

Right Surface Treatments in Urban Areas

Pavement Preservation Series

SDLTAP –

South Dakota State University



Overview

Pavement Preservation

Asphalt Pavements

Crack Sealing and Crack Filling

Mastics

Chip Seal

Slurry Seal

Thin Overlay

PCC Pavements

Joint Sealing

Joint & Spall Repair

Panel Replacement

Slab Jacking

Diamond Grinding or Diamond Grooving

Pavement Preservation

What is Pavement Preservation?

- Proactive approach in maintaining our existing highways
- Enables transportation agencies to reduce costly time-consuming rehabilitation and reconstruction projects and the associated traffic disruptions
- Can provide the traveling public with improved safety and mobility, reduced congestion, and smoother, longer lasting pavements.

Pavement Preservation has Two Main Objectives

1. Preserve the pavement investment.

- *This objective involves minimizing the structural failures and extending the structural life of the pavement to preserve the investment the agency has made in the pavement asset.*

2. Maintain high level of service (LOS).

- *This objective involves maintaining acceptable smoothness and surface friction in order to provide a high LOS for the roadway customers.*

"Right Road, Right Treatment, at the Right Time"

South Dakota Local Transportation Assistance Program

What is Pavement Preservation (Cont)

Includes	Does Not Include
Preventive Maintenance	New Pavement
Minor Rehabilitation (non-structural)	Construction
Some Routine Maintenance	Reconstruction
	Major Rehabilitation
	Corrective Maintenance

