REVISED SEPTEMBER 1970

ADDENDA A TO 1961 STANDARD SPECIFICATIONS

AMENDMENTS

FOR

REVISION OF BITUMINOUS-STABILIZED BASE AND BITUMINOUS CONCRETE MIXTURES

AND

THE USE OF STANDARD SIZE DESIGNATIONS FOR COARSE AGGREGATES AND SCREENINGS

AND

REVISION OF TABLE 36. -SOIL AGGREGATES, GRADATION

DIVISION 1

GENERAL PROVISIONS

SECTION 4

SCOPE OF THE WORK

1.4.7. MATERIALS.

THIS ARTICLE OF THE STANDARD SPECIFICATIONS IS AMENDED UNDER THE FOLLOWING SUBHEADING:

SAMPLING AND TESTING. GENERAL.

IN TABLE 1 ON PAGE 23 OF THE STANDARD SPECIFICATIONS, THE MATERIAL AND SAMPLING REQUIREMENTS FOR AGGREGATES, COARSE ARE CHANGED TO READ AS FOLLOWS:

MATERIAL	SAMPLES	RATE OF SAMPLING	DELIVERY INSTRUCTIONS
AGGREGATES, COARSE			
STD.SIZE NO.1,2,24,3 AND 357	80 LB.	1000 TONS	2 LARGE SAMPLE BAGS
STD.SIZE NO.4 AND 467	35 LB.	1000 TONS	LARGE SAMPLE BAG
STD.SIZE NO.5,56,57,6, 67 AND 68	25 LB.	500 TONS	LARGE SAMPLE BAG
STD.SIZE NO.7,78,8 AND 89	15 LB.	250 TONS	LARGE SAMPLE BAG
STD.SIZE NO.9	10 LB.	250 TONS	SMALL SAMPLE BAG

IN TABLE 1 ON PAGE 24 OF THE STANDARD SPECIFICATIONS, THE MATERIAL AND SAMPLING REQUIREMENTS FOR BITUMINOUS CONCRETE AND FOR BITUMINOUS STABILIZED BASE COURSE ARE CHANGED TO READ AS FOLLOWS:

MATERIAL	SAMPLES	RATE OF SAMPLING	DELIVERY INSTRUCTIONS
BITUMINOUS CONCRETE, HOT MIXED	(IN ACCORDANCE WITH ARTICLE 3.10.2)		
COLD MIXED MIXTURE	5 LB.	EACH TYPE PRODUCED DAILY	SECURELY WRAPPED
BITUMINOUS STABILIZED BASE COURSE	(IN ACCORDANCE WITH ARTICLE 3.10.2)		

THE FOLLOWING IS ADDED IN TABLE 1 ON PAGE 24 OF THE STANDARD SPECIFICATIONS AS A FOOTNOTE TO THE RATE OF SAMPLING OF BITUMINOUS CONCRETE OR BITUMINOUS STABILIZED BASE COURSE:

> WHEN A PLANT IS PRODUCING BITUMINOUS CONCRETE OR BITUMINOUS STABILIZED BASE COURSE FOR TWO OR MORE DEPARTMENT PROJECTS AT THE SAME TIME, THE RATE OF SAMPLING SHALL BE APPLIED TO THE PLANT'S PRODUCTION FOR ALL DEPARTMENT PROJECTS RATHER THAN INDIVIDUAL PROJECTS.

IN TABLE 1 ON PAGE 26 OF THE STANDARD SPECIFICATIONS, THE MATERIAL AND SAMPLING REQUIREMENTS FOR SCREENINGS, STONE OR SLAG ARE CHANGED TO READ AS FOLLOWS:

MATERIAL	SAMPLES	RATE OF SAMPLING	DELIVERY INSTRUCTIONS
SCREENING, STONE OR SLAG STD.SIZE NO.10	10 LB.	250 TONS	SMALL SAMPLE BAG

IN TABLE 1 ON PAGE 26 OF THE STANDARD SPECIFICATIONS, SHOULDER AGGREGATES AND THE SAMPLING REQUIREMENTS THEREOF ARE DELETED.

DIVISION 3

PAVEMENTS

SECTION 2

MACADAM BASE COURSE

3.2.2. MATERIALS.

THE SECOND SENTENCE OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

THE LARGE AGGREGATE SHALL BE STANDARD SIZE NO. 1 OR 2 FOR COURSES 4 INCHES OR MORE IN THICKNESS AND STANDARD SIZE NO. 2 OR 3 FOR COURSES OF LESS THAN 4 INCH THICKNESS, AND SCREENINGS SHALL BE STANDARD SIZE NO. 10.

SECTION 2A

BITUMINOUS-STABILIZED BASE COURSE

3.2A.2. MATERIALS.

THE THIRD PARAGRAPH OF THIS ARTICLE OF STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

COMPOSITION OF MIXTURES. THE MINERAL CONSTITUENTS FOR EACH MIX SHALL BE COMBINED IN SUCH PROPORTIONS THAT THE RESULTING MIXTURE WILL COMPLY WITH THE GRADING REQUIREMENTS PRESCRIBED IN ARTICLE 3.10.2 FOR MIX NO. 1, EXCEPT THAT THE MAXIMUM AGGREGATE PARTICLE SIZE IN INCHES SHALL NOT EXCEED ONE HALF OF THE PLANNED COMPACTED THICKNESS OF THE COURSE OR LIFT TO BE LAID. IN CALCULATING PERCENTAGES OF AGGREGATES OF THE VARIOUS SIZES, BITUMINOUS MATERIAL IS EXCLUDED.

THE GRADATION TABLE AT THE BOTTOM OF PAGE 144 AND THE FIRST PARAGRAPH ON PAGE 145 OF THE STANDARD SPECIFICATIONS ARE DELETED.

THE SECOND PARAGRAPH ON PAGE 145 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS AND THE EXCEPTIONS THERETO ARE DELETED:

FORMULA FOR JOB MIX. THE PROVISIONS PERTAINING TO JOB MIX FORMULA AND ITS APPLICATION SHALL BE AS SPECIFIED FOR MIX NO.1 UNDER HOT-MIXED BITUMINOUS CONCRETE IN ART. 3.10.2.

SECTION 10

BITUMINOUS CONCRETE SURFACE COURSE, HOT-MIXED

3.10.2. MATERIALS.

THAT PORTION OF THE FOURTH AND FIFTH PARAGRAPHS OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS WHICH REFERS TO NO. 10 SIEVE IS AMENDED TO READ NO. 8 SIEVE.

THE FIRST PARAGRAPH, INCLUDING THE TABULATION THEREOF, ON PAGE 168 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

COARSE AGGREGATE FOR THE VARIOUS TYPES AND MIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ART. 8.5.5, EXCEPT THAT THE GRADATION NEED NOT CONFORM TO TABLE 28 UNDER ART. 8.5.4.

THE LAST SENTENCE IN THE SIXTH PARAGRAPH ON PAGE 168 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

IN CALCULATING THE PERCENTAGES OF AGGREGATES OF THE VARIOUS SIZES, THE BITUMINOUS MATERIAL IS EXCLUDED.

THE LAST PARAGRAPH ON PAGE 168 OF THE STANDARD SPECIFICATIONS IS DELETED.

THE FOLLOWING IS ADDED TO THIS ARTICLE OF THE STANDARD SPECIFICATIONS:

IN THE FOLLOWING TABLES, THE VARIOUS BITUMINOUS CONCRETE COURSES SHALL BE CONSTRUCTED WITH THE MIX NUMBERS AS SHOWN BELOW:

COURSE	MIX NO.
BITUMINOUS STABILIZED BASE (STONE OR GRAVEL MIX)	1
ALL BOTTOM COURSES	2
CA-BC-1 AND CA-BC-2, TOP	3
MA-BC-1 AND MA-BC-2, TOP	4

FA-BC-1 AND FA-BC-2, TOP 5

SP-1 AND SP-2, TOP 6

SHEET ASPHALT 7

TABLE 3 ON PAGE 169 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

TABLE 3. BITUMINOUS CONCRETE MIXTURES

GRADATION MIX NO.	1	2	3	4	5	6	7
SIEVE SIZE	GRADING OF TOTAL AGGREGATE (COARSE PLUS FINE, PLUS FILLER IF REQUIRED). AMOUNTS FINER THAN EACH LABORATORY SIEVE (SQUARE OPENING), WEIGHT PERCENT.						
2''	100	---	---	---	---	---	---
1-1/2''	90-100	100	---	---	---	---	---
1''	80-100	90-100	100	---	---	---	---
3/4''	---	---	90-100	100	---	---	---
1/2''	50-85	60-80	---	90-100	100	---	---
3/8''	---	---	60-80	---	80-100	100	---
NO. 4	25-60	25-60	35-65	40-70	55-75	80-100	100
NO. 8	20-50	15-45	20-50	25-55	30-60	65-100	95-100
NO. 16	---	---	---	---	---	40-80	85-100
NO. 30	---	---	---	---	---	20-65	70-95
NO. 50	8-30	3-18	8-25	10-25	10-30	7-40	45-75
NO. 100	---	---	---	---	---	5-20	20-40
NO. 200	4-12	1-7	4-10	4-10	4-10	4-10	9-20
ASPHALT CEMENT, WEIGHT PERCENT OF TOTAL MIXTURES							
	3.5-8	4-8.5	4-9	4.5-9.5	5-10	7-12	8.5-12

NOTE: MATERIAL PASSING THE NO. 200 SIEVE MAY CONSIST OF FINE PARTICLES OF THE AGGREGATE OR MINERAL FILLER, OR BOTH. MATERIAL PASSING THE NO. 40 SIEVE SHALL BE NONPLASTIC WHEN TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF CURRENT A.A.S.H.O. DESIGNATION T 90.

