

FHWA 3M A380 AW Tape and 70E, 71E Statewide Certification Request 11/6/13 D. Kozol

Introduction:

On November 24, 2008, FHWA gave Public Interest Approval with a sunset date of December 31, 2013 for the proposed use of 3M 380WR and 380-5WR Wet Reflective Tape.

Since then, WisDOT conducted several field tests to determine if there were other products comparable to the upgraded version of the 380WR tape, the A380AW and corresponding contrast tape A380AW-5. Tests were also conducted of the 3M 70 E, 71E elements placed in modified epoxy binder in 2012 on locations as part of the Systemic Safety Improvement Project on conventional roads. Several Federal Work Plans were developed for FHWA project acceptance of above and are summarized below.

WisDOT Requirements

- Wet recovery retroreflectance value of 250 mcd (initial) and 80 mcd (after 1-year) per ASTM E 2177, 45 seconds after the pavement marking is wetted.

Findings:

White Pavement Marking Retroreflectance Measurement (mcd) – 45-second Wet-Recovery per ASTM E 2177

Product	Initial Reading	1 year Reading	Figure
3M A380AW-5 wet-reflective tape	540	Testing stopped	A
Brite Line XRP-R-HCL Tape	174	Product obsolete, testing stopped	A
3M 70 E elements- white- USH 45	255	161	B
3M 70 E elements- white- USH 8	173	161	B
3M 71E elements- yellow- USH 45	184	151	B
3M 71E elements- yellow- USH 8	88	85	B

Summary:

The A380AW tape provide the wet reflective results as expected and do not have a suitable alternative. The 3M 70 E, 71E elements provide lower initial results yet provide the minimum required one year later and do not having a suitable alternative. Therefore, WisDOT requests statewide certification for:

- A380AW, A380AW-5 tape for lane lines, channelizing lines and gore markings on multilane divided highways.
- 3M 70E and 71E elements for use on divided and undivided multilane and conventional highways.

Status of Federal Work Plans for 3M Wet Reflective Products

US41/Wis 441, Project 1220-15-71, Brown County - wet reflective elements- data may soon be available to compare the A380AW tape to the wet reflective epoxy edge lines.

USH 12/14 EB and WB Madison Beltline, 1009-10-89, between Whitney Way and Gammon Road, Dane County- Comparison b/w A380AW-5 and Brite Line XRP-R HCL tapes.

No follow up test was conducted due to the Brite Line product was obsolete and in 2012 a work zone for the Gammon Rd. interchange project conflicted with monitoring. Refer to Figure A.

Figure A

Section 1 Whitney Way On Ramp installed 6/13/2011							
	Hwy	Mile Marker Location	LTL 2000X				Wet Recovery
			1st R/L	2nd R/L	3rd R/L	Average	
9/13/11 initial reading	Whitney Way On Ramp (WB)	Mainline	3M A380AW				
		1	1195	1342	1242	1260	695
		2	1335	1293	1384	1384	618
		3	1660	1240	1360	1420	78
		Rampline	BriteLine Tape XRP-R-HCL				
		1	717	683	663	688	226
		2	688	656	748	697	252
		3	635	570	545	583	246
USH 12/14 WB Tape installed 6/13/2011							
9/13/11 initial reading	Hwy	Mile Marker Location	LTL 2000X				Wet Recovery
			1st R/L	2nd R/L	3rd R/L	Average	
	USH 12/14 WB	Section 1	3M A380AW Tape				
		L/L 8 .069	1423	1400	1275	1275	691
		L/L 16 .145	1454	1426	1312	1397	215
		L/L 24 .222	1274	1393	1287	1318	630
		L/L 32 .297	1487	1375	1268	1377	562
		Section 2	BriteLine Tape XRP-R-HCL				
		L/L 8 .448	653	681	613	649	231
		L/L 16 .524	811	898	823	844	220
		L/L 24 .601	937	883	224	681	228
		L/L 32 .675	778	922	740	813	240
		Section 3	3M A380AW Tape				
		L/L 8 .824	1039	1069	1309	1139	657
		L/L 16 .901	1093	1256	1324	1224	589
		L/L 24 .977	1220	1296	1512	1343	648
		L/L 32 1.052	1244	1177	1264	1228	660
		Section 4	BriteLine Tape XRP-R-HCL				
		L/L 8 1.164	789	824	727	780	0
		L/L 16 1.203	625	766	725	705	197
L/L 24 1.240		766	783	773	774	220	
L/L 32 1.278		990	1022	321	778	280	

