

**Supplemental Specifications to The Standard Specifications  
for Road and Bridge Construction, 2008 Edition**  
(Effective with the September 26, 2008 Letting)

<b>SUBSECTION:</b>	805.01 GENERAL.
<b>REVISION:</b>	Replace the second paragraph with the following:  The Department's List of Approved Materials includes the Aggregate Source List, the list of Class A and Class B Polish-Resistant Aggregate Sources, and the Concrete Restriction List.
<b>SUBSECTION:</b>	805.04 CONCRETE.
<b>REVISION:</b>	Replace the "AASHTO T 160" reference in first sentence of the third paragraph with "KM 64-629"
<b>SUBSECTION:</b>	805.15 GRADATION ACCEPTANCE OF NON-SPECIFICATION COARSE AGGREGATE.
<b>TABLE:</b>	AGGREGATE SIZE USE
<b>PART:</b>	Cement Concrete Structures and Incidental Construction
<b>REVISION:</b>	Replace "9-M for Waterproofing Overlays" with "8 or 9-M for Waterproofing Overlays"
<b>SUBSECTION:</b>	805.16 SAMPLING AND TESTING.
<b>REVISION:</b>	Replace the "AASHTO T 160" method with the "KM 64-629" method for the Concrete Beam Expansion Test.  Replace the "ASTM D 3042" method with the "KM 64-625" method for Insoluble Residue.

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**SUBSECTION:** 805.15 GRADATION ACCEPTANCE OF NON-SPECIFICATION COARSE AGGREGATE.  
**REVISION:** Replace the "SIZES OF COARSE AGGREGATES" table in with the following:

Aggregate Size	Sieve Nominal <sup>a)</sup> Maximum Aggregate Size	AMOUNTS FINER THAN EACH LABORATORY SIEVE (SQUARE OPENINGS) PERCENTAGE BY WEIGHT															
		4 inch	3 1/2 inch	3 inch	2 1/2 inch	2 inch	1 1/2 inch	1 inch	3/4 inch	1/2 inch	3/8 inch	No. 4	No. 8	No. 16	No. 30	No. 100	No. 200
1	3 1/2 inch	100	90-100		25-60		0-15		0-5								
2	2 1/2 inch			100	90-100		0-15		0-5								
23	2 inch			100		40-90		0-15		0-5							
3	2 inch				100	90-100	35-70	0-15		0-5							
357	2 inch				100	95-100	35-70		10-30		0-5						
4	1 1/2 inch					100	90-100	20-55	0-15		0-5						
467	1 1/2 inch					100	95-100	35-70		10-30	0-5						
5	1 inch					100	90-100	20-55	0-10	0-5							
57	1 inch					100	95-100		25-60		0-10	0-5					
610	1 inch					100	85-100		40-75		15-40						
67	3/4 inch						100			20-55	0-10	0-5					
68	3/4 inch						100	90-100		30-65	5-25	0-10	0-5				
710	3/4 inch						100	80-100		30-75	0-30 <sup>b)</sup>						
78	1/2 inch							100	90-100	40-75	5-25	0-10	0-5				
8	3/8 inch								100	85-100	10-30	0-10	0-5				
9-M	3/8 inch								100	75-100	0-25	0-5					
10 <sup>2)</sup>	No. 4									100	85-100				10-30		
11 <sup>2)</sup>	No. 4									100	40-90	10-40			0-5		
DENSE GRADED AGGREGATE <sup>2)</sup>	3/4 inch						100	70-100		50-80	30-65			10-40			4-13
CRUSHED STONE BASE <sup>2)</sup>	1 1/2 inch				100		90-100		60-95	30-70	15-55			5-20			0-8

<sup>1)</sup> Gradation performed by wet sieve KM 64-630 or AASHTO T 111/T 27.

<sup>2)</sup> Sizes shown for convenience and are not to be considered as coarse aggregates.

Note: The Department will allow blending of same source/same type aggregate when precise procedures are used such as cold feed, belt, or equivalent and combining of sizes or types of aggregate using the weigh hopper at concrete plants or controlled feed belts at the pugmill to obtain designated sizes.

## SECTION 805 — COARSE AGGREGATES

**805.01 GENERAL.** Coarse aggregates include, but at the discretion of the Engineer are not limited to, crushed stone and crushed or uncrushed gravel. Includes lightweight aggregates or slag where permitted.

The Department's List of Approved Materials includes the Aggregate Source List and the list of Class A and Class B Polish-Resistant Aggregate Sources.

**805.02 APPROVAL.** Provide coarse aggregates from sources included on the Aggregate Source List meeting the description and requirements specified in this section.

