

**PROPOSED  
SPECIFICATIONS  
FOR  
PAVING AND DRAINAGE IMPROVEMENTS  
HAYS COUNTY, TEXAS**

**DESIGN STANDARDS:** Design Standards, unless specifically listed below, shall be standards that are found in common usage by the Texas Department of Transportation (TXDOT), latest edition or City of Austin Standard Specifications or stricter of the two. Design guidelines shall follow the "American Association of State Highway Transportation Officials", "U.S. Department of Transportation Highway Utility Guide", "Uniform Manual of Traffic Control Devices", or as directed by the County Engineer.

**Item: 1.00 EXCAVATION AND SUBGRADE PREPARATION**

**1.01 DESCRIPTION** The work to be performed under this specification will consist of excavation and grading necessary for the preparation of the road-bed subgrade and roadside and drainage ditches, and shall include the removal and satisfactory disposal of all trees, shrubs, brush, rock and other debris within the right-of-way being cleared.

**1.02 CONSTRUCTION METHODS** After the site of the work has been properly cleared, the excavation and grading may proceed in conformity with the plans and specifications, and as directed by the County Engineer or Representative.

When required by the plans and specifications, selected materials from the excavation shall be utilized to improve the road-bed, in which case the work shall be performed in such manner and sequence that suitable materials may be selected, removed separately and deposited in the roadway within the limits and to the required elevations.

If unsuitable subgrade material is encountered, this material shall be excavated to a depth as required by the County Engineer or Representative and suitable material from the project used to construct the roadbed.

Care shall be exercised so as not to disturb the natural ground below the compacted subgrade limits except for the construction of structures, or when so ordered by the County Engineer or Representative.

The finished grades, slopes and edges of the excavation shall be backfilled where necessary, using select materials thoroughly compacted and dressed off uniformly in a neat and workmanlike manner.

The Contractor shall at all times make ample provisions for completely and readily draining the subgrades and excavation.

**1.03 EMBANKMENT** Embankments or fills shall be constructed at the locations and to the lines and grades indicated on the drawings, or as established. Materials placed in fills shall be free from all vegetable matter, trash and frozen materials, and stone having a maximum dimension greater than six inches. Fills shall be formed of excavated materials placed in successive layers of such widths and lengths as are suited to the sprinkling and compaction method utilized. Embankments shall be constructed in layers not exceeding six inches in thickness after compaction. The Contractor shall add moisture to or shall dry by aeration, each layer as may be necessary to meet the requirements of this specification for compaction. The addition

of moisture to or drying by aeration of, each layer, shall be accompanied with thorough mixing so as to bring all material in each layer to a uniform moisture content. Compaction shall be accomplished with tamping rollers, discs, and pneumatic rollers of approved design. Tamping rollers shall be used except for the final rolling of the completed fill which shall be accomplished by rubber-tired rollers. The rollers, unless otherwise directed, shall be operated at a speed between two and three miles per hour. All soft areas that develop under construction operations shall be scarified, aerated or moistened as required, and compacted to the full depth required to obtain the specified density of 95% for each layer. Portions of embankments which are too near adjacent walls, pavements or other fixed objects to permit use of the above specified rolling equipment for compacting, and other portions which the roller cannot reach for any reason, shall be thoroughly compacted by tamping in two-inch layers with mechanical tampers or other equipment as approved by the County Engineer or Representative. The degree of compaction for such portions of the embankments shall be equivalent to that obtained by sprinkling and rolling as specified for other respective portions of the embankment. Any damage to adjacent walls, pavements or other fixed objects, shall be replaced or repaired at the expense of the Contractor.

After compaction, a field density test shall be required at intervals no less than 300 feet, at locations representative of the entire roadway. Intermediate points will be tested if required by the County Engineer or Representative. The cost of these tests shall be borne by the Developer or contractor.

All road subgrade and embankments shall be compacted to a minimum density of ninety-five percent (95%) AASHO T-99, Method D. (All lifts are subject to proof Roll, Per TXDOT Item 216)

<u>Description</u>	<u>Density, Percent</u>	<u>Moisture</u>
Non-swelling soils with plasticity index less than 20	Not less than 95	
Swelling soils with plasticity index of 20 to 35	Not less than 95 nor more than 102	Not less than optimum to +3
Swelling soils with plasticity index over 35	Not less than 95 nor more than 100	Not less than optimum to +3

**1.04 MAINTENANCE OF THE FINISHED SUBGRADE**

The finish subgrade shall be maintained to the proper grade, cross section, density, and moisture requirements by the Contractor until subbase or base material is placed thereon. All such maintenance, including recompacting necessary as a result of precipitation or excessive drying out, shall be the responsibility of the Contractor. All construction traffic shall be uniformly distributed over the subgrade. The contractor shall check the subgrade for conformity to the lines and grades by setting "blue tops" at intervals not exceeding 50 feet (15 meters) on the centerline, at quarter points, at edge of flex base and at other points indicated on the drawings or requested by the County Engineer or Representative. All subgrade and ditches shall have positive drainage prior to placement of flex base.

**1.05 STABILIZED SUBGRADE**

Reference TXDOT most current Specifications. Method must be approved by Geotechnical Report and the County Engineer.

## 1.06 SUBGRADE TESTING

1. All paving subgrade shall be proof-rolled after the roadway has been cut to grade. The design Engineer, Accredited Laboratory, or their designated representative shall monitor proof-rolling operations and shall determine whether remediation of weak areas is required before subgrade treatment. If remediation is required, the Design Engineer or Accredited Laboratory shall provide recommendations for remediation. The Design Engineer shall determine equipment that is suitable for use during proof-rolling. County Representative must be present.
2. Density tests shall be performed every 300 linear feet of subgrade. Closer spacing for density testing may be required to verify conformance with project specifications.
3. In the event of rainwater standing on the subgrade after densities are made, or other conditions beyond the contractors control, and if the County Engineer or Representative deems that the subgrade conditions have been adversely affected, proof-rolling of the subgrade will be required.
4. A minimum of (3) in-place density test per street are required. County Engineer or Representative is required to be at all in-place densities.
5. The contractor is required to have copies of all subgrade density reports in his/her possession at the construction site at the time of placement of base material. Test date must be clearly marked on the test reports.

**1.07 INSPECTION** Prior to the installation of the base material, the compacted subgrade shall be inspected by the County Engineer or Representative. The owner or his agent shall notify the County Engineer or his Representative twenty-four (24) hours prior to the time when the inspection is needed. **(Proof Roll require per TXDOT Item 216)**

## Item: 2.00 PIPE EMBEDMENT

### 2.01 Materials

Bedding shall be angular material (crushed stone or gravel) that is, washed material, hard and insoluble in water, free of mud, clay, silt, vegetation or other debris.

- a. For pipe smaller than 12- inches in diameter, the embedment material shall meet ASTM C33 size No. 67

<u>Sieve Size</u>	<u>Percent Passing</u>
1"	100%
3/4"	90-100%
3/8"	20-55%
#4	0-10%
#8	0-5%

- b. For pipe 12-inches in internal diameter or large, the embedment

Material shall meet C33 size No. 57

<u>Sieve Size</u>	<u>Percent Passing</u>
1 1/2"	100%
1"	95-100%
1/2"	25-60%
#4	0-10%
#8	0-5%

## 2.02 Installation of Embedment

All Lines shall have a min of 6-inches of embedment material below the bottom of the pipe. The initial layer of embedment placed to receive the pipe shall be brought up to a grade higher than that required for the bottom of pipe. The pipe shall be placed and brought to grade by tamping or by removal of the slight excess amount of embedment under the pipe:

Adjustments to grade shall be made by scraping away or filling with embedment material. Wedging or blocking up the pipe will not be permitted. Each pipe section of the pipe shall have a uniform bearing on the embedment of the length of pipe, except immediately at the joint. All lines shall have a minimum of 6-inches of granular embedment material on each side of the pipe and not less than 12-inches above the top of pipe. **(No sand allowed in right-of-way)** All other bedding materials must be approved by the County Engineer. All bedding and trenches must be inspected prior to backfill by the County Engineer or Representative. **All trenches in right-of-way must meet Hays County subgrade requirements for testing.**

## Item: 300 FLEXIBLE BASE

**3.01 DESCRIPTION** This item shall consist of a foundation course for the asphaltic concrete or other paving, and shall be composed of crushed limestone material constructed as herein specified in one or more courses in conformity with the typical sections shown on the plans and to the lines and grades established.

