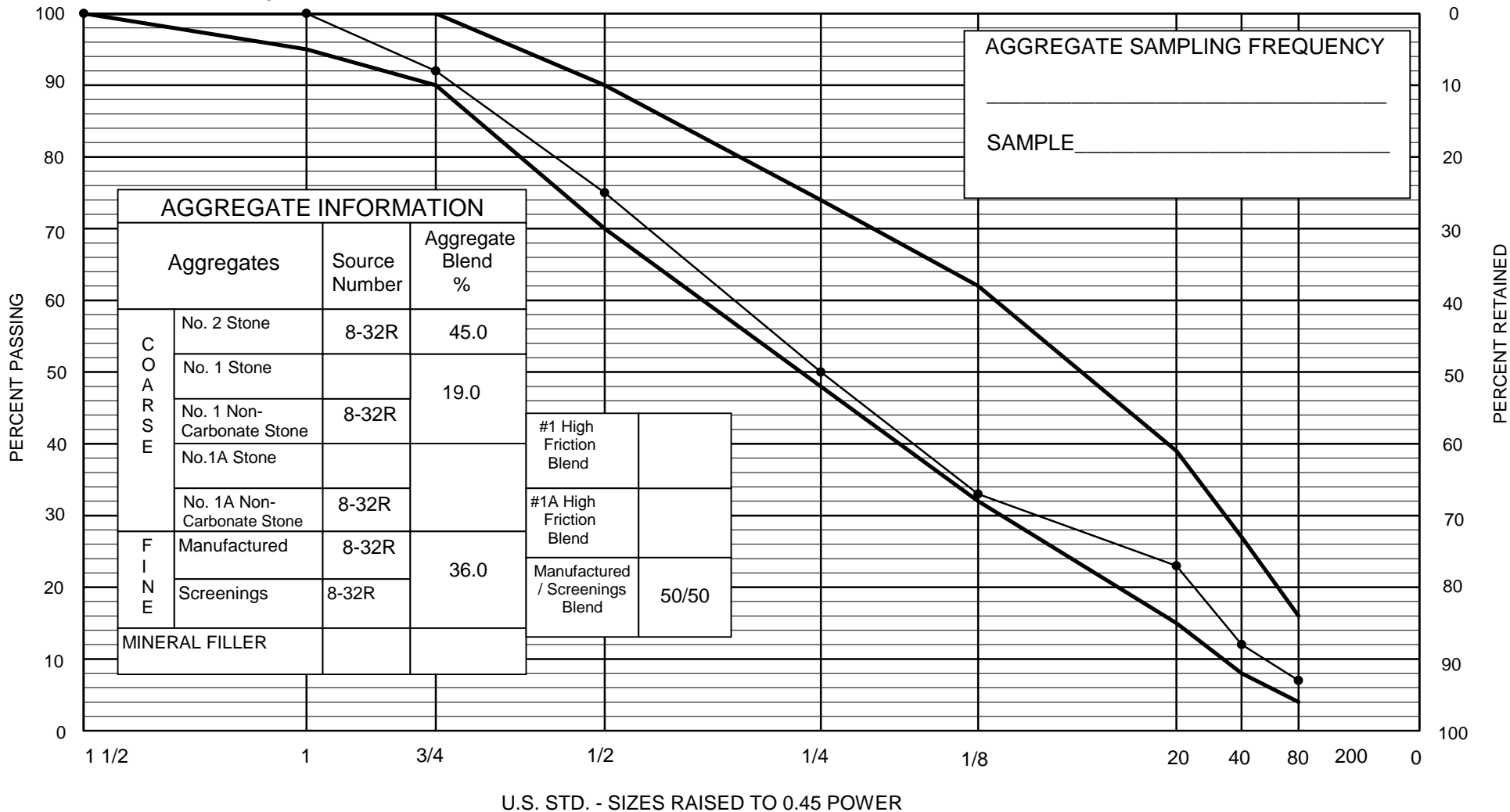


NEW YORK CITY  
DEPARTMENT OF TRANSPORTATION  
MATERIALS BUREAU  
JOB MIX FORMULA

Facility No. \_\_\_\_\_ Formula No. \_\_\_\_\_  
Plant Willets Point Asphalt Region 11  
Plant Location Flushing, NY  
Submitted Willets Point Asphalt Date 3/31/2021