The Department will consider a source for inclusion on the Aggregate Source List when the aggregate producer complies with KM 64-608 and provides the following:

- 1) A Quality Control Plan.
- 2) A satisfactory laboratory facility with all necessary testing equipment.
- 3) A Qualified Aggregate Technician to perform the required testing.

Obtain the Department's approval before furnishing aggregate from sources not on the Aggregate Source List. The Department will sample the aggregate during stockpiling and test according to the Department's Manual of Field Testing and Sampling Practices.

The Department will reject aggregate when excessive variation of gradation or physical properties cause unworkable mixtures, mixture control problems, or non-conformance to the finished product or mixture requirements.

Coarse aggregates are subject to preliminary source approval.

**805.03 GENERAL REQUIREMENTS.** Provide coarse aggregates that are free of objectionable amounts of clay lumps, dirt coatings, and foreign material. The Department will reject contaminated aggregate when the Engineer deems it could be detrimental to the finished product.

**805.03.01 Soundness and Shale.** Conform to the following:

AGGREGATE USE	SHALE PERMITTED <sup>(1)</sup> (Maximum %)	SOUNDNESS REQUIREMENT (Maximum %)
<b><u>Portland Cement Concrete Mixtures</u></b>		
Aggregate for Bridge Decks, Bridge Deck Overlays, and Bridge Barrier Walls	1.0	9
All Other Concrete Classes and Uses	2.0	12
<b><u>Asphalt Mixtures</u></b>		
Aggregate for Polish Resistant Surfaces and Asphalt Surface Under OGFC:		
Limestone and Dolomite	1.0	9
Other Aggregate Types	2.0	12
All Other Asphalt Mixtures	2.0	15
<b><u>Other Uses</u></b>		
Sizes No. 610 or 710 When Used for Aggregate		
Surfacing, Traffic Bound Base, and Maintenance	5.0	18
Riprap and Channel Lining	2.0	12
All Other Uses	2.0	15

<sup>(1)</sup> The Department will determine shale quantity by visual estimation for Riprap and Channel Lining and according to KM 64-604 for all other aggregate.

**805.03.02 Physical Properties.** Conform to the following:

Wear (Except Slag and Sandstone)	40% (maximum)
Wear (Sandstone)	50% (maximum)
Wear (Slag)	60% (maximum)
Friable Particles	1.0% (maximum)
Unit Weight (Slag)	70 lbs/ft <sup>3</sup> (minimum)

**805.03.03 Gradation.** Where the Department specifies or permits designated sizes of coarse aggregates, provide aggregates meeting the grading limits indicated for the various sizes listed in the Sizes of Coarse Aggregates table. When the Contract does not specify sizes or combinations of aggregate for various types of construction, furnish aggregate according to the Aggregate Size Use table. The Department will allow blending of same source/same type aggregate to achieve designated sizes when precise procedures are used such as cold feeds, belts, weigh hoppers, or equivalent.

**805.03.04 Erodible or Unstable Material.** Treat as applicable. The Department considers Size No. 57 or larger aggregate, except crushed or uncrushed gravel, non-erodible. The Department considers the following materials to be erodible or unstable:

- 1) Friable sandstone. The Engineer determines when sandstone is friable or non-friable.
- 2) Crushed or uncrushed gravel, any size.
- 3) Crushed coarse aggregate smaller than Size No. 57.
- 4) Any material with 50 percent or more passing the No. 4 sieve.

**805.04 CONCRETE.** Provide crushed stone or crushed or uncrushed gravel. The Department will allow any combination of crushed stone, crushed or uncrushed gravel when the combination is achieved in the concrete plant weigh hopper. Conform to the following:

	<u>Max. Pct. by Wt.</u>
Friable Particles	1.0
Finer than No. 200	2.0
Coal and Lignite	0.5
Lightweight particles (Gravel) <sup>(1)</sup>	4.0
(Sp. Gr. Less than 2.40)	
Lightweight particles (Limestone)	1.0
(Sp. Gr. Less than 2.40)	

<sup>(1)</sup> *The permissible lightweight particle content of gravel coarse aggregate for reinforced concrete box culvert sections, concrete pipe, pipe arches, or for use only in concrete that will be permanently protected from freezing by 2 feet or more of cover is 10.0 percent.*

The Department will waive the requirements for gradation and finer than No. 200 for concrete pipe.

Do not use aggregate produced from an individual production lift until the Department obtains the finished product results from the Concrete Beam Expansion Test Method AASHTO T 160. If beam expansion is greater than 0.06 percent at 6 months, the Department will reject the production lift for use in concrete applications.