Today's Budget Constraints

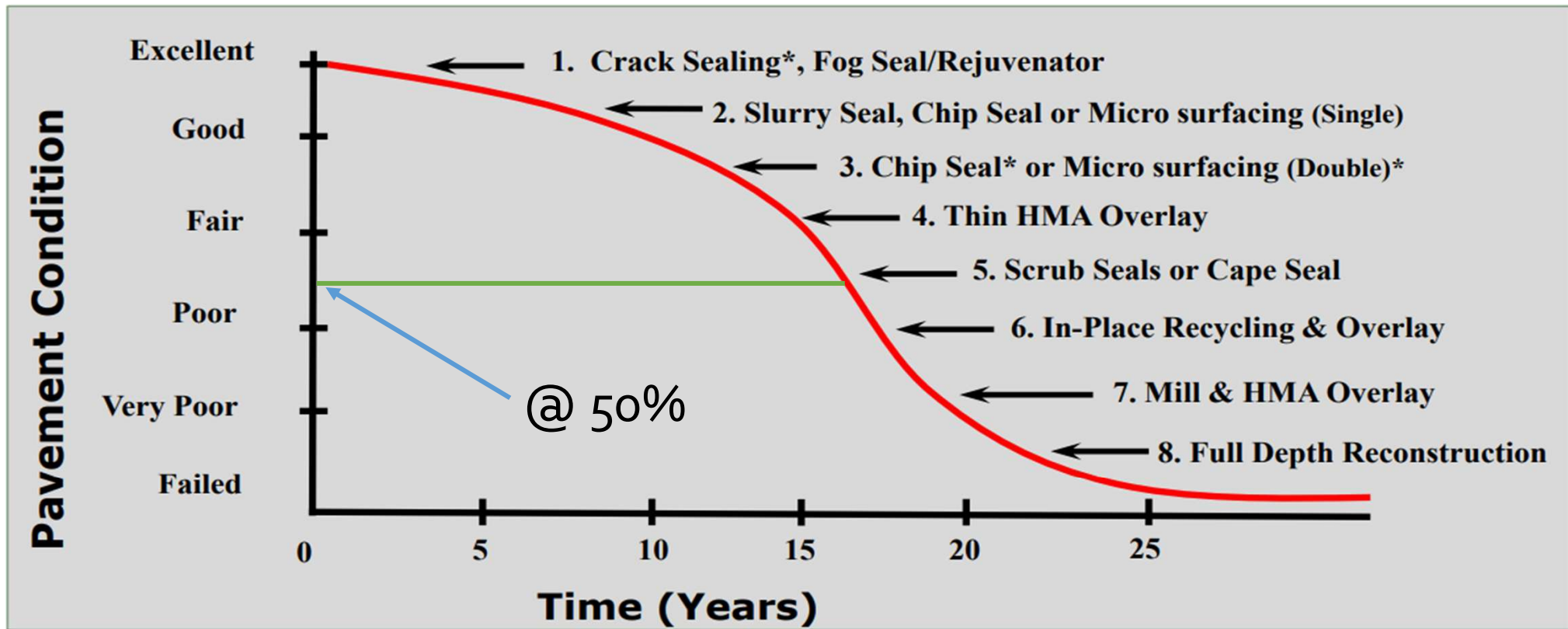
Perform More work with Less Money

- Pavement maintenance dollar cut or saved today will cost taxpayers of tomorrow six to ten dollars

Historically been focused on upgrading and building new roads

New focus is on preserving and maintaining existing pavements

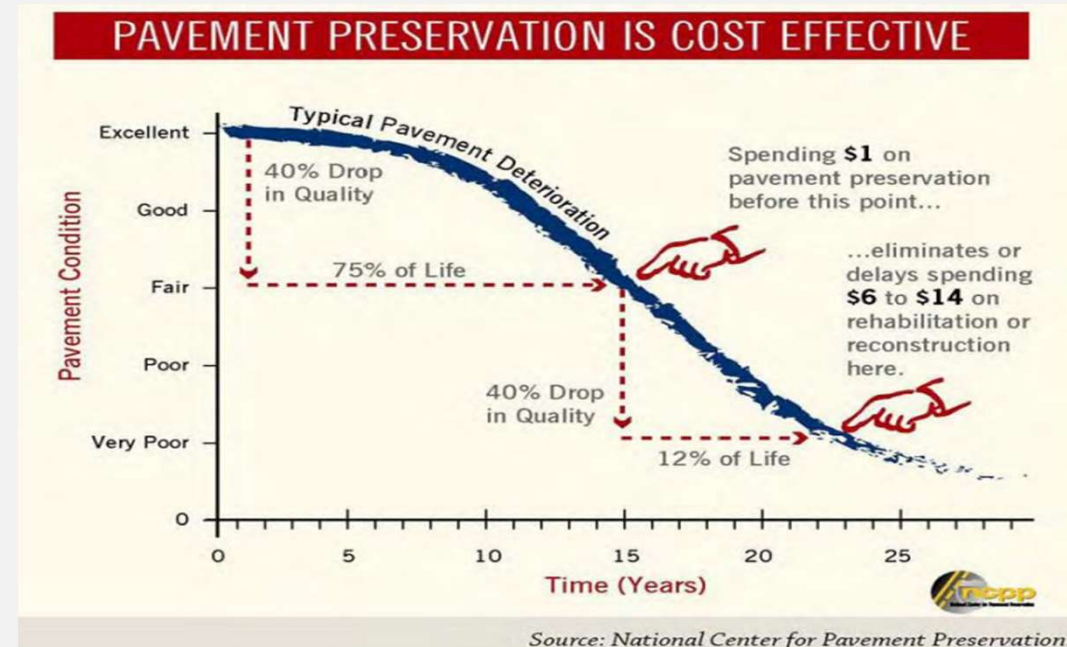
Applying the Right Treatment to the Right Road at the Right Time



*** Crack Sealing is also be used in conjunction with other applications and as needed**

Preventative Maintenance Pays

- Reduce Overall Life Cycle Cost by as much as 50%
- Benefits of Preservation is at least a 6:1 Ratio
- **Public and Political pressure to fix the worst first!**
- In many agencies asphalt roads are the most expensive asset they manage





