301 SUBGRADE

301.01.00 CONSTRUCTION

301.01.01 CLEARING AND GRUBBING

Clearing and grubbing operations shall conform to requirements in Section 203 CLEARING AND GRUBBING.

Clearing and grubbing shall be completed in advance of staking final lines and grades. Depressions or ruts containing water shall be drained and the subgrade bladed to remove irregularities and to produce a uniform surface.

301.01.02 EXCAVATION

Excavation and backfill shall conform with applicable requirements of Section 204 EXCAVATION, BACKFILL, AND OTHER SITE WORK.

301.01.03 UNTREATED SUBGRADE

The subgrade shall be shaped to the lines, grades, and cross sections shown in the contract documents.

Areas that are to receive fill shall be compacted to the depth of grubbing for the full width of the fill. The subgrade shall be compacted to 93 percent or the density specified in the contract documents.

The contractor shall obtain optimum moisture content for the subgrade materials in a manner approved by the City Engineer.

301.01.04 OVEREXCAVATION AND FOUNDATION STABILIZATION

The contractor shall, at the direction of the City Engineer, remove and dispose of unsuitable materials beyond the lines and grades shown on the project plans. Stabilizing material shall be entirely isolated from contact with native materials by use of woven Geotextile fabric, and shall conform to the requirements of section 205.03.03 FOUNDATION STABILIZATION MATERIAL.

301.02.00 MEASUREMENT AND PAYMENT

301.02.01 PREPARATION OF SUBGRADE

Labor, materials, and equipment required to prepare the subgrade in conformance with the contract documents, including any additional work necessary to obtain optimum moisture content for the subgrade materials, will be considered incidental to excavation and backfill.

301.02.02 FOUNDATION STABILIZATION

Measurement and payment for foundation stabilization will be made in conformance with Subsection 204.05.04 FOUNDATION STABILIZATION.

301.02.03 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

302 AGGREGATE BASES

302.01.00 MATERIALS

302.01.01 AGGREGATE

Aggregate shall conform to requirements for aggregate base materials in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

302.02.00 CONSTRUCTION

302.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

302.02.02 SURFACE CONDITIONS

The contractor shall not place aggregate materials in standing water or on a soft, muddy, frozen, or otherwise unsatisfactory subgrade.

The contractor shall be solely responsible for any damage that occurs to the subgrade, aggregate materials, or completed aggregate base that is a result of the contractor's operations. Subgrade, aggregate materials, or completed aggregate base so damaged shall be restored, removed, or reconstructed, as determined to be applicable by the City Engineer, at the contractor's expense.

302.02.03 PLACEMENT OF BASE AND SUB-BASE

Equipment shall be capable of spreading and striking off aggregate materials to the designated line, grade, and transverse slope at a uniform rate and in a manner that will not cause segregation of coarse and fine materials.

Aggregate shall be graded in a manner such that excessive shifting, rehandling, or regrading will not be necessary to place the aggregate to the required thickness and to the designated line and grade. The aggregate shall be placed without segregating the components of the mixture.

302.02.03A THICKNESS OF LIFTS

The maximum compacted thickness of any one lift shall not exceed eight inches. Each lift shall be placed as wide as is practical and compacted to the specified density before a succeeding lift is placed.

302.02.03B COMPACTION

Compaction equipment shall be operated in accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

The contractor shall use compaction equipment that will not crush the aggregate.

302.02.04 DENSITY REQUIREMENTS

Each lift of base and sub-base material shall be compacted to not less than 93 percent of maximum density as determined by ASTM D 1557.

302.02.05 SURFACE FINISH

The completed surface of the base course shall be within 0.05 of one foot of the cross section and grade specified in the contract documents and shall not vary more than 0.05 of one foot from specified line and grade at any point when checked with a 10-foot straightedge.

302.02.06 SAMPLING AND TESTING

The contractor shall collect samples of aggregate materials for testing and conduct subsequent analysis of the samples as provided for in Subsection 106.03.00 SAMPLING AND TESTING.

Aggregate base materials and the source of such materials shall be approved by the City Engineer prior to delivery to the job site.

302.03.00 MEASUREMENT AND PAYMENT

302.03.01 AGGREGATE BASE AND SUB-BASE

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade, furnish aggregate base materials at the site, and to place and compact the materials in conformance with the contract documents.

The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Aggregate base and sub-base materials under curbs, gutters, combination curb and gutter, and sidewalks are not included in this pay item.

302.03.01A SQUARE-YARD BASIS

Measurement and payment for aggregate base and sub-base will be made on a square-yard, in-place basis.

Measurement will be based on the surface length and width of the aggregate base measured to the nearest 0.1 of a foot.

302.03.01B CUBIC-YARD BASIS

Measurement and payment for aggregate base and sub-base will be made on an in-place, compacted, cubic-yard basis.

Load receipts shall be given to the City Engineer for each load of material as it is delivered to the job site. Each receipt shall show the date and time of delivery, truck number, and driver's name and will be considered a valid receipt only when signed by the City Engineer.

The actual volume of material in any given load shall be based on the length, width, and depth of the leveled material in the dump box measured to the nearest 0.1 of a foot.

302.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

303 CEMENT TREATED BASE (CTB)

303.01.00 MATERIALS

303.01.01 CEMENT TREATED BASE

Materials used in the production of CTB shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

303.01.02 CURING SEAL

Bituminous curing seal shall conform to requirements for asphalt materials in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

303.02.00 CONSTRUCTION

303.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

303.02.02 MIXING

The CTB materials shall be prepared and mixed at a plant capable of providing a mix of aggregate, cement, and water of specified proportions and consistency as designated by the mix design.

Mixing shall continue until a uniform and homogeneous mixture of aggregate, cement, and water has been obtained and is in conformance with the mix design and applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

303.02.03 SURFACE AND WEATHER CONDITIONS

Operations associated with the construction of the CTB shall be so coordinated that regardless of daily or seasonal variations in weather, temperature, and humidity such work shall result in a completed CTB that conforms in every respect to specified requirements.