↓  
**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	-	70-90	48-74	32-62	15-39	8-27	4-16	2-8	4.5-6.5
	2. JMF Range	100	95-100	-	71-81	42-52	25-35	17-27	8-16	4-12	2-6	-
	3. Target Value	100	100	92	75	50	33	23	12	7	3	4.5

Asphalt Grade
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**  

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**Type 3 Binder**  

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**Willets Point Asphalt**  

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**Flushing, NY**  

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NO. OF COMPOSITE/STOCKPILES AVERAGED 10

AVERAGE BIN BREAKDOWN

AGGREGATE INFORMATION			
AGGREGATES		SOURCE NUMBER	AGGREGATE BLEND %
COARSE	No. 2 Stone	8-32R	45.0
	No. 1 Stone		
	No. 1 Non-Carbonate Stone	8-32R	19.0
	No. 1A Stone		
	No. 1A Non-Carbonate Stone	8-32R	
	FINE	Manufactured	8-32R
	Screenings	8-32R	18.0
	R.A.P.		
MINERAL FILLER			

Sieve Size	BIN 3/4" NO. 6		BIN 3/8" NO. 5		BIN 1/4" NO. 4		BIN M.Sand NO. 3		BIN Scrn NO. 2		MF NO. 1	
	%		%		%		%		%		%	
	ret.	pass	ret.	pass.	ret.	pass.	ret.	pass.	ret.	pass.	ret.	pass.
1 1/2"	-	100.0	-	100.0	-	100.0	-	100.0	-	100.0		
1"	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0		
3/4"	18.8	81.2	18.8	81.2	0.0	100.0	0.0	100.0	0.0	100.0		
1/2"	36.2	45.0	47.0	34.2	0.5	99.5	0.0	100.0	0.0	100.0		
1/4"	41.8	3.2	31.0	3.2	34.4	65.1	0.0	100.0	0.0	100.0		
1/8"					61.3	3.8	1.1	98.9	21.0	79.0		
20							26.9	72.0	25.0	54.0		
40							41.0	31.0	18.0	36.0		
80							17.0	14.0	14.0	22.0		
200							9.5	4.5	9.7	12.3		
PAN	3.2	-	3.2	-	3.8	-	4.5	-	12.3	-	100.0	-
Totals	100.0	-	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
3/4"	45.0	45.0	45.0	36.5	20.3	1.4	0.0	0.0	0.0	0.0	0.0
3/8"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1/4"	19.0	19.0	19.0	19.0	18.9	12.4	0.7	0.0	0.0	0.0	0.0
Sand	18.0	18.0	18.0	18.0	18.0	18.0	17.8	13.0	5.6	2.5	0.8
Screening	18.0	18.0	18.0	18.0	18.0	18.0	14.2	9.7	6.5	4.0	2.2
MF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	100.0	91.5	75.2	49.8	32.7	22.7	12.1	6.5	3.0
Specification Limits		100	95-100	-	70-90	48-74	32-62	15-39	8-27	4-16	2-8

REMARKS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY Willets Point Asphalt ON 3/31/2021

