycle of Failure**
- Heavy traffic loads
- Freezing/Thawing
- Age
- Inadequately restored utility cuts

**Why the problem gets worse**
- Increased cost
- Budget reductions
- Deferred maintenance

**The “Infrastructure Problem”**

*Why don’t “they” do something?*

**Life Cycle of a typical road**

<table>
<thead>
<tr>
<th>Time</th>
<th>Road Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GOOD</td>
</tr>
<tr>
<td></td>
<td>Overlay</td>
</tr>
<tr>
<td></td>
<td>Failure</td>
</tr>
</tbody>
</table>

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What is “Whitetopping”

- Whitetopping is a concrete overlay of an existing asphalt pavement.
- Concrete is 4 inches or more.
- The first documented Whitetopping in the US was in Terre Haute Indiana in 1918.
- Dye Road, a Michigan highway was whitetopped in 1953.

Whitetopping History

- Modern usage began in Iowa in 1960’s where heavy loads from farm trucks created a need for a durable pavement.
- Performance was excellent.
- Over 300 miles of whitetopped roads since the 1960’s.
- Now used for Interstates, highways, airports, and parking lots.

Whitetopping is a proven construction technique.

Whitetopping works. In fact, time and time again it worked better than expected.

UltraThin Whitetopping

By Definition:

- Thickness between 2 - 4"
- Bonded to underlying surface
- Uses existing asphalt pavement as a base
- Short joint spacing 2 - 6’ panels

UltraThin Whitetopping is not experimental

Bond is Key Element

- Forms Composite Pavement
- Reduces edge stress on pavement

<table>
<thead>
<tr>
<th>Overlay Thickness</th>
<th>Unbonded psi</th>
<th>Bonded psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 1/2&quot;</td>
<td>1480</td>
<td>550</td>
</tr>
<tr>
<td>2&quot;</td>
<td>2420</td>
<td>420</td>
</tr>
</tbody>
</table>

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When you test the bonding strength
The bond within the asphalt fails before the bond between the asphalt and concrete fails.

Typical Core Sample
New Concrete
The Bond between the two surfaces
Old Asphalt

Short Joint Spacing
• Reduces effects of slab curling
• Acts as mini-paving blocks
• Compact slabs minimize joint movement

Ultra-Thin Whitetopping
Short joint spacing allows the slabs to deflect instead of bend. This reduces slab stresses to reasonable values.

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Construction Steps

1. Core existing surface for asphalt depth
2. Mill and clean the surface
3. Place
4. Finish
5. Cure
6. Early saw
7. Open to traffic

Coring

- You can't tell what type of material you have by standing on it
- Coring is a must
- Determine what type and thickness of asphalt pavement exists
- Failures are inevitable without coring.
- "Trust Me" the thickness and material will vary

Cleaning the Existing Surface

The beauty of UltraThin

Normal finishing and texturing

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75 percent of all panel cracks occur in the end panels
- Impact loading from vehicles moving across the junction of the asphalt/concrete
- Vehicle loads across the concrete overlay’s free edge
- Debonding of the concrete overlay’s free edge
- Improper milling (not deep enough)

Edges need to be thickened

Thicken any entry or exit panel

UTW - What’s Been Learned
- UTW Acts As Composite Pavement Due to Bond
- Milled Surface Produces Best Bond
- Base Asphalt Minimum 3" Required

UTW - What’s Been Learned
- Local Aggregates, Ready-Mix Plants & Contractors
- Local Maintenance Crews Can Be Trained to Place UTW
- All types Paving Equipment Can Place UTW

UTW - What’s Been Learned
- Mix Design Varied to Match Opening Requirements & Traffic
- Outperformed Asphalt Overlays at Same Location
- Will Handle Long Term Traffic on Local Roads

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Benefits of UTW

- New Choice for Pavement Overlays
- Durable Surface - Eliminates Rutting
- Fast-Track Construction - Open 24 hours
- Reduce Interim Maintenance
- Competitive Cost

Summary

- In a perfect world all roads would be concrete.
- UltraThin Whitetopping is a new choice that creates a competitive environment and is a wise use of tax dollars.

Local Whitetopping Projects

- Mr. C
- Marsh
- YMCA
- Fishers, Indiana
- INDOT Projects
- Grace College
- City of Indianapolis
- City of Columbus

In the beginning....... Mr. “C”

- 40th and Keystone, Indianapolis
- June 1984
- 3 1/2” over mostly existing asphalt
- 10’ X 10’ joint spacing
- Transition areas with thicken edge
- Preparation was sweeping to remove all loose particles.
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What was learned from Mr. C

- 15,000 vehicles per month
- Daily truck traffic
- Held up to the onslaught of oil dripping cars
- $0.00 maintenance in the first eight years
- vs. average repair of $500

Marsh Supermarkets, Inc.

