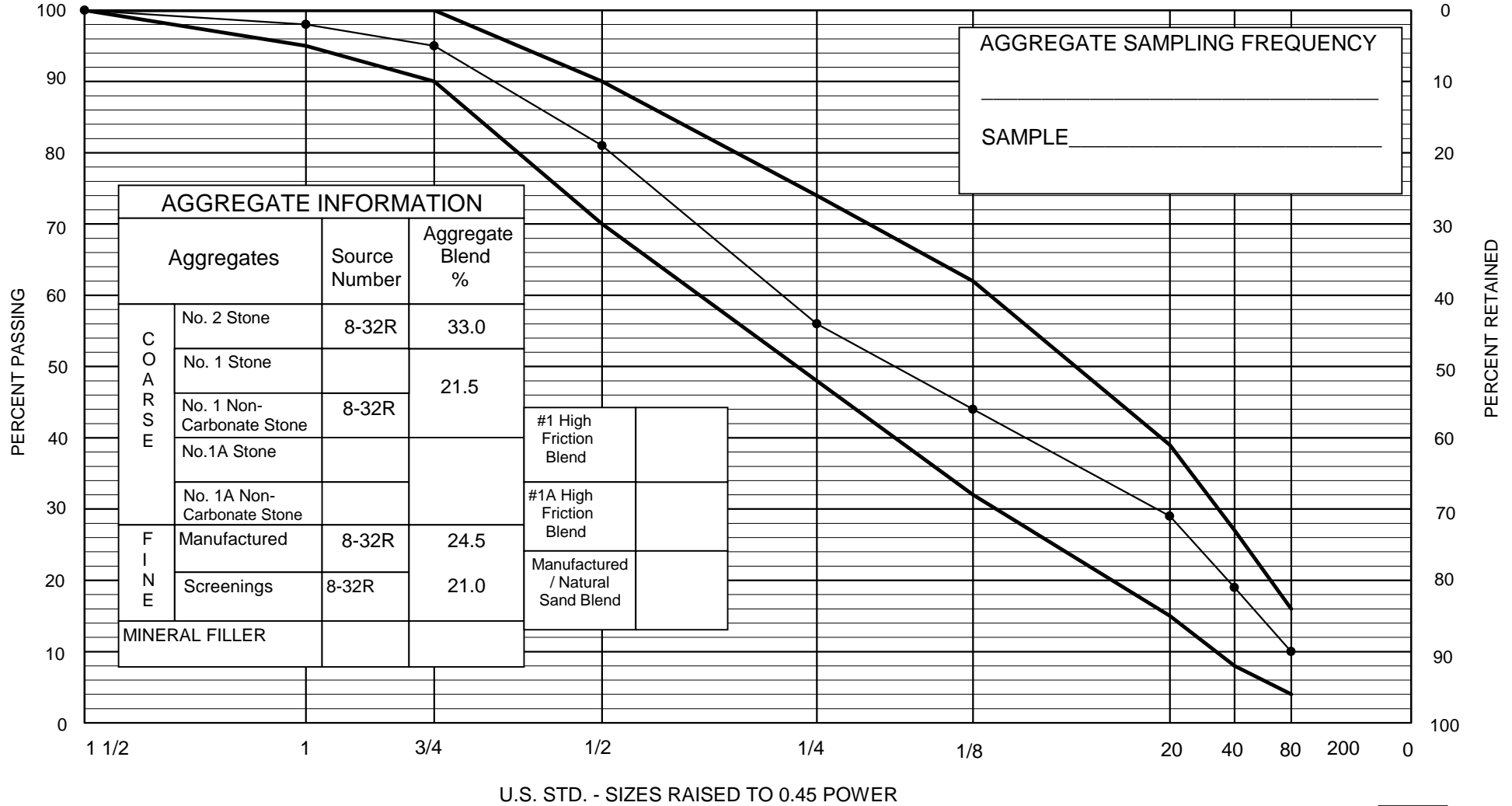


NEW YORK CITY
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU
JOB MIX FORMULA

Facility No. _____ Formula No. _____
Plant Willets Point Asphalt Region 11
Plant Location Flushing, NY
Submitted By Larry Santana QC Manager Date 3/7/2019

