MnROAD
Safer, Smarter, Sustainable Pavements Through Innovative Research

National Center for Asphalt Technology
NCAT
at AUBURN UNIVERSITY

70th Street Field Performance Update
Pavement Preservation

June 22, 2021

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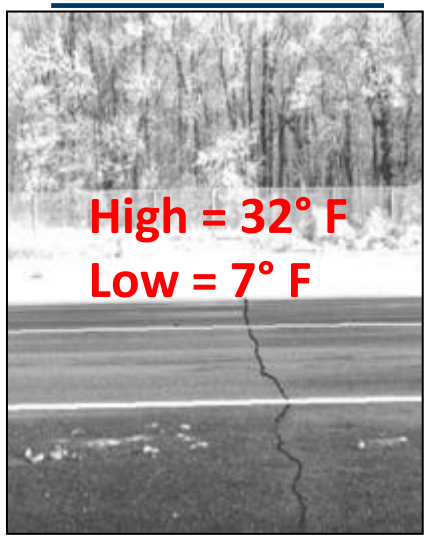
DEPARTMENT OF TRANSPORTATION

National Pavement Preservation Study
2 Climates & 2 Traffic Levels

	Minnesota		Alabama
		Climate 2/4/2021	
2016		High Traffic	 2015
2016		Low Traffic	 2012

Purpose

- Existing condition
- Rehab results
- Treatment mix design

70th Street

- EB= Albertville, MN
- WB= Otsego, MN
- ≈1 mile
- Challenges:
  - Very short time frame
    - 8/19/2019 – 8/23/2019
  - ~ 0.1 mile sections
  - Closure on 1 lane ≈2,700 AADT
  - Partnership
    - Equipment Compatibility
    - Coordination

Pre-existing Condition

IRI of sections from 270's to 420's Motivation

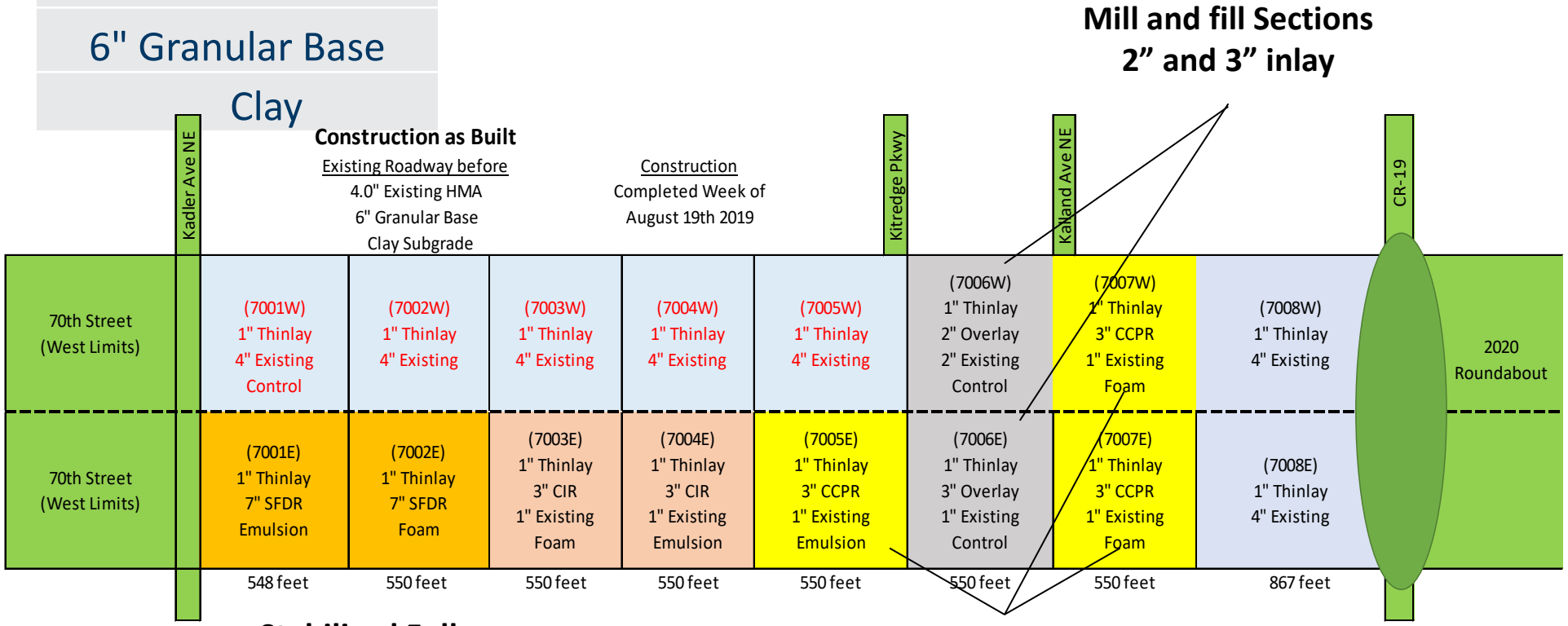
- Recycling sections were not constructed in 2016 MN treatments