**3.02 MATERIALS** The flexible base shall be constructed of crushed limestone material from an approved source. The material shall consist of durable stone particles mixed with an approved binding material, meeting the requirements of **TXDOT Item 247**

Retained on 1 3/4" sieve	0%
Retained on 7/8" sieve	10% to 35%
Retained on 3/8" sieve	30% to 50%
Retained on #4 sieve	45% to 65%
Retained on #40 sieve	70% to 85%

The material passing the #40 sieve shall be known as "soil binder" and shall meet the following requirements:

Liquid limit shall not exceed 42

Plasticity index shall not exceed 10

The base material proposed to be used shall be tested by an approved soils testing laboratory and the results of the test shall be submitted to the County Engineer or Representative prior to use of the material.

**3.03 CONSTRUCTION METHODS** The base material shall be placed on the prepared subgrade in uniform courses with the compacted thickness to be no more than 7 inches nor less than 3 inches. Material deposited on the subgrade shall be spread and shaped the same day unless otherwise directed by the County Engineer or Representative.

The course shall then be sprinkled as required and rolled as directed until a uniform compaction is secured. Through this entire operation, the shape of the course shall be maintained by blading and the surface, upon completion, shall be smooth and in conformance with the typical sections shown on the plans and to the established lines and grades. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the area affected, adding suitable material as required, and reshaping and recompacting by sprinkling and rolling. Material excavated in preparation of the subgrade may be utilized in the construction of adjacent shoulders and slopes or otherwise disposed of as directed, and any additional material required for the completion of the shoulders and slopes shall be secured from approved sources designated by the County Engineer or Representative.

Each course of base shall be compacted to a minimum density of 100 percent (100%), according to **TXDOT Test Method Tex-113-E**.

After final compaction, a field density test shall be required at intervals no less than 300 feet, at locations representative of the entire road base. Intermediate points will be tested if required by the County Engineer or Representative. The cost of these tests shall be borne by the Developer or contractor.

**3.04 THICKNESS CONTROL** The thickness of the compacted flexible base may vary from a maximum of 1/2 inches less than specified to a maximum of 1 inch more than specified. Deviations not within this tolerance shall be corrected. The contractor shall check the surface of the lift for conformity of the lines and grades by setting "blue tops" at intervals not exceeding 50 feet (15 meters) on the centerline, at quarterpoints, at curb lines or at edge of pavement, and at other points that may be indicated on the drawings.

When the thickness of a particular lift of the flex base is in question, the contractor shall check the lift for conformity to the lines and grades by setting "blue tops" at intervals not to exceed 50 feet (15 meters) on the centerline, at quarterpoints, at curblines or edge of pavement, and at other points that may be indicated on the drawings, or as directed by the County Engineer or Representative

### **3.05 ROADS BASE REQUIREMENT**

Roads that are intended to be privately maintained may be constructed of compacted flexible base material with a minimum width as shown on Table 7.3. The base course shall have a thickness of not less than Eight inches (8") after compaction for streets constructed on subgrade material with a Plasticity Index less than thirty (30). The base course shall have a thickness of not less than Ten inches (10") after compaction for streets constructed on subgrade material with a Plasticity Index greater than thirty (30), but less than forty-five (45). In the event that the Plasticity Index of the subgrade exceeds forty-five (45), the flexible base course shall not be less than twelve inches (12") after compaction. Design engineer must submit a Geo technical report and approved by the County Engineer prior to pavement design.

### **3.06 FLEXIBLE BASE TESTING**

1. All base material shall be from an approved TxDOT supplier or supplier approved by the County Engineer.
2. Density test shall be performed every 300 linear feet of base material. Closer spacing for density test may be required to verify conformance with project specifications.
3. A minimum of (3) in-place density test per street are required. County Engineer or Representative must be present at time of in-place density.

**3.07 INSPECTION** Prior to the installation of the paving, the compacted base material shall be inspected by the County Engineer or Representative. (Proof Roll required prior to paving per **TxDOT Item 216**) The Owner or his agent shall notify the County Engineer or Representative twenty-four (24) hours prior to the time when the inspection is needed.

### **Item: 4.00 PRIME COAT**

#### **4.01 Description**

This item shall govern the application of asphaltic material on the completed base course and/or other approved areas in accordance with the Drawings, these specifications or as directed by the County Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

#### **4.02 Materials**

##### **A. Asphalt Materials**

The asphalt material for Prime Coat shall meet the requirements of Cutback Asphalt, MC-30, Emulsion, SS-1, Emulsion CSS-1 or AE-P, or TxDOT's most current Specification.

##### **B. Water**

Water shall be furnished by the Contractor and shall be clean and free from industrial wastes and other objectionable matter.

##### **C. Dispersal Agent**

Agent shall be added to water and sprayed on surfaces to be primed in accordance with asphalt manufacturer's recommendations.

#### **4.03 Construction Methods**

When, in the opinion of the County Engineer or designated representative, the base course or other surface is satisfactory to receive the prime coat, the

surface shall be prepared by sweeping or other approved methods as directed by the County Engineer or designated representative. The surface shall be lightly sprinkled with water just prior to application of the asphaltic material unless this requirement is waived by the County Engineer or designated representative. The Contractor shall submit a list of prime material(s) recommended for application on the work to the County Engineer or designated representative for approval. When emulsions are approved, a dispersal agent shall be added to the water before sprinkling.

The asphaltic material shall be applied on the clean surface by an approved type of self-propelled pressure distributor operated so as to distribute the prime coat at a rate ranging from 0.1 to 0.3 gallons per square yard (0.45 to 1.36 liters per square meter) of surface area. The material shall be evenly and smoothly distributed under pressure sufficient to assure proper distribution. During the application of prime coat, care shall be taken to prevent splattering of adjacent pavement, curb and gutters or structures. The Contractor shall be responsible for cleaning all splattered areas.

Prime Coat may be applied when the temperature of the surface on which the prime coat is to be placed is 60°F (16°C) or above and the air temperature is above 50°F (10°C) and rising; the air temperature being taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer or designated representative, are not suitable.

***The Contractor shall provide all necessary facilities and equipment for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two (2) distributor loads.***

The distributor shall have been calibrated within three (3) years from the date it is first used on this project. The County Engineer or designated representative shall be furnished an accurate and satisfactory record of such calibration. After beginning the work, if the yield on the asphaltic material applied appears in error, the distributor shall be calibrated in a manner satisfactory to the County Engineer or designated representative before proceeding with the work.

The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the Engineer or designated representative. No traffic, hauling or placement of any subsequent courses shall be permitted over the freshly applied prime coat for a minimum of 48 hours or until the prime coat is accepted as dry and cured completely by the County Engineer or designated representative.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times and they shall be operated in such a manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating unit at all times.

The County Engineer or designated representative will approve the temperature of application based on the temperature-viscosity relationship that will permit application of the asphalt within the limits recommended in TxDOT's most current specification. The Contractor shall apply the asphalt at a temperature within 15<sup>0</sup>F (8<sup>0</sup>C) of the temperature specified in TxDOT's most current Specifications

**Item: 5.00 TWO COURSE SURFACE TREATMENT**

**5.01 DESCRIPTION** This item shall consist of a wearing surface composed of two applications of asphaltic material, each covered with aggregate constructed on the prepared base course as herein specified and in accordance with the details shown on the plans. All specifications in this item shall be in conformance with the Texas Highway Department Standard Specifications for Construction of Highways, Streets, and Bridges, herein referred to as TXDOT most current Highway Standards.

Two course surface treatment shall not be applied when the air temperature is below 60oF, or when it is anticipated that the air temperature will fall below 50oF within the (10) days following application. Air temperature shall be taken in the shade and away from artificial heat. Asphaltic material shall not be placed when general weather conditions, in the opinion of the County Engineer or Representative, are not suitable.

**5.02 MATERIALS**

Aggregate:

Aggregates are to be composed of sound and durable particles of gravel, crushed gravel, crushed stone, crushed slag, or natural limestone rock asphalt. These materials shall contain not more than one percent (1%) by weight of organic matter other than native bitumen, clays, loam or pebbles coated therewith and shall not contain more than five percent (5%) by weight of any combination of slate, shale, or soft particles of sandstone when tested in accordance with Test Method TEX-217-F. The per cent of wear on natural limestone rock asphalt as determined by Test Method TEX-410-A shall be made on that portion of the material retained on the No. 4 sieve, having naturally impregnated asphalt content of less than one percent (1%).

When tested by Test Method TEX-200-F the percent by weight shall be as follows:

<b>CLASS B:</b> Grade 3	<b>TYPE B</b> Retained on 3/4" sieves	0
	Retained on 5/8" sieves	0-2
	Retained on 1/2" sieves	20-25
	Retained on 3/8" sieves	85-100
	Retained on 1/4" sieves	95-100
	Retained on No. 10 sieves	99-100

Application Rate - Min 1 cy covers 80 sy, (1:80), max 1 cy covers 100 sy, (1:100).

