SECTION 816
AGGREGATES

816.01 FINE AGGREGATE FOR CONCRETE.

A. **General.** Fine aggregate for concrete shall meet AASHTO M-6 with the following changes:

1. **Gradation.** Fine aggregate shall meet the following:

Sieve Size	Percent Passing
3/8 Inch	100
No. 4	95–100
No. 16	45–80
No. 50	10–30
No. 100	0–10
No. 200	0–3

2. **Test Methods and Requirements.** Only the following tests from AASHTO M-6 will be used:

Test	Method	Requirements
Sampling	AASHTO T-2	
Reducing Sample to Test Size	AASHTO T-248	
Lightweight pieces in Aggregate	AASHTO T-113*	2% max.
Organic impurities	AASHTO T-21	Not darker than the reference std. color
Mortar-making properties	AASHTO T-71	
Sieve analysis	AASHTO T-27	
Soundness (sodium sulfate)	AASHTO T-104	10% max.
Material Passing No. 200 Sieve	AASHTO T-11	

*Oven-dry weights will be substituted for saturated surface-dry weights. The percentage of lightweight pieces will be based on the total sample submitted for testing. Lightweight pieces will be those with a specific gravity less than 1.95. The No. 30 sieve will be substituted for the No. 50 sieve. Agitate the sample by stirring for a period of 15 seconds. Allow the sample to settle for 30 seconds and decant. Perform this procedure until the specimen is free of floating pieces or a maximum of three times.

816.02 COARSE AGGREGATE FOR CONCRETE.

A. **General.** Coarse Aggregate shall consist of gravel, crushed gravel, crushed stone, or other approved inert materials of similar characteristics, or a combination thereof, meeting the following:

1. **Gradation.** The gradation shall meet the following:

Size No. and Percent Passing by Weight

Sieve Size	3	4	5
1-1/2 inch	100		
1 inch	95–100	100	

3/4 inch		90–100	100
1/2 inch	25–65		90–100
3/8 inch	15–55	20–55	40–70
No. 4	0–10	0–10	0–15
No. 8	0–5	0–5	0–5
No. 200 (Max)	1.0	1.0	1.0

2. **Test Methods and Requirements.**

	Test	Method	Requirements Max. Percent by Weight of the Plus No. 4 Fraction
a.	Shale	NDDOT Method**	0.7
b.	Iron Oxide Particles	NDDOT Method**	4.0*
c.	Lignite and Other Coal	NDDOT Method**	0.5
d.	Soft Particles Exclusive of a, b, c (Includes clay, and other friable material)	NDDOT Method**	2.5
e.	Thin or Elongated Pieces (maximum thickness less than 1/4 the maximum width, or maximum length more than 3 times the maximum width)	NDDOT Method**	15.0
f.	Material Passing No. 200 Sieve	AASHTO T-11	
g.	L.A. Abrasion	AASHTO T-96	40.0
h.	Soundness (Sodium Sulfate)	AASHTO T-104	12
i.	Sampling	AASHTO T-2	
j.	Reducing Sample to Test Size	AASHTO T-248	
k.	Sieve Analysis	AASHTO T-27	

*__NOTE:__ For spall repairs for concrete pavements and for bridge deck overlays, the maximum iron oxide particles shall be 2.0%.

**Field Sampling and Testing Manual

Coarse aggregate for use in concrete that is subjected to moisture, extended exposure to humid atmosphere, or contact with moist ground shall not contain any materials that are deleteriously reactive with the alkalies in the cement in a quantity sufficient to cause excessive expansion of mortar or concrete. If such materials are present in injurious quantities, the coarse aggregate may be used with a cement containing less than 0.6% alkalies calculated as sodium oxide or with the addition of a material that has been shown to prevent harmful expansion due to the alkali-aggregate reaction. The reactivity shall be determined according to the test methods specified in AASHTO M-80.

816.03 AGGREGATES FOR SURFACING, BASE, ASPHALT MIXES, BLOTTER, AND SEAL COATS.

A. **General.** The material shall consist of sound, durable particles of gravel or sand which may include limited quantities of fine soil particles as binding material. It shall be free of sod, roots, and other organic matter. The physical characteristics and quality of the materials shall be approved by the Engineer.