The contractor shall not place CTB in standing water or on a soft, muddy, frozen, or otherwise unsuitable subgrade.

The contractor shall be solely responsible for any damage that occurs to the subgrade, CTB mixture, or the completed CTB that is a result of the contractor's operations. Subgrade, CTB mixture, or the completed CTB so damaged shall be restored, removed, or reconstructed as determined to be applicable by the City Engineer, at the contractor's expense.

303.02.04 HAULING

Vehicles used for hauling the CTB mixture shall be watertight and capable of discharging the mixture without waste or separation.

The mixture shall not be retempered with water during transit to the work site. Mixture that has been retempered with water in transit or has begun to harden or take an initial set prior to placement will be rejected by the City Engineer and will not be considered for payment.

303.02.05 PLACING

The CTB mixture shall be placed and compacted within two hours of mixing. Any CTB mixture that is not placed and compacted within this two-hour period shall be subject to rejection, removal, and replacement as the City Engineer determines to be applicable. Costs associated with such removal and replacement shall be borne by the contractor.

The mixture shall be delivered and placed without operating hauling equipment over any uncured mixture.

The placing of CTB mixture shall progress continuously. Should operations be stopped for a duration sufficient for the mixture to harden or take its initial set, the contractor shall construct a transverse construction joint at the end of the work as specified herein.

The surfaces of the subgrade and the CTB mixture shall be maintained in a moist condition at all times by sprinkling with water.

303.02.05A SPREADING

The contractor shall use equipment that is capable of spreading the mixture without segregating or fracturing the aggregate.

Equipment that will be operated over freshly spread CTB mixture shall not displace the mixture or leave tracks that are of such depth as to be visible after compaction is completed.

The CTB mixture shall be placed in a manner such that excessive shifting or rehandling will not be necessary to place the mixture to the required thickness and to the designated line and grade. The mixture shall be placed without segregating the components of the mixture.

The mixture shall be placed such that the number of longitudinal joints shall be held to a practical minimum.

303.02.05B THICKNESS AND NUMBER OF LIFTS

If the required compacted depth of the CTB exceeds six inches, the CTB shall be constructed in two or more layers of equal thickness. The maximum compacted thickness of each lift shall not exceed six inches.

303.02.05C CONSTRUCTION JOINTS

The contractor shall construct a transverse construction joint near the termination point of each day's work, at temporary work stoppages, and at any other time where the CTB mixture will be allowed to harden or take its initial set prior to resumption of work.

The construction joint shall extend across the full width of the exposed face of the CTB and shall be at a slope of 2:1 or steeper with the face of the joint free of loose material.

303.02.05D COMPACTION

Compaction shall be by vibratory, drum-type compactors and shall be adequate to compact the CTB to the density specified herein.

Compaction equipment shall be operated in accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

Compaction of the CTB mixture shall begin as soon as it has been spread and shall be continuous until completion.

Compaction operations shall be controlled as necessary to prevent breakdown or lateral displacement of the mixture at the sides of a strip and at the edges of successive passes of the compactor.

303.02.06 DENSITY REQUIREMENTS

Density of the completed CTB shall be 95 percent of the maximum density indicated by the mix design.

303.02.07 CURING OF CTB

The surface of the compacted CTB mixture shall be kept moist until the bituminous seal has been placed.

After each lift of CTB is completed, the surface and exposed edges shall be covered with a bituminous curing seal. The curing seal shall be applied by a pressure spray method at a rate necessary to provide a continuous unbroken curing membrane.

After the curing seal has been applied, the CTB shall be allowed to cure for a period of four days before placing the next lift. During the curing time, no vehicles of any type shall be permitted to drive over the surface.

CTB that is damaged during the curing period shall be removed and reconstructed and the curing seal replaced, all at the contractor's expense.

303.02.08 SURFACE FINISH

The surface of each lift of CTB shall parallel the cross section and grade of the finished surface within 0.05 of a foot. The finished surface of the CTB shall not vary more than 0.05 of a foot from specified line and grade at any point when checked with a 10-foot straightedge.

303.02.09 SAMPLING AND TESTING

The contractor shall collect samples of CTB mixtures, and component parts thereof, for testing and conduct subsequent analysis of the samples as provided for in Subsection 106.03.00 SAMPLING AND TESTING.

CTB mixtures, and component parts thereof, shall be subject to testing at the time of delivery to the job site and during placing and compaction operations to assure compliance with the mix design and other requirements specified herein.

303.03.00 MEASUREMENT AND PAYMENT

303.03.01 CEMENT TREATED BASE

Measurement and payment for CTB will be made on a square-yard, in-place basis. The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Measurement will be based on the surface length and width of the CTB measured to the nearest 0.1 of a foot.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade, furnish CTB mixture at the site, place and compact the mixture, and to furnish and apply a bituminous curing seal in conformance with the contract documents.

CTB placed under curbs, gutters, and combination curb and gutter will not be included in this pay item.

303.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

304 ASPHALT CONCRETE PAVEMENT

304.01.00 MATERIALS

304.01.01 ASPHALT

Asphalt products, and component parts thereof, shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

304.01.02 STRIPING MATERIALS

Unless otherwise specified, thermoplastic striping materials shall be used. Lane line markings shall be extruded profiled or extruded non-profiled (Method A) thermoplastic as specified in Section 00865 of the *Oregon Standard Specifications for Construction*. Markings used for legends, symbols, crosswalks, and stop bars shall be PreMark as manufactured by Flint Trading, Inc., or approved equal. Pavement markings shall be installed in accordance with the *Manual on Uniform Traffic Control Devices*.

Where approved by the City Engineer, Stamark brand as manufactured by 3M or approved equal may be substituted for thermoplastic striping materials. Stamark Series 380I ES shall be used for lane lines and Stamark Series 420 shall be used for crosswalks, symbols, and legends.

Striping material shall be applied in strict adherence to the manufacturer's specifications.