THE FOLLOWING IS ADDED TO THIS ARTICLE OF THE STANDARD

SPECIFICATIONS:

PLANTS PRODUCING FOR MULTIPLE PROJECTS. WHEN A PLANT IS PRODUCING BITUMINOUS CONCRETE OR BITUMINOUS STABILIZED BASE COURSE FOR TWO OR MORE DEPARTMENT PROJECTS AT THE SAME TIME, ONLY ONE COMMON SET OF LOTS FOR STABILITY AND JOB MIX FORMULA SHALL BE ESTABLISHED AND THE SAMPLES TAKEN FOR EACH LOT SHALL APPLY TO EACH PROJECT ON WHICH A PART OF THAT LOT WAS USED.

ALL REFERENCES TO A PAYMENT QUANTITY FOR A LOT IN THIS SPECIFICATION SHALL MEAN THE PAYMENT QUANTITY FOR THAT PORTION OF THE LOT USED ON ONE PROJECT.

THE ENTIRE TEXT BEGINNING WITH THE LAST PARAGRAPH ON PAGE 169 AND CONTINUING TO THE END OF THIS ARTICLE ON PAGE 170 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

FORMULA FOR JOB MIX. THE CONTRACTOR SHALL SUBMIT FOR THE ENGINEER'S APPROVAL ON FORMS SUPPLIED BY THE DEPARTMENT, A JOB MIX FORMULA FOR EACH MIXTURE REQUIRED FOR THE PROJECT, A STATEMENT NAMING THE SOURCE OF EACH COMPONENT, AND A REPORT SHOWING THE RESULTS OF THE APPLICABLE TESTS SPECIFIED IN TABLE 3-B. THE JOB MIX FORMULA, INCLUDING THE TOLERANCES SHOWN IN TABLE 3-A(1), SHALL BE WITHIN THE MASTER RANGE SPECIFIED IN TABLE 3 FOR THE PARTICULAR TYPE OF BITUMINOUS CONCRETE. WHEN PLOTTED ON A 0.45 POWER GRADING ACCUMULATION CHART AS USED BY THE DEPARTMENT, THE AGGREGATE GRADATION FOR THE JOB MIX FORMULA SHALL PRODUCE A GRADING CURVE WITH NO ABRUPT CHANGES AND APPROXIMATELY PARALLEL TO THE CURVES OF THE GRADING LIMITS SPECIFIED IN TABLE 3.

THE JOB MIX FORMULA FOR EACH MIXTURE SHALL BE IN EFFECT UNTIL MODIFICATION IS APPROVED BY THE ENGINEER.

THE JOB MIX FORMULA FOR EACH TYPE OF MIXTURE SHALL ESTABLISH THE PERCENTAGE OF DRY WEIGHT OF AGGREGATE PASSING EACH REQUIRED SIEVE SIZE, A PERCENTAGE OF BITUMEN (BITUMINOUS MATERIAL) TO BE ADDED TO THE AGGREGATE MIXTURE, AND A TEMPERATURE AT WHICH THE MIXTURE IS TO BE DISCHARGED FROM THE PLANT, ALL IN ACCORDANCE WITH THE TOLERANCES SHOWN IN TABLE 3-A(1).

SHOULD A CHANGE IN SOURCES OF MATERIALS BE MADE, A NEW JOB MIX FORMULA SHALL BE ESTABLISHED AND APPROVED BEFORE THE NEW MATERIAL IS USED. WHEN UNSATISFACTORY RESULTS OR OTHER CONDITIONS MAKE IT NECESSARY, THE ENGINEER MAY REQUIRE THE CONTRACTOR TO SUBMIT A CHANGE IN THE JOB MIX FOR APPROVAL.

QUALITY CONTROL TESTING SHALL BE PERFORMED BY THE PRODUCER TO KEEP THE MIX WITHIN THE SPECIFIED TOLERANCES.

TABLE 3-A(1). TOLERANCES FROM JOB MIX FORMULA FOR INDIVIDUAL SAMPLES

GRADATION MIX NO.	1	2	3	4	5	6	7

SIEVE SIZE	TOLERANCE (PLUS OR MINUS) PERCENTAGES						
NO.8	8	6	5	5	6	8	
NO.50	5	4	4	4	5	5	8
NO.200	2.0	2.0	2.0	2.0	2.0	2.0	2.0
ASPHALT	0.7	0.7	0.6	0.6	0.6	0.6	0.6
TEMPERATURE OF THE MIXTURE	PLUS OR MINUS 15 DEG. F FOR ALL TYPES						

TABLE 3-A(5). TOLERANCES FROM JOB MIX FORMULA FOR AVERAGE OF 5 SAMPLES

GRADATION MIX NO.	1	2	3	4	5	6	7
SIEVE SIZE	TOLERANCE (PLUS OR MINUS) PERCENTAGE						
NO. 8	4.0	3.0	2.5	2.5	3.0	4.0	
NO. 50	2.5	2.0	2.0	2.0	2.5	2.5	4.0
NO. 200	1.0	1.0	1.0	1.0	1.0	1.0	1.0
ASPHALT	0.35	0.35	0.30	0.30	0.30	0.30	0.30

RESISTANCE TO PLASTIC FLOW. THE BITUMINOUS MIXTURE WHEN COMBINED IN THE PROPORTIONS OF THE JOB MIX FORMULA SHALL CONFORM TO THE DESIGN AND CONTROL REQUIREMENTS OF TABLE 3-B WHEN TESTED IN ACCORDANCE WITH REQUIREMENTS OF CURRENT A.S.T.M. DESIGNATION D-1559.

TABLE 3-B. DESIGN AND CONTROL REQUIREMENTS

MIX NUMBER	1	2	3	4	5	6	7
	STONE GRAVEL						
CRITERIA	TEST LIMITS						
DESIGN STABILITY, LBS. MIN.	1500	1100	1200	1400	1300	1200	---- ----
CONTROL STABILITY, LBS. MIN.	1200	800	900	1100	1000	900	---- ----
FLOW VALUE, 0.01''	6-18	6-18	6-18	6-16	6-16	6-16	---- ----
DESIGN AIR VOIDS, PERCENTAGE (NOTE 2)	2-6	2-6	2-6	2-6	2-6	2-6	2-6 2-6
CONTROL AIR VOIDS, AVERAGE OF 5 CORES, PERCENTAGE	2-8	2-8	2-8	2-8	2-8	2-8	2-8 2-8

(NOTES 1 AND 2)

NOTE 1 - AS DETERMINED BY THE ENGINEER FROM DRILLED PAVEMENT CORES TAKEN BY THE DEPARTMENT.

NOTE 2 - AS DETERMINED FROM THE VALUES FOR THE CALCULATED MAXIMUM THEORETICAL SPECIFIC GRAVITY OF THE MIX AND THE BULK SPECIFIC GRAVITY OF THE COMPACTED MIXTURE. MAXIMUM THEORETICAL SPECIFIC GRAVITY OF THE MIX WILL BE DETERMINED BY THE METHOD SPECIFIED IN ARTICLE 9.1.21 ELSEWHERE HEREIN. BULK SPECIFIC GRAVITY OF THE COMPACTED MIXTURE WILL BE DETERMINED WHEN TESTED IN ACCORDANCE WITH REQUIREMENTS OF CURRENT A.A.S.H.O. DESIGNATION T166 EXCEPT COATING WITH PARAFFIN WILL NOT BE REQUIRED.

CONFORMANCE TO JOB MIX FORMULA. CONFORMANCE TO THE JOB MIX FORMULA WILL BE DETERMINED ON THE BASIS OF 5 RANDOM SAMPLES TAKEN AND TESTED AT THE MIXING PLANT FROM EACH LOT OF APPROXIMATELY 1500 TONS OF EACH TYPE OF MIX. WHEN A LOT OF BITUMINOUS CONCRETE IS NECESSARILY LESS THAN 1500 TONS, SAMPLES SHALL BE TAKEN AT RANDOM FOR EACH TYPE OF MIX AT THE RATE OF ONE SAMPLE FOR EACH 300 TONS OR FRACTION THEREOF.