The Department will not require tests for Concrete Beam Expansion from an individual production lift if the individual ledges are accessible for hand sampling and the lift is acceptable based on petrographic examination of the hand samples. The Department will accept a production lift if no more than 20 percent of the total lift footage is considered potentially alkali carbonate reactive upon petrographic inspection.

**805.04.01 JPC Base, JPC Pavement, JPC Shoulders, Concrete for Bridge Decks, and Precast Products.** The Department will subject coarse aggregates that are to be used in JPC base, JPC pavement, JPC shoulders, bridge decks, concrete overlays, and precast products to freeze-thaw testing according to KM 64-626. The Department will allow sources having expansions of 0.06 percent or less and a minimum of 80 percent durability factor to supply any size coarse aggregate listed in the Aggregate Size Use table, providing that size or a larger size has tested satisfactorily. When sources have expansions of more than 0.06 percent or a durability factor of less than 80 percent the Department will:

- 1) Reject the material.
- 2) Limit to the permitted sizes determined from acceptable freeze-thaw testing.
- 3) Allow the submittal of a proposal to the Engineer for production of acceptable coarse aggregate. The Department will require acceptable freeze-thaw test results before approving any proposal.

Provide a signed certification from the aggregate producer for the approved freeze-thaw coarse aggregate stating that the aggregate is supplied from the approved parent material as found on the Department's List of Approved Materials and Concrete Aggregate Restriction List.

**805.04.02 Lightweight Aggregate.** When the Department allows lightweight aggregate conform to the following:

- 1) Dry Loose Unit Weight. As appropriate or as specified, AASHTO M 195, Table 2.
- 2) Gradation (by weight). Provide size specified, AASHTO M 195, Table 1.
- 3) Wear. 50 percent maximum.
- 4) Soundness. 9 percent loss maximum.
- 5) Friable Particles. 1.0 percent maximum.
- 6) Deleterious Particles. 1.0 percent maximum.
- 7) Freeze-Thaw Resistance. 85 percent minimum durability factor and 0.06 percent maximum length change according to KM 64-626.
- 8) Provide creep, shrinkage, and tensile splitting strength test data made on concrete produced from the lightweight aggregate when the Engineer requests.
- 9) If lightweight aggregate from an unapproved source is proposed for use, notify the Engineer of the aggregate source and proposed concrete mix design at least 10 weeks before any lightweight aggregate concrete is placed, so the Department may subject the lightweight aggregate to testing as outlined above, plus any additional testing as deemed necessary and indicated in AASHTO M 195. At the Departments option, suitable documentation of such testing by an independent testing laboratory may be accepted.

**805.05 ASPHALT MIXTURES AND SEALS.** Provide crushed stone, crushed gravel, or blast furnace slag. The Department will allow any combination of crushed stone, crushed gravel, or blast furnace slag when the combination is achieved using cold feeds at the asphalt plant. The Engineer may allow other coarse aggregates.

**805.05.01 Absorption.** Provide aggregates having a water absorption of no more than 3.0 percent for each size and type. When blast furnace slag is used, provide total combined aggregates having a water absorption of no more than 4.0 percent.

**805.05.02 Crushed Particles.** Applies to the total combined aggregates retained on a No. 4 sieve, including the material from the fine aggregate. Conform to the following:

- A) **Superpave Mixtures.** Minimum percent crushed requirements as listed in the Superpave Coarse Aggregate Consensus Property Requirements table.

- B) **Open-Graded Friction Courses.** Minimum 95 percent one or more crushed faces and 75 percent 2 or more crushed faces.
- C) **Seal Coats.** Minimum 90 percent one or more crushed faces.
- D) **Other Mixtures.** Unless otherwise specified, minimum 75 percent one or more crushed faces.

SUPERPAVE COARSE AGGREGATE CONSENSUS PROPERTY REQUIREMENTS						
ESAL Class	Design ESALs (millions)	Coarse Aggregate Angularity (Percent)				Flat and Elongated <sup>(b)</sup> (Percent), maximum
		Minimum Depth From Surface				
		≤ 100 mm		> 100 mm		
		Crushed Faces		Crushed Faces		
		≥1	≥2	≥1	≥2	
1	< 0.3	75	-	75	-	10
2	0.3 to < 3	75	-	75	-	10
3	3 to < 30	95	90	80	75	10
4	≥ 30	100	100	100	100	10

<sup>(b)</sup> Criterion based on a 5:1 maximum-to-minimum ratio.

