



Chip Seal and Microsurfacing Practices in the Midwest

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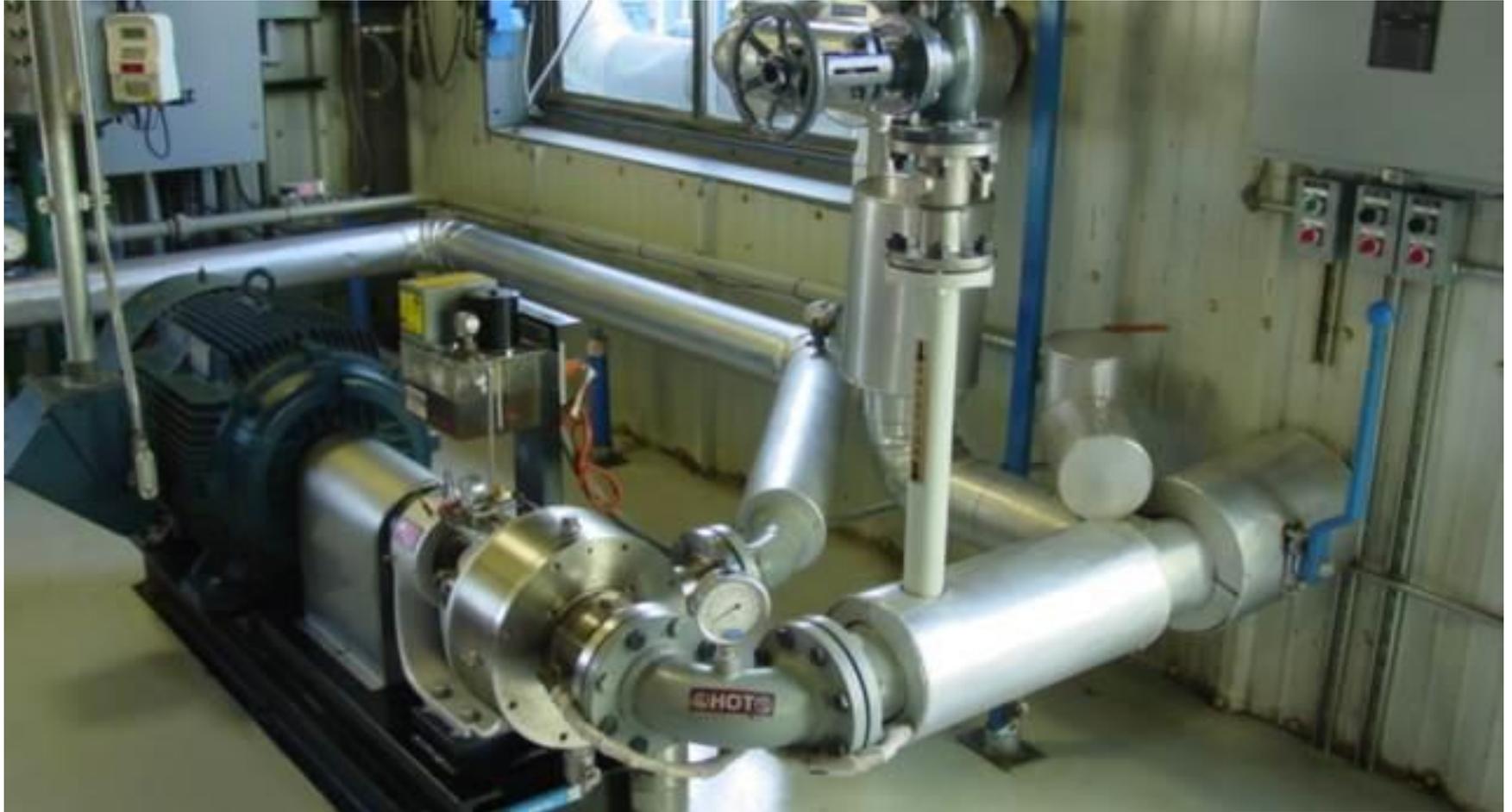
Why Maintenance Emphasis?

- The country has significant investment already in place
- Increasing the life span of existing assets between major rehabilitation cycles improves the roadway's life cycle cost
- Recent study from the Asphalt Institute concludes that early maintenance decreases a roadway's oxidation

Common Applications in the Midwest and its emulsified asphalts

- Microsurfacing
 - CQS-1HP (CSS-1HP Slurry)
 - CQS-1P
- Slurry
 - CQS-1H
 - CSS-1H Slurry
- Cold-in-Place Recycle
 - CIR-EE
 - SBEE
 - PG 49-34 (PG 52-34 CIR)
- Chip Seals
 - CRS-2P (CRS-2M, CRS-P, CRS-1HP)
 - CRS-2
 - HFRS-2
 - HFRS-2P (HFP)
 - HFMS-2 (AE-150S, HFE-90)
 - HFMS-2S (HFE-150)

Emulsion Mill



Common Aggregates Utilized in the Midwest

- Granite
- Quartzite
- Limestone
- Natural gravels
- Trap Rock (basalt or igneous rock)
- Slag (by-product of coal burning process)

1/4" Granite



3/8" Granite



1/4" Granite



3/8" Granite



1/8" Trap Rock



3/8" Limestone (uniform gradation)



Limestone (non-uniform gradation)



Crushed natural gravel with limestone



Natural gravel (smooth side)



Natural gravel (fractured face)



Slag



Chip Seal Designs

- [1/8" Trap Rock](#)
- [1/4" Granite](#)
- [3/8" Granite](#)
- [3/8" Granite](#)
- [3/8" Natural crushed](#)

HFRS-2P Compatibility



HFRS-2 Compatibility



MnRoad Chip Seal (I-94)



MnRoad Chip Seal (I-94)



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MnRoad Chip Seal (I-94)



Trap Rock Chip Seal Video



3 roller passes with rubber tired rollers



Recent Trap Rock Chip Seal



Recent Trap Rock Chip Seal



Granite Chip Seal



Recent Limestone Chip Seal



Recent Limestone Chip Seal



Recent Pea Gravel Chip Seal



Recent Slag Chip Seal



Recent Slag Chip Seal



Recent Slag Chip Seal



1 Day Old Chip Seal (pre-fog seal)



CFS-1 D50 Fog Seal Trial (normally fog seal with CSS-1H D50)



CFS-1 D50 Broken in < 10 minutes



Microsurfacing

- MnDOT requires a return to traffic within 1 hour
- Other Midwest states do not have have this return to traffic requirement
- Chemistry of the CQS-1HP / CQS-1P is different based on the set time requirement

Recent Type II Microsurfacing (CQS-1HP & Granite) (Still brown)



Recent Type II Microsurfacing (Turning black, Set time ~ 15 minutes)



Scratch Coarse



Surface Coarse



Surface Course



Implementation of Flexible Microsurfacing

- CQS-1HP has historically been done utilizing PG 64-22 and either natural or synthetic latex
- CQS-1P projects have been implemented with
 - PG 58-28 and synthetic latex
 - PG 49-34 and SBS polymer
- Current challenges
 - Wet Track Abrasion values are higher
 - Chemistry needed to be tweaked to speed up set time

CQS-1P Test Strip (mid 60'sF, low humidity, set in ~ 20 minutes)



CQS-1P Test Strip



New Stillwater, MN bridge



New Stillwater, MN Bridge



Existing Stillwater, MN Bridge



Questions?

