

Lightly Surfaced Roadways Putting Roof on Your Gravel Road

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MnDOT

Agenda

- Chip Sealing
- OTTO Sealing
- FDR and Chip Seal Surfacing
- Using Waste Asphalt Shingles for Gravel Roads

The Issues

- Gravel Roads are
 - Costly to maintain
 - Dust
 - Hard on vehicles
 - Not liked by traveling public

The Issues

- Why not pave all of them
 - Too Costly
 - Not best stewardship of resource

Silver Creek Township

- 4.3 mile loop road
- 75 to 100 ADT
- Graded to be paved
- Cost estimate to pave \$760,000.00
 - 2 to 3 years of Township's pavement budget
- Residents up set with decision not to pave roadway

Silver Creek Township

- Decide to try Prime & Chip Seal Surfacing
 - Prime with Penetrating Emulsion Prime
 - Chip Seal with FA-2.5 chip & Crs-2P
 - Modified Fog Seal

Silver Creek Township

- Not a paved surface
- Improved Gravel Roadway
 - No Dust
 - No Wash Boarding
 - No Dirty Car
 - No Re-Gravel

Preparation before Prime & Chip

- Correct any **DRAINAGE** issues
- Increase cross slope from 2% to 4+%
 - Add Gravel to increase slope
- Established centerline
- Shaped and compacted surface



Pre-wetting Gravel



Priming PEP



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PEP at 0.25 gal/yd²



5 to 8 lbs./yd² Trap Rock Sand





Applying CRS-2P



Rolling Chip Seal



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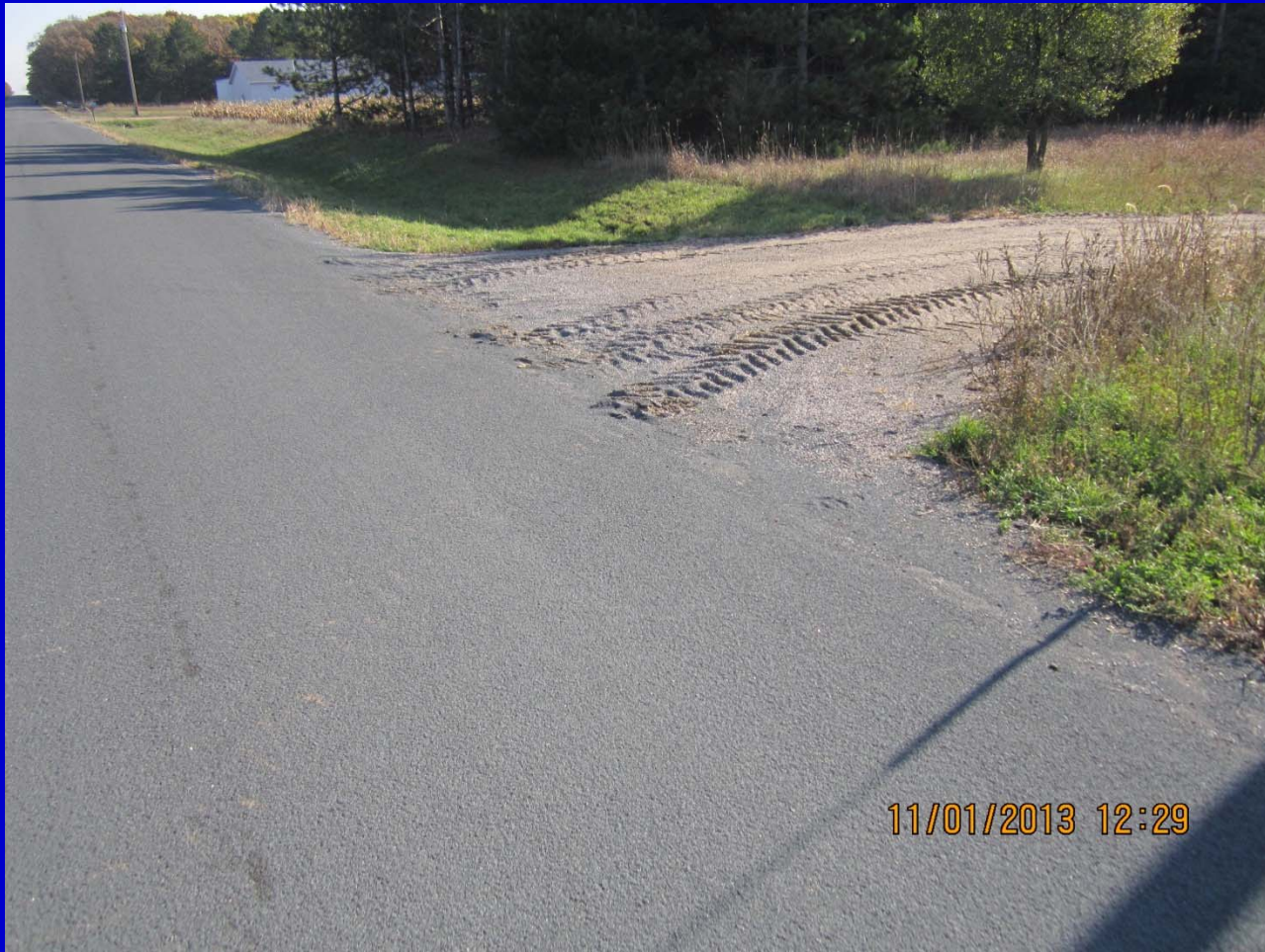
Sweeping Extra Chips off Roadway



