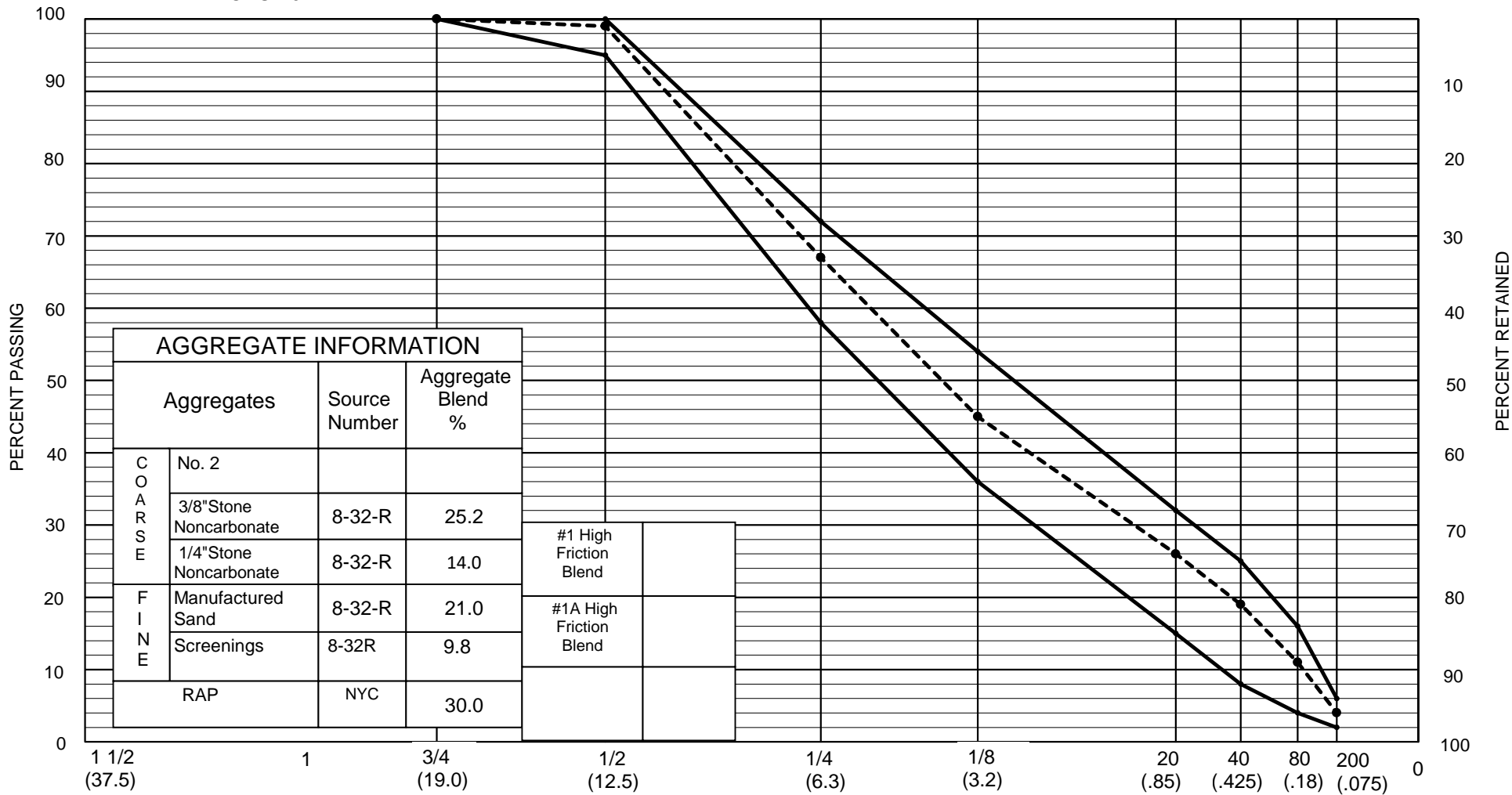


**NEW YORK CITY  
DEPARTMENT OF TRANSPORTATION  
MATERIALS BUREAU  
JOB MIX FORMULA**

Facility No.	Formula No.	Region	11
Plant <b>WILLETS POINT ASPHALT</b>	FLUSHING-N.Y.	Date	3/5/2019
Plant Location	Submitted By		
	WILLETS POINT ASPHALT		

