

AGGREGATE TECHNICIAN HANDOUTS



AGGREGATE GRADATION
SPECIFICATIONS - 2018

| | |
|------------------|--|
| Coarse Aggregate | Agg Manual Pg. 1 – 23 Spec Book Pg. 800, Table 703.4 C. Agg. } MP 601.03.51 Minus No. 200 in Conc. Agg. Spec Book Pg. 799, 703.4 |
| Fine Aggregate | Agg Manual Pg. 1 – 25 Spec Book Pg. 795, 702.6 F. Agg. } MP 601.03.51 Minus No. 200 in Conc. Agg. Spec Book Pg. 794, 702.1.2 |
| Combination | Agg Manual Pg. 1 – 24 Spec Book Pg. 802, Table 704.6.2 |

Aggregate in the 2017 Spec Book

| | | | |
|------------|---|------------|--|
| 207 | Excavation and Embankment (pg. 112) | 412 | Winter Grade Asphalt Patching Material (pg. 213) |
| 211 | Borrow Excavation (pg. 128) | 501 | Portland Cement Concrete Pavement (pg. 219) |
| 212 | Structure, Rock, and Wet Excavation (Select Materials) pg. 133 | | |
| 217 | Special Rock Fill (pg. 140) | 507 | Crack and Pothole Repair (pg. 263) |
| 218 | Slope and Foundation Protection (pg. 141) | 601 | Structural Concrete (pg. 297) |
| 307 | Crushed Aggregate Base Course (p. 153) | 603 | Prestressed Concrete Members (pg. 340) |
| 311 | Open Graded Free Draining Base Course (pg. 159) | 604 | Pipe Culverts (pg. 365) |
| | | 606 | Underdrains (pg. 383) |
| 401 | Hot Mix, Asphalt Wearing and Patching, and Leveling (pg. 163) | 626 | Retaining Wall Systems (pg. 511) |
| 402 | Asphalt Skid-Resistant Pavement (pg. 181) | 636 | Maintaining Traffic (pg. 540) |
| 405 | Surface Treatments (pg. 283) | 702 | Fine Aggregate (pg. 794) |
| | | 703 | Coarse Aggregate (pg. 796) |
| | | 704 | Stone and Crushed Aggregate (pg. 801) |

Sampling from a Conveyor Belt

- Suppose the random number chosen to locate the Sampling Unit was .886
 $.886 \times 240 \text{ minutes} = 212.6 = 213 \text{ minutes}$
- Next convert 213 minutes to hours ($213 / 60 = 3 \text{ hours } 33 \text{ minutes}$)

Sampling From a Conveyor Belt Using a Calculator

- $213 / 60 = 3.55 \text{ hours}$
NOT 3 HOURS 55 MINUTES!
- .55 hour must then be multiplied by 60 minutes in one hour to obtain the number of minutes in excess of 3 hours
- $.55 \text{ hour} \times 60 \text{ minutes in one hour} = 33 \text{ minutes}$
- This gives you the correct answer of 3 hours and 33 minutes added to the starting time of production.

EXAMPLE:

8:00 AM + 3 hour and 33 minutes = 11:33 AM

Moisture Problem

10,000 TONS Class 1

6% Moisture

$$W_A = (1 + 0.06) = 10,000 \text{ TN}$$

$$W_A = 10,000 / 1.06$$

$$W_A = 9,434 \text{ TN}$$

$$W_w = 10,000 - 9434 = 566 \text{ TN}$$

$$\text{Class 1} = \$30.00 / \text{TN}$$

$$566 \text{ TN} \times \$30.00 =$$

\$16,980.00 For Water

(W_A is the weight of aggregate)

(W_w is the weight of water)

WEST VIRGINIA DIVISION OF HIGHWAYS
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE (AASHTO T-27)
MATERIALS FINER THAN No. 200 SIEVE BY WASHING (AASHTO T-11)

| | | | | |
|-----------------------------|--|------------------|-----------|------------|
| Site Manager I.D.#: | Aggregate Size: Manufactured Sand | Spec Sieve Sizes | % Pass | Pass /Fail |
| Lab Reference Number: | Sieve Type Coarse: | 3/8 in.(9.5mm) | 100 | Pass |
| Technician: | Sieve Type Fine: | No. 4 (4.75mm) | 100 | Pass |
| Producer / Supplier Code: | Material Type: | No. 16 (1.18mm) | 83 | Fail |
| Producer / Supplier Name: | Contract #: | No. 50 (300µm) | 53 | Fail |
| Site Manager Material Code: | Project #: | No. 100 (150µm) | 23 | Fail |
| Date Sampled: | Auth #: | No. 200 (75µm) | 2.6 | Pass |
| Date Tested: | Item #: | | 19 | 20 |
| | Tons / CY | | | |

