

MOISTURE AND DENSITY DETERMINATION

NUCLEAR METHOD

Clear Form

DISTRIBUTION: ORIGINAL – Construction Engineer, COPIES – Area Density Specialist, Density Technology Unit (Lansing).

* SEE REVERSE SIDE

DATE 05/12/20	CONTROL SECTION ID 82000	JOB NUMBER 205935A, 207914A	ROUTE NO. or STREET Major Fed-Aid HMA Resurfacing	GAUGE NO. 2411
DENSITY INSPECTOR Ryan Castillo		CERTIFICATION NO. 31927-0522	DENSITY INSPECTOR PHONE NO. (313) 680-3222	CONSTRUCTION ENG. (MDOT) Andrea Wilcox - Detroit TSC
ASST. CON. ENG. / CONSULTANT ENG. Kevin Surhigh (HRC)				

TEST			DETERMINATION OF IN-PLACE DENSITY								LOCATION OF TEST				
ORIGINAL	RECHECK	TEST DEPTH inch	COUNTS (MC)	COUNTS (DC)	DRY DENSITY PCF	WET DENSITY PCF	MOIS- TURE PCF	MOIS- TURE %	MAX DENSITY PCF	PERCENT OF COM- PACTION	STATION	DISTANCE FROM CL ft		DEPTH BELOW PLAN GRADE ft	ITEM OF WORK *
												LEFT	RIGHT		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
13		BS	70	790		145.8	8.6	6.2	158.1	92.2	Remarks	6		0.2	BB
14		BS	71	759		148.9	8.7	6.2	158.1	94.2	Remarks	4		0.2	BB
15		BS	58	784		146.5	6.9	4.9	158.1	92.7	Remarks	18		0.2	BB
16		BS	59	771		147.8	7.0	5.0	158.1	93.5	Remarks	14		0.2	BB
17		BS	58	780		146.9	6.9	4.9	158.1	92.9	Remarks	3		0.2	BB
18		BS	61	765		148.4	7.3	5.2	158.1	93.8	Remarks	5		0.2	BB
19		BS	61	769		148.0	7.3	5.2	158.1	93.6	Remarks	16		0.2	BB
20		BS	60	733		151.7	7.2	5.0	158.1	95.9	Remarks	14		0.2	BB
21		BS	68	778		147.0	8.3	6.0	158.1	93.0	Remarks	3		0.2	BB
22		BS	63	760		148.9	7.6	5.4	158.1	94.2	Remarks	2		0.2	BB
23		BS	73	777		147.1	9.0	6.5	158.1	93.0	Remarks	10		0.2	BB
24		BS	59	753		149.6	7.0	4.9	158.1	94.6	Remarks	15		0.2	BB

TEST NO.	MOIS- TURE %	VOLUME OF MOLD CU. FT.	DETERMINATION OF MAXIMUM DENSITY (SOIL & HMA)							NOTE: To convert (g) to (lbs): Wt. (g) ÷ 453.59 = Wt. (lbs)	
			WET SOIL + MOLD g	MOLD g	WET SOIL g	WET SOIL lbs	COMPACTED SOIL WET PCF	MAX DENSITY PCF	OPTIMUM MOISTURE %		
A	B	C	D	E	F	G	H	I	J	CHART STANDARDS	
4E3								158.1		DENSITY	MOISTURE
										2,963	438
										3,023	454
										OPERATING STANDARDS	
										DENSITY	MOISTURE
										2,980	440

REMARKS
The tests were taken on the Service Drive of M-10 between Trumbull and ended 350 ft before the Forest M-10 exit ramp. Test 13:42.3562, -83.0800

Test 14: 42.3570, -83.0789 Test 15: 42.3573, -83.0779 Test 16: 42.3571, -83.0776 Test 17: 42.3575, -83.0776 Test 18: 42.3577, -83.0758

Test 19: 42.3573, -83.0761 Test 20: 42.3566, -83.0757

20/10 Weights	1st	2nd	DENSITY INSPECTOR'S SIGNATURE Ryan Castillo May 15 2020 9:34 AM DocuSign	AGENCY / COMPANY Somat Engineering, Inc. (JN. 2019086C)
3rd	4th	5th		

DENSITY REQUIREMENTS

	MINIMUM % OF COMPACTION	ITEM OF WORK	DEPTH
Original Ground			
Road Embankment Areas (if specified on the plans)	90.0	OG	9"
Bridges – as shown on the plans	95.0	OG	9"
Cut Areas			
Cuts requiring Sand Subbase	95.0	CS	9"
Cuts not requiring Sand Subbase	95.0	CN	12"
Subgrade for HMA Base, Aggregate Base and Concrete Widening	95.0	SG	9"
Embankments			
Regular	95.0	E	
Abutments with Piling	95.0	AP	
Abutments without Piling – within the limits for Structure Embankment as shown on the plans	100.0	AN	
Backfill			
Foundation Undercut Backfill for Retaining Walls, Grade Separation or Bridges	100.0	FB	
Backfill for Bridges, Culverts, Sewers, Water Main, Manholes, Catch Basins, Edge Drains and Subgrade Undercuts	95.0	B	
Pavement Structure			
Subbase	95.0	S	
Subbase for Slope Paving	90.0	SP	
Aggregate Base-used under Concrete Pavement	95.0	SS	
Aggregate Base-used under HMA Pavement	98.0	AB	
OGDC – used under Concrete and HMA Pavement	95.0	OGDC	
OGDC – used under Concrete and HMA Pavement (recycled material)	95.0	OGR	
HMA Aggregate Base (pulverized HMA used as Aggregate Base)	98.0	BAB	
Aggregate Base – used under Concrete Pavement (recycled material)	95.0	CAC	
Aggregate Base – used under HMA Pavement (recycled material)	98.0	CAB	
OGDC – Sleeper slab footprint and approach area	95.0	SLO	
OGDC – Sleeper slab footprint and approach area (recycled material)	95.0	SLOR	
Aggregate Base – Sleeper slab footprint and approach area	98.0	SLA	
Trenching – under concrete pavement	95.0	TC	
Trenching – under HMA pavement	98.0	TB	
Shoulders – Class I	98.0	SAA	
Shoulders – Class II and III	95.0	SA	
HMA Stabilization	98.0	BS	
HMA Paving – Base Course	92.0*	BB	
HMA Paving – Leveling Course	92.0*	BL	
HMA Paving – Top Course	92.0*	BT	

See JMF (form 1911) for G_{mm} value for target density value. $TMD = G_{mm} \times 62.4$

*Minimum % compaction of JMF TMD