SAMPLING OF BITUMINOUS MIXTURES WILL BE IN ACCORDANCE WITH ARTICLE 9.1.22 ELSEWHERE HEREIN.

ACCEPTANCE TESTING OF BITUMINOUS MIXTURES SHALL BE PERFORMED BY THE PRODUCER'S QUALITY CONTROL TECHNICIAN UNDER THE SUPERVISION OF THE ENGINEER.

LABORATORY ANALYSIS OF BITUMINOUS CONCRETE SHALL BE IN ACCORDANCE WITH ARTICLE 9.1.23 ELSEWHERE HEREIN.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATES SHALL BE IN ACCORDANCE WITH CURRENT A.A.S.H.U. DESIGNATION T 27.

THE AVERAGE OF TEST RESULTS FOR THE 5 SAMPLES FROM A LOT SHALL CONFORM TO THE JOB MIX FORMULA WITHIN THE TOLERANCES OF TABLE 3-A(5). THE PAYMENT QUANTITY OF ANY LOT WHICH DOES NOT COMPLY WITH THESE REQUIREMENTS WILL BE ADJUSTED IN ACCORDANCE WITH TABLE 3-C.

TABLE 3-C. ADJUSTMENT OF PAYMENT QUANTITIES PER LOT OF BITUMINOUS CONCRETE DUE TO NONCONFORMANCE TO JOB MIX FORMULA IN THE CHARACTERISTICS OF ASPHALT CONTENT OR OF AGGREGATE PASSING THE NO.8, NO.50 OR NO.200 SIEVE

DEVIATION OF 5-SAMPLE AVERAGE, PERCENT OF TOLERANCES IN TABLE 3-A(5)	REDUCTION OF PAYMENT QUANTITY PER LOT, PERCENT

0 TO 100	NONE
101 TO 150	2
151 TO 200	5
OVER 200 (SEE NOTE 1)	10

NOTE 1- THE ENGINEER MAY ORDER THE REMOVAL, AT THE CONTRACTOR'S EXPENSE, OF ANY MATERIAL SUBJECT TO THE MAXIMUM ADJUSTMENT OF PAYMENT QUANTITY SHOWN IN TABLE 3-C.

NOTE 2- WHERE MORE THAN ONE ADJUSTMENT OF PAYMENT QUANTITIES DUE TO NONCONFORMANCE TO JOB MIX FORMULA IS APPLICABLE TO A LOT, ONLY THE GREATEST SINGLE ADJUSTMENT WILL BE USED.

CONFORMANCE TO CONTROL STABILITY REQUIREMENTS. CONFORMANCE TO THE CONTROL STABILITY REQUIREMENTS SPECIFIED IN TABLE 3-B WILL BE ASCERTAINED FROM THE AVERAGE OF FIVE STABILITY DETERMINATIONS FOR EACH LOT OF MATERIAL AS ESTABLISHED FOR TESTING CONFORMANCE TO THE JOB MIX FORMULA. THE MATERIAL FOR THE STABILITY DETERMINATIONS WILL BE OBTAINED AT THE MIXING PLANT AT THE SAME TIME THAT THE RANDOM SAMPLES ARE TAKEN FOR MEASUREMENT OF CONFORMANCE TO THE JOB MIX FORMULA. THE PAYMENT QUANTITY OF ANY LOT WHICH DOES NOT COMPLY WITH THE SPECIFIED STABILITY REQUIREMENTS WILL BE ADJUSTED IN ACCORDANCE WITH TABLE 3-D.

TABLE 3-D. ADJUSTMENT OF PAYMENT QUANTITIES PER LOT OF BITUMINOUS CONCRETE DUE TO NON-CONFORMANCE TO STABILITY REQUIREMENTS.

AVERAGE OF 5 DEVIATIONS OF LOT STABILITY BELOW CONTROL STABILITY OF TABLE 3-B (LBS.)	REDUCTION OF PAYMENT QUANTITY (PERCENT)
1 TO 150	2
151 TO 300	5
OVER 300	10

DETERMINATION OF CONFORMANCE TO CONTROL AIR VOIDS REQUIREMENTS. CONFORMANCE TO THE CONTROL OF AIR VOIDS SPECIFIED IN TABLE 3-B SHALL BE DETERMINED ON THE BASIS OF THE AVERAGE OF 5 AIR VOIDS MEASUREMENTS FOR EACH LOT OF APPROXIMATELY 5,000 SQUARE YARDS OF PAVEMENT. THE PAYMENT OF ANY LOT WHICH DOES NOT COMPLY WITH THE SPECIFIED AIR VOIDS REQUIREMENTS SHALL BE ADJUSTED IN ACCORDANCE WITH TABLE 3-E.

TABLE 3-E. ADJUSTMENT OF PAYMENT QUANTITIES PER LOT (APPROX. 5,000 SQ. YDS.) OF BITUMINOUS CONCRETE DUE TO NON-CONFORMANCE TO AIR VOIDS REQUIREMENTS

MIX NUMBER	AVERAGE OF 5 DEVIATIONS OF LOT AIR VOIDS ABOVE MAX. CONTROL AIR VOIDS OF TABLE 3-B (PERCENT)	AVERAGE OF 5 DEVIATIONS OF LOT AIR VOIDS BELOW MIN. CONTROL AIR VOIDS OF TABLE 3-B (PERCENT)	REDUCTION OF PAYMENT QUALITY (PERCENT)
1 AND 2	0.1 TO 0.7	----	5
	0.8 TO 1.5	0.1 TO 0.5	10
	OVER 1.5	OVER 0.5	20
3,4,... AND	0.1 TO 1.0	----	5
	1.1 TO 2.0	0.1 TO 0.5	10
	OVER 2.0	OVER 0.5	20

3.10.3. METHODS OF CONSTRUCTION.

THE FIFTH SENTENCE OF THE FOURTH PARAGRAPH ON PAGE 172 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

INSPECTION PLATFORMS AWAY FROM THE PLANT LOADING OPERATIONS SHALL BE PROVIDED TO ENABLE SAFE AND CONVENIENT SAMPLING OF BITUMINOUS CONCRETE MIXTURES FROM EACH SIDE OF LOADED TRUCKS.

THE ENTIRE TEXT UNDER THE SUBHEADING INSPECTION OF BITUMINOUS PLANT OPERATION ON PAGES 172 AND 173 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

INSPECTION OF BITUMINOUS PLANT OPERATIONS AND TESTING. THE ENGINEER SHALL HAVE ACCESS AT ALL TIMES TO ANY PART OF THE PLANT FOR EXERCISING ALL GENERAL INSPECTION PERTAINING TO THE MATERIALS, BATCHING, MIXING, TEMPERATURES OF MATERIALS, AND MIXES, PROCUREMENT OF SAMPLES, STABILITY TESTS, AND TESTING PERFORMED BY PLANT TECHNICIANS, TRUCK WEIGHING; AND THE PREPARATION AND REPORTING OF THE NECESSARY RECORDS. UNDER NO CIRCUMSTANCES WILL AN EMPLOYEE OF THE DEPARTMENT DO THE COMPOSITION CONTROL TESTING OR OTHER ROUTINE TEST FUNCTIONS IN THE ABSENCE OF, OR IN LIEU OF THE PLANT LABORATORY TECHNICIAN.

AT EACH PLANT SITE THERE SHALL BE PROVIDED A TESTING LABORATORY FOR JOINT USE OF THE PRODUCER'S QUALITY CONTROL AND ACCEPTANCE TESTING FUNCTIONS AND THE ENGINEER OR INSPECTOR DURING PERIODS OF MIX PRODUCTION, SAMPLING, AND TESTING, AND WHENEVER MATERIALS SUBJECT TO THE PROVISIONS OF THESE SPECIFICATIONS ARE BEING SUPPLIED OR TESTED.

THE BITUMINOUS PLANT TESTING LABORATORY SHALL HAVE A FLOOR AREA OF NOT LESS THAN 150 SQUARE FEET, WITH A CEILING HEIGHT OF NOT LESS THAN 7 1/2 FEET. THE LABORATORY SHALL BE WEATHER TIGHT, SUFFICIENTLY HEATED IN COLD WEATHER, AIR-CONDITIONED IN

HOT WEATHER TO MAINTAIN TEMPERATURES FOR TESTING PURPOSES OF 75 PLUS OR MINUS 5 DEG. F. IT SHALL BE SO LOCATED ON THE ASPHALT PLANT SITE AS TO PROVIDE AN UNOBSTRUCTED VIEW FROM ONE OF IT'S WINDOWS OF THE TRUCKS AS THEY ARE LOADED WITH THE PLANT MIXED MATERIALS.

THE BITUMINOUS PLANT TESTING LABORATORY SHALL HAVE:

ADEQUATE ARTIFICIAL LIGHTING.