Preventative Maintenance Pays

PP - Good Pavement Preservation Candidates



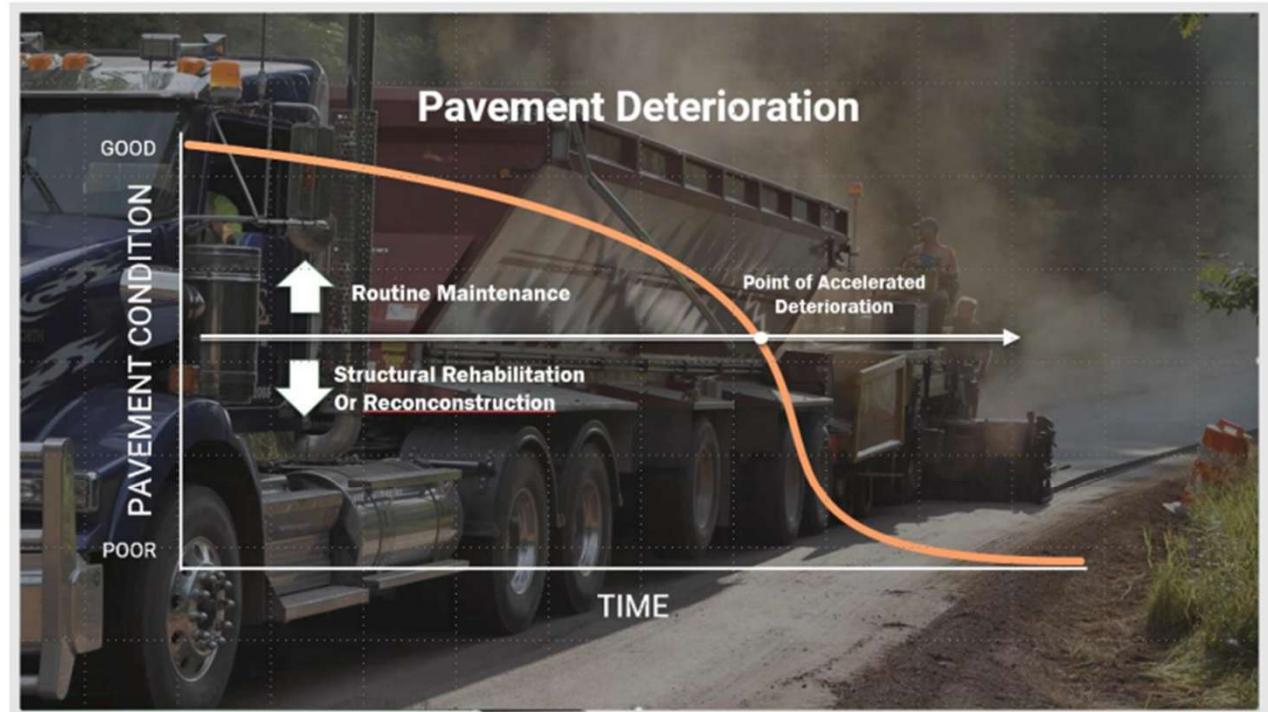
PP - Unacceptable Candidates – Too Late!



REVIEW

Keep our pavements
at the top of the curve

Put More Life into
Your Network than
You Lose



Why Crack Seal?

Protects the longevity of the pavement

Prevent water into base

Cost-effective

Prevent Incompressible Material Getting Into Cracks

Slows Down Pavement Deterioration



Type of Cracks



Transverse



Longitudinal



Fatigue (Alligator)

A basic understanding of what type of cracks you're working with, so you know how to treat them.



Cold Joint



Block

Don't get caught up in trying to remember each Type of Crack, just remember one thing if it's a crack an 1/8" and larger SEAL IT!

Sealant Selection

Crumb Rubber

- Typically used on Crack Filling
- Asphalt Rubber Type 4

Hot Pour – Low Modulus

- Typically used on Crack Sealing (Rout and Seal)
- More flexible
- ASTM D6690 Type IV
- Crafc0 Road Saver 231

Clean & Seal (Crack Filling)



Route & Seal (Crack Sealing)