304.01.03 RAISED, REFLECTORIZED PAVEMENT MARKERS

Raised, reflectorized pavement markers and adhesive shall conform to applicable requirements of ODOT's *Oregon Standard Specifications for Construction* and shall be installed accordance with the manufacturer's recommendations and the *Manual on Uniform Traffic Control Devices*. Raised reflectorized pavement markers shall be placed as shown on the Construction Drawings and as directed by the City Engineer.

304.02.00 CONSTRUCTION

304.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

304.02.02 PREPARATION OF PAVEMENT BASE

Pavement bases shall be constructed in conformance with Section 302 AGGREGATE BASES and the applicable standard details.

Manholes, inlets, and other such structures shall be completed, cured as applicable, and otherwise prepared prior to construction of asphalt pavement.

Manhole frame and cover assemblies shall be adjusted such that they can be paved over and then later adjusted to final grade as shown on the standard details.

Tack coat shall be applied to vertical surfaces that will come in contact with asphalt pavement to provide a good bond and seal.

Top surfaces of structures, such as manhole and valve box covers, shall be covered with paper, a light coating of fuel oil, or other approved materials to prevent adherence of asphalt pavement or tack coat.

304.02.02A RECONDITIONING EXISTING AGGREGATE BASE

The contractor shall not recondition existing aggregate bases or make use of existing aggregate base material unless such work is authorized by the contract documents or approved by the City Engineer.

When authorized by the contract documents or approved by the City Engineer, existing aggregate bases or aggregate material shall be graded and compacted in conformance with requirements of Section 302 AGGREGATE BASES, the contract documents, or as directed by the City Engineer.

304.02.03 MIXING

Asphalt and aggregate shall be mixed at a central mixing plant equipped as necessary to accurately measure, monitor, and control the various components and temperature of the mix to produce a uniform, homogeneous mixture that conforms to the mix formula.

Mixing temperatures shall be sufficient to provide thorough mixing and coating of the asphalt and aggregate and to provide a mass viscosity of the mix on the grade that will permit compaction to required density.

Mix temperatures and asphalt in storage shall meet requirements of the approved, certified mix design.

304.02.04 SURFACE AND WEATHER LIMITATIONS

Operations associated with the construction of the pavement shall be so coordinated that regardless of daily or seasonal variations in weather, temperature, and humidity such work shall result in a completed pavement that conforms in every respect to specified requirements.

Asphalt pavement shall not be constructed when the atmospheric temperature is lower than 40° F in the shade, during rainfall, or when the surface upon which the paving material is to be placed is frozen or damp unless precautionary measures have been taken and are approved by the City Engineer.

Class D asphalt wearing surfaces shall be placed when the existing pavement temperature is 60° F or higher. The contractor shall be solely responsible for any damage that occurs to the subgrade, aggregate base, asphalt mixture, or the completed pavement that is a result of the contractor's operations. Subgrade, aggregate base, asphalt mixture, or the completed pavement so damaged shall be restored, removed, or reconstructed as determined to be applicable by the City Engineer, at the contractor's expense.

304.02.05 ASPHALT TACK COAT

Tack coat shall be applied to all edges of existing pavement, gutter face, manhole castings, inlet boxes, and like items prior to placement of the first lift of asphalt. Surfaces that are to receive a tack coat shall be thoroughly cleaned of dust, dirt, and loose debris. Tack shall be applied in a manner that ensures complete, uniform coverage of all surfaces.

Tack coat shall be applied to the previous lift of asphalt when more than twelve hours have elapsed before the time of placing the subsequent lift.

Asphalt tack coat shall be applied to the base lift of asphalt at a rate of 0.15 of a gallon per square yard.

The tack coat shall not be applied during wet weather, when the temperature is below 40° F, or during darkness, and shall be applied in advance of paving operations as is appropriate to maintain a tacky, sticky condition of the asphalt.

304.02.06 PLACING

The contractor shall not schedule delivery of asphalt so late in the day as to prevent the spreading and compacting of the mixture during daylight.

The contractor shall not allow motor vehicle traffic, including dump trucks and other construction equipment, to travel over any lift of asphalt pavement until the mixture has been compacted and has cooled sufficiently to preclude tracking or displacement of the mixture.

Paving operations shall progress continuously. Should operations be stopped for a length of time sufficient for uncompacted mixture to harden, the contractor shall remove such mixture to the extent necessary to construct a transverse construction joint at the end of the work as specified herein.

304.02.06A TEMPERATURE OF MIX

With the exception of Class D mix, the temperature of hot mix asphalt at the time it is spread into final position shall be between 275° and 325° F. The temperature of Class D mix at the time of placing shall be between 200° and 250° F.

If the temperature of any quantity of asphalt mixture is allowed to fall below 275° F, or 200° F for Class D mix, the mixture shall be removed from the job site.

304.02.06B SPREADING

Bituminous paving machines shall be capable of spreading and finishing layers of bituminous mix material in lane widths to the thicknesses, lines, grades, and cross sections specified in the contract documents. The paving machine shall be operated at a speed that provides for uniform spreading and finishing of the mix.

Care shall be taken at all times to prevent segregation of any component parts of the mixture. Areas with segregated materials shall be removed and replaced with fresh mixture prior to compaction. At no time shall course aggregate segregated from the mix by hand spreading or raking of joints be scattered across the pavement mat.

304.02.06C THICKNESS OF LIFTS

The thickness of the completed asphalt pavement will be specified in the contract documents.

The maximum thickness for any one lift of pavement shall not exceed three inches. The minimum thickness for placement of pavement shall not be less than 1½ inches.

304.02.06D TRANSVERSE AND LONGITUDINAL JOINTS

The configuration, location, and other details relating to the construction of transverse and longitudinal joints requires the approval of the City Engineer.

The contractor shall schedule and conduct paving operations in a manner that limits the number of transverse and longitudinal joints to a practical minimum.