Pavement Preservation Northern Recycling
70th Street as built (about one mile)

Existing
4”+ HMA

6" Granular Base

Clay



Stabilized Full Depth Reclamation
Emulsion + Foam with Control

Cold In-place Recycling
Emulsion + Foam with Control

Cold Central Plant Recycling
Emulsion + Foam with Control

Winter 2019-2020

- Cold November/ December (<0°F)
  - Reflective cracks noticed in thinlay sections
  - All rutting values <0.125”
  - Transverse cracks in SFDR
  - 7001 (SFDR-E, cement) = 86’ of cracking
  - 7002 (SFDR-F, cement) = 110’ of cracking

General Trends – AVERAGE IRI Ride

Cell	10/4/2018	10/23/2019	8/11/2020	9/2/2020	9/16/2020	10/8/2020	10/28/2020	4/12/2021	5/4/2021	5/11/2021
7011 thin	318.7	81.7	96.8	97.3	94.6	96.4	100.4	120	97.5	99.4
7012 thin	306.8	75.6	82.5	80.8	83.5	83.8	79.3	89.5	85.1	86.6
7013 thin	274.3	65.3	77.3	75.5	75.8	73.8	71.0	78.2	77.8	76.6
7014 thin	334.6	78.4	87.2	86.2	87.9	87.5	81.0	91.5	88.4	89.2
7015 thin	297.9	72.4	86.1	84.9	84.7	83.0	82.7	88.3	88.3	88.6
7016 2”	293.5	42.3	46.0	44.0	44.9	44.8	46.6	47.9	45.3	46.1
7017 3”ccpr	383.9	63.9	68.4	70.3	68.3	67.5	66.9	65.3	70.8	71.4
7018 thin		90.0	99.0	96.4	99.5	97.6	95.6	97.8	108.2	107.6

General Trends – AVERAGE IRI Ride

Cell		10/4/2018	10/23/2019	8/11/2020	9/2/2020	9/16/2020	10/8/2020	10/28/2020	4/12/2021	5/4/2021	5/11/2021
7001	SFDR-E	316.9	76.3	79.8	85.0	82.0	77.6	82.5	82.6	84.5	88.4
7002	SFDR-F	385.3	66.9	73.7	75.9	74.2	75.7	74.8	79.6	85.3	81.6
7003	3”CIR-F	377.0	67.7	71.8	70.3	71.4	72.2	70.7	73.1	75.6	75.3
7004	3”CIR-E	396.3	69.1	66.6	69.1	70.6	66.9	68.0	68.5	67.6	66.7
7005	3”CCPR-E	375.7	74.3	86.3	77.3	80.2	82.0	78.5	92.8	92.2	90.0
7006	3”mill	418.4	48.5	50.1	53.2	49.2	54.2	52.4	61.0	61.3	60.0
7007	3”CCPR-F	428.9	60.9	66.7	62.9	69.5	61.8	62.9	65.1	66.6	65.2
7008	1” thin		89.2	107.8	107.4	108.6	102.5	107.2	106.8	108.5	102.5