**NYCDOT 6F HDRA**



**U.S. STD. - SIZES RAISED TO 0.45 POWER**

Sieve Size	1 1/2" (37.5)	1" (25.0)	3/4"(19.0)	1/2"(12.5)	1/4" (6.3)	1/8" (3.2)	20(0.850)	40(0.425)	80(0.180)	200(0.075)	Asphalt Content (Percent)	
% Passing	1.General Limits	-	-	100	95-100	58-72	36-54	15-32	8-25	4-16	2-6	5.0-6.0
	2.JMF Range	-	-	100	95-100	62-72	41-49	22-30	15-23	8-14	2-6	-
	3.Target Value	-	-	100	99	67	45	26	19	11	4	5.4

Asphalt Grade
<b>PG</b>

Recommended for Approval by Regional Director \_\_\_\_\_

Date: \_\_\_\_\_

Approved by Director, Materials Bureau \_\_\_\_\_

Date: \_\_\_\_\_

Remarks: \_\_\_\_\_

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

ITEM \_\_\_\_\_ REGION **11**MIX TYPE \_\_\_\_\_ **6F HD/RA**

WORKSHEET FOR ANALYSIS OF  
COMPACTED PAVING MIXTURE

PRODUCER \_\_\_\_\_ **WILLETS POINT ASPHALT**

(Analysis by weight of total mixture)

LOCATION \_\_\_\_\_ **FLUSHING, NY**

## COMPOSITION OF PAVING MIXTURE

**COMPACTION 75 BLOWS PER SIDE**

CONSTITUENT MATERIAL		NYSDOT Source Number	Specific Gravity,G		Region Verification	Mix composition, % by weight of Total Mix., P				
			Apparent	Bulk		Mix or Trial Number				
		1	2	3	4	5				
Coarse	No. 2 Stone				P1					
	3/8"Non-Carb	8-32R	2.701	2.688	P2	24.1	24.0	23.8	23.7	23.6
	No. 1 Non-Carb.				P3					
	1/4"Non-Carb	8-32R	2.700	2.687	P4	13.4	13.3	13.2	13.2	13.1
	1A Non-Carb.				P5					
Fine	Manufactured	8-32R	2.618	2.608	P6	20.1	20.0	19.9	19.8	19.7
	SCREENINGS	8-32R	2.670	2.658	P7	9.3	9.3	9.3	9.2	9.2
RAP		NYC	2.664	2.651	P8	28.7	28.5	28.4	28.2	28.1
TOTAL AGGREGATE					PS	95.6	95.1	94.6	94.1	93.7
ASPHALT CEMENT @ 77F (25C)				1.031	PB	4.4	4.9	5.4	5.9	6.3
Gmm	Max. Sp. Gr. of Paving Mix (ASTM D2041)					2.519	2.509	2.494	2.476	2.454
Gmb	Bulk Sp. Gr. of compacted mix (ASTM D2726)					2.356	2.375	2.394	2.407	2.414
Gsb	Bulk Sp. Gr. of total aggregate					2.657	2.657	2.657	2.657	2.657
Gse	Effective Sp. Gr. of total aggregate					2.698	2.709	2.714	2.715	2.705
Gsa	Apparent Sp. Gr. of total aggregate					2.669	2.669	2.669	2.669	2.669
VMA	100-(Gmb*Ps/Gsb)					15.22	14.98	14.75	14.74	14.86
Pa	Air Voids=100(Gmm-Gmb)/Gmm					6.47	5.34	4.01	2.79	1.63
Pvma	%VMA filled w/A.C. = 100(VMA-Pa)/VMA					57.49	64.36	72.82	81.08	89.03
Pbe	Effective Asphalt Content = Gb(VMA-Pa)/Gmb					3.83	4.19	4.63	5.12	5.65
Stability (CORRECTED)						2108	2217	2325	2300	2208
Flow						9.3	10.2	12.2	13.2	13.7
Marshall Quotient=Stability(corrected)/Flow						226.7	217.4	190.6	174.2	161.2
Unit Weight						147.0	148.2	149.4	150.2	150.6

