

SECTION 32 11 24

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. This Section is a part of the entire set of Contract Documents and shall be coordinated with the applicable provisions of the other parts.
- B. Related Sections:
 - 1. Section 31 20 00 Earthwork

1.2 SCOPE

- A. The work under this section of the specification shall consist of furnishing all labor, materials and equipment to produce, place, spread, compact and finish to proper grade and cross section all aggregate base courses according to the drawings and specifications.

1.3 SUBMITTALS

- A. Submit to the Landscape Architect a sieve analysis of the proposed stone to be installed.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aggregate base material shall conform to DOT specifications for 21AA 100% crushed limestone and shall be placed and compacted to the minimum depth shown on plans. Crushed concrete, slag, etc. shall not be allowed.

Aggregate Sieve Analysis Percent Passing

1½"	100
1"	85-100
½"	50-75
No. 8	20-45
No. 200	4-8

PART 3 - EXECUTION

3.1 SUB-GRADE CONSTRUCTION:

- A. The sub-grade shall be so constructed as to have uniform stability for a width at least equal to that of the proposed pavement plus one (1) foot on each side. It shall be brought to an elevation and cross section such that, after being rolled, the surface will be at the required elevation. At the time the sub-grade is prepared, the fill area shall have been constructed to the full width and to at least the elevation of the finished sub-grade.
- B. The material present in the next six (6) inches below the elevation of the sub-grade shall be scarified, mixed and recompact, or otherwise treated to produce a uniform condition. Stones over four (4) inches in size shall be removed from the loosened portion of the sub-grade and disposed as directed by the project representative.
- C. Depressions that develop during the following shall be filled with suitable material, and the rolling shall continue until the sub-grade is uniformly firm, properly shaped and substantially true to grade and cross section. It shall be so maintained until the pavement is place.

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- D. Material, other than sand, which will not compact readily under roller shall be removed and replaced with material which will compact readily and that portion of the sub-grade shall be rolled again.
- E. The rolling of the sub-grade shall extend for at least twelve (12) inches outside of each edge of the proposed turf boundaries when possible. Piles or ridges of earth or material that would seriously interfere with the operations of finishing the pavement shall not be left on the shoulders.
- F. During the process of construction sub-grade, the soil shall be maintained in a condition sufficiently moist to facilitate compaction and produce a firm, compact surface.
- G. If, in the preparation of the sub-grade, it becomes necessary to excavate below the elevation of the earth shoulders, ditches or drains shall be provided at frequent intervals to permit ready drainage of surface water from sub-grade to side ditches.
- H. If ruts or other objectionable irregularities form in the sub-grade during construction, the Contractor shall reshape and re-roll the sub-grade before the pavement is laid. The material used for filling ruts or other depressions shall be of such character as to make it equally desirable for sub-grade purposes as the material presented in the sub-grade.
- I. When the sub-grade is being prepared for placement as an aggregate base course, the elevation of the most finished surface, at the time the next layer is placed, shall not vary by more than 0.05 foot above or below the prescribed elevation at any point where measurement is made.

3.2 AGGREGATE BASE COURSE:

- A. Base course construction shall proceed as follows only after the Landscape Architect has approved the sub-grade construction and the gravel tests.
- B. The base shall be constructed in layers of not more than three (3) inches (75mm) compacted thickness when conventional rolling equipment is used.
- C. If vibratory or other approved special equipment is used, the thickness of every compacted layer may be increased to a maximum of eight (8) inches (150mm).
- D. The finished surface of any aggregate base course shall not vary more than 0.02 foot (15mm) from the elevations, grades and cross sections on the drawings.
- E. Compacted stone base dimensions shall be a minimum of 6".

3.3 COMPACTION REQUIREMENTS:

- A. Sub-grade shall be compacted to not less than ninety-two percent (92%) of maximum density at not less than seventy-five percent (75%) of optimum moisture content.
- B. Aggregate base course shall be compacted to not less than ninety-five percent (95%) of maximum density. Using conventional rolling equipment, moisture content shall not be less than ninety percent (90%) nor more than one hundred-ten percent (110%) of optimum moisture content. Using vibrating equipment, moisture content shall not be less than seventy-five (75%) of optimum moisture content.
- C. Maximum density shall be determined in accordance with AASHTO Modified Method of Test for the Compaction and Density of Soil, Designation T-180, and the optimum moisture content shall be that corresponding to the maximum density in the above test.

