

DIVISION 11**ROADWAY CONSTRUCTION****Section 11.01 GENERAL:**

This Division covers roadway construction. Work shall consist of pulverizing existing asphalt, earthwork, roadway excavation, 6-inch curb walls, 24-inch curb and gutter, 4-foot sidewalk, and drive approaches. It will also include imported granular borrow, curb face inlet boxes including connection to existing storm drain, subgrade preparation, untreated base course, asphalt surface and raising manholes and valve boxes to grade.

Section 11.02 PULVERIZING:

The Developer/Contractor shall pulverize the existing asphalt and roadbase to a depth of 6 to 8 inches. The limits of the area to be pulverized will be as shown on the improvement drawings. This material will be used for granular borrow or untreated roadbase. The Developer/Contractor has the option of methods he feels will result in the least work and best product in breaking up the existing asphalt, provided that the maximum size for a single piece of asphalt does not exceed 3-inches. Placing, grading and compacting of this material shall comply with the requirements of borrow or roadbase. The existing asphalt edges where the pulverizing terminates shall be saw cut following or prior to being pulverized.

Section 11.03 EARTHWORK:

The earthwork needed for roadway construction shall meet the requirements of Division 7, Earthwork.

Section 11.04 ROADWAY EXCAVATION:

Following completion of the curb and gutter improvements the roadway between lip of gutters shall be excavated to the lines and grades shown on the improvements drawings. Materials not suitable for use as granular borrow or roadbase shall be removed from the road section. Excavation may be done on one-half of the road at a time.

Section 11.05 SUBGRADE PREPARATION:

This work shall consist of the shaping and compacting of the subgrade in accordance with these specifications and in conformity with the lines, grades, and typical cross sections shown on the Drawings or as established by the Public Works Representative/Engineer.

Following roadway excavation the subgrade shall be proof rolled by running moderate-weight rubber tire-mounted construction equipment uniformly over the surface at least twice. During the rolling operation moisture content of the subgrade layer shall be maintained at not less than 97% or more than 105% of the optimum moisture content. Rolling shall be continued until the entire roadbed is compacted to the specified density to a minimum depth of 8 inches.

Section 11.06 GRANULAR BORROW:

Granular borrow (foundation or roadway) material shall consist of well graded granular bank run natural aggregate material with a maximum size of 3 inches and less than 15% passing a No. 200 sieve. The material shall meet the following gradation:

Sieve Size	Percent Passing
No. 10	50 max.
No. 40	30 max.
No. 200	15 max.

The granular borrow material shall be compacted to not less than 96% maximum dry density as determined by AASHTO T-99. Granular foundation borrow shall be compacted to not less than 95% of maximum dry density as determined by ASTM D-1557. Surfaces shall be true to the established grade with thickness being not less than 1/4-inch from the required layer thickness and with the surface elevation varying not more than 3/8-inch in ten feet from the true profile and cross section.

Section 11.07 GRANULAR BACKFILL BORROW:

Granular backfill borrow shall be free draining natural aggregate material meeting the following gradation:

Sieve Size	Percent Passing
1 - ½ inch	100
1 inch	95-100
½ inch	25-60
No. 4	0-10

Section 11.08 BASE COURSE:

Base for all streets shall consist of select material, either natural aggregate or crushed slag, and shall be graded as follows:

Sieve Size	Percent Passing
3/4 inch	100
3/8 inch	78-92
No. 4 sieve	55-67
No. 16 sieve	28-38
No. 200 sieve	7-11

Slag 4133 (3/4 inch minus) and slag 4120 (3/4 inch minus) can be used.

The material shall be deposited and spread in a uniform layer, without segregation of size, with such depth that when compacted, the layer will have the required thickness as stated below.

Each layer shall be compacted for the full width and depth. Alternate blading and rolling will be required to provide a smooth, even and uniformly compacted course true to cross section and grade. Places inaccessible to rolling shall be compacted with mechanically operated hand tampers.

The gravel base shall be compacted to not less than 96% maximum dry density as determined by AASHTO T-180. Surfaces shall be true to the established grade with thickness being not less than 1/4-inch from the required layer thickness and with the surface elevation varying not more than 3/8-inch in ten feet from the true profile and cross section.

Section 11.09 BITUMINOUS ASPHALT CEMENT PAVEMENT:

The bituminous asphalt cement surface course shall not be placed until the Public Works Representative/Engineer has approved the underlying base course. The bituminous asphalt cement surface course shall be placed no less than 7 days following this approval. After 7 days the base course must be reinspected before the surface course is placed.

Over the dry, dust-free compacted base course the Developer/Contractor shall place and compact a bituminous asphalt cement surface course. The surface course shall consist of a mixture of mineral aggregate and binder. Gradation of aggregate shall conform to the following:

Sieve Size	Percent Passing
3/4 inch	100
3/8 inch	69-91
No. 4	42-58
No. 16	17-31
No. 50	9-21
No. 200	4-8

The Developer/Contractor shall establish a mix gradation, and the amount of bituminous material shall be subject to the approval of the Public Works Representative/Engineer and shall meet the requirements of the gradation selected. Regardless of the bituminous content, there shall not be more than 3% voids in the aggregate.