Grade 4	Retained on 5/8" sieves	0
	Retained on 1/2" sieves	0-2
	Retained on 3/8" sieves	20-35
	Retained on No. 4 sieves	95-100
	Retained on No. 10 sieves	99-100

Application Rate-Min. 1 cy covers 90 sy, (1:90), max 1 cy covers 110 sy, (1:110).

Asphaltic Materials:

Asphaltic materials shall be AC-5 Asphaltic Cement or HFRS-2 High Float Anionic Emulsion as specified by item 300 of TxDot 1993 Standard Specifications. Application temperature for AC-5 shall be between 275oF - 325oF and for HFRS-2 shall be between 110oF - 150oF. Rate of application shall be 0.35 - 0.45 gallons per square yard for the first course and 0.25-0.35 gallons per square yard for the second course. HFRS-2, if used, shall be applied at the upper end of these application rates.

**5.03 CONSTRUCTION METHODS** The area to be treated shall be cleaned of dirt, dust, or other deleterious matter by sweeping or other approved methods. If it is found necessary by the County Engineer or Representative, the surface shall be lightly sprinkled just prior to the first application of asphaltic material.

Asphaltic material of the type and grade shown on the plans for the first course shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified, evenly and smoothly, under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all of the heating equipment and in the distributor, for determining the rate at which it is applied, and for securing uniformity at the junction of two distributor loads. The distributor shall have been recently calibrated and the County Engineer or Representative shall be furnished an accurate and satisfactory record of such calibration. After beginning work, should the yield of the asphalt material appear to be in error, the distributor shall be recalibrated in a manner satisfactory to the Road Director before proceeding with the work.

Asphaltic material for each course may be applied for the full width of the surface treatment in one application, unless the width exceeds twenty-six feet (26'). No traffic or hauling will be permitted over the freshly applied asphaltic material until immediate covering is assured.

Aggregate, of the type and grade shown on the plans for the first course, shall be immediately and uniformly applied and spread by an approved self-propelled continuous feed aggregate spreader, unless otherwise shown on the plans or authorized by the County Engineer in writing. The aggregate shall be applied at the approximate rates indicated on the plans and as directed by the County Engineer or Representative. The Contractor shall be responsible for the maintenance of the surface of the first course until the second course is applied.

The entire surface shall be broomed, bladed or raked as required by the County Engineer or Representative and shall be thoroughly rolled with power rollers, self-

propelled type, weighing not less than 6 tons not more than 12 tons. All wheels shall be flat.

In lieu of the rolling equipment specified, the Contractor may, upon written permission from the County Engineer, operate other compacting equipment that will produce equivalent relative compaction in the same period of time as the specified equipment. If the substituted compaction equipment fails to produce the desired compaction within the same period as would be expected of the specified equipment, as determined by the County Engineer or representative, its use shall be discontinued.

Rollers shall be maintained in good repair and operating condition and shall be approved by the County Engineer or Representative.

The second course shall consist of asphaltic material and aggregate of the type and grade indicated on the plans for the second course. The asphaltic material and aggregate for this second course shall be applied and covered in the manner specified for the first application. The surface shall then be broomed, bladed or raked as required by the County Engineer or Representative and thoroughly rolled as specified for the first course. Asphaltic materials and aggregates for both courses shall be applied at the approximate rates indicated on the plans and as directed by the County Engineer or Representative.

The Contractor shall be responsible for the maintenance of the surface until the work is accepted by the County Engineer.

The Contractor shall be responsible for the proper preparation of all stockpile area before aggregates are placed thereon, including leveling and cleaning of debris necessary for the protection of the aggregate to prevent any contamination thereof.

All storage tanks, piping, retorts, booster tanks and distributors used in storing or handling asphaltic materials shall be kept clean and in good operating condition at all times and they shall be operated in such manner that there will be no contamination of the asphaltic material with foreign material. It shall be the responsibility of the Contractor to provide and maintain in good working order a recording thermometer at the storage heating utility at all times.

The County Engineer or Representative will select the temperature of application based on the temperature-viscosity relationship that will permit application of the asphalt within the limits recommended in the Item, "Asphalt's Oils, Emulsions." The recommended range for the viscosity of the asphalt is 50 seconds to 60 seconds, Saybolt Furol. The Contractor shall apply the asphalt at a temperature within 15oF of the temperature selected.

## **Item: 6.00 HOT ASPHALTIC CONCRETE PAVEMENT**

**6.01 DESCRIPTION** This item shall consist of a surface course to be composed of a compacted mixture of aggregate and asphaltic material to be constructed on the previously completed base as herein specified, and in accordance with the details shown on the plans. All specifications in this item are in accordance with the TxDot most current Standard Specifications for Construction of Highways, Streets, Bridges, herein referred to as TxDot most current Standard Specifications.

**6.02 MATERIALS** Pavement shall meet the requirements of the TxDot most current Standard Specifications for item 340, Hot Mix Asphaltic Concrete Pavement (Class A), Type "D" as follows:

Type "D" (Fine Graded Surface Course):

	Per Cent by Weight
Passing 1/2" Sieve	100
Passing 3/8" Sieve	95 to 100
Passing 3/8" sieve, Retained on No. 4 Sieve	20 to 50
TOTAL REMAINING ON NO. 10 SIEVE	50 to 70
Passing No. 10 sieve, Retained on No. 40 Sieve	0 to 30
Passing No. 40 sieve, retained on No. 80 Sieve	4 to 25
Passing No. 80 sieve, retained on No. 200 Sieve	3 to 25
Passing No. 200 Sieve	1 to 8

The asphaltic material shall form from 4.0 to 8.0 per cent of the mixture by weight unless specified otherwise on the plans.

Asphalt for the pavement mixture shall be asphalt cement (AC-5 or AC-10) which shall meet the requirements of the TxDot 1993 Standard Specifications, for item 300.

The asphalt materials for tack coat shall meet the requirements for cut back asphalt, RC-250. Asphalt for prime coat shall meet Item 4.00 of this manual. All asphalt materials shall meet the requirements of TxDot 1993 Standard Specifications, Item 300.

The Coarse and Fine Aggregates shall meet the requirements of the TxDot 1993 Standard Specifications, Section 340.2.

**6.03 CONSTRUCTION METHODS** Before the asphaltic concrete is placed, the surface on which the mixture is to be placed shall be thoroughly cleaned and the prime coat of MC-30 or tack coat of RC-2, or both, applied as directed with approved sprayer at the rate of 0.10 gallons minimum per square yard of surface.

The asphaltic concrete mixture, heated and prepared as specified, shall be hauled to the project in tight vehicles previously cleaned of all foreign material. The mixture shall be at a temperature of 250oF to 350oF for the mixture suitable to the weather and project conditions. The target temperature shall be reported to the County Engineer or Representative daily and recorded in the daily report. The mixture shall not vary by more than 25oF from the target temperature upon discharge from the mixer. No mixture cooler than 50oF from the target temperature shall be accepted or placed on the project. It shall be spread into place with an approved mechanical finishing machine to the compacted depth shown on plans. Minimum thickness standard for Hot Mix Asphaltic Cement, if selected, to be not less than one and one-half inches (1 1/2") after compaction.

The finishing machine shall be of the screeding and/or tamping type.

While still hot, as soon as it will bear the roller without undue displacement or hair cracking, the surface shall first be compressed thoroughly and uniformly with acceptable power-driven three wheel or tandem rollers weighing from 8 to 10 tons. Subsequent compression shall be obtained by starting at the sides and rolling longitudinally toward the center of the pavement, over-lapping on successive trips by at least one-half (1/2) of the width of the rear wheels. Alternate trips of the roller shall be slightly different in lengths. Rolling shall be continued until no further compression can be obtained and all roller marks are eliminated. To prevent adhesions of the surfacing mixture to the roller, the wheels shall be kept properly moistened with water, but excess of water will not be permitted. The final rolling shall be done with a tandem roller. A double coverage with an approved pneumatic roller shall be used on the asphaltic concrete surface after flat wheel and tandem rolling has been completed.

Along curbs, headers and similar structures, and at all places not accessible to the roller, the mixture shall be compacted thoroughly with a lightly oiled hand tamp.

The completed surface, when tested with a ten (10) foot straight-edge laid parallel to the centerline of the roadway, shall have a maximum ordinate measured from the face of the straight-edge not to exceed one-eighth (1/8) inch at any point.

Approved templates shall be furnished by the Contractor for checking subgrade and finished sections. The templates shall be of such strength and rigidity that if the support is transferred to the center there will not be a deflection of more than one-eighth inch (1/8").

**6.04 EQUIPMENT** Mixing plants that will not continuously produce a mixture meeting all the requirements of this specification will not be accepted.

