

Table 4.3

SUBBASE AGGREGATE GRADATION

PERCENTAGE OF TOTAL AGGREGATE PASSING					
SIEVE SIZE		CLASS I BAND LIMITS	IDEAL GRADATION	CLASS II BAND LIMITS	IDEAL GRADATION
METRIC	AMERICAN STANDARD				
152.4 mm	6"	100	100	--	--
76.20 mm	3"	90 - 100	95	100	100
50.80 mm	2"	80 - 100	90	90 - 100	95
25.0 mm	1"	70 - 90	80	70 - 90	80
12.5 mm	½"	51 - 75	63	51 - 75	63
4.75 mm	#4	31 - 65	48	31 - 65	48
1.18 mm	#16	16 - 40	28	16 - 40	28
.075 mm	#200	2 - 12	7	2 - 12	7

4.5.7. UNTREATED ROADBASE - ONE INCH AND THREE-QUARTER INCH.

All gravel pits supplying aggregate shall be UDOT approved pits. Roadbase for all roadways and associated areas shall consist of select materials, natural and/or crushed. Coarse aggregate shall be all material retained on the #4 (4.75 mm) sieve, and shall be crushed stone, crushed gravel, or crushed slag with a minimum of forty percent (40%) fractured faces per FLH designation T-506-94. Fine aggregate may be a natural, or manufactured, product and shall pass through a #4 (4.75 mm) sieve. All aggregates shall be clean, hard, tough, durable and sound containing no more than two percent (2%) gypsum and be free from other deleterious and/or organic materials and harmful adherent coatings. The test for gypsum shall follow City of St. George Chemical Quantitative Analysis of Gypsum in Aggregates, Test Procedure S-3171-96.

Aggregate wear shall be less than fifty percent (50%) when tested by AASHTO T-96 and the material passing the #40 (.0425 mm) sieve shall be non-plastic per AASHTO T-90. The dry-rodded unit weight shall be at least seventy five pounds per cubic foot (1200 kg/m³) per AASHTO T-19.

Prior to delivering any roadbase to any site, the supplier shall submit, in writing, a job-mix gradation and a standard aggregate gradation plot to the City Engineer for approval. The job-mix gradation shall have definite single values for the

percentage of aggregate passing each specified sieve based on the dry weight of the aggregate. Dry weight values shall fall within the band limits shown in Table 4.4, and provide a uniform curve when plotted on a standard aggregate gradation chart. The City Engineer has the right to request modification to the job-mix gradation to provide an acceptable curve. The accepted job mix will then become the target gradation for the aggregate source for the calendar year.

Annual job-mix gradations shall be submitted in writing to the City Engineer for approval prior to January 31 each calendar year, or upon selection of new aggregate sources. Any revisions to the approved job-mix gradation shall fall within the requirements listed above.

If a supplier does not have an approved job-mix gradation that is current for the aggregate source, or calendar year, the "Ideal Gradation" in Table 4.4 will apply.

The roadbase placed on a projects during one day's operation shall come from a single source. Intermixing from more than one source will not be permitted.

Roadbase shall be placed in layers compatible with the equipment and not exceeding eight (8) inches in non-compacted thickness. Where the required thickness is more than eight inches the roadbase shall be spread and compacted in two or more layers of approximately equal thickness. However, if vibratory compaction equipment of a type approved by the City's Representative is used, and the requirements for density and moisture content are complied with, the noncompacted thickness of any one layer may be increased to ten (10) inches. Each layer shall be compacted for the full width and depth by mechanical means. When mixing, moistening and placing roadbase the moisture content shall be not less than two percent (2%) below optimum. Care shall be used to avoid overwatering. Alternate blading and rolling will be required to provide a smooth, evenly moistened and uniformly compacted course true to cross-section and grade. Locations inaccessible to rolling shall be compacted with mechanically operated hand tampers. The roadbase shall be compacted to not less than ninety-five percent (95%) maximum dry density as determined by ASTM D-1557-78 or AASHTO T-180 method D. Roadbase tolerances when compacted shall meet or exceed the required minimum thickness and shall not vary more than 0.02 foot from the specified grade and cross-section at the time the asphalt pavement is placed.

When the roadbase surface is used to convey traffic, or is left unpaved for an extended period of time, the contractor shall preserve the integrity and grade and an asphalt prime coat meeting the requirements in Section 4.5.8 shall be applied. When asphalt prime is not used, the contractor shall maintain the roadbase moisture, structural integrity and finish, to the finished tolerances of this subsection.

