



# ALABAMA DEPARTMENT OF TRANSPORTATION

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Montgomery, Alabama 36110

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Bob Riley  
Governor

Joe McInnes  
Transportation Director

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DEC 08 2008

ENGINEERING DEPT.

December 1, 2008

Mr. Joe Ruffer, County Engineer  
Mobile Government Plaza, 6<sup>th</sup> Floor S  
205 Government Street  
Mobile, Alabama 36644-1600

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DEC 09 2008

FILE RM

Dear Mr. Ruffer:

RE: Section 429 Specifications for Mobile County

Attached is a copy of the current Special Provision No. 08 - Mobile County, which is added to the Alabama Standard Specifications, 2008 Edition, for use by Mobile County on local projects. It is my understanding that Section 429 will be used by Mobile County for jobs using no state or federal funds.

Please advise if you need additional information.

Sincerely,

D. W. Vaughn, P.E.  
Chief Engineer/Deputy Director

DWV:kg  
cc: File

*file 429 spec  
file also under  
2008-PAG 6.*

# ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: November 25, 2008

Special Provision No. 08-MobileCo

EFFECTIVE DATE: November 25, 2008

SUBJECT: Improved Bituminous Concrete Base, Binder, and Wearing Surface Layers.

Alabama Standard Specifications, 2008 Edition, shall be amended by the addition of a new Section 429 as follows. This addition is solely and exclusively for use by Mobile County for projects that do not have State or Federal Funds.

## SECTION 429 IMPROVED BITUMINOUS CONCRETE BASE, BINDER, AND WEARING SURFACE LAYERS

### 429.01 Description.

The work covered by this Section shall consist of a hot bituminous plant mixed pavement layer placed on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, typical cross section, and the approximate placement rate shown on the plans or as directed. General requirements for all bituminous concrete pavements as specified in Section 410 are applicable to this Section, subject to any exceptions contained herein. Quality Control/Quality Assurance (QC/QA) requirements as specified in Section 106 are applicable to this section, subject to any exceptions contained herein.

The work will be accepted on a LOT by LOT basis in accordance with the applicable requirements.

### 429.02 Materials.

The materials furnished for use shall conform to the requirements of Section 410 and the following:

#### (a) AGGREGATES.

##### 1. GENERAL.

All fine and coarse aggregate furnished shall come from an approved producer who is participating in and meeting the requirements of ALDOT-249, Procedure for Acceptance of Coarse and Fine Aggregates. The producer's name shall be listed in the Department's Materials, Sources, and Devices with Special Acceptance Requirements Manual, List I-1. The Department has established a list of qualified producers of fine and coarse aggregates. Refer to Subarticle 106.01(f) and ALDOT-355 concerning this list.

##### 2. COARSE AGGREGATE.

Coarse aggregate shall be aggregate retained on the No. 4 {4.75 mm} sieve.

Coarse aggregate shall consist of crushed (or uncrushed) gravel with a bulk specific gravity greater than 2.550 (AASHTO T 85), crushed stone, or crushed slag, crushed quartzite, or a combination thereof having hard, strong, durable pieces, free from adherent coatings, and meeting all requirements of these specifications.

**Aggregate Soundness.**

The percent degradation of the source aggregate by the sodium sulfate soundness test (AASHTO T 104, Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate), after five cycles of testing, shall not exceed 10.0 %.

**Deleterious Materials, Flat or Elongated Particles, and Absorption.**

The amount of deleterious substances, flat or elongated particles, and absorption in the coarse aggregate shall not exceed the following limits:

(a) Coal and Lignite (Visual)	0.25 %
(b) Clay Lumps and Friable Particles (AASHTO T 112)	0.25 %
(c) Flat or Elongated particles (5:1 Ratio) (ASTM D 4791 by Mass)	10.0 %
(d) Flat or Elongated particles (3:1 Ratio) (ASTM D 4791 by Mass) The requirements given for flat or elongated particles shall not apply to the 3/8 inch {9.5 mm} mix.	20.0 %
(e) Other local deleterious substances (Shale, Mica, Marcasite, etc.)(Visual)	2.0 %
(f) Absorption (Total sample absorption on the material passing the 3/4 inch {19.0 mm} sieve and retained on the No. 4 {4.75 mm} sieve)(AASHTO T 85 *). Applies to gravel aggregates only.	2.0 %
* Section 8.1 of AASHTO T 85 modified to require a 15 minute vacuum saturation period as per Section 6.3 of AASHTO T 209 prior to the required 15-19 hour soaking period.	