**805.05.03 Flat and Elongated.** Provide aggregates for Superpave mixtures not exceeding the flat and elongated maximum as listed in the Superpave Coarse Aggregate Consensus Property Requirements table.

**805.05.04 Finer Than No. 200 (Seals).** Provide coarse aggregates having no more than 3.0 percent passing the No. 200 sieve.

**805.05.05 Polish-Resistant Aggregate.** Provide coarse aggregates required for polish-resistant applications from a Class A or Class B Polish-Resistant Aggregate Source, as applicable, based on mixture designation of aggregate type.

Provide a signed certification from the aggregate producer for the manufactured polish-resistant coarse aggregate stating that the aggregate is supplied from the approved parent material as found on the Department's List of Approved Materials, Polish-Resistant Aggregate Source List and Guidelines on the Division of Materials' webpage.

**805.06 DENSE GRADED AGGREGATE (DGA) AND CRUSHED STONE BASE (CSB).** Provide crushed stone having a sand equivalent value of 30 or greater with mineral filler as needed to meet gradation requirements. The Department may waive the sand equivalent requirement when the portion passing the No. 40 sieve has a plasticity index of 4 or less according to AASHTO T 90.

**805.07 FREE DRAINING BEDDING AND BACKFILL.** Provide crushed stone or crushed or uncrushed gravel. The Department will allow a shale content of 5 percent providing the combined shale, friable particles, and minus No. 200 content does not exceed 5 percent. Conform to the following gradation:

Sieve Size	Percent Passing
1 1/2 inch	100
No. 4	0-30

**805.08 COARSE AGGREGATES FOR UNDERDRAINS.** Furnish crushed or uncrushed aggregate, including pea gravel meeting the quality requirements of Section 805 with the following exception: The Department will allow a shale content of 5 percent

providing the combined shale, friable particles, and minus No. 200 content does not exceed 5 percent. Conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
1 1/2 inch	100
No. 4	0-30
No. 100	0-5

**805.09 COARSE AGGREGATE FOR ROCK DRAINAGE BLANKET.** Provide crushed or uncrushed aggregate, including pea gravel, meeting the quality requirements of this section with the following additional requirement: Ensure the minus No. 200 content does not exceed 5 percent. When the material includes a significant amount of individual fragments greater than 1 1/2 inches, the Engineer may accept the minus No. 200 portion based on visual inspection. Conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
4 inch	100
No. 4	0-30

**805.10 GRANULAR EMBANKMENT.** Provide granular material up to 12-inch maximum size with a maximum shale content of 5 percent. Use either:

- 1) Engineer approved shot limestone or sandstone from roadway excavation, borrow excavation, or another approved source.
- 2) Crushed stone, crushed or uncrushed gravel, or crushed or natural sand meeting general requirements of Section 804 and this section, with a minus No. 200 content not exceeding 10.0 percent.

**805.11 STRUCTURE GRANULAR BACKFILL.** Provide crushed or uncrushed aggregate meeting the quality requirements of this section. When the material includes a significant amount of individual fragments greater than 1 1/2 inches, the Engineer may visually accept the minus No. 200 portion. Conform to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
4 inch	100
No. 4	0-10
No. 200	0-5

**805.12 REINFORCED FILL MATERIAL.** Obtain the Engineer's approval for material quality before use. Ensure the material is reasonably free of shale or other deleterious material. Conform to the following:

- A) **Gradation.** Conform to Subsection 805.11.
- B) **Resistivity.** Greater than 3,000 ohm-cm (applicable only when granular fill has more than 50 percent passing the No. 4 sieve).
- C) **PH.** Between 5-10.
- D) **Chlorides.** Less than 200 parts per million.
- E) **Sulfates.** Less than 1,000 parts per million.
- F) **Angle of Internal Friction.** Greater than or equal to 34 degrees. When providing gap-graded materials, single size aggregates, uncrushed gravel, or blends including uncrushed gravel, furnish a test report showing the 34 degree minimum internal friction angle is met. Test sample according to AASHTO T 236 compacted to 95 percent of AASHTO T 99 Methods C or D at optimum moisture content. When such materials are approved, the Engineer will perform sampling and testing on the project as necessary to assure that the material furnished is closely similar to that approved.

**805.13 SLOPE PROTECTION AND CHANNEL LINING.**

**805.13.01 Cyclopean Stone Riprap and/or Channel Lining Class III.** Provide material meeting the general requirements of Section 805. Ensure that 100 percent passes through a square opening of 16 inches by 16 inches, and no more than 20 percent passes through square openings of 8 inches by 8 inches. The Department may allow stones of smaller sizes for filling voids in the upper surface and dressing to the proper slope.