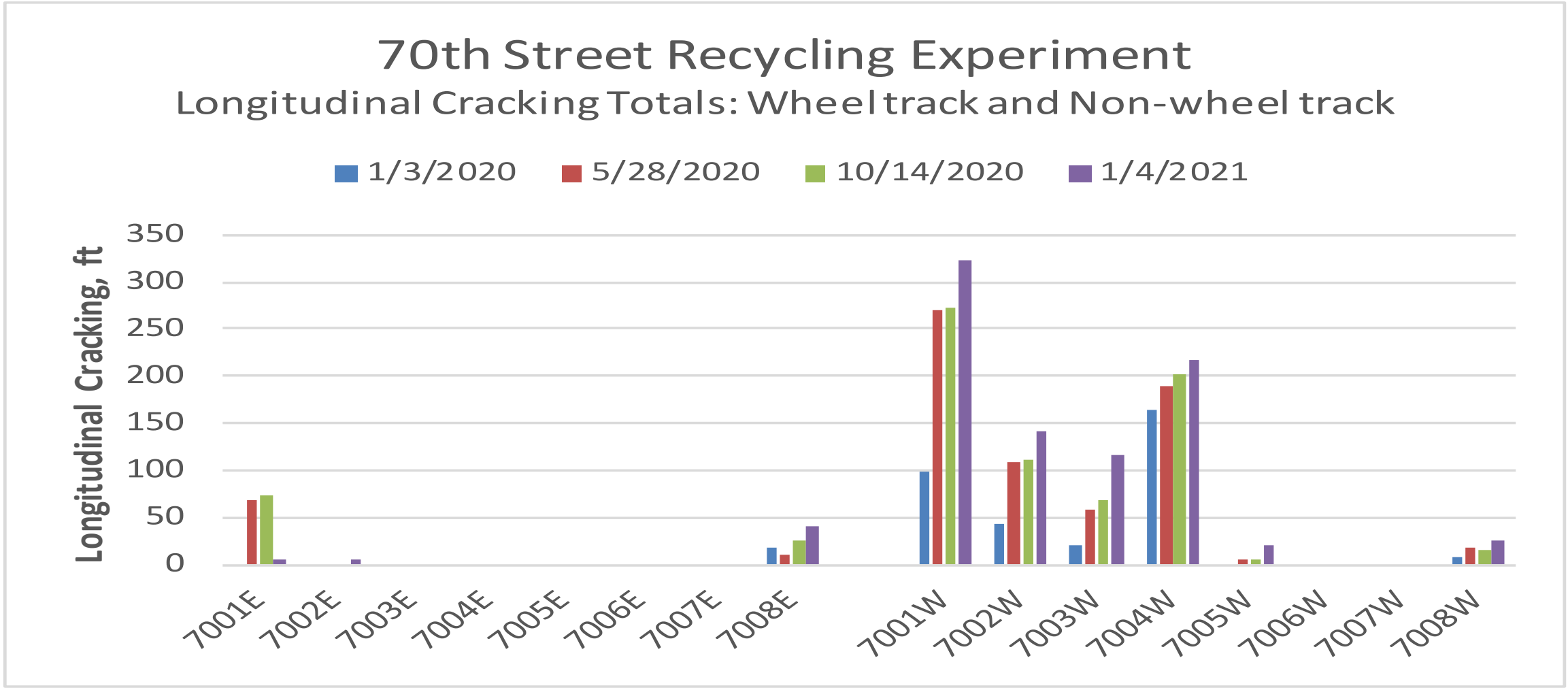
General Trends – AVERAGE rutting

Cell		10/4/2018	10/23/2019	8/11/2020	9/2/2020	9/16/2020	10/8/2020	10/28/2020	4/12/2021	5/4/2021	5/11/2021
7011	thin	7.90	1.70	2.90	2.92	3.12	2.97	2.93	2.87	3.20	3.90
7012	thin	7.00	2.02	2.40	2.58	2.73	2.75	2.75	3.00	2.63	3.37
7013	thin	4.70	1.42	1.47	1.75	1.78	1.72	1.33	1.87	2.00	2.57
7014	thin	6.40	1.68	2.32	2.33	2.53	2.43	1.62	2.63	2.43	3.07
7015	thin	5.20	1.87	2.52	2.42	2.63	2.55	2.23	2.93	2.73	2.83
7016	2” mill	5.15	1.83	2.30	2.28	2.43	2.47	1.82	2.60	2.37	2.33
7017	3”CCPR-F	6.80	2.32	2.43	2.53	2.87	2.73	1.67	2.37	2.37	2.33
7018	thin		2.27	3.57	3.18	3.25	3.95	2.83	3.07	3.80	3.57