**Los Angeles Abrasion Criteria.**

The percent loss of the coarse aggregate by the LA Abrasion test (AASHTO T 96, Resistance to Abrasion of Small Size Aggregate by use of the Los Angeles Machine) shall not exceed 48 %, except that for Sandstone and Blast Furnace Slag, the LA Abrasion shall not exceed 55 %.

**3. FINE AGGREGATE.**

Fine aggregate shall be aggregate passing the No. 4 {4.75 mm} sieve. Gravel used to manufacture fine aggregate shall have a bulk specific gravity greater than 2.550 (AASHTO T 85).

The fine aggregate shall be non-plastic when tested in accordance with AASHTO T 89, as modified by ALDOT-232, and AASHTO T 90 and shall have a maximum of 1.0 percent clay lumps and friable particles as determined by AASHTO T 112. It shall consist of hard, tough grain, free of injurious amounts of clay, loam, or other deleterious substances.

**Clay Content.**

The amount of clay material, as indicated by the sand equivalent, measured on the aggregate passing the No. 4 {4.75 mm} sieve as determined by AASHTO T 176, *Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test*, shall be no less than the values defined by Table 1 according to the total design traffic in equivalent single axle loads (ESALs).

ESAL Range	Traffic (ESALs)	Sand Equivalent
A	ESALs < 3.0x10 <sup>5</sup>	≥ 40.0
B	3.0x10 <sup>5</sup> ≤ ESALs < 1.0x10 <sup>6</sup>	≥ 40.0
C	1.0x10 <sup>6</sup> ≤ ESALs < 3.0x10 <sup>6</sup>	≥ 40.0
D	3.0x10 <sup>6</sup> ≤ ESALs ≤ 1.0x10 <sup>7</sup>	≥ 45.0
E	If the total design traffic ESALs is greater than	
F	1.0x10 <sup>7</sup> , mixes from Section 423 and 424 may be used.	

**4. MINERAL FILLER.**

Mineral filler shall consist of finely divided mineral matter such as rock dust, slag dust, hydrated lime, hydraulic cement, or fly ash meeting the requirements of Section 805.

The introduction of mineral filler shall be in accordance with AASHTO M 156 Section 3.3 as specified in ALDOT-324 with the additional requirement that accurate proportioning shall be accomplished by means of pneumatic or mechanical metering.

**(b) RECYCLED ASPHALT PAVEMENT (RAP).**

When RAP is used as a component of a wearing or binder layer, the coarse and fine aggregates contained in the RAP shall meet the respective requirements as outlined in Items 429.02(a)1., 2., & 3., except for the Clay Content requirement in Item 429.02(a)3.

If the RAP contains any gravel with a bulk specific gravity of less than 2.550 or fine aggregate manufactured from this gravel, it may not be used in any wearing layer (even if this layer is to be covered by an OGFC) and is limited to 15% of any other layer. If the RAP does not contain any chert gravel, it is limited to 20%.

In addition to the above requirements, RAP used in a 3/8 inch {9.5 mm} maximum size mix shall be processed so that 100 % of the RAP shall pass the 1/2 inch {12.5 mm} sieve.

Percentages of RAP shall be based on total weight {mass} of the aggregate blend.

**(c) BLEND OF AGGREGATES.**

The coarse and fine aggregates shall be combined in a total blend that will produce an acceptable job mix within the gradation limits determined by the maximum and minimum control points and a restricted zone as defined by Tables 2A-2E. Restricted zones are a function of the maximum particle sizes in the blended gradations. Maximum particle size is defined as the sieve size that is two sizes larger than the first sieve to retain more than 10 percent of the material. The sequence of sieve sizes to be used in determining maximum particle size is that contained in Tables 2A-2D. Gradation charts illustrating gradation requirements are given in Article 429.03.

The plans and proposal will designate the mix to be used. Unless otherwise shown on the plans or in the proposal, base layer mixtures may be designed on either the fine or coarse side, or through of the restricted zone. All binder and wearing layers shall be designed either through the restricted zone or on the fine side of the restricted zone.

Production tolerances shall be as shown in Subarticle 429.04(e).

