

PHRASE

**“IT’S JUST A SIMPLE MILL AND
OVERLAY”**

17th Annual TERRA Pavement Conference

February 14, 2013

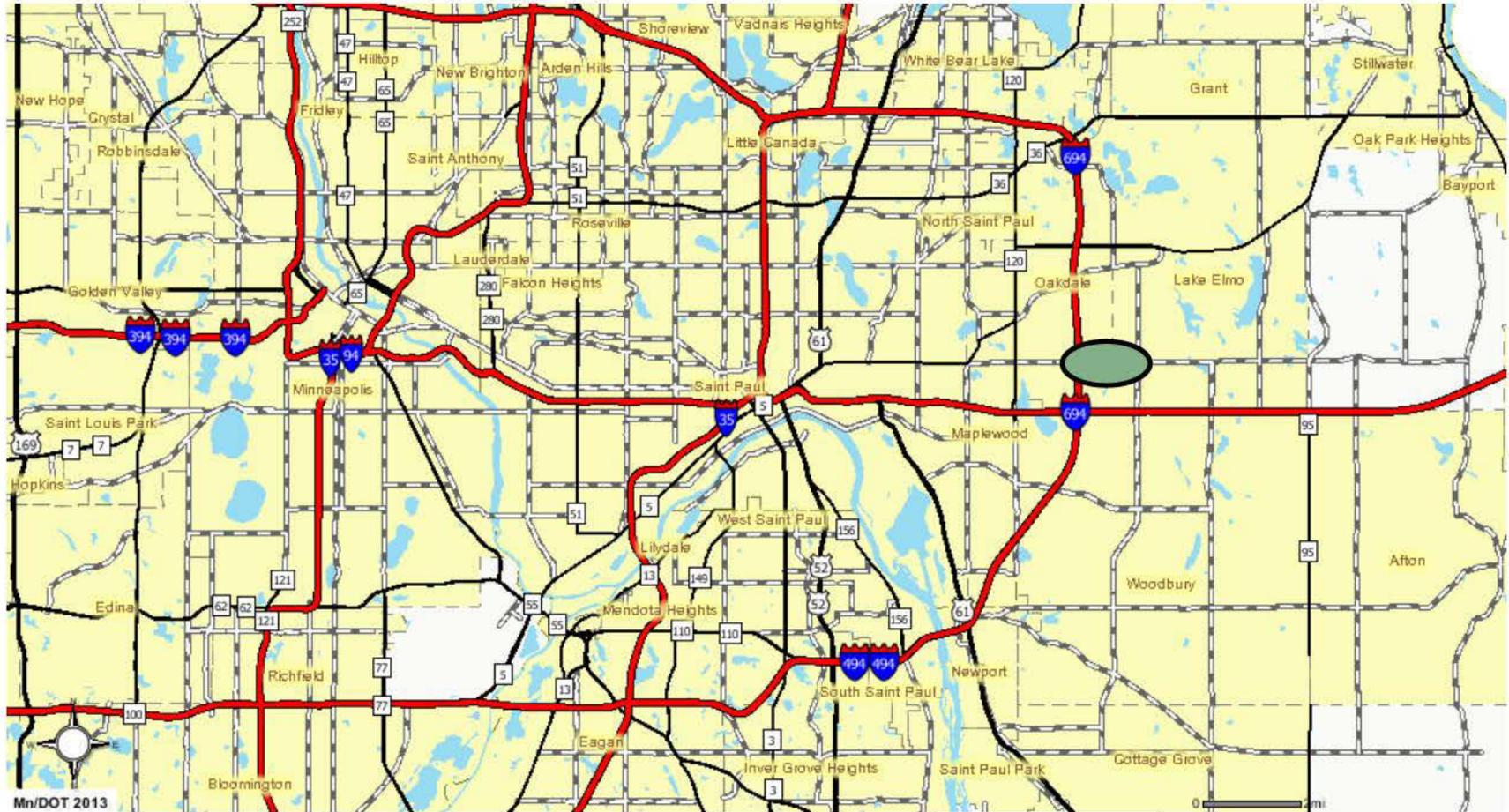
Matt Oman, PE – Braun Intertec

Cory Slagle, PE – Washington County Public Works

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Project Location



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Background

- ☒ Most recently constructed in 1994
 - ☒ muck excavation, widening, and paving
- ☒ 2012 pavement rehabilitation project: \$650,000 
- ☒ 2-inch mill & overlay to improve ride
 - little risk
- ☒ June 2012 letting and finished by end of July 2012



What?

- ☒ **First day of paving (EB): shifting/rolling/pumping of new surface from Inwood Ave**



View From a Different Perspective

 **Thank you, KSTP.**

<http://kstp.com/news/stories/s2719837.shtml>

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Our Initial Questions

- ❏ Was it really “moving”?
- ❏ Was it really “flat” after milling?
- ❏ Is this nothing more than a mix problem?
...but the bituminous production tests were all good...
- ❏ Are there organic soils left in place?
... but the densities were all very good...

Our Opinions After Field Review

- ❑ Standing high water levels were noted in the catch basins. Several outlet pipes were plugged.
- ❑ Definitely a subsurface issue

