

**3138 AGGREGATE FOR SURFACE AND BASE COURSES**

**3138.1 SCOPE**

This specification lists the quality requirements for aggregates used for 2118, 2211, and 2221.

**3138.2 REQUIREMENTS**

**A General**

Use aggregate sources meeting the requirements of 1601, "Source of Supply and Quality."

Provide certified aggregate materials that have uniform: appearance, texture, moisture content, and performance characteristics.

Provide binder soils from sources meeting the requirements of 3146, "Binder Soil." Add binder soils during the crushing and screening operations.

**B Virgin Materials**

Provide virgin aggregates meeting the following requirements:

- (1) Comprised of naturally occurring mineral materials, and contains no topsoil, organics, or disintegrating rock as defined in Laboratory Manual section 1209,
- (2) Class 2 must be composed of 100% crushed quarry rock, and
- (3) Conforms to the quality requirements of Table 3138-1.

<b>Table 3138-1 Quality Requirements for Virgin Materials</b>				
<b>Requirement</b>	<b>Class</b>			
	<b>1 and 2</b>	<b>3 and 4</b>	<b>5 and 5Q</b>	<b>6</b>
Max Shale, if No. 200 ≤ 7% by mass	NA	10.0%	10.0%	7.0%
Max Shale, if No. 200 > 7% by mass	NA	7.0%	7.0%	7.0%
Minimum Crushing Requirements *	NA	NA	10%	15%
Maximum Los Angeles Rattler (LAR) loss from carbonate quarry rock	40%	40%	40%	35%
Maximum Insoluble residue for the portion of quarried carbonate aggregates passing the No. 200 sieve	10%	10%	10%	10%

\* Material crushed from quarries is considered crushed material.

**C Recycled Materials**

The Contactor may substitute recycled aggregates for virgin aggregates, if meeting the following requirements:

- (1) Recycled aggregates contain only recycled asphalt pavement (RAP), recycled concrete materials, recycled aggregate materials, or certified recycled glass, and
- (2) Must meet the requirements of Table 3138-2.

<b>Table 3138-2 Quality Requirements for Recycled Materials</b>	
<b>Requirement</b>	<b>Classes 1, 3, 4, 5, 5Q and 6</b>
Maximum Bitumen Content of Composite	3.5%
Maximum Masonry block %	10%
Maximum percentage of glass *	10%
Maximum size of glass *	¾ in
Crushing (Class 1, 5, 5Q, and 6)	10% for Class 1 & 5 †, 60% for Class 5Q †, and 15% for Class 6 †
Maximum amount of Brick	1.0% #
Maximum amount of other objectionable materials including but not limited to: wood, plant matter, plastic, plaster, and fabric	0.3% #

\* Glass must meet certification requirements on the Grading and Base website. Combine glass with other aggregates during the crushing operation.  
 † If material ≥ 20% RAP and/or Concrete, Class 5 crushing requirement is met.]  
 † If material ≥ 60% RAP and/or Concrete, Class 5Q crushing requirement is met.  
 † If material ≥ 30% RAP and/or Concrete, Class 6 crushing requirement is met.  
 || Material crushed from quarries is considered crushed material.  
 # The Contractor/Supplier may not knowingly allow brick and other objectionable material and must employ a QC process to screen it out, before it becomes incorporated into the final product.

**D Surfacing Aggregates**

Provide surfacing aggregates in accordance with 3138.2.A, "General," 3138.2.B, "Virgin Materials," and 3138.2.C, "Recycled Materials," and meeting the following requirements:

- (1) 100% of the material passes the ¾" sieve, regardless of the class specified; this modifies the requirements of Tables 3138-3, 3138-4, and 3138-5 for surfacing aggregates.
- (2) Does not use glass,
- (3) Recycled concrete materials may only be used for the roadway shoulders, and
- (4) There is no restriction on the bitumen content, if used for shouldering.
- (5) Provide aggregate with a minimum clay content of 3% and a Plasticity Index (PI) of 5 – 12. The requirements for PI and minimum clay content are met:
  - if the bitumen content is 1% or greater, or
  - the material is composed of at least 25% recycled materials, or the material is composed of at least 50% crushed quarry aggregate.

Note: Class 2 must be composed of 100% crushed quarry rock per 3138.2.B.3.

**E Gradation Requirements**

- (1) For products containing less than 25 percent recycled materials, conform to Table 3138-3.
- (2) For products containing 25 percent or more recycled materials and less than 75% recycled concrete, conform to Table 3138-4. Bituminous millings meeting a gradation of 100% passing the 1.5" sieve and 95-100% passing the 1" sieve may be used for the 1-2' fillet/rollover outside of a paved shoulder for class 1 and class 2.
- (3) For products containing 75 percent or more recycled concrete, conform to Table 3138-5.
- (4) Perform gradation tests prior to bituminous extraction.