**805.13.02 Crushed Aggregate Slope Protection.** Provide aggregate meeting the general requirements of Section 805. Conform to the following gradation (Coarse aggregate sizes No. 1 and No. 2 conform to this requirement):

<u>Sieve Size</u>	<u>Percent Passing</u>
4 inch	100
2 1/2 inch	25-100
1 1/2 inch	0-15

**805.13.03 Channel Lining, Class IA.** Provide crushed stone meeting the general requirements of this section. Use a crusher, grizzly, or sieve with openings to produce a grading that 100 percent passes the 5 inch sieve, no more than 20 percent of the finished product passes through square openings 1 1/2 by 1 1/2 inches.

**805.13.04 Channel Lining, Class II.** Provide crushed stone meeting the general requirements of this section. Use a crusher, grizzly, or sieve with openings to produce a grading that 100 percent passes the 9-inch sieve, and no more than 20 percent of the finished product passes through square openings 5 by 5 inches.

**805.13.05 Channel Lining, Class IV.** Provide material excavated and prepared according to Section 204.

**805.13.06 Stone for Gabions.** Provide aggregate meeting the general requirements of this section and be of such gradation that 100 percent passes through a square opening of 12 by 12 inches and 100 percent is retained on a 4 inch sieve.

**805.14 AGGREGATE SURFACING, TRAFFIC-BOUND BASE, AND MAINTENANCE.** When providing size No. 610 or 710 coarse aggregate for aggregate surfacing (shoulders, entrances, mailbox turn outs, or similar items), traffic bound base and maintenance operations; furnish aggregate meeting the grading requirements in Sizes of Coarse Aggregates table, with no more than 12 percent finer than a No. 200 sieve.

When providing DGA for aggregate surfacing, traffic bound base, and maintenance operations conform to the grading requirement in Sizes of Coarse Aggregates table.

**805.15 GRADATION ACCEPTANCE OF NON-SPECIFICATION COARSE AGGREGATE.** It is intended that all aggregate purchased for Department work meet the requirements of this section. When reasonably acceptable work has been produced using the aggregate in question, the Department may accept the work according to Subsection 105.04. When the Engineer determines that the aggregate not conforming to gradation requirements may be left in place, the Department will accept the aggregate at a reduction in the Contract unit bid price for the work containing the aggregate according to the following procedures. The Department will not consider these procedures a means to continue accepting non-specification aggregates.

The Department will base the reduction on the invoice price for the aggregate at the source. When satisfactory invoices are not furnished, the Department will use current bin prices for that source on file with the Cabinet's Division of Purchases. The maximum deduction for non-specification material which is allowed to remain in place is 50 percent.

When aggregate fails to conform to gradation on more than one sieve, the Department will apply the largest payment reduction.

The Department will define a lot based on the smallest definable quantity of material represented by acceptance test results, either passing results or failing results, or both. Normally, the Department will average all test results for the lot to determine the test result for payment according to the deduction tables. However, when test results are not reasonably uniform the Department will not average the high and low test results within a lot. The Department will assign each test result to equal quantities in new smaller lots in proportion to the number of tests representing the original lot. When daily tests are performed, the lot will be a day's production unless the Department defines a smaller lot.

When 2 consecutive lots contain non-specification material, discontinue the use of the aggregate until the Department makes a decision concerning the overall acceptability of the aggregate from that source.

The Department will not impose a reduction in payment for quantities less than 50 tons unless the Engineer deems it necessary.

GRADATION - SIZE NO. 1					
Payment Reduction	Sieve Size-Percent Passing				
	4 inch	3 1/2 inch	2 1/2 inch	1 1/2 inch	3/4 inch
0%	100	90-100	25-60	0-15	0-5
10%			61-62		
10%	98-99	88-89	23-24	16-17	6-7
20%			22		
20%	97	87	63	18	8
30%			21		
30%	96	86	64	19	9
50%			20		
50%	95	85	65	20	10

GRADATION - SIZE NO. 2					
Payment Reduction	Sieve Size-Percent Passing				
	3 inch	2 1/2 inch	2 inch	1 1/2 inch	3/4 inch
0%	100	90-100	35-70	0-15	0-5
10%			33-34		
10%	98-99	88-89	71-72	16-17	6-7
20%			32		
20%	97	87	73	18	8
30%			31		
30%	96	86	74	19	9
50%			30		
50%	95	85	75	20	10