- Failing parking lot
- Leased building
- Need a 10 year fix
- New section would be 9" thick
- Test Section 1992 they tried a 1 inch 66' x 130' test section

Mr. “C” Phase II

Traffic Flow
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Indianapolis Business Journal
May 26, 1997

In 1996 Marsh finished the 16,000 sq. ft. of 5" overlay

Southside YMCA
- Land locked site
- Increasing program load
- An old tennis court that hadn't been used in over seven years
- No money to rip it out.
- Couldn't be used for much else due to poor condition.

Will the cracks reflect through?

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Fishers, Indiana
- Rapidly growing area
- Large increases in traffic
- Large increases in truck traffic
- Road system not designed for these conditions.

INDOT Overlays

I-69 UNBONDED OVERLAY
- FROM SR 18 RM 66.29
- to
- GRANT COUNTY LINE RM 71.64
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**I-69 UNBONDED OVERLAY**
- I-69 OPENED TO TRAFFIC 1964
- RESURFACED (Bituminous) 1975
- RESURFACED (Bituminous) 1978
- UNBONDED OVERLAY 1988

**Future INDOT Overlays**

**Future INDOT Overlays**

**INDOT Overlays**

**I-65 UNBONDED OVERLAY**
- FROM 2.4 MILES SOUTH OF
- TO
- 8.6 MILES NORTH OF SR 114

**Future INDOT Overlays**

**I-94 UNBONDED OVERLAY**
- FROM SR 39
- TO
- 1.1 mile W of PORTER / LP COL

**Future INDOT Overlays**

**I-70 UNBONDED OVERLAY**
- FROM .3 mi W of CENTERVILLE
- TO
- .86 mi W of US 35
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I-70 UNBONDED OVERLAY

- 5.5 MILES LONG
- 4 LANES WIDE
- $10,000,000 (estimated)
- CURRENTLY ON HOLD FOR FUNDING

Ultra-thin Whitetopping

- Grace College Warsaw, Indiana
- 20 year old asphalt parking areas
- Vicious repair cycle
- 2 inches of concrete was better than 2 inches of asphalt
- Allowed them to do additional work

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City of Indianapolis

UltraThin inlays on bus lanes
Three test sections - 12' X 100'

City of Indianapolis

Bus Lanes

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City of Indianapolis

Had a rutting problem in their bus lanes

Had to re-surface the lanes once a year.

STEPS OF CONSTRUCTION:

- Determine areas to be rehabilitated
- Determine asphalt depth in each area
- Mill out the depth of asphalt
- Replace milled concrete with high early strength concrete
- Soft Cut
- Cure & Protect (with 2” of styrofoam)

AREAS TO BE REPAIRED:

Three areas on Ohio Street
- 1 in-between Penn & Meridian (section 1)
- 1 in-between Meridian & Illinois (section 2)
- 1 in-between Illinois & Capital (section 3)

DEPTH of ASPHALT:

- Cored each section to determine asphalt depth
- This information will help in concrete depth selection.

MILL OUT ASPHALT:

- Mill out each section to the designed depth (as close as possible)
- Concern about manholes

HANDLING MANHOLES
PLACE CONCRETE:

- Curb elevation varied
- Decided to place by hand
- Mix: high cement, super, double fibers
- Wanted to have 3,000psi in 24 hours

PLACING CONCRETE

BULL FLOATING & HAND FLOAT

TEXTURED FINISH

SAW CUT:

- Spacing determined by depth
  - 4" deep: 5'x5'
  - \(3\frac{12}{16}"\): 3'-4" x 3'-4"
- must total to the 10' lane
- Used soft cut method
- Waited to cut before they cured

SOFT CUT

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CURE & PROTECTION:

- Cure:
  - White pigmented
  - Used power sprayer
  - Waited until saw cut.
- Protection:
  - Used 2" Styrofoam to trap heat
  - Some areas used insulating blankets

PROTECTION

PERFORMANCE:

- All three sections appear to be performing well
- City is happy with the project
- Goal: To involve the City in other applications.

City of Columbus

Taking core samples
Core samples

- Rule of Thumb: need at least 3" of good asphalt base.
- Ours: 5"-6" range
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QUESTIONS??