- (A) Initial Oven Dry Mass of Total Sample..... (A) _____
- (B) Oven Dry mass of Total Sample After T-11..... (B) _____
- (C) Oven Dry Mass of Plus No. 4 Material..... (C) _____
- (D) Oven Dry Mass of Plus No. 4 Material After T-11..... (D) _____
- (E) Oven Dry Mass of Minus No. 4 Material Used in Split..... (E) _____
- (F) Combination Gradation Coarse Fraction Pan Material After Dry Sieving (K)..... (F) _____
- (G) Total Oven Dry Mass of Minus No. 4 Material (E+F)..... (G) _____
- (H) Initial Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material..... (H) **2** 340.8
- (I) Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material After T-11..... (I) **3** 335.5

Sieve Analysis of Coarse Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /A)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|-------------------------------------|------------------------------|-------------|--------------|------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| (J) Pan | | | | | | | | |
| (K) Combination Grad. Pan | | | | | | | | |
| (L) Loss By T-11..... | | | | | | | | |
| (M) Final Total (Σ M _R) | | | | | | | | |

C. F. = (G) ÷ (P)
C. F. = _____ ÷ _____
C. F. = _____

Sieve Analysis of Fine Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /HorA) x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|--|------------------------------|---------------|--------------|--|-----------------|--------------------------|-------------------------|---------------|
| | Regular | Combination | | | | | Low | High |
| 1 3/8 in.(9.5mm) | 4 0.0 | 8 ok | ok | 13 0.0 | 99.95 | 17 100 | 100 | 18 100 |
| No. 4 (4.75mm) | 0.0 | ok | ok | 0.0 | 99.95 | 100 | 95 | 100 |
| No. 8 (2.36mm) | 10.7 | ok | ok | 3.1 | 96.85 | 97 | | |
| No. 16 (1.18mm) | 47.7 | ok | ok | 14.0 | 82.85 | 83 | 45 | 80 |
| No. 30 (600µm) | 47.5 | ok | ok | 13.9 | 68.95 | 69 | | |
| No. 50 (300µm) | 55.1 | ok | ok | 16.2 | 52.75 | 53 | 10 | 30 |
| No. 100 (150µm) | 102.8 | ok | ok | 30.2 | 22.55 | 23 | 2 | 10 |
| No. 200 (75µm) | 68.0 | ok | ok | 20.0 | 2.55 | 2.6 | 0 | 5 |
| (N) Pan..... | 3.4 5 | | | | | | | |
| (O) Loss By T-11..... (H - | 5.3 7 | | | | | | 6 3.4 | |
| (P) Final Total Fine Sample (Σ M _R)..... | 10 340.5 | | | | | | 9 5.3 | |
| (Q) Final Total - No. 4 (Σ M _R)..... | | | | 14 8.7 | | | | 340.8 |
| (R) Combined Total (M+Q)..... | | | | x 100 = | 2.55281 | 15 % | | |
| (S) Sample Loss or Gain | (A-M) or (M-A)..... | | | | | | | |
| | (H-P) or (P-H)..... | 0.3 11 | | | | | | |
| | (A-R) or (R-A)..... | | | | | | | |
| (T) Percentage of Initial OD Mass ((S/A)x100) or ((S/H)x100) | | 0.1 12 | | | | | | |

Truncate to 2 Places
DO NOT ROUND!!!

Name: _____

Signature: _____

Date: _____

Remarks: _____

Lab Info Only:

WEST VIRGINIA DIVISION OF HIGHWAYS
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE (AASHTO T-27)
MATERIALS FINER THAN No. 200 SIEVE BY WASHING (AASHTO T-11)

| | | | | |
|-----------------------------|----------------------------|--------------------|--------|-------------|
| Site Manager I.D.#: | Aggregate Size: Class 1 | Spec Sieve Sizes | % Pass | Pass / Fail |
| Lab Reference Number: | Sieve Type Coarse: 12 Inch | 1 1/2 in. (37.5mm) | 100 | Pass |
| Technician: | Sieve Type Fine: 12 Inch | 3/4 in. (19.0mm) | 80 | Pass |
| Producer / Supplier Code: | Material Type: Lime Stone | No. 4 (4.75mm) | 34 | Pass |
| Producer / Supplier Name: | Contract #: | No. 40 (425µm) | 11 | Pass |
| Site Manager Material Code: | Project #: | No. 200 (75µm) | 7.2 | Fail |
| Date Sampled: | Auth #: | | (37) | (38) |
| Date Tested: | Item #: | | | |
| | Tons / CY | | | |