GRADATION - SIZE NO. 23				
Payment Reduction	Sieve Size-Percent Passing			
	3 inch	2 inch	1 inch	1/2 inch
0%	100	40-90	0-15	0-5
10%		38-39		
10%	98-99	91-92	16-17	6-7
20%		37		
20%	97	93	18	8
30%		36		
30%	96	94	19	9
50%		35		
50%	95	95	20	10

GRADATION - SIZE NO. 3					
Payment Reduction	Sieve Size-Percent Passing				
	2 1/2 inch	2 inch	1 1/2 inch	1 inch	1/2 inch
0%	100	90-100	35-70	0-15	0-5
10%			33-34		
10%	98-99	88-89	71-72	16-17	6-7
20%			32		
20%	97	87	73	18	8
30%			31		
30%	96	86	74	19	9
50%			30		
50%	95	85	75	20	10

GRADATION - SIZE NO. 357					
Payment Reduction	Sieve Size-Percent Passing				
	2 1/2 inch	2 inch	1 inch	1/2 inch	No. 4
0%	100	95-100	35-70	10-30	0-5
10%			33-34	8-9	
10%	98-99	93-94	71-72	31-32	6-7
20%			32	7	
20%	97	92	73	33	8
30%			31	6	
30%	96	91	74	34	9
50%			30	5	
50%	95	90	75	35	10

GRADATION - SIZE NO. 4					
Payment Reduction	Sieve Size-Percent Passing				
	2 inch	1 1/2 inch	1 inch	3/4 inch	3/8 inch
0%	100	90-100	20-55	0-15	0-5
10%			18-19		
10%	98-99	88-89	56-57	16-17	6-7
20%			17		
20%	97	87	58	18	8
30%			16		
30%	96	86	59	19	9
50%			15		
50%	95	85	60	20	10

GRADATION - SIZE NO. 467					
Payment Reduction	Sieve Size-Percent Passing				
	2 inch	1 1/2 inch	3/4 inch	3/8 inch	No. 4
0%	100	95-100	35-70	10-30	0-5
10%			33-34	8-9	
10%	98-99	93-94	71-72	31-32	6-7
20%			32	7	
20%	97	92	73	33	8
30%			31	6	
30%	96	91	74	34	9
50%			30	5	
50%	95	90	75	35	10

GRADATION - SIZE NO. 5					
Payment Reduction	Sieve Size-Percent Passing				
	1 1/2 inch	1 inch	3/4 inch	1/2 inch	3/8 inch
0%	100	90-100	20-55	0-10	0-5
10%			18-19		
10%	98-99	88-89	56-57	11-12	6-7
20%			17		
20%	97	87	58	13	8
30%			16		
30%	96	86	59	14	9
50%			15		
50%	95	85	60	15	10

GRADATION - SIZE NO. 57					
Payment Reduction	Sieve Size-Percent Passing				
	1 1/2 inch	1 inch	1/2 inch	No. 4	No. 8
0%	100	95-100	25-60	0-10	0-5
10%			23-24		
10%	98-99	93-94	61-62	11-12	6-7
20%			22		
20%	97	92	63	13	8
30%			21		
30%	96	91	64	14	9
50%			20		
50%	95	90	65	15	10

GRADATION - SIZE NO. 610				
Payment Reduction	Sieve Size-Percent Passing			
	1 1/2 inch	1 inch	1/2 inch	No. 4
0%	100	85-100	40-75	15-40
10%			38-39	13-14
10%	98-99	83-84	76-77	41-42
20%			37	12
20%	97	82	78	43
30%			36	11
30%	96	81	79	44
50%			35	10
50%	95	80	80	45

GRADATION - SIZE NO. 67					
Payment Reduction	Sieve Size-Percent Passing				
	1 inch	3/4 inch	3/8 inch	No. 4	No. 8
0%	100	90-100	20-55	0-10	0-5
10%			18-19		
10%	98-99	88-89	56-57	11-12	6-7
20%			17		
20%	97	87	58	13	8
30%			16		
30%	96	86	59	14	9
50%			15		
50%	95	85	60	15	10

GRADATION - SIZE NO. 68						
Payment Reduction	Sieve Size-Percent Passing					
	1 inch	3/4 inch	3/8 inch	No. 4	No. 8	No. 16
0%	100	90-100	30-65	5-25	0-10	0-5
10%			28-29	3-4		
10%	98-99	88-89	66-67	26-27	11-12	6-7
20%			27	2		
20%	97	87	68	28	13	8
30%			26	1		
30%	96	86	69	29	14	9
50%			25	0		
50%	95	85	70	30	15	10