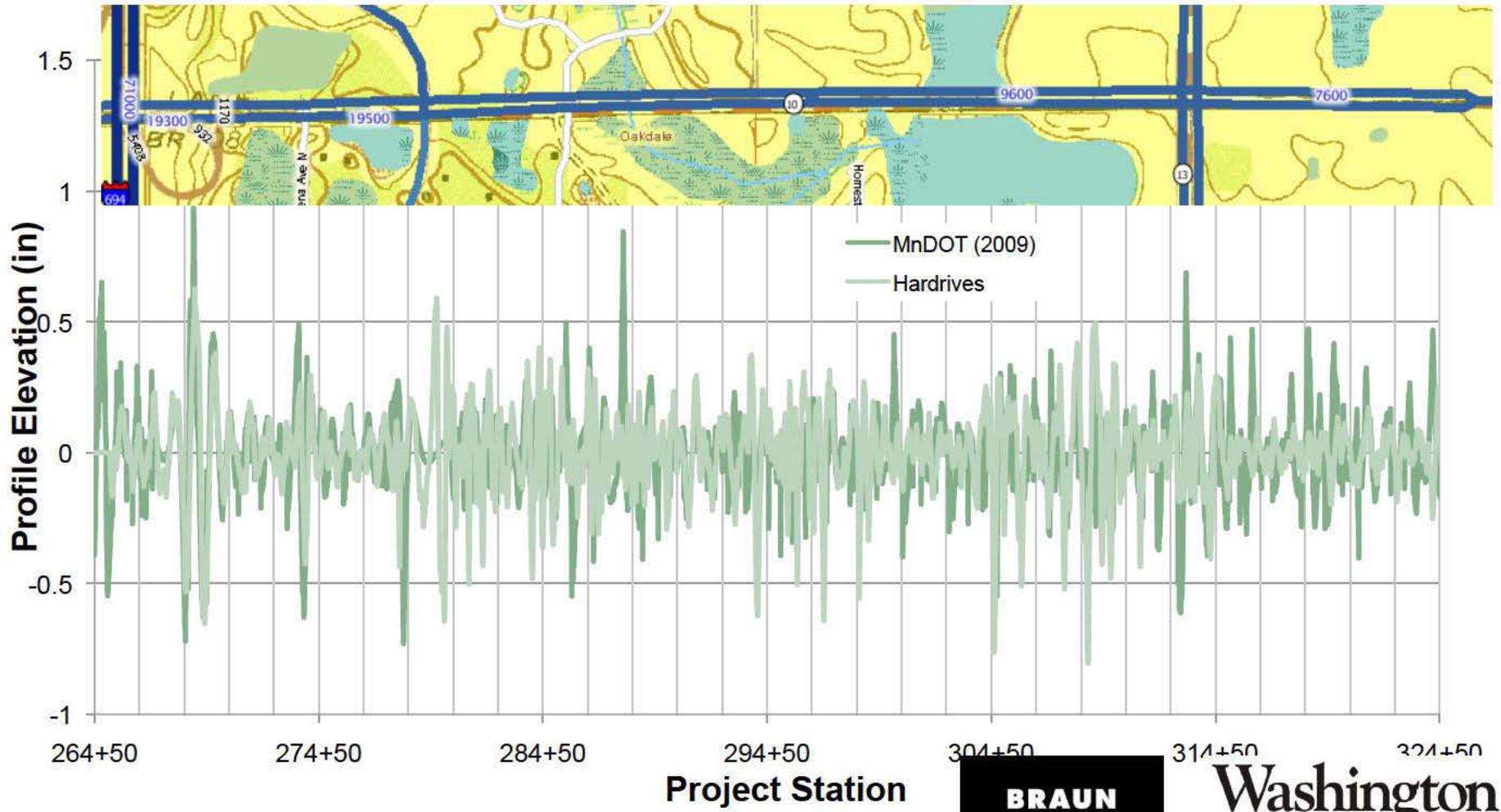


What Data Was Available?

- ❏ Soils Maps
- ❏ Construction Plans (w/ muck profile/x-sections)
- ❏ Previous MnDOT Pavement Management Data
 - ❏ 2005 – IRI ~116 in/mi.
 - ❏ 2009 – IRI ~ 150 in/mi.
 - ❏ 2012 – IRI estimate ~180 in/mi (+10 in/mi/yr historical)
- ❏ 2010 FWD
 - ❏ approximately every one-tenth of a mile
 - ❏ backcalculated R-values generally lower in the EB lane
- ❏ 2012¹ Contractor IRI²
correction



Synchronized EB 2009 & 2012¹



Subsurface Investigation

- ☒ 9 SPT borings in EB lanes
 - ☒ Good and bad areas
- ☒ Subsurface Conditions
 - ☒ No buried organics, some lacustrine deposits
 - ☒ Fine- to medium-grained sand backfill
 - ☒ SP and SP-SM (i.e., MnDOT Select Granular)
 - ☒ Water encountered ~4-6 ft below roadway surface
 - ☒ “Subgrade” well compacted, loose below that depth
 - ☒ Confirmed by County inspector that backfill placed underwater with little compaction

What Happened?

The Perfect Storm

1. High water conditions
2. Previously mucked areas
3. Muck excavation backfill
 - § Little to no compaction
 - § Fine- to medium-grained... susceptible to pumping
4. Larger, more efficient vibratory rollers
 - § Likely the biggest “load” the embankment has felt
5. The road was rough before milling

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Recommendations

- ❏ Leave WB direction alone.
- ❏ Mill and replace two inches in the EB lanes from just west of Helmo Avenue to approx STA 315+00.
 - ❏ Shoulders not be necessary but the County indicated this would be included for a consistent final product.
- ❏ Minimize the compactive energy that reaches the subgrade.
 - ❏ Smaller rollers
 - ❏ Static rollers



Recommendations

- ❏ Consider changing bituminous mix properties
 - ❏ warm mix additives
 - ❏ lower traffic level
 - ❏ higher compaction temperatures
- ❏ Incorporate high quality measures to ensure a smooth, flat milled surface.
- ❏ Consider shifting traffic into a two-way configuration would provide the best conditions.

