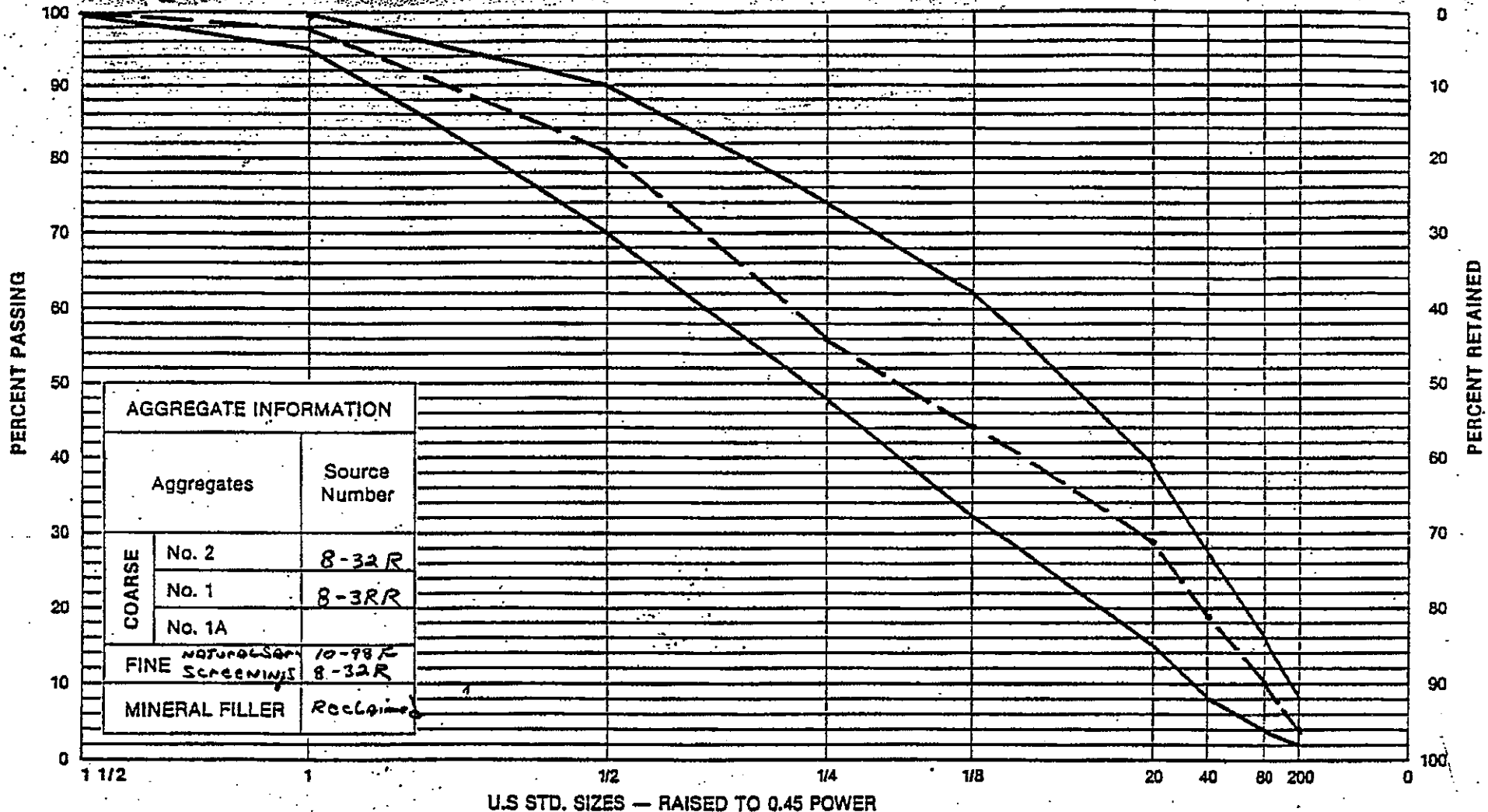
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU
**JOB MIX FORMULA** PROD. COPY
Type 3 Binder (Dense)