**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	
3.5	5	45.0	521.1	0.0	98.0	188.6	217.8	0.0	0.0	0.0	0.0	0.0	16.7	521.1
	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	19.0	220.0	0.0	0.0	1.1	75.7	134.9	0.0	0.0	0.0	0.0	8.3	220.0
	2	18.0	208.4	0.0	0.0	0.0	0.0	2.3	56.1	85.5	35.4	0.0	29.1	208.4
	1	18.0	208.4	0.0	0.0	0.0	0.0	43.8	52.1	37.5	29.2	0.0	45.8	208.4
	MF	0.0	0.0	(Specimen wtg)= $\frac{1200}{1200}$ x $\frac{3.5}{42.0}$ %A.C. = $\frac{42.0}{1158.0}$ gr. A.C.										
	Total	100.0	1158.0	(Specimen wtg)= $\frac{1200}{1200}$ - $\frac{42.0}{1158.0}$ gr. A.C. = $\frac{1158.0}{1158.0}$ 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	
4.0	5	45.0	518.4	0.0	97.5	187.7	216.7	0.0	0.0	0.0	0.0	0.0	16.5	518.4
	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	19.0	218.9	0.0	0.0	1.1	75.3	134.2	0.0	0.0	0.0	0.0	8.3	218.9
	2	18.0	207.4	0.0	0.0	0.0	0.0	2.3	55.8	85.0	35.3	0.0	29.0	207.4
	1	18.0	207.4	0.0	0.0	0.0	0.0	43.5	51.8	37.3	29.0	0.0	45.8	207.4
	MF	0.0	0.0	(Specimen wtg)= $\frac{1200}{1200}$ x $\frac{4.0}{48.0}$ %A.C. = $\frac{48.0}{1152.0}$ gr. A.C.										
	Total	100.0	1152.0	(Specimen wtg)= $\frac{1200}{1200}$ - $\frac{48.0}{1152.0}$ gr. A.C. = $\frac{1152.0}{1152.0}$ 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	
4.5	5	45.0	515.7	0.0	97.0	186.7	215.6	0.0	0.0	0.0	0.0	0.0	16.4	515.7
	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	19.0	217.7	0.0	0.0	1.1	74.9	133.5	0.0	0.0	0.0	0.0	8.2	217.7
	2	18.0	206.3	0.0	0.0	0.0	0.0	2.3	55.5	84.6	35.1	0.0	28.8	206.3
	1	18.0	206.3	0.0	0.0	0.0	0.0	43.3	51.6	37.1	28.9	0.0	45.4	206.3
	MF	0.0	0.0	(Specimen wtg)= $\frac{1200}{1200}$ x $\frac{4.5}{54.0}$ %A.C. = $\frac{54.0}{1146.0}$ gr. A.C.										
	Total	100.0	1146.0	(Specimen wtg)= $\frac{1200}{1200}$ - $\frac{54.0}{1146.0}$ gr. A.C. = $\frac{1146.0}{1146.0}$ 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	
5.0	5	45.0	513.0	0.0	96.4	185.7	214.4	0.0	0.0	0.0	0.0	0.0	16.5	513.0
	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	19.0	216.6	0.0	0.0	1.1	74.5	132.8	0.0	0.0	0.0	0.0	8.2	216.6
	2	18.0	205.2	0.0	0.0	0.0	0.0	2.3	55.2	84.1	34.9	0.0	28.7	205.2
	1	18.0	205.2	0.0	0.0	0.0	0.0	43.1	51.3	36.9	28.7	0.0	45.2	205.2
	MF	0.0	0.0	(Specimen wtg)= $\frac{1200}{1200}$ x $\frac{5.0}{60.0}$ %A.C. = $\frac{60.0}{1140.0}$ gr. A.C.										
	Total	100.0	1140.0	(Specimen wtg)= $\frac{1200}{1200}$ - $\frac{60.0}{1140.0}$ gr. A.C. = $\frac{1140.0}{1140.0}$ 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	
5.5	5	45.0	510.3	0.0	95.9	184.7	213.3	0.0	0.0	0.0	0.0	0.0	16.4	510.3
	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	19.0	215.5	0.0	0.0	1.1	74.1	132.1	0.0	0.0	0.0	0.0	8.2	215.5
	2	18.0	204.1	0.0	0.0	0.0	0.0	2.2	54.9	83.7	34.7	0.0	28.6	204.1
	1	18.0	204.1	0.0	0.0	0.0	0.0	42.9	51.0	36.7	28.6	0.0	44.9	204.1
	MF	0.0	0.0	(Specimen wtg)= $\frac{1200}{1200}$ x $\frac{5.5}{66.0}$ %A.C. = $\frac{66.0}{1134.0}$ gr. A.C.										
	Total	100.0	1134.0	(Specimen wtg)= $\frac{1200}{1200}$ - $\frac{66.0}{1134.0}$ gr. A.C. = $\frac{1134.0}{1134.0}$ gr. Aggregate										

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

**COMPUTATION OF MARSHALL  
MIX PROPERTIES**

ITEM \_\_\_\_\_ REGION 11MIX TYPE Type 3 BinderPRODUCER Willets Point Asphalt LOCATION Flushing, NY