Sieve Size	Control Point (Percent Passing)	
	Minimum	Maximum
No. 200 {75 $\mu$ m}	1	7
No. 8 {2.36 mm}	19	45
3/4" {19 mm}	-	90
1" {25 mm}	90	100
1.5" {37.5 mm} Maximum	100	-
<b>Restricted Zone</b>		
No. 4 {4.75 mm}	39.5	39.5
No. 8 {2.36 mm}	26.8	30.8
No. 16 {1.18 mm}	18.1	24.1
No. 30 {600 $\mu$ m}	13.6	17.6
No. 50 {300 $\mu$ m}	11.4	11.4

Table 2B. Aggregate Gradation Control Points and Boundaries of Restricted Zone (1 inch {25.0 mm} Maximum Size Mix)		
Sieve Size	Control Point (Percent Passing)	
	Minimum	Maximum
No. 200 {75 $\mu$ m}	2	8
No. 8 {2.36 mm}	23	49
1/2" {12.5 mm}	-	90
3/4" {19 mm}	90	100
1" {25 mm} Maximum	100	-
Restricted Zone		
No. 4 {4.75 mm}	-	-
No. 8 {2.36 mm}	34.6	34.6
No. 16 {1.18 mm}	22.3	28.3
No. 30 {600 $\mu$ m}	16.7	20.7
No. 50 {300 $\mu$ m}	13.7	13.7

Table 2C. Aggregate Gradation Control Points and Boundaries of Restricted Zone (3/4 inch {19.0 mm} Maximum Size Mix)		
Sieve Size	Control Point (Percent Passing)	
	Minimum	Maximum
No. 200 {75 $\mu$ m}	2	10
No. 8 {2.36 mm}	28	58
3/8" {1.18 mm}	-	90
1/2" {12.5 mm}	90	100
3/4" {19.0 mm} Maximum	100	-
Restricted Zone		
No. 4 {4.75 mm}	-	-
No. 8 {2.36 mm}	39.1	39.1
No. 16 {1.18 mm}	25.6	31.6
No. 30 {600 $\mu$ m}	19.1	23.1
No. 50 {300 $\mu$ m}	15.5	15.5

Table 2D. Aggregate Gradation Control Points and Boundaries of Restricted Zone (1/2 inch {12.5 mm} Maximum Size Mix)		
Sieve Size	Control Point (Percent Passing)	
	Minimum	Maximum
No. 200 {75 $\mu$ m}	2	10
No. 8 {2.36 mm}	32	67
No. 4 {4.75 mm}	-	90
3/8" {9.5 mm}	90	100
1/2" {12.5 mm} Maximum	100	-
Restricted Zone		
No. 4 {4.75 mm}	-	-
No. 8 {2.36 mm}	47.2	47.2
No. 16 {1.18 mm}	31.6	37.6
No. 30 {600 $\mu$ m}	23.5	27.5
No. 50 {300 $\mu$ m}	18.7	18.7

Sieve Size	Control Point (Percent Passing)	
	Minimum	Maximum
No. 200 {75 $\mu$ m}	6	12
No. 16 {1.18 mm}	30	60
No. 4 {4.75 mm}	90	100
3/8" {9.5 mm} Maximum	95	100

Note: This mix has no Restricted Zone and up to 5% may be retained on the maximum size sieve (3/8 inch {9.5 mm}).

#### Coarse Aggregate Angularity.

The coarse aggregate angularity shall be measured on the total blended aggregate retained on the No. 4 {4.75 mm} sieve in accordance with ASTM D 5821.

A fractured face is defined as an angular, rough, or broken surface of an aggregate particle created by crushing, by other artificial means, or by nature. A face is considered fractured only if it has a projected area at least as large as one-quarter of the maximum projected area (maximum cross-sectional area) of the particle and has sharp, well-defined edges.

The percent by weight [mass] of the coarse particles of the blended aggregate retained on the No. 4 {4.75 mm} sieve with one fractured face and with two or more fractured faces shall be no less than the values in Table 3.

ESAL Range	Traffic (ESALs)	Wearing Surface & Binder Layers	Base Layers
A	ESALs < $3.0 \times 10^5$	55 / -	- / -
B	$3.0 \times 10^5 \leq$ ESALs < $1.0 \times 10^6$	65 / -	- / -
C	$1.0 \times 10^6 \leq$ ESALs < $3.0 \times 10^6$	75 / -	50 / -
D	$3.0 \times 10^6 \leq$ ESALs $\leq 1.0 \times 10^7$	85 / 80	60 / -
E	If the total design traffic ESALs is greater than $1.0 \times 10^7$ , mixes from Section 423 and 424 may be used.		
F			

Note: "85 / 80" denotes that 85 percent of the coarse aggregate has at least one fractured face and 80 percent has two or more fractured faces. Coarse aggregate angularity requirements shall not apply to the 3/8 inch {9.5 mm} mix.