USH 12/14 EB Tape installed 6/13/2011						
9/13/11 initial reading	Hwy	Mile Marker Location	LTL 2000X			
			1st R/L	2nd R/L	3rd R/L	Average Wet Recovery
	USH 12/14 EB	Section 1	3M A380AW Tape			
		L/L 8 .067	1228	1246	1312	1262 551
		L/L 16 .143	1400	1335	1413	1383 574
		L/L 24 .219	1296	1221	1240	1252 580
		L/L 32 .294	1109	1384	1199	1231 655
		Section 2	BriteLine Tape XRP-R-HCL			
		L/L 8 .446	699	712	708	223 231
		L/L 16 .522	946	1019	994	986 128
		L/L 24 .598	694	784	756	745 225
		L/L 32 .673	846	894	877	872 202
		Section 3	3M A380AW Tape			
		L/L 8 .827	1357	1325	1431	1371 593
		L/L 16 .901	1182	1238	1291	1237 631
		L/L 24 .976	1343	1117	1107	1189 660
		L/L 32 1.052	1137	1335	1279	1250 547
		Section 4	BriteLine Tape XRP-R-HCL			
		L/L 8 1.146	810	715	742	756 0
		L/L 16 1.175	686	653	640	660 128
		L/L 24 1.202	657	1035	1084	925 187
		L/L 32 1.231	936	859	880	892 170

Section 1 Whitney Way Off Ramp installed 6/13/2011						
9/13/11 initial reading	Hwy	Mile Marker Location	LTL 2000X			
			1st R/L	2nd R/L	3rd R/L	Average Wet Recovery
	Whitney Way Off Ramp (WB)	Rampline	3M A380AW			
		1	472	556	493	507 365
		2	480	513	509	504 340
		3	501	457	495	484 342
		Mainline	BriteLine Tape XRP-R-HCL			
		1	1012	1079	1079	1057 195
		2	987	784	1148	973 1
		3	1125	1122	1173	1140 20

USH 2 EB and WB, 1180-50-71, Douglas County-Grooved Epoxy with 3M elements Series 70E.

Wet and dry readings taken were voided after contractor reinstalled markings. No follow up testing was conducted.

USH 51 NB and SB, 1009-10-90, Dane County- Glomarc 65 with Type 5 Visimax beads, LS 65 with standard glass beads.

Wet readings not available due to failure of Type 5 beads adhesion.

2012 Systemic Safety Improvement Projects

Several regions utilized a double drop mixture for mostly conventional road locations showing high crash ratings. Most locations utilized the mixture for edge lines accompanying center line rumbles strips. One location utilized the mixture for also center line markings.

- 5.4 pounds of 3M elements, 70E for white and 71E for yellow
- 12-22 pounds per gallon larger bead Utah blend.
- Modified epoxy mixture of LS 65, HPS-4, or Mark 55.4
- 60 mils +/- 10 mils grooved slot for concrete
- 80 mils +/- 10 mils grooved slot for asphalt