County Priorities

1. IRI / Ride

2. Bituminous Density

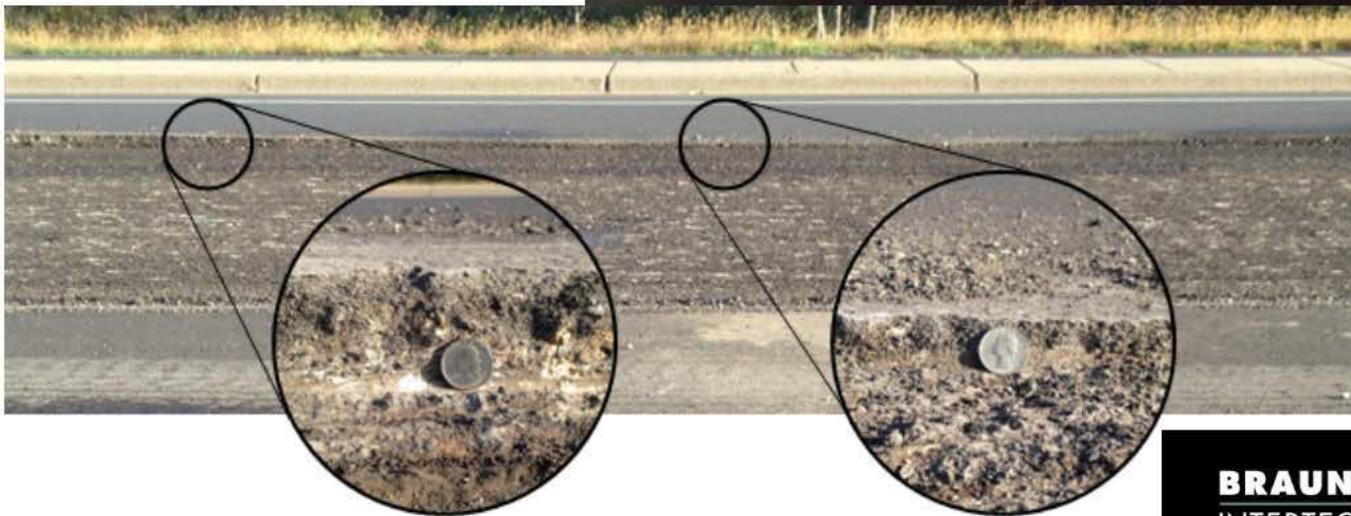
willing to sacrifice density to maximize ride



Plan

- ❑ New, laser-controlled mill
- ❑ Warm mix additive
 - ❑ As compaction aid
 - ❑ Evotherm 3G
- ❑ Same roller train but
 - ❑ Hamm breakdown in ***oscillation only***
 - ❑ Rubber-tire as intermediate
 - ❑ Hamm finish in ***oscillation*** or ***static***