\*EQUATIONS FROM CHAPTER V, SECTION E, NY MATERIALS METHODS 5.13

Prepared by WILLETS POINT ASPHALT3/5/2019

COMPUTATION OF MARSHALL  
MIX PROPERTIESNEW YORK CITY  
DEPARTMENT OF TRANSPORTATION  
MATERIALS BUREAUITEM \_\_\_\_\_ REGION 11MIX TYPE 6F HD/RAPRODUCER WILLETS POINT ASPHALT LOCATION FLUSHING, NY

Specimen		Asphalt Content	Weight - Grams			Volume CC	Specific Gravity		Voids Total Mix	Unit Wt. KG/Cu. M.	Stability - N.		Flow 0.25 MM.
			In Air	In Water	S.S.D		Bulk Gmb	Theor. Gmm			Measured	Corrected	
a	b		c	d	e	f	g	h	i	j	k	l	m
						e-d	c/f		100(h-g)/h	(g*1000)			
A		4.4	1223.1	705.5	1224.9	519.4	2.355				2075	2075	9.0
B	AC virgin	2.8	1218.1	703.2	1220.2	517.0	2.356				2100	2100	9.5
C	ACrap	1.5	1218.2	703.5	1220.1	516.6	2.358				2150	2150	9.5
AVG.	AC total	4.3				Averages:	2.356	2.519	6.47	2.356		2108	9.3
A		4.9	1223.1	708.9	1224.5	515.6	2.372				2200	2200	10.5
B	AC virgin	3.3	1222.9	709.8	1224.4	514.6	2.376				2200	2200	10.0
C	ACrap	1.5	1223.9	710.1	1225.1	515.0	2.377				2250	2250	10.0
AVG.	AC total	4.8					2.375	2.509	5.34	2.375		2217	10.2
A		5.4	1235.1	720.5	1236.2	515.7	2.395				2350	2350	12.5
B	AC virgin	3.8	1234.5	719.6	1235.6	516.0	2.392				2275	2275	12.5
C	ACrap	1.5	1233.9	719.5	1235.0	515.5	2.394				2350	2350	11.5
AVG.	AC total	5.3				Averages:	2.394	2.494	4.01	2.394		2325	12.2
A		5.9	1240.3	725.6	1240.9	515.3	2.407				2250	2250	12.5
B	AC virgin	4.3	1240.5	725.4	1241.4	516.0	2.404				2300	2300	13.5
C	ACrap	1.5	1241.1	726.8	1242.0	515.2	2.409				2350	2350	13.5
AVG.	AC total	5.8				Averages:	2.407	2.476	2.79	2.407		2300	13.2
A		6.3	1243.1	728.3	1243.5	515.2	2.413				2200	2200	13.5
B	AC virgin	4.8	1244.8	729.5	1245.2	515.7	2.414				2250	2250	13.5
C	ACrap	1.5	1245.3	730.2	1245.7	515.5	2.416				2175	2175	14.0
AVG.	AC total	6.3				Averages:	2.414	2.454	1.63	2.414		2208	13.7

Prepared by WILLETS POINT ASPHALT 3/5/2019

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

MIX TYPE **6F HD/RA** REGION **11**

PRODUCER **WILLETS POINT ASPHALT**

LOCATION **FLUSHING, NY**

MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES  
ASTM D-2041 (RICE METHOD)

Maximum Specific Gravity of Bituminous Paving Mixture = Gmm  
 A = Weight of dry sample in air (grams)  
 D = Weight of flask filled with airless water at 77F (25C) grams  
 E = Weight of flask filled with water and sample at 77F (25C) grams  
 $Gmm = A/(A+D-E)$

ASPHALT CONTENT	4.40%		4.90%		5.40%		5.90%		6.40%	
TEST NO.	1	2	1	2	1	2	1	2	1	2
A	2020.3	2012.8	2015.4	2016.1	2100.8	2060.3	2022.4	2005.8	2060.5	2023.8
D	1267.2	1276.4	1267.2	1276.4	1267.2	1276.4	1267.2	1276.4	1267.2	1276.4
E	2485.1	2490.2	2480.1	2488.2	2524.2	2512.0	2472.1	2472.3	2488.0	2475.6
A+D-E	802.4	799.0	802.5	804.3	843.8	824.7	817.5	809.9	839.7	824.6
Gmm	2.518	2.519	2.511	2.507	2.490	2.498	2.474	2.477	2.454	2.454
Average Gmm	2.519		2.509		2.494		2.476		2.454	