Plant Flushing Asphalt Region 11
Plant Location College Pt
Submitted By R. Hoeffner Date 1/6/16
(SUBMISSION INSTRUCTIONS ON BACK)




| AGGREGATE INFORMATION | | |
|---|---|---|
| Aggregates | | Source Number |
| COARSE | No. 2 | 8-32R |
| | No. 1 | 8-3RR |
| | No. 1A | |
| FINE | Natural Sand | 10-98R |
| | Screenings | 8-32R |
| MINERAL FILLER | | Reclaim |

| Sieve Size | | 2" | 1 1/2" | 1" | 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 | 4-18 | 2-8 | 4.5-6.5 |
| | 2. JMF Range | | 100 | 95-100 | 75-87 | 49-63 | 37-51 | 22-36 | 12-26 | 6-14 | 2-6 | |
| | 3. Target Value | | 100 | 97.5 | 81 | 56 | 44 | 29 | 19 | 10 | 4 | 5.0 |

| Asphalt Grade |
|---|
| AC 20 |

Approved by (for) Regional Director _____ Date 1/6/16

Remarks: _____

BR 77a (2/90)

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

ITEM 403.13 REGION 11

MIX TYPE DENSE BINDER

PRODUCER Flushing Asphalt

LOCATION COLLEGE POINT

COMPACTION 75 BLOWS PER SIDE

## WORKSHEET FOR ANALYSIS OF COMPACTED PAVING MIXTURE

(Analysis by weight of total mixture)

### COMPOSITION OF PAVING MIXTURE

| CONSTITUENT MATERIAL | | NYSDOT Source Number | Specific Gravity, G: Apparent | Specific Gravity, G: Bulk | | Region Verification | Mix Composition, % by weight of Total Mix., P: Mix or Trial Number 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Coarse Aggregates | No. 2 Stone | 8-32R | 2.767 | 2.740 | $P_1$ | | 31.5 | 31.4 | 31.3 | 31.2 | 31.1 |
| | No. 1 Stone | 8-32R | 2.767 | 2.740 | $P_2$ | | 20.6 | 20.5 | 20.4 | 20.3 | 20.2 |
| | No. 1 Non-Carbonate Stone | ---- | ---- | ---- | $P_3$ | | | | | | |
| | No. 1A Stone | ---- | ---- | ---- | $P_4$ | | | | | | |
| | 1A Non-Carbonate Stone | ---- | ---- | ---- | $P_5$ | | | | | | |
| Fine Aggregates | Manufactured | 8-32R | 2.767 | 2.740 | $P_6$ | | 23.3 | 23.2 | 23.1 | 23.0 | 22.9 |
| | Natural | 10-98FM | 2.646 | 2.612 | $P_7$ | | 20.2 | 20.1 | 20.0 | 19.9 | 19.8 |
| MINERAL FILLER | | | | | $P_8$ | | ---- | ---- | ---- | ---- | ---- |
| TOTAL AGGREGATE | | | | | $P_S$ | | 95.6 | 95.2 | 94.8 | 94.4 | 94.0 |
| ASPHALT CEMENT @ 77 F (25C) | | | 1.025 | | $P_B$ | | 4.4 | 4.8 | 5.2 | 5.6 | 6.0 |
| $G_{mm}$ | Max. Sp. Gr. of Paving Mix (ASTM D2041) | | | | | | 2.551 | 2.534 | 2.520 | 2.501 | 2.477 |
| $G_{mb}$ | Bulk Sp. Gr. of compacted mix (ASTM D2726) | | | | | | 2.397 | 2.424 | 2.440 | 2.438 | 2.429 |
| $G_{sb}$ | Bulk Sp. Gr. of total aggregate* | | | | | | 2.711 | 2.712 | 2.712 | 2.712 | 2.712 |
| $G_{se}$ | Effective Sp. Gr. of total aggregate* | | | | | | 2.738 | 2.737 | 2.734 | 2.733 | 2.723 |
| $G_{sa}$ | Apparent Sp. Gr. of total aggregate* | | | | | | 2.740 | 2.740 | 2.740 | 2.740 | 2.741 |
| VMA | $100 - \left(\frac{G_{mb} \times P_S}{G_{sb}}\right)$ | | | | | | 15.48 | 14.91 | 14.71 | 15.14 | 15.81 |
| $P_a$ | Air Voids $= 100\left(\frac{G_{mm} - G_{mb}}{G_{mm}}\right)$ | | | | | | 6.04 | 4.34 | 3.17 | 2.52 | 1.94 |
| $P_{vma}$ | % VMA filled w/A.C. $= 100\left(\frac{VMA - P_a}{VMA}\right)$ | | | | | | 60.98 | 70.89 | 78.45 | 83.35 | 87.72 |
| $P_{be}$ | Effective Asphalt Content $= \left(\frac{G_b (VMA - P_a)}{G_{mb}}\right)$ | | | | | | 4.03 | 4.46 | 4.85 | 5.30 | 5.85 |
| | Stability (CORRECTED) | | | | | | 2271 | 2626 | 2673 | 2636 | 2520 |
| | Flow | | | | | | 6.0 | 8.7 | 12.0 | 14.0 | 16.3 |
| | Marshall Quotient $= \frac{\text{Stability (corrected)}}{\text{Flow}}$ | | | | | | 379 | 302 | 228 | 188 | 155 |
| | Unit Weight | | | | | | 149.57 | 151.26 | 152.26 | 152.13 | 151.57 |