Correction – Milling



Correction – Paving



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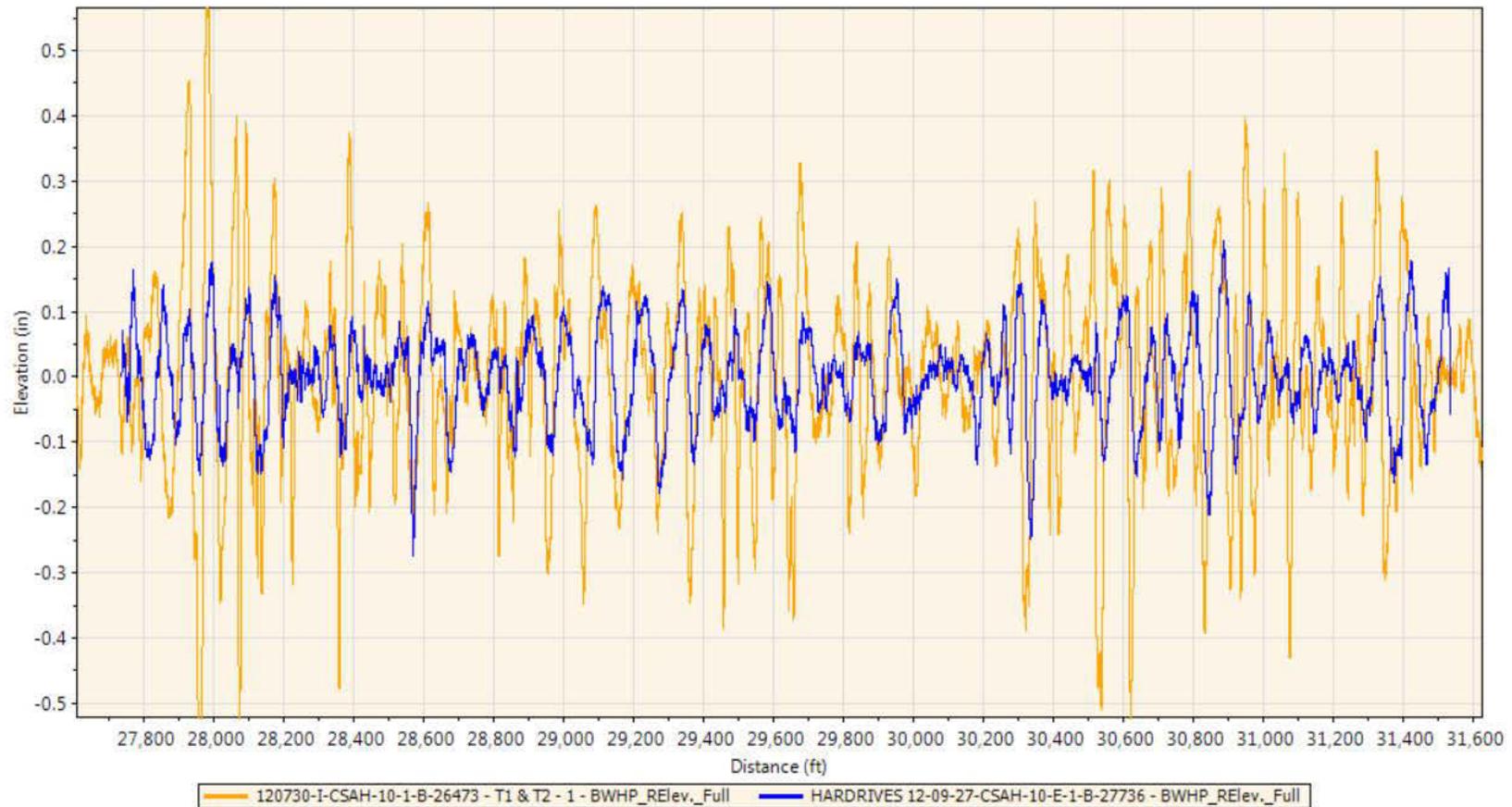
Correction – Compaction



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Correction – Pre- & Post-Profile



Correction – Final Analysis

- Ⓜ **Density:** Not greatly sacrificed. The six Contractor cores extracted indicated densities of 89.8% to 95.9% (average = 91.6%).
- Ⓜ **IRI:** *If* evaluated as % Improvement project, would have earned incentive (> 64% is

Lane	Location	Pre-Correction IRI	Post-Correction IRI	% Improvement	Ave % Improvement
Driving (right)	Left WP	149	80	46	55
	Right WP	123	46	63	
Passing (left)	Left WP	115	68	41	50
	Right WP	113	45	60	
Overall Percentage Improvement					52

Closing Thoughts

- ❏ Repair approximately \$175,000
 - ❏ State Aid funds used
- ❏ This was a unique situation that County staff, Braun, and contractor had not seen previously
- ❏ County staff will look for similar conditions on future projects and take measures to minimize risk

- ❏ **For potentially touchy soil/site conditions consider:**

- ❏ **Incorporating warm mix additives**
- ❏ **Reducing compactive effort**
- ❏ **Foregoing density for ride**



QUESTIONS?
THANK YOU!



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