#### Fine Aggregate Angularity.

The percent air voids in loosely compacted fine aggregate measured according to AASHTO T 304, Method "A", or ASTM C 1252, Method "A", *Uncompacted Void Content of Fine Aggregate (as Influenced by Particle Shape, Surface Texture, and Grading)* shall be no less than the values in Table 4.

ESAL Range	Traffic (ESALs)	Minimum % Air Void
A	ESALs < $3.0 \times 10^5$	-
B	$3.0 \times 10^5 \leq$ ESALs < $1.0 \times 10^6$	40
C	$1.0 \times 10^6 \leq$ ESALs < $3.0 \times 10^6$	43
D	$3.0 \times 10^6 \leq$ ESALs $\leq 1.0 \times 10^7$	45
E	If the total design traffic ESALs is greater than	
F	$1.0 \times 10^7$ , mixes from Section 423 and 424 may be used.	

#### Use of Carbonate Stone.

Carbonate stone which tends to polish under traffic will be permitted only in underlying layers, shoulder paving, and widening as defined by Article 410.01 and layers that are to be covered by

Polymer Modified Open Graded Friction Course (Section 420) mix in this contract, except as specified in Table 5, or otherwise shown on the plans.

BPN 9 Value Of Aggregate Source *	Maximum Allowable Percentage Of Carbonate Stone
≤ 25	30
26 through 28	35
29 through 31	40
32 through 34	45
≥ 35	50

\* This value, BPN 9, is made using the British Pendulum Tester on aggregate source specimen polished for 9 hours on an accelerated polishing machine known as the British Wheel as per ASTM D 3319 and ASTM E 303.

In no case shall the total amount of virgin carbonate stone in the combined mixture used as actual wearing surface layers exceed the percentage shown in Table 5. When parts of the carbonate stone used in the mix are from differing stratas of material or coming from multiple sources that are represented by different BPN 9 values, the lowest BPN 9 value will be used.

(d) LIQUID ASPHALT BINDER.

Liquid asphalt binders shall come from an approved producer who is participating in and meeting the requirements of ALDOT-243, Acceptance Program For Asphalt Materials. The producer's name shall be listed in the Department's Materials, Sources, and Devices With Special Acceptance Requirements Manual, List I-4. The Department has established a list of qualified producers of asphalt materials. Refer to Subarticle 106.01(f) and ALDOT-355 concerning this list. Unless shown otherwise on the plans or in the proposal, liquid asphalt binder shall be PG 67-22 in accordance with the requirements given in Section 804.

(e) MIX PROPERTIES.

1. AIR VOIDS (V<sub>a</sub>).

The design air voids for all levels of traffic is 4.0 %.

2. VOIDS IN MINERAL AGGREGATE (VMA).

The job mix shall be designed to produce a minimum VMA according to Table 7.

Maximum Aggregate Size *	Minimum VMA (%) for Mixes Designed on the Fine Side of the Restricted Zone	Minimum VMA (%) for Mixes Designed Through or on the Coarse Side of the Restricted Zone
3/8" {9.5 mm}	16.0 **	16.0 **
1/2" {12.5 mm}	16.0	15.0
3/4" {19.0 mm}	15.0	14.0
1" {25.0 mm}	14.0	13.0
1.5" {37.5 mm}	13.0	12.0

\* As defined in Subarticle 429.02(c)  
 \*\* All 3/8" {9.5 mm} mixes where the ESAL range is greater than B shall have a maximum VMA of 18.0.

3. DUST PROPORTION.

The ratio of the percent by weight {mass} of aggregate passing the No. 200 sieve to the effective asphalt content expressed as percent by weight {mass} of the total mix shall be between 0.6 and 1.2 for mixes designed through or on the fine side of the restricted zone and between 0.6 and 1.6 for mixes designed on the coarse side of the restricted zone. All 3/8 inch {9.5 mm} mixes shall have a dust to effective asphalt ratio range of 0.9 to 2.0. These ratio limits apply to both the design and production phases. Effective asphalt content is that asphalt cement not absorbed into the aggregate pore structure and is determined according to Section 4.09 of the Asphalt Institute's, MS-2, *Mix Design Methods for Asphalt Concrete*.

