MnROAD / NCAT Pavement Preservation Visual Survey Record
Estimated quick field survey

Date	9/17/2021
Observer (s)	MnROAD Staff
Visual Documentation	Pictures
Report Developed	Yes / No - To date there are periodic updates only

Open Graded Friction Course on the MnROAD Low Volume Road

Background

In 2016 an Open Graded Friction Course was designed and constructed on the MnROAD Low Volume Road (LVR) as part of a pavement preservation partnership that included MnDOT and the National Center for Asphalt Technology. The LVR is a two-lane, closed loop, undivided roadway. The mixture was placed in a 1-inch lift directly over existing PCC and HMA pavement in October 2016. The experiment included use of two types of tack coat material, and each tack was placed over PCC and HMA pavement (Figure 1). The result was the four LVR Test Cells 55 through 58. The inside lane received traffic, while the outside lane received no traffic. The mixture design details show 18% voids and a VMA of 14% at 50 gyrations. Additional design information is shown in Figure 1.

Sieve Size	Composite Formula
1"	100
3/4"	100
1/2"	93
3/8"	69
#4	13
#8	10
#16	8
#30	6
#50	4
#100	3
#200	1.7
Spec Voids	18.0
%AC	5.4
% NEW AC	**4.6**

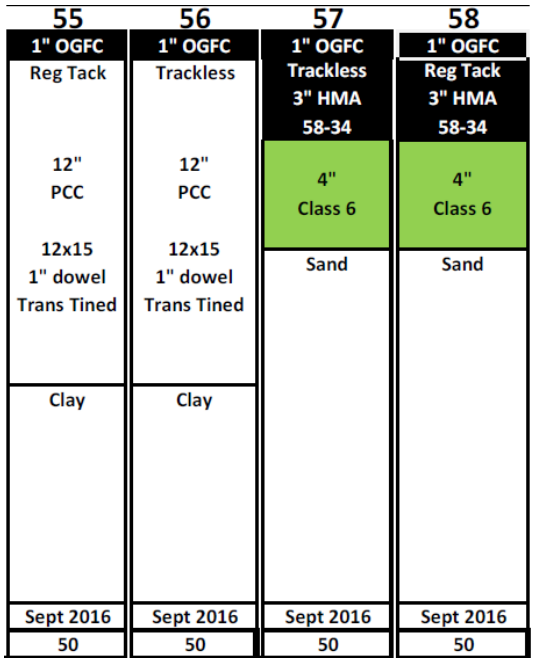

Figure 1 OGFC Design Gradation and MnROAD Low Volume Road Layout.[1]

[1] http://www.dot.state.mn.us/mnroad/testcells/pdf's/MnROAD%20Cell%20LVR%20Maps%20(Oct%202017).pdf

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MnROAD Low Volume Road cells 55 - 58 OGFC Performance

Cell	Distress			Comment
	Type	Reflected Percent	Overall Severity	
PCC/Reg Tack	Transverse Cracking	100	Medium Sealed 0 %	Traffic Lane: 36 ft – Med Non-Traffic Lane: 36 ft – Med
PCC/Non-Track Tack	Transverse Cracking	100	Low Sealed 0 %	Traffic Lane: 24 ft – Low Non-Traffic Lane: 12 ft – Low 12 ft – Med
HMA/Non-Track Tack	Transverse Cracking	100	Medium Sealed 0 %	Traffic Lane: 12 ft – Med(*) Non-Traffic Lane: 12 ft – Med(*)
HMA/Reg Tack	Transverse Cracking	0	No cracking or sealed %	0 ft cracking
Other		0	Sealed %	HMA/Reg Tack Non-Traffic Lane: damage outside fog stripe (20 ft x 0.5ft)
Treatment Retention			Retained % 100	
Bleeding			0 % Affected	

Comment

PCC/Reg Tack Non-Traffic Lane: 14x1 ft shoving in right wheel path noted on July 7, 2017 after construction activity.

PCC/Non-Track Tack: (*) Reflected crack at transition from PCC to HMA.

HMA/Reg Tack: Partially covered with slurry after 2017 construction activities. Non-Traffic Lane currently 5% (30 sf) covered. Traffic Lane currently 20% (120 sf) covered. Initial permeability varied with the coverage severity.