Mixing plants may be either the weight-batching type or the continuous mixing type. Both types of plants shall be equipped with satisfactory conveyors, power units, aggregates handling equipment, hot aggregate screens and bins and dust collectors and shall consist of the following essential pieces of equipment.

The Cold Aggregates Bin and the Proportioning Device, Dryer, Screens, Aggregate Weight Box and Batching Scales, Mixer, Asphalt Storage and Heating Devices, Asphalt Measuring Devices, and Truck Scales if used, shall be of the type to adequately supply materials within the tolerances set out in these specifications.

The aggregate shall be separated into at least three bins for Type 3 as specified herein. Bin No. 1 will contain aggregates of which 90 to 100 per cent by weight will pass the No. 10 sieve. Bin No.2 will contain aggregates of which at least 85 per cent by weight will be of such size as to pass the 1/4 inch sieve and be retained on the No. 10 sieve. Bin No.3 will contain aggregates of which 85 per cent by weight will be such size as to pass the 1/2 inch sieve and be retained on the No. 4 sieve.

**6.05 COMPACTION** The pavement layers/lifts shall be compacted thoroughly and uniformly to obtain the compaction and cross section meeting the requirements indicated on the Drawings and this specification item.

Regardless of the method used for compaction, all rolling to achieve specified density shall cease before the temperature of the HMA mixture drops below 175°F (80°C).

Rolling with a pneumatic tire roller shall be used to seal the surface. Rolling with a tandem or other steel-wheel roller shall be provided if required to iron out any roller marks. Surface sealing and removal of roller marks may be accomplished at HMA temperatures below 175°F (80°C).

**6.06 TESTING** The Developer, at his expense, shall employ a commercial testing laboratory approved by the County Engineer or Representative to conduct the required material checks and design the mix. During the production of the plant mix, the Contractor will provide, at his expense, continuous inspection and testing at the plant and on the project by a commercial testing laboratory approved by the County Engineer. Minimum in place density should reach 91 percent (91%).

The HMA mixture shall be tested daily at the Project site for conformance to specification requirements. The County Engineer or designated representative shall utilize a random selection method to determine sample locations based on the Contractor's anticipated production. Each day's anticipated production shall be divided into three (3) essentially equal single-pass, sub-area lots. Each day's sample locations shall be equally distributed over the three (3) sub-areas. If, due to the weather or plant malfunctions, the Contractor's daily-anticipated production is not attained, the random locations will not be recalculated. Also, no more than one location of the three (3) sub-areas shall be located in an irregular shaped area such as a cul-de-sac.

Unless directed otherwise by the County Engineer or designated representative, a minimum of three bag samples and three correlating 6-inch (150-mm) cores will be obtained from each day's production.

Bag samples shall be taken during lay-down operations. The primary sampling point for the bag samples shall be from the windrow if a windrow elevator is used. If a windrow elevator is not used, the sample shall be taken from the middle of the paving machine hopper. This sampling location will require a stoppage in the paving operation in order for the Inspector to safely secure a sample from the hopper.

One core shall be taken for every 2,000 single-pass square yards (1 675 single-pass square meters) with a minimum of three (3) cores for all projects. One core shall be taken at the same station and pass sampled for each of the bag samples. Cores shall be taken by the laboratory within 48 hours of pavement laydown unless otherwise directed by the County Engineer or designated representative.

For total areas of less than 500 square yards (420 square meters), a total of only two bag samples and two correlating cores will be obtained. If the Contractor desires additional testing, it shall be at its own entire expense.

The County Engineer or designated representative may alter, increase or waive the testing schedule to ensure material and workmanship compliance with specification requirements. Acceptability of the completed pavement shall be based on the average of test results for the Project as defined in Section 6.08, "Acceptance Plan" of this item.

Gradation, asphalt content and stability value of the HMA mixture shall be reported for each of the bag samples. The stability value reported for each of the bag samples shall be the average of three (3) tests per bag.

Pavement thickness and density shall be determined from 6-inch (150 mm) field cores. For each day's placement, density of cores for which no corresponding bag samples were taken shall be determined by using the average Maximum Theoretical Density of the day's three (3) bag samples or as may otherwise be determined by the County Engineer or designated representative.

When, in the opinion of the County Engineer or designated representative, test results appear unrepresentative, additional testing may be authorized. The retesting will be at the expense of the Owner and the results of the retesting shall be averaged with the

results of the original testing. If the results of retesting indicate that the original test results were erroneous, the original test results will be discarded.

Pavements with low-density results may be recored; but the pavement shall not receive any additional compactive effort.

Cores shall be taken by the laboratory within 48 hours of paving unless otherwise authorized by the County Engineer. Pavements that will not or cannot be cored within 48 hours shall be closed to both public and construction traffic.

**6.07 ASPHALT CONTENT ACCEPTANCE SCHEDULE (TEX-210-F)**

<u>Deviation from the Job Mix Formula</u>	<u>Local Streets</u>	<u>All Others</u>
+/- 0.5	Acceptance	Acceptance
+/- 0.51 to +/- 0.60	Warranty Letter	Warranty Letter
+/- 0.61 to +/- 0.70	Warranty Letter	Remove and Replace
Over +/- 0.70	Remove and Replace	Remove and Replace

**6.08 DENSITY ACCEPTANCE SCHEDULE ( TEX-207-F/TEX-227-F)**

<u>Percent Density</u>	<u>1-1/2" thickness or Greater</u>
Above 96	Remove and Replace
91 to 96	Acceptable
90.9 to 88.1	Warranty Letter
Less than 88.1	Remove and Replace

**6.09 THICKNESS ACCEPTANCE SCHEDULE**

<u>Variance Percent of Thickness</u>	<u>Acceptable/ Remove and Replace</u>
0 – 10	Acceptance
10.1 - 16	Warranty Letter
16.1 – 25	Warranty Letter
Over 25	Remove and Replace

**Item: 7.00 REINFORCING STEEL**

**7.01 Description**

This item shall consist of the furnishing and placing of reinforcing steel, deformed and smooth, of the size and quantity indicated and in accordance with these specifications.

**7.02 Materials**

(1) Bars

Bar reinforcement shall be deformed and shall conform to ASTM A 615, A 616, Grades 40, 60 or 75 and shall be open-hearth, basic oxygen or electric furnace new billet steel, unless otherwise indicated. Large diameter new

billet steel (Nos. 14 and 18), Grade 75, will be permitted for straight bars only.

Where bending of bar sizes No. 14 or No. 18 of Grades 40 or 60 is required, bend testing shall be performed on representative specimens as described for smaller bars in the applicable ASTM specification. The required bend shall be 90 degrees at a minimum temperature of 60 F around a pin having a diameter of 10 times the nominal diameter of the bar and shall be free of cracking.

Spiral reinforcement shall be either smooth or deformed bars or wire of the minimum diameter indicated. Bars for spiral reinforcement shall comply with ASTM A 675, A 615 or A 617. Wire shall comply with ASTM A 82. The minimum yield strength for spiral reinforcement shall be 40,000 psi.

In cases where the provisions of this item are in conflict with the provisions of the ASTM Designation to which reference is made, the provisions of this item shall govern.

Report of chemical analysis showing the percentages of carbon, manganese, phosphorus and sulphur will be required for all reinforcing steel when it is to be welded, except for drill shafts. No tack welding will be allowed. All welding shall conform to the requirements of AWS D-1-72.

The nominal size and area and the theoretical weight (lbs.) of reinforcing steel bars covered by these specifications are as follows:

<b>Bar Size Number</b>	<b>Nom. Diameter, inches</b>	<b>Nom. Area, Sq. ins.</b>	<b>Weight/Linear Foot</b>
2	0.250	0.05	0.167
3	0.375	0.11	0.376
4	0.500	0.20	0.668
5	0.625	0.31	1.043
6	0.750	0.44	1.502
7	0.875	0.60	2.044
8	1.000	0.79	2.670
9	1.128	1.00	3.400
10	1.270	1.27	4.303
11	1.410	1.56	5.313
14	1.693	2.25	7.65
18	2.257	4.00	13.60

Smooth bars, larger than No. 4, may be steel conforming to the above or may be furnished in any steel that meets the physical requirements of ASTM A 36.

Smooth, round bars shall be designated by size number through No. 4. Smooth bars above No. 4 shall be designated by diameter in inches.

## (2) Welded Wire Fabric

Wire for fabric reinforcement shall be cold-drawn from rods hot-rolled from open-hearth, basic oxygen or electric furnace billet. Wire shall conform to the requirements of the Standard Specifications for Cold-Drawn Steel Wire

for Concrete Reinforcement, ASTM A 82 or A 496. Wire fabric, when used as reinforcement, shall conform to ASTM A 185 or A 497.

