



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**MATERIAL REQUIREMENTS FOR COARSE
AGGREGATES USED IN CONCRETE
ITM No. 226-23**

1.0 SCOPE.

- 1.1 This method sets forth the material requirements for coarse aggregates when used in concrete.
- 1.2 Coarse aggregates that have also been shown to be suitable to create optimized concrete mix designs in accordance with this ITM are called Concrete Coarse Aggregates (CCA).
- 1.3 This procedure may involve hazardous materials, operations, and special equipment. All the safety problems associated with the use of the test method may not be addressed herein. The user of the ITM is responsible for the establishment and implementation of appropriate safety and health practices and the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 ITM Standards.

211 Certified Aggregate Producer Program

3.0 TERMINOLOGY. Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

4.0 SIGNIFICANCE AND USE. This ITM shall be used to evaluate coarse aggregates for use in concrete mixtures, and coarse aggregate blends in concrete mixtures.

5.0 GENERAL REQUIREMENTS.

5.1 Concrete Coarse Aggregate for Section 501

5.1.1 Concrete Coarse Aggregate for Standard Specification Section 501 concrete may utilize any aggregate gradation that complies with the following:

Sieve Size	Percent Passing
1 1/2 in. (37.5 mm)	100
1 in. (25.0 mm)	95 - 100*
Decant (Stone and Slag)	0 - 2.5
Decant (All Others)	0 - 1.5

*This requirement will not apply for approved Class AP aggregate with expansion values 0.030 or lower. Request to waive this requirement will be via the CMDS.

5.2 Concrete Coarse Aggregate for Section 502, 506, and 702

5.2.1 Concrete Coarse Aggregate for Standard Specification Sections 502, 506, and 702 shall be one of the following gradations:

	INDOT #8	AASHTO #57
Sieve Size	Percent Passing	Percent Passing
1 1/2 in. (37.5 mm)	100	100
1 in. (25.0 mm)	100	95 - 100
3/4 in. (19.0 mm)	75 - 95	
1/2 in. (12.5 mm)	40 - 70	25 - 60
3/8 in. (9.5 mm)	20 - 50	
No. 4 (4.75 mm)	0 - 15	0 - 10
No. 8 (2.36 mm)	0 - 10	0 - 5
Decant (Stone and Slag)	0 - 2.5	0 - 2.5
Decant (All Others)	0 - 1.5	0 - 1.5

5.3 Intermediate-Sized Coarse Aggregate

5.3.1 Intermediate-sized coarse aggregate shall be of the quality classification specified by the Division of Materials and Tests.

For an aggregate such as pea gravel, this determination will be made based on the quality classification of aggregates from the same pit.

5.4 Fine Aggregate

5.4.1 Fine aggregate shall be in accordance with either 6.3 or 6.4 below.

6.0 PROCEDURE

6.1 Spreadsheet

6.1.1 A spreadsheet has been developed for review of Concrete Coarse Aggregates by this ITM. The spreadsheet is posted on the Department Materials and Tests website.

6.2 Tarantula Curve

6.2.1 The tarantula curve is a tool used to evaluate aggregate proportioning for concrete mixtures. Evaluation is accomplished by evaluating individual percent retained on each sieve of the combined mixture gradation. The percent retained requirements are the tarantula curve are as follows:

Sieve size	Individual Percent Retained by Volume (%)	
	Min	Max
1-1/2 in. (37.5 mm)	0	0
1.00 in. (25 mm)	0	16
3/4 in. (19 mm)	0	20
1/2 in. (12.5 mm)	4	20
3/8 in. (9.5 mm)	4	20
No. 4 (4.75 mm)	4	20
No. 8 (2.36 mm)	0	12
No. 16 (1.18 mm)	0	12
No. 30 (600 μm)	4	20
No. 50 (300 μm)	4	20
No. 100 (150 μm)	0	10
No. 200 (75 μm)	0	2

