Section 02741

ASPHALTIC CONCRETE PAVEMENT

PART 1 G E N E R A L

1.01 SECTION INCLUDES

A. Surface course of compacted mixture of coarse and fine aggregates and asphaltic binder.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for hot-mix asphalt concrete pavement is on square yard basis. Separate pay items are used for each different required thickness of pavement.

2. Payment for hot-mix asphalt concrete pavement includes payment for associated work performed in accordance with Section 02743 - Tack Coat.

3. Measurement for utility projects: Match actual pavement replaced but no greater than maximum pavement replacement limits shown on Drawings.

   a. Extend 12 inches beyond outside trench or trench slopes for utilities and appurtenant structure excavation or for pavement removed to construct utility appurtenances.

   b. Extend 5 feet beyond outside excavation limits for junction box or tunnel shaft walls.

   c. No payment will be made for work outside maximum pavement limits or in areas removed or replaced for Contractor’s convenience. Maximum payment limits are shown on Drawings.

4. Payment for temporary detour pavement is on a square yard basis and includes surface and base materials, associated grading, adjustment of manholes, provisions for temporary drainage, maintenance, and removal of pavement and restoration of ditches.

5. Payment for speed humps is on linear foot basis, and includes milling of existing pavement, tack coat, and placement and compaction of asphalt. Measurement of speed hump is along length of 12 foot wide speed hump, measured transverse to centerline of road. Separate payment is made for thermoplastic markings applied to speed hump.

6. Refer to Section 01270 - Measurement and Payment for unit price procedures.

7. Refer to Paragraph 3.08 for unit price adjustments.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

A. ASTM C 33 - Standard Specification for Concrete Aggregates.

B. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

C. TxDOT Tex-106-E - Calculating the Plasticity Index of Soils.

D. TxDOT Tex-126-E - Molding, Testing, and Evaluating Bituminous Black Base Material.

E. TxDOT Tex-200-F - Sieve Analysis of Fine and Course Aggregates.

F. TxDOT Tex-203-F - Sand Equivalent Test.

G. TxDOT Tex-204-F - Design of Bituminous Mixtures.

8. TxDOT Tex 206-F - Compacting Test Specimens of Bituminous Mixtures.

I. TxDOT Tex-207-F - Determining Density of Compacted Bituminous Mixtures.

J TxDOT Tex-208-F - Test for Stabilometer Value of Bituminous Mixtures.

K. TxDOT Tex-217-F - Determining Deleterious Material and Decantation Test for Coarse Aggregates.

L. TxDOT Tex-227-F - Theoretical Maximum Specific Gravity of Bituminous Mixtures.

13. TxDOT Tex-530-C - Effect of Water on Bituminous Paving Mixtures.

14. TxDOT Tex-531-C - Prediction of Moisture Induced Damage to Bituminous Paving Materials Using Molded Specimens.

1.04 SUBMITTALS

A. Conform to requirements of Section 01330 - Submittal Procedures.

B. Submit certificates that asphalt materials and aggregates meet requirements of Paragraph 2.01, Materials.

C. Submit proposed design mix and test data for surface course.

D. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

PART 2 P R O D U C T S

2.01 MATERIALS

A. Coarse Aggregate:

1. Use gravel, crushed stone, or combination thereof, that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Use aggregate conforming to ASTM C 33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C 131.

2. Aggregate by weight shall not contain more than 1.0 percent by weight of fine dust, clay-like particles, or silt when tested in accordance with Tex-217-F, Part II.

B. Fine Aggregate: Sand, stone screenings or combination of both passing No. 10 sieve. Use aggregate conforming to ASTM C 33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than 6 when tested by TxDOT Tex-106-E. Sand equivalent shall have minimum value of 45 when tested by TxDOT Tex-203-F.

C. Composite Aggregate: Conform to following limits when graded in accordance with TxDOT Tex-200-F. Use type specified on Drawings:

GRADATION OF COMPOSITE AGGREGATE		
	PERCENT PASSING	
SIEVE SIZE	**Course Surface (TxDOT Type C)**	**Fine Surface (TxDOT Type D)**
f"	100	---
e"	95 to 100	---
2"	C	100
d"	70 to 85	85 to 100

#4	43 to 63	50 to 70
#10	30 to 40	32 to 42
#40	10 to 25	11 to 26
#80	3 to 13	4 to 14
#200	1 to 6*	1 to 6*
VMA % minimum	13	14
* 2 to 8 when Test Method Tex-200-F, Part II (Washed Sieve Analysis) is used.		

D. Asphalt Binder: Moisture-free homogeneous material, which will not foam when heated to 347 F, meeting the following requirements. Use the PG grades as specified on the drawings for each Project.

