The Rebirth of Chip Sealing in Minnesota

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The Issues

- In the early 1990's chip seal performance was very unpredictable.
  - Large amount of aggregate loss
  - Bleeding
  - Vehicle damage
  - Cost overruns
  - Average chip seal life was 5 to 7 years

LRRB funded a study of Chip Seals.

Mn/DOT adopted a modified McLeod design

- Determined amount of aggregate needed to cover 1 sq/y one stone deep
- Increased aggregate embedment depth from 50% to 60% - 65%

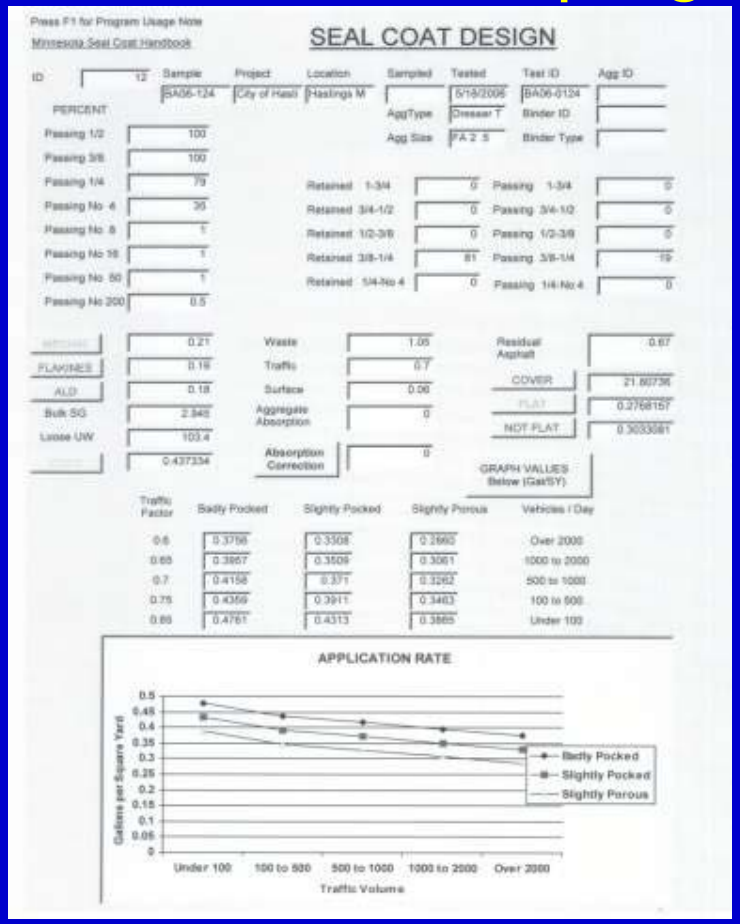
Seal Coat Design Summary

- Design for FA-3 (3/8”) Chip
  - Previous Average (No Design):
    - 30 lbs/yd^2 Aggregate
    - 0.30 gal/yd^2 Binder
  - Current Average (With Design):
    - 17 lbs/yd^2 Aggregate
    - 0.42 gal/yd^2 Binder

