



MATHY CONSTRUCTION CO.

GENERAL CONTRACTORS

920 10TH AVE N POST OFFICE BOX 189 ONALASKA, WI 54650

PHONE 608-781-4683 FAX 608-781-4694

Report of Bituminous Mix Design



Project Name	Tomah - Necedah STH 21
Date	June 17, 2016
Project #	7010-01-61
Test#	15-16-1176-4-MT-58-28S(R)(Wa) 250-0161-2016
County	Juneau
Specifications	4-MT-58-28S design(WARM MIX)
Course/Layer	

Aggregate Sources

	Percent	Material	Location / Source								G _{sb}
1	9	Washed CA 13 Bit Rock(3243)	Tork/1,22,5E Wood								2.678
2	12	Washed CA 14 Bit Rock(3244)	Tork/1,22,5E Wood								2.689
3	29	3/8" Washed Gravel Man Sand(5400)	Manthey East Pit 26,17,7E Adams								2.736
4	14	5/8" Screened Sand(5501)	Manthey East Pit 26,17,7E Adams								2.676
5	17	1/4" Washed Man Sand(3402)	Rock Springs/28,12,5E Sauk								2.651
6	19	RAP(5.2%AC)(7302)	Manthey East Pit/26/35,17,7E Adams								2.693
7											
8											
Total		1	2	3	4	5	6	7	8	Comb G _{sb}	2.694
Virgin Agg Blend		11.11	14.81	35.80	17.28	20.99				Comb G _{se}	2.729

Aggregate Gradations

Sieve		Material								Job Mix	Spec	
(Std)	(mm)	1	2	3	4	5	6	7	8		High	Low
2"	50	100.0	100.0	100.0	100.0	100.0	100.0			100.0		
1.5"	37.5	100.0	100.0	100.0	100.0	100.0	100.0			100.0		
1"	25	100.0	100.0	100.0	100.0	100.0	100.0			100.0		
3/4"	19	100.0	100.0	100.0	100.0	100.0	100.0			100.0		
1/2"	12.5	100.0	88.0	100.0	98.0	100.0	99.0			98.1		
3/8"	9.5	78.0	38.0	100.0	94.0	100.0	94.0			88.6		
#4	4.75	22.0	3.5	72.0	84.0	97.0	79.0			66.5		
#8	2.36	4.1	1.5	43.0	76.0	76.0	60.0			48.0		
#16	1.18	3.2	1.3	26.0	71.0	51.0	46.0			35.3		
#30	0.6	2.9	1.2	17.0	55.0	31.0	36.0			25.1		
#50	0.3	2.7	1.1	9.7	22.0	16.0	23.0			13.4		
#100	0.15	2.4	1.0	3.4	6.0	3.7	14.0			5.5		
#200	0.075	2.3	0.9	1.4	2.5	1.8	9.0			3.1		
Soundness		225-20	225-20	225-133	225-133	225-127					12 Max	
LAR 100/500 Rev		2014	2014	2016	2016	2015					13 & 45 Max	
Crush 1 Face (%)		100.0	100.0	100.0	34.0	100.0	91.0			94.5	75 Min	
Crush 2 Face (%)		100.0	100.0	100.0	31.0	100.0	86.0			93.7	60 Min	
Sand Equiv.										86	40 Min	
Flat & Elong (%)		1.1	0.5	1.4	1.2	3.6	0.7			1.0	5 Max	
Fine Agg Ang										43	43 Min	
Water Abs.		0.4	0.2	1.1	0.6	0.2	1.0			0.7		

Test Methods: D312, T176/D2419, T11/C117, T27/C136, D4791, D5821, T304/C1252, T96/C131, T209/D2041, T166/D2726



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Mix Properties

Trial #	1	2	3	4	5	6
AC Content (% by Wt)	4.5	5.0	5.5	6.0		5.5
Compaction Level	Design	Design	Design	Design		Max
Air Voids V_a (%)	6.9	5.5	4.1	2.8		4.2
% G_{mm} @ N_i	87.5	88.9	89.9	91.1		89.5
% G_{mm} @ N_{final}	93.1	94.5	95.9	97.2		96.7
VMA (%)	16.2	16.0	15.8	15.8		15.2
VFA (%)	57.3	65.7	74.2	82.3		72.3
Density (kg/m^3)	2365	2382	2399	2413		2419
G_{mb}	2.365	2.382	2.399	2.413		2.419
G_{mm}	2.540	2.521	2.501	2.483		2.501

Gyrations	
N_i	7
N_d	75
N_m	115

Antistrip	
	None

WMA Additive: Evotherm
Concentration: 0.4

Mix Design

Property	Value	Specification
Design P_b	5.5	
Added P_b	4.5	
V_a	4.0	4.0
VMA	15.8	14.5 Minimum
VFA	74.7	70 - 76
G_{mm}	2.501	
G_{mb}	2.401	
P_{be}	5.1	
P_{ba}	0.5	
Dust/Binder Ratio	0.6	0.6 - 1.2
% G_{mm} @ N_i	90.1	< 89.0 Rec
% G_{mm} @ N_d	95.8	~ 96.0
% G_{mm} @ N_m	96.7	98.0 Max
TSR Ratio	84.4	75 Minimum
Rec. Mix Temp.	220-240	

Primary AC Source	AC Type	Gb
MIA - La Crosse	PG 58-28	1.028
Alternate Sources		
MIA - La Crosse	PG 52-34	1.023
MIA - La Crosse	PG 58-34	1.023
MIA - La Crosse	PG 64-28	1.030
MIA - La Crosse	PG 64-28P	1.030

% Binder Replacement
18.0%

Average # of Gyrations	23
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Since this design is material specific, the conclusions and recommendations contained within are obtained from material submitted to and subjected to observations under laboratory conditions. Adjustments may become necessary when field laboratory data is obtained from plant produced mix. No guarantee or warranty is implied or offered. Recommended Lab Compaction Temp. = 230F

Signature *J. E. Ingman* Cert. No. 361 Date: 6/17/2016

Tomah - Necedah STH 21

Design # 15-16-1176-4-MT-58-28S(R)(Wa) -- 12.5 mm Mix -- Blend 1