Longitudinal cold joints are not permitted. For the purpose of this requirement, a cold joint is defined as one found between compacted mixture that has cooled overnight or longer and mixture that is placed at the resumption of the paving operation.

The contractor shall divide paving projects into full-width sections of a length that will allow for the entire width and length of a section to be paved on the same day.

The configuration and construction of transverse and longitudinal joints shall be in accordance with the following requirements:

TRANSVERSE JOINTS: The Contractor shall provide and install a form to match the height of the existing asphalt lift at all course or strip transverse cold joints. The joint shall be carefully formed and compacted to provide a straight and vertical edge that will match the newly laid asphalt panel and to provide a smooth riding surface over the joint.

As an alternative, a transverse joint may be formed by cutting back the leading edge of the asphalt to expose the full depth of the layer or course. A tack coat shall be applied to the contact surfaces just before the mixture is placed against the previously compacted mat.

Where the end of a course or strip of asphalt concrete is to be subjected to traffic, the end shall be left on a bevel of approximately 20:1 (horizontal to vertical).

LONGITUDINAL JOINTS: The mixture shall be placed in strips of sufficient width to limit to a practical minimum the number of longitudinal joints required.

The longitudinal joints in any lift of pavement shall offset the joint in the preceding lift by not less than six inches. Longitudinal joints in the wearing course shall not be located within the wheel path.

Longitudinal joints shall be constructed in a manner that will achieve maximum density of the joint. The course aggregate in the material overlapping the edge of the previous panel shall be removed, leaving only the finer portion of the mixture to be compacted into the joint.

304.02.06E COMPACTION AND COMPACTION EQUIPMENT

Asphalt shall be compacted with vibratory, drum-type compactors capable of providing compaction effort of 200 to 300 pounds per linear inch. Compaction equipment shall be capable of compacting the mixture to the specified density without crushing the aggregate to any extent.

Roller wheels shall be moistened with water or other approved material as necessary to prevent pickup of the mixture by the roller.

Compaction equipment shall be operated in accordance with the roller manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

Compaction equipment shall be operated in a manner that will remove all roller marks and produce a smooth, uniform surface. Any displacement of the mixture occurring as a result of the reversing of the direction of a roller, or from any other cause, shall be corrected immediately.

304.02.07 DENSITY REQUIREMENTS

The density of asphalt concrete pavement shall be no less than 92 percent, and no more than 95 percent of the maximum density of the asphalt concrete.

304.02.08 SURFACE FINISH

The finished surface of each course or layer of asphalt shall be of uniform texture, smooth, free of all defects, and shall parallel the line and grade specified for the top surface of the finished pavement. The finished surface of the pavement shall provide for positive drainage and shall not impound water to any extent.

The surface of each layer shall be tested for trueness to specified line, grade, and transverse slope at selected locations with a 12-foot straightedge. Any variations of the pavement surface from the testing edge of the straightedge between any two contact points with the pavement surface shall at no point exceed 0.01 of a foot on the underlying courses or the top course or wearing surface of the pavement.

If the surface smoothness of the finished pavement is found to exceed the tolerance permitted, the pavement shall be brought into conformance with the specified tolerances in a manner approved by the City Engineer.

Repair or replacement of such defective work shall be at the sole expense of the contractor.

304.02.09 SAMPLING AND TESTING

The contractor shall collect samples of asphalt mixture, and component parts thereof, for testing and conduct subsequent analysis of the samples as provided for in Subsection 106.03.00 SAMPLING AND TESTING.

The asphalt mixture, and component parts thereof, shall be subject to testing at the time of delivery to the job site and during placing and compaction operations to ensure compliance with the mix formula and other requirements specified herein.

Testing for density of asphalt concrete shall be performed using a calibrated nuclear densometer in backscatter mode. Sampling frequency and location shall be as determined by the City Engineer to verify conformance to these specifications.

304.03.00 MEASUREMENT AND PAYMENT

304.03.01 ASPHALT CONCRETE PAVEMENT

Measurement and payment for asphalt concrete pavement will be made on a ton or square-yard, in-place basis. The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade and aggregate base, furnish asphalt concrete mixture at the site, and to place and compact the mixture in conformance with the contract documents.

No additional payment over the contract unit price will be made for pavement having a thickness greater than shown in the contract documents.

304.03.01A SQUARE-YARD BASIS

Measurement will be based on the surface length and width of the asphalt pavement measured to the nearest 0.1 of a foot.

304.03.01B TON BASIS

Measurement will be based on the number of tons of asphalt concrete required to complete the work in conformance with the contract documents.

Asphalt mixture and the hauling vehicles shall be weighed on scales that are licensed for commercial use by the Weights and Measures Division of the Oregon State Department of Agriculture.

Trip tickets shall be given to the City Engineer as the material is delivered to the job site. Each trip ticket shall show the date and time of delivery, truck number, driver's name, net weight of the material, grade of asphalt, and the City's project number. Trip tickets shall be considered valid only when approved by the City Engineer.

No material will be considered for payment without a trip ticket being available at the time of delivery.

304.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

305 PORTLAND CEMENT CONCRETE PAVEMENT

305.01.00 MATERIALS

305.01.01 PORTLAND CEMENT CONCRETE

Portland cement concrete, and component parts thereof, shall conform to applicable requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

305.01.02 CURING MATERIALS

Curing materials shall conform to applicable requirements in Section 206 CONCRETE STRUCTURES.

305.02.00 CONSTRUCTION

305.02.01 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

305.02.02 PREPARATION OF PAVEMENT BASE

Pavement bases shall be constructed in conformance with Section 302 AGGREGATE BASES and the applicable standard details.

Manholes, inlets, and other such structures shall have been completed, cured as applicable, and otherwise prepared for construction of the pavement.

Top surfaces of structures, such as manhole and valve box covers, shall be protected from the concrete.

Pavement bases that are damaged during the course of the work, regardless of cause, shall be repaired far enough in advance of the paver so as to cause the least disruption of the paving operation.