GRADATION - SIZE NO. 710				
Payment Reduction	Sieve Size-Percent Passing			
	1 inch	3/4 inch	3/8 inch	No. 4
0%	100	80-100	30-75	0-30
10%			28-29	
10%	98-99	78-79	76-77	31-32
20%			27	
20%	97	77	78	33
30%			26	
30%	96	76	79	34
50%			25	
50%	95	75	80	35

GRADATION - SIZE NO. 78						
Payment Reduction	Sieve Size-Percent Passing					
	3/4 inch	1/2 inch	3/8 inch	No. 4	No. 8	No. 16
0%	100	90-100	40-75	5-25	0-10	0-5
10%			38-39	3-4		
10%	98-99	88-89	76-77	26-27	11-12	6-7
20%			37	2		
20%	97	87	78	28	13	8
30%			36	1		
30%	96	86	79	29	14	9
50%			35	0		
50%	95	85	80	30	15	10

GRADATION - SIZE NO. 8					
Payment Reduction	Sieve Size-Percent Passing				
	1/2 inch	3/8 inch	No. 4	No. 8	No. 16
0%	100	85-100	10-30	0-10	0-5
10%			8-9		
10%	98-99	83-84	31-32	11-12	6-7
20%			7		
20%	97	82	33	13	8
30%			6		
30%	96	81	34	14	9
50%			5		
50%	95	80	35	15	10

GRADATION - SIZE NO. 9-M				
Payment Reduction	Sieve Size-Percent Passing			
	1/2 inch	3/8 inch	No. 4	No. 8
0%	100	75-100	0-25	0-5
10%	98-99	73-74	26-27	6-7
20%	97	72	28	8
30%	96	71	29	9
50%	95	70	30	10

GRADATION - SIZE NO. 10			
Payment Reduction	Sieve Size-Percent Passing		
	3/8 inch	No. 4	No. 100
0%	100	85-100	10-30
10%			8-9
10%	98-99	83-84	31-32
20%			7
20%	97	82	33
30%			6
30%	96	81	34
50%			5
50%	95	80	35

GRADATION - SIZE NO. 11				
Payment Reduction	Sieve Size-Percent Passing			
	3/8 inch	No. 4	No. 8	No. 100
0%	100	40-90	10-40	0-5
10%		38-39	8-9	
10%	98-99	91-92	41-42	6-7
20%		37	7	
20%	97	93	43	8
30%		36	6	
30%	96	94	44	9
50%		35	5	
50%	95	95	45	10

GRADATION - DENSE GRADED AGGREGATE						
Payment Reduction	Sieve Size-Percent Passing					
	1 inch	3/4 inch	3/8 inch	No. 4	No. 30	No. 200
0%	100	70-100	50-80	30-65	10-40	4-13
5%		68-69	48-49	28-29		
5%	98-99		81-82	66-67	41-42	14
10%		66-67	46-47	26-27	9	
10%	96-97		83-84	68-69	43-44	15
20%	95	65	45	25		3
20%			85	70	45	16
30%		64	44	24	8	2
30%	94		86	71	46	17

GRADATION - CRUSHED STONE BASE							
Payment Reduction	Sieve Size-Percent Passing						
	2 1/2 inch	1 1/2 inch	3/4 inch	3/8 inch	No. 4	No. 30	No. 200
0%	100	90-100	60-95	30-70	15-55	5-20	0-8
5%		88-89	58-59	28-29	13-14	3-4	
5%	98-99		96-97	71-72	56-57	21-22	
10%		86-87	56-57	26-27	11-12	1-2	
10%	96-97		98	73	58	23	9
20%		84-85	54-55	24-25	9-10	0	
20%	95		99	74	59	24	10
30%		83	53	23	8		
30%	94		100	75	60	25	11

GRADATION - FREE DRAINING BEDDING AND BACKFILL		
Payment Reduction	Sieve Size-Percent Passing	
	1 1/2 inch	No. 4
0%	100	0-30
10%	98-99	31-32
20%	97	33
30%	96	34
50%	95	35

GRADATION - COARSE AGGREGATES FOR UNDERDRAINS			
Payment Reduction	Sieve Size-Percent Passing		
	1 1/2 inch	No. 4	No. 100
0%	100	0-30	0-5
10%	98-99	31-32	6
20%	97	33	7
30%	96	34	8
50%	95	35	9

GRADATION - COARSE AGGREGATE FOR ROCK DRAINAGE BLANKET		
Payment Reduction	Sieve Size-Percent Passing	
	4 inch	No. 4
0%	100	0-30
10%	98-99	31-32
20%	97	33
30%	96	34
50%	95	35