4. ASPHALT DRAINDOWN.

The amount of draindown in an uncompacted asphalt-aggregate sample shall not exceed 0.3 % at the end of one hour in accordance with ALDOT-386, *Asphalt Draindown Test*.

5. RESISTANCE TO MOISTURE INDUCED DAMAGE.

All mixes shall be designed and produced to have a tensile strength ratio (TSR) of at least 0.80 when compacted according to ALDOT-307 at seven percent air voids and tested in accordance with AASHTO T 283 as modified by ALDOT-361.

(f) DESIGN PROCEDURES.

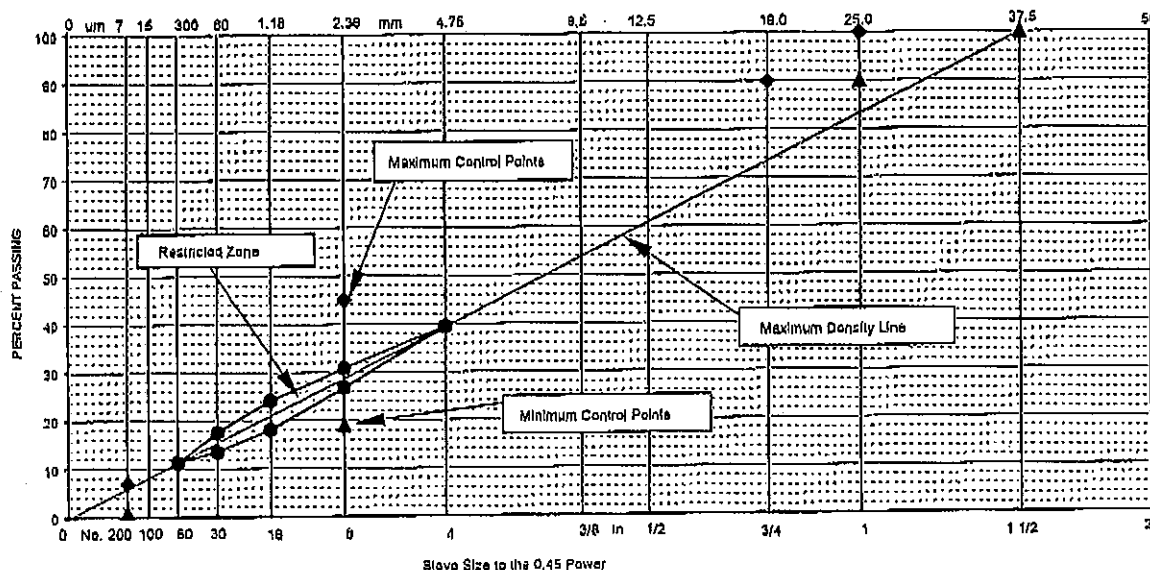
Mixes with 100 % virgin aggregates shall be designed with ALDOT-307, *Design Method for Selecting Optimum Asphalt Cement Content of Bituminous Mixture by Means of the Marshall Apparatus*. Mixes containing recycled asphalt pavement (RAP) shall be designed by ALDOT-344, *Design Method for Selecting the Grade of Recycling Agent and Optimum Asphalt Content of Hot-Mix Recycled Bituminous Mixtures*.

The 50 Blow Marshall Mix Design method shall be used for all mixes if the total design traffic ESALs is less than  $3.0 \times 10^6$ . If the total design traffic ESALs is greater than or equal to  $3.0 \times 10^6$  and less than  $1.0 \times 10^7$ , the 75 Blow Marshall Mix Design method shall be used for all mixes. If the total design traffic ESALs is greater than  $1.0 \times 10^7$ , mixes from Section 423 and 424 may be used. For Marshall stability and flow values shall be no less than the values defined in Table 8.