After Construction



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After 1st Winter



Quantity

- Priming Gravel Surface
 - PEP 0.25 gal/yd²
 - Blotter Sand 5-8 lbs./yd²
- Chip Sealing
 - CRS-2p 0.35 lbs./yd²
 - FA-2 ½ 16 to 18 lbs./yd²
- Modified Fog Seal
 - CRS-2p 0.15 gal/yd²
 - Cover Sand 5-8 lbs./yd²

Recap

- Need structurally sound road
- Good drainage
- Proper amount of gravel
- Needs to be graded smooth

Recap

- Is alternative for paving low volume roadways
- Not a paved roadway but improved gravel roadway
- HMA cost \$12.55 yd²
- Prime & Chip \$2.50 yd²

Otto Seal



Otto Seal

- Two course application of the following:
- HFMS-2s emulsion 0.50 g/y²
- 50 lbs./y² of surfacing gravel
- Rolled

Otto Seal

- Let traffic drive on first course for 2 to 3 weeks and repeat
- End up with $\frac{3}{4}$ to 1 inch asphaltic flexible surface

Otto Seal



Otto Seal



Otto Seal



Surfacing in place of HMA



Cell 28 History

- 4.5 " of HMA
- 6" of gravel
- Clay sub base
- Control for drainage experiment

Failed Within 2 Years



Emulsion Stabilized FDR



Modified Double Chip Surface



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90 + laps per day at 80K





- Two localized areas of failure easily patched
- 40000 ESAL
- Comment from Staff “seem to improve with time and traffic”

Using Waste Shingles to Improve Gravel Roads



The Issues

- 200,000 + tons of Tear Off Waste Shingle (TOSS) per year produced in MN
- 5% max allowed in HMA
- Aggregate quality declining
- Increase demand for dust control

Research Project Scope

- Alternate uses for TOSS
 - To improve quality of surfacing gravel and shouldering materials
 - As an effective dust control method
- What size of grind is best and amounts