ELECTRICAL OUTLETS SUFFICIENT IN NUMBER AND CAPACITY FOR OPERATING THE REQUIRED TESTING EQUIPMENT AND FOR DRYING SAMPLES.

FIRE UNDERWRITERS APPROVED EXTINGUISHERS.

WORK BENCHES FOR TESTING WITH DIMENSIONS NOT LESS THAN 2 1/2' X 10'.

A DESK OR TABLE AND AT LEAST 2 CHAIRS.

SANITARY FACILITIES CONVENIENT TO THE TESTING LABORATORY CONFORMING TO ARTICLE 1.4.6.

EXHAUST FAN TO OUTSIDE AIR, WITH MINIMUM BLADE DIAMETER OF 12'' TO ADEQUATELY HANDLE LABORATORY DUST AND FUMES.

TELEPHONE.

FOUR DRAWER LEGAL SIZE FILE CABINET.

A SINK WITH RUNNING WATER AND ATTACHED DRAIN-BOARD AND DRAIN CAPABLE OF HANDLING ELUTRIABLE MATERIAL.

A METAL STAND TO HOLD SIEVES USED IN WASHING ELUTRIABLE MATERIAL.

A 2-ELEMENT HOT PLATE OR OTHER COMPARABLE HEATING DEVICE, WITH SUITABLE DIAL TYPE THERMOSTATIC CONTROLS TO ADJUST THE HEAT, FOR DRYING AGGREGATES.

MECHANICAL SHAKER AND SIEVES CONFORMING TO RE-QUIREMENTS OF CURRENT A.S.T.M. DESIGNATION E-11 FOR DETERMINING THE GRADATION OF COARSE AND FINE AGGREGATES.

TESTING EQUIPMENT MEETING THE REQUIREMENTS OF CURRENT A.A.S.H.O. DESIGNATION T-164 METHOD A FOR THE EXTRACTION OF BITUMEN FROM BITUMINOUS PAVING MIXTURES.

APPARATUS AS SPECIFIED IN ARTICLE 2, CURRENT REQUIREMENTS OF A.S.T.M. D-1559 FOR STABILITY TESTING BY THE MARSHALL METHOD.

TESTING EQUIPMENT MEETING THE REQUIREMENTS OF CURRENT A.A.S.H.O. DESIGNATION T-49 FOR THE PENETRATION OF BITUMINOUS MATERIALS.

OTHER NECESSARY SMALL HAND TOOLS REQUIRED FOR PROPER SAMPLING AND TESTING OF MATERIALS, AS REQUESTED BY THE ENGINEER.

THE REQUIREMENTS FOR THE BITUMINOUS PLANT TESTING LABORATORY ARE MINIMUM FOR NOT MORE THAN 1800 TONS OF BITUMINOUS CONCRETE MIXTURE PER DAY. ASPHALT PLANT SITES PRODUCING LARGER DAILY PRODUCTION SHALL HAVE PROPORTIONATELY INCREASED LABORATORY FACILITIES AND EQUIPMENT.

APPROVAL OF THE BITUMINOUS PLANT AND TESTING LABORATORY WILL REQUIRE ALL THE ABOVE FACILITIES AND EQUIPMENT IN GOOD WORKING ORDER, AND OPERATED IN ACCORDANCE WITH SPECIFIED METHODS OF TESTING BY A RESIDENT TECHNICIAN WHO SHALL BE PRESENT DURING ALL PERIODS OF MIX PRODUCTION, SAMPLING, AND TESTING; AND WHENEVER MATERIALS SUBJECT TO THE PROVISIONS OF THESE SPECIFICATIONS ARE BEING SUPPLIED OR TESTED. FAILURE TO PROVIDE ANY OF THE ABOVE FACILITIES AND RESIDENT TECHNICIAN, USE OF NON-STANDARD METHODS, OR FAILURE TO REPORT TEST RESULTS NOT ACCEPTABLE TO THE ENGINEER FOR REASONS OF ACCURACY AND VALIDITY, SHALL BE SUFFICIENT CAUSE FOR DISAPPROVING THE BITUMINOUS PLANT OPERATIONS.

3.10.4. QUANTITY AND PAYMENT.

ALL ADJUSTMENTS OF PAYMENT QUANTITIES OF BITUMINOUS CONCRETE PAVEMENT AND OF BITUMINOUS-STABILIZED BASE COURSE BECAUSE OF NONCONFORMANCE TO THE JOB MIX FORMULA, STABILITY, AIR VOIDS AND SPECIFIED THICKNESS REQUIREMENTS, SHALL BE CUMULATIVE. EACH ADJUSTMENT SHALL BE COMPUTED AS A FUNCTION OF THE FULL ORIGINAL LOT QUANTITY. THE COMPUTATION OF ADJUSTMENTS MAY REQUIRE CONVERSIONS BETWEEN TONNAGE AND SQUARE YARDS. SUCH CONVERSIONS WILL BE MADE USING THE COMPUTED ACTUAL WEIGHT PER SQUARE YARD ESTABLISHED IN ACCORDANCE WITH ARTICLE 3.10.3.

DIVISION 4

BRIDGE STRUCTURES

SECTION 1

CONCRETE STRUCTURES

4.1.2. MATERIALS.

THE FIFTH AND SIXTH PARAGRAPHS OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS ARE CHANGED TO READ AS FOLLOWS:

EXCEPT WHERE OTHERWISE SPECIFICALLY PROVIDED, COARSE AGGREGATES FOR THE VARIOUS ITEMS OF WORK SHALL BE OF THE STANDARD SIZE NUMBERS AS FOLLOWS:

ITEMS OF WORK	STANDARD SIZE NUMBERS
CONCRETE BASE COURSE AND CONCRETE SURFACE PAVEMENT	357,467,57, OR 67
FOOTINGS OF NONREINFORCED CONCRETE ABUTMENTS, PIERS AND WALLS	357,4,467,57, OR 67
FOOTINGS OF REINFORCED CONCRETE ABUTMENTS, PIERS AND WALLS	467,57, OR 67
NONREINFORCED CONCRETE ABUTMENTS, PIERS AND WALLS, ABOVE FOOTINGS	357,4,467,57, OR 67
REINFORCED CONCRETE ABUTMENTS, PIERS AND WALLS, ABOVE FOOTINGS	57 OR 67
ARCH SPANS AND RIGID FRAMES	57 OR 67
DECK SLABS, CURBS, SIDEWALKS AND PARAPETS	57 OR 67
SEAL CONCRETE	57 OR 67
BALUSTRADES AND POSTS	57,67, OR 7
CLASS C CONCRETE (ROADWAY)	57,67, OR 7
PRESTRESSED CONCRETE BEAMS AND CAST-IN-PLACE CONCRETE DIAPHRAGMS	57,67, OR 7
PRECAST AND CAST-IN-PLACE CONCRETE PILES	57,67, OR 7

MANHOLE, INLET AND CATCH BASIN WALLS,
PIPE PLUGS, SADDLES AND ENCASEMENTS ..... 57,67, OR 7

FOUNDATIONS FOR MANHOLES, INLETS
AND CATCH BASINS ..... 357,467,57,67, OR 7

TOP SLABS FOR MANHOLES, INLETS
AND CATCH BASINS ..... 57 OR 67

CONCRETE GUTTERS, AND CURBS
AND HEADERS ..... 57,67, OR 7

FOUNDATION FOR GRANITE CURB
AND HEADERS ..... 57,67, OR 7

WHITE CONCRETE VERTICAL AND
SLOPING CURBS ..... 57,67, OR 7

WHITE CONCRETE BARRIER CURB ..... 57 OR 67

CONCRETE SIDEWALK AND ISLAND PAVEMENT,
WHITE CONCRETE ISLAND PAVEMENT ..... 57,67, OR 7

CONCRETE CRIB MEMBERS, HEADWALLS
AND APRONS, AND MONUMENTS ..... 57,67, OR 7

CONCRETE CULVERTS ..... 57 OR 67

FOOTINGS FOR FENCES, SIGNS ..... 57,67, OR 7

FOUNDATIONS FOR HIGHWAY LIGHTING
AND TRAFFIC SIGNAL EQUIPMENT AND SIGNS ..... 57,67, OR 7

JUNCTION BOXES ..... 57,67, OR 7

UNLESS SPECIFICALLY EXCLUDED BY SPECIAL PROVISIONS, THE CONTRACTOR MAY USE ANY OF THE AGGREGATE SIZES INDICATED FOR A PARTICULAR ITEM OF WORK; HOWEVER, THE ENGINEER RESERVES THE RIGHT TO REQUIRE THAT THE NEXT SMALLER STANDARD SIZE SHOWN IN THE ABOVE LISTING BE USED SHOULD THE SIZE SELECTED BY THE CONTRACTOR PROVE TO BE A CLEARANCE PROBLEM.