- (A) Initial Oven Dry Mass of Total Sample..... (A) (3) 10804.0
- (B) Oven Dry mass of Total Sample After T-11..... (B)
- (C) Oven Dry Mass of Plus No. 4 Material..... (C) (4) 7330.0
- (D) Oven Dry Mass of Plus No. 4 Material After T-11..... (D) (7) 7272.0
- (E) Oven Dry Mass of Minus No. 4 Material Used in Split..... (E) (5) 3483.0
- (F) Combination Gradation Coarse Fraction Pan Material After Dry Sieving (K)..... (F) (14) 77.0
- (G) Total Oven Dry Mass of Minus No. 4 Material (E+F)..... (G) (15) 3560.0
- (H) Initial Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material..... (H) (6) 320.6
- (I) Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material After T-11..... (I) (9) 259.3

Sieve Analysis of Coarse Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /A)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|-------------------------------------|------------------------------|-------------|--------------|------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| (1) 1 1/2 in. (37.5mm) | | (11) 0.0 | (12) ok | (27) 0.0 | 100.10 | (35) 100 | (36) 100 | |
| 1 in. (25.0mm) | | 559.0 | ok | 5.2 | 94.90 | 95 | | |
| 3/4 in. (19.0mm) | | 1,602.0 | ok | 14.8 | 80.10 | 80 | 50 | 90 |
| 1/2 in. (12.5mm) | | 2,488.0 | ok | 23.0 | 57.10 | 57 | | |
| 3/8 in. (9.5mm) | | 1,059.0 | ok | 9.8 | 47.30 | 47 | | |
| No. 4 (4.75mm) | | 1,486.0 | ok | 13.8 | 33.50 | 34 | 20 | 50 |
| (J) Pan | | | | | | | | |
| (K) Combination Grad. Pan | | (13) 77.0 | | | | | | |
| (L) Loss By T-11 | | (8) 58 | | | | | | |
| (M) Final Total (Σ M _R) | | 7,252.0 | | | | | | |

C. F. = (G) ÷ (P)
C. F. = (19) 3,560.0 ÷ (20) 320.4
C. F. = (23) 11.1111 (Rounded @ 4 Places)

Sieve Analysis of Fine Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /HorA)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|--|------------------------------|--------------|----------------------|---------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| (2) No. 8 (2.36mm) | (16) 101.7 | (17) 1130.0 | ok | 10.5 | 23.00 | 23 | | |
| No. 16 (1.18mm) | 75.6 | 840.0 | ok | 7.8 | 15.20 | 15 | | |
| No. 40 (425µm) | 37.2 | 413.3 | ok | 3.8 | 11.40 | 11 | 5 | 20 |
| No. 50 (300µm) | 9.9 | 110.0 | ok | 1.0 | 10.40 | 10 | | |
| No. 100 (150µm) | 17.0 | 188.9 | ok | 1.7 | 8.70 | 9 | | |
| No. 200 (75µm) | 14.2 | 157.8 | ok | 1.5 | 7.20 | 7.2 | 0 | 7 |
| (N) Pan | 3.5 | 38.9 | | | | | | |
| (O) Loss By T-11 | (10) 61.3 | 681.1 | Coarse - No. 200 Dry | | | | (29) 38.9 | |
| (P) Final Total Fine Sample (Σ M _R) | (18) 320.4 | | Coarse - No. 200 Wet | (28) 58.0 | | | (30) 681.1 | |
| (Q) Final Total - No. 4 (Σ M _R) | | (23) 3560.0 | Total - No. 200 | (31) 778.0 | ÷ | Init. Mass (A) or (H) | (32) 10804.0 | |
| (R) Combined Total (M+Q) | | (24) 10812.0 | | | x 100 = | (33) 7.20103 | % | |
| (S) Sample Loss or Gain | (A-M) or (M-A)..... | | | | | | | |
| | (H-P) or (P-H)..... | | | | | | | |
| | (A-R) or (R-A)..... | (25) 8.0 | | | | | | |
| (T) Percentage of Initial OD Mass ((S/A)x100) or ((S/H)x100) | | (26) 0.1 | | | | | | |

(Truncate @ 5 Places)

| | |
|------------|--|
| Name: | |
| Signature: | |
| Date: | |

| | | |
|----------|-------------|---|
| Remarks: | Fail | Lab Info Only: <input type="checkbox"/> |
| | | |
| | | |
| | | |