Recommend Grind Size

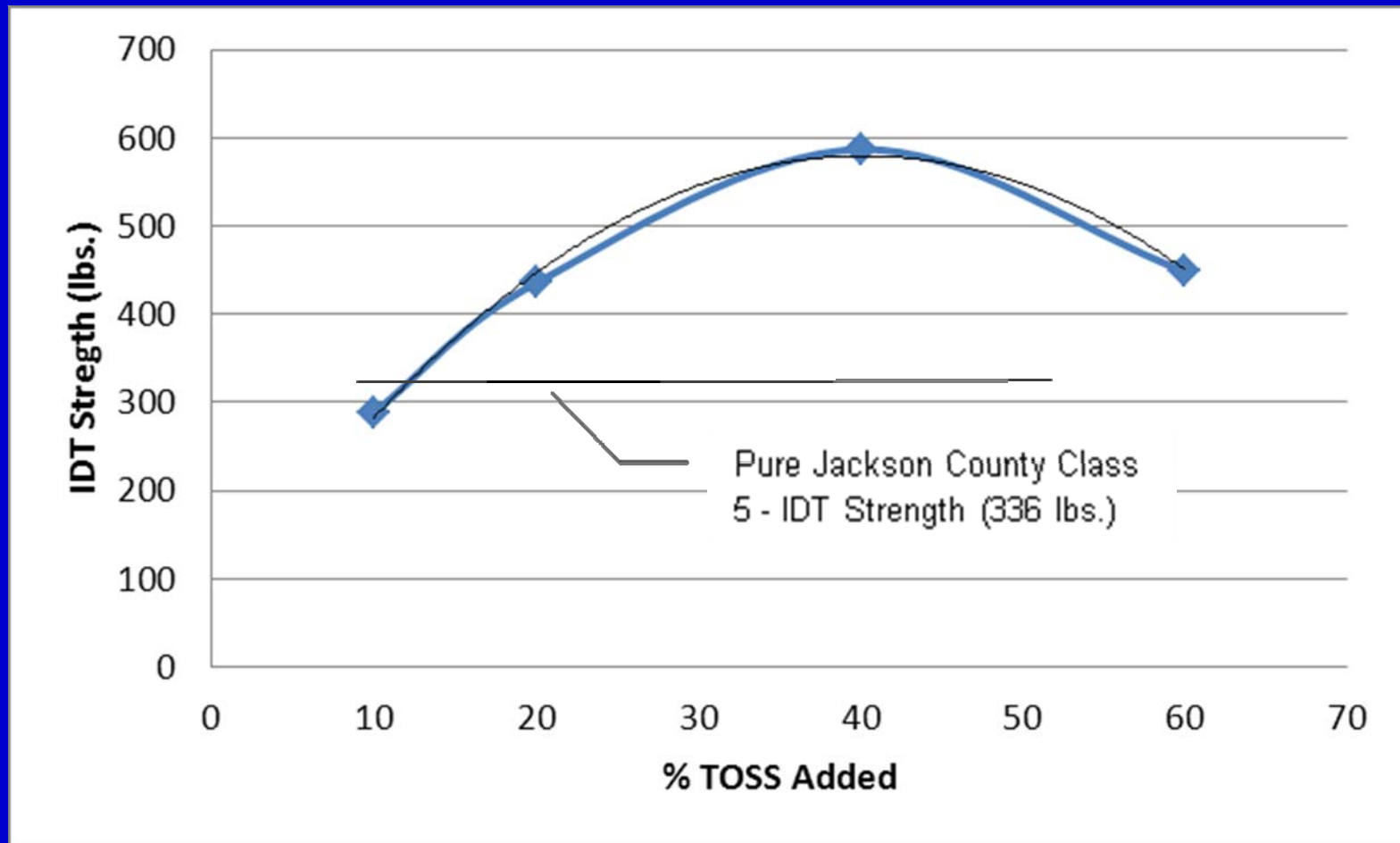
$\frac{1}{2}$ inch minus cost $\frac{1}{3}$ less than #4 minus grind



How the Research Was Done

- Laboratory Testing
 - Determine if TOSS help or hurt performance
 - Determined what was best percentage to add

Best Lab Performance 40% Weight



Built Test Section

- Jackson Co. Goals
 - Limit Corrugation
 - Less Blading
- What was done
 - Started at 4 TOSS to 10 gravel blend by volume
 - Went to 1 to 1 blend by volume
 - = 35% by weight