Test By **WILLETS POINT ASPHALT** on **3/5/2019**

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

<b>REGION</b>	<b>11</b>
<b>ITEM</b>	
<b>MIX TYPE</b>	<b>6F HD/RA</b>
<b>PRODUCER</b>	<b>WILLETS POINT ASPHALT</b>
<b>LOCATION</b>	<b>FLUSHING, NY</b>

NO. OF HOT BINS AVERAGED 15

**AVERAGE BIN BREAKDOWN**

<b>AGGREGATE INFORMATION</b>				
Aggregates		Source Number	Aggregate Blend %	
<b>COARSE</b>	No. 2 Stone			#1 High Friction Blend
	3/8" Non-Carbonate Stone	8-32-R	25.2	
	No. 1 Non-Carbonate Stone			#1A High Friction Blend
	1/4" Non-Carbonate Stone	8-32-R	14.0	
	No. 1A Non-Carbonate Stone			
<b>FINE</b>	Natural Sand	10-98F	21.0	Manufact/ Natural Sand Blend
	Screenings	8-32R	9.8	
<b>RAP</b>		RBF	30.0	

100.0

Sieve Sizes		BIN NO.	3/8"	BIN NO.	1/4"	BIN NO.	SAND	BIN NO.	SCR	RAP	
Metric Unit	U.S Unit	% ret	% pass	% ret	% pass	% ret	% pass	% ret	% pass	% ret	% pass
37.5	1 1/2"	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100	0.0	100.0
25.0	1"	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100	0.0	100.0
19.0	3/4"	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100	0.0	100.0
12.5	1/2"	1.2	98.8	0.0	100.0	0.0	100.0	0.0	100	0.0	100.0
6.3	1/4"	92.6	6.2	1.2	98.8	0.9	99.1	0.1	99.9	28.9	71.1
3.2	1/8"	3.9	2.3	84.6	14.2	25.6	73.5	12.4	87.5	9.5	61.6
0.850	20	1.1	1.2	11.6	2.6	31.6	41.9	37.9	49.6	23.9	37.7
0.425	40					6.8	35.1	13.3	36.3	9.8	27.9
0.180	80					15.0	20.1	14.8	21.5	11.8	16.1
0.075	200					14.0	6.1	8.8	12.7	9.9	6.2
PAN	PAN	1.2		2.6	-	6.1		12.7	-	6.2	-
Totals		100.0		100.0	-	100.0	-	100.0	-	100.0	-

BIN	%	% Passing Sieve									
		(37.5) 1 1/2"	(25.0) 1"	(19.0) 3/4"	(12.5) 1/2"	(6.3) 1/4"	(3.2) 1/8"	(0.850) 20	(0.425) 40	(0.180) 80	(0.075) 200
3/8"	25.2%	25.2	25.2	25.2	24.9	1.6	0.6	0.3	0.0	0.0	0.0
1/4"	14.0%	14.0	14.0	14.0	14.0	13.8	2.0	0.4	0.0	0.0	0.0
SAND	21.0%	21.0	21.0	21.0	21.0	20.8	15.5	8.8	7.4	4.2	1.3
SCR.	9.8%	9.8	9.8	9.8	9.8	9.8	8.6	4.9	3.6	2.1	1.2
RAP	30.0%	30.0	30.0	30.0	30.0	21.3	18.5	11.3	8.4	4.8	1.9
TOTAL	100.0%	100.0	100.0	100.0	99.7	67.3	45.2	25.7	19.4	11.1	4.4
Spec. LIMITS		100	100	100	95-100	58-72	36-54	15-32	8-25	4-16	2-6

