CHAPTER 3

STREETS

STANDARD CONSTRUCTION SPECIFICATIONS

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STANDARD CONSTRUCTION SPECIFICATIONS

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301 - Subgrade

301.01.00 Description

This Section covers work necessary for preparation of the subgrade, complete. See also **Section 203 - Clearing and Grubbing**, and **Section 204 - Excavation, Embankment, Bedding, and Backfill.**

Subgrade is defined as the area of new or existing roads, streets, alleys, driveways, sidewalks, or other public places upon which additional materials are to be placed as a part of work covered in other Sections or by future work. Where applicable, subgrade may be considered to extend over the full width of the specified base course. Subgrade is classified as untreated or treated.

301.01.01 Untreated Subgrade

The uppermost material placed in embankments or unmoved from cuts in the normal grading of the roadbed and which is brought to true line and grade, shaped and compacted as necessary to provide a foundation for the pavement structure.

301.01.02 Treated Subgrade

Subgrade which is improved by the addition of stabilizers and prepared as in **Subsection 301.01.01 Untreated Subgrade.**

301.02.00 Materials

301.02.01 Soil Stabilizing Materials

Soil stabilizing materials shall conform to the following requirements:

depressions or ruts which contain water. Blade and drag subgrade to remove irregularities and secure a uniform surface.

Complete all underground work contemplated in the area of the subgrade including backfill before subgrade work is started. This requirement includes work on the contract, work to be performed by the City, or by others.

301.03.02 Untreated Subgrade

When excavating; shape the subgrade to line, grade, and cross section. When filling and/or grubbing; compact the fill material to the existing depth of grubbing or to a minimum of 8 inches (203.20 mm) and to not less than 95 percent of maximum density as specified in **Subsection 303.03.04 Compaction**. Compact the subgrade to the full width of the cut or of the subgrade level on embankment.

Subgrade areas which cannot be compacted to specified density, but which in the judgement of the Engineer otherwise meet the requirements herein, may at the option of the contractor, be removed and aerated or stabilized with an approved soil stabilizing material.

When in the opinion of the Engineer, unsuitable material or other conditions are discovered which render the subgrade, unable to be compacted to the specified density, then the Engineer may order the contractor to use treated subgrade as noted in **Subsection 301.03.03 Treated Subgrade**. All such work ordered by the Engineer will be paid for as in **Subsection 109.05.00 Payment for Extra Work**, unless the unsuitable area was caused by the negligence of the contractor in his/her operations. In such case all such costs shall be borne by the contractor, at no additional expense to the City.

301.03.03 Treated Subgrade

301.03.03A - General

At contractor's option, the subgrade material may be moistened and/or loosened by scarifying to the depth to be treated prior to application of the stabilizing material, as approved.

Dry and reduce cemented soil clods to moisture content and size specified. Shape and size the subgrade material blanket to the size that can pass through the mixing machine. Apply stabilizing materials only when temperature is above freezing, or when wind and other weather conditions are not detrimental to the work or to the public, as approved. Take all precautions necessary to prevent injury to persons, livestock, or property. Any material which is spilled or deposited at places other

content for a 6 inch (152.40 mm) depth, in accordance with AASHTO T 180.

2) If necessary, scarify and sprinkle water on subgrade to achieve moisture content and compaction.

3) Finish subgrade smooth and uniform to required lines and grades.

Compact and finish the cement treated surface within five hours after cement is applied and compact and finish other treated surfaces within 12 hours after compaction begins. If not compacted and finished within this time period, loosen the mixture and add stabilizing material and water as directed, remix, relay, and compact, all at no additional expense to the City. During compaction, maintain surface of the mixture at proper grade and cross section and lightly water to retain optimum moisture content.

Accomplish final finishing by rolling accompanied by light watering and reshaping to provide a surface free of hairline cracking.

301.03.04 Tolerances

Rework areas found to be deficient in thickness by more than 0.04 foot (0.012 192 m) or excessive in thickness by more than 0.08 foot (0.024 384 m), except that fresh stabilizing material shall be added in an amount equal to one-half of the original amount; as specified. Accomplish all reworking at no expense to the City.

The finished surface of treated and untreated subgrade shall not vary more than 0.04 foot (0.012 192 m) from established grade and cross section at any point. The finished surface, when tested with a 10 foot (3.0480 m) straightedge, shall not vary from the testing edge by more than 0.08 foot (0.024 384 m) at any point.

The Contractor will provide sufficient survey instruments, blue tops, etc. as necessary to transfer lines and grades from staking provided to construct subgrades accurately within above tolerances.

301.03.05 Curing Treated Subgrade

Limit traffic over treated subgrade to wheel loads which do not cause any damage to the subgrade and which do not visibly deflect, ravel, or wear the surface. Keep the finished surface moist and protected from rutting, spalling, and displacement, for a period of seven days or until a subsequent course of planned construction which will prevent drying of the mixture by evaporation or absorption is placed thereon.

301.04.01D - Soil Stabilizing Materials

Quantities for soil stabilizing materials will be measured by the ton (metric ton), dry weight, to the nearest 0.01 ton (0.009 072 metric ton), for the materials incorporated in the work at the rate and in the quantity specified or directed. Measurement and payment for stabilizing materials will not include any which are lost, displaced, used in reworking, used in restoration work, or used contrary to direction. Packaged materials will be accepted at the net weight shown by the manufacturer, subject to periodic verification and approval. Provide a certificate with each shipment together with a certified copy of the weight of each delivery.

301.04.01E - Treated Subgrade

Quantities for treated subgrade will be measured by the square yard (m^2), to the nearest square yard (m^2), of the finished surface of the treatment within the neat lines shown or established.