305.02.02A RECONDITIONING EXISTING AGGREGATE BASE

Reconditioning of existing aggregate bases shall conform to provisions of Section 304 ASPHALT CONCRETE PAVEMENT.

305.02.03 MIXING

Mixing of portland cement concrete shall conform to requirements in Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

305.02.04 SURFACE AND WEATHER LIMITATIONS

The contractor shall conform to applicable provisions of Section 206 CONCRETE STRUCTURES and the following requirements relating to weather limitations.

The contractor shall schedule and coordinate all operations involved in constructing the pavement so that regardless of the daily or seasonal variations in weather, temperature, and humidity such work shall result in a finished pavement conforming in all respects to the specified requirements.

Concrete pavement shall not be constructed during rainfall or when the surface upon which the concrete is to be placed is frozen or has impounded water unless precautionary measures have been taken and are approved by the City Engineer.

The contractor shall be solely responsible for any damage that occurs to the subgrade, aggregate base, concrete, or the completed pavement that is a result of the contractor's operations. Subgrade, aggregate base, concrete, or completed pavement so damaged shall be restored, removed, or reconstructed as determined to be applicable by the City Engineer, at the contractor's expense.

305.02.05 HAULING

Hauling of portland cement concrete shall conform to applicable provisions in Section 206 CONCRETE STRUCTURES.

305.02.06 FORMS

Form work shall conform to applicable requirements in Section 206 CONCRETE STRUCTURES.

305.02.07 PAVING MACHINES

The concrete shall be placed with paving machines that are designed to spread, screed, and float finish the freshly placed concrete in one complete pass of the machine in such a manner that a minimum of hand finishing shall be required to provide a dense and homogeneous pavement in conformance with the specified thickness, grade, and cross section.

Paving machines shall be operated in a manner that shall cause minimal displacement of the base.

Portions of paving machines or other equipment that ride on pavement, concrete gutter, or other improved surfaces shall be offset sufficiently to prevent breakage of the edges of these structures. The contractor shall provide supports, protective pads, or other suitable means to prevent the paving machine from marring or chipping pavement, gutters, or other adjacent improved surfaces or structures.

305.02.08 PLACING

The contractor shall coordinate mixing, delivery, and spreading of the concrete to the extent necessary to provide for continuous progress of the paving operation.

The concrete shall be placed uniformly in final position in such a manner that a minimum of hand finishing shall be necessary to provide a dense and homogeneous pavement in conformance with the specified line, grade, and cross section.

If, for any reason, it is necessary to stop the forward motion of the paver, the vibratory and tamping elements shall be stopped immediately.

The contractor shall stop the paving operation if the pavement is not in conformance with specified requirements and shall resume operations only when the cause of the deficiency has been determined and corrective action has been taken.

The contractor shall not place concrete over a subgrade or pavement base that has been damaged such that it will not conform to the specified requirements for line, grade, and density. Subgrade or pavement bases so damaged shall be repaired prior to placing concrete.

When using slip-form pavers, the contractor shall be prepared to protect the edges of the pavement from slumping. Corrective action to prevent slumping shall be taken while the concrete is still plastic.

Pavement that is not in conformance with specified requirements shall be removed and replaced or repaired, whichever is determined applicable by the City Engineer, before the concrete starts to set.

305.02.08A COMPACTION, TAMPING, AND SCREEDING

The concrete shall be vibrated for the full depth and width of the pavement as it is being placed. The performance of such vibration shall be in accordance with applicable provisions of Section 206 CONCRETE STRUCTURES.

The surface of the concrete shall be consolidated by means of vibrating screeds, mechanical tampers, or other methods that have been approved by the City Engineer.

Equipment shall be operated in such a manner that a satisfactory compaction of the concrete is produced and the surface of the pavement is uniform and true to grade and cross section.

305.02.09 FINISHING

After the concrete is placed and compacted and is true to the specified line, grade, and cross section, the surface shall be brought to a smooth even texture with a float. The float shall be applied to the surface of the concrete with its length parallel to the centerline of the street. The completed float finish shall be free of soupy mortar and surface irregularities.

After the concrete has obtained the proper set, a roadway finish shall be applied to the surface of the concrete. The concrete surface shall be given a steel-tine broom finish using a broom that will mark the finished concrete to a depth not to exceed ⅛-inch. Markings shall be perpendicular to the roadway centerline and full roadway width, except for strips 16 inches wide along curb faces which shall be marked parallel to the curb face.

The edges of the new pavement and joints with previously placed concrete shall be finished with an approved edging tool to provide a clean, rounded edge to the new pavement. Edging tools shall be used in a manner that will not form ridges on the surface of the concrete.

Exposed edges of the new pavement that show evidence of honeycombing or other defects in composition of the concrete shall be filled with a stiff mortar or cement and fine aggregate applied to the moistened concrete and troweled smooth. Areas that show serious defects in composition of the concrete, as determined by the City Engineer, shall be removed and replaced with concrete to the nearest longitudinal and transverse contraction joints adjacent to the defective areas.

305.02.10 JOINTS

The contractor shall construct joints in concrete pavement in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES and the following additional requirements.

305.02.10A CONSTRUCTION JOINTS

Construction joints shall be constructed when there is an interruption of more than 30 minutes in the paving operation. The contractor shall provide and install dowels or other load transfer devices in construction joints as required by the City Engineer.

305.02.10B CONTRACTION JOINTS

Contraction joints shall be constructed by sawing the concrete to the depths and widths specified.

SAWED CONTRACTION JOINTS

Longitudinal and transverse contraction joints shall be sawcut to a minimum depth equal to ⅓ of the thickness of the pavement. The maximum width of the sawcuts shall not exceed ⅛ inch. Commencement of sawing the contraction joints is dependent upon the setting time of the concrete and shall occur soon enough to prevent uncontrolled shrinkage cracking yet late enough to perform the sawing without tearing or raveling the surface of the concrete.

If the width of the sawcuts exceeds ⅛ inch, the contractor shall fill the joints with a joint filler approved by the City Engineer.