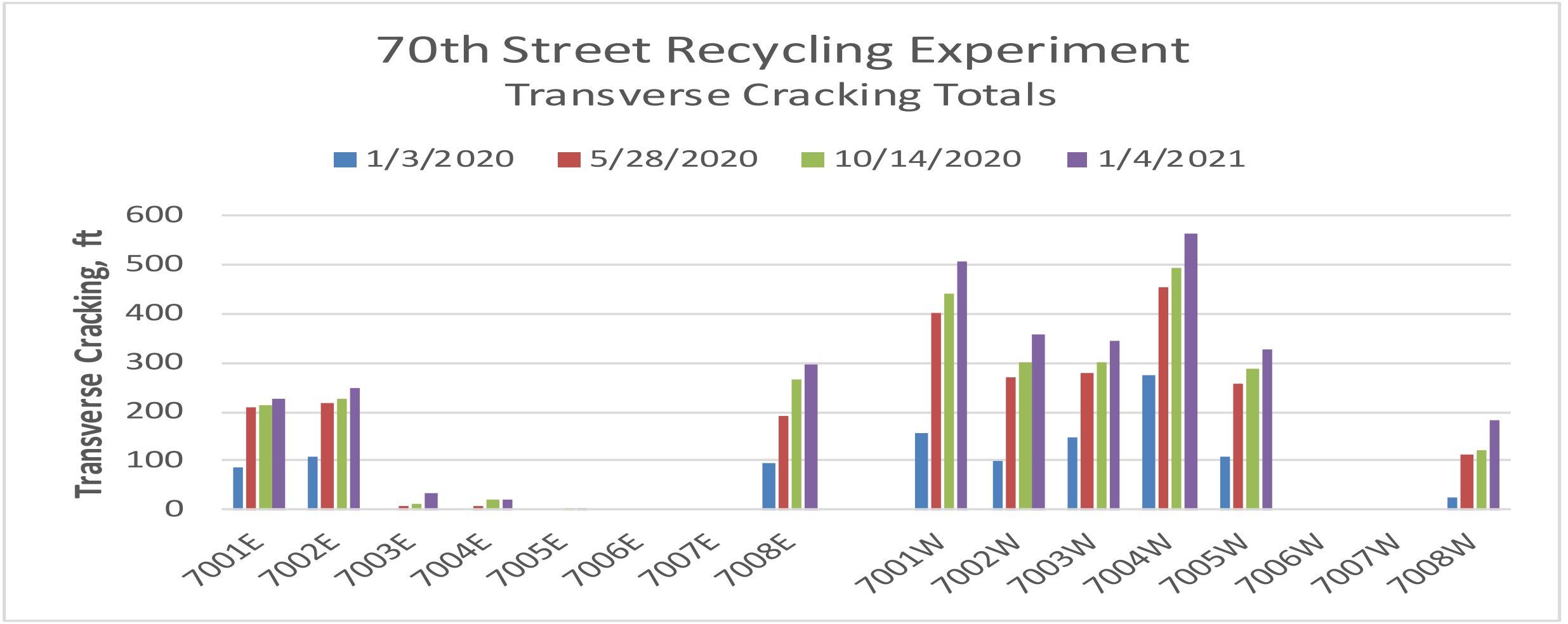
General Trends – AVERAGE rutting

Cell		10/4/2018	10/23/2019	8/11/2020	9/2/2020	9/16/2020	10/8/2020	10/28/2020	4/12/2021	5/4/2021	5/11/2021
7001	SFDR-E	10.50	1.63	1.78	1.33	2.38	1.55	2.43	2.27	2.53	2.77
7002	SFDR-F	8.20	0.65	0.83	0.63	1.23	0.87	1.78	1.13	2.40	3.23
7003	3”CIR-F	10.60	1.20	1.50	1.73	2.17	1.87	1.97	2.30	2.70	3.00
7004	3”CIR-E	9.55	2.08	3.73	3.42	4.23	4.20	3.83	4.87	4.47	4.40
7005	3”CCPR-E	9.00	2.28	3.93	3.35	4.72	4.57	4.55	5.33	4.90	4.87
7006	3” mill	10.30	1.23	2.03	2.37	2.25	2.28	2.30	2.63	2.33	3.13
7007	3”CCPR-F	10.05	1.07	1.02	1.20	1.72	1.28	1.62	1.63	1.43	2.23
7008	thin		2.17	3.20	3.33	3.45	3.43	3.60	3.57	3.23	4.20

