Chip Seal

ROAD FUTURE: TOWN OF STAR VALLEY RANCH
Presentation Goals

- Chip Seal Class 101 (4 questions)
  - What is It?
  - How is it Different from Asphalt?
  - Why Use it?
  - How is Chip Seal Placed?
- Review Silver Creek Township
- TSVR Plan Outline
1. Chip Seal - What is it?

- A pavement surface treatment
  - Combines one or more layer(s) of asphalt
  - One or more layer(s) of fine aggregate.
- In the United States
  - Chip seals are typically used on rural roads
  - Carrying lower traffic volumes
2. Chip Seal – How Different from Asphalt?

- The construction method.
- **Hot Mix Asphalt** pavement is produced by heating liquid asphalt and mixing it with aggregate, with the mix then spread and compacted to form a durable road structure and riding surface.
- **Chip Sealing** uses the same ingredients as asphalt concrete paving, but the construction method is different.
  - A thin film of heated asphalt liquid is sprayed on the road surface, followed by the placement of small "chips".
  - The chips are compacted to orient the chips for maximum adherence to the asphalt; excess stone is swept from surface.
- The ingredients of hot mix asphalt and chip seals are the same; only the construction methods are different.
3. Why Use Chip Seal?

- Maintain the roads for very low cost.
- One fourth to one fifth the cost of a conventional asphalt.
- Enhance safety by providing good skid resistance.
- Provide an effective moisture barrier for the underlying pavement against water intrusion by sealing cracks in the pavement.
- Used on low traffic routes, less than 2500 vehicles per day.
- In hot weather, chip seals re-seal cracks by flowing back together.
4. How is Chip Seal Placed?

- Road cleaned of debris and holes patched.
- Each lane sprayed with hot liquid asphalt to assure an even application. The asphalt applied at a temperature 150 - 185 F.
- A chip spreader follows as rapidly as possible with a rock application, preferably within one minute. The asphalt must be fluid so the rock will be embedded. The rocks are an aggregate crushed to a special specification for size and cleanliness.
- A rubber-tire roller is used to set the rock into the liquid asphalt. Rolling orients the flat sides of the rock down and produces a tighter chip seal.
- Sweeping is done at the completion of the chip seal process to remove surplus rock from the surface. This loose rock can grind and loosen rock set in the chip seal and damage the project.
Chip Seal over Gravel Road Project
Improved Gravel Road

Silver Creek Township
July 2013

Northwestern Wright Co Mn
3827 134th St NW
Monticello Mn 55362
Silver Creek - Problems

- 44 miles of gravel roads to maintain and control, gravel, mud and dust, along with 22 miles of asphalt paved roads.

- The township wanted to find an affordable alternative to asphalt, for gravel roads that have low volume traffic, serve primarily residential homes and farms.

- The goal is to eliminate the expense of grading, roughness of the road, mud and dust and the expense of adding gravel lost to grading, snow removal and traffic.

- The other savings would be the elimination of the chloride solutions for gravel stabilization and dust control, to eliminate mud associated with gravel roads after rains and snows.

- Expense to surface gravel roads with asphalt or concrete too expensive for the townships budget, given the volume of traffic on these roads and the additional expense to maintain asphalt or concrete, which adds an additional layer of expense after the fact.
One solution, was to apply a designed flexible chip seal matt, on 4 miles of rebuilt gravel roads.

The roads were recently rebuilt for grade and soundness.

A decision was made to apply a 3/8\textsuperscript{th} granite chip (FA-3A chip), on top of an emulsion primer coat (PEP), on top of graded prepared packed gravel surface.

The cost savings of a chip seal matt over a common bituminous asphalt mix, is approximately 75%.
Other considerations were asphalt for these same roads surfaces. The preliminary estimates for asphalt, at the time, were coming in at $760,000, based on early season bituminous pricing and gravel shouldering.

The additional cost with a bituminous asphalt surface, down the road, would be crack filling and chip sealing the asphalt surface and additional, continued shouldering gravel expense.

After research and discussions, the town board decided to proceed, with the help of MnDOT research project coordinator Mr. Wood, with the chip seal over gravel.