The bituminous material for the surface course shall be AC-10 penetration asphalt cement conforming to the requirements of ASTM M20-60.

The bituminous surface course shall be mixed at a mixing plant and spread and compacted on the prepared base in conformance with the lines and dimensions shown on the Drawings and in accordance with these Specifications.

The bituminous mixtures shall be spread with self-propelled mechanical spreading and conditioning equipment capable of distributing at least a 12-foot width. The mixture shall be spread and struck off in such a manner that the finished surface shall result in a uniform smooth surface. The longitudinal joints in succeeding courses shall be offset at least 6-inches transversely to avoid a vertical joint through more than one course.

The temperature of the bituminous mix shall be between 270 deg. F. and 325 deg. F. when placing.

After the mixture has been spread, the surface shall be rolled in longitudinal direction commencing at the outside edge or lower side and proceeding to the higher side. Each pass of the roller shall overlap the preceding pass at least one-half the width of the roller. Rolling shall continue until 95% of the laboratory density as determined in accordance with ASTM Designation D-1559 for the bituminous mixture being used has been obtained. Density tests shall be done following the procedures of ASTM D-2950.

Rolling operations shall be conducted in such a manner that shoving or distortion will not develop beneath the roller.

The surface of the pavement, after compaction, shall be uniform and true to the established grade. When tested with a ten-foot straight edge placed on the surface of the pavement, at any point, the surface shall not deviate more than one-eighth of an inch from the lower edge of the straight edge. All high and low spots shall be remedied immediately by removing the wearing course material over the affected areas and replacing it with fresh, hot wearing course and surface finish material and immediately compacting it to conform with surrounding area.

It is the responsibility of the Developer/Contractor to control traffic. All traffic shall be kept off the completed surface for a minimum period of 24 hours unless specifically approved by the City.

No bituminous surface course shall be placed when the temperature of the air or roadbed is 50 deg. F. or below, during rainy weather, when the base is wet, or during other unfavorable weather conditions as determined by the Public Works Representative/Engineer. The air temperature shall be measured in the shade.

Section 11.10 ADJUSTING MANHOLES AND VALVE BOXES TO FINAL GRADE:

This section covers the requirements for adjusting manholes and valves to final grade. The adjustment shall be made with cast-iron ring inserts concrete grade rings or cast-in-place concrete collars. Cast-in-place concrete collars shall be constructed after the asphalt surface has been placed.

When concrete rings are used the concrete shall conform to the requirements of Division 8. Concrete shall be Class AA(AE). The concrete mix shall be one part cement to two parts sand or Kent Seal.

Manhole rings shall be set to the grade and slope of the road – shim and grout ring into place.

Manholes and valves placed in asphalt surfacing shall be set in a concrete collar. The collar shall be at least eight inches (8”) thick and extend at least twelve inches (12”) from the cast iron ring or valve box. The concrete collar shall be constructed such that at the interface with the asphalt, the collar shall be one-half inch (1/2”) lower than the pavement. The cast iron ring or valve box shall be constructed such that it is three-fourths inch (3/4”) lower than the pavement.

Where manholes are to be raised this is to be accomplished by removing the cover and frame and raising the manhole to proper elevation with concrete.

Rings and covers shall be protected during backfilling and compaction of the soil and during the placing or replacing of road surfaces. Any ring or cover loosened from the manhole section shall be reset in cement mortar and any ring or cover damaged or broken shall be replaced by the Developer/Developer/Contractor at its expense.

Section 11.11 SLURRY SEAL COAT

All new roadways shall receive a complete slurry seal coat one year after the asphalt is originally placed. The City may choose to use the monies in escrow and complete the work, or it may require the Developer/Contractor to complete the work in accordance with the requirements of this section.

Slurry Seal shall consist of a properly proportioned mixture of fine graded aggregate, mineral filler, emulsified asphalt and water mixed and evenly spread as a surface treatment. The cured slurry shall have a homogeneous appearance, fill all cracks, adhere firmly to the surface and have skid resistant texture.

Materials shall be per Section 405 of the Utah Department of Transportation Standard Specifications and as follows:

- A. The emulsified asphalt shall meet the current specifications of the American Society of Testing and Materials (ASTM) for cationic emulsified asphalt grade CSS-1hr (ASTM D 2397), grade SS-1hr for anionic emulsified asphalt (ASTM D 977) or quick setting asphalt emulsion (QSH) or (CQS-1hr).
- B. Aggregate: The mineral aggregate shall consist of natural or manufactured sand, slag, crushed fines or a combination thereof. The aggregate shall be clean and free from other materials. The aggregate blend shall have a sand equivalent of not less than forty-five (45). The mineral aggregate shall conform to the quality requirements of ASTM D 1073.
- C. Mineral Filler: Mineral filler shall be portland cement, hydrated lime or aluminum sulfate conforming to ASTM D 242.
- D. The combined aggregate and mineral filler shall conform to the following gradation:

<u>AMOUNT PASSING SIEVE SIZE</u>	<u>PERCENT PASSING BY WEIGHT</u>
<u>SIEVE SIZE</u>	<u>TYPE III</u>
No. 4	100
No. 8	85-100
No. 16	10-25
No. 50	0-5
No. 200	0-2

- E. The aggregate spread shall be an average of eighteen (18) pounds per square yard and not less than fifteen (15) pounds shall receive a second application at the contractor’s expense.
- F. Water: All water used with the slurry mixture shall be potable and free from harmful soluble salts.
- G. Selection of materials and rate or percentage of each in the slurry mix shall be in accordance with the following:

The contractor shall provide the Engineer with test results from an independent laboratory of materials he intends to use. The tests results shall conform to the requirements of ASTM D 3910-80a and shall be as follows:

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| 1. Consistency Test | 4.4.4 |
| 2. Set Time | 4.4.5 |
| 3. Cure Time | 4.4.6 |
| 4. Wet Track Abrasion Test | 4.4.7 |

The contractor shall include the cost of the above tests in the unit bid price for Asphalt for Slurry Seal Coat.

- H. Equipment. The equipment shall be designed specifically for the blending, mixture and placing of "Slurry Seal" similar and/or equal to the #804 Young Continuous Mix Slurry Machine. The slurry machine shall have been calibrated in advance to ensure proper proportioning of the materials, and all equipment used in the performance of this work shall be maintained in satisfactory working order at all times.

Surface preparation, asphalt material application, cover material application, and surface rolling shall be in accordance with Section 405 of the Utah Department of Transportation Standard Specifications and as follows:

Preparation of Surfaces: Immediately prior to applying the slurry, unsatisfactory areas shall be repaired and the surface shall be cleaned of all oil spots, loose paint, silt spots, vegetation, and other loose and objectionable material. Any standard cleaning method may be used, except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface. Areas that have been subject to fuel or oil spillage shall be wire-brushed to remove any dirt accumulations. The area shall then be primed with shellac or a synthetic resin to prevent the sealcoat from debonding. The authorized representative of the owner shall give final approval that the surface has been prepared properly.

Application: The surface shall be pre-wetted by fogging ahead of the slurry box. Water shall be applied at a rate of 0.02 to 0.05 gals/yd². No free water shall be on the surface of the pavement in front of the slurry box. The slurry mixture shall be of the desired consistency upon deposit on the surface and no additional elements shall be added. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. Overloading of the spreader shall be avoided. No lumping, balling or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse shall be permitted. No excessive breaking of emulsion shall be allowed in the spreader box. No streaks, such as those caused by oversized aggregate will be left in the finished pavement.

Joints: Build up on longitudinal and traverse joints shall not be permitted. Slurry seal placed adjacent to concrete pavements or concrete curb and gutter shall be placed with a straight longitudinal edge and shall not overlap the concrete by more than two (2") inches. All edges shall be straight and neat in appearance.

Hand Work: Approved squeegees shall be used to spread slurry in non-accessible areas to slurry mixer. Care should be exercised not to leave an unsightly appearance from handwork.

Curing: Treated areas shall be allowed to cure until such time as the Engineer permits opening to traffic.

Weather Limitations: No slurry shall be applied, a) when there is any danger that the unfinished product will freeze before it cures completely; b) when the pavement or air temperature is 55°F (13°C) or below and falling, but may be applied when both air and pavement temperature are 45°F (7°C) or above and rising; or c) in the period following a rain while puddles of water remain on the surface to be coated. Slurries that cure by evaporation should not be laid during periods of abnormally high humidity, or when rain may fall within a few hours. Slurries that cure by chemical ejection of water may be laid without regard to existing humidity, even during periods of light rainfall.

Traffic Control: Suitable methods such as barricades, flagmen, pilot cars, etc., shall be used to protect the uncured slurry surface from all types of traffic. Any damage to the uncured slurry will be the responsibility of the contractor. Unless otherwise approved, all traffic control devices are to remain in place at least 24 hours.

Section 11.12 ASPHALT PAVING

All streets shall be surfaced in accordance with the following, unless otherwise specified by the City Engineer.

Local Streets

- A. 8-inch minimum crushed gravel base course over prepared subgrade.
- B. 3-inch minimum compacted thickness plant mix asphalt surfacing on streets.

Collector Streets

- A. 10-inch minimum crushed gravel base course over prepared subgrade.
- B. 4-inch minimum compacted thickness plant mix asphalt surfacing on streets.

Minor Arterial Streets

- A. 10-inch minimum crushed gravel base course over prepared subgrade.
- B. 4-inch minimum compacted thickness plant mix asphalt surfacing on streets.

Arterial Streets

- A. Pavement structure will be based on specific design to meet specific conditions.

Note - The developer may be required to submit a pavement design for review on any street.