BLENDED SIZES MAY BE PRODUCED BY WEIGHT PROPORTIONING INTO THE WEIGH HOPPER OR PRODUCED BY PLANT COMBINATION INTO STOCKPILES EXCEPT FOR STANDARD SIZE NOS. 357 AND 467. STANDARD SIZE NOS. 357 AND 467 MAY NOT BE STOCKPILED AND SHALL BE PRODUCED ONLY BY WEIGHT PROPORTIONING INTO THE WEIGH HOPPER FROM THEIR CONSTITUENT SIZES. CONFORMANCE TO REQUIRED GRADATION WILL BE DETERMINED ON THE BASIS OF SEPARATE TESTS OF THE COMPONENT SIZES BEFORE COMBINING.

THE FIRST PARAGRAPH ON PAGE 220 OF THE STANDARD SPECIFICATIONS IS DELETED.

THE FOLLOWING IS ADDED TO THIS ARTICLE OF THE STANDARD SPECIFICATIONS:

SPECIAL PROVISIONS FOR COUNTY AND MUNICIPAL PROJECTS.

WHEN SO PROVIDED IN THE SUPPLEMENTARY SPECIFICATIONS OF COUNTY AND MUNICIPAL PROJECTS, STANDARD SIZE NOS. 8 AND 89 MAY BE ALLOWED AS ALTERNATIVES FOR SPECIFIC CONSTRUCTION ITEMS.

SECTION 2
PRESTRESSED CONCRETE STRUCTURES

4.2.2. MATERIALS.

THE FIFTH PARAGRAPH ON PAGE 233 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

COARSE AGGREGATE. COARSE AGGREGATE SHALL BE WASHED GRAVEL OR BROKEN STONE OF ARGILLITE, GRANITE, GNEISS, QUARTZITE OR TRAP ROCK, CONFORMING TO THE REQUIREMENTS OF ART. 8.5.6 AND 8.5.5, RESPECTIVELY, AND SHALL BE GRADED AS SPECIFIED FOR STANDARD SIZE NO. 57, 67, OR 7.

SECTION 5
BEARING PILES

4.5.2. MATERIALS.

THE THIRD PARAGRAPH OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

THE COARSE AGGREGATE SHALL BE STANDARD SIZE NO. 57, 67, OR 7.

DIVISION 5
ROAD STRUCTURES

SECTION 6
WHITE CONCRETE CURB

5.6.2. MATERIALS.

THE LAST SENTENCE OF THE SEVENTH PARAGRAPH OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

THE COARSE AGGREGATE FOR GRAY CONCRETE AND WHITE CONCRETE SHALL CONFORM TO THE REQUIREMENTS OF ART. 5.5.2, EXCEPT THAT STANDARD SIZE NO. 57 OR 67 SHALL BE USED FOR BARRIER CURB.

DIVISION 8
MATERIALS

SECTION 1
BITUMINOUS MATERIALS

8.1.2. ASPHALT CEMENT FOR PAVING.

THE FOLLOWING IS ADDED TO THIS ARTICLE OF THE STANDARD SPECIFICATIONS:

THE PENETRATION GRADE OF ASPHALT CEMENT SHALL BE DETERMINED BY THE METHOD OF TEST PRESCRIBED BY CURRENT A.A.S.H.O. DESIGNATION T 49.

SECTION 5
NONMETALLIC MATERIALS

8.5.4. AGGREGATE, COARSE.

EXCEPT AS OTHERWISE PROVIDED, COARSE AGGREGATE SIZES SPECIFIED IN THE VARIOUS DIVISIONS OR IN THE PLANS ARE CHANGED TO THE STANDARD SIZE NUMBERS FOLLOWS:

AGGREGATE SIZE	STANDARD SIZE NO.
2-1/2''	2
1-1/2''	3 OR 4
1''	56
3/4''	57
5/8''	67
1/2''	7
3/8''	8
1/4''	9
GRITS	9
SCREENINGS	10

TABLE 28 ON PAGE 383 OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS SHOWN ON THE FOLLOWING PAGE:

TABLE 28. STANDARD SIZES OF COARSE AGGREGATES

2-21-68

Size Number	Nominal Size Square Openings (1)	Amounts finer than each laboratory sieve (square openings), percentage by weight														
		4	3½	3	2½	2	1½	1	¾	½	3/8	No. 4	No. 8	No. 16	No. 50	No. 100
1	3½ to 1½	100	90–100		25–60		0–15		0–5							
2	2½ to 1½			100	90–100	35–70	0–15		0–5							
24	2½ to ¾			100	90–100		25–60		0–10	0–5						
3	2 to 1				100	90–100	35–70	0–15		0–5						
357	2 to No. 4				100	95–100		35–70		10–30		0–5				
4	1½ to ¾					100	90–100	20–55	0–15		0–5					
467	1½ to No. 4					100	95–100		35–70		10–30	0–5				
5	1 to ½						100	90–100	20–55	0–10	0–5					
56	1 to 3/8						100	90–100	40–75	15–35	0–15	0–5				
57	1 to No. 4						100	95–100		25–60		0–10	0–5			
6	¾ to 3/8							100	90–100	20–55	0–15	0–5				
67	¾ to No. 4							100	90–100		20–55	0–10	0–5			
68	¾ to No. 8							100	90–100		30–65	5–25	0–10	0–5		
7	½ to No. 4								100	90–100	40–70	0–15	0–5			
78	½ to No. 8								100	90–100	40–75	5–25	0–10	0–5		
8	3/8 to No. 8									100	85–100	10–30	0–10	0–5		
89	3/8 to No. 16									100	90–100	20–55	5–30	0–10	0–5	
9	No. 4 to No. 16										100	85–100	10–40	0–10	0–5	
10	No. 4 to 0 (2)										100	85–100				10–30

(1) In inches, except where otherwise indicated. Numbered sieves are those of the United States Standard Sieve Series.
(2) Screenings.

8.5.8. SLAG, BOILER.

THE THIRD AND FOURTH PARAGRAPHS OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS ARE CHANGED TO READ AS FOLLOWS:

IT SHALL WEIGH NOT LESS THAN 85 POUNDS PER CUBIC FOOT, LOOSE MEASUREMENT, AS DETERMINED BY THE ''METHOD OF TEST FOR UNIT WEIGHT OF COUARSE AGGREGATE (DRY LOOSE MEASURE)'' SPECIFIED IN ART. 9.1.2.

IT SHALL HAVE A SPECIFIC GRAVITY OF NOT LESS THAN 2.80, 1.2 PERCENT MAXIMUM ABSORPTION IN COLD WATER, AND SHALL CONFORM TO THE GRADING REQUIREMENTS SPECIFIED FOR STANDARD SIZE NO. 10 IN TABLE 28.

8.5.12. AGGREGATE, FINE, FOR BITUMINOUS CONCRETE AND SHEET ASPHALT.

THE FIRST PARAGRAPH OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS IS CHANGED TO READ AS FOLLOWS:

FINE AGGREGATE (PASSING THE NO. 8 SIEVE) FOR HOT-MIXED BITUMINOUS CONCRETE AND SHEET ASPHALT SHALL BE STONE SAND OF ARGILLITE, GNEISS, GRANITE, QUARTZITE OR TRAP ROCK CONFORMING TO THE QUALITY REQUIREMENTS PRESCRIBED THEREFORE IN ARTICLE 8.5.5. NATURAL SAND SHALL CONSIST OF MATERIAL COMPOSED OF PREDOMINANTLY ANGULAR PARTICLES OF QUARTZ OR OTHER HARD DURABLE MINERALS.

IT SHALL CONFORM TO THE FOLLOWING QUALITY REQUIREMENTS:

ITEM	MAX. PERCENT BY WT. OF TOTAL SAMPLE
MICA	2.0
ABSORPTION, COLD WATER	2.0
SODIUM SULPHATE SOUNDNESS (5 CYCLES)	5.0
SOFT PARTICLES, CLAY, CLAY LUMPS, LOAM AND CEMENTED PARTICLES	5.0

IT SHALL COMPLY WITH THE FOLLOWING GRADATION REQUIREMENTS:

SIEVE NO.	TOTAL PCT PASSING
3/8''	100

NO.4	95-100
NO.8	85-100

UNLESS OTHERWISE SPECIFICALLY EXCLUDED NATURAL FINE AGGREGATES FOR SURFACE COURSES SHALL BE WASHED AND GRADED PRODUCTS. AFTER WASHING NOT MORE THAN A TOTAL OF 4 PERCENT BASED ON OVEN DRY WEIGHT SHALL PASS THE NO. 200 SIEVE.

IN LIEU OF THE ABOVE REQUIREMENTS FOR GRADATION AND WASHING THE APPROPRIATE PROVISIONS OF THE CURRENT REQUIREMENTS OF A.S.T.M. C-33 MAY BE SUBSTITUTED.

SIEVE ANALYSIS OF FINE AGGREGATE SHALL BE IN ACCORDANCE WITH CURRENT A.A.S.H.O. DESIGNATION T 27.