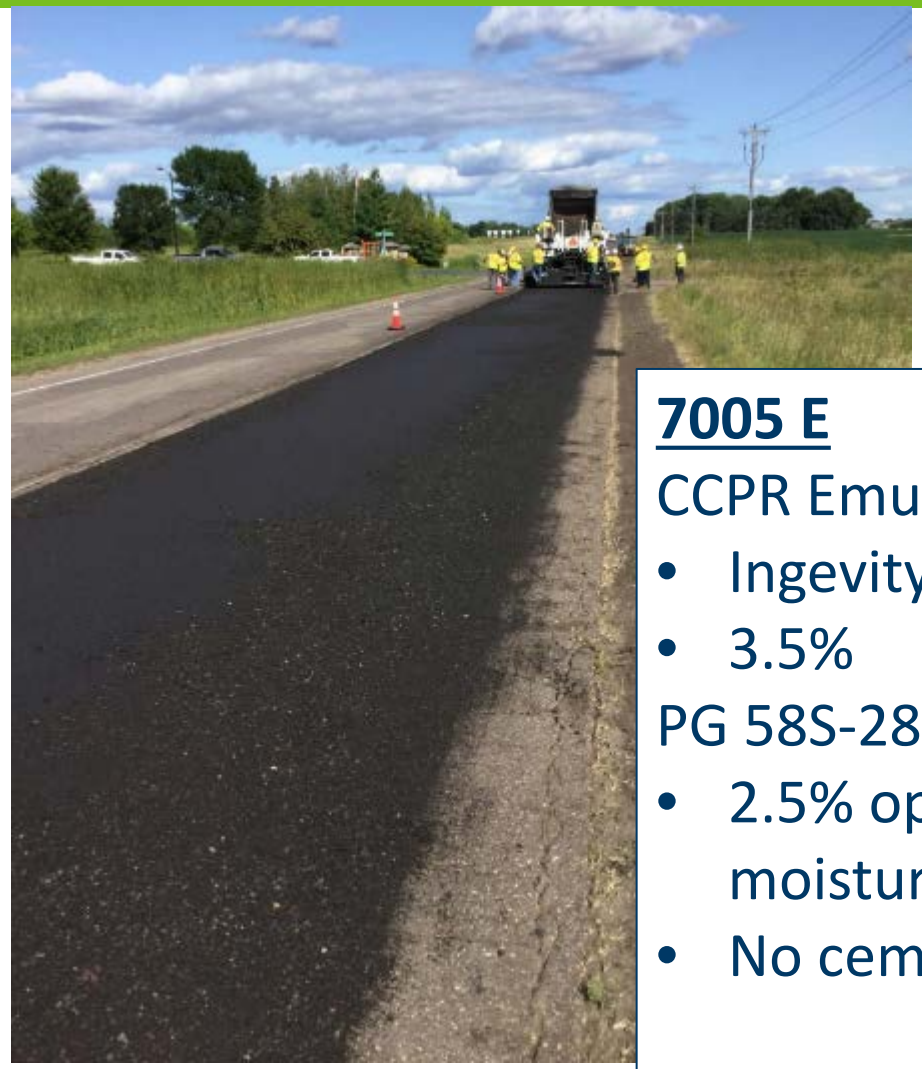
General Trends – Longitudinal cracking



General Trends – Transferse cracking



Cold Central Plant Recycling (CCPR)