TOOLED CONTRACTION JOINTS

Where approved by the City Engineer, tooled contraction joints shall be installed in conformance with requirements in Subsection 206.03.06C CONTRACTION JOINTS.

305.02.11 CURING

After floating, final surface finishing and brooming, and edging have been completed, and while the pavement surface is still moist, the concrete shall be cured in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES.

305.02.12 PROTECTION OF CONCRETE

The contractor shall erect and maintain suitable barriers to protect the concrete from traffic or other detrimental trespass until the pavement is opened to traffic. Sentries shall be employed as necessary to ensure that barriers remain effective.

Wherever it is necessary that traffic, including contractor's vehicles, and equipment be carried from one side of the pavement to the other, the contractor shall construct and maintain suitable bridges over the pavement.

Prior to allowing equipment or traffic on the new surface, the concrete shall have attained the specified compressive strength and shall be free from scarring, abrasion, stones, loose mortar, and other matter apt to be deleterious to the concrete surface. Equipment shall be operated in a manner that will not damage the new pavement.

Prior to its acceptance, pavement that has been damaged by traffic or from any other cause shall be removed and replaced to the nearest longitudinal and transverse contraction joints adjacent to the damaged area. The contractor shall supply and install dowels as directed by the City Engineer. Costs associated with the removal and replacement of the pavement, the installation of dowels, and any other work or materials necessary to bring the work into compliance with specified requirements shall be at the sole expense of the contractor.

305.02.13 SURFACE TOLERANCE AND TESTING

The surface of finished pavement shall not deviate from longitudinal and transverse smoothness more than the prescribed limits. Testing shall be done under the supervision of the City Engineer with equipment furnished and operated by the contractor at the contractor's expense as soon as the hardness of the concrete permits. Surface smoothness shall meet both of the following specifications:

305.02.13A STRAIGHTEDGE TESTING AND TOLERANCE

Testing for longitudinal and transverse smoothness for travel lanes shall be done with a 12-foot straightedge. The extent of the testing will be determined by the City Engineer. The pavement shall not deviate from the straightedge at any point by more than 0.01 of a foot for all areas constructed by the prescribed machine methods, including all traffic lanes and bike lanes.

305.02.13B GRAPHIC PROFILE TESTING AND TOLERANCE

The longitudinal surface of all travel lanes, including ramps, of the concrete pavement shall be tested for smoothness by the graphic profile method according to ODOT TM 770. The profilograph shall be the California-type complete with recorder for determining the profile index of highway pavement. The pavement shall have a profile index of 7.0 in./mile or less for each wheelpath in each 600-foot segment or partial segment, and shall have no individual deviation of .025 of a foot.

305.02.14 CORRECTION OF DEFICIENCIES

If the pavement does not conform to the prescribed limits of deviation, the following corrections shall apply:

305.02.14A PLASTIC PCC FAILURE TO MEET STRAIGHTEDGE

The paving operations shall be stopped until revised methods, changes in equipment, or correction of procedures are made or proposed for trial and are approved by the City Engineer.

305.02.14B HARDENED PCC FAILURE TO MEET SMOOTHNESS REQUIREMENTS

For any segment or partial segment failing to meet the straightedge or profilograph test requirements, the contractor shall take corrective action as follows:

- Remove the nonspecification concrete pavement as determined by the City Engineer and replace with specification concrete pavement.
- Profile with abrasive grinder(s), equipped with a cutting head comprised of multiple diamond blades. The contractor shall determine and mark the areas to be profiled. Areas corrected by grinding shall have the required surface texture as specified in 206.03.07B and shall have the transverse joints restored to contract specifications by sawing with diamond blade saws.
- Retest the entire length with the graphic profile testing method of all segments requiring corrective work with the profilograph by the contractor under the supervision of the City Engineer. Perform all corrective work and graphic profiling at the contractor's expense, including traffic control.

305.03.00 MEASUREMENT AND PAYMENT

305.03.01 PORTLAND CEMENT CONCRETE PAVEMENT

Measurement and payment for portland cement concrete pavement will be made on a square-yard, in place basis. The quantity measured for payment will include only that material placed within the limits defined in the contract documents.

Measurement will be based upon the surface length and width of the pavement measured to the nearest 0.1 of a foot.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade and pavement base, furnish portland cement concrete mixture at the site, and to place, consolidate, finish, and cure the concrete in conformance with the contract documents.

305.03.02 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

306 CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APPROACHES, AND ACCESS RAMPS

306.01.00 MATERIALS

Curbs, gutters, sidewalks, driveway approaches, and wheelchair ramps shall be constructed of portland cement concrete.

Materials shall conform to requirements of Section 205 CONCRETE, ASPHALT, AND AGGREGATE MATERIALS.

306.02.00 CONSTRUCTION

For new construction projects, specific types of curbs, gutters, sidewalks, driveway approaches, and wheelchair ramps will be specified in the contract documents or as approved by the City.

Unless otherwise directed by the City Engineer, horizontal concrete sawcutting equipment shall be used to create new points of accesses (e.g. driveways) in existing curbs. Sawcutting shall extend full depth through the curb and shall result in a smooth top face. Sawn edges shall be ground to a rounded edge.

For smaller improvement projects, such as those undertaken by private homeowners, specific construction requirements pertaining to the construction or modification of these structures, that are not covered in the *Standard Construction Specifications* or included as a part of the encroachment permit, will be determined by the City Engineer.

306.02.01 WHEELCHAIR RAMPS

Wheelchair ramps shall be installed in all new curb return construction and in all existing curb returns that are to undergo reconstruction.

306.02.02 PREPARATION OF SUBGRADE

Subgrade shall be prepared as specified in Section 301 SUBGRADE.

306.02.03 PREPARATION OF BASE

Bases shall be constructed in conformance with Section 302 AGGREGATE BASES and the applicable standard details.

Reconditioning of existing aggregate bases shall conform to provisions of Section 304 ASPHALT CONCRETE PAVEMENT.