SPECIFIC GRAVITY AND ABSORPTION OF FINE AGGREGATE SHALL BE IN ACCORDANCE WITH CURRENT A.A.S.H.O. DESIGNATION T 84.

PERCENT OF MICA IN FINE AGGREGATE SHALL BE DETERMINED BY THE PROVISIONS OF ARTICLE 9.1.20 ELSEWHERE HEREIN.

THE SODIUM SULPHATE SOUNDNESS TEST FOR FINE AGGREGATE SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF ARTICLE 9.1.19 ELSEWHERE HEREIN.

TABLE 31 IN THIS ARTICLE OF THE STANDARD SPECIFICATIONS IS DELETED.

SECTION 8
SOIL AGGREGATES

8.8.1. SOIL AGGREGATES.

IN THE SECOND, FOURTH AND FIFTH PARAGRAPHS OF THIS ARTICLE OF THE STANDARD SPECIFICATIONS, CHANGE NO. 10 SIEVE TO READ NO. 8 SIEVE.

TABLE 36 AND THE LAST PARAGRAPH ON PAGE 420 OF THE STANDARD SPECIFICATIONS ARE CHANGED TO READ AS SHOWN ON THE FOLLOWING PAGE:

TABLE 36. SOIL AGGREGATES, GRADATION

Rev. 8/13/70

Types	1			2		3			4								5
Class	A	B	C	A	B	A	B	C	A	B	C	D	E	F	G	H	A
Sieve Size	PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVES																
4"	100		100					100	100	100	100	100			100	100	
2½"							100										100
2"	70–100	100		100	100	100				80–100	80–100				80–100		
1"						95–100											
¾"	50–95	65–100	60–100	70–100	70–100					60–100	60–100				60–100		55–90
½"						80–100	65–100						100				
No. 4	30–60	40–75	30–100	35–75	30–80					40–100	40–100		95–100		40–100	30–100	25–60
No. 8						45–100	35–100										
No. 16													45–70				
No. 50	10–25	10–30	5–35	15–30	10–35	0–20	5–50		5–35	10–30	0–75	0–75	5–25		5–40		5–25
No. 100						0–3	0–5	0–20									
No. 200	0–7	0–7	0–5	*	*		0–2	0–5	0–8	0–8	0–8	0–5	0–5		0–20	0–12	3–12

* Also, see the requirements given in the text for Type 2.

FOR TYPE 3, CLASS B, THE GRADATION PERCENTAGES SHOWN ABOVE FOR SIEVES NO. 8, NO. 50, NO. 100 AND NO. 200 ARE APPLICABLE TO THAT PORTION OF MATERIAL PASSING THE NO. 4 SIEVE.

DIVISION 9

METHODS OF TESTS AND TEMPERATURE-VOLUME CORRECTION FACTORS

SECTION 1

METHODS OF TESTS

THE FOLLOWING IS ADDED TO THIS SECTION OF THE STANDARD SPECIFICATIONS:

9.1.21. METHOD OF TEST FOR MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES BY SOLVENT IMMERSIONS.

SCOPE.

1. THE METHOD CONSISTS OF PLACING A BITUMINOUS MIXTURE IN A LARGE PYCNOMETER AND INTRODUCING A SOLVENT THAT DISSOLVES THE ASPHALT, THEREBY LIBERATING THE AIR VOIDS IN THE MASS. FROM THE WEIGHTS OF THE SAMPLE AND THE SOLVENT USED, THE SPECIFIC GRAVITY OF THE VOIDLESS BITUMINOUS MIXTURE CAN BE DETERMINED BY CALCULATION.

APPARATUS.

2. (A) CONSTANT TEMPERATURE WATER BATH THERMOSTATICALLY CONTROLLED AT 25 PLUS OR MINUS 0.10 DEG. C.

(B) BALANCE OF APPROXIMATELY 3 KG CAPACITY ACCURATE TO PLUS OR MINUS 0.1 G.

(C) SPECIFIC GRAVITY BOTTLE APPROVED BY THE ENGINEER. LOWER PORTION SHALL BE A 1000 ML ERLENMEYER FLASK WITH A 45/50 GROUND GLASS NECK. THE UPPER PORTION SHALL BE SPECIALLY MADE WITH DIMENSIONS APPROVED BY THE ENGINEER AND HAVING A GROUND GLASS 45/50 CONNECTION TO FIT INTO THE FLASK PORTION. THE TOP SHALL BE FITTED WITH A GROUND GLASS STOPPER.

(D) SOLVENT (THRICHLOROETHYLENE OR BENZENE, INDUSTRIAL PURE GRADE OR BETTER).

PROCEDURE.

3. (A) THE SPECIFIC GRAVITY BOTTLE SHALL BE CALIBRATED AS FOLLOWS: WEIGH THE EMPTY FLASK UNIT AND RECORD ITS WEIGHT UNDER A. WEIGH THE FLASK UNIT FILLED TO MARK WITH SOLVENT BROUGHT TO A TEMPERATURE OF 25 DEG. C AND RECORD WEIGHT UNDER B.

(B) THE SPECIFIC GRAVITY OF THE SOLVENT SHALL BE DETERMINED BY HYDROMETER OR PYCONOMETER, TO THREE DECIMAL PLACES AT 25/25 DEG. C AND RECORD UNDER C.

(C) THE SAMPLE OF BITUMINOUS MIX SHALL BE BROKEN UP AND HEATED SUFFICIENTLY TO PASS THROUGH THE LARGE NECK OF THE FLASK. THE SAMPLE SHALL BE PLACED IN THE FLASK AND WEIGHED AND RECORDED UNDER D. APPROX. 500 ML OF SOLVENT SHALL BE ADDED AND LET STAND UNTIL ALL BITUMEN IN SAMPLE IS DISSOLVED. THE CONTENTS SHALL BE CAREFULLY AGITATED TO HELP BREAK UP SPECIMEN AND TO RELEASE AIR VOIDS.

(D) WHEN ALL BITUMEN IS IN SOLUTION AND NO MORE AIR BUBBLES RISE, THE FLASK SHALL BE FILLED TO MARK WITH SOLVENT AND PLACED IN THE CONSTANT TEMPERATURE BATH FOR 2 HOURS. THE SOLVENT WHICH HAS PREVIOUSLY BEEN BROUGHT TO A TEMPERATURE OF 25 DEG. C SHALL BE ADDED TO FLASK AS REQUIRED. THE FLASK CONTAINING BITUMINOUS MIX AND SOLVENT SHALL BE WEIGHED AT 25 DEG. C AND RECORDED UNDER E. MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS MIXTURE SAMPLE SHALL BE CALCULATED AS FOLLOWS:

$$\frac{(D-A) \times C}{(B \text{ PLUS } D) - (E \text{ PLUS } A)} \text{ EQUALS MAXIMUM SPECIFIC GRAVITY}$$

WHERE:

A EQUAL WEIGHT OF FLASK UNIT, GRAMS

B EQUAL WEIGHT OF FLASK FILLED TO MARK WITH SOLVENT AT 25 DEG. C, GRAMS

C EQUAL SPECIFIC GRAVITY OF SOLVENT

D EQUAL WEIGHT OF FLASK PLUS SAMPLE, GRAMS

E EQUAL WEIGHT OF FLASK PLUS SAMPLE, PLUS SOLVENT AT 25 DEG. C, GRAMS

REPORT.

4. THE MAXIMUM SPECIFIC GRAVITY SHALL BE REPORTED TO THE NEAREST HUNDRETH TOGETHER WITH THE CALCULATIONS AND OTHER SAMPLE INFORMATION.

PRECISION.

5. DUPLICATE RESULTS OBTAINED BY THE SAME OPERATOR AND APPARATUS SHALL NOT DIFFER BY MORE THAN 0.01.

9.1.22. METHOD OF SAMPLING BITUMINOUS MIXTURES.

SCOPE.

1. THIS METHOD OF SAMPLING COVERS THE PROCEDURES USED TO SAMPLE BITUMINOUS MIXTURES AT THE PLANT TO OBTAIN SAMPLES FOR MARSHALL STABILITY TESTS AND LABORATORY EXTRACTION TESTS.

APPARATUS.

2. (A) TABLE OF RANDOM NUMBERS

(B) SCOOP TO MAKE FURROWS AND TO DIG MATERIAL FROM THE FURROWS IN THE PILE OF BITUMINOUS MIXTURE.

PROCEDURE.

3. (A) THE SAMPLES FOR EXTRACTION AND STABILITY TESTING WILL BE TAKEN AT THE PLANT, FROM TRUCKS BY THE DEPARTMENT'S PLANT INSPECTOR.

(B) THE RATES OF SAMPLING WILL BE APPLIED TO THE PLANT'S PRODUCTION FOR ALL DEPARTMENT PROJECTS RATHER THAN INDIVIDUAL PROJECTS.