The estimated budget cost of the improved gravel road chip seal project is $170,000.
Silver Creek - Procedure
Test the road bed for soundness and bring up to specs or re-grade road to paving asphalt specs. There should not be spots or frost boils. Ensure the road is graded and packed with a 4% to 5% crown or cross slope, for good drainage. Have a good gravel packed base to work with. These roads were recently rebuilt in the last 2 yrs.
The first step was to apply water to the dry gravel base, to help with, and allow, the Primer (PEP) to penetrate better into the gravel surface.
The second step was to apply the primer (PEP).
After run off concerns were solved and waiting 20 min for curing, the PEP had not completely penetrated into the road surface. Personnel, onsite, decided to apply sand to the surface, to allow traffic during the PEP curing process.
After the application of the sand, the PEP was allowed to cure for a minimum of 3 hours, after which, excess sand was swept off and the chip seal emulsion applied.
The next step, after the PEP primer / sand was cured and swept off, the Chip Seal matt was placed with emulsion oil followed by granite chips rolled in. All areas primed, were chip sealed the same day to protect the PEP from traffic damage.
Fog seal over Dresser Rock Sand
Results – Silver Creek Township

- Overall, the Township Board and the residents that live on the road; are very happy with the design and performance of this improved gravel surface.
- It has met all the goals of an improved gravel road.
- It is smooth and rides well.
- The road isn’t muddy or dusty.
- It has not required grading or chloride solution expenses.
- It is performing like a bituminous asphalt road, at far less costs.
- Anticipate the chip seal matt with be flexible and require little maintenance in its expected life (5-7 years.).
- It appears to be wearing well and rides nicely.
- It is inexpensive and easy to repair. There should be not cracks to fill, as is common with asphalt or concrete.
The repair process is simple. We bought a couple pails of foundation coating from Menards. Clean and pack out the damaged area. Pour in some foundation coating oil. Add the FA-3A chips and pack level.
The improved gravel road / chip sealed matt, should have a life expectancy of 5-7 yrs (depending on traffic volume).
<table>
<thead>
<tr>
<th>Cost Comparison between Gravel, Improved Gravel and Asphalt Roads,</th>
<th>Improved Gravel (Chip Seal on Gravel Surface)</th>
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<tbody>
<tr>
<td>Gravel road costs, for this 4 mile loop of roads ~</td>
<td>Removed mud and dust complaints from residents</td>
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<tr>
<td>- Chloride solutions for gravel stability and dust control Per Yr - $11,500 yr (0.90¢ gal chloride)</td>
<td>- Chip Seal cost about $2.60 - $2.75 per square yard, on gravel</td>
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<td>- Gravel savings @ 1300 yds per yr @ $8 bucks yrd applied ($10,400 per yr savings on gravel)</td>
<td>- Chip seal is a flexible matt, that should move with freeze thaw cycles</td>
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<td>- Grading @ $150 per hour 5 to 6 times yr ($3,000 per yr)</td>
<td>- No crack filling necessary or expense required</td>
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<tr>
<td>- Tractor and Packer @ $75 per hour 5-6 times yr ($1,500 per yr)</td>
<td>- No shouldering expense</td>
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<td>- Asphalt and shouldering costs estimated at $760,000 or around $11.15 y²</td>
<td>- If asphalt would have been applied, a chip seal would be necessary to top off and seal the asphalt surface in 3ys or so – cost $1.75 y² or $114,000</td>
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Gravel and improved gravel save on chloride solutions.
“This will be an ongoing evaluation of the roads involved”
Chip Seal Roads in Lincoln County

- County Road 110, Etna Bench
- County Road 115, Clark Lane
- County Road 117, Muddy String
- County Road 122, Thayne to Bedford
- County Road 125, Thayne to Freedom
- County Road 126, Strawberry
- County Road 127, Heiner-Suter
- County Road 173S, River View Ranch
- County Road 134, Auburn-Tygee
- County Road 135, Allred
- County Road 137, Swift Creek Lane
- County Road 140, Bitter Creek
- County Road 146, Dry Creek
- County Road 148, Smoot – Afton
- County Road 198, Allred Extension
TSVR Chip Seal Road Plan

- Approximately 4 miles of road
  - Vista entrance up to Vista East
  - 200 yds up Vista East and Vista West
  - Cedar Creek to Hardman
  - Hardman to Butte
  - Butte to East
  - East to Perkins
- Completed Summer of 2015
- Estimated cost of $238,080.50
- Evaluate and Consider other roads
TSVR Roads Planned for Chip Seal
TSVR Roads Planned for Chip Seal
Questions