PERFORMANCE GRADED BINDER		
	PERFORMANCE GRADE	
CRITERIA / TEST	PG70-22	PG64-22
Average 7-day Maximum Pavement Design Temperature, C	< 70	< 64
Minimum Pavement Design Temperature, C	> -22	> -22
ORIGINAL BINDER		
Flash Point Temperature, T48; Minimum C	230	230
Viscosity, ASTM D 4402; Maximum, 3Pa*s (3000 cP) Test Temperature, C	135	135
Dynamic Shear, TP5; G*/sin[ ], Minimum, 1.00 kPa Test Temperature @ 10 rad/sec., C	70	64
ROLLING THIN FILM OVEN (T240) OR THIN FILM OVEN (T179) RESIDUE		
Mass Loss, Maximum, %	1.00	1.00
Dynamic Shear, TP5; G*/sin [ ], Minimum, 2.20 kPa Test Temperature @ 10 rad/sec., C	70	64

PRESSURE AGING VESSEL RESIDUE (PP1)		
PAV Aging Temperature, C	100	100
Dynamic Shear, TP5; G*/sin [ ], Minimum, 5000 kPa Test Temperature @ 10 rad/sec., C	28	25
Physical hardening	Report	Report
Creep Stiffness, TP1; S, Maximum, 300 Mpa Cvalue, Minimum, 0.300 Test Temperature @ 60 sec., C	-12	-12
Direct Tension, TP3; Failure Strain, Minimum, 1.0% Test Temperature @ 1.0 mm/min, C	-12	-12

1. City Engineer will designate grade of asphalt to use after design tests have been made. Use only one grade of asphalt after grade is determined by test design for project.

E. Anti-stripping Agent:

1. Evaluate mixture of aggregate, asphalt, and additives proposed for use for moisture susceptibility and requirement for anti-stripping agents. To substantiate mix design, produce and test trial mixtures using proposed project materials and equipment prior to placement. Test for susceptibility to moisture and trial mixture may be waived by City Engineer when similar designs using same material have previously proven satisfactory.

2. Liquid Anti-stripping Agent. Use anti-stripping agent with uniform liquid with no evidence of crystallization, settling, or separation of components. Submit sample of anti-stripping agent proposed for use and manufacturer's product data, including recommended dosage range, handling and storage, and application instructions.

F. Pavement markings for speed humps: Conform to requirements of Section 02767 - Thermoplastic Pavement Markings.

2.02 EQUIPMENT

A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing continuous mixtures meeting specifications. With exception of a drum mix plant, plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors.

2. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:

1. Cold aggregate bins and proportioning device

2. Dryer

3. Screens

4. Aggregate weight box and batching scales

5. Mixer

6. Asphalt storage and heating devices

7. Asphalt measuring devices

8. Truck scales

B. Bins: Separate aggregate into minimum of four bins to produce consistently uniform grading and asphalt content in completed mix. Provide one cold feed bin per stockpile.

2.03 MIXES

A. Employ certified testing laboratory to prepare design mixes. Test in accordance with TxDOT Tex-126-E or Tex-204-F, Tex-206-F, Tex-208-F, Tex-530-C and Tex-531-C.

B. Density, Stability and Air Void Requirements:

Percent Density		Percent	HVEEM Stability Percent
Min.	Max.	Optimum	Not Less Than
94.5	97.5	96	35

PART 3 E X E C U T I O N

3.01 EXAMINATION

A. Verify compacted base course is ready to support imposed loads.

B. Verify lines and grades are correct.

3.02 PREPARATION

A. Tack Coat: Conform to requirements of Section 02743 - Tack Coat. Where mixture will adhere to surface on which it is to be placed without use of tack coat, tack coat may be eliminated when approved by City Engineer.

B. Prepare sub grade in accordance with requirements of Section 02711 - Hot Mix Asphalt Base Course, Section 02712 - Cement Stabilized Base Course, or Section 02713 - Recycled Crushed Concrete Base Course.

C. Prepare sub grade in advance of asphalt concrete paving operation.

D. Perform pavement repair and resurfacing as indicated in Section 02951 - Pavement Repair and Resurfacing.

E. Do not use cutback asphalt.

G. Milling of pavement for speed humps: Mill pavement (concrete or asphalt) to depth of one inch and width between 18 and 24 inches around entire perimeter of proposed hump, as shown in detail for speed hump design.

3.03 PLACEMENT

A. Do not place asphalt pavement less than 2 inches thick when surface temperature taken in shade and away from artificial heat is below 50 F and falling.

B. Haul prepared and heated asphaltic concrete mixture to project in tight vehicles previously cleaned of foreign material. Mixture shall be at temperature between 250 F and 325 F when laid.