301.04.02 Payment

301.04.02A - Soil Stabilizing Materials

Payment for soil stabilizing materials will be made on a ton (metric ton) basis for the type or types specified and used in the work.

301.04.02B - Treated Subgrade

Payment for treated subgrade will be made on a square yard (m^2) basis for the type or types specified and used in the work.

302 - Watering

302.01.00 Description

This Section covers work necessary to furnish and apply water or combinations of water and compatible binders or additives for roadway excavations, embankments, subgrades, roadbeds, backfills, subbases, bases and surfacings, and water for the alleviation or prevention of dust within the project limits, as directed.

Excluded from this Section is watering used in connection with Portland Cement concrete construction, wetting foundations preparatory to placing concrete thereon, curing concrete, and watering which is specified as incidental.

Measurement and payment will be made only for quantities as are approved for use in the work.

302.04.01B - Water by Weight

Quantities of water determined by weight will be measured in tons (metric ton) to the nearest 0.1 ton (0.090 72 metric ton). Measurement will be the actual tons (metric ton) used based on weight tickets from State certified scales presented for approval on the day the water is delivered. No measurement or payment will be allowed on tickets not so delivered and approved.

302.04.01C - Binders and Additives

Quantities of compatible binders or additives combined with water for watering purposes will be determined separately from the water and will be measured as specified and shown on the proposal.

302.04.02 Payment

302.04.02A - Water on Incidental Basis

When neither specified nor shown in the proposal for separate payment, all water will be considered incidental to the other items of work and no separate payment will be made.

302.04.02B - Water by Volume

Payment for water will be made on a 1,000 gallon (3785 L) basis.

302.04.02C - Water by Weight

Payment for water will be made on a ton (metric ton) basis.

302.04.02D - Binders and Additives

Payment for compatible binders or additives combined with water for watering purposes will be paid for at the applicable contract unit price as set forth in the proposal. Payment shall constitute full compensation for the binder material or additive, for the combining of it with the water and for all extra costs involved in the use of the binder material or additive in the watering work.

Separated Sizes					
	2 1/2"-0 (63.50mm)	2"-0 (50.80mm)	1 1/2"-0 (38.10mm)	1"-0 (25.40mm)	3/4"-0 (19.05mm)
Sieve Size Passing	Percentages (by weight)				
3"(76.20mm)	100				
2 1/2"(63.50mm)	95-100	100			
2"(50.80mm)		95-100	100		
11/2"(38.10mm)			95-100	100	
1 1/4"(31.75)	55-75				
1"(25.40mm)		55-75		90-100	100
3/4"(19.05mm)			55-75		90-100
1/2"(12.70mm)				55-75	
3/8"(9.525mm)					55-75
*1/4"(6.35mm)	30-45	30-45	35-50	40-55	40-60

* Of the fraction passing the 1/4 inch (6.35 mm) sieve 40 percent to 60 percent shall pass the No. 10 sieve.

303.02.05 Acceptance

Materials will be subject to acceptance as follows:

Construction Method	Time of Acceptance
Stationary plant mixed	Immediately following mixing
Travel plant mixed	After mixing and before laying
Road mixed	After mixing and before compacting

Acceptance will be based on periodic samples taken following mixing.

303.03.00 Construction

1) Furnish and lay base and leveling rock to lines and grades shown.

2) Shape and grade each lift to conform to street cross section.

approved type, equipped with at least an 8 foot (2.4384 m) blade. Equipment shall be capable of spreading and striking off material to the designated line, grade, and transverse slope with surface texture of uniform appearance without excessive segregation or fracture of material.

Spreading equipment may be provided with an automatic control system if contractor so elects.

303.03.03C - Thickness of Lifts

Place in lifts not to exceed 6 inches (152.40 mm) in compacted thickness each. Place each layer in spreads as wide as practicable and to full width of the course before a succeeding layer is placed.

303.03.04 Reserved

303.03.05 Surface Finish

Surface of the subbase shall parallel the established cross section and grade for the finished surface within 0.05 foot (0.015 24 m). The finished surface of base, when tested with a 10 foot (3.0480 m) straight edge shall not vary from the testing edge by more than 0.04 foot (0.012 192 m) at any point.

303.04.00 Measurement and Payment

303.04.01 Measurement

303.04.01A - Square Yard (m^2) Basis

Measurement of aggregate base will be made on a square yard (m^2) basis. Measurement will be made of width and length of each separately constructed strip of aggregate base incorporated in the work and accepted, wherein width is the design width or edge-to-edge width of aggregate base, whichever is the lesser, and length is from end to end along the center of the strip. Measurement shall be on the surface of the aggregate base to the nearest 0.1 foot (0.030 48 m) and the square yardage (m^2) shall be to the nearest full square yard (m^2).

Extra thickness of aggregate base, when directed by the Engineer, will be measured by conversion of a proportionate volume basis to an equivalent number of square yards (m^2) of specified standard thickness base.

304.02.00 Materials

Aggregate and asphalt will be subject to acceptance prior to mixing. Mixtures will be subject to final acceptance after blending and mixing either at the plant for plant mixes or at the place of delivery for road mixes. Acceptance will be based on periodic sampling of the materials.

304.02.01 Aggregates

Aggregates shall conform to material requirements of **Section 205 - Materials**, with grading requirements conforming to **Section 303 - Aggregate Bases** or to the following gradations:

	Separated Sizes			
	1 1/2"-0 (38.10mm)	1"-0 (25.40mm)	3/4"-0 (19.05mm)	1/2"-0 (12.70mm)
Sieve Size Passing	Percentages (by weight)			
1 ½"(38.10mm)	100			
1"(25.40mm)	70-90	100		
3/4"(19.05mm)	65-85		100	
½"(12.70mm)	50-80	45-75	60-80	100
3/8"(9.52mm)				90-100
1/4"(6.35mm)				51-71
No. 4	5-30	5-30	5-35	
No. 10	0-6	0-6	0-10	5-15
No. 40				
No. 200	0-2	0-2	0-2	2-6

Sixty-five percent of the material retained on the 1/4 inch (6.35 mm) screen shall have at least one fractured face.