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		1202.6	704.8	1203.3	498.5	2.412		2875	1.04	2990	9.0	
B		1198.4	703.2	1199.2	496.0	2.416		2915	1.04	3032	9.5	
C		1199.4	703.6	1200.4	496.8	2.414		2870	1.04	2985	9.0	
AVG.	3.5					2.414	150.6			3002	9.2	326
A		1201.0	706.7	1202.1	495.4	2.424		2950	1.09	3216	10.5	
B		1202.1	708.1	1202.9	494.8	2.429		2925	1.09	3188	10.0	
C		1202.7	707.9	1203.5	495.6	2.427		2870	1.09	3128	10.0	
AVG.	4.0					2.427	151.4			3177	10.2	312
A		1202.9	712.1	1203.8	491.7	2.446		3050	1.09	3325	11.0	
B		1201.6	711.6	1202.4	490.8	2.448		3260	1.09	3553	10.5	
C		1202.3	709.4	1203.1	493.7	2.435		3175	1.09	3461	11.0	
AVG.	4.5					2.443	152.4			3446	10.8	319
A		1202.1	714.1	1203.1	489.0	2.458		2625	1.09	2861	12.0	
B		1202.8	714.6	1203.6	489.0	2.460		2675	1.09	2916	11.5	
C		1200.7	712.0	1201.5	489.5	2.453		2530	1.09	2758	11.0	
AVG.	5.0					2.457	153.3			2845	11.5	247
A		1200.6	711.5	1201.5	490.0	2.450		2550	1.09	2780	12.0	
B		1197.9	711.2	1198.7	487.5	2.457		2415	1.09	2632	12.0	
C		1201.5	711.9	1202.6	490.7	2.449		2425	1.09	2643	12.5	
AVG.	5.5					2.452	153.0			2685	12.2	220

PREPARED BY \_\_\_\_\_

Willets Point Asphalt

DATE \_\_\_\_\_

3/31/2021

BR 76 M (12/94)

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

MIX TYPE Type 3 Binder 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	3.5 %		4.0 %		4.5 %		5.0 %		5.5 %	
	1	2	1	2	1	2	1	2	1	2
A	1202.5	1201.3	1203.0	1201.3	1202.7	1198.7	1199.4	1202.5	1201.4	1199.6
D	7407.0	7492.0	7407.0	7492.0	7492.0	7407.0	7492.0	7407.0	7492.0	7407.0
E	8142.6	8225.3	8139.1	8224.1	8222.9	8133.9	8215.1	8133.4	8213.6	8126.1
A+D-E	466.9	468.0	470.9	469.2	471.8	471.8	476.3	476.1	479.8	480.5
Gmm	2.575	2.567	2.555	2.560	2.549	2.541	2.518	2.526	2.504	2.497
Average Gmm	2.571		2.558		2.545		2.522		2.501	

TESTED BY Willets Point Asphalt ON 3/31/2021

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

ITEM \_\_\_\_\_ REGION 11  
MIX TYPE 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	2.731	2.676	P1	43.43	43.20	42.98	42.75	42.53
	No. 1 Stone				P2					
	No. 1 Non-Carbonate Stone	8-32R	2.731	2.676	P3	18.34	18.24	18.15	18.05	17.96
	No. 1A Stone				P4					
	No. 1A Non-Carbonate Stone				P5					
FA	Man. Sand	8-32R	2.735	2.688	P6	17.37	17.28	17.19	17.10	17.01
	Screenings	8-32R	2.735	2.688	P7	17.37	17.28	17.19	17.10	17.01
	R.A.P.				P8					
MINERAL FILLER					P9					
TOTAL AGGREGATE					Ps	96.5	96.0	95.5	95.0	94.5
ASPHALT CEMENT @ 25 C				1.031	PB	3.5	4.0	4.5	5.0	5.5
Gmm	Max Sp. Gr. of Paving Mix (AASHTO T209)					2.571	2.558	2.545	2.522	2.501
Gmb	Bulk Sp. Gr. of compacted mix (AASHTO T166)					2.414	2.427	2.443	2.457	2.452
Gsb	Bulk Sp. Gr. of total aggregate*					2.680	2.680	2.680	2.680	2.680
Gse	Effective Sp. Gr. of total aggregate*					2.718	2.726	2.734	2.730	2.727
Gsa	Apparent Sp. Gr. of total aggregate					2.732	2.732	2.732	2.732	2.732
VMA	100 - (Gmb x Ps/Gsb)					13.08	13.06	12.95	12.90	13.54
Pa	Pa = 100[(Gmm - Gmb)/Gmm]					6.11	5.12	4.01	2.58	1.96
VFA	VFA = 100 [(VMA - Pa)/VMA]					53.29	60.80	69.03	80.00	85.52
Pbe	Effective Asphalt Content = Gb(VMA - Pa)/Gmb					2.98	3.37	3.77	4.33	4.87
	Stability (CORRECTED)					3002	3177	3446	2845	2685
	Flow					9.2	10.2	10.8	11.5	12.2
	Marshall Quotient = Stability(corrected)/Flow					326	312	319	247	220
	Unit Weight					150.6	151.4	152.4	153.3	153.0

