Lightly Surfaced Roadways
Putting Roof on Your Gravel Road

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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
PEP at 0.25 gal/yd²
5 to 8 lbs./yd² Trap Rock Sand
Applying CRS-2P
Rolling Chip Seal
Sweeping Extra Chips off Roadway
After Construction
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

- 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 ¾ to 1 inch asphaltic flexible surface
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
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

½ inch minus cost ⅓ 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
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 where not sure of value as far as grading
- Did observe less dust
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 landfills
  - Protect water from chlorides
  - Less fugitive dust
  - Cost effective alternate to other dust control methods
Question?
Thank You