C. Spread material into place with approved mechanical spreading and finishing machine of screening or tamping type.

D. Surface Course Material: Surface course 2 inches or less in thickness may be spread in one lift. Place courses within 12 hours of one another unless otherwise approved by City Engineer. When time is exceeded, remove and replace base course. Spread lifts in such manners that, when compacted, finished course will be smooth, of uniform density, and will be to section, line and grade as shown. Place construction joints on surface courses to coincide with lane lines or as directed by City Engineer.

E. Joints: Pass roller over unprotected ends of freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce slightly beveled edge for full thickness of course. Remove old material, which has been cut away and lay new mix against fresh cut.

F. When new asphalt is laid against existing or old asphalt, saw cut existing or old asphalt to full depth to provide straight smooth joint.

G. In smaller restricted areas where use of paver is impractical, spread material by hand. Compact asphalt by mechanical means. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove lumps that do not break down readily.

3.04 COMPACTION

A. Construct test strip to identify correct type, number, and sequence of rollers necessary to obtain specified in-place density or air-voids. Prepare test strip at least 500 feet in length, comparable to placement and compaction conditions for Project.

B. Begin rolling while pavement is still hot and as soon as it will bear roller without shoving, displacement or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water or petroleum by-products.

C. Compact surface thoroughly and uniformly, first with power-driven, 3-wheel, or tandem rollers weighing from 8 to 10 tons. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mat temperature drops below 175 F.

D. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.

E. Along walls, curbs, headers and similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.

F. Compact binder course and surface course to density 91 to 95 percent of maximum possible density of voidless mixture composed of same materials in like proportions.

3.05 TOLERANCES

A. Furnish templates for checking surface in finished sections. Maximum deflection of templates, when supported at center, shall not exceed c inch.

B. Completed surface, when tested with 10-foot straightedge laid parallel to centerline of pavement, shall show no deviation in excess of c inch in 10 feet. Correct surface not meeting this requirement.

C. Dimensions of speed humps shall conform with details for speed hump design and speed hump height tolerances.

3.06 QUALITY CONTROL

A. Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.

B. For in-place depth and density, take minimum of one core at random locations for each 1000 feet of single lane pavement. On a 2-lane pavement, take samples at random every 500 feet from alternating lanes. Take cores for parking lots every 500 square yards of base to determine in-place depth and density. If cul-de sac or streets are less than 500 feet, minimum

of 2 cores (one per lane) will be procured. On small projects, take a minimum of two cores for each day's placement. For first day's placement and prior to coring, minimum of 5 nuclear gauge readings will be performed at each core location to establish correlation between nuclear gauge (wet density reading) and core (bulk density). This process will continue for each day's placement until engineer determines that a good bias has been established for that nuclear gauge.

C. Determine in-place density in accordance with TxDOT Tex-207-F and Tex-227-F from cores or sections. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by City Engineer.

D. Request, at option, three additional cores in vicinity of cores indicating nonconforming in-place depths at no additional cost to City. In-place depth at these locations shall be average depth of four cores.

E. Fill cores and density test sections with new compacted asphaltic concrete.

F. Speed humps: Measure dimensions of completed speed hump, before applying pavement markings, at locations shown on Speed Hump Height Measurement Worksheet. Complete one worksheet for each speed hump, and send completed worksheets to City of Tomball, Department of Public Works and Engineering, Traffic Management and Maintenance Branch, _____Tomball, Texas, _____.

3.07 NONCONFORMING PAVEMENT

A. Recompact nonconforming pavement sections not meeting surface test requirements or having unacceptable surface texture with new material sections of surface course pavement. Patch asphalt pavement sections in accordance with procedures established by Asphalt Institute.

B. Remove and replace areas of asphalt found deficient in thickness by more than 10 percent. Use new asphaltic base of thickness shown on Drawings.

C. Replace speed humps which do not conform to requirements of details, or which are rejected by City Engineer.

3.08 UNIT PRICE ADJUSTMENT

A. Adjust Unit Prices for in-place depth determined by cores as follows:

1. Adjusted Unit Price shall be ratio of average thickness as determined by cores to thickness bid upon, times unit price bid.

2. Apply adjustment to lower limit of 90 percent and upper limit of 100 percent of unit price.

3. Average depth below 90 percent may be rejected by City Engineer.

3.09 PROTECTION

A. Do not open pavement to traffic until 12 hours after completion of rolling, or as shown on Drawings.

B. Maintain asphalt pavement in good condition until completion of Work.

C. Repair defects immediately by replacing asphalt pavement to full depth.

3.10 PAVEMENT MARKINGS FOR SPEED HUMPS

A. Apply pavement markings to speed humps in conformance with dimensions shown on detail for speed hump design.

END OF SECTION