NYCDOT TYPE 3 BINDER



Sieve Size		1 1/2"	1"	3/4"	1/2"	1/4"	1/8"	No. 20	No. 40	No. 80	No. 200	Asphalt Content (Percent)
% Passing	1. General Limits	100	95-100	90-100	70-90	48-74	32-62	15-39	8-27	4-16	2-8	4.5-6.5
	2. JMF Range	100	95-100	90-100	75-87	49-63	37-51	22-36	12-26	6-14	2-6	-
	3. Target Value	100	98	95	81	56	44	29	19	10	4	4.5

Asphalt Grade
PG 64-22

Recommended for Approval by Regional Director _____

Date: _____

Approved by Director, Materials Bureau _____

Date: _____

Remarks: _____

**NEW YORK CITY
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU
MARSHALL GRADATION ANALYSIS WORKSHEET**

**REGION
ITEM
MIX TYPE
PRODUCER
LOCATION**

11
**NYCDOT TYPE 3 BINDER
Willets Point Asphalt
Flushing, NY**

NO. OF COMPOSITE/STOCKPILES AVERAGED 10

AVERAGE BIN BREAKDOWN

AGGREGATE INFORMATION			
AGGREGATES		SOURCE NUMBER	AGGREGATE BLEND %
COARSE	No. 2 Stone	8-32R	33.0
	No. 1 Stone		
	No. 1 Non-Carbonate Stone	8-32R	21.5
	No. 1A Stone		
	No. 1A Non-Carbonate Stone		
	FINE	Manufactured	8-32R
	screenings	8-32R	21.0
MINERAL FILLER			

Sieve Size	BIN NO. 5		BIN 3/4" NO. 4		BIN 3/8" NO. 3		BIN 1/4" NO. 2		BIN Sand NO. 1		MF	
	100%		%		%		%		%		%	
	ret.	pass.	ret.	pass.	ret.	pass.	ret.	pass.	ret.	pass.	ret.	pass.
1 1/2"	0.0	100.0										
1"	2.5	97.5										
3/4"	5.0	95.0										
1/2"	14.0	81.0										
1/4"	25.0	56.0										
1/8"	12.0	44.0										
20	15.0	29.0										
40	10.0	19.0										
80	9.0	10.0										
200	6.0	4.0										
PAN	4.0		100.0	-	100.0	-	100.0	-	100.0	-	100.0	-
Totals			100.0	-	100.0	-	100.0	-	100.0	-	100.0	-

COMBINED AVERAGE GRADATION

BIN	% Batched	% PASSING SIEVE									
		1 1/2"	1"	3/4"	1/2"	1/4"	1/8"	20	40	80	200
composite	100.0	100.0	97.5	95.0	81.0	56.0	44.0	29.0	19.0	10.0	4.0
TOTAL	100.0	100.0	97.5	95.0	81.0	56.0	44.0	29.0	19.0	10.0	4.0
Specification Limits		100	95-100	90-100	75-87	49-63	37-51	22-36	12-26	6-14	2-6