304.02.02 Asphalt

Conform to requirements of **Section 205 - Materials.**

304.03.05 Compaction

Conform to requirements for compaction in **Section 306 - Asphalt Concrete Pavement**, except as follows:

Use static or vibratory steel wheel rollers for breakdown rolling of open graded ATB. As soon as practicable after breakdown rolling, choke material at the rate of six (2.7216 kg) to nine pounds (4.0824 kg) per square yard (m^2) may be applied to the surface to prevent tire pick up if necessary.

304.03.06 Density

Density requirements for dense graded hot ATB shall conform to the applicable requirements of **Section 306 - Asphalt Concrete Pavement**. Achieve maximum density of open graded mixes by rolling until all roller marks disappear.

304.03.07 Transverse Joints

Placing of a course or strip of ATB shall be as nearly continuous as practicable. Construct transverse joints carefully with vertical faces and thoroughly compact to provide a smooth riding surface.

When the end of a course or strip of ATB is to be temporarily subjected to traffic, the end shall be left on a bevel of approximately 20:1 (horizontal to vertical), being later cut back to a vertical edge to provide a fresh surface when construction resumes.

304.03.08 Surface Finish

Final surface course of the asphalt treated base section, whether constructed in one or more lifts, shall not vary more than 0.05 foot (0.1524 m) from plan elevation at any point. Final surface shall not deviate at any point more than 0.03 foot (0.09144 m) from the bottom of a 10 foot (3.048 m) straightedge laid in any direction on the surface on either side of the roadway crown. Failure to meet the above requirement will necessitate sufficient surface correction to satisfy the requirement and shall be done at no expense to the City.

	Payment Item	Unit of Measure
1.	Asphalt-treated Base (specify thickness)	Per S.Y. (m^2) or Ton (metric ton)
2.	Bituminous Cement in Asphalt Concrete	Per Ton (metric ton)

305 - Surface Treatments

305.01.00 Description

This Section covers work necessary to construct asphalt and mineral aggregate surfaces by treating an existing crushed rock, screened gravel, or bituminous roadway surface to obtain a surface thoroughly cemented to the roadway to the contour and section shown and ensuring good riding and nonskid qualities.

305.01.01 Seal Coat

Seal coat is defined as one or more applications of bituminous binder, either with or without a cover of aggregate.

305.01.02 Penetration Macadam

Penetration macadam is defined as asphalt penetration of graded aggregates with bituminous material applied in successive spreads by the penetration method to bind the aggregates together into a firm surfacing.

305.02.00 Materials

305.02.01 Asphalt

Asphalt materials incorporated in the mix shall conform to requirements of **Section 205 - Materials.**

305.02.02 Aggregates

Aggregates shall conform to requirements of **Section 205 - Materials** and to additional requirements contained herein.

Mineral aggregate shall have a record of approved performance, or be subject to the Stripping Test for Bituminous Aggregate Mixtures, AASHTO T 182, using a sample of asphalt to be used in the major portion of the work. When so tested the retention of asphalt shall be above 95 percent. Mineral aggregate failing to

Rate of Application Per Square Yard (0.8361 m²)			
Seal Coat Types	Bituminous Size of Screenings	Screenings (pounds)	Binder (gallons)
Fog	N/A	N/A	0.05 to 0.10 (0.1893-0.3785L)
Fine	1/4" to No. 10 (6.35mm)	12 to 16 (5.4432-7.2576 kg)	0.15 to 0.30 (0.5677-1.1355L)
Coarse	½"-No. 4 (12.70mm)	25 to 35 (11.34-15.876kg)	0.25 to 0.35 (0.9462-1.3247L)
Double			
1st application	½"-No. 4 (12.70mm)	25 to 35 (11.34-15.876kg)	0.20 to 0.35 (0.757-1.3247L)
2nd application	1/4"-No. 10 (6.35mm)	12 to 16 (5.4432-7.2576kg)	0.15 to 0.25 (0.5677-0.9462L)

305.03.02 Penetration Macadam

The order and number of spreads, designated sizes of aggregates, and rates of spreads of aggregate and bituminous material shall be as shown on the table in the ODOT Standard Drawings entitled Asphalt Penetration Macadam.

Rates of spreads and quantities of materials are subject to variance as directed to adjust for variable conditions encountered or experienced during construction. Also, recognize that the nature of the work calls for equipment in varying number and versatility and modification of procedures to some extent. Generally, the ratio of bituminous cement to aggregate shall be held closely constant to that specified.

305.03.03 Preparation of Base

Conform to the applicable requirements for preparation of bases in **Section 306 - Asphalt Concrete Pavement.**

305.03.04 Placing

305.03.04A - Weather and Seasonal Limitations

Do not place asphalt penetration macadam or seal coat on any wet surface, or when air temperature is below 60 degrees Fahrenheit (15.56°C), or when the

separate applications of asphalt, spread sufficient building paper over the treated surface to ensure that spray jets will be functioning normally when the untreated surface is reached. Omissions (skips) by the distributor must be immediately covered by hand patching with the same grade of asphalt.

Area covered by any one spread of asphalt shall be no more than can be covered with mineral aggregate within ten minutes from the time of application upon any part of the spread.

Spread asphalt toward the source of mineral aggregate to avoid injury to the freshly treated surface.