When wire is ordered by size numbers, the following relation between size number, diameter in inches and area shall apply unless otherwise indicated:

<b>Size, W Number</b>	<b>Nom. Diameter (inch)</b>	<b>Nom. Area, sq. inches</b>
31	0.628	0.310
30	0.618	0.300
28	0.597	0.280
26	0.575	0.260
24	0.553	0.240
22	0.529	0.220
20	0.505	0.200
18	0.479	0.180
16	0.451	0.160
14	0.422	0.140
12	0.391	0.120
10	0.357	0.100
8	0.319	0.080
7	0.299	0.070
6	0.276	0.060
5.5	0.265	0.055
5	0.252	0.050
4.5	0.239	0.045
4	0.226	0.040
3.5	0.211	0.035
3	0.195	0.030
2.5	0.178	0.025
2	0.160	0.020
1.5	0.138	0.015
1.2	0.124	0.012
1	0.113	0.010
0.5	0.080	0.005

Where deformed wire is required, the size number shall be preceded by D and for smooth wire the prefix W shall be shown.

(3) Chairs and Supports

Chairs and Supports shall be steel, precast mortar or concrete blocks cast in molds meeting the approval of the Engineer/Architect of sufficient strength to position the reinforcement as indicated when supporting the dead load of the reinforcement, the weight of the workers placing concrete and the weight of the concrete bearing on the steel. Chairs shall be plastic coated when indicated.

<b>Chair Types and Applicable Uses</b>	
Structural or Architectural Elements (columns, beams, walls, slabs) exposed to weather, not subjected to sand blasting, water blasting or grinding.	Galvanized steel or steel chairs with plastic coated feet.
Structural or Architectural Elements exposed to weather and subject to sand blasting, water blasting or grinding.	Stainless steel chairs.
Structural or Architectural Elements not exposed to weather or corrosive conditions.	Uncoated steel chairs
Slabs and grade beams cast on grade.	Steel chairs with a base with 9 inch <sup>2</sup> minimum area or sufficient area to prevent the chair from sinking into fill or subgrade. Precast mortar or concrete blocks meeting the requirements of this item may be used.

**7.03 Bending**

The reinforcement shall be bent cold, true to the shapes indicated. Bending shall preferably be done in the shop. Irregularities in bending shall be cause for rejection.

Unless otherwise indicated, the inside diameter of bar bends, in terms of the nominal bar diameter (d), shall be as follows:

Bends of 90 degrees and greater in stirrups, ties and other secondary bars that enclose another bar in the bend.

Bar Number	Grade 40	Grade 60
3,4,5	3d	4d
6,7,8	4d	5d

All bends in main bars and in secondary bars not covered above.

Bar Number	Grade 40	Grade 60	Grade 75
------------	----------	----------	----------

3 thru 8	6d	6d	--
9,10	8d	8d	--
11	8d	8d	8d
14,18	10d	10d	--

#### 7.04 Storing

Steel reinforcement shall be stored above the surface of the ground upon platforms, skids or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the work, reinforcement shall be free from dirt, paint, grease, oil or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross sectional area and tensile properties of a hand wire brushed specimen meets the physical requirements for the size and grade of steel indicated.

#### 7.05 Splices

No splicing of bars, except when indicated or specified herein, will be permitted without written approval of the Engineer/Architect. No substitution of bars will be allowed without the approval of the Engineer/Architect. Any splicing of substituted bars shall conform to Table 1.

Splices not indicated will be permitted in slabs not more than 15 inches in thickness, columns, walls and parapets, but not included for measurement, subject to the following:

Splices will not be permitted in bars 30 feet or less in plan length. For bars exceeding 30 feet in plan length, the distance center to center of splices shall not be less than 30 feet minus 1 splice length, with no more than 1 individual bar length less than 10 feet. Splices not indicated, but permitted hereby, shall conform to Table 1. The specified concrete cover shall be maintained at such splices and the bars placed in contact and securely tied together.

<b>Bar Number</b>	<b>Grade 40</b>	<b>Grade 60</b>
3	1 foot 0 inches	1 foot 0 inches
4	1 foot 2 inches	1 foot 9 inches
5	1 foot 5 inches	2 feet 2 inches
6	1 foot 9 inches	2 feet 7 inches
7	2 feet 4 inches	3 feet 5 inches
No. 8	3 feet 0 inches	4 feet 6 inches
No. 9	3 feet 10 inches	5 feet 8 inches
No. 10	4 feet 10 inches	7 feet 3 inches

No. 11	5 feet 11 inches	8 feet 11 inches
--------	------------------	------------------

Spiral steel shall be lapped a minimum of 1 turn. Bar No. 14 and No. 18 may not be lapped.

Welding of reinforcing bars may be used only where indicated or as permitted herein. All welding operations, processes, equipment, materials, workmanship and inspection shall conform to the requirements indicated. All splices shall be of such dimension and character as to develop the full strength of the bar being spliced.

End preparation for butt welding reinforcing bars shall be done in the field, except Bar No. 6 and larger shall be done in the shop. Delivered bars shall be of sufficient length to permit this practice.

For box culvert extensions with less than 1 foot of fill, the existing longitudinal bars shall have a lap with the new bars as shown in Table 1. For box culvert extensions with more than 1 foot of fill, a minimum lap of 6 inches will be required.

Unless otherwise indicated, dowel bars transferring tensile stresses shall have a minimum embedment equal to the minimum lap requirements shown in Table 1. Shear transfer dowels shall have a minimum embedment of 12 inches.

### 7.06 Placing

Reinforcement shall be placed as near as possible in the position indicated. Unless otherwise indicated, dimensions shown for reinforcement are to the centers of the bars. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/12 of the spacing between bars. In the plane of the steel perpendicular to the nearest surface of concrete, bars shall not vary from plan placement by more than 1/4 inch. Cover of concrete to the nearest surface of steel shall be as follows:

	Minimum Cover, Inches
(a) Concrete cast against and permanently exposed to earth	3
(b) Concrete exposed to earth or weather:	
Bar No. 6 through 18 bars	2
Bar No. 5, W31 or D31 wire and smaller	1 1/2
(c) Concrete not exposed to weather or in contact with ground:	
Slabs, walls, joists:	
Bar No. 14 and 18	1 1/2
Bar No. 11 and smaller	1
Beams, columns:	
Primary reinforcement, ties, stirrups, spirals	1 1/2
Shells, folded plate members:	
Bar No. 6 and larger	1
Bar No. 5, W31 or D31 wire, and smaller	1

Vertical stirrups shall always pass around the main tension members and be attached securely thereto. The reinforcing steel shall be spaced its required

distance from the form surface by means of approved galvanized metal spacers, metal spacers with plastic coated tips, stainless steel spacers, plastic spacers or approved precast mortar or concrete blocks. For approval of plastic spacers on a project, representative samples of the plastic shall show no visible indications of deterioration after immersion in a 5 percent solution of sodium hydroxide for 120 hours.

All reinforcing steel shall be tied at all intersections, except that where spacing is less than 1 foot in each direction, alternate intersections only need be tied. For reinforcing steel cages for other structural members, the steel shall be tied at enough intersections to provide a rigid cage of steel. Mats of wire fabric shall overlap each other 1 full space as a minimum to maintain a uniform strength and shall be tied at the ends and edges.

Where prefabricated deformed wire mats are specified or if the Contractor requests, welded wire fabric may be substituted for a comparable area of steel reinforcing bar plan, subject to the approval of the Engineer/Architect.

A suitable tie wire shall be provided in each block, to be used for anchoring to the steel. Except in unusual cases and when specifically authorized by the Engineer, the size of the surface to be placed adjacent to the forms shall not exceed 2 1/2 inches square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be cast accurately to the thickness required and the surface to be placed adjacent to the forms shall be a true plane, free of surface imperfections.

Reinforcement shall be supported and tied in such a manner that a sufficiently rigid cage of steel is provided. If the cage is not adequately supported to resist settlement or floating upward of the steel, overturning of truss bars or movement in any direction during concrete placement, permission to continue concrete placement will be withheld until corrective measures are taken. Sufficient measurements shall be made during concrete placement to insure compliance with the above.

No concrete shall be deposited until the Engineer/Architect has reviewed the placement of the reinforcing steel and all mortar, mud, dirt, etc, shall be cleaned from the reinforcement, forms, workers' boots and tools.

## **Item: 8.00 CONCRETE STRUCTURES**

### **8.01 Description**

This item shall govern quality, storage, handling, proportioning and mixing of materials for Portland cement concrete construction of bridges, culverts, slabs, prestressed concrete and incidental appurtenances.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

## 8.02 Materials

Concrete shall be composed of Portland cement or Portland cement and fly ash, water, aggregates (fine and coarse), and admixtures proportioned and mixed as hereinafter provided to achieve specified results.