WEST VIRGINIA DIVISION OF HIGHWAYS
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE (AASHTO T-27)
MATERIALS FINER THAN No. 200 SIEVE BY WASHING (AASHTO T-11)

| | | | | |
|-----------------------------|--|------------------|--------|------------|
| Site Manager I.D.#: | Aggregate Size: Manufactured Sand | Spec Sieve Sizes | % Pass | Pass /Fail |
| Lab Reference Number: | Sieve Type Coarse: | 3/8 in.(9.5mm) | 100 | Pass |
| Technician: | Sieve Type Fine: | No. 4 (4.75mm) | 100 | Pass |
| Producer / Supplier Code: | Material Type: | No. 16 (1.18mm) | 83 | Fail |
| Producer / Supplier Name: | Contract #: | No. 50 (300µm) | 53 | Fail |
| Site Manager Material Code: | Project #: | No. 100 (150µm) | 23 | Fail |
| Date Sampled: | Auth #: | No. 200 (75µm) | 2.6 | Pass |
| Date Tested: | Item #: | | | |
| | Tons / CY | | | |

- (A) Initial Oven Dry Mass of Total Sample..... (A) _____
- (B) Oven Dry mass of Total Sample After T-11..... (B) _____
- (C) Oven Dry Mass of Plus No. 4 Material..... (C) _____
- (D) Oven Dry Mass of Plus No. 4 Material After T-11..... (D) _____
- (E) Oven Dry Mass of Minus No. 4 Material Used in Split..... (E) _____
- (F) Combination Gradation Coarse Fraction Pan Material After Dry Sieving (K)..... (F) _____
- (G) Total Oven Dry Mass of Minus No. 4 Material (E+F)..... (G) _____
- (H) Initial Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material..... (H) **340.8**
- (I) Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material After T-11..... (I) **335.5**

Sieve Analysis of Coarse Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /A)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|-------------------------------------|------------------------------|-------------|--------------|------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| (J) Pan | | | | | | | | |
| (K) Combination Grad. Pan | | | | | | | | |
| (L) Loss By T-11..... | | | | | | | | |
| (M) Final Total (Σ M _R) | | | | | | | | |

C. F. = (G) ÷ (P)
C. F. = _____ ÷ **340.5**
C. F. = _____

Sieve Analysis of Fine Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /(H+R))x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|--|------------------------------|-------------|--------------|--|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| 3/8 in.(9.5mm) | 0.0 | | ok | 0.0 | 99.95 | 100 | 100 | 100 |
| No. 4 (4.75mm) | 0.0 | | ok | 0.0 | 99.95 | 100 | 95 | 100 |
| No. 8 (2.36mm) | 10.7 | | ok | 3.1 | 96.85 | 97 | | |
| No. 16 (1.18mm) | 47.7 | | ok | 14.0 | 82.85 | 83 | 45 | 80 |
| No. 30 (600µm) | 47.5 | | ok | 13.9 | 68.95 | 69 | | |
| No. 50 (300µm) | 55.1 | | ok | 16.2 | 52.75 | 53 | 10 | 30 |
| No. 100 (150µm) | 102.8 | | ok | 30.2 | 22.55 | 23 | 2 | 10 |
| No. 200 (75µm) | 68.0 | | ok | 20.0 | 2.55 | 2.6 | 0 | 5 |
| (N) Pan..... | 3.4 | | | | | | | |
| (O) Loss By T-11..... (H - | 5.3 | | | | | | | |
| (P) Final Total Fine Sample (Σ M _R)..... | 340.5 | | | | | | | |
| (Q) Final Total - No. 4 (Σ M _R)..... | | | | | | | | |
| (R) Combined Total (M+Q)..... | | | | | | | | |
| (S) Sample Loss or Gain | (A-M) or (M-A)..... | | | | | | | |
| | (H-P) or (P-H)..... | 0.3 | | | | | | |
| | (A-R) or (R-A)..... | | | | | | | |
| (T) Percentage of Initial OD Mass ((S/A)x100) or ((S/H)x100) | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Total - No. 200 8.7 ÷ Init. Mass (A) or (H) **340.8**
x 100 = 2.55281 %
DO NOT ROUND!!!