Remarks
Tested by <b>W.P</b> <span style="float:right">3/5/2019</span>

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

% A.C.	AGGREGATE COMPONENT (BIN)	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										TOTAL Wgt. Ret.
				(25.0) 1"	(19.0) 3/4"	(12.5) 1/2"	(6.3) 1/4"	(3.2) 1/8"	(0.850) 20	(0.425) 40	(0.180) 80	(0.075) 200	PAN	
4.4%	3/8"	25.2%	295.1			3.5	273.3	11.5	3.2	0.0	0.0	0.0	3.5	295.1
	1/4"	14.0%	164.1			0.0	2.0	138.8					4.3	145.1
	SAND	21.0%	246.1				2.2	63.0	77.8	16.7	36.9	34.5	15.0	246.1
	SCR.	9.7%	113.9				0.1	14.1	43.2	15.1	16.9	10.0	14.5	113.9
	RAP	30.0%	351.4											
<b>TOTAL</b>	<b>100.0%</b>	<b>1170.6</b>												
				1225.0 gr. - <u>4.4%</u> A. C. = <u>54.3</u> gr. A. C.										
				1225.0 gr. - <u>54.3</u> gr. A. C. = <u>1170.7</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT (BIN)	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										TOTAL Wgt. Ret.
				(25.0) 1"	(19.0) 3/4"	(12.5) 1/2"	(6.3) 1/4"	(3.2) 1/8"	(0.850) 20	(0.425) 40	(0.180) 80	(0.075) 200	PAN	
4.9%	3/8"	25.2%	293.9			3.5	272.2	11.5					3.5	290.7
	1/4"	14.0%	162.9			0.0	2.0	137.8					4.2	144.0
	SAND	21.0%	244.9				2.2	62.7	77.4	16.7	36.7	34.3	14.9	244.9
	SCR.	9.8%	113.9				0.1	14.1	43.2	15.1	16.9	10.0	14.5	113.9
	RAP	30.0%	349.0											
<b>TOTAL</b>	<b>100.0%</b>	<b>1164.6</b>												
				1225.0 gr x <u>4.9%</u> A. C. = <u>60.5</u> gr. A. C.										
				1225.0 gr. - <u>60.5</u> gr. A. C. = <u>1164.5</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT (BIN)	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										TOTAL Wgt. Ret.
				(25.0) 1"	(19.0) 3/4"	(12.5) 1/2"	(6.3) 1/4"	(3.2) 1/8"	(0.850) 20	(0.425) 40	(0.180) 80	(0.075) 200	PAN	
5.4%	3/8"	25.2%	293.9			3.5	272.2	11.5					3.5	290.7
	1/4"	14.0%	163.0			0.0	2.0	137.9					4.2	144.1
	SAND	21.0%	245.8				2.2	62.9	77.7	16.7	36.9	34.4	15.0	245.8
	M.F	9.8%	114.9				0.1	14.2	43.5	15.3	17.0	10.1	14.6	114.9
	RAP	30.0%	350.7											
<b>TOTAL</b>	<b>100.0%</b>	<b>1168.3</b>												
				1235.0 gr x <u>5.4%</u> A. C. = <u>66.7</u> gr. A. C.										
				1235.0 gr. - <u>66.7</u> gr. A. C. = <u>1168.3</u> gr. Aggregate										

% A.C.	AGGREGATE COMPONENT (BIN)	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										TOTAL Wgt. Ret.
				(25.0) 1"	(19.0) 3/4"	(12.5) 1/2"	(6.3) 1/4"	(3.2) 1/8"	(0.850) 20	(0.425) 40	(0.180) 80	(0.075) 200	PAN	
5.9%	3/8"	25.2%	295.2			3.5	273.4	11.5					3.5	292.0
	1/4"	14.0%	164.4			0.0	2.0	139.1					4.3	145.3
	SAND	21.0%	246.6				2.2	63.1	77.9	16.8	37.0	34.5	15.0	246.6
	SCR.	9.8%	114.6				0.1	14.2	43.4	15.2	17.0	10.1	14.6	114.6
	RAP	30.0%	351.3											
<b>TOTAL</b>	<b>100.0%</b>	<b>1172.1</b>												
				1245.0 gr x <u>5.9%</u> A. C. = <u>72.9</u> gr. A. C.										
				1245.0 gr. - <u>72.9</u> gr. A. C. = <u>1172.1</u> gr. Aggregate										