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

Prepared by R. HOEFFNER on 1/6/16

BR 88b (2/90)

# NEW YORK STATE
# DEPARTMENT OF TRANSPORTATION
## MATERIALS BUREAU
## MARSHALL GRADATION ANALYSIS WORKSHEET

REGION 11

ITEM 403.13

MIX TYPE DENSE BINDER

PRODUCER Flushing Asphalt

LOCATION College PT NY

COMPOSITE NO. OF ~~HOT~~ BINS AVERAGED 10+

## AGGREGATE INFORMATION

| | Aggregates | Source Number | Aggregate Blend % |
|---|---|---|---|
| COARSE | No. 2 Stone | 8-32R | |
| COARSE | No. 1 Stone | 8-32R | |
| COARSE | No. 1 Non-Carbonate Stone | | |
| COARSE | No. 1A Stone | | |
| COARSE | No. 1A Non-Carbonate Stone | | |
| FINE | Manufactured | 8-32R | |
| FINE | Natural | 10-98F | |
| MINERAL FILLER | | | |

| | |
|---|---|
| # 1 High Friction Blend | |
| #1A High Friction Blend | |
| Manufactured /Natural Sand Blend | |

## AVERAGE BIN BREAKDOWN

| Sieve Sizes | BIN NO. % retained | BIN NO. % pass | BIN NO. Composite % retained | BIN NO. Composite % pass | BIN NO. % retained | BIN NO. % pass | BIN NO. % retained | BIN NO. % pass | MINERAL FILLER % retained | MINERAL FILLER % pass |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 1/2" | | | 0 | 100 | | | | | | |
| 1" | | | 2.5 | 97.5 | | | | | | |
| 3/4" | | | --- | --- | | | | | | |
| 1/2" | | | 16.5 | 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 | --- | | | | | | |
| TOTALS | | | | | | | | | | |

## COMBINED AVERAGE GRADATION

| BIN | % BATCH | % Passing Sieve 1 1/2" | 1" | 3/4" | 1/2" | 1/4" | 1/8" | 20 | 40 | 80 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| Composite | 100.0 | 100 | 97.5 | -- | 81.0 | 56.0 | 44.0 | 29.0 | 19.0 | 10.0 | 4.0 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| Min. Filler | | | | | | | | | | | |
| TOTAL | | 100 | 97.5 | -- | 81.0 | 56.0 | 44.0 | 29.0 | 19.0 | 10.0 | 4.0 |
| Spec. LIMITS | | 100 | 95/100 | | 75/87 | 49/63 | 37/51 | 22/36 | 12/26 | 6/14 | 2/6 |

Remarks

TESTED BY R. HOEFFNER ON 1/6/16

BR 88b (2/90)
REVERSE

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

| % A.C. | AGGREGATE COMPONENT (BIN) | % BATCH | GRAMS BATCH | WEIGHT RETAINED (GRAMS) 1" | 3/4" | 1/2" | 1/4" | 1/8" | 20 | 40 | 80 | 200 | PAN | TOTAL Wgt. Ret. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | Composite | 100.0 | 1147.2 | 28.7 | -- | 189.3 | 286.8 | 137.6 | 172.0 | 114.7 | 103.2 | 68.8 | 46.1 | |
| 4.4 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | Min. Filler | | | | | | | | | | | | | |
| | TOTAL | | | | | | | | | | | | | |

1200.0 gr × 4.4 % A.C. = 52.8 gr. A.C.