Before application to the roadway, heat asphalt materials to the temperatures directed, but within the applicable limits for material used, as shown in the following table:

Type and Grade of Asphalt	Spraying Temperature			
	Minimum		Maximum	
	Degree F	Degree C	Degree F	Degree C
Asphalt Cements:				
AR 1000	275	135.0	325	162.8
AR 2000	285	140.6	350	176.7
AR 4000	290	143.3	350	176.7
Liquid Asphalts:				
MC and RC 250	165	73.9	220	104.4
MC and RC 800	200	93.3	355	179.4
Emulsified Asphalts:				
CRS-1	75	23.9	130	54.4
CRS-2	100	37.8	160	71.1
CMS-2S	100	37.8	160	71.1
CMS-2	100	37.8	160	71.1
CMS-2h	100	37.8	160	71.1
CSS-1	75	23.9	130	54.4
CSS-1h	75	23.9	130	54.4

Building paper shall be placed over the end area of previously placed spreads and the adjoining application shall start on the paper, after which the paper shall be removed. Rates of application shall not vary from prescribed rates by more than 10 percent. Protect structures and vegetation from being splattered, stained, or marred. Remove any stains and remedy disfigurements as approved. Use hand application or other approved means on areas inaccessible to the distributor.

305.03.07 Removal of Excess Material

Where excess rock has been applied, either remove it or drift it uniformly over the adjacent roadway by using an approved motor patrol grader equipped with a wire broom mold board. Hold this type of brooming to a minimum, and where necessary, perform it very carefully so as not to disturb the mat in any way. Correct thin or bare spots in the spread of cover stone by hand spreading or by use of a grader as described above. The cost associated with removal of excess material as described hereinabove will be considered incidental to other contract items performed under this Section.

305.03.08 Surface Tolerance, Penetration Macadam

The surface of the course, when finished and established, will be tested for trueness to specified grade and transverse slope at selected locations and shall not deviate at any point more than 0.03 foot (9.144 mm) from the bottom of a 10 foot (3.048 m) straightedge.

305.04.00 Measurement and Payment

305.04.01 Measurement

305.04.01A - Aggregate by the Cubic Yard (m^3)

Measurement of aggregate will be made on a cubic yard (m^3) basis for the materials in the hauling vehicle at points of deposit. See **Section 109 - Measurement of Quantities.**

305.04.01B - Bituminous Cement

Measurement of bituminous cements will be made on a ton (metric ton) basis. See **Section 109 - Measurement of Quantities.**

Water added to emulsion will not be paid for as emulsified asphalt. Pay quantity shall be the amount of undiluted emulsion used.

305.04.01C - Surface Treatment by the Square Yard (m^2)

Measurement of surface treatment will be made on a square yard (m^2) basis, complete in place as specified and accepted. Measurement will be made of width and length of each area completed, wherein width is the edge-to-edge width of the surface treatment, and length is from end to end of the area along the centerline.

306.02.03 Aggregates

Aggregates shall conform to requirements of **Section 205 - Materials** and to additional requirements contained herein.

Grading of designated sizes of coarse aggregate shall be as follows:

	Designated Sizes		
	3/4"-1/4" (19.05-6.35mm)	½"-1/4" (12.70-6.35mm)	3/8"-1/4" (9.525-6.35mm)
Sieve Size Passing	Percentages (by weight)		
1"(25.40mm)	100		
3/4"(19.05mm)	90-100	100	
½"(12.70mm)	60-75	85-100	100
3/8"(9.525mm)			85-100
1/4"(6.35mm)	0-15	0-15	0-15

Grading of the fine aggregate shall conform to the following:

Percentage passing 3/8 inch (9.525 mm) sieve	100 percent
Percentage passing 1/4 inch (6.35 mm) sieve	85-100 percent

Of the fraction passing the 1/4 inch (6.35 mm) sieve, the following percentages thereof shall pass the No. 10 sieve:

Class "B" Hot Mix	43-57 percent
Class "C" Hot Mix	43-57 percent
Class "E" Hot Mix	7-22 percent

Of the fraction passing the No. 10 sieve, the following percentages thereof shall pass the No. 40 sieve:

Class "B" Hot Mix	30-55 percent
Class "C" Hot Mix	30-55 percent

	Class "B"	Class "C"	Class "D"	Class "E"
Sieve Size Passing	Percentages of Total Aggregate (by weight)			
1"(25.40mm)	99-100			
3/4"(19.05mm)	90-98	99-100		99-100
½"(12.70mm)	72-90	90-98	99-100	90-98
3/8"(9.25mm)				
1/4"(6.35mm)	45-65	50-70	85-100	25-40
#10	17-37	21-41	37-57	2-12
#40	2-16	6-20	13-29	
#200	2-7	3-8	4-9	1-5
Asphalt Cement	3-8*	4-8*	4-8*	4-8*
Portland Cement or Hydrated Lime**				0.5-1.5*

* The exact percentage used (mix formula) shall be as designed or approved by the Engineer on the basis of preliminary laboratory tests and analysis of aggregate.

** contractor's option.

Class "E" is an open-graded mix and separation of asphalt from aggregate may occur. Any noticeable separation at the point of delivery will be cause for rejection.

Class "B", "C", and "D" asphalt concrete shall meet the following qualifying test requirements:

Test	Test Method	Requirements
Stability, First Compaction	ODOT Standard Test*	32 minimum
Voids, First Compaction	ODOT Standard Test*	7% maximum
Voids, Second Compaction	ODOT Standard Test*	1% minimum
Retained Strength	AASHTO T 165-Mod.	70% minimum

* Available from Engineer of Materials, ODOT, Salem, Oregon 97310.

306.02.07 Mix Formula and Tolerances

At least 15 days prior to producing any of the mixture for use in asphalt concrete pavement, furnish representative samples of acceptable materials proposed for use in determination of the proportions of each of several constituents to be used in the

Liberally apply tack coat material to all joints with existing pavement, manhole frames, etc.