### A. Cementitious Materials

Portland cement shall conform to ASTM C 150, Type I (General Purpose), Type II (General Purpose with Moderate Sulfate Resistance) and Type III (High Early Strength). Type I shall be used when none is specified or indicated on the drawings. Type I and Type III cements shall not be used when a Type II cement is specified or indicated on the drawings. Type III cement may be used in lieu of a Type I cement, when the anticipated air temperature for the succeeding 12 hours will not exceed 60°F (15.6°C). All cement shall be of the same type and from the same source for a monolithic placement.

Portland cement manufactured in a cement kiln fueled by hazardous waste shall be considered as an approved product if the production facility is authorized to operate under regulation of the Texas Commission on Environmental Quality (TCEQ) and the U. S. Environmental Protection Agency (EPA). Supplier shall provide current TNRCC and EPA authorizations to operate the facility.

Fly ash (denoted by TEX designations Type A and Type B) may replace 20 to 35 percent of a mix design's Portland cement content by absolute volume. Fly ash shall not be used in mix designs with less than five (5) sacks of Portland cement per cubic yard (163 kilograms per cubic meter) unless specifically permitted by the contract Drawings or project manual. Fly Ash may be used in all other classes of concrete, except that Type B fly ash shall not be used with Type II cement. Fly ash shall conform to the requirements of TxDOT's most current requirement for concrete admixtures.

### B. Mixing Water

Water for use in concrete and for curing shall be potable water free of oils, acids, organic matter or other deleterious substances and shall not contain more than 1,000 parts per million of chlorides as Cl or sulfates as SO<sub>4</sub>.

Contractor may request approval of water from other sources. Contractor shall arrange for samples to be taken from the source and tested at his expense. Water quality tests shall conform to AASHTO Method T-26 except where such methods are in conflict with provisions of this specification.

Water used in white Portland cement concrete shall be free from iron and other impurities, which may cause staining, or discoloration.

### C Coarse Aggregate

Coarse aggregate shall consist of durable particles of crushed or uncrushed gravel, crushed blast furnace slag, crushed stone or combinations thereof; free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material either free or as an adherent coating. When white Portland cement is specified, the coarse aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout.

The coarse aggregate from each source shall not contain more than 0.25 percent by weight of clay lumps, nor more than 1.0 percent by weight of shale nor more than 5 percent by weight of laminated and/or friable particles when tested in accordance with TXDOT Test Method TEX-413-A. The coarse aggregate from each source shall have a wear of not more than 40 percent when tested in accordance with TXDOT Test Method TEX-410-A.

Unless otherwise indicated on the drawings, the coarse aggregate from each source shall be subjected to 5 cycles of the soundness test conforming to TXDOT Test Method TEX-411-A. The loss shall not be greater than 12 percent when sodium sulfate is used or 18 percent when magnesium sulfate is used.

Coarse aggregate shall be washed. The Loss by Decantation (TXDOT Test Method TEX-406-A), plus allowable weight of clay lumps, shall not exceed 1 percent or the value indicated on the drawings or in the project manual, whichever is less. If material finer than the # 200 (75 micrometer) sieve is definitely established to be dust of fracture of aggregates made primarily from crushing of stone, essentially free from clay or shale as established by Part III of TXDOT Test Method TEX-406-A, the percent may be increased to 1.5.

The coarse aggregate factor may not be more than 0.82; however, when voids in the coarse aggregate exceed 48 percent of the total rodded volume, the coarse aggregate factor shall not exceed 0.85. The coarse aggregate factor may not be less than 0.68 except for a Class I machine extruded mix that shall not have a coarse aggregate factor lower than 0.61.

When exposed aggregate surfaces are required, the coarse aggregate shall consist of particles with at least 40 percent crushed faces. Uncrushed gravel, polished aggregates and clear resilient coatings are not acceptable for exposed aggregate finishes.

When tested by approved methods, the coarse aggregate including combinations of aggregates when used, shall conform to the grading requirements shown in Table 1.

<b>Table 1: Coarse Aggregate Gradation Chart (TEX 401-A, Percent Retained)</b>										
<b>Grade</b>	<b>Nom. Size</b>	<b>2-1/2"</b>	<b>2"</b>	<b>1 1/2"</b>	<b>1"</b>	<b>3/4"</b>	<b>1/2"</b>	<b>3/8"</b>	<b>No. 4</b>	<b>No. 8</b>
1	2 1/2"	0	0-20	15-50		60-80			95-100	
2 (467)*	1 1/2"		0	0-5		30-65		70-90	95-100	
3	1"		0	0-5		10-40	40-75		95-100	
4 (57)*	1"			0	0-5		40-75		90-100	95-100
5 (67)*	3/4"				0	0-10		45-80	90-100	95-100
6 (7)*	1/2"					0	0-10	30-60	85-100	95-100
7	3/8"						0	5-30	75-100	
8	3/8"						0	0-5	35-80	90-100

**D. Fine Aggregate**

Fine aggregate shall be washed and consist of clean, hard, durable and uncoated particles of natural or manufactured sand or a combination thereof, with or without a mineral filler. When white Portland cement is specified, the fine

aggregates used in the concrete shall be light colored. Quality shall be reasonably uniform throughout It shall be free from frozen material or injurious amounts of salt, alkali, vegetable matter or other objectionable material and it shall not contain more than 0.5 percent by weight of clay lumps. When subjected to color test for organic impurities per TXDOT Test Method TEX-408-A, it shall not show a color darker than standard.

Unless indicated otherwise on the drawings the acid insoluble residue of fine aggregate used in slab concrete subject to direct traffic shall not be less than 60 percent by weight (mass) when tested conforming to TXDOT Test Method TEX-612-J.

When tested in accordance with TxDoT Test Method Tex-401-A, the fine aggregate, including combinations of aggregates, when used, shall conform to the grading requirements shown in Table 2.

Table 2: Fine Aggregate Gradation Chart (TEX 401-A, Percent Retained)							
3/8 (9.5 mm)	No. 4 (4.75 mm)	No. 8 (2.36 mm)	No. 16 (1.18mm)	No. 30 (600 µm)	No. 50 (300µm)	No. 100 (150 µm)	No. 200 (75 µm)
0	0-5	0-20	15-50	35-75	65-90	90-100	97-100

Where sand equivalence is greater than 85, retainage on No. 50 sieve may be 65 to 94 percent.

Where manufactured sand is used in lieu of natural sand, the percent retained on No. 200 (75 µm) sieve shall be 94 to 100.

Sand equivalent per TXDOT Test Method TEX-203-F shall not be less than 80 nor less than otherwise indicated on the drawings, whichever is greater.

The fineness modulus will be determined by adding the percentages by weight retained on sieve Nos. 4, 8, 16, 30, 50 and 100 (4.75 mm, 2.36 mm, 1.18mm, 600 µm, 300 µm, and 150 µm) and dividing the sum of the six sieves by 100. For all classes of concrete except H (see Table 4), the fineness modulus shall be between 2.30 and 3.10. For Class H concrete, the fineness modulus shall be between 2.40 and 2.90.

E. Mineral Filler

Mineral filler shall consist of stone dust, clean crushed sand or other approved inert material. When tested in accordance with TxDoT Test Method Tex-401-A, it shall conform to the following gradation:

Retained on No. 30 (600 µm) Sieve 0 percent

Retained on No. 200 (75 µm) Sieve 0 to 35 percent

F. Mortar and Grout

Unless otherwise specified, indicated on the drawings or approved by the Engineer or designated representative mortar and grout shall consist of 1 part cement, 2 parts finely graded sand and enough water to make the mixture plastic. When required to prevent color difference, white cement shall be added to produce color required. When required by the Engineer or designated representative, an approved latex adhesive may be added to the mortar.

## G. Admixtures

All admixtures shall comply with the requirements of TxDOT's most current requirements for Concrete Admixtures. Calcium chloride-based admixtures shall not be approved.

### 8.03 Storage of Materials

#### A. Cement, Flyash and Mineral Filler

All cement, fly ash and mineral filler shall be stored in separate and well ventilated, weatherproof buildings or approved bins, which will protect the material from dampness or absorption of moisture. Storage facilities shall be easily accessible and each shipment of packaged cement shall be kept separated to provide for identification and inspection. Engineer may permit small quantities of sacked cement to be stored in the open for a maximum of 48 hours on a raised platform and under waterproof covering.