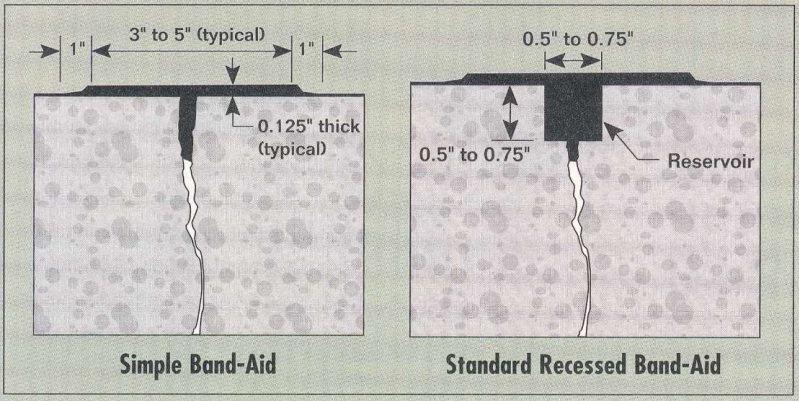
Sealing and Blotting The Crack



Routed Cracks: Ensure that you have a Flat Bottom & Use The Proper Tool



Use a Tool to check Depth and Width Checks
- Very Important to have a Vertical Side and Flat Bottom



Important: Seal Along Curbs To Keep Moisture out of the base & Blot All Cracks with Toilet Paper



Remember - Why Crack Seal?

**Cost-Effective, Protects the
Longevity of the Pavement,
and Slows Pavement
Deterioration**

Mastics



- Very strong and durable
- Cupped & Large Cracks
- NOT a sealant
- May need two Passes !!
- Repair Potholes and settlement issues
- 100% density with no compaction
- Material Cost - \$0.40 to \$0.80 per SY

Mastics

- Cracks that look like this are good candidates
- When they get this wide and deep – a Backer Rod should be used to save material!!
- Mastic Material should be placed in 2 (two) Lifts to achieve smoothness



Mastics



Repairing Deteriorated
Longitudinal Joints



Leveling Depressed
Thermal Cracks



Filling Wide
Cracks and Joints



For production may need
2-3 hoppers



Mastic Placed on City Streets



Why Chip Seal?

Extend service life of surfaces in good condition

Will retard weathering/aging of an asphalt surface

Will seal minor surface cracking

Restore skid resistance to the surface

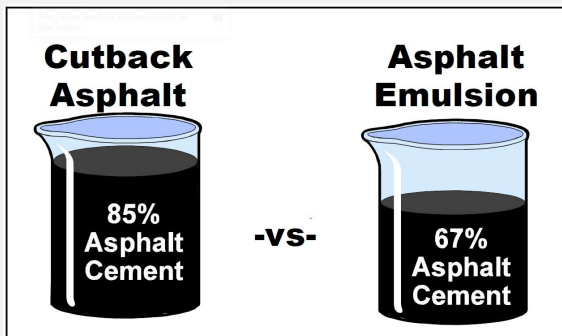
Types of Chip Sealing Products

Cutbacks – Asphalt Binder and Petroleum Distillate

- MC-3000
- More forgiving with dirty aggregate
- Problems during damp conditions
- Good storage life

Emulsion – Asphalt Binder, Water, and Emulsifier

- CRS-2P, HFMS-2, & AE-150S
- Make sure its compatible with aggregate
- Strength in hours instead of day
- Clean aggregate – minimize the #200 Material
- Place aggregate within 1 minute
- **Safer to use – Low application temps**
- More environmentally friendly
- Not as forgiving during application



Asphalt Emulsions vs. Cutbacks: (Cont)

Asphalt Emulsion

- Asphalt Emulsion is said to have **"SET"** when the water has evaporated, **often Minutes**
- Emulsified asphalt are diluted with water so that a low application rate could be achieved
- The color of emulsion is brown during initial time of application, Turns Black when Set

Cutback Asphalt

- Cutback emulsion is described to have been **"CURED"** when the solvent has evaporated – **Often Days**
- Cutback Asphalts are diluted with petroleum to reduce viscosity of asphalt in low temperatures

Compatibility Testing of Chips



Washed Natural Aggregate –
with CRS-2P Emulsion



Dirty Natural Aggregate (2.2%
#200) – with HFMS-2P Emulsion

Modified McLeod Chip Seal Design Method



What
Should it
Do?