REMARKS _____

TESTED BY Willets Point Asphalt ON 3/7/2019

**COMBINED MARSHALL GRADATION
AT THE % ASPHALT CEMENT INDICATED**

% A.C.	AGGREGATE COMPONENT	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										Total WGT. RET.
				1	3/4	1/2	1/4	1/8	20	40	80	200	Pan	
4.4	5	100.0	52.8	1.3	2.6	7.4	13.2	6.3	7.9	5.3	4.8	1.3	2.7	52.8
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MF	0.0	0.0	(Specimen wtg)= <u>1200</u> x <u>4.4</u> %A.C. = <u>52.8</u> gr. A.C.										
	Total	0.0	0.0	(Specimen wtg)= <u>1200</u> - <u>52.8</u> gr. A.C. = <u>1147.2</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										Total WGT. RET.
				1	3/4	1/2	1/4	1/8	20	40	80	200	Pan	
4.8	5	100.0	1142.4	28.6	57.1	159.9	285.6	137.1	171.4	114.2	102.8	28.6	57.1	1142.4
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MF	0.0	0.0	(Specimen wtg)= <u>1200</u> x <u>4.8</u> %A.C. = <u>57.6</u> gr. A.C.										
	Total	0.0	0.0	(Specimen wtg)= <u>1200</u> - <u>57.6</u> gr. A.C. = <u>1142.4</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										Total WGT. RET.
				1	3/4	1/2	1/4	1/8	20	40	80	200	Pan	
5.2	5	100.0	1137.6	28.4	56.9	159.3	284.4	136.5	170.6	113.8	102.4	28.4	56.9	1137.6
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MF	0.0	0.0	(Specimen wtg)= <u>1200</u> x <u>5.2</u> %A.C. = <u>62.4</u> gr. A.C.										
	Total	0.0	0.0	(Specimen wtg)= <u>1200</u> - <u>62.4</u> gr. A.C. = <u>1137.6</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										Total WGT. RET.
				1	3/4	1/2	1/4	1/8	20	40	80	200	Pan	
5.6	5	100.0	1132.8	28.3	56.6	158.6	283.2	135.9	169.9	113.3	102.0	28.3	56.7	1132.8
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MF	0.0	0.0	(Specimen wtg)= <u>1200</u> x <u>5.6</u> %A.C. = <u>67.2</u> gr. A.C.										
	Total	0.0	0.0	(Specimen wtg)= <u>1200</u> - <u>67.2</u> gr. A.C. = <u>1132.8</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										Total WGT. RET.
				1	3/4	1/2	1/4	1/8	20	40	80	200	Pan	
6.0	5	100.0	1128.0	28.2	56.4	157.9	282.0	135.4	169.2	112.8	101.5	28.2	56.4	1128.0
	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	MF	0.0	0.0	(Specimen wtg)= <u>1200</u> x <u>6.0</u> %A.C. = <u>72.0</u> gr. A.C.										
	Total	0.0	0.0	(Specimen wtg)= <u>1200</u> - <u>72.0</u> gr. A.C. = <u>1128.0</u> gr. Aggregate										

**NEW YORK CITY
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU**

**COMPUTATION OF MARSHALL
MIX PROPERTIES**

ITEM _____ REGION 11
MIX TYPE NYCDOT TYPE 3 BINDER
LOCATION Flushing, NY

PRODUCER Willets Point Asphalt

Specimen	Asphalt Content	Weight - Grams			Volume CC	Bulk Specific Gravity Gmb	Unit Wt. lb/cu. Ft.	Stability - Lbs.			Flow 0.01 in	Marshall Quotient lb/0.01 in.
		In Air	In Water	S.S.D.				Measured	Correction Factor	Corrected		
a	b	c	d	e	f	g	h	i	j	k	l	m
					e-d	c/f	g*62.4					k/l
A		1200.7	702.1	1202.1	500.0	2.401		2215	1.04	2304	6.0	
B		1205.1	704.6	1206.7	502.1	2.400		2206	1.04	2294	6.0	
C		1199.6	699.3	1201.3	502.0	2.390		2130	1.04	2215	6.0	
AVG.	4.4					2.397	149.6			2271	6.0	379
A		1201.0	706.5	1201.9	495.4	2.424		2550	1.09	2780	10.0	
B		1204.1	709.4	1205.6	496.2	2.427		2550	1.04	2652	8.0	
C		1200.0	705.6	1201.4	495.8	2.420		2464	1.09	2686	8.0	
AVG.	4.8					2.424	151.3			2706	8.7	311
A		1194.9	706.3	1196.1	489.8	2.440		2416	1.09	2633	12.0	
B		1199.8	708.1	1200.5	492.4	2.437		2388	1.09	2603	12.0	
C		1197.1	708.0	1198.0	490.0	2.443		2552	1.09	2782	12.0	
AVG.	5.2					2.440	152.3			2673	12.0	223
A		1200.7	709.3	1200.9	491.6	2.442		2469	1.09	2691	12.0	
B		1193.0	704.7	1194.1	489.4	2.438		2425	1.09	2643	15.0	
C		1199.5	708.0	1200.8	492.8	2.434		2361	1.09	2573	15.0	
AVG.	5.6					2.438	152.1			2636	14.0	188
A		1206.8	710.7	1207.1	496.4	2.431		2445	1.04	2543	17.0	
B		1203.4	707.5	1203.7	496.2	2.425		2436	1.04	2533	16.0	
C		1204.0	709.3	1204.8	495.5	2.430		2387	1.09	2602	16.0	
AVG.	6.0					2.429	151.6			2559	16.3	157

PREPARED BY

Larry Santana QC Manager

DATE

3/7/2019

BR 76 M (12/94)

