



# RAP Chip Seal

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# RAP Piles Everywhere

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- Milling or Micro-milling creating RAP
- Current use is 20-25% RAP content in HMA
- Remainder becomes property of the contractor or gets hauled to a Maintenance site





## Find an Innovative Use for RAP

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Presentation at Pavement Preservation  
Conference – Dean, Steph & Greg

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Submission through TRIP - Steph

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Collaborated with CA expert - Don

# The Perfect Project??

Micro-mill on ND 34 left a RAP pile in Napoleon

26 miles on ND 3 needed a seal coat N of Napoleon



# Project Created

- Bid April 13, 2018
- Special Provision for RAP Chip Seal
- 10-mile test section
- 16-mile control section



# SP Highlights

- Process at the Napoleon Section
- Screen the chips before delivery
- Construct a 1000' test section
- 23 lb/SY chips and 0.30 Gal/SY Oil

# Gradations

Sieve Size	Micro-mill 20 Ft/Min	Micro-mill 25 Ft/Min	CI 41 Chips
	% passing	% passing	NDDOT 816 Spec
3/8 inch	87.5	76.8	100
No. 4	51.5	45	20-70
No. 8	28.2	17.9	0-17
No. 16	14.5	7.3	
No. 200	0.5	1.1	0-1.5

RAP Chips	
Sieve Size	% passing
3/8 inch	100
No. 4	20-70
No. 8	0-17
No. 200	0-2



## Cost:

- \$40 / Ton RAP Chips
- \$45 / Ton CI 41 Chips
- Oil was same price
- Application rate:
  - 0.40 Gal/SY for Chips
  - 0.30 to 0.32 Gal/SY for RAP.



## Failure to Launch

- Several Chip Seals not completed in 2018
- RAP Chip Seal was one of them



Let's try this

- June 2019 started screening RAP
- June 11-13 Chip Seal on Control Section
- June 13 RAP Chip Seal test sections

The background image shows a quarry or processing site. In the foreground, there are large, conical piles of dark, granular material, likely recycled asphalt pavement (RAP) chips. A blue machine, possibly a conveyor or spreader, is visible in the middle ground, with a person standing on it. The sky is blue with scattered white clouds. The ground in the foreground is a mix of dirt and gravel.

## Concerns with RAP Chips

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- Able to process/make?
- Would they come out of the spreader?
- Will they stay on the road?



## Screening Operation

- Power screen worked... sort of
- Made 3 piles: RAP Chips, Fines, Oversized
- Ran oversized back thru the power screen

# Contractor agreed to 4 Test Sections

*We both agreed to Push the limits*

Typical application rates for Chip Seal in ND:  
0.40 Gal/SY Oil and 24 lb/SY Chips

Typical application rates for RAP Chip Seal in CA:  
0.28 Gal/SY and 22 lb/SY Chips



# Test Section 1

0.34 Gal/SY oil

21.5 LB/SY chips



## Test Section 2

0.30 Gal/SY oil

16.5 LB/SY chips



## Test Section 3

0.28 Gal/SY oil

14.5 LB/SY chips



## Test Section 4

0.30 Gal/SY oil

13.5 LB/SY chips

Quote from  
Superintendent  
after test sections

“As crazy as this  
sounded, it might  
actually work”





Which Rate Did we  
Choose?