Name: _____

Signature: _____

Date: _____

Remarks: _____

Lab Info Only:

WEST VIRGINIA DIVISION OF HIGHWAYS
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE (AASHTO T-27)
MATERIALS FINER THAN No. 200 SIEVE BY WASHING (AASHTO T-11)

| | | | | |
|-----------------------------|--------------------|--------------------|--------|------------|
| Site Manager I.D.#: | Aggregate Size: | Spec Sieve Sizes | % Pass | Pass /Fail |
| Lab Reference Number: | Sieve Type Coarse: | 1 1/2 in. (37.5mm) | 100 | Pass |
| Technician: | Sieve Type Fine: | 1 in. (25.0mm) | 99 | Pass |
| Producer / Supplier Code: | Material Type: | 1/2 in. (12.5mm) | 40 | Pass |
| Producer / Supplier Name: | Contract #: | No. 4 (4.75mm) | 3 | Pass |
| Site Manager Material Code: | Project #: | No. 8 (2.36mm) | 2 | Pass |
| Date Sampled: | Auth #: | No. 200 (75µm) | 1.5 | Pass |
| Date Tested: | Item #: | | | |
| | Tons / CY | | | |

- (A) Initial Oven Dry Mass of Total Sample..... (A) **10336.2**
- (B) Oven Dry mass of Total Sample After T-11..... (B) **10219.5**
- (C) Oven Dry Mass of Plus No. 4 Material..... (C) _____
- (D) Oven Dry Mass of Plus No. 4 Material After T-11..... (D) _____
- (E) Oven Dry Mass of Minus No. 4 Material Used in Split..... (E) _____
- (F) Combination Gradation Coarse Fraction Pan Material After Dry Sieving (K)..... (F) _____
- (G) Total Oven Dry Mass of Minus No. 4 Material (E+F)..... (G) _____
- (H) Initial Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material..... (H) _____
- (I) Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material After T-11..... (I) _____

Sieve Analysis of Coarse Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /A)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|-------------------------------------|------------------------------|-------------|--------------|------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| 1 1/2 in. (37.5mm) | 0.0 | | ok | 0.0 | 99.99 | 100 | 100 | 100 |
| 1 in. (25.0mm) | 61.4 | | ok | 0.6 | 99.39 | 99 | 95 | 100 |
| 3/4 in. (19.0 mm) | 2104.7 | | ok | 20.4 | 78.99 | 79 | | |
| 1/2 in. (12.5mm) | 4013.2 | | ok | 38.8 | 40.19 | 40 | 25 | 60 |
| 3/8 in. (9.5mm) | 2270.6 | | ok | 22.0 | 18.19 | 18 | | |
| No. 4 (4.75mm) | 1564.4 | | ok | 15.1 | 3.09 | 3 | 0 | 10 |
| No. 8 (2.36mm) | 64.5 | | ok | 0.6 | 2.49 | 2 | 0 | 5 |
| No. 200 (75µm) | 101.9 | | ok | 1.0 | 1.49 | 1.5 | 0 | 1.5 |
| (J) Pan | 37.4 | | ok | | | | | |
| (K) Combination Grad. Pan | | | | | | | | |
| (L) Loss By T-11..... | 116.7 | | | | | | | |
| (M) Final Total (Σ M _R) | 10,334.8 | | | | | | | |

C. F. = (G) ÷ (P)
C. F. = _____ ÷ _____
C. F. = _____ ÷ _____

Sieve Analysis of Fine Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /HorA) x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|--|------------------------------|-------------|--------------|--|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| (N) Pan..... | | | | | | | | |
| (O) Loss By T-11..... (H - | | | | | | | | |
| (P) Final Total Fine Sample (Σ M _R)..... | | | | | | | | |
| (Q) Final Total - No. 4 (Σ M _R)..... | | | | | | | | |
| (R) Combined Total (M+Q)..... | | | | | | | | |
| (S) Sample Loss or Gain | (A-M) or (M-A)..... | 1.4 | | | | | | |
| | (H-P) or (P-H)..... | | | | | | | |
| | (A-R) or (R-A)..... | | | | | | | |
| (T) Percentage of Initial OD Mass ((S/A)x100) or ((S/H)x100) | | 0.0 | | | | | | |

Coarse - No. 200 Dry **37.4** Fine - No. 200 Dry
Coarse - No. 200 Wet **116.7** Fine - No. 200 Wet
Total - No. 200 154.1 ÷ Init. Mass (A) or (H) **10336.2**
x 100 = 1.49087 %
DO NOT ROUND!!!