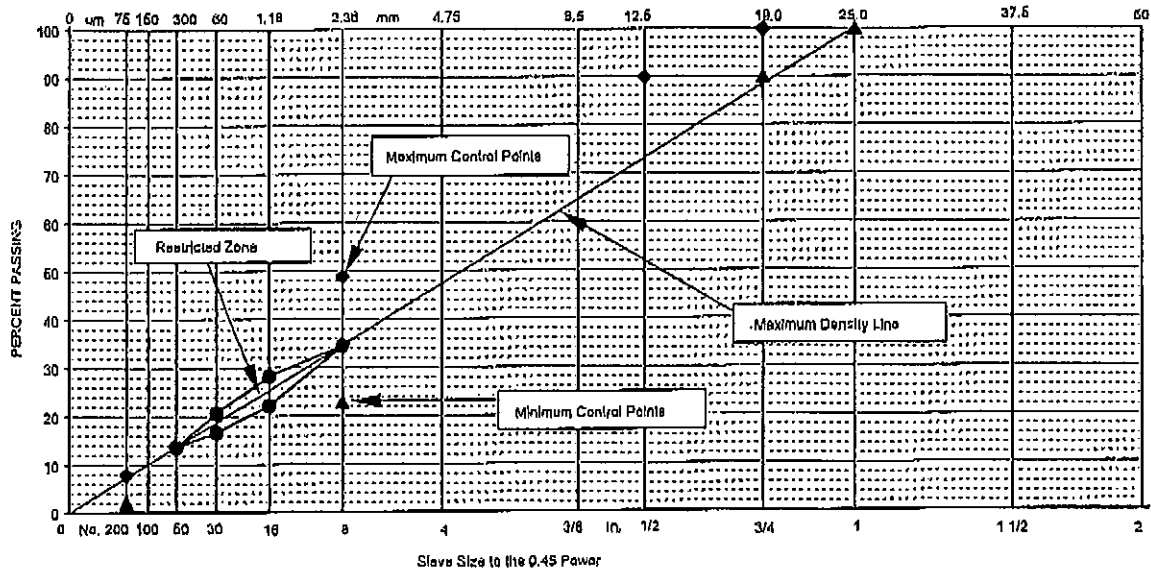
Table 8. Marshall Stability and Flow Criteria			
Mix	Stability (lbs)[kN]	Flow (0.01 in.) [mm]	
		50 Blow	75 Blow
Wearing Surface Layers	$\geq 1600$ {7.5}	8 - 18 {2.0 - 4.5}	8 - 16 {2.0 - 4.0}
Binder Layers	$\geq 1400$ {6.5}	8 - 18 {2.0 - 4.5}	8 - 16 {2.0 - 4.0}
Base Layers	$\geq 1200$ {5.5}	8 - 18 {2.0 - 4.5}	8 - 16 {2.0 - 4.0}

429.03 Gradation Requirements.

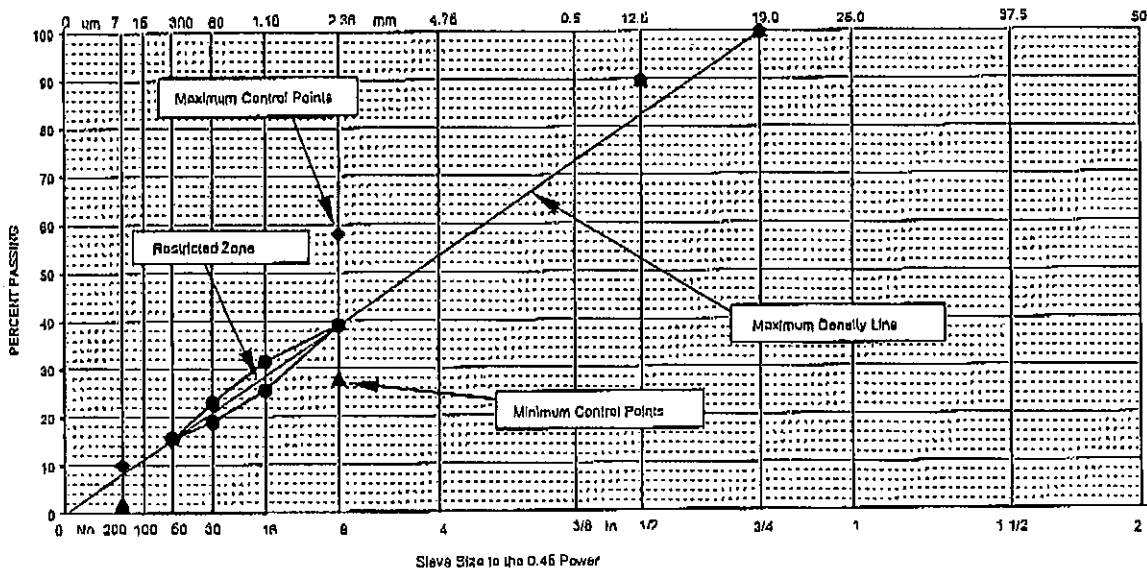
GRADATION CHART FOR 1 1/2 Inch (37.5 mm) MAXIMUM SIZE AGGREGATE