#### B. Aggregates

The method of handling and storing concrete aggregates shall prevent contamination with foreign materials. If the aggregates are stored on the ground, the sites for the stockpiles shall be clear of all vegetation and shall be level. Aggregates shall be stockpiled in sizes to facilitate blending. If the aggregate is not stockpiled on a hard, non-contaminant base, the bottom 6-inch (150 mm) layer of the stockpile shall not be used without recleaning the aggregate. Where space is limited, stockpiles shall be separated by walls or other appropriate barriers. Aggregate shall be stockpiled and protected from the weather a minimum of 24 hours prior to use to minimize free moisture content. When stockpiles are too large to protect from the weather, accurate and continuous means acceptable to the Engineer or designated representative shall be provided to monitor aggregate temperature and moisture. Aggregates shall be stockpiled and handled such that segregation and contamination are minimized.

#### C. Admixtures

Admixtures shall be stored in accordance with TxDOT's most current requirements for concrete admixtures.

### 8.04 Measurement of Materials

Water shall be accurately metered. Fine and coarse aggregates, mineral filler, bulk cement and fly ash shall be weighed separately. Allowances shall be made in the water volume and aggregate weights during batching for moisture content of aggregates and admixtures. Volumetric and weight measuring devices shall be acceptable to the Engineer or designated representative.

Batch weighing of sacked cement is not required; however, bags, individually and entire shipments, may not vary by more than 3 percent from the specified weight of 94 pounds (42.6 kilograms) per bag. The average bag weight of a shipment shall be determined by weighing 50 bags taken at random.

## 8.05 Mix Design

The Contractor shall furnish a mix design acceptable to the County Engineer or designated representative for the class of concrete specified. The mix shall be designed by a qualified commercial laboratory and signed/sealed by a registered Professional Engineer, licensed in the state of Texas to conform with requirements contained herein, to ACI 211.1 or TXDOT Bulletin C-11 (and supplements thereto). The Contractor shall perform, at his own expense, the work required to substantiate the design, including testing of strength specimens. Complete concrete design data shall be submitted to the County Engineer or designated representative for approval. The mix design will be valid for a period of one (1) year provided that there are no changes to the component materials.

At the end of one (1) year, a previously approved mix may be resubmitted for approval if it can be shown that no substantial change in the component materials has occurred. The resubmittal analysis must be reviewed, signed and sealed by a registered Professional Engineer, licensed in the state of Texas. This resubmittal shall include a reanalysis of specific gravity, absorption, fineness modulus, sand equivalent, soundness, wear and unit weights of the aggregates. Provided that the fineness modulus did not deviate by more than 0.20 or that the re-proportioned total mixing water, aggregate and cement (or cement plus fly ash) are within 1, 2, and 3 percent, respectively, of pre-approved quantities, a one-year extension on the approval of the mix may be granted by the Engineer or designated representative. Updated cement, fly ash, and admixture certifications shall accompany the resubmittal.

Approved admixtures conforming to TxDOT's most current Specification may be used with all classes of concrete at the option of the Contractor provided that specific requirements of the governing concrete structure specification are met. Water reducing and retarding agents shall be required for hot weather, large mass, and continuous slab placements. Air entraining agents may be used in all mixes but must be used in the classes indicated on Table 4. Unless approved by the Engineer or designated representative, mix designs shall not exceed air contents for extreme exposure conditions as recommended by ACI 211.1 for the various aggregate grades.

<b>Table 3: Slump Requirements</b>		
<b>Type of Construction</b>	<b>Slump, inches (mm)</b>	
	<b>Maximum</b>	<b>Minimum</b>
Cased Drilled Shafts	4 (100)	3 (75)
Reinforced Foundation Caissons and Footings	3 (75)	1 (25)
Reinforced Footings and Substructure Walls	3 (75)	1 (25)
Uncased Drilled Shafts	6 (150)	5 (125)
Thin-walled Sections; 9 inches (225 mm) or less	5 (125)	4 (100)
Prestressed Concrete Members	5 (125)	4 (100)
Precast Drainage Structures	6 (150)	4 (100)
Wall Sections over 9 inches (225 mm)	4 (100)	3 (75)
Reinforced Building Slabs, Beams, Columns and Walls	4 (100)	1 (25)
Bridge Decks	4 (100)	2 (50)
Pavements, Fixed-form	3 (75)	1 (25)
Pavements, Slip-form	1-1/2 (37.5)	½ (12.5)
Sidewalks, Driveways and Slabs on Ground	4 (100)	2 (50)
Curb & Gutter, Hand-vibrated	3 (75)	1 (25)
Curb & Gutter, Hand-tamped or spaded	4 (100)	2 (50)
Curb & Gutter, Slip-form/extrusion machine	2 (50)	½ (12.5)
Heavy Mass Construction	2 (50)	1 (25)
High Strength Concrete	4 (100)	3 (75)
Riprap and Other Miscellaneous Concrete	6 (150)	1 (25)
Under Water or Seal Concrete	6 (150)	5 (125)

### 7.06 Consistency and Quality of Concrete

Concrete shall be workable, cohesive, possess satisfactory finishing qualities and of stiffest consistency that can be placed and vibrated into a homogeneous mass within slump requirements specified in Table 3. No concrete will be permitted with a slump in excess of the maximums shown unless water-reducing admixtures have been previously approved. Slump values shall be conducted in accordance with TXDOT Test Method TEX-415-A.

Consistency and quality of concrete should allow efficient placement and completion of finishing operations before initial set. Re-tempering (i.e. addition of water and reworking concrete after initial set) shall not be allowed. When field conditions are such that additional moisture is needed for final concrete surface finishing operation, the required water shall be applied to surface by fog spray only and shall be held to a minimum. Excessive bleeding shall be avoided and in no case will it be permissible to expedite finishing and drying by sprinkling the surface with cement powder.

During progress of the work, the County Engineer or designated representative shall require the Developer to cast test cylinders and/or beams as a check on compressive and/or flexural strength of concrete actually placed. The County Engineer or designated representative may require the developer also to

perform slump tests, entrained air tests and temperature checks to ensure compliance with specifications. The cost to be bared by the developer or contractor.

Proportioning of all material components shall be checked prior to discharging. Excluding mortar material for pre-coating of the mixer drum [see section 403S.8.B and adjustment for moisture content of admixtures and aggregates, material components shall fall within the range of + 1% for water, + 2% for aggregates, + 3% for cement, +2% for fly ash and within manufacturer recommended dosage rates for admixtures except that air entrainment shall be within + 1-1/2 percentage points of the mix design requirements.

Unless otherwise specified or indicated on the drawings, concrete mix temperature shall not exceed 90°F (32°C) except in mixes with high range water reducers where a maximum mix temperature of 100°F (38°C) will be allowed. Cooling an otherwise acceptable mix by addition of water or ice during agitation will not be allowed.

Ice may be used during hot weather concrete placement to lower the concrete temperature; however, the Contractor shall furnish a mix design acceptable to the Engineer or designated representative for class of concrete specified. The addition of ice shall not exceed 50% of the total mix water weight.

Test beams or cylinders will be required for small placements such as manholes, inlets, culverts, wing walls, etc. The Engineer may vary the number of tests to a minimum of 1 for each 25 cubic yards (1 for each 19 cubic meters) placed over a several day period.

Test beams or cylinders shall be required for each monolithic placement of bridge decks or superstructures, top slabs of direct traffic culverts, cased drilled shafts, structural beams and as otherwise directed by County Engineer or designated representative for design strength confirmation or early form removal. All concrete testing to be at developers cost.

A strength test shall be defined as the average of breaking strength of 2 cylinders or 2 beams as applicable. Specimens will be tested conforming to TXDOT Test Method TEX-418-A. If required strength or consistency of class of concrete being produced cannot be secured with minimum cementitious material specified or without exceeding maximum water/cementitious material ratio, Contractor will be required to furnish different aggregates, use a water reducing agent, an air entraining agent or increase the cement content in order to provide concrete meeting these specifications.

Slump tests will be performed in accordance with TxDOT Test Method Tex-415-A. Entrained air tests will be performed in accordance with TxDOT Test Method Tex-416-A.

Test specimens shall be cured using the same methods and under the same conditions as the concrete represented. Design strength beams and cylinders shall be cured conforming to TXDOT Bulletin C-11 (and supplements thereto).

When control of concrete quality is by 28-day compressive tests, job control testing will be by 7-day compressive strength tests. The minimum strength requirement for seven (7) day test will be 70 percent of the specified minimum 28-day compressive strength. If the required 7-day strength is not secured with

the quantity of cement specified in Table 4, changes in the mix design shall be made and resubmitted for approval. For an occasional failure of the seven-day compressive test, the concrete may be tested at 28 days for final evaluation.