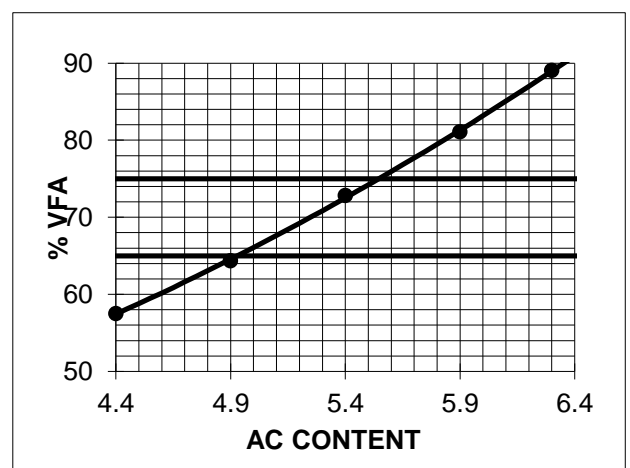
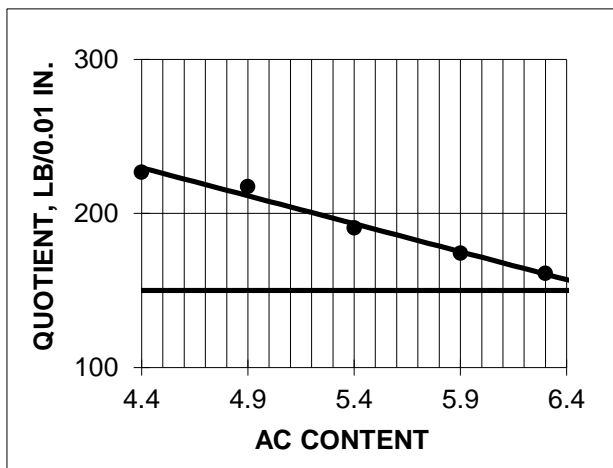
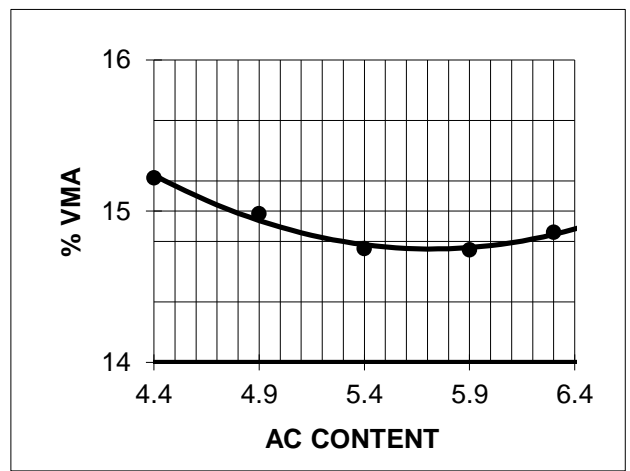
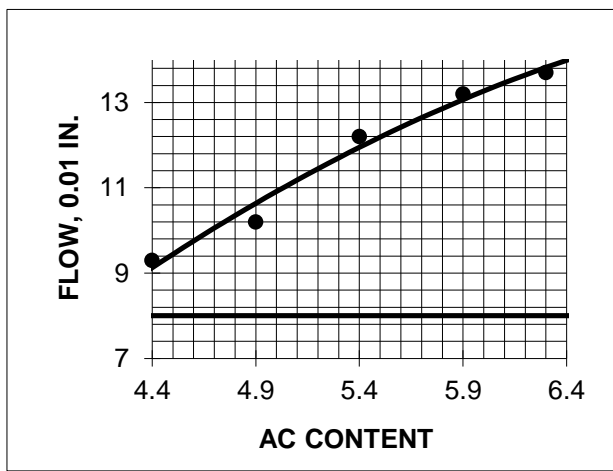
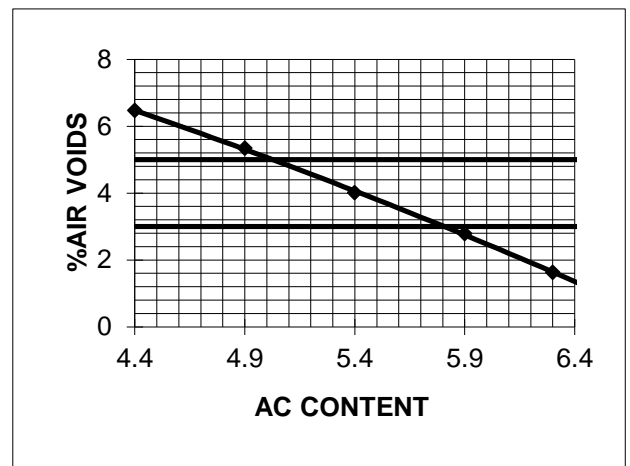
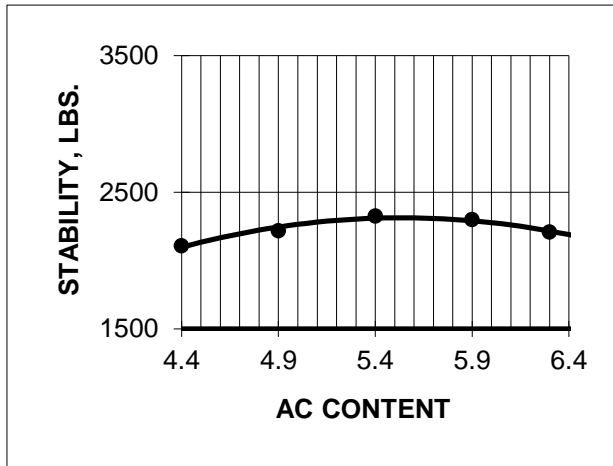
% A.C.	AGGREGATE COMPONENT (BIN)	% BATCH	GRAMS BATCH	WEIGHT RETAINED (GRAMS)										TOTAL Wgt. Ret.
				(25.0) 1"	(19.0) 3/4"	(12.5) 1/2"	(6.3) 1/4"	(3.2) 1/8"	(0.850) 20	(0.425) 40	(0.180) 80	(0.075) 200	PAN	
6.3%	3/8"	25.2%	293.7			3.5	272.0	11.5					3.5	290.5
	1/4"	14.0%	163.0			0.0	2.0	137.9					4.2	144.1
	SAND	21.0%	245.2				2.2	62.8					15.0	79.9
	SCR.	9.8%	114.5					14.2	43.4	15.2	16.9	10.1	14.5	114.4
	RAP	30.0%	349.7											
<b>TOTAL</b>	<b>100.0%</b>	<b>1166.1</b>												
				1245.0 gr x <u>6.3%</u> A. C. = <u>77.8</u> gr. A. C.										
				1245.0 gr. - <u>77.8</u> gr. A. C. = <u>1166.2</u> gr. Aggregate										