(C) THE PLANT'S PRODUCTION WILL BE DIVIDED INTO SUCCESSIVE PARTS OR LOTS OF APPROXIMATELY 1500 TONS OF MATERIAL. FIVE SAMPLES TO BE TESTED FOR STABILITY AND FIVE TO BE USED FOR EXTRACTION TESTING WILL BE TAKEN FROM EACH LOT.

(D) THE DEPARTMENT'S PLANT INSPECTOR WILL ASSIGN CONSECUTIVE LOT NUMBERS FOR EACH TYPE OF MIX AT THE PLANT. THE PRODUCER SHALL INCLUDE THE ASSIGNED LOT IDENTIFICATION NUMBER ON EACH WEIGH TICKET.

(E) A TABLE OF RANDOM NUMBERS WILL BE USED BY THE DEPARTMENT TO MAKE RANDOM SELECTION OF WHICH TON OF MIX AND THUS FROM WHICH TRUCKLOAD EACH SAMPLE WILL BE TAKEN.

(F) THE FOLLOWING METHOD WILL BE USED TO OBTAIN SAMPLES FROM THE DESIGNATED TRUCKLOADS OF MATERIAL:

FROM ONE OF THE CONICAL PILES OF MIXTURE WITHIN THE TRUCK, TWO FURROWS THREE TO SIX INCHES IN DEPTH WILL BE DUG EXTENDING FROM THE TOP TO THE BOTTOM OF THE PILE. THE FURROWS WILL BE 180 DEGREES FROM EACH OTHER AND WILL BE PREPARED WITHIN EITHER THE FRONT OR THE REAR HALF OF THE TRUCK. A COIN WILL BE FLIPPED TO DETERMINE WHICH HALF OF THE TRUCK IS TO BE USED--HEADS FRONT HALF, TAILS REAR HALF. EACH FURROW WILL FOLLOW THE SLOPE OF THE PILE AND BE FORMED AS NEAR ITS CENTER AS POSSIBLE. SAMPLING IN AREAS BETWEEN PILES WILL BE AVOIDED BECAUSE OF POSSIBLE

SEGREGATION.

THREE SCOOPS OF APPROXIMATELY EQUAL VOLUMES OF MATERIAL WILL BE DUG FROM EACH FURROW, REPRESENTING THE TOP-THIRD, CENTER-THIRD AND BOTTOM-THIRD OF THE PILE. THE MATERIAL WILL THEN BE THOROUGHLY MIXED TOGETHER TO FORM ONE SAMPLE. THE VOLUME OF THIS SAMPLE WILL BE A MINIMUM OF 28 LBS. IN WEIGHT.

THE SAMPLE REMOVED FROM THE TRUCK WILL BE REDUCED BY QUARTERING AND REMIXING TO THE SIZE OF SAMPLE REQUIRED FOR THE TESTS. PRIOR TO AND AFTER EACH REMIXING AND QUARTERING, ALL TOOLS WILL BE CLEANED TO PREVENT THE BUILD-UP OF ASPHALT AND FINES. THE CLEANING, DURING THE REMIXING AND QUARTERING OPERATIONS, WILL BE ACCOMPLISHED WITHOUT SOLVENTS.

APPROXIMATELY A 5 POUND SAMPLE (MOLDED INTO ONE SPECIMEN) FOR A MARSHALL STABILITY TEST. IN ADDITION APPROXIMATELY A 5 POUND SAMPLE IS TO BE WRAPPED, SEALED AND STORED.

ALL SAMPLES FORWARDED FOR ACCEPTANCE TESTING MUST BE IDENTIFIED AS TO THEIR LOT NUMBER AND POSITION IN THE LOT'S SAMPLING SEQUENCE. FOR THIS PURPOSE, AN IDENTIFICATION CODE, CONSISTING OF A NUMBER FOLLOWED BY A LETTER, WILL BE USED WITH EACH SAMPLE. THE NUMBER-PORTION OF THE CODE WILL BE THE NUMBER OF THE LOT FROM WHICH THE SAMPLE WAS TAKEN. THE LETTER-PORTION IS TO INDICATE WHERE THE SAMPLE FITS INTO THE LOT'S SAMPLING SEQUENCE. THE LETTER ''A'' WILL BE USED TO INDICATE THE FIRST SAMPLE OF THE LOT; THE LETTER ''B'' FOR THE SECOND SAMPLE; THE LETTER ''C'' FOR THE THIRD; AND SO FORTH. WHEN SEVERAL SAMPLES (EXTRACTIONS AND/OR STABILITY) COME FROM THE SAME TRUCK-LOAD OF MIX, EACH OF THESE SAMPLES WILL HAVE THE SAME IDENTIFICATION CODE (NUMBER AND LETTER).

9.1.23. METHOD OF TEST FOR LABORATORY ANALYSIS OF BITUMINOUS CONCRETE.

A. QUANTITATIVE EXTRACTION OF BITUMEN

SCOPE.

1. THIS METHOD COVERS PROCEDURES FOR THE QUANTITATIVE DETERMINATION OF BITUMEN IN PAVING MIXTURES AND PAVEMENT SAMPLES. THE BITUMEN CONTENT IS CALCULATED BY DIFFERENCE FROM THE WEIGHT OF THE EXTRACTED AGGREGATE, MOISTURE CONTENT (WHEN APPLICABLE), AND WEIGHT OF ASH IN EXTRACT FROM AN ALIQUOT PART OF THE EXTRACT.

APPARATUS.

2. (A) OVEN, CAPABLE OF MAINTAINING THE TEMPERATURE AT 280 DEG. F.

(B) PAN, 12 IN. DIAMETER.

(C) BALANCE, CAPABLE OF WEIGHING 2000 GRAMS TO AN ACCURACY OF 0.2 G.

(D) BALANCE, CAPABLE OF WEIGHING 5000 GRAMS TO AN ACCURACY OF 0.2 G.

(E) HOT PLATE, ELECTRIC, 3600-WATT, LOW, MEDIUM, AND HIGH SETTING.

(F) SMALL MOUTH GRADUATE, 1000 ML CAPACITY.

(G) TEST TUBE, 100 ML CAPACITY.

(H) DESICCATOR.

(I) ANALYTICAL BALANCE.

(J) CENTRIFICAL EXTRACTION APPARATUS, CONSISTING OF A BOWL AND AN APPARATUS IN WHICH THE BOWL IS REVOLVED AT A SPEED OF 2200 RPM. THE APPARATUS SHALL BE PROVIDED WITH A CONTAINER FOR CATCHING THE SOLVENT THROWN FROM THE BOWL AND A DRAIN FOR REMOVING THE SOLVENT. THE APPARATUS SHALL BE PROVIDED WITH EXPLOSION-PROOF FEATURES AND INSTALLED IN A HOOD TO PROVIDE VENTILATION.

(K) FILTER RINGS, TO FIT THE RIM OF THE BOWL.

(L) REAGENT, BENZENE, CONFORMING TO A.S.T.M. D-836.

(M) CENTRIFUGE, CAPABLE OF ROTATING 100 ML TEST TUBES AT 1500 RPM.

PROCEDURE.

3. (A) RANDOM WEIGHT SAMPLES 900 TO 1300 GRAMS ARE USED FOR EXTRACTION. A SAMPLE SHALL BE OBTAINED AND PLACED ON A FLAT PAN AND WARM IN A 280 DEG. F. OVEN, ONLY UNTIL IT CAN BE HANDLED. THE PARTICLES OF THE MIXTURE SHALL BE SEPARATED AS UNIFORMLY AS POSSIBLE USING CARE NOT TO FRACTURE THE MINERAL PARTICLES.

(B) THE 900 PLUS GRAM SAMPLE SHALL BE TRANSFERRED INTO THE BOWL.

(C) THE SAMPLE SHALL BE COVERED IN THE BOWL WITH BENZENE AND SUFFICIENT TIME ALLOWED FOR THE SOLVENT TO DISINTEGRATE THE SAMPLE (NOT OVER ONE HOUR). THE BOWL CONTAINING THE SAMPLE AND THE SOLVENT SHALL BE PLACED IN THE EXTRACTION APPARATUS. THE FILTER RING SHALL BE DRIED AND WEIGHED AND FIT AROUND THE EDGE OF THE BOWL. THE COVER SHALL BE CLAMPED ON THE BOWL TIGHTLY WITH A TORQUE WRENCH TO 110 INCH POUNDS. A BEAKER

SHALL BE PLACED UNDER THE DRAIN TO COLLECT THE EXTRACT.

(D) THE CENTRIFUGE SHALL BE REVOLVED UNTIL THE SOLVENT CEASES TO FLOW FROM THE DRAIN. THE MACHINE SHALL BE ALLOWED TO STOP, 250 ML OF BENZENE SHALL BE ADDED AND THIS PROCEDURE REPEATED TWICE. THE EXTRACT AND THE WASHINGS SHALL BE COLLECTED IN A SUITABLE GRADUATE.