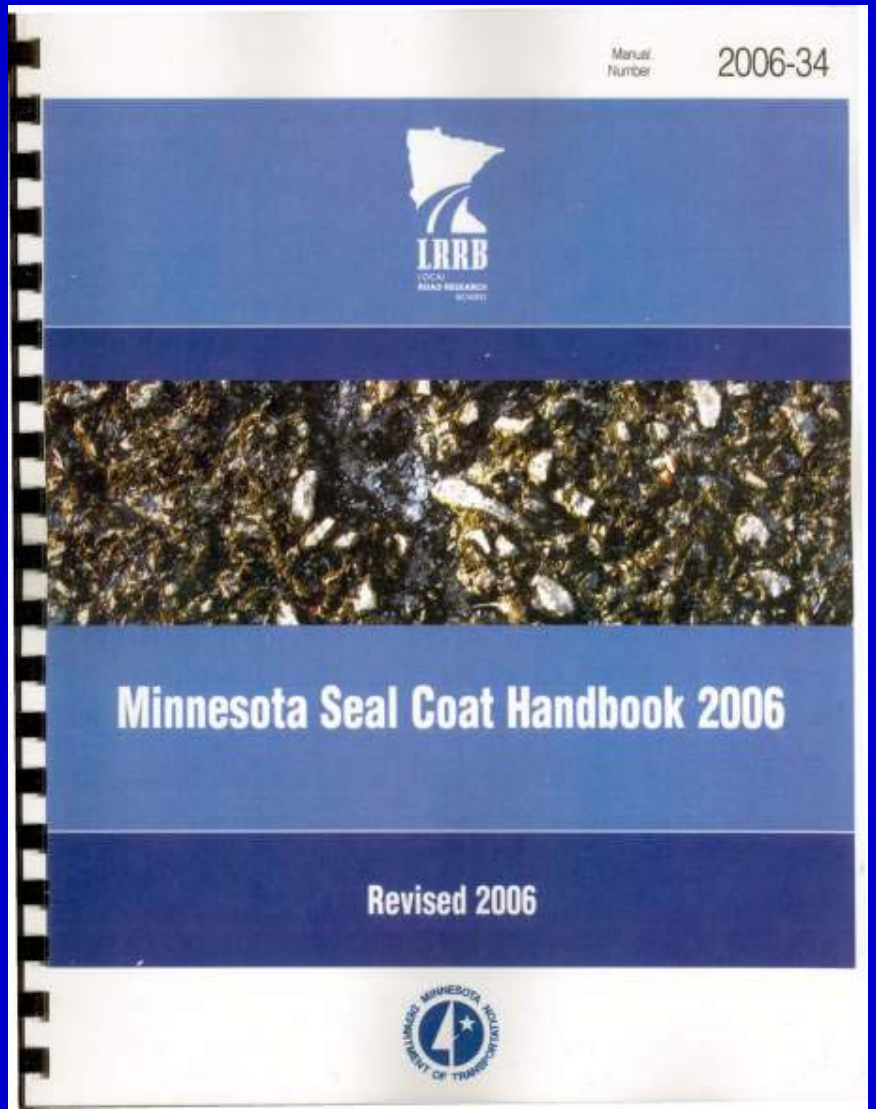
“*One state that adopted Mn/DOT’s design method reported a $1 million savings in aggregate costs the first year*”

Mn/DOT's Design Method

http://www.mrr.dot.state.mn.us/research/MnROAD_Project/restools/sealcoatprogram.asp



Originally Published in 1997
Revised in 2006



Current Mn/DOT Special Provisions

- Requires use of CRS-2p emulsion
- Clean aggregate
- Proper methods
  - Minimum time between application of binder and aggregate (< 1 minute)
  - 3 rollers with minimum of 3 passes
- Chips shall be swept day of construction
  - Before traffic control is lifted

Current Mn/DOT Special Provisions

- Contractor responsible for all vehicle damage.
- All chip seals on State routes shall be fog sealed.
  - No earlier than the next morning.
  - Css-1h diluted 1:1 at place of manufacture is required for fog seal.
  - Shoulders + Rumble Strips too!

Mn/DOT Special Provisions were re-written in 2001

- Old pay items
  - Tons aggregate
  - Gallons of binder
- New pay item
  - Gallons of binder
  - Square yards of chip seal applied
    - Pay for aggregate, application, sweeping, etc.

Outcome

- Many Agencies in MN have started to chip seal or increased their use of chip sealing.
- Average age of roadway to receive first chip seal application is 5 years
- The average size of chip used has increased from ¼” chip to 100 percent passing ⅜”.
- Maximum allowable traffic for placing chip seals increased from 500 - 1000 ADT to as high as 15,000+/- ADT.
- Average life of chip seals has increased from 5 – 7 years to 10 - 15 years.

What the Traveling Public Sees!


2 Years Later

Minnesota State Animal
The Gopher