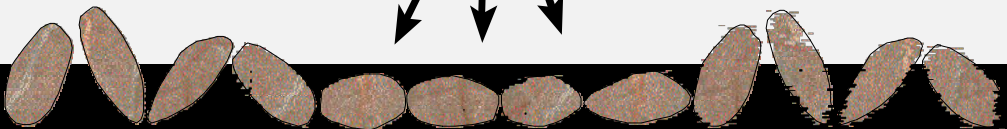
1. Provide an amount of aggregate to cover **1 sq. yd** **yard a single stone thick**
 2. Provide a starting Emulsion/Cutback application Rate
 - Starting Rate should yield 70% embedment if there is no absorption by pavement surface
 - Must adjust for underlying pavement conditions
- 

Modified McLeod Chip Seal Design Method (Cont)

Flakiness Index: Flat and Elongated Chips

If the seal coat is designed for chips in the non-traffic areas:

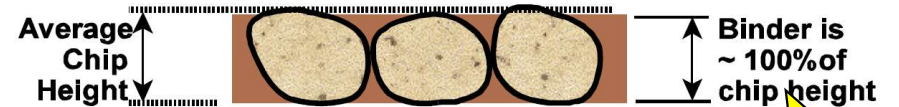
BLEEDING



There is too much binder in the wheelpaths after the flat chips lay on their flattest side.

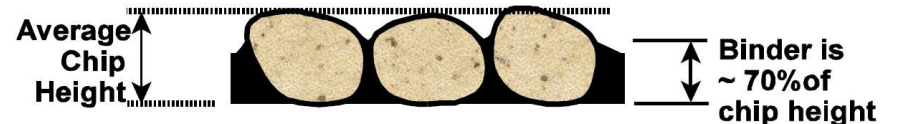
Emulsion Application Rate

Before Curing:



No more than 80% with cutback

After Curing:



Aggregate Types – Use the Most Economical Chip Available

Ledge Rock

Limestone (Black Hills)

May be soft and dusty
Fractured faces interlock
Provides great skid resistance
Improper Crushing creates Flat and Elongated Pieces

Quartzite Chips (East River)

Moderately priced
Hard and Durable
Single sized stone
Fractured faces interlock
Provides great skid resistance
Loose stones can and will cause windshield damage operations
Improper Crushing creates Flat and Elongated Pieces

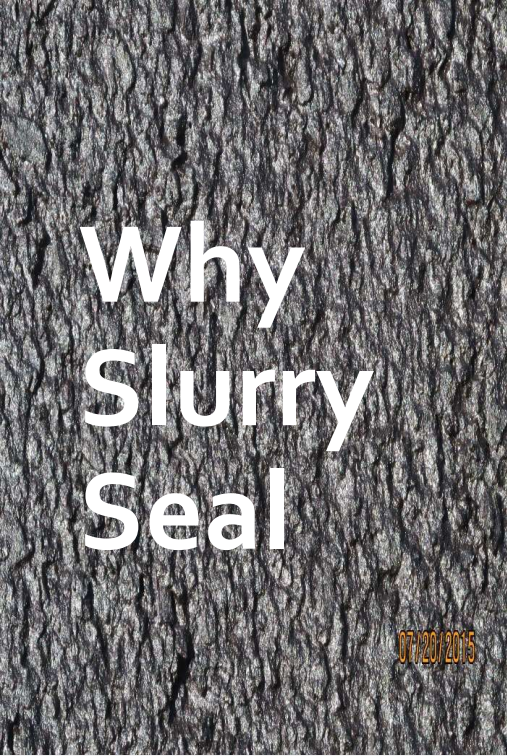
Natural Chips

May be soft and dusty
Fractured faces interlock
Provides great skid resistance
Improper Crushing creates Flat and Elongated Pieces



Municipal Street AST with and Without Fog Seal





Why Slurry Seal

07/20/2015

Blocks Water: A mix of water, asphalt emulsion, and fine crushed rock fills tiny cracks and voids, stopping moisture from damaging the road base below

Stops Wear and Tear: It adds a protective new wearing surface that stops the asphalt from oxidizing, raveling (crumbling), or losing essential oils.