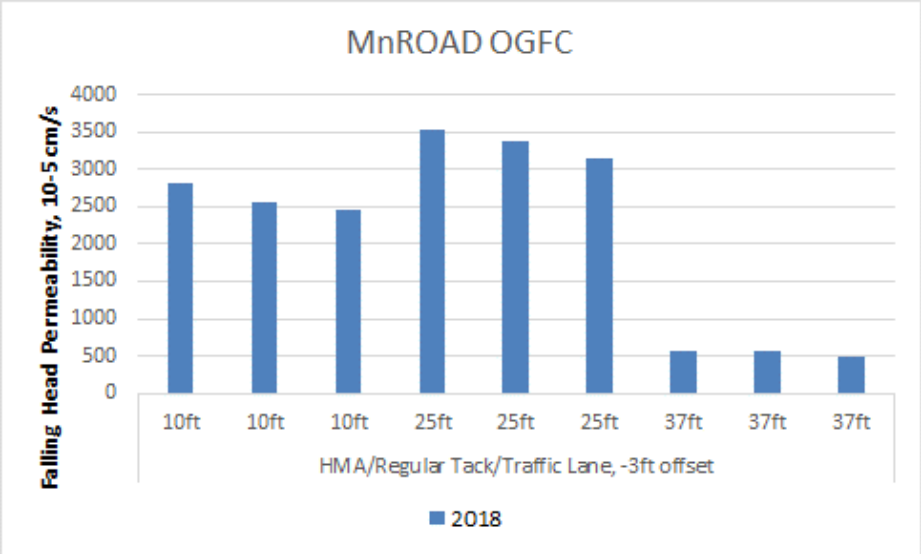

Figure 2 Falling Head Permeability of various locations on Cell 58, Inside Lane, Left Wheel Path in 2018.

Note the decline in roughness of the HMA/Regular cell that occurred in late 2017 and the increase of PCC/Non-Track cell in 2019 (Figure 3). Figure 4 also presents ride quality of the non-trafficked (outside) lane. Continued monitoring is planned.

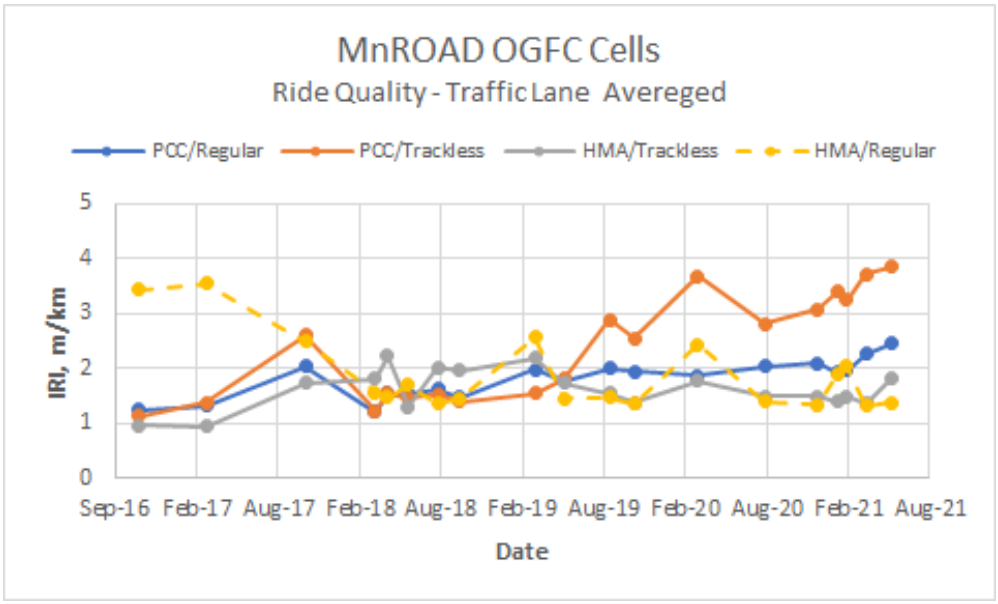

Figure 3 OGFC: Ride Quality of Trafficked (Inside) Lane.