CLASS OF AGGREGATE AND SPECIFICATION LIMITS

B. **Specific Requirements**.

Table I: Aggregates for Subgrade Repair, Trench Backfill, Bases, and Surfacing

Sieve Size Percent Passing	Permeable Trench Backfill	Aggr. for Subgrade Repair	Aggr. for Blended Base	Shldr. Aggr. Surface	Aggr. Base	Permeable Base Aggr.	Temp. Traffic Surface Aggr.	Aggr. Surface
	2	3	3M	4	5	7	8	13
3”		100						
1-1/2”							100	
1-1/4”								
1”			100		100	100		100
3/4”	100			100	90–100	95–100		70–100
5/8”								
1/2”						85–100		
3/8”	50–95					60–90		
No. 4		35–85	35–85	35–85	35–70	15–25	35–80	38–75
No. 8						2–10		22–62
No. 10	0–15							
No. 16						2–5		
No. 30	0–4	20–50	20–50	10–50	16–40			12–45
No. 50								
No. 100								
No. 200		0–15	4–10	7–17	4–10	0–3		7–15
Shale[1]		12%	12%	15%	12%	8%	20%	12%
L. A. Abrasion[1]				50%	50%	40%		50%
Plasticity Index[2]								
Fractured Faces[3]				10%	10%	85%		10%

Table II: Aggregates for Asphalt Mixes, Blotter, and Seal Coats

Sieve Size Percent Passing	Asphalt Hot Mix Low to High Quality				Chip Seal	Chip Seal	Blotter Sand	Sand Seal
	27	29	31	33	42	43	44	45
3”								
1-1/2”								
1-1/4”								
1”								
3/4”								
5/8”	100	100	100	100			100	
1/2”	70–100	70–100	70–100	70–100				
3/8”					100	100		100
No. 4	40–70	40–70	40–70	40–70	20–70	20–70	90–100	85–100
No. 8					2–20	0–17		
No. 16								45–80
No. 30	15–35	15–35	15–35	15–35				
No. 50								10–30
No. 200	2.0–9.0	2.0–9.0	2.0–9.0	2.0–9.0	0–5	0–2	0–20	0–3
Shale[1]	5.0%	5.0%	5.0%	5.0%	8.0%	8.0%		3.0%
L. A. Abrasion[1]	40%	40%	40%	40%	40%	40%		
Plasticity Index[2]	3	3	N.P.	N.P.				
Fractured Faces[3]	55%	65%	75%	95%				
Crushed Fines[4]	10%	40%	60%	80%				

Footnotes for Tables I and II:

[1] Maximum Allowable Percentages.

[2] Maximum allowable unless range shown. N.P. = Non Plastic as per AASHTO T-90. Use material passing the No. 40 sieve (standard method). For Class 5 aggregate the maximum allowable Plasticity Index shall be determined from the following formula: Max. allowable PI for Class 5 = 10 - (% Passing No. 40 Sieve / 10)

[3] Minimum weight percentage allowable for the portion of the aggregate retained on a No. 4 sieve having at least 1 fractured face for Classes 4, 5, 13, 27, 29, 31, and 33, and at least 2 fractured faces for Class 7.

[4] Minimum percentage of material passing a No. 4 sieve that is composed of fractured material produced by a crushing process. The Contractor shall demonstrate that the crushing operation produces this result.

C. **Sampling and Testing.**

Sampling	AASHTO T-2
Reducing Sample to Test Size	AASHTO T-248
Liquid Limit	AASHTO T-89
Plastic Limit and Plasticity Index	AASHTO T-90
Los Angeles Abrasion	AASHTO T-96
Lightweight Pieces of Aggregate	AASHTO T-113*
Sieve Analysis	AASHTO T-27
Amount of Material Finer than No. 200 Sieve in Aggregate	AASHTO T-11**
Fractured Faces	Department Method

*Oven-dry weights will be substituted for saturated surface-dry weights. The No. 30 sieve will be substituted for the No. 50 sieve. The percentage of lightweight pieces will be based on the total sample retained on the No. 30 sieve. Lightweight pieces will be those with a specific gravity less than 1.95. Agitate the sample by stirring for a period of 15 seconds. Allow the sample to settle for 30 seconds and decant. Perform this procedure until the specimen is free of floating pieces or a maximum of three times.

**AASHTO T-11 is to be used in conjunction with AASHTO T-27 for all aggregate tests.

SECTION 818
BITUMINOUS MATERIALS

818.01 GENERAL REQUIREMENTS.

The original certificate of compliance covering material shipped in each car or tank truck shall be furnished at the time of shipment. The certificate shall be furnished to the applicable Department's District office and shall contain the following information:

1. Project Number
2. Destination
3. Quantity Contained in Car or Tank Truck
4. Gross, Tare, and Net Weights if Shipped by Truck
5. Car Initials and Number or Tank Truck Number
6. Type and Grade of Bitumen
7. Date of Shipment
8. Specific Gravity
9. Statement that the material meets all of the Specifications