1200.0 gr − 52.8 gr. A.C. = 1147.2 gr. Aggregate

| % A.C. | AGGREGATE COMPONENT (BIN) | % BATCH | GRAMS BATCH | WEIGHT RETAINED (GRAMS) 1" | 3/4" | 1/2" | 1/4" | 1/8" | 20 | 40 | 80 | 200 | PAN | TOTAL Wgt. Ret. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | Composite | 100.0 | 1142.4 | 28.6 | -- | 188.5 | 285.6 | 137.0 | 171.3 | 114.2 | 102.8 | 68.5 | 45.9 | |
| 4.8 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | Min. Filler | | | | | | | | | | | | | |
| | TOTAL | | | | | | | | | | | | | |

1200.0 gr × 4.8 % A.C. = 57.6 gr. A.C.

1200.0 gr − 57.6 gr. A.C. = 1142.4 gr. Aggregate

| % A.C. | AGGREGATE COMPONENT (BIN) | % BATCH | GRAMS BATCH | WEIGHT RETAINED (GRAMS) 1" | 3/4" | 1/2" | 1/4" | 1/8" | 20 | 40 | 80 | 200 | PAN | TOTAL Wgt. Ret. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | Composite | 100.0 | 1137.6 | 28.4 | -- | 187.7 | 284.4 | 136.5 | 170.6 | 113.8 | 102.3 | 68.2 | 45.7 | |
| 5.2 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | Min. Filler | | | | | | | | | | | | | |
| | TOTAL | | | | | | | | | | | | | |

1200.0 gr × 5.2 % A.C. = 62.4 gr. A.C.

1200.0 gr − 62.4 gr. A.C. = 1137.6 gr. Aggregate

| % A.C. | AGGREGATE COMPONENT (BIN) | % BATCH | GRAMS BATCH | WEIGHT RETAINED (GRAMS) 1" | 3/4" | 1/2" | 1/4" | 1/8" | 20 | 40 | 80 | 200 | PAN | TOTAL Wgt. Ret. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | Composite | 100.0 | 1132.8 | 28.3 | -- | 186.9 | 283.2 | 135.9 | 169.9 | 113.3 | 101.9 | 67.9 | 45.5 | |
| 5.6 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | Min. Filler | | | | | | | | | | | | | |
| | TOTAL | | | | | | | | | | | | | |

1200.0 gr × 5.6 % A.C. = 67.2 gr. A.C.

1200.0 gr − 67.2 gr. A.C. = 1132.8 gr. Aggregate

| % A.C. | AGGREGATE COMPONENT (BIN) | % BATCH | GRAMS BATCH | WEIGHT RETAINED (GRAMS) 1" | 3/4" | 1/2" | 1/4" | 1/8" | 20 | 40 | 80 | 200 | PAN | TOTAL Wgt. Ret. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | |
| | Composite | 100.0 | 1128.0 | 28.2 | -- | 186.1 | 282.0 | 135.3 | 169.2 | 112.8 | 101.5 | 67.7 | 45.2 | |
| 6.0 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | Min. Filler | | | | | | | | | | | | | |
| | TOTAL | | | | | | | | | | | | | |

1200.0 gr × 6.0 % A.C. = 72.0 gr. A.C.