Improves Safety: The textured aggregate mix restores lost friction and skid resistance for safer driving

Fast and Efficient: The wet mixture cures quickly, allowing streets to reopen to traffic in an Hour or Less

Looks Clean: It leaves a fresh, deep black finish that makes older residential streets look uniform and well-maintained

Slurry Seal

- Contractor performed
- Application Rates from 14 lb/SY to 30 lb/SY
- More Expensive than a chip seal
2026 Costs: \$3.55 to \$4.14 per SY
- Service Life = @ 6-8 years
- No Loose Chips
- Safe to Drive on in @ 1 hour or Less



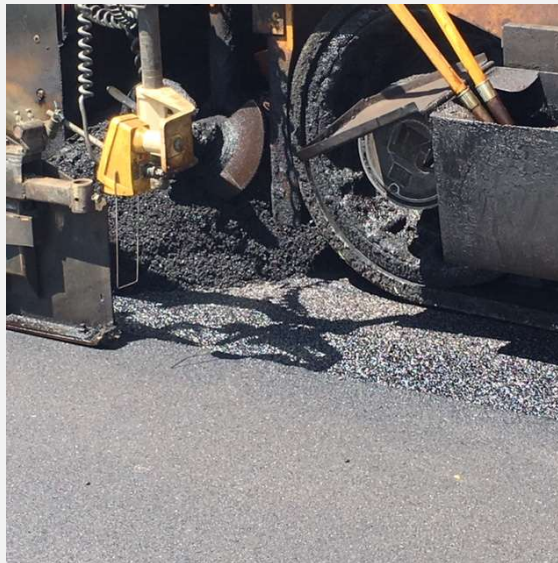
Municipal Slurry Seal



South Dakota Local Transportation Assistance Program

Thin Lift Overlay

- Thin lift HMA is a hot mix asphalt treatment consisting of paving grade asphalt and aggregate
- **Thin lift asphalt treatments are generally applied at a compacted depth of .75" to 1" on roads in good condition**
- Provides a smooth surface, while addressing raveling, low-severity top-down cracking and oxidation.



Review

PCC Pavements

Joint Sealing/Resealing

Partial Depth Joint & Spall Repair

Full Depth Replacement

Diamond Grinding or Diamond Grooving

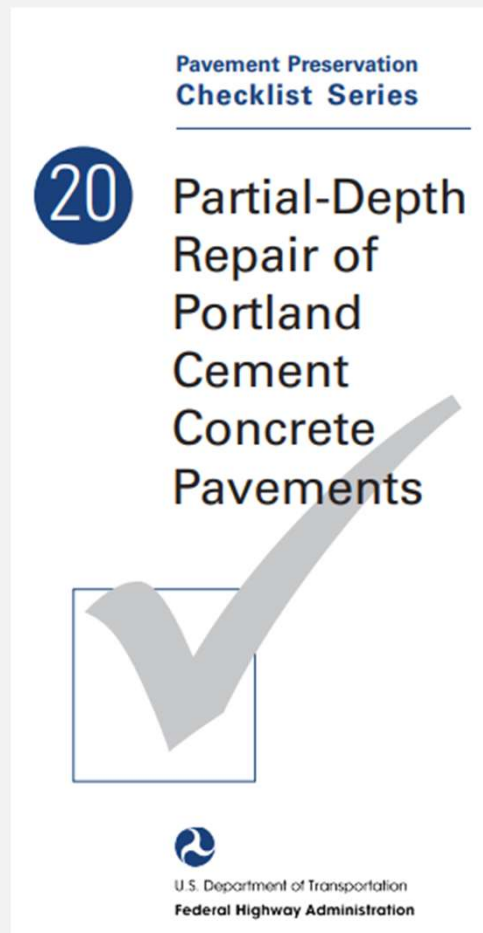
Slab Jacking/Stabilization

Quality Pavement Preservation Project Design & Construction:

“Remember: Only YOU Can Ensure A Successful Project”