306.02.04 WEATHER LIMITATIONS

The contractor shall conform to applicable provisions of Section 206 CONCRETE STRUCTURES.

306.02.05 FORMS

Form work shall conform to applicable requirements in Section 206 CONCRETE STRUCTURES and the standard details.

Completed form work for curbs, gutters, sidewalks, driveway approaches, and wheelchair ramps shall be approved by the City Engineer prior to placing concrete.

306.02.06 PLACING CONCRETE

Concrete shall be placed with equipment that will provide a dense and homogeneous concrete structure in conformance with the specified thickness, grade, and cross section.

Concrete shall be placed and consolidated in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES.

Concrete shall not be placed until the base and forms have been inspected and approved by the City Engineer.

306.02.07 FINISHING

306.02.07A SIDEWALKS, DRIVEWAY APPROACHES, AND ACCESS RAMPS

Edges, contraction joints, and panel divisions shall be finished with an approved edging tool to provide a clean, rounded edge to the new concrete. Edging tools shall be used in a manner that shall not form ridges on the surface of the concrete.

Sidewalk surfaces shall be divided into panels by marking the surface of the concrete with an appropriate jointing tool. In new construction, the length of the panels shall be equal to the width of the sidewalk, not to exceed 10 feet. Panel division markings shall be straight lines installed transverse to the length of the sidewalk. Contraction joints shall penetrate at least one third the depth of the concrete. Joints shall not exceed ¼" width at the surface.

While the concrete is still green, a light broom finish shall be applied to the surface of driveways, wheelchair ramps, and sidewalks.

Where sections of existing sidewalk are to be removed and replaced, the contractor shall reproduce the existing panel division markings as directed by the City Engineer.

Valve box assemblies, meter boxes, manhole frame and cover assemblies, and similar structures shall be adjusted to the finish surface grade prior to placing the concrete.

306.02.07B CURBS AND GUTTERS

Curbs and gutters shall be constructed independently of, and separated by a cold joint from adjacent concrete construction including sidewalks, driveways, curb ramps, etc. Forms shall be removed after the concrete has taken initial set and while the concrete is still green.

Unless otherwise directed by the City Engineer, horizontal concrete sawcutting equipment shall be used to create new points of accesses (e.g. driveways) in existing curbs. Sawcutting shall extend full depth through the curb and shall result in a smooth top face. Sawn edges shall be ground to a rounded edge.

Honeycombed and other defective concrete shall be removed and replaced as directed by the City Engineer at the contractor's expense.

While the concrete is still green, a broom finish shall be applied to the exposed surfaces of the curb. The broom finish shall be applied parallel to the longitudinal axis of the curb.

306.02.08 CURB DRAINS

The contractor shall furnish and install a minimum of two, three-inch minimum diameter PVC Schedule 40 pipe curb drains to serve each lot. For undeveloped property, the curb drains shall be installed five feet from each property corner or at locations determined by the City Engineer. For developed property, curb drains shall be installed opposite all existing drainage outlets serving the property, or as directed by the City Engineer. Wherever possible, curb drain locations shall be adjusted to coincide with contraction joints in the curb and/or sidewalk.

Curb drains shall be constructed through the curb section and extended to the property line using three-inch Schedule 40 PVC pipe. Curb drains shall be installed transverse to the length of the curb without the use of intermediate angle fittings between the face of the curb and the property line.

The curb drain shall be installed through the sidewalk section such that positive flow from the property line to the gutter is maintained.

PVC pipe shall conform to ASTM D 2241.

306.02.09 CURING

After floating, final surface finishing and brooming, and edging have been completed, and while the pavement surface is still moist, the concrete shall be cured in conformance with applicable provisions of Section 206 CONCRETE STRUCTURES.

306.02.10 JOINTS IN PORTLAND CEMENT CONCRETE

306.02.10A CONTRACTION JOINTS

CURB AND GUTTER

In straight curb, contraction joints shall be installed to a minimum depth equal to one-half the height of the curb. In combination curb and gutter, the contraction joint shall be installed to a minimum depth equal to one-half the thickness of the gutter section.

DRIVEWAY APPROACHES

Contraction joints shall be installed in driveway approaches when the length or width of the approach exceeds 15 feet.

Contraction joints in driveway approaches shall be located as specified in the standard details or as directed by the City Engineer.

CURB DRAINS

Contraction joints shall be installed in curb sections and sidewalks over curb drains. The installation of these joints shall not affect specified minimum contraction joint spacing in the sidewalk or curb.

306.02.10B COLD JOINTS

Concrete pavement, curbs, driveway approaches, wheelchair ramps, and sidewalks shall be separated by cold joints when constructed concurrently.

306.02.11 DOWELS, TIE BARS, REINFORCING

Steel, reinforcing dowels and tie bars shall be placed in conformance with the contract documents, applicable requirements in Section 206 CONCRETE STRUCTURES, or as required by the City Engineer.

306.02.12 PROTECTION OF CONCRETE

The contractor shall protect the concrete in conformance with applicable requirements in Section 206 CONCRETE STRUCTURES.

306.03.00 MEASUREMENT AND PAYMENT

306.03.01 CURBS AND COMBINATION CURB AND GUTTER

Measurement of curb and combination curb and gutter will be made on a linear-foot basis as measured along the face of the curb.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade; supply aggregate; construct base; construct and remove forms; furnish portland cement concrete at the site; and place, consolidate, finish, and cure the concrete in conformance with the contract documents.

306.03.02 SIDEWALKS AND DRIVEWAY APPROACHES

Measurement of sidewalks and driveway approaches will be made on a square-yard basis as determined by surface measurements.

Payment for this item will constitute full compensation for materials, labor, and equipment necessary to prepare the subgrade; supply aggregate; construct base; construct and remove forms; furnish portland cement concrete at the site; and place, consolidate, finish, and cure the concrete in conformance with the contract documents.