**NEW YORK CITY
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU**

MIX TYPE TYPE 3 REGION 11

PRODUCER Willets Point Asphalt

LOCATION Flushing, NY

**MAXIMUM SPECIFIC GRAVITY OF HOT MIX ASPHALT
AASHTO T209**

- Gmm** = Maximum Specific Gravity of Hot Mix Asphalt
- A** = Weight of sample in air (grams)
- D** = Weight of pycnometer filled with airless water at 25 C (grams)
- E** = Weight of pycnometer filled with water and sample at 25 C (grams)
- Gmm** = $\frac{A}{A+D-E}$

ASPHALT CONTENT	4.4 %		4.8 %		5.2 %		5.6 %		6.0 %	
TEST NO.	1	2	1	2	1	2	1	2	1	2
A	1203.1	1202.4	1204.6	1203.9	1205.9	1206.3	1207.4	1207.4	1208.6	1207.9
D	7391.6	7391.6	7391.6	7391.6	7391.6	7391.6	7391.6	7391.6	7391.6	7391.6
E	8122.5	8123.2	8120.1	8121.1	8118.4	8119.8	8115.3	8118.3	8111.7	8112.4
A+D-E	472.2	470.8	476.1	474.4	479.1	478.1	483.7	480.7	488.5	487.1
Gmm	2.548	2.554	2.530	2.538	2.517	2.523	2.496	2.512	2.474	2.480
Average Gmm	2.551		2.534		2.520		2.504		2.477	

TESTED BY Larry Santana QC Manager ON 3/7/2019

NEW YORK CITY
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM _____ REGION 11
MIX TYPE NYCDOT TYPE 3 BINDER
PRODUCER Willets Point Asphalt
LOCATION Flushing, NY
COMPACTION 75 BLOWS PER SIDE

WORKSHEET FOR ANALYSIS OF
COMPACTED PAVING MIXTURE

(Analysis by weight of total mixture)
COMPOSITION OF PAVING MIXTURE

CONSTITUENT MATERIAL		NYS DOT	Specific Gravity		Mix Composition, % by weight of Total Mix, P					
			Source Number	Apparent	Bulk	Region Verification	Mix or Trial Number			
		1					2	3	4	5
CA	No. 2 Stone	8-32R	2.767	2.740	P1	31.55	31.42	31.28	31.15	31.02
	No. 1 Stone				P2					
	No. 1 Non-Carbonate Stone	8-32R	2.767	2.740	P3	20.55	20.47	20.38	20.30	20.21
	No. 1A Stone				P4					
	No. 1A Non-Carbonate Stone				P5					
FA	Man. Sand	8-32R	2.767	2.740	P6	23.42	23.32	23.23	23.13	23.03
	screenings	8-32r	2.646	2.612	P7	20.08	19.99	19.91	19.82	19.74
					P8					
MINERAL FILLER					P9					
TOTAL AGGREGATE					Ps	95.6	95.2	94.8	94.4	94.0
ASPHALT CEMENT @ 25 C				1.031	PB	4.4	4.8	5.2	5.6	6.0
Gmm	Max Sp. Gr. of Paving Mix (AASHTO T209)					2.551	2.534	2.520	2.504	2.477
Gmb	Bulk Sp. Gr. of compacted mix (AASHTO T166)					2.397	2.424	2.440	2.438	2.429
Gsb	Bulk Sp. Gr. of total aggregate*					2.712	2.712	2.712	2.712	2.712
Gse	Effective Sp. Gr. of total aggregate*					2.737	2.735	2.737	2.736	2.721
Gsa	Apparent Sp. Gr. of total aggregate					2.741	2.741	2.741	2.741	2.741
VMA	100 - (Gmb x Ps/Gsb)					15.50	14.91	14.71	15.14	15.81
Pa	Pa = 100[(Gmm - Gmb)/Gmm]					6.04	4.34	3.17	2.64	1.94
VFA	VFA = 100 [(VMA - Pa)/VMA]					61.03	70.89	78.45	82.56	87.73
Pbe	Effective Asphalt Content = Gb(VMA - Pa)/Gmb					4.07	4.50	4.88	5.29	5.89
	Stability (CORRECTED)					2271	2706	2673	2636	2559
	Flow					6.0	8.7	12.0	14.0	16.3
	Marshall Quotient = Stability(corrected)/Flow					379	311	223	188	157
	Unit Weight					149.6	151.3	152.3	152.1	151.6