GRADATION - CRUSHED AGGREGATE SLOPE PROTECTION			
Payment Reduction	Sieve Size-Percent Passing		
	4 inch	2 1/2 inch	1 1/2 inch
0%	100	25-100	0-15
10%	98-99	23-24	16-17
20%	97	22	18
30%	96	21	19
50%	95	20	20

SIZES OF COARSE AGGREGATES																	
Size	Sieve Maximum Nominal Size	AMOUNTS FINER THAN EACH LABORATORY SIEVE (SQUARE OPENINGS) PERCENTAGE BY WEIGHT															
		4 inch	3 1/2 inch	3 inch	2 1/2 inch	2 inch	1 1/2 inch	1 inch	3/4 inch	1/2 inch	3/8 inch	No. 4	No. 8	No. 16	No. 30	No. 100	No. 200
1	3 1/2 inch	100	90-100		25-60		0-15		0-5								
2	2 1/2 inch			100	90-100	35-70	0-15	0-5									
23	2 1/2 inch			100	40-90		0-5										
3	2 inch				100	95-100	35-70	0-5									
357	2 inch				100	95-100	35-70	0-5									
4	1 1/2 inch				100	90-100	20-55	0-15									
467	1 1/2 inch				100	95-100	35-70										
5	1 inch					90-100	20-55	0-10	0-5								
57	1 inch					95-100		25-60									
610	1 inch					85-100		40-75									
67	3/4 inch					100	90-100		20-55								
68	3/4 inch					100	90-100		30-65								
710	3/4 inch					100	80-100		30-75								
78	1/2 inch						100	90-100	40-75								
8	3/8 inch							100	85-100								
9-M	3/8 inch							100	75-100								
10 <sup>23</sup>	No. 4								100								
11 <sup>27</sup>	No. 4								100								
DENSE GRADED AGGREGATE <sup>a)</sup>	3/4 inch						100	70-100									4-13
CRUSHED STONE BASE <sup>b)</sup>	2 inch				100		90-100		60-95								0-8

<sup>a)</sup> Gradation performed by wet sieve KM 64-620 or ASHTO T 11/T 27.

<sup>b)</sup> Sizes shown for convenience and are not to be considered as coarse aggregates.

Note: The Department will allow blending of same source/same type aggregate when precise procedures are used such as cold feed, belt, or equivalent and combining of sizes or types of aggregate using the weigh hopper at concrete plants or controlled feed belts at the pugmill to obtain designated sizes.

AGGREGATE SIZE USE	
Type of Construction	Sizes to be Used
Asphalt Mixtures	See Subsection 403.03
Traffic-Bound Base	57, 610, 710, or DGA
JPC Base and Class P Concrete	57, 67, 68, 78, 8, or 9-M with fine aggregate as specified in Section 804.
Cement Concrete Structures and Incidental Construction	57, 67, 68, 78, 8, 9-M for Classes "A", "AA", "D", "D" Modified, "M1", "M2", and "B" (357 & 467 also for Class B). 9-M for Waterproofing Overlays. 67, 68, 78, 8, 9-M for all other Overlays and Classes "AAA" and "A" Modified; with fine aggregate as specified in Section 804.

**805.16 SAMPLING AND TESTING.** The Department will sample and test coarse aggregates at locations and frequencies that the Engineer determines. The Department will sample and test according to the following methods when applicable:

Absorption (Coarse Aggregate)	AASHTO T 85
Chlorides	Calif. DOT 422
Clay Lumps and Friable Particles	AASHTO T 112
Coal and Lignite	KM 64-615
Concrete Beam Expansion Test	AASHTO T 160
Dry Sieve Analysis	AASHTO T 27
Finer Than No. 200	KM 64-606 or AASHTO T 11 (Procedure B)
Flat and Elongated Particles	ASTM D 4791
Freeze/Thaw	KM 64-626
Insoluble Residue	ASTM D 3042
Lightweight Particles	AASHTO T 113
Percent Crushed Particles	ASTM D 5821
pH	Calif. DOT 643
Plastic Limit and Plasticity Index	AASHTO T 90
Resistivity	Calif. DOT 643
Sampling	AASHTO T 2
Sand Equivalent	AASHTO T 176
Shale	KM 64-604
Soundness (5 Cycles)	KM 64-610
Sulfates	Calif. DOT 417
Unit Weight	AASHTO T 19
Wear	AASHTO T 96
Wet Sieve Analysis	KM 64-620 or AASHTO T 11 (Procedure B)/T 27