306.03.03 WHEELCHAIR RAMPS

306.03.03A PER-EACH BASIS

The construction of wheelchair ramps in existing curb and/or sidewalk will be paid for on a per-each basis as stated in the contract documents.

Payment for each wheelchair ramp will constitute full compensation for materials, labor, and equipment necessary to sawcut the existing concrete; excavate and remove excavated materials; prepare the subgrade and aggregate base; construct and remove forms; furnish portland cement concrete at the site; and to place, consolidate, finish, and cure the concrete in conformance with the contract documents.

306.03.03B INCIDENTAL BASIS

The construction of wheelchair ramps will be considered incidental to other items of work when installed during the construction of new curb and/or sidewalk and no separate payment will be made.

306.03.04 INCIDENTALS

Other materials, labor, and equipment required to complete the work in conformance with the contract documents and not listed as separate pay items in the proposal will be considered incidental to other items of work and no separate payment will be made.

307 PAVEMENT MARKINGS

307.01.00 MATERIALS

Pavement markings shall be thermoplastic unless otherwise directed by the City Engineer.

307.01.01 MATERIALS

Acceptable products for extruded thermoplastic shall conform to the approved ODOT Qualified Products List for Longitudinal Markings – A or B as applicable.

307.01.02 PREFORMED THERMOPLASTIC PRODUCTS

Preformed thermoplastic material shall be a resilient white product conforming to AASHTO M249 (except as it is preformed). It shall be capable of conforming to pavement contours, and shall be resistant to motor fuels, lubricants, and hydraulic fluids.

The thermoplastic product shall be capable of fusing to previously applied thermoplastic, and/or fusing to itself when heated with a torch in accordance with manufacturer's instructions.

The product shall contain a minimum 30 percent by weight glass beads, uniformly distributed throughout the entire cross sectional area. Glass beads shall conform to AASHTO M247, Type 1, with a minimum refractive index of 1.50. The surface of the product shall reveal sufficient glass beads, without hand application of additional beads to demonstrate a uniform retroreflection when tested in accordance with ASTM E 1710, with an initial minimum intensity reading of 500 $mcd \cdot m^{-2} \cdot lx^{-1}$ as measured with an LTL-2000 or LTL-X Retroreflectometer.

The finished surface shall provide a minimum resistance value of 45 BPN when tested in accordance with ASTM E303.

Preformed thermoplastic products shall present visual indicators to demonstrate correct installation with proper molten state fusion and surface adhesion achieved.

Acceptable preformed thermoplastic for pavement markings: PreMark as manufactured by Ennis-Flint.

307.02.00 CONSTRUCTION

307.02.01 GENERAL CONDITIONS

307.02.01A MANUFACTURER'S REPRESENTATIVE

The Contractor shall apply pavement markings only under the direct observation of a manufacturer's representative. Application of pavement markings shall proceed only upon the satisfaction of the manufacturer's representative and the Engineer as to surface and environmental conditions.

307.02.01B COMPLETION TIME

Pavement markings shall be completed within 48 hours of the final placement of the asphalt concrete wearing surface. Timing of placement on Portland cement concrete surfaces shall conform to manufacturer's recommendations. Curing time delays, if any, shall not be cause for an extension of contract time.

307.02.01C SURFACE PREPARATIONS

The Contractor shall ensure the pavement surface is dry and free of dirt, dust, chemicals, and oily surfaces at the time of application of pavement markings.

The Contractor shall remove painted pavement markings prior to application of thermoplastic pavement markings at any location where the thermoplastic will be applied.

307.02.01D ENVIRONMENTAL CONDITIONS

Pavement markings shall not be applied within 24 hours of rainfall in any amount. Pavement markings shall not be applied when rainfall is forecast during the time of marking operations.

Surface temperatures shall be at least 40 degrees Fahrenheit and rising prior to application of pavement markings.

307.02.01E PORTLAND CEMENT CONCRETE SURFACES

Application of pavement markings on Portland cement concrete surfaces shall be in accordance with manufacturer's instructions, and shall utilize such sealants, primers, microgrinding, or other surface treatments as may be required or recommended by the manufacturer.

307.02.02 LONGITUDINAL PAVEMENT MARKINGS

Construction of longitudinal pavement markings shall conform to the requirements of Section 00865 of the *Oregon Standard Specifications for Construction* Method A (Profiled) and/or Method B (Non-Profiled).

Applied longitudinal pavement markings shall not deviate by more than one half inch from the design layout on straight runs, and no more than one inch from design layout along curves, as measured from centerline of stripe to the design location.

Longitudinal pavement markings shall maintain unwavering alignments with smooth transitions. Offsets from parallel pavement markings shall be maintained at a consistent distance. Markings shall be applied without splatter, and shall have clean edges, and start and stop ends.

307.02.03 STOP BARS AND CROSSWALK MARKINGS

Stop Bars and Crosswalk Markings shall be constructed using preformed thermoplastic products measuring no less than 125 mils (3.15 mm) in thickness.

307.02.04 SYMBOLS, AND LEGENDS

Symbols and legends shall be constructed using preformed thermoplastic products measuring no less than 125 mils (3.15 mm) in thickness.

As an exception to the above, bicycle lane symbols located entirely within a defined bicycle lane shall measure no less than 90 mils (2.29 mm) in thickness.

307.03.00 MEASUREMENT AND PAYMENT

307.03.01 LONGITUDINAL PAVEMENT MARKINGS

Longitudinal pavement markings will be paid on a linear foot basis, identified separately for each size (width) of striping, unless otherwise identified in the contract documents.

Longitudinal pavement markings will be measured for the length of material actually applied. Gaps or spacings between pavement markings will not be included in the measurement.

307.03.02 STOP BARS AND CROSSWALK MARKINGS

Stop Bars and Crosswalk Markings shall be paid for on a square-foot basis, unless otherwise identified in the contract documents.

307.03.03 SYMBOLS AND LEGENDS

Symbols and legends shall be paid for on a per-each basis, unless otherwise identified in the contract documents.

**** END OF DIVISION ****