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

Region 11  
Mix Type 6F HD/RA

Producer WILLETS POINT ASPHALT

Location FLUSHING, NY

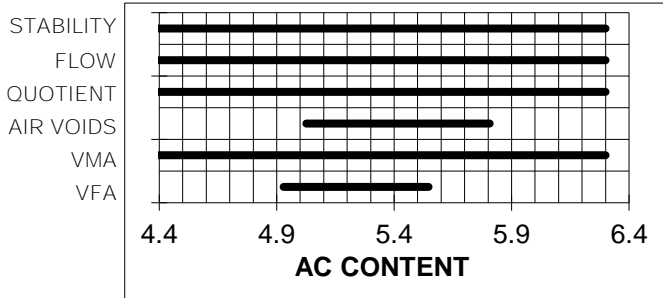


**NEW YORK STATE  
DEPARTMENT OF TRANSPORTATION  
MATERIALS BUREAU**

Region 11  
Mix Type 6F HD/RA

Producer WILLETS POINT ASPHALT

Location FLUSHING, NY



PROPERTY	SPEC	ACTUAL
STABILITY	1800 MIN.	2325
FLOW	8.0 MIN.	12.2
QUOTIENT	150 MIN.	190.6
AIR VOIDS	3.0-5.0	4.01
VMA	14.0MIN	14.75
VFA	65-75	72.82

COMMON OVERLAP RANGE 5.0 5.5

MID POINT (OPTIMUM AC CONTENT) 5.4

SUBMITTED BY WILLETS POINT ASPHALT

DATE 3/5/2019