1200.0 gr − 72.0 gr. A.C. = 1128.0 gr. Aggregate

BR 79 (3/81)

COMPUTATION OF MARSHALL MIX PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM 403.13 REGION 11

MIX TYPE DENSE BINDER

PRODUCER Flushing Asphalt LOCATION COLLEGE POINT, NY

| Specimen | Asphalt Content | Weight – Grams | | | Volume CC | Specific Gravity | | Voids Total Mix | Unit Wt. Lb/Cu Ft | Stability–Lb | | Flow 0.01 In. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In Air | In Water | S.S.D. | | Bulk $G_{mb}$ | Theor. $G_{mm}$ | | | Measured | Corrected | |
| a | b | c | d | e | f | g | h | i | j | k | l | m |
| | | | | | e–d | $\frac{c}{f}$ | | $\frac{100(h-g)}{h}$ | (gX62.4) | | | |
| A | 4.4 | 1200.7 | 702.1 | 1202.1 | 500 | 2.401 | 2.551 | | | 2215 | 2304 | 6.0 |
| B | 4.4 | 1205.1 | 704.6 | 1206.7 | 502.1 | 2.400 | 2.551 | | | 2206 | 2294 | 6.0 |
| C | 4.4 | 1199.6 | 699.3 | 1201.3 | 502.0 | 2.389 | 2.551 | | | 2130 | 2215 | 6.0 |
| AVG. | 4.4 | | | | | 2.397 | 2.551 | 6.04 | 149.57 | | 2271 | 6.0 |
| A | 4.8 | 1201.0 | 706.5 | 1201.9 | 495.4 | 2.424 | 2.534 | | | 2550 | 2652 | 10.0 |
| B | 4.8 | 1204.1 | 709.4 | 1205.6 | 496.2 | 2.427 | 2.534 | | | 2550 | 2652 | 8.0 |
| C | 4.8 | 1200 | 705.6 | 1201.4 | 495.8 | 2.420 | 2.534 | | | 2464 | 2563 | 8.0 |
| AVG. | 4.8 | | | | | 2.424 | 2.534 | 4.34 | 151.26 | | 2626 | 8.7 |
| A | 5.2 | 1194.9 | 706.3 | 1196.1 | 489.8 | 2.439 | 2.520 | | | 2416 | 2633 | 12.0 |
| B | 5.2 | 1199.8 | 708.1 | 1200.5 | 492.4 | 2.436 | 2.520 | | | 2388 | 2603 | 12.0 |
| C | 5.2 | 1197.1 | 708.0 | 1198.0 | 490.0 | 2.443 | 2.520 | | | 2552 | 2782 | 12.0 |
| AVG. | 5.2 | | | | | 2.439 | 2.520 | 3.21 | 152.2 | | 2673 | 12.0 |
| A | 5.6 | 1200.7 | 709.3 | 1200.9 | 491.6 | 2.442 | 2.501 | | | 2469 | 2692 | 12.0 |
| B | 5.6 | 1193.0 | 704.7 | 1194.1 | 489.4 | 2.438 | 2.501 | | | 2425 | 2643 | 15.0 |
| C | 5.6 | 1199.5 | 708.0 | 1200.8 | 492.8 | 2.434 | 2.501 | | | 2361 | 2573 | 15.0 |
| AVG. | 5.6 | | | | | 2.438 | 2.501 | 2.52 | 152.13 | | 2636 | 14.0 |
| A | 6.0 | 1206.8 | 710.7 | 1207.1 | 496.4 | 2.431 | 2.477 | | | 2445 | 2543 | 17.0 |
| B | 6.0 | 1203.4 | 707.5 | 1203.7 | 496.2 | 2.425 | 2.477 | | | 2436 | 2533 | 16.0 |
| C | 6.0 | 1204.0 | 709.3 | 1204.8 | 495.5 | 2.430 | 2.477 | | | 2387 | 2483 | 16.0 |
| AVG. | 6.0 | | | | | 2.429 | 2.477 | 1.94 | 151.57 | | 2520 | 16.3 |

PREPARED BY R. HOEFFNER DATE 1/6/16

BR 76 (3/81)