0.32 Gal/SY oil

21 LB/SY chips

Control Section

0.40 Gal/SY CRS2P

23 LB/SY Chips

Fog Coat

Picture taken: May 6, 2020



RAP Chip Seal

0.32 Gal/SY CRS2P

21 LB/SY Chips

No Fog

Picture taken: May 6, 2020



RAP Chip Seal

0.32 Gal CRS2P

21 LB/SY Chips

Fog Coat

Picture taken: May 6, 2020





## What Worked?

- Able to produce RAP Chips
- Chips came out of spreader
- Application Rates

## What Needs Improvement?

- Time to produce RAP Chips
- Ride issue at overlaps

# RAP Slurry Seal

RAP Chips were time consuming to make

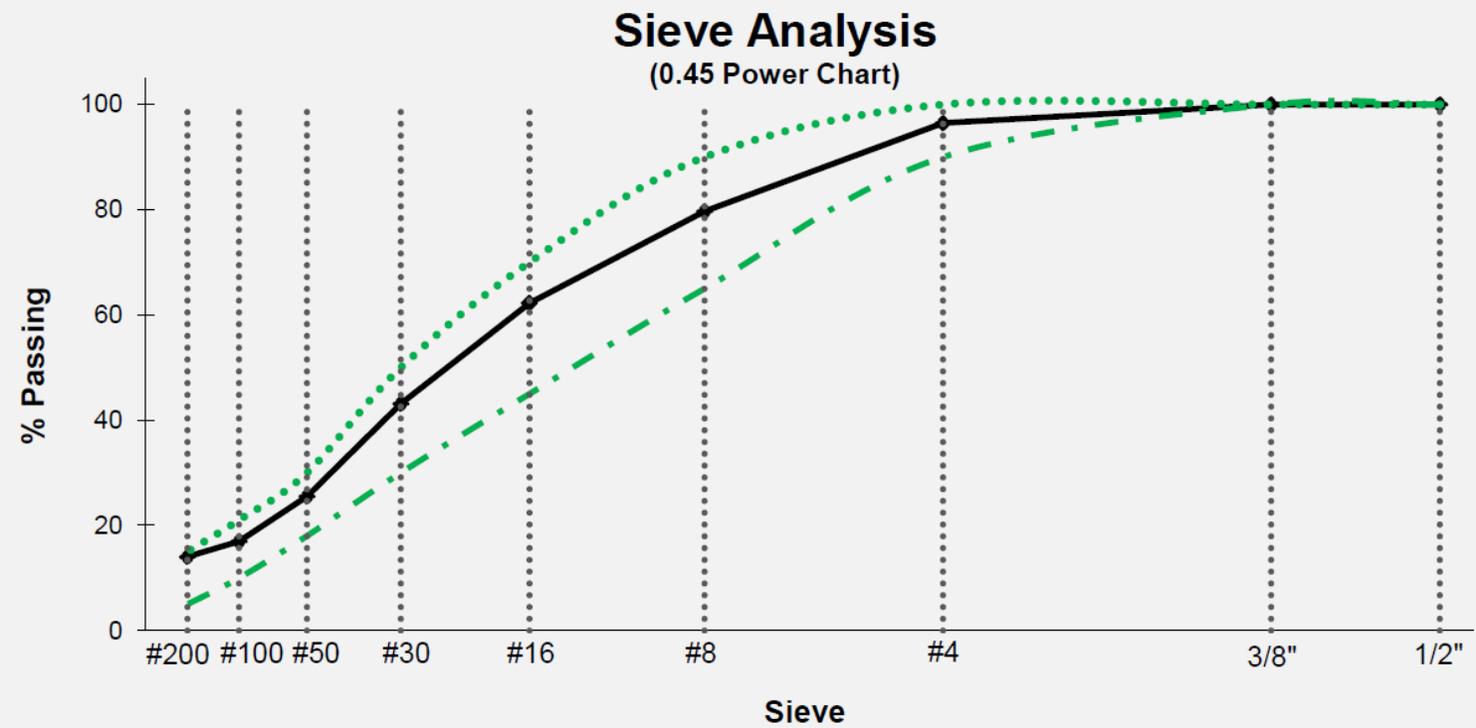
DOT and Contractor ran gradations on Fines



# RAP Slurry Seal

Fines material = Type II  
Micro/Slurry Aggregate

Mix Design = 12% emulsion  
CQS-1HP (Micro Oil)



# RAP Slurry Seal

Placed 1.2 Miles in 3 hours

Future option to use RAP  
from Micro-milling as a  
Slurry/Micro Seal





# Questions?

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