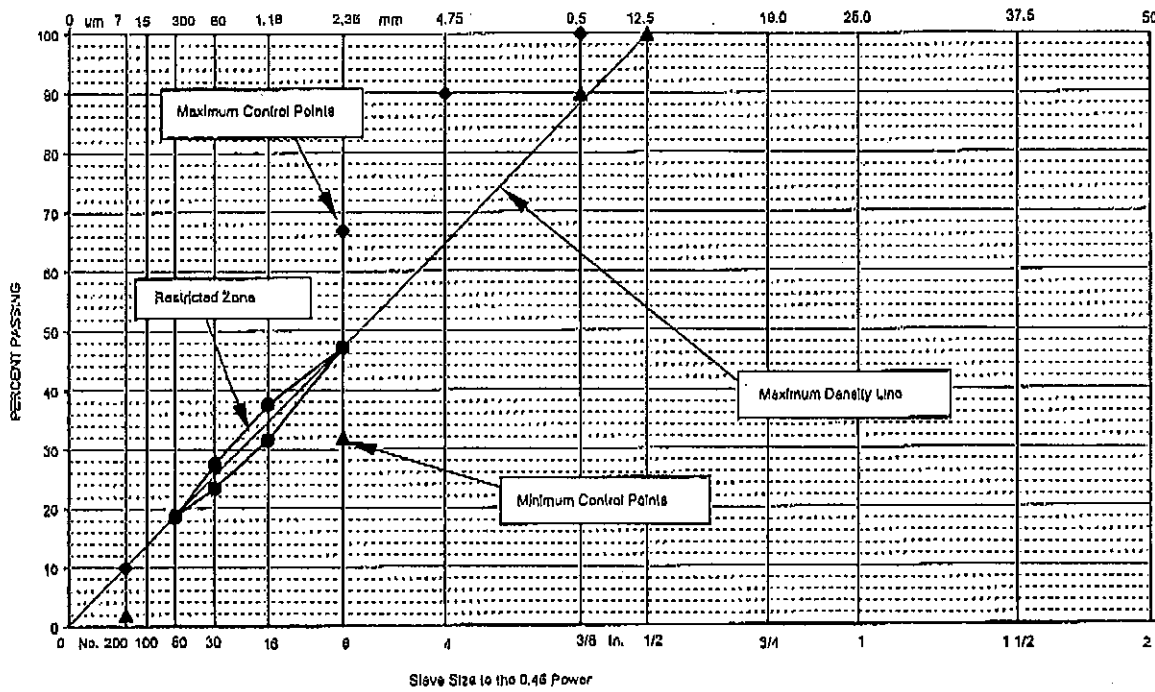
GRADATION CHART FOR 1 inch (25 mm) MAXIMUM SIZE AGGREGATE