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3.4 ROLLERS:

- A. Smooth steel-wheeled rollers shall be self-propelled and have a total weight not less than 8 tons. The compression (driving) roller shall exert a pressure of not less than 250 lbs. per inch width of the roller.
- B. Pneumatic-tire rollers shall have a compacting width of sixty (60) inches (1.5m) or more and shall be capable of varying the weight from 100 to 250 lbs. per inch of rolling width.

END OF SECTION 32 11 24

SECTION 32 12 18

BITUMINOUS ASPHALT PAVEMENT – STANDARD DUTY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. This Section is a part of the entire set of Contract Documents and shall be coordinated with the applicable provisions of the other parts.
- B. Related Sections:
 - 1. Section 31 20 00 Earthwork
 - 2. Section 32 11 24 Aggregate Base Course

1.2 SCOPE

- A. The work under this section of specifications shall include the furnishing of all labor, materials and equipment necessary to produce, place, spread, compact and finish to proper grade and cross section all plant mix bituminous pavement as shown on the drawings and as specified herein.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Michigan Department of Transportation
 - a. All work done under this section of the specifications except as amended herein, shall be in accordance with current edition of the Michigan Department of Transportation Standard Specifications for Highway Construction, referred to hereafter as the MDOT Specifications.
- B. Acceptability of the Work:
 - 1. Grade: Grade conformance tests shall be conducted on both the leveling and wearing courses. The entire surface shall have positive drainage.
 - 2. Planarity: After completion of the finish rolling operations on each course, the compacted surface shall be tested with a 10' straightedge. Measurements shall be made perpendicular to and across all mats at a distance not to exceed 25 feet. The maximum allowable planarity deviation within a pass shall be no more than 1/4" in 10' when measure in any direction.

1.4 PLACEMENT AND COMPACTION

- A. Paving operations shall provide a mat that is smooth, dense and of the proper thickness, slope and planarity. The plant mix bituminous material shall be compacted to 95% of the bulk density as determined by 50 blows-per-side Marshall procedures.
- B. The wearing course shall be placed such that the longitudinal joints of the wearing course are offset from that of the leveling course. Transverse joints shall be off set a minimum of 24".
- C. In placing each succeeding pass after the initial one, the screed of the paver should be set so that it overlaps the preceding pass by 2" and be sufficiently high so that when compacted, a smooth joint is produced. Prior to pinching the joint, the excess material shall be pushed onto the edge of the new pass with a lute. Excess material shall be removed from the pass.
- C. Deficient areas within the base course shall be corrected by sawcutting or milling to a depth equal to the thickness of the mat. Tack coat shall be applied to all edges and the pavement shall be replaced.

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PART 2 - MATERIALS

2.1 PLANT MIX

A. Leveling Course: The bituminous plant mix base course shall meet the requirements of MDOT Specification 7.10 - Plant Mix Bituminous Mixtures. The specific mix and cross sections are as follows.

1. Thickness: Not less than 1 ½” inches when compacted
2. Liquid Asphalt or Bitumen: 5% ~ 7% by weight
3. Asphalt Penetration or Type: (PG-58-28)
4. Aggregate Type: Crushed limestone or natural aggregate. Slag is unacceptable unless other materials cannot be obtained. Only blast furnace slag is acceptable in this case.
5. MDOT Mix: 1100 L - 20AA

<u>Aggregate Sieve Analysis</u>	<u>Percent Passing</u>
¾”	100
½”	90-100
⅜”	65-95
No. 8	45-70
No. 30	20-45
No. 200	3-10

B. Wearing Course: The bituminous plant mix base course shall meet the requirements of MDOT Specification 7.10 - Plant Mix Bituminous Mixtures. The specific mix and cross sections are as follows.