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

MIX TYPE DENSE BINDER REGION 11

PRODUCER FLUSHING ASPHALT, LLC

LOCATION COLLEGE POINT

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

Maximum Specific Gravity of Bituminous Paving Mixture = $G_{mm}$
A= Weight of dry sample in air (grams)
D= Weight of flask filled with airless water at 77°F (25°C) grams
E= Weight of flask filled with water and sample at 77°F (25°C) grams

$$G_{mm} = \frac{A}{A+D-E}$$

| 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 | 1203.9 | 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 | 482.6 | 488.5 | 487.1 |
| $G_{mm}$ | 2.548 | 2.554 | 2.530 | 2.538 | 2.517 | 2.523 | 2.496 | 2.506 | 2.474 | 2.480 |
| Average $G_{mm}$ | 2.551 | | 2.534 | | 2.520 | | 2.501 | | 2.477 | |

Test By R. HOEFFNER on 1/6/16

BR 78a (2/90)

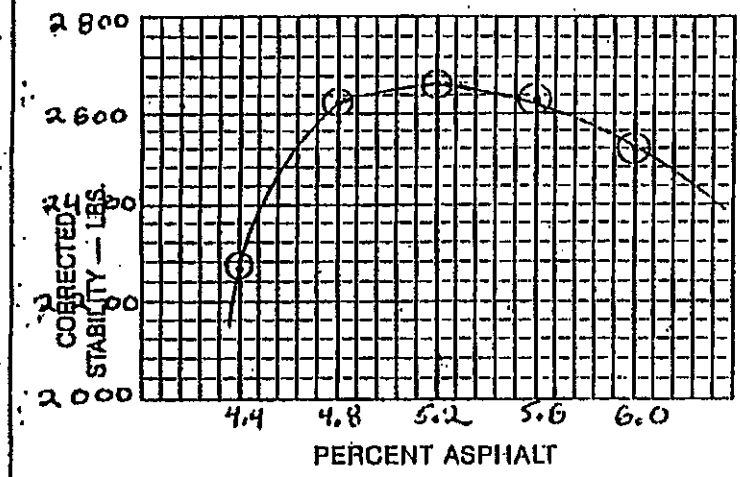
NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