<b>Table 3138-3</b> <b>Base and Surfacing Aggregate</b> (containing less than 25 percent recycled aggregates) Total Percent Passing *							
Sieve Size	Class 1 (Surfacing £)	Class 2 (Surfacing β)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 5Q (Base)	Class 6 (Base)
2 in	—	—	100	100	—	100	—
1½ in	—	—	—	—	100	—	100
1 in	—	—	—	—	—	65 – 95	—
¾ in	100	100	—	—	70 – 100	45 – 85	70 – 100
⅜ in	65 – 95	65 – 90	—	—	45 – 90	35 – 70	45 – 85
No. 4	40 – 85	35 – 70	35 – 100	35 – 100	35 – 80	15 – 45	35 – 70
No. 10	25 – 70	25 – 45	20 – 100	20 – 100	20 – 65	10 – 30	20 – 55
No. 40	10 – 45	12 – 30	5 – 50	5 – 35	10 – 35	5 – 25	10 – 30
No. 200	8.0–15.0	5.0–13.0	5.0–10.0	4.0–10.0	3.0–10.0	3.0–10.0	3.0–7.0

\* If product contains recycled aggregate, add letters in parentheses for each aggregate blend designating the type of recycled products included in the mixture.  
 (B) = Bituminous, (C) = Concrete, (G) = Glass  
 (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass  
 (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass  
 £ Recycled concrete is only allowed for shoulders  
 β Class 2 must be composed of 100% crushed quarry rock per 3138.2.B.2.

<b>Table 3138-4</b> <b>Base and Surfacing Aggregate</b> (containing 25% or more recycled aggregates & 75% or less recycled concrete) Total Percent Passing *						
Sieve Size	Class 1 (Surfacing £)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 5Q (Base)	Class 6 (Base)
2 in	—	100	100	—	100	—
1½ in	—	—	—	100	—	100
1 in	—	—	—	—	65 – 95	—
¾ in	100	—	—	70 – 100	45 – 85	70 – 100
⅜ in	65 – 95	—	—	45 – 90	35 – 70	45 – 85
No. 4	40 – 85	35 – 100	35 – 100	35 – 80	15 – 45	35 – 70
No. 10	25 – 70	20 – 100	20 – 100	20 – 65	10 – 30	20 – 55
No. 40	10 – 45 † 5 – 45	5 – 50	5 – 35	10 – 35	5 – 25	10 – 30
No. 200	5.0 – 15.0 † 0 – 15.0	0 – 10.0	0 – 10.0	0 – 10.0	0 – 10.0	0 – 7.0

\* Add letters in parentheses for each aggregate blend designating the type of recycled products included in the mixture.  
 (B) = Bituminous, (C) = Concrete, (G) = Glass  
 (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass  
 (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass  
 † Note: For Class 1, if the bitumen content is ≥ 1.5%, the gradation requirement is modified to 5 – 45% for the #40 sieve and 0 – 15.0% for the #200 sieve.  
 £ Recycled concrete is only allowed for shoulders

<b>Table 3138-5</b> <b>Base and Surfacing Aggregate</b> (containing more than 75 percent recycled concrete) Total Percent Passing *						
Sieve Size	Class 1 (Surfacing £)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 5Q (Base)	Class 6 (Base)
2 in	—	100	100	100	100	100
1½ in	—	—	—	—	—	—
1 in	—	—	—	—	65 – 95	—
¾ in	100	—	—	45 – 100	45 – 85	45 – 100
⅜ in	65 – 95	—	—	25 – 90	35 – 70	25 – 85

**Table 3138-5**  
**Base and Surfacing Aggregate**  
 (containing more than 75 percent recycled concrete)  
 Total Percent Passing \*

<b>Sieve Size</b>	<b>Class 1 (Surfacing £)</b>	<b>Class 3 (Subbase)</b>	<b>Class 4 (Subbase)</b>	<b>Class 5 (Base)</b>	<b>Class 5Q (Base)</b>	<b>Class 6 (Base)</b>
No. 4	40 – 85	35 – 100	35 – 100	15 – 65	15 – 45	15 – 65
No. 10	25 – 70	20 – 100	20 – 100	10 – 45	10 – 30	10 – 45
No. 40	10 – 45	0 – 20	0 – 20	0 – 20	0 – 20	0 – 20
No. 200	5.0 – 15.0	0 – 6.0	0 – 6.0	0 – 6.0	0 – 6.0	0 – 6.0

\* Add letters in parentheses for each aggregate blend designating the type of recycled products included in the mixture.

(B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete,

(BG) = Bituminous and Glass, (CG) = Concrete and Glass,

(BCG) = Bituminous, Concrete, and Glass

£ Recycled concrete is only allowed for shoulders

**3138.3 SAMPLING AND TESTING**

Report the No. 200 sieve results to the nearest 0.1 percent and all other sieve results to the nearest 1 percent.

<b>A</b>	<b>Sampling, Sieve Analysis and Crushing Tests Grading and Base Manual</b>	
<b>B</b>	<b>Los Angeles Rattler Loss Laboratory Manual Method .....</b>	<b>1210</b>
<b>C</b>	<b>Shale Tests Laboratory Manual Method.....</b>	<b>1207 &amp; 1209</b>
<b>D</b>	<b>Bitumen Content Laboratory Manual Method .....</b>	<b>1852</b>
<b>E</b>	<b>Insoluble Residue Laboratory Manual Method.....</b>	<b>1221</b>
<b>F</b>	<b>Reclaimed Glass AGI Visual Method (AGI Data sheet 15.1 and 15.2)</b>	
<b>G</b>	<b>Particle Size Analysis Laboratory Manual Method.....</b>	<b>1302</b>
<b>H</b>	<b>Liquid Limit Determination Laboratory Manual Method.....</b>	<b>1303</b>
<b>I</b>	<b>Plastic Limit Determination Laboratory Manual Method.....</b>	<b>1304</b>