Initial and first annual wet recoverable readings were taken at two locations

1. NE Region/USH 8 Dunbar at CTH O to USH 141 Pembine, Marinette Co. -conventional road with center line and edge lines.

Figure B

Region	NE	Hwy:	8	Direction	WB	NE	Hwy:	8	Direction	WB		
Start Loc.				Date:	9/25/2012				Date:	9/17/2013		
Hwy. Config.			Divided:		Undiv.			Divided:		Undiv.		Two Lane
Contractor:	Century Fence					Century Fence						LTL2000X:
Pavemt. Type		Paint Type					Paint Type					LTL 2000:
Asphalt		Epoxy	Wet		Date		Epoxy	Wet		Date		Painted:
Concrete		Wtr.Born					Wtr.Born					Vendor: Poly Carb
Surf. Tex.	Tined	Scarified		Other	45 Sec.	Tined	Scarified		Other	45 Sec.		
Loc.	1st. R/L	2nd. R/L	3rd. R/L	Average	Wet Rec.	1st. R/L	2nd. R/L	3rd. R/L	Average	Wet Rec.	Comments	
1 - BP - LL	284	289	268	280	27	233	241	243	239	79		
2 - BP - CL	247	261	262		67	140	137	142	140	16		
3 - BP - CL	320	283	267	290	79	212	211	212	212	34		
4 - BP - EL	474	531	492	494	238	599	599	585	594	198	REL	
5												
6 - BP - EL	420	411	453	428	160						Repeat further W of DW	
7												
8 Lake Rd - EL	579	627	503	570	128	403	404	403	403	82		
9 Lake Rd - CL Skip	291	302	294	296	62	291	278	290	286	81		
10 Lake Rd - EL	352	402	399	384	261	565	583	567	572	125		
11												
12 Pemwan 1 - LEL	424	464	465	451	175	444	459	458	454	124	At NPZ	
13 Pemwan 1 - SL	404	425	349	393	139	486	404	444	445	137		
14 Pemwan 1 - BL	476	326	342	315	80	328	383	336	349	168		
15 Pemwan 1 - REL	455	421	476	461	49	640	654	678	657	228	Middle - Lack of Beads	
16												
17 W9694 Hwy 8 - LEL	435	417	399	417	236	417	419	469	435	120	Groleski Residence	
18 W9694 Hwy 8 - SL	407	407	368	394	149	284	306	323	304	76		
19 W9694 Hwy 8 - BL	270	258	314	281	103	373	425	418	405	86	NPZ Pennant	
20 W9694 Hwy 8 - REL	417	425	437	426	138	530	566	638	578	248		

2. NC Region/USH 45 Clintonville between CTH D and Shawano Co. line Waupaca Co. - Four lane undivided with edge lines, lane lines and 8" channelizing lines.

Figure C

Region	NC	Hwy:	45	Direction	NB	NC	Hwy:	45	Direction	NB	
Start Loc.				Date:	10/3/2012				Date:	9/18/2013	
Hwy. Config.		Divided:		Undiv.			Divided:		Undiv.		Two Lane
Contractor:	Mega Rentals										LTL2000X:
Pavemt. Type		Paint Type					Paint Type				LTL 2000:
Asphalt		Epoxy	Wet	Painted:	2-7 days old		Epoxy	Wet	Painted:	1 year old	
Concrete		Wtr.Born		Vendor:	Ennis HPS-4		Wtr.Born		Vendor:	Ennis HPS-4	
Surf.Text.	Tined	Scarified		Other	45 Sec.	Tined	Scarified		Other	45 Sec.	
Loc.	1st. R/L	2nd. R/L	3rd. R/L	Average	Wet Rec.	1st. R/L	2nd. R/L	3rd. R/L	Average	Wet Rec.	Comments
1 - TWLTL - YEL	729	674	688	696	228	447	529	523	500	192	N1110 Hoans Rd ? Start of TWLTL N of Clintonville
2 - TWLTL - LL	628	546	590	588	219	486	423	388	432	68	
3 - TWLTL - REL	235	375	299	303	111	414	375	391	393	145	
4 -											
5 - YEL	640	654	679	658	261	704	704	696	701	134	Alberts
6 - LL	510	627	563	567	223	374	386	431	397	88	
7 - REL	435	403	387	408	373	392	426	394	404	150	
SOUTHBOUND											
8 - LEL	381	330	391	367	62	397	429	398	408	128	down grade
9 - LL	511	600	614	575	350	715	688	708	704	356	

D. Kozol 11/5/13