**Table 4.4
ROADBASE AGGREGATE GRADATION**

PERCENTAGE OF TOTAL AGGREGATE					
Sieve Size		1 inch/ 25mm Band Limits	Ideal Gradation	3/4 Inch/ 19mm Band Limits	Ideal Gradation
Metric	American Standard				
25mm	1"	100	100	—	—
19mm	3/4"	—	—	100	100
12.5mm	1/2"	79-91	85	—	—
9.5mm	3/8"	--	--	78-92	85
4.75mm	#4	49-61	55	55-67	61
1.18mm	#16	27-35	31	28-38	33
.075mm	#200	7-11	9	7-11	9

4.5.8 PRIME COAT. Prime coat is required for all roadway work unless otherwise approved by the City Engineer. This work shall consist of preparing and treating an existing aggregate base with bituminous material and blotter material, if required, in accordance with these specifications and in conformity with the lines shown on the plans or established by the City's Representative. The type and grade of bituminous material shall be MC-70 liquid asphalt, unless otherwise approved by the City's Representative.

The Contractor shall provide equipment for heating and applying the bituminous material. The asphalt distributor shall be so designed, equipped, maintained and operated that bituminous material will be applied uniformly on variable widths of surface at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard with uniform pressure and an allowable variation from any specified rate not to exceed 0.02 gallon per square yard. Distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank, and thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

Bituminous material shall not be applied on a wet surface that has free standing water, or when the atmospheric and surface temperature is less than 50° F. (10°C.) or when weather conditions, in the opinion of the City's Representative, would prevent the proper application of the prime coat. The surface upon which the

bituminous prime coat will be placed shall conform to the established lines and grades, shall be smooth and uniform and shall be compacted to the required density with the optimum moisture content at plus, or minus, two percent (2%). If, for any reason, the required density and/or moisture deteriorates between the time the gravel course was compacted and the time the prime coat is placed, the surface shall be recompact and/or moisture conditioned to the required density and moisture content.

Bituminous material shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform, continuous spread. When traffic is maintained, not more than one-half of the width of the section shall be treated in one application. Traffic will not be allowed on the treated surface until the bituminous material is absorbed and will not adhere to the vehicle tires. Care shall be taken that the application of bituminous material at the junctions of spreads is not in excess of the specified amount. Skipped areas or deficiencies shall be corrected.

Application rate shall be 0.25 gallon per square yard, or as directed by the City's Representative. At the time of placement the temperature of the liquid asphalt shall be uniform and not less than 120 degrees F. (49 degrees C.) nor more than 180 degrees F. (82 degrees C.).

If the bituminous material fails to penetrate within forty-eight hours, blotter material shall be spread as required to absorb any excess bituminous material. All loose blotter material shall be completely removed from the treated areas prior to placing surfacing material. Prior to placing asphalt concrete, additional prime coat shall be applied as directed by the City's Representative to areas where the prime coat has been damaged, and loose or extraneous material shall be removed.

Sand blotter material shall meet the following requirements. The material may be accepted in the stockpile at the source.

REQUIRED TESTS

Sieve Analysis
 Sampling Aggregate
 Organic Impurities

TEST METHODS

AASHTO T27
 ASTM D 75
 ASTM C 40

GRADATION REQUIREMENTS

Percentage by Weight

<u>Sieve Sizes</u>		<u>Passing Sieve</u>
½ Inch	100
No. 4	90 - 100
No. 16	30 - 75
No. 200	0 - 12

Liquid asphalt shall not be sprayed upon adjacent pavements, that portion of the traveled way being used by traffic, structures, railings and barriers, markers, adjacent property and improvements, and other roadway improvements or facilities not mentioned herein.

4.5.9 TACK COAT. This work shall consist of preparing and treating an existing bituminous or concrete surface with asphaltic emulsion in accordance with these specifications and in conformity with the lines shown on the plans or established by the City's Representative. The type and grade of bituminous material shall be SS-1h asphalt emulsion, unless otherwise directed.

Asphalt emulsion used as a tack coat between courses of plant mix surface, or over an existing surface, shall be prepared for application by using warm water to cut back the emulsion in the quantity of fifty percent (50%) of the emulsion by weight.

Bituminous material shall be applied to the width of the section to be tacked by means of a pressure distributor in a uniform, continuous spread. Care shall be taken that the application of bituminous material at the junctions of spreads is not in excess of the specified amount. Skipped areas or deficiencies shall be corrected.

The Contractor shall provide equipment for heating and applying the bituminous material. The asphalt distributor shall be so designed, equipped, maintained and operated that bituminous material will be applied uniformly on variable widths of surface at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard with uniform pressure and with an allowable variation from any specified rate not to exceed 0.02 gallon per square yard. Distributor equipment shall include a tachometer, pressure gauge(s), accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

Application of tack coat may occur only when the surface and air temperature is 50 degrees F. (10 degrees C.) and rising. The surface shall be clean, dry, free of irregularities and shall be smooth and uniform.

At the time of placement the temperature of the asphaltic emulsion shall be uniform and not less than 75 degrees F. (24 degrees C.) nor more than 130 degrees F. (54 degrees C.). The tack shall be applied at a rate of 0.05 to 0.10 gallon per square yard. The rate of application may be adjusted by the City's Representative.

Liquid asphalt shall not be sprayed upon adjacent pavements, structures, railing, barriers, markers, adjacent property improvements, and other facilities not mentioned herein.