Name: _____
Signature: _____
Date: _____

Remarks: _____ Lab Info Only:

WEST VIRGINIA DIVISION OF HIGHWAYS
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE (AASHTO T-27)
MATERIALS FINER THAN No. 200 SIEVE BY WASHING (AASHTO T-11)

| | | | | |
|-----------------------------|--------------------|--------------------|--------|------------|
| Site Manager I.D.#: | Aggregate Size: | Spec Sieve Sizes | % Pass | Pass /Fail |
| Lab Reference Number: | Sieve Type Coarse: | 1 1/2 in. (37.5mm) | 100 | Pass |
| Technician: | Sieve Type Fine: | 3/4 in. (19.0 mm) | 76 | Pass |
| Producer / Supplier Code: | Material Type: | No. 4 (4.75mm) | 28 | Pass |
| Producer / Supplier Name: | Contract #: | No. 40 (425µm) | 13 | Pass |
| Site Manager Material Code: | Project #: | No. 200 (75µm) | 4.4 | Pass |
| Date Sampled: | Auth #: | | | |
| Date Tested: | Item #: | | | |
| | Tons / CY | | | |

| | | |
|--|-----|---------|
| (A) Initial Oven Dry Mass of Total Sample..... | (A) | 12870.1 |
| (B) Oven Dry mass of Total Sample After T-11..... | (B) | |
| (C) Oven Dry Mass of Plus No. 4 Material..... | (C) | 9350.4 |
| (D) Oven Dry Mass of Plus No. 4 Material After T-11..... | (D) | 9299.6 |
| (E) Oven Dry Mass of Minus No. 4 Material Used in Split..... | (E) | 3510.7 |
| (F) Combination Gradation Coarse Fraction Pan Material After Dry Sieving (K)..... | (F) | 80.2 |
| (G) Total Oven Dry Mass of Minus No. 4 Material (E+F)..... | (G) | 3590.9 |
| (H) Initial Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material..... | (H) | 333.5 |
| (I) Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material After T-11..... | (I) | 258.9 |

Sieve Analysis of Coarse Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /A)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|--------------------|------------------------------|-------------|--------------|------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| 1 1/2 in. (37.5mm) | | 0.0 | ok | 0.0 | 100.12 | 100 | 100 | 100 |
| 1 in. (25.0mm) | | 929.2 | ok | 7.2 | 92.92 | 93 | | |
| 3/4 in. (19.0 mm) | | 2,130.1 | ok | 16.6 | 76.32 | 76 | 50 | 90 |
| 1/2 in. (12.5mm) | | 2,670.0 | ok | 20.7 | 55.62 | 56 | | |
| 3/8 in. (9.5mm) | | 1,551.7 | ok | 12.1 | 43.52 | 44 | | |
| No. 4 (4.75mm) | | 1,941.2 | ok | 15.1 | 28.42 | 28 | 20 | 50 |

| | | | | | | | | |
|-------------------------------------|--|---------|--|--|--|--|--|--|
| (J) Pan | | | | | | | | |
| (K) Combination Grad. Pan | | 80.2 | | | | | | |
| (L) Loss By T-11..... | | 50.8 | | | | | | |
| (M) Final Total (Σ M _R) | | 9,273.0 | | | | | | |

C. F. = (G) ÷ (P)
 C. F. = 3,590.9 ÷ 333.4
 C. F. = 10.7705 (Round this Number to 4 Places)

Sieve Analysis of Fine Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /HorA) x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|-----------------|------------------------------|------------------------------|--------------|--|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination (Regular x C.F.) | | | | | Low | High |
| No. 8 (2.36mm) | 104.6 | 1126.6 | ok | 8.8 | 19.62 | 20 | | |
| No. 16 (1.18mm) | 48.5 | 522.4 | ok | 4.1 | 15.52 | 16 | | |
| No. 40 (425µm) | 28.3 | 304.8 | ok | 2.4 | 13.12 | 13 | 5 | 20 |
| No. 50 (300µm) | 7.8 | 84.0 | ok | 0.7 | 12.42 | 12 | | |
| No. 100 (150µm) | 38.1 | 410.4 | ok | 3.2 | 9.22 | 9 | | |
| No. 200 (75µm) | 57.9 | 623.6 | ok | 4.8 | 4.42 | 4.4 | 0 | 7 |