FHWA Treatment Checklists



www.fhwa.dot.gov/pavement/preservation/resources.cfm

Other valuable resources:
www.roadresource.org

www.fp2.org

<https://www.cptechcenter.org/pavement-preservation/>

www.tsp2pavement.pavementpreservation.org



800-422-0129



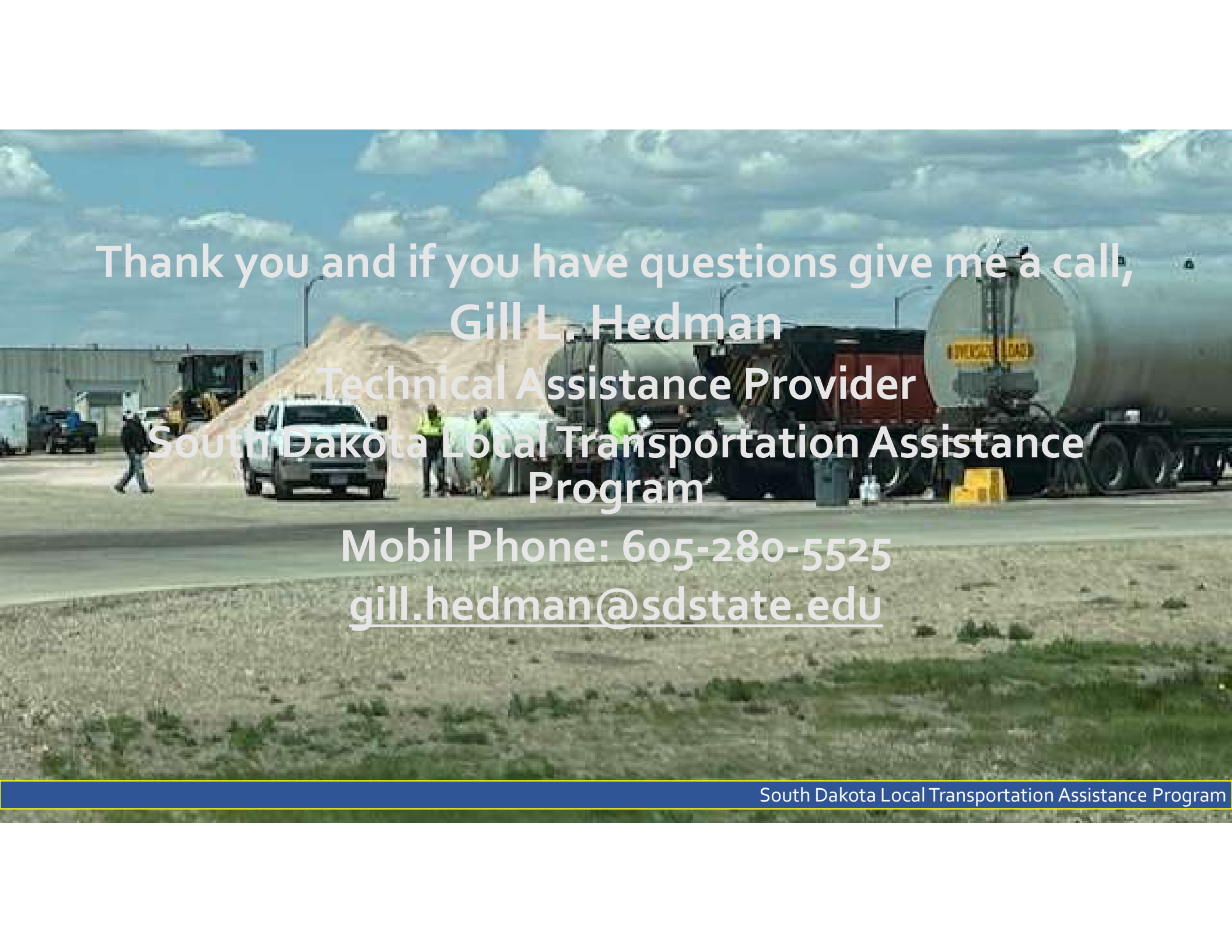
www.facebook.com/SDLTAP/



SDLTAP@sdstate.edu



**[www.sdstate.edu/jerome-j-lohr-engineering/
sd-local-transportation-assistance-program](http://www.sdstate.edu/jerome-j-lohr-engineering/sd-local-transportation-assistance-program)**



Thank you and if you have questions give me a call,

Gill L. Hedman

Technical Assistance Provider

South Dakota Local Transportation Assistance
Program

Mobil Phone: 605-280-5525

gill.hedman@sdstate.edu