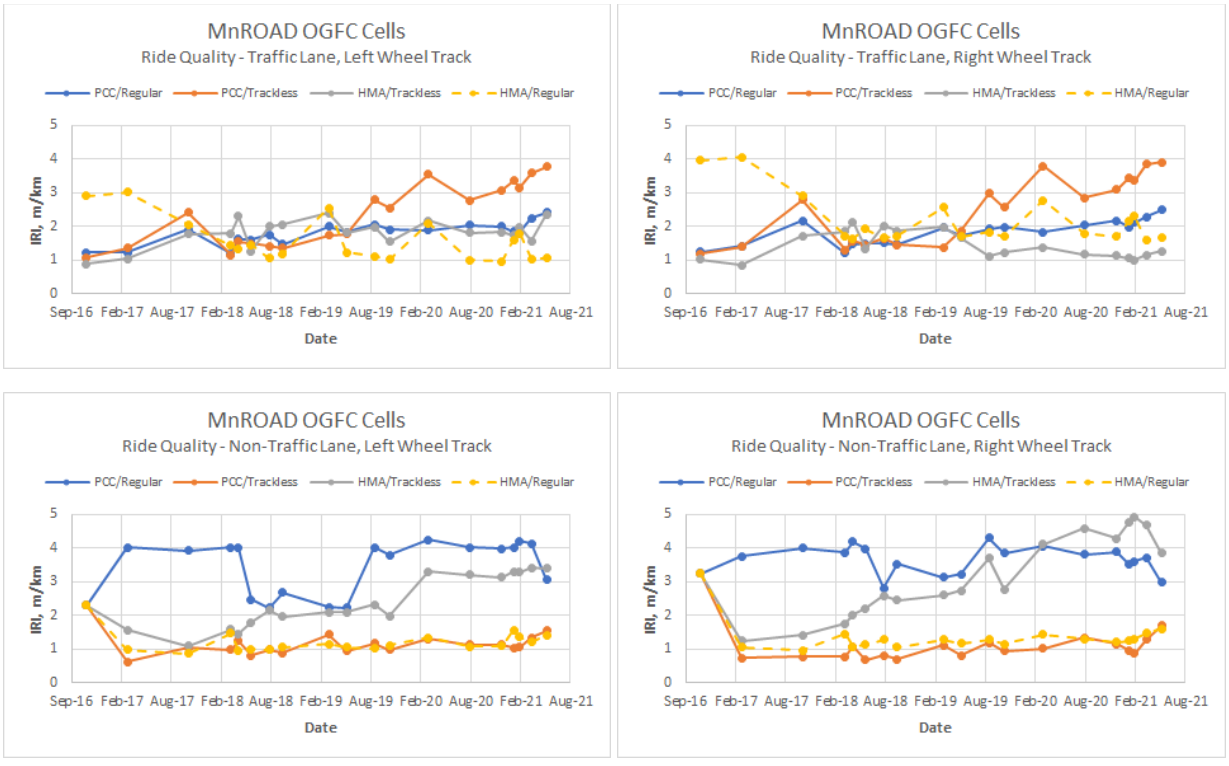

Figure 4 Ride Quality of Trafficked (top) and Non-Trafficked (bottom) lanes by left and right wheel track.

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A gate-valve permeameter was used to evaluate the water infiltration characteristics of OGFC installations. Several locations in the Environmental (Outside) Lane were tested for field permeability on June 1, 2017. Figure 5 shows that in 2018 permeability had declined at those points by 77 to 96 percent. In April of 2019 permeability had generally continued to decrease in the Outside Lane but had increased in the left wheel path of the Inside Lane. On September 17, 2021 single runs were performed at the test points and results showed that permeability was drastically reduced in both lanes. Results from the gate-valve device ranged between 112 $x10^{-5}$ and 518 $x10^{-5}$ cm/sec; suggesting that both lanes of the OGFC were performing like dense-graded bituminous pavement.

Continued monitoring is planned. The next round of measurements will include the gate-valve permeameter and, if warranted, a tiered, NCAT-style device that is suited for evaluating less permeable material.

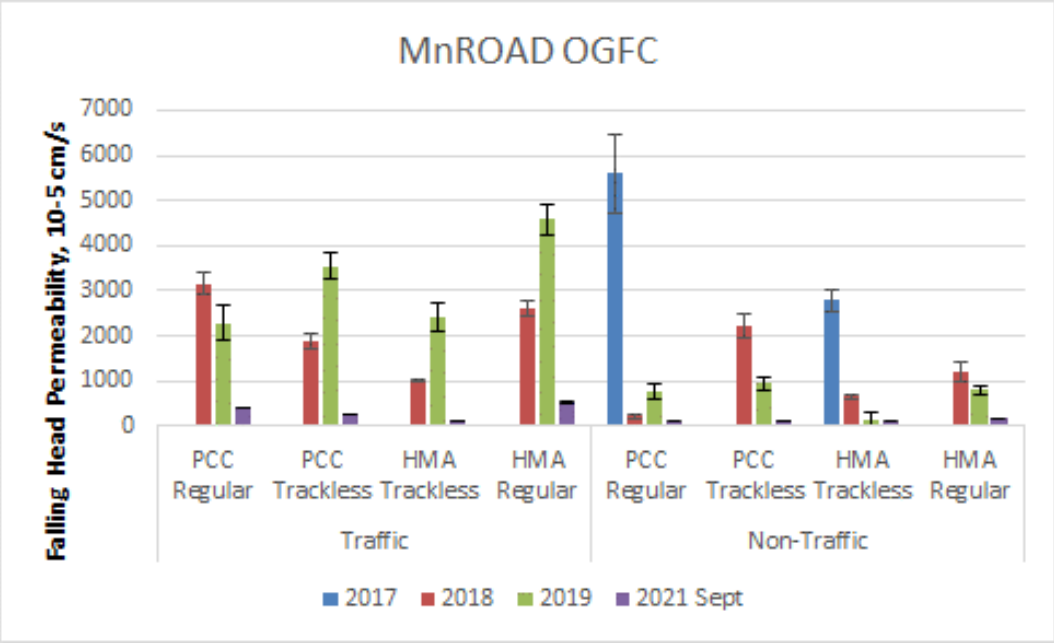

Figure 5 OGFC: Falling Head Permeability at Inside (Left Wheel Path) and Outside Lane (Between Wheel Paths).

Snapshots of the OGFC surface condition are shown in Figure 6. Traffic occurs in the left lane of each picture.

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CELL	April 2017	July 2018	Sept 2021
55 PCC/Reg Tack			
56 PCC/ Trackless Tack			
57 HMA/ Trackless Tack			
58 HMA/Reg Tack			

Figure 6 Photos of MnROAD OGFC Cells: Viewed Eastbound.