Figure 1

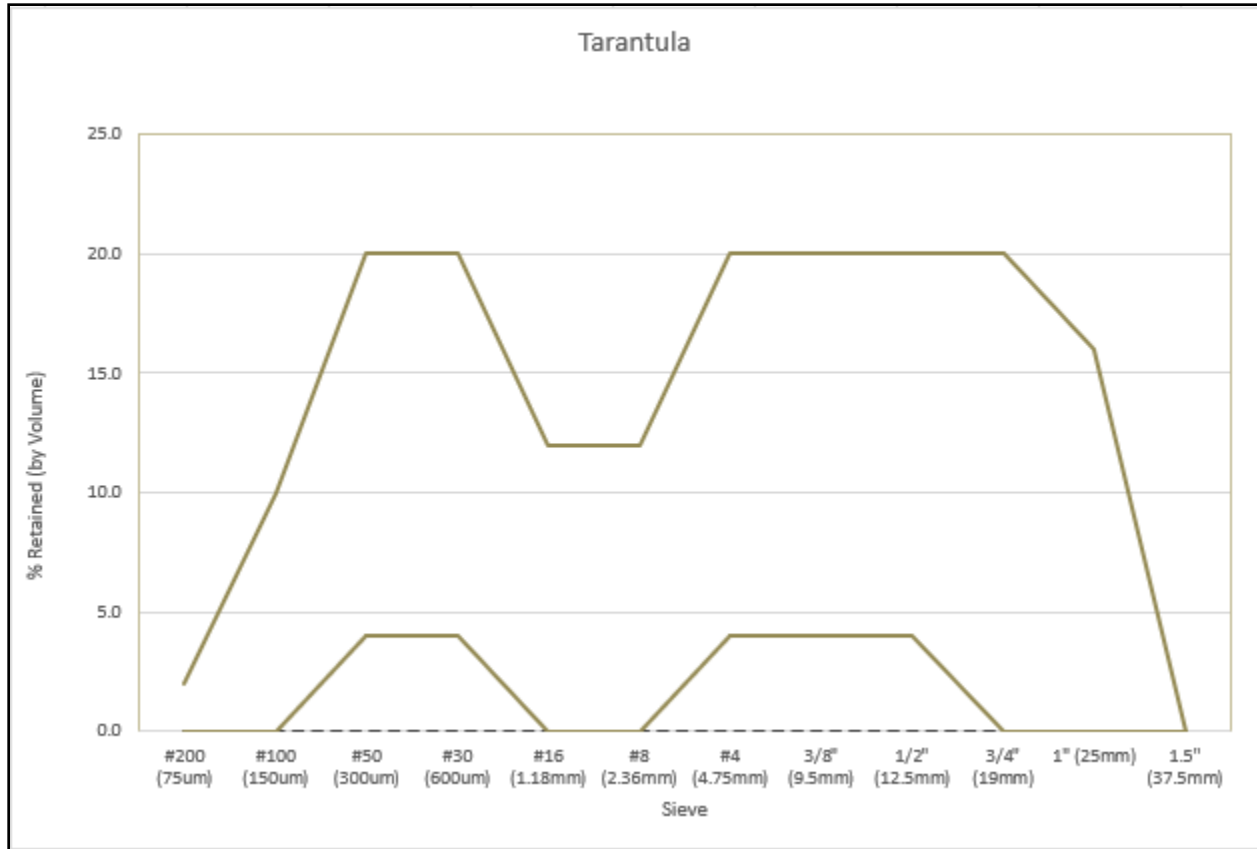


Figure 2

6.3 Coarse and Fine Sand Limits

6.3.1 Coarse Sand is defined as the total of the material retained on the #8, #16, and #30 sieves.

6.3.2 Fine Sand percentage is defined as the total of the material retained on the #30, #50, #100, and #200 sieves.

6.3.3 Utilizing the same four trial aggregate blends developed in 6.2, coarse and fine sand limits will be evaluated by the following criteria:

- a) Coarse sand percentage shall be 20% or greater.
- b) Fine sand percentage shall be between 25% and 34%.

6.4 Fine Aggregate Limits for Mixes not using 6.2 above

6.4.1 For normal weight concrete the fine aggregate shall be no less than 40% nor more than 45% of the total weight of aggregates used, except the limit may be increased to 50% when slag coarse aggregate is used. The aggregates shall be proportioned to use the maximum amount of coarse aggregate

which produces a workable mix. For lightweight concrete, the fine aggregate proportioning limits will not apply.

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