| | | | | | | | | |
|--|---------------------|---------|----------------------|---------|---|------------------------|---------|--|
| (N) Pan..... | 0.6 | 6.5 | | | | | | |
| (O) Loss By T-11..... (H - | 47.6 | 512.7 | Coarse - No. 200 Dry | | | Fine - No. 200 Dry | 6.5 | |
| (P) Final Total Fine Sample (Σ M _R)..... | 333.4 | | Coarse - No. 200 Wet | 50.8 | | Fine - No. 200 Wet | 512.7 | |
| (Q) Final Total - No. 4 (Σ M _R)..... | | 3591.0 | Total - No. 200 | 570.0 | ÷ | Init. Mass (A) or (H) | 12870.1 | |
| (R) Combined Total (M+Q)..... | | 12864.0 | | x 100 = | | 4.42887 | % | |
| (S) Sample Loss or Gain | (A-M) or (M-A)..... | | | | | DO NOT ROUND!!! | | |
| | (H-P) or (P-H)..... | | | | | | | |
| | (A-R) or (R-A)..... | 6.1 | | | | | | |
| (T) Percentage of Initial OD Mass ((S/A)x100) or ((S/H)x100) | | 0.0 | | | | | | |

| | |
|------------|--|
| Name: | |
| Signature: | |
| Date: | |

| | |
|----------|---|
| Remarks: | Lab Info Only: <input type="checkbox"/> |
| | |
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| | |

WEST VIRGINIA DIVISION OF HIGHWAYS
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE (AASHTO T-27)
MATERIALS FINER THAN No. 200 SIEVE BY WASHING (AASHTO T-11)

| | | | | |
|-----------------------------|----------------------------|------------------|--------|------------|
| Site Manager I.D.#: | Aggregate Size: Class1 | Spec Sieve Sizes | % Pass | Pass /Fail |
| Lab Reference Number: | Sieve Type Coarse: 12 inch | | | |
| Technician: | Sieve Type Fine: 12 inch | | | |
| Producer / Supplier Code: | Material Type: Lime Stone | | | |
| Producer / Supplier Name: | Contract #: | | | |
| Site Manager Material Code: | Project #: | | | |
| Date Sampled: | Auth #: | | | |
| Date Tested: | Item #: | | | |
| | Tons / CY | | | |

- (A) Initial Oven Dry Mass of Total Sample..... (A) _____
- (B) Oven Dry mass of Total Sample After T-11..... (B) _____
- (C) Oven Dry Mass of Plus No. 4 Material..... (C) _____
- (D) Oven Dry Mass of Plus No. 4 Material After T-11..... (D) _____
- (E) Oven Dry Mass of Minus No. 4 Material Used in Split..... (E) _____
- (F) Combination Gradation Coarse Fraction Pan Material After Dry Sieving (K)..... (F) _____
- (G) Total Oven Dry Mass of Minus No. 4 Material (E+F)..... (G) _____
- (H) Initial Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material..... (H) 380.4
- (I) Oven Dry Mass of Total Fine Sample or Mass of Minus No. 4 Material After T-11..... (I) 368.8

Sieve Analysis of Coarse Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /A)x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|-------------------------------------|------------------------------|-------------|--------------|------------------------------------|-----------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| (J) Pan | | | | | | | | |
| (K) Combination Grad. Pan | | | | | | | | |
| (L) Loss By T-11..... | | | | | | | | |
| (M) Final Total (Σ M _R) | | | | | | | | |

C. F. = (G) ÷ (P)
C. F. = _____ ÷ k
C. F. = _____

Sieve Analysis of Fine Aggregate

| Sieve Size | Mass Retained M _R | | Over Loading | % Retained (M _R /(H or A) x100 | Percent Passing | Reported Percent Passing | Material Specifications | |
|--|------------------------------|-------------|----------------------|---|-------------------------|--------------------------|-------------------------|------|
| | Regular | Combination | | | | | Low | High |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| (N) Pan..... | | | | | | | | |
| (O) Loss By T-11..... | 11.6 | | Coarse - No. 200 Dry | | | Fine - No. 200 Dry | | |
| (P) Final Total Fine Sample (Σ M _R)..... | | | Coarse - No. 200 Wet | | | Fine - No. 200 Wet | 11.6 | |
| (Q) Final Total - No. 4 (Σ M _R)..... | | | Total - No. 200 | 11.6 | ÷ Init. Mass (A) or (H) | | 380.4 | |
| (R) Combined Total (M+Q)..... | | | | x 100 = | 3.04942 | % | | |
| (S) Sample Loss or Gain | (A-M) or (M-A)..... | | | | | | | |
| | (H-P) or (P-H)..... | | | | | | | |
| | (A-R) or (R-A)..... | | | | | | | |
| (T) Percentage of Initial OD Mass ((S/A)x100) or ((S/H)x100) | | | | | | | | |

| | |
|------------|--|
| Name: | |
| Signature: | |
| Date: | |

| | | |
|----------|------------------|---|
| Remarks: | Pass/Fail | Lab Info Only: <input type="checkbox"/> |
| | | |
| | | |
| | | |