Machine lay and compact asphalt concrete paving, all in conformance with current ODOT specifications. Use type, weight and size roller sufficient to achieve specified compaction.

Finish pavement lines and grades to conform accurately with lines and grades shown and as staked in field.

Finish pavement to meet catch basin inlets, existing pavements, warping at intersections, etc.

Protect new pavement from traffic until it is set.

Surface of pavement to be a smooth, well-sealed, and a tight mat.

306.03.01 Preparation of Bases

All pavement bases and foundations constructed under this contract shall be completed and finished as prescribed under the applicable specification for its construction.

Manholes, inlets, and other such structures shall have been completed, adjusted, cured, and otherwise prepared, as applicable, and made clean and ready for asphalt placement. Seal vertical surfaces that will come in contact with asphalt pavement with tack coat material to provide a good bond and seal. Cover top surfaces with paper or other material to prevent adherence of asphalt pavement, tack coat, or prime coat.

306.03.01A - Joining Existing Pavements

All existing pavement edges to be joined with new pavement shall be saw cut such that the cut remains straight and vertical without breakouts at the time of joining the new pavement.

Thoroughly seal the saw cut edge with AR 4000 or PBA-2 asphaltic cement.

Make the finished surface of the new compacted paving flush with the existing surface unless otherwise shown or approved.

Immediately after the new paving is compacted, seal all joints between new and original asphalt pavement with AR 4000 or PBA-2 asphaltic cement and, if

Spread asphalt by means of pressure-spray equipment which will provide uniformity of application at prescribed rates. Do not apply aggregate cover material to the tack coat. Normally, asphalt shall be applied to the prepared surface at a rate within a range of 0.02 (0.0757 L) to 0.06 gallon (0.2271 L) per square yard (0.8361 m^2) of surface, actual rate to be as directed. The tack coat shall not be applied during wet or cold weather or during darkness and apply only so far in advance as is appropriate to maintain a tacky, sticky condition of the asphalt. Apply tack coat in such manner as to offer the least interference to traffic and to permit at least one-way traffic without pickup or tracking of asphalt.

306.03.05 Mixing

Mix the asphalt concrete by combining aggregate, asphalt, and additives at an approved central mixing plant equipped with controls to accurately measure and monitor the various components of the mix to produce a uniform homogeneous mixture at the specified temperature.

The discharge temperature of the mix will vary with the type of mixing plant, climatic conditions, and other variables. However, the temperature shall be sufficient to provide thorough mixing and coating and to provide a mass viscosity of the mix on the grade which will permit compaction to required density. Mix temperatures and asphalt in storage shall generally not exceed 325 degrees Fahrenheit (162.8°C).

306.03.06 Placing

Conform to the plan of work, order of paving, and other details of performance as approved. Lift thickness shall be as shown.

The City may specify routing of asphalt trucks from the mixing plant to the job site. Send no loads so late in the day as to prevent the spreading and compacting of the mixture during daylight, unless approved lighting is provided. Deliver trip tickets to the Engineer each day to verify material delivery.

Hot mix asphalt concrete shall normally be placed on dry prepared surfaces and when air temperature in the shade is 40 degrees Fahrenheit (4.44°C) and warmer. Place Class "E" wearing surface only when the existing pavement temperature is at least 60 degrees Fahrenheit (15.55°C). Placing during rain or other adverse weather conditions normally will not be permitted, except that mix in transit at the time these adverse conditions may occur may be laid provided it is of proper temperature, the mix has been covered during transit, and is placed on a foundation free from pools or flow of water. The temperature of hot mix at the time it is spread into final position shall be between 240 and 300 degrees Fahrenheit

306.03.06A - Thin Overlays

Flush and sweep the streets prior to cleaning the road surface. Prior to placing the fiber membrane or thin overlay, the existing pavement shall be cleaned to the satisfaction of the Engineer. All metal structures shall be shot blasted to provide a clean bonding surface. Each manhole, valve cover, inlet grates, etc. shall be free and operable regardless of the preexisting condition. Manholes, water valve boxes, cleanouts, etc., shall be adjusted to the proper finish grade. Raised traffic buttons shall be removed. Asphalt ramps at curbed driveways shall be removed and temporary ramps installed until new A.C. is placed.

A reinforced waterproof membrane shall be placed on the surface to be overlaid, such as Geotac as manufactured by Pave Prep Corporation or approved equal. The membrane shall be waterproof incorporating a high strength, uncoated 6 oz./sq. yd. (170.1 g /0.8361 m^2) polypropylene fabric embedded in a layer of self adhesive rubberized asphalt with the following properties:

TECHNICAL SPECIFICATIONS		
Property	Typical Value	Test Method
Caliper (thickness)	0.080 inch (2.032 mm)	ASTM D1777
Grab Tensile Strength	245.0 pounds (111.132 kg)	ASTM D4632
Puncture Resistance	200.0 pounds (90.72 kg)	ASTM E154
SBS Polymer Content (backing)	15 percent	
Permeance	0.10 (Max.) Perms	ASTM E96, Method B
Elongation	80 percent	ASTM D4632
Strip Tensile	50 (Min.) lbs./in. (22.68 kg/38.10 mm)	ASTM 882 (modified)
Pliability (1/4 inch Mandrel 180° @ -25°F)	No cracks in fabric or rubberized asphalt	ASTM D146 (modified)

The Contractor shall plan for sufficient time for delivery of the waterproof membrane from the manufactureer.