7005 E

CCPR Emulsion

- Ingevity Design
- 3.5%

PG 58S-28

- 2.5% optimum moisture
- No cement

7007 E & W

CCPR Foam

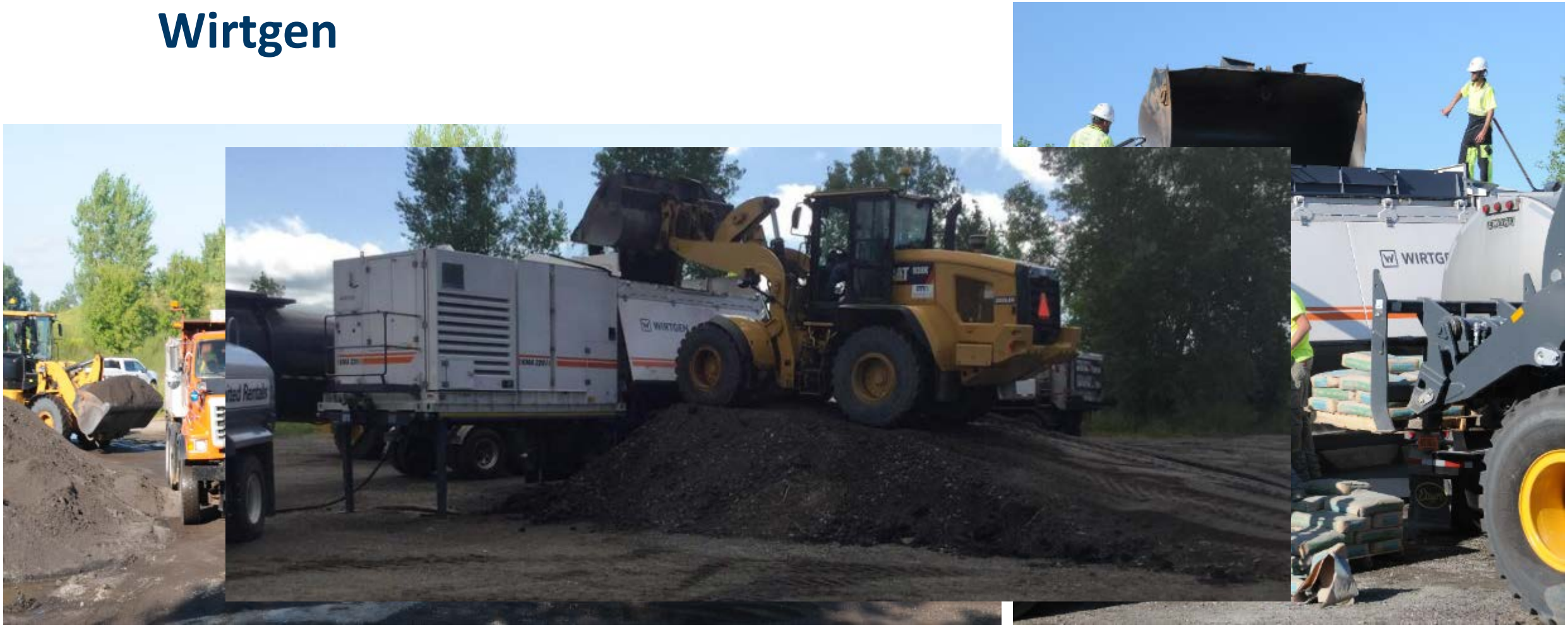
- NCAT Design
- 2.3%

PG 58S-28

- 4.5% optimum moisture
- 1% cement

Cold Central Plant Recycling (CCPR)

Wirtgen



Cold In-Place Recycling (CIR)