T301E
Rev. 4-03

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOIL AND TESTING
A CALCULATION WORKSHEET

F. S. #
Tech.
Date

Combo A-Bar Color
ColorGradations.xlsm
5/29/2018

| Lab Number | Project and Contract | | | | | Date Sampled | | | Transmit Date | |
|---------------|----------------------|-----|--------------|--------------|---------------------|--------------|-------------------|---------------|-----------------------|--|
| Test Sequence | Material Code | | Quantity | | | Item Number | Plant Source Code | | Aggregate Source Code | |
| Sieves: | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | No. 200 | |
| Design Number | | | | Unit Weight | Face Fracture % One | % Two | LL | PL | PI | |
| AASHTO Size | Smallest Sieve 100% | | Target A-bar | Actual A-bar | FA A-bar | CA No. 200 | FA No. 200 | Total No. 200 | P/F/N | |
| | | | 4.88 | 4.72 | 6.36 | 1.0 | 2.5 | 1.6 | P | |

Plant Name _____ Source Coarse Agg. _____

Technician _____ Date _____ Source Fine Agg. _____

Class of Concrete _____ Cmnt Fact _____ Field Sample # _____

| Sieves | CA #57 Lmst | FA Silca Sand | Cement | Total Mass of Each Solid at SSD in One yd ³ of Concrete From Mix Design | |
|----------------|-------------|---------------|--------|--|---------------------|
| 1 1/2" % pass | 100 | 100 | 100 | M _{ca} | 1808 lb |
| 3/4" % pass | 76 | 100 | 100 | M _{fa} | 1366 lb |
| 3/8" % pass | 12 | 100 | 100 | M _{ca} + M _{fa} | 3174 lb |
| No. 4 % pass | 3 | 98 | 100 | *M _c | 536 lb |
| No. 8 % pass | 2 | 83 | 100 | M _t | 3710 lb |
| No. 16 % pass | 0 | 67 | 100 | Fractional Part of Each Solid (0.001) | |
| No. 30 % pass | 0 | 55 | 100 | M _{ca} / M _t | 1808 / 3710 = 0.487 |
| No. 50 % pass | 0 | 25 | 100 | M _{fa} / M _t | 1366 / 3710 = 0.368 |
| No. 100 % pass | 0 | 5 | 100 | *M _c / M _t | 536 / 3710 = 0.144 |
| No. 200 % pass | 1.0 | 2.5 | 100 | M _t / M _t | 3710 / 3710 = 1.000 |
| Total | 194.0 | 635.5 | 1000.0 | | |
| Solid A-bar's | 1.94 | 6.36 | 10.00 | | |

Solid Fraction x Each Solid A-bar

| | | | | | | |
|------------|-------|---|-------|---|------|-----------------|
| Coarse Agg | 0.487 | x | 1.94 | = | 0.94 | A _{ca} |
| Fine Agg | 0.368 | x | 6.36 | = | 2.34 | A _{fa} |
| Cement | 0.144 | x | 10.00 | = | 1.44 | A _c |

Fractional Part of Coarse and Fine Agg. (0.001)

| | | | | | | |
|-----------------|---|--|---|-------------|---|-------|
| F _{ca} | = | M _{ca} / (M _{ca} + M _{fa}) | = | 1808 / 3174 | = | 0.570 |
| F _{fa} | = | M _{fa} / (M _{ca} + M _{fa}) | = | 1366 / 3174 | = | 0.430 |

Adjusted and Maximum Minus No. 200 Based on Fractional Part of Total Aggregate (0.01)

| | | |
|--------------------|--|------|
| A-bar Total Solids | A _{ca} + A _{fa} + A _c | 4.72 |
| Target A-bar | | 4.88 |
| A-bar Tolerance ± | | 0.25 |
| Total A-bar P/F | | P |

| | | |
|---|---|----------------------------------|
| - No. 200 % pass x F _{ca} or F _{fa} | = | Adjusted Total - 200 CA + FA |
| CA 1.0 x 0.570 | = | 0.57 |
| FA 2.5 x 0.430 | = | 1.08 |
| | | 1.6 |
| - No. 200 Spec Limit x F _{ca} or F _{fa} | = | Max. Allowed Total - 200 CA + FA |
| CA 1.5 x 0.570 | = | 0.86 |
| FA 3.0 x 0.430 | = | 1.29 |
| | | 2.2 |