1. Thickness: Not less than 1 ½” inches when compacted
2. Liquid Asphalt/Bitumen: 5% ~ 9% by weight ($\pm 1\frac{1}{2}\%$)
3. Asphalt Penetration or Type: (PG-58-28)
4. Aggregate Type: Crushed limestone or natural aggregate. Slag is unacceptable unless other materials cannot be obtained. Only blast furnace slag is acceptable in this case.
5. MDOT Mix: 1100 T - 36-A

<u>Aggregate Screen Size</u>	<u>Percent Passing</u>
½”	100
⅜”	92-100
No. 4	65-90
No. 8	55-75
No. 30	20-50
No. 200	4-10
Percent Crushed	60

C. The Contractor shall submit to the Landscape Architect a job mix formula, including the exact proportions of bituminous material and mineral filler.

D. No bituminous surface shall be placed prior to approval of the job mix formula by the Engineer/Landscape Architect.

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PART 3 - EXECUTION

3.1 LIMITATIONS OF OPERATIONS

- A. Bituminous tack coat shall be applied only when surface and weather conditions are favorable.
- B. Bituminous plant mix shall be placed only during daylight hours when the temperature of a shaded portion of aggregate the base is 40°F. or higher and when the surface upon which it is to be constructed is dry.

3.2 SUB-GRADE AND BASE COURSE PREPARATION

- A. Prepare sub-grade and aggregate base course in accordance with these specifications. The subgrade shall be proof compacted loaded rubber tired equipment and witnessed by a representative of the design team. Areas that exhibit significant deflection or pumping shall be removed and replaced with compacted granular material. Aggregate base course shall be compacted to 95% of the maximum dry density as determined by ASTM D698 (AASHTO T99) procedures.
- B. At the time of applying bituminous material, the sub-grade surface shall be dry and clean, and all necessary repairs or reconditioning work shall have been completed.
- C. All objectionable foreign matter dirt, debris, etc. on the asphalt surface shall be removed and disposed by the Contractor.

3.3 BITUMINOUS TACK COAT

- A. Bituminous tack coat shall be applied at a rate of 0.10 gallons per square yard to existing bituminous surfaces and to successive plant mix surfaces. The tack coat may be waived by the Landscape Architect where successive plant mix courses are to be placed during one day's operation.
- B. The bituminous tack coat shall be applied uniformly to the clean, dry surface with a pressure distributor. Pools of bituminous material shall not be allowed to remain on the surface. The tack coat material shall be applied far enough ahead of the paving operation to allow it to cure before placing the subsequent plant mix bituminous material.

3.4 TEMPERATURE

- A. The temperature of bituminous material at the time of application shall be as approved by the Landscape Architect within the limits specified below.

SS-1h	105-180 degrees F.
Plant Mix	270-330 degrees F.

- B. The Landscape Architect may reject any load of plant mix bituminous material whose temperature is outside the temperature limits identified in 3.4A

3.5 BITUMINOUS PAVING

- A. After completion and acceptance of the stone base course, install 1½” of leveling course and 1½” of wearing asphalt materials.
- B. Installation shall be in two (2) separate courses of 1½” and 1½” after compaction. Each asphalt lift shall be installed using automated laser grade control, self-propelled paving equipment, with dual-slope capabilities.

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- C. The plant mix bituminous material shall be compacted to 95% of the bulk density as determined by 50 blows-per-side Marshall procedures.
- D. Plant mix shall be placed and compacted in accordance with 1990 MDOT Specification Section 4.00 - Plant Mix Bituminous Pavements. The initial contact with the hot mixture leveling course shall be made by the power or driving roll of the steel roller, weighing not less than six (6) tons. The finish surface of the leveling course shall not vary more than 1/4" in 10 feet when measured in any direction. The finish surface of the wearing course shall not vary more than 1/8" in 10 feet when measured in any direction.

3.6 TESTS AND SAMPLES

- A. At the direction of the Landscape Architect, the Contractor shall cut samples from any course or finished pavement not to exceed five (5) in number from any days run for tests of density and composition. These samples shall be taken at points designated by the Landscape Architect by sawing with a power driven masonry saw or diamond core drill. Samples shall be sufficiently large to meet the needs of the testing laboratory.
- B. The Owner will hire an independent testing laboratory to perform field density testing with a nuclear density gage to verify that the specified density requirements are being met.
- C. The surface from which samples are taken shall be restored by the Contractor not later than the next succeeding day of plant operation.
- D. All test results will be available to the Contractor.
- E. All testing samples will be paid for in accordance with these specifications.

END OF SECTION 32 12 18