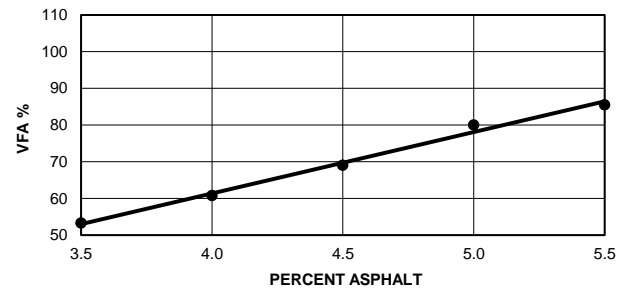
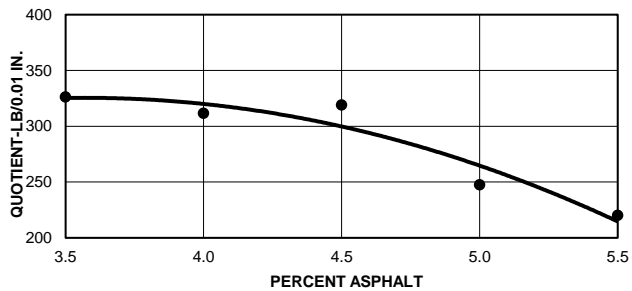
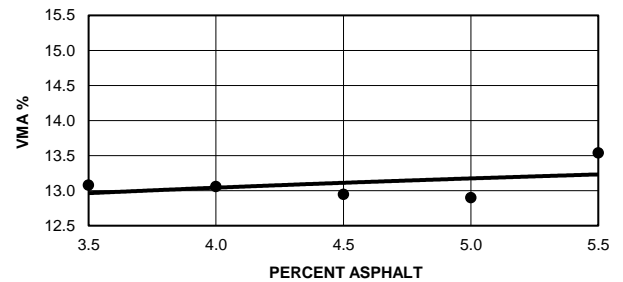
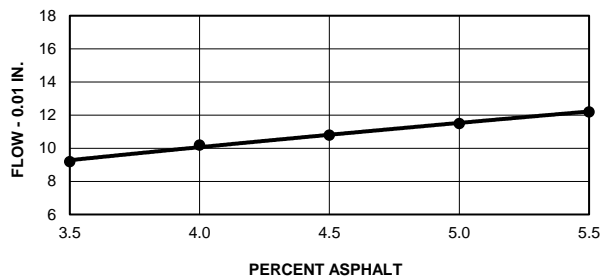
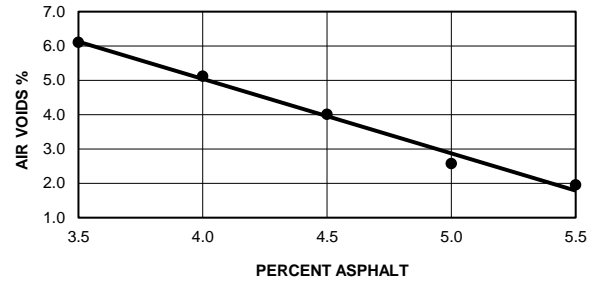
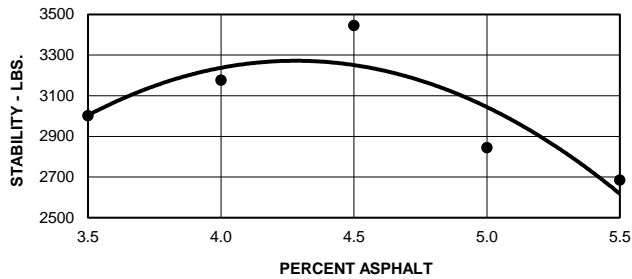
\* EQUATIONS FROM CHAPTER V, SECTION E, NY MATERIALS METHOD 5.13

Prepared By

Willets Point Asphalt

On 3/31/2021

MARSHALL TEST PROPERTY CURVES AND RANGE DATA



COMMON OVERLAP RANGE 4.2-4.8  
 MID POINT 4.5  
 (OPTIMUM AC CONTENT) 4.5

SUBMITTED BY Willets Point Asphalt  
 DATE 3/31/2021

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	3350	10.7	315	4.0	13.5	70.0