The waterproof membrane shall not be placed when the ambient temperature is below 50 degree F (10.0°C). Install in widths of 24 inch (609.60 mm) and shall be

width of existing driveway. At driveways where less than 1 inch (25.40 mm) of curb exposure or no curb exposure exists, feather the A.C. pavement over the curb and 6 foot (1.8288 m) maximum into the driveway such that water ponding will not occur. Taper the A.C. pavement thickness to match existing catch basin grate elevations. The length of feathered taper shall be 6 feet (1.8288 m) and the minimum asphalt thickness shall be 0.25 inch (6.35 mm). Longitudinal cold joints shall not be coincident with normal wheel tracks of vehicles. They shall normally be on a lane stripe or mid-way between lane stripes.

On noncurbed sections of the streets bordered by gravel, lawn, or barkdust, the Contractor shall redress these areas adjacent to the final paving with like materials to the satisfaction of the Engineer. Shoulder rock shall be 1/4"-0" (6.35 mm -0) placed approximately 3 feet (0.9144 m) wide. There will be no separate payment for this work, it being understood to be included in and incidental to contract unit prices for Class "C" asphaltic concrete.

306.03.07 Compaction

The contractor will not be permitted to use any equipment which crushes the aggregate to any extent. However he/she will be required to obtain the densities required in **Subsection 306.03.08.**

306.03.08 Density Requirements

The density of asphalt concrete as determined by AASHTO T 230 or AASHTO T 238 (Method A or B) shall be at least 95 percent of the maximum density determined in accordance with AASHTO T 245 or T 246.

Samples and tests will be taken as frequently and at such locations as the Engineer elects, and the results will be made known to the contractor as soon as is practicably possible. However, it shall be the responsibility of the contractor to obtain specified density at all times, and delay in advising the contractor of test results shall not act as a waiver of this responsibility. When it is determined that specified density is not being obtained, discontinue all paving operations until corrective measures have been taken.

Any displacement occurring as a result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition of fresh mixture when required. Do not displace the line and grade of edges. Moisten steel roller wheels with water or other approved material to the least extent necessary to prevent pickup of mixture and yet not cause spotting or defacement of the surface of the mixture.

306.04.00 Measurement and Payment

306.04.01 Measurement

Pay quantities for hot mix asphalt concrete and other bituminous construction under this Section will be measured by one or another of the methods as set forth hereinafter.

Payment for A.C. pavement to include compensation for all labor, equipment, materials and incidentals specified in this section.

If no bid item is included in the Schedule of Contract Prices, the adjustment of structures such as valve boxes, manhole, catch basins, etc. will be considered incidental to the work and no separate or direct payment will be made therefore.

Payment for waterproof membrane shall be measured in linear feet as placed and accepted on the exisitng pavement. Payment for water proof membrane shall be in the bid item in the proposal Waterproof Membrane. The price shown in the proposal shall be full compensation for furnishing all materials, for all preparation and application of these materials, for all labor, equipment, and incidentals necessary to complete this item.

306.04.01A - Asphalt Concrete on a Single Unit Basis

When pay items in the proposal so indicate, the quantity of asphalt concrete used in the accepted work as specified will be measured on a ton (metric ton) basis. There will be no separate measurement of bituminous cement or additives contained in the mixture or used otherwise in the work. Measurement will be made on the number of tons (metric ton) of asphalt concrete, as weighed on approved and tested scales. Give trip tickets to the Engineer each day to verify material delivery. Each trip ticket shall show date and time of delivery, truck number or driver's name, and net weight of material.

306.04.01B - Asphalt Concrete on Square Yard (m^2) Basis

When the pay items in the proposal so indicate, asphalt concrete, complete in place as specified and accepted, will be measured on a square yard (m^2) basis. Measurement will be made of width and length of each separately constructed strip of pavement, wherein width is the design width or edge-to-edge width of pavement, whichever is the lesser, and length is from end to end of pavement along the center of the strip. Measurement will be on the surface of the pavement to the nearest 0.1 foot (30.48 mm) and the square yardage (m^2) will be to the nearest full square yard (m^2).

1. Deviations in asphalt cement shall be weighted eight times, and deviations in 200-minus material shall be weighted two times the deviation in the other specified aggregate sieve sizes.

2. All materials furnished where the cumulative deviation equals or exceeds 12 percent shall be removed and replaced with acceptable material at no cost to the City.

3. When asphalt paving materials with a cumulative deviation of less than 12 percent are furnished, the City shall notify contractor, in writing, to remove and replace defective materials at no cost to the City or to pay to the City liquidated damages in accordance with the above deduction schedule, as determined by the Engineer.

307 - Portland Cement Concrete Pavement

307.01.00 Description

This Section covers work necessary for construction of Portland Cement concrete pavements, with or without reinforcement, on a prepared subgrade or base course, complete.

307.02.00 Materials

All materials shall conform to requirements of **Section 205 - Materials.**

307.03.00 Construction

307.03.01 General

The plant, equipment, and tools required in the performance of the work must be approved as to design, capacity, and condition to efficiently perform their respective functions of the work. Schedule and coordinate all operations involved in constructing the pavement so that regardless of the daily or seasonal variations in weather, temperature and humidity under which the work is permitted to proceed, such work will result in a finished pavement conforming in all respects to specified requirements. Provide and have available at all times adequate equipment, tools, material, and labor to achieve these results and failure to so provide will be cause for discontinuance of the work upon order of the Engineer. Conform to applicable requirements of concrete construction in **Section 602 - Concrete Structures.**

307.03.06 Tamping and Screeding

Compact the concrete pavement by means of vibrating screeds, mechanical tampers, tamping templates, and such other implements as approved. A vibrating screed or an automatic screeding and tamping machine may be substituted for a tamping template, subject to approval. Operate the equipment in such a manner that a satisfactory compaction of the concrete is produced and the surface of the pavement is uniform, true to grade, and cross section.