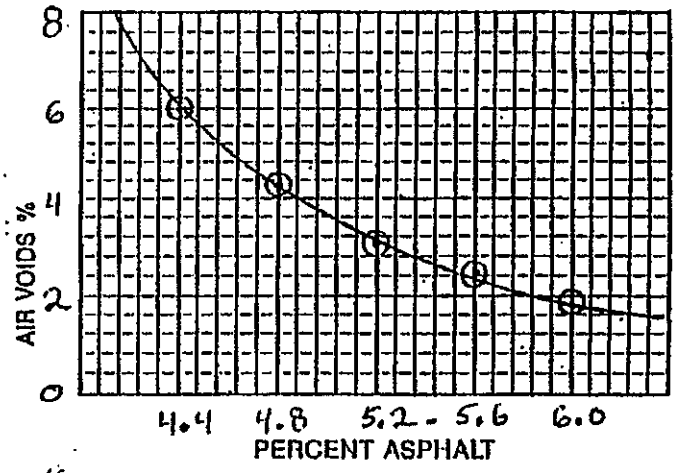
REGION 11

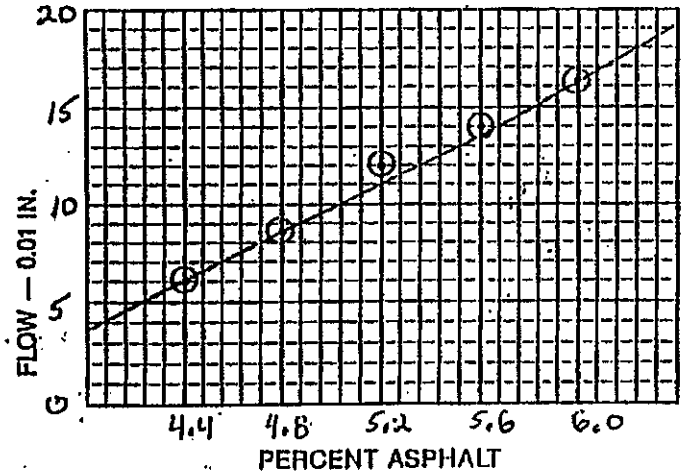
MIX TYPE III

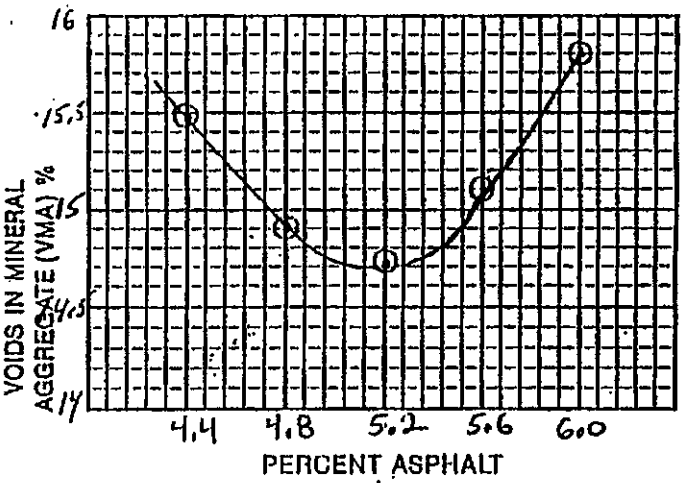
Producer FLUSHING ASPHALT LLC Location College PT

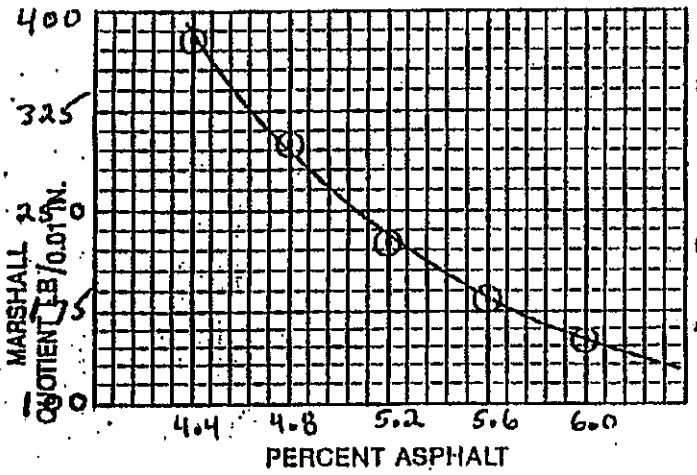
## MARSHALL TEST PROPERTY CURVES AND RANGE DATA

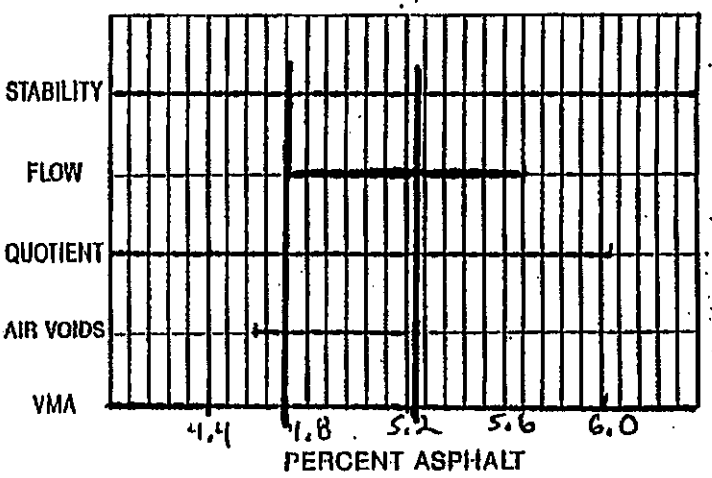



COMMON OVERLAP RANGE 4.7 - 5.3

MID POINT (OPTIMUM AC CONTENT) 5.0

SUBMITTED BY Ralph Hoeffner

DATE 1/6/16

VALUES AT OPTIMUM AC CONTENT

| PROPERTY | STABILITY | FLOW | QUOTIENT | AIR VOIDS | VMA |
|---|---|---|---|---|---|
| SPEC. | 1500 | 8-14 | 150 MIN. | 3-5 | 13.5 MIN |
| ACTUAL | 2650 | 10 | 265 | 3.8 | 14.7 |