(E) THE FILTER RING SHALL BE REMOVED FROM THE BOWL AND DRIED. AS MUCH OF THE MINERAL MATTER ADHERING TO THE RING SHALL BE REMOVED AS POSSIBLE AND ADDED TO THE AGGREGATE. THE RING AND CONTENTS OF THE BOWL SHALL BE DRIED TO CONSTANT WEIGHT IN AN OVEN AT 280 DEG. F.

(F) THE VOLUME OF THE TOTAL EXTRACT IN THE GRADUATE SHALL BE RECORDED. THE EXTRACT SHALL BE AGITATED THOROUGHLY AND 75 ML IMMEDIATELY MEASURED OUT AND POURED INTO A PREVIOUSLY WEIGHED TEST TUBE. THE TEST TUBE SHALL BE PLACED IN A CENTRIFUGE AND REVOLVED AT 1500 RPM FOR THIRTY MINUTES. THE LIQUID SHALL BE DECANTED AND POURED IN CLEAN BENZENE. THE RESIDUE SHALL BE DISLODGED AND STIRRED WITH A SPATULA. THE TEST TUBE SHALL BE FILLED WITH BENZENE, CLEANING THE SPATULA, AND PLACED BACK IN THE CENTRIFUGE FOR THIRTY MINUTES. THIS RINSING PROCESS SHALL BE REPEATED UNTIL BENZENE REMAINS CLEAN. THE TEST TUBE SHALL BE DECANTED AND PLACED IN AN OVEN UNTIL DRY, THEN COOLED IN A DESICCATOR AND WEIGHED. A MINIMUM OF ONE DETERMINATION OF FINES IN THE EXTRACT SHALL BE DONE ON EACH LOT OF MATERIAL.

(G) CENTRIFUGE FINES IN EXTRACT SHALL BE CALCULATED AS FOLLOWS:

$$\frac{AB}{75} \text{ EQUALS WEIGHT OF FINES IN EXTRACT}$$

WHERE:

A EQUALS TOTAL AMOUNT OF EXTRACT
B EQUALS AMOUNT OF MATERIAL IN TUBE

CONVERT TO ASH AS FOLLOWS:

Y EQUALS 1.0983 X PLUS 0.6140

WHERE:

Y EQUALS WEIGHT OF ASH IN EXTRACT
X EQUALS WEIGHT OF CENTRIFUGE FINES IN EXTRACT

ALTERNATE METHOD OF DETERMINING WEIGHT OF ASH IN EXTRACT - A.A.S.H.O. T 164-65, SECTION 8, PARA. (F) AND SECTION 9, PARA. (A).

(H) USING A DRY OR PREVIOUSLY DRIED SAMPLE CALCULATE PERCENTAGE OF BITUMEN IN THE SAMPLE SHALL BE CALCULATED AS FOLLOWS:

PERCENT A.C. EQUALS $\frac{(W1+W2)-(W3+W4+W5)}{W1} \times 100$

WHERE:

W1 EQUALS WEIGHT OF SAMPLE
W2 EQUALS WEIGHT OF RING

W3 EQUALS WEIGHT OF AGGREGATE

W4 EQUALS WEIGHT OF RING AFTER CENTRIFUGING

W5 EQUALS WEIGHT OF FINES IN EXTRACT

(I) IF SAMPLE IS HIGH IN BITUMEN CONTENT, IT SHALL BE DRIED TO CONSTANT WEIGHT TO DETERMINE WATER CONTENT AND RERUN. A WATER CONTENT (A.A.S.H.O. DESIGNATION: T55) SHALL BE DONE WHEN MOISTURE IS SUSPECTED OR THERE IS A KNOWN MOISTURE PROBLEM.

4. THE PERCENTAGE OF BITUMEN SHALL BE REPORTED TO THE NEAREST HUNDREDTH OF A PERCENT.

B. MECHANICAL ANALYSIS OF EXTRACTED AGGREGATE

SCOPE.

1. THIS METHOD OF TEST COVERS A PROCEDURE FOR THE DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF FINE AND COARSE AGGREGATES EXTRACTED FROM BITUMINOUS MIXTURES, USING SIEVES WITH SQUARE OPENINGS.

APPARATUS.

2. (A) BALANCE: THE BALANCE OR SCALE SHALL BE SENSITIVE TO WITHIN 0.2G.

(B) SIEVES: THE SIEVES WITH SQUARE OPENINGS SHALL BE MOUNTED ON SUBSTANTIAL FRAMES CONSTRUCTED IN A MANNER THAT WILL PREVENT LOSS OF MATERIAL DURING SIEVING. SUITABLE SIEVE SIZES SHALL BE SELECTED TO FURNISH THE INFORMATION REQUIRED BY THE SPECIFICATIONS COVERING THE MATERIAL TO BE TESTED. THE WOVEN WIRE CLOTH SIEVES SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR SIEVES FOR TESTING PURPOSES (A.A.S.H.O. DESIGNATION: M 92).

SAMPLE.

3. THE SAMPLE SHALL CONSIST OF THE ENTIRE LOT OR SAMPLE OF AGGREGATE FROM WHICH THE BITUMINOUS MATERIAL HAS BEEN EXTRACTED.

PROCEDURE.

4. (A) THE TEST SAMPLE SHALL BE DRIED TO A CONSTANT WEIGHT, AND WEIGHED. THE WEIGHT OF MINERAL MATTER CONTAINED IN THE EXTRACTED BITUMEN SHALL BE DETERMINED AND THIS WEIGHT ADDED TO THE WEIGHT OF THE WASHED AND DRIED AGGREGATE.

(B) THE TEST SAMPLE AFTER BEING DRIED AND WEIGHED SHALL BE PLACED OVER PROPER SIEVES DECREASING IN SIZE DOWN TO THE NO. 10 OR NO. 8 WITH A CATCH PAN UNDER THEM. THE SIEVING OPERATION SHALL BE CONDUCTED BY MEANS OF A LATERAL AND VERTICAL MOTION OF THE SIEVE, ACCOMPANIED BY JARRING ACTION SO AS TO KEEP THE SAMPLE MOVING CONTINUOUSLY OVER THE SURFACE OF THE SIEVE. IN NO CASE SHALL FRAGMENTS IN THE SAMPLE BE TURNED OR MANIPULATED THROUGH THE SIEVE BY HAND. SIEVING SHALL BE CONTINUED UNTIL NOT MORE THAN 1 PERCENT BY WEIGHT OF THE RESIDUE PASSES ANY SIEVE DURING 1 MIN.

(C) THE FINE AGGREGATE IN THE CATCH PAN SHALL BE WEIGHED AND RECORDED, THEN PLACED IN A NO.200 WASHING SIEVE AND WASHED IN NAPHTHA. THE SAMPLE SHALL BE CAREFULLY AGITATED DURING THIS WASHING OPERATION; RESULTING IN THE MINUS 200 MATERIAL BEING REMOVED BY THE WASHING MEDIUM.

(D) THE WASHED MATERIAL SHALL THEN BE THOROUGHLY DRIED ON A HOT PLATE AND WEIGHED. (IF THE AMOUNT OF PASSING NO. 200 MATERIAL FAILS TO MEET THE MINIMUM REQUIREMENT FOR THE SPECIFIC SAMPLE UNDER TEST, THE COARSE AGGREGATE OF THAT PARTICULAR SAMPLE MUST ALSO BE WASHED IN NAPHTHA. THE MINUTE AMOUNT OF FINES WASHED FROM THE COARSE AGGREGATE SHALL THEN BE ADDED TO THE PASSING NO. 200 MATERIAL WASHED FROM THE FINE AGGREGATE PORTION OF THE SAMPLE.)

(E) THE DRIED MATERIAL SHALL THEN BE PLACED OVER A SET OF PROPER SIEVES INCLUDING THE NO. 200 SIEVE. IT SHALL BE AGITATED MECHANICALLY FOR FIVE MINUTES.

(F) THE WEIGHT OF MATERIAL PASSING EACH SIEVE AND RETAINED ON THE NEXT AND THE AMOUNT PASSING THE NO. 200 SIEVE SHALL BE RECORDED. THE WEIGHT OF DRY MATERIAL PASSING THE NO. 200 SIEVE BY DRY SIEVING SHALL BE ADDED TO THE WEIGHT OF MINERAL MATTER IN THE BITUMEN, IN THE RING, AND THE WEIGHT REMOVED BY WASHING IN ORDER TO OBTAIN THE TOTAL PASSING THE NO. 200.

REPORT.

5. THE RESULTS OF THE SIEVE ANALYSIS SHALL BE REPORTED AS FOLLOWS: (A) TOTAL PERCENTAGES PASSING EACH SIEVE. PERCENTAGES SHALL BE REPORTED TO THE NEAREST TENTH OF A PERCENT.