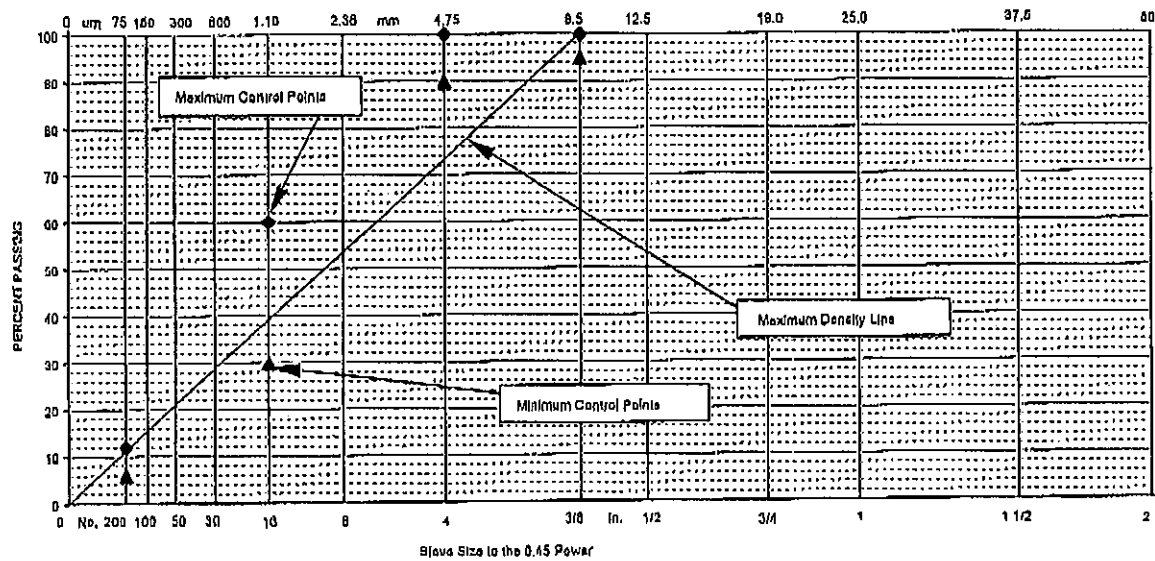
GRADATION CHART FOR 3/4 inch (19 mm) MAXIMUM SIZE AGGREGATE



GRADATION CHART FOR 1/2 inch (12.5 mm) MAXIMUM SIZE AGGREGATE



GRADATION CHART FOR 3/8 inch (9.5 mm) MAXIMUM SIZE AGGREGATE



429.04 Construction Requirements.

(a) GENERAL.

Mixing temperature shall not exceed 350 °F [180 °C].

(b) BINDER LAYER AND WEARING SURFACE LAYER.

Construction requirements shall be as specified in Articles 410.03 through 410.07.

**(c) BASE LAYER.**

The construction requirements for base layers shall be as specified in Articles 410.03 through 410.07, except as follows:

The edges shall be trimmed immediately after final rolling, using an accurately aligned string or wire to a tolerance of 2 inches {50 mm} outside the theoretical edge of the layer and to a slope not flatter than 1:1.

Any edge distorted by rolling shall be promptly corrected.

**(d) PREPARATION OF MIXTURES - MOISTURE CONTENT.**

Each time an asphalt content measurement is made (ALDOT-354 or AASHTO T 308) the amount of moisture in the mixture shall be determined, regardless of aggregate type, as specified in ALDOT-130 reported on Form BMT-20. The moisture determination shall be used in computing the corrected asphalt content. Moisture samples shall be taken with the asphalt content samples from the loaded truck. Moisture in the mixture shall not exceed 0.20 % by weight {mass}.

**(e) PRODUCTION TOLERANCES.**

All mixtures furnished for use shall conform to the approved job mix formula (JMF) within the tolerances set in Article 410.02. Mixture gradations may be produced within the restricted zone provided the gradations are within the tolerances.

**429.05 Method of Measurement.**

The accepted quantities of Improved Bituminous Concrete Wearing Surface Layer, Improved Bituminous Concrete Binder Layer, and Improved Bituminous Concrete Base Layer will be measured as provided in Article 410.08.

**429.06 Basis of Payment.****(a) UNIT PRICE COVERAGE.**

Improved Bituminous Concrete Wearing Surface Layer, Improved Bituminous Concrete Binder Layer, and Improved Bituminous Concrete Base Layer will be paid for at the contract unit price bid in accordance with Article 410.09.

**(b) PAYMENT WILL BE MADE UNDER ITEM NO.:**

- 429-A Improved Bituminous Concrete Wearing Surface Layer,    \*,  
   \*\* Maximum Aggregate Size Mix, ESAL Range    \*\*\* - per ton {metric ton}
- 429-B Improved Bituminous Concrete Binder Layer,    \*,  
   \*\* Maximum Aggregate Size Mix, ESAL Range    \*\*\* - per ton {metric ton}
- 429-C Improved Bituminous Concrete Base Layer,    \*,  
   \*\* Maximum Aggregate Size Mix, ESAL Range    \*\*\* - per ton {metric ton}
- \* Specify "Patching", "Leveling", "Widening", etc. only when required
  - \*\* Specify Maximum Aggregate Size, 3/8", 1/2", 3/4", 1", or 1.5"  
{9.5 mm, 12.5 mm, 19.0 mm, 25.0 mm, or 37.5 mm}
  - \*\*\* Specify "A", "B", "C", or "D"