7004 E

CIR Emulsion

- Ingevity Design
- 3.0%

PG 58S-28

- 2.0% optimum moisture
- No cement

7003 E

CIR Foam

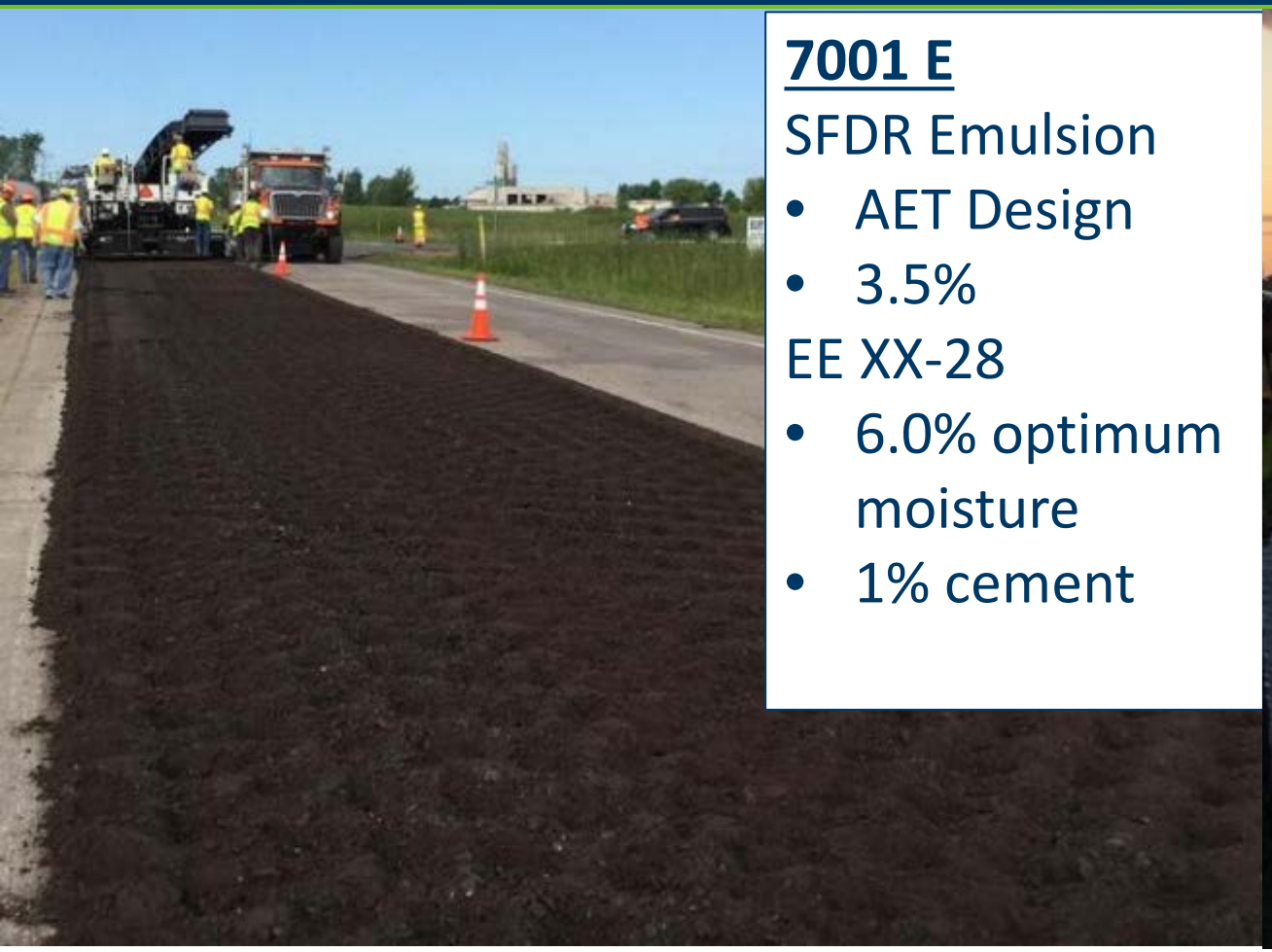
- NCAT Design
- 2.6%

PG 58S-28

- 4.5% optimum moisture
- 1% cement

Cold In-Place Recycling (CIR)

Stabilized Full Depth Reclamation (SFDR)



7001 E

SFDR Emulsion

- AET Design
- 3.5%

EE XX-28

- 6.0% optimum moisture
- 1% cement

7002 E

SFDR Foam

- AET Design
- 2.5%

PG 58S-28

- 6.0% optimum moisture
- 1% cement

Stabilized Full Depth Reclamation (SFDR)

Stabilized Full Depth Reclamation (SFDR)

1” HMA Thinlay

- 4.75 mm NMAS
- 20% RAP
- 6.4% PG 58-28

Samples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- NCAT
  - Dr. Adriana Vargas – Lead Researcher for Preservation Project
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Questions???

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