Immediately after placing concrete upon the subgrade and before initial set has occurred, strike off the concrete and tamp by means of a tamping template, used at right angles to the centerline of the street, until the concrete is thoroughly consolidated to specified grade and crown section and sufficient mortar is brought to the surface for finishing purposes. If the design or location of the base is such as to preclude the possibility of tamping as previously described, such as a variable crown section, curb being constructed monolithic with base, in alleys, or where the grade exceeds 10 percent; employ other approved methods to obtain the prescribed results.

307.03.07 Roadway and Alley Finishing

After the concrete is placed and compacted, strike it true to line, grade, and cross section as shown and float to a smooth, even texture with an approved long handled wood float having a troweling or smoothing surface from 6 to 12 inches (152.40 mm to 304.80 mm) wide, or other approved floating device. Apply the float to the surface of the concrete with its length parallel to the centerline of the street and operate it from bridges, planing off the high places, and filling the low places. Lap preceding applications of the float by at least one-half its length. If, after such planing, low places are discovered in the surface of the concrete, add additional concrete to fill in and bring such low places to grade, as approved. Floating shall leave the surface finish at specified grade, cross section, and surface tolerance, with a surface free from laitance, soupy mortar, marks, or irregularities.

Following the float finish and at the proper set, broom finish the surface. Draw the broom transversely across the pavement with not more than one stroke per width of broom. Fill any areas of minor honeycomb or other minor defect in composition of the concrete along the exposed edges with a stiff mortar or cement and fine aggregate applied to the moistened concrete in a workmanlike manner. Areas of affected pavement and replacement with pavement of specified quality for the full width of strip between longitudinal joints or edges and for a length not less than 10 feet (3.048 m).

3. Apply burlap cloth to damp concrete as soon as it can be placed without marring the surface. Saturate the cloth with water and keep fully wetted during the curing period.

Regardless of which of the above methods the contractor chooses, keep the curing medium intact and effective for a period of not less than 72 hours after application.

307.03.10B - Protection of Concrete

Erect and maintain suitable barriers to protect the concrete from traffic or other detrimental trespass until the pavement is opened to traffic. If necessary, maintain watchmen 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, construct and maintain suitable bridges over the pavement as directed.

Prior to allowing equipment or traffic on the new surface, the concrete must 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. Operate all equipment without damage to the new concrete.

Repair or replace any part of the pavement, as directed, which has been damaged by traffic or from any other cause, prior to its official acceptance, at no expense to the City.

307.04.00 Measurement and Payment

307.04.01 Measurement

307.04.01A - Portland Cement Concrete Pavement

Measurement of Portland Cement concrete pavement will be made on a square yard (m^2) basis for the pavement complete in place as specified, and accepted. Measurement will be made of width and length of each separately constructed strip of pavement, wherein the width is the design width or edge-to-edge width of pavement, whichever is the lesser, and the length is from end to end of pavement to the nearest 0.1 foot (30.48 mm) and the square yardage (m^2) shall be to the nearest square yard (m^2).

Extra thickness of pavement, when shown or specifically directed to be placed, will be measured by conversion on a proportionate volume basis to an equivalent number of square yards (m^2) of specified standard thickness pavement.

308.02.00 Materials

308.02.01 General

Materials shall conform to requirements of **Section 205 - Materials** and to additional requirements contained herein.

308.02.02 Portland Cement Concrete

Concrete, expansion joint filler, reinforcing steel and aggregates to conform to current ODOT specifications.

Use Minor Structure Concrete (MSC) conforming to ODOT, Section 00440, 3300 psi (22.75 MPa) at 28 days, 4-7% AEA, 5 inch (127.00 mm) slump, 1/2 inch (12.70 mm) max. size coarse aggregate.

Portland Cement concrete shall conform to **Subsection 205.02.02** except that extruded curbs and/or gutters shall have a maximum slump of 2 inches (50.80 mm) as specified in **Subsection 308.03.03A** and sidewalks and pathways may have a design strength of 3,000 psi (20.6685 MPa).

308.02.03 Asphalt Concrete

Conform to Class "C" Hot Mix in **Section 306 - Asphalt Concrete Pavement.**

308.02.04 Aggregate

Aggregate materials for base, foundation courses, leveling courses, or bedding shall conform to 3/4"-0 (19.05 mm-0) gradation in **Section 303 - Aggregate Bases.**

308.03.00 Preparation of Base

308.03.01 Base Preparation

Conform to lines and grades shown or as staked in the field.

Conform to dimensions shown on standard plans or detailed plans, if any.

Construct curbs, sidewalks and driveways on prepared subgrade.

Construct in conformance with current ODOT specifications.

308.03.01C - Base for Portland Cement Concrete

All bases upon which new cement concrete structures are to be constructed shall be firm and free of all deleterious matter. Dampen thoroughly surfaces upon which new cement concrete is to be placed. No payment will be made for water and the work of placing base materials. The cost of preparing bases shall be considered as incidental to the construction of structures.

When new concrete is placed by the mechanical extrusion method, vertical dowel fastening to underlying concrete or asphalt may be eliminated and the bond between new concrete and underlying concrete or asphalt provided with epoxy cement applied in conformance with the manufacture's recommendations as approved. Spread epoxy at a rate which will provide a thorough coating to the surface with all voids and depressions filled. Place new structure on the epoxy cement within 15 minutes after spreading.

308.03.01D - Base for Asphalt Concrete

Bring the base of new asphalt concrete structures to proper grade, firm, dry, and free of deleterious matter.