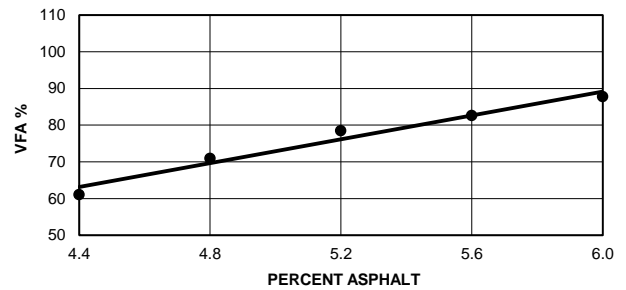
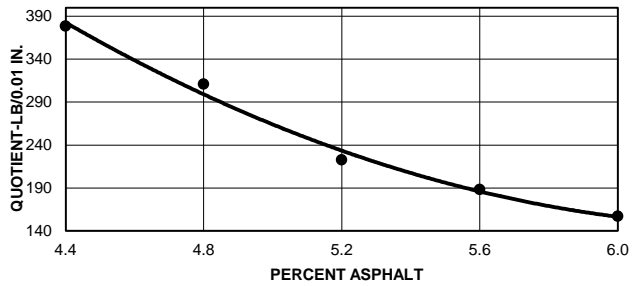
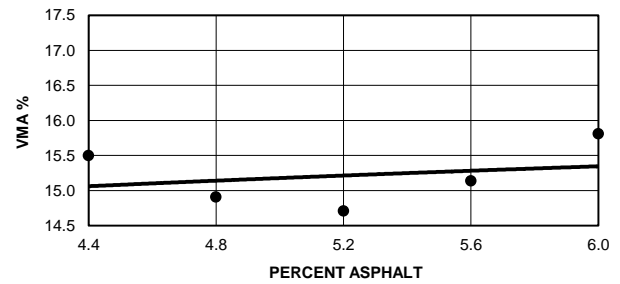
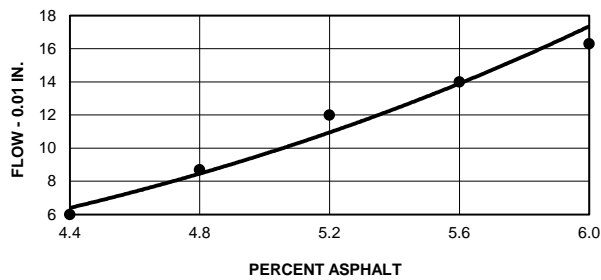
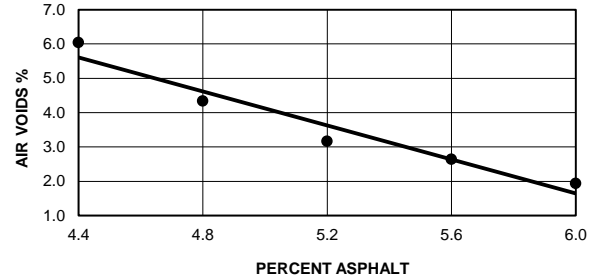
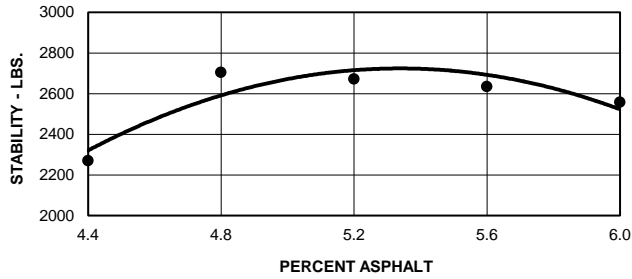
* EQUATIONS FROM CHAPTER V, SECTION E, NY MATERIALS METHOD 5.13

Prepared By

Larry Santana QC Manager

On 3/7/2019

MARSHALL TEST PROPERTY CURVES AND RANGE DATA



COMMON OVERLAP RANGE 4.5-6.5
 MID POINT 4.5
 (OPTIMUM AC CONTENT) 4.5

SUBMITTED BY Larry Santana QC Manager
 DATE 3/7/2019

VALUES AT OPTIMUM AC CONTENT

PROPERTY	STABILITY	FLOW	QUOTIENT	AIR VOIDS	VMA	VFA
SPECIFICATION	1500 min.	8-16	150 min	3.0-5.0	12.0 min.	65-75
ACTUAL	2650	10	250	3.8	14.7	72