Performance

- Comments from interviews from Jackson Co. Personnel
 - Blade operators wants rest of pile on his roads
 - Less corrugation
 - Less float
 - Seem to shed water better
 - Less dust observed





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Goodhue County

- Goodhue use crush limestone for surfacing gravel
- Biggest issue is dust control

Goodhue



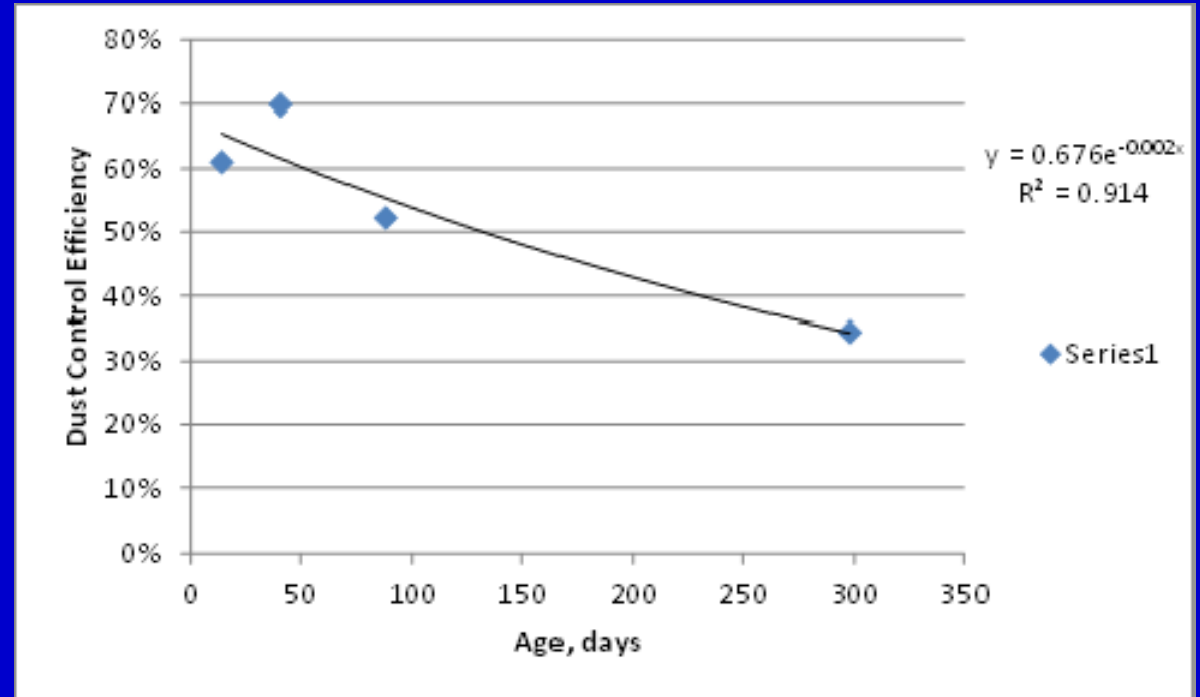
- Blend TOSS at rate of 1 to 1 by volume for top ½ inch
- Made comment that the TOSS made road look dirty
- They were not sure of value as far as grading
- Did observe less dust



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Results

- At 1 yr. TOSS treated section still 34% effective
- Other dust methods <5% after year in place



Cost Comparison

- Calcium chloride \$0.50 square yard
 - \$7,040 per mile per application
- Shingles prepared \$14.00 ton = \$7.00 cubic yard
 - \$16,500 per mile
- Cost to break even
 - 2.2 years compared to single application of chloride
 - 1.2 years compared to double yearly application of chloride

Benefits

- Re-use of a valuable resource
- Reduce chlorides from dust control
- Reduce grading of gravel surfaced roadways and shoulders
- Reduction in re-graveling

Benefits

- Environmental savings
 - Divert shingle waste from land fills
 - Protect water from chlorides
 - Less fugitive dust
 - Cost effective alternate to other dust control methods

Question?



Thank You