Where asphalt concrete is to come in contact with previously placed Portland Cement concrete, asphalt concrete, or bituminous surfaces, give the area of contact an application of epoxy cement as specified for use with Portland Cement concrete in **Section 205 - Materials**, or a light coating of emulsified asphalt conforming to the requirements for Tack Coat in **Section 306 - Asphalt Concrete Pavement.**

Where dowel fastenings between new asphalt concrete and the underlying foundation are shown, the dowels may be eliminated when the asphalt concrete is placed by mechanical extrusion method provided an application of epoxy cement, as set forth herein for use with Portland Cement concrete, is used to provide positive bond between the new and old materials.

308.03.02 Forms

308.03.02A - Forms

Conform to requirements for Forms in **Section 602 - Concrete Structures.**

308.03.03B - Asphalt Concrete

Asphalt concrete curbs may be placed by mechanical extrusion methods or between suitable forms, as the contractor may elect. Spread asphalt concrete for sidewalks, driveways, and pathways, where specified, uniformly by hand or by a paving machine and thoroughly compact in conformance with the requirements in **Section 306 - Asphalt Concrete Pavement.**

308.03.04 Finishing

308.03.04A - General

Construct all structures within 1/4 inch (6.35 mm) of true line, within 1/4 inch (6.35mm) of established surface grade, cross section, and slope, and within 1/8 inch (3.175 mm) of specified thickness, and all finished surfaces shall be free from humps, sags, or other irregularities. When a straightedge 10 feet (3.048 m) long is laid on a finished surface tangent, the surface shall not vary more than 0.02 foot (60.96 mm) from edge of the straightedge.

Where asphalt concrete or Portland Cement concrete sidewalks or pathways are to be placed around or adjacent to manholes, pipe inlets, or other miscellaneous structures, do not construct such structures to final grade until after the sidewalks or pathways have been constructed for an approved distance on each side of the structures.

308.03.04B - Portland Cement Concrete

Sidewalks and Other Structures:

Finish surface of concrete to grade and cross section with a bull float, trowel smooth, score if required, then finish with a broom. Use floats of not less than 10 feet (3.0480 m) in length for straight grade sections and not less than 6 inches (152.40 mm) in width. Finish concrete adjacent to expansion joints with an edger tool. Light brooming shall be transverse to the line of traffic and if water is necessary, it shall be lightly applied to the surface immediately in advance of brooming.

The surface of concrete sidewalks shall be marked into rectangles with a scoring tool which will leave the edges rounded. Scoring and dimensions shall be as shown on the appropriate standard plan or as directed. Sidewalks shall have a slope of 1/4 inch (6.36 mm) per foot (0.3048 m) from the top of curb to the back of walk unless otherwise shown.

308.03.06B - Contraction Joints in Curbs

Place contraction joints in curbs at 10 foot (3.048 m) intervals and coincident to sidewalk joints. Contraction joints shall be of the open joint type and shall be provided by inserting a thin, oiled steel sheet vertically in the fresh concrete to force coarse aggregate away from the joint. The steel sheet shall be inserted one-half the depth of the curb. After initial set has occurred in the concrete and prior to removing the front curb form, the steel sheet shall be removed with a sawing motion. Finish top of curb with a steel trowel and finish edges with a steel edging tool.

308.03.06C - Expansion Joints

Provide expansion joints between driveways and Portland Cement concrete pavements, around poles, boxes, and other fixtures which protrude through, into, or against the structure, and other locations detailed on the plans, or standard plans. Place each expansion joint at right angles to the structure alignment, vertical to the structure surface, and provide complete separation between concrete surfaces.

The width of joints and thickness of filler shall match those of the joints in abutting or underlying concrete; elsewhere it shall be not less than ½ inch (12.70 mm).

308.03.06D - Requirements Near Existing Structures

Cut back existing curbs, walks, driveways, and other such structures to permit the new construction and where the new structures are to be constructed against or within 4 inches (101.60 mm) of the end, edge, or side of other structures, the new construction shall include the construction of approved connections therewith, using the same kind of concrete as is used in the new construction. Make the joint between the old and new material with a saw cut.

In this work, furnish and place preformed expansion joint filler, minimum ½ inch (12.70 mm) thickness, between new and old Portland Cement concrete.

308.03.07 Dowels, Tie Bars, Reinforcing

Provide metal reinforcing bars and wire fabric reinforcement when and as shown. When shown, provide and place dowels with "slip sleeves," as load transfer mediums. Provide and place dowels, but without "slip sleeves," as fastenings or ties between new concrete and existing underlying concrete when shown. Provide tie bars when shown. Place reinforcing, dowels and tie bars in conformance to the applicable requirements in **Section 603 - Reinforcement.**

308.04.01G - Driveways, Sidewalks, and Pathways

Measurement of Portland Cement or asphalt concrete driveways, sidewalks, or pathways will be made on a square yard (m^2) basis on the actual surface of the specified thickness concrete or asphalt completed and accepted.

308.04.01H - Sawed Joints

Sawed joints will be measured on a linear foot (meter) basis for each joint sawed, cleaned, and sealed as specified and directed.

308.04.01I - Aggregate Base

Pay quantities of aggregate bases material will be measured as set forth in **Section 303 - Aggregate Bases.**

308.04.02 Payment

Payment will be made for any or all of the following items when listed as pay items in the proposal for any particular contract:

	Payment Item	Unit of Measure
1.	Curb (specify asphalt or concrete)	Per L.F. (m)
2.	Concrete Curb and Gutter	Per L.F. (m)
3.	Sidewalk (specify asphalt or concrete)	Per S.F. (m^2) or L.F. (m)
4.	Precast Concrete Curb	Per L.F. (m) or EA.
5.	Concrete Valley Gutter	Per S.Y. (m^2)
6.	Driveways, Sidewalks, and Pathways (specify thickness and Asphalt or Portland Cement Concrete)	Per S.Y. (m^2)
7.	Sawed Joints	Per L.F. (m)
8.	Aggregate Base	Per C.Y. (m^3)