Class	Cement Sks Per CY	Minimum 28 Day psi (MPa)	Minimum 7 Day psi (MPa)	*Maximum W/C Ratio	Coarse Aggr. Number	** Air Entrain.
A	5.0 (280 kg/m <sup>3</sup> )	3000 (20.6)	2100 (14.5)	6.5	1,2,3,4,5	Yes
B	4.0 (225 kg/m <sup>3</sup> )	2000(13.8)	1400 (9.7)	8.0	2,3,4,5	No
C	6.0 (335 kg/m <sup>3</sup> )	3600(24.8)	2520 (17.4)	6.0	1,2,3,4,5	Yes
D	4.5 (252 kg/m <sup>3</sup> )	2500(17.2)	1750 (12.1)	7.5	2,3,4	No
H	6.0 (335 kg/m <sup>3</sup> )	As indicated	As Indicated	5.5	3,4	Yes
I	5.5 (308 kg/m <sup>3</sup> )	3500(24.1)	2450 (16.9)	6.2	2,3,4,5	Yes
J	2.0 (112 kg/m <sup>3</sup> )	800(5.5)	560 (3.9)	N/A	2,3,4,5	No
S	6.0 (335 kg/m <sup>3</sup> )	4000 (27.6)	2800 (19.3)	5.0	2,3,4,5	Yes

**Notes:**

1. Grade 1 coarse aggregate may be used in massive foundations only (except case drilled shafts) with 4 inch (100 mm) minimum clear spacing between reinforcing steel.
2. When Type II cement is used in Class C, S or A concrete, the 7-day compressive strength requirement will be 2310 psi (15.9 MPa) for Class C, 2570 psi (17.7 MPa) for Class C and 1925 psi (13.3 MPa) for Class C minimum.
3. \*The design water-cement ratio shall be appropriately adjusted for mixes with fly ash per ACI 211.1 or TXDOT C-11 (and supplements thereto), as applicable.
- 4.\*\*Maximum air design contents for the five grades of coarse aggregate, unless otherwise approved by Engineer or designated representative, are: 4.5% for Grade 1, 5.5% for Grade 2, and 6.0% for Grades 3, 4, and 5.

**8.07 Mixing and Mixing Equipment**

All equipment, tools and machinery used for hauling materials and performing any part of the work shall be maintained in such condition to insure completion of the work without excessive delays for repairs and replacement. Mixing shall be done in a mixer of approved type and size that will produce uniform distribution of material throughout the mass and shall be capable of producing concrete meeting requirements of ASTM C 94, Ready-mixed Concrete and these specifications. Mixing equipment shall be capable of producing sufficient concrete to provide required quantities. Entire contents of the drum shall be discharged before any materials are placed therein for a succeeding batch. Improperly mixed concrete shall not be placed in a structure. For all mixers an adequate water supply and an accurate method of measuring the water shall be provided.

The mixer may be batched by either volumetric or weight sensing equipment and shall be equipped with a suitable timing device that will lock the discharging mechanism and signal when specified time of mixing has elapsed.

## A. Proportioning and Mixing Equipment

For all miscellaneous concrete placements, a mobile, continuous, volumetric mixer or a volumetric or weight batch mixer of the rotating paddle type may be used.

When approved by County Engineer or designated representative in writing or when specified for use in other items, these mixers may be used for other types of concrete construction, including structural concrete, if the number of mixers furnished will supply the amount of concrete required for the particular operation in question.

These mixers shall be designed to receive all the concrete ingredients, including admixtures, required by the mix design in a continuous uniform rate and mix them to the required consistency before discharging.

For continuous volumetric mixers, the materials delivered during a revolution of the driving mechanism or in a selected interval, will be considered a batch and the proportion of each ingredient will be calculated in the same manner as for a batch type plant.

Mixing time shall conform to recommendations of manufacturer of mixer unless otherwise directed by County Engineer or designated representative.

## B. Ready-mixed Concrete

Use of ready-mixed concrete will be permitted provided the batching plant and mixer trucks meet quality requirements specified herein. When ready-mixed concrete is used, additional mortar (1 sack cement, 3 parts sand and sufficient water) shall be added to each batch to coat the mixer drum. Ready-mixed concrete, batching plant and mixer truck operation shall include the following:

1. A ticket system will be used that includes a copy for the Inspector. Ticket will have machine stamped time/date of concrete batch, a mix design designation, weight of cement, fly ash, sand and aggregates; exact nomenclature and written quantities of admixtures and water. Any item missing or incomplete on ticket may be cause for rejection of concrete.
2. Sufficient trucks will be available to support continuous placements. The Contractor will satisfy the County Engineer or designated representative that adequate standby trucks are available to support monolithic concrete placement requirements.
3. A portion of mixing water required by the mix design to produce the specified slump may be withheld and added at the job site, but only with permission of the County Engineer or designated representative and under the Inspector's observation. When water is added under these conditions, the concrete batch will be thoroughly mixed before any slump or strength samples are taken. Additional cement shall not be added at the job site to otherwise unacceptable mixes.
4. A metal plate(s) shall be attached in a prominent place on each truck mixer plainly showing the various uses for which it was designed. The data shall include the drum's speed of rotation for mixing and for agitating and the capacity for complete mixing and/or agitating only. A copy of the manufacturer's design, showing dimensions of blades, shall

be available for inspection at the plant at all times. Accumulations of hardened concrete shall be removed to the satisfaction of the County Engineer or designated representative.

5. The loading of the transit mixers shall not exceed capacity as shown on the manufacturer's plate attached to the mixer or 63 percent of the drum volume, whichever is the lesser volume. The loading of transit mixers to the extent of causing spill-out enroute to delivery will not be acceptable. Consistent spillage will be cause for disqualification of a supplier.
6. Excess concrete remaining in the drum after delivery and wash water after delivery shall not be dumped on the project site unless approval of the dump location is first secured from the County Engineer or designated representative.

#### C. Hand-mixed Concrete

Hand mixing of concrete may be permitted for small placements or in case of an emergency and then only on authorization of the County Engineer or designated representative. Hand-mixed batches shall not exceed a 4 cubic foot (3 cubic meters) batch in volume. Material volume ratios shall not be leaner than 1 part cement, 2 parts large aggregate, 1 part fine aggregate and enough water to produce a consistent mix with a slump not to exceed 4 inches (100 mm). Admixtures shall not be used unless specifically approved by the County Engineer or designated representative.

### Item: 9.00 DRAINAGE FACILITIES

**9.01 DESCRIPTION** This item shall govern the furnishing of all drainage culvert pipe, concrete headwalls, and reflector post as shown on the Plans and herein specified, and installing the same as designated on the Plans or by the County Engineer or Representative in conformity with the lines and grades given.

**9.02 MATERIALS** The culvert pipe shall be of size, length, and gauge as shown on the plans. Corrugated galvanized metal pipe shall be as specified by item 460 of the TxDot most current Standard Specifications. Reinforced concrete pipe shall be as specified by Item 464 of the same. All pipe shall be new and unused and shall not have been damaged by handling or shipping.

Reflector posts shall be 1 1/2 inch schedule 20, galvanized steel posts equipped with 3 inch amber reflectors. The length of the post shall be adequate to place the reflector assembly 48 inches above the centerline elevation of the street and anchor the post approximately 48 inches into the ground.

Concrete headwalls and/or rip-rap shall be constructed of 3000 psi, five sack, concrete meeting the requirements of Item 421 of TxDot most current Standard Specifications reinforced with deformed bars or wire mesh meeting the requirements of Item 440 of same. All headwalls and/or rip-rap shall be of the dimensions and in the locations shown on the plans.

**9.03 CONSTRUCTION METHODS** Culvert pipe shall be installed to the lines and grades shown on the Plan or as specified by the County Engineer or Representative. The pipe shall be bedded along its complete length and the backfill around the pipe shall be compacted. The installation of all culvert pipes shall be in general

conformance with the appropriate sections of the TxDot most current Standard Specifications. All culvert pipes located at street intersections shall be provided with reflector posts. The reflector post shall be equipped with one reflector facing in each direction of traffic flow. Reflector posts shall be provided on the ends of the concrete headwalls or rip-rap as shown on the Plans. The concrete headwalls or rip-rap shall be of the dimensions and at the locations shown on the plans. The headwalls shall be formed on their exposed surfaces, which shall be grouted and broom finished upon removal of the forms. Guardrail is required where slopes do not meet requirements of Table 7.3.

## **Item: 10.00 CHANNEL EXCAVATION**

**10.01 DESCRIPTION** Channel Excavation shall consist of required excavation for all channels, the removal and proper utilization or disposal of all excavated materials, and constructing, shaping and finishing of all earthwork involved in conformity with the required lines, grades and typical cross sections and in accordance with the specifications and requirements herein outlined.

**10.02 CLASSIFICATION** All Channel Excavation will be Unclassified. Unclassified Channel Excavation shall include all materials encountered regardless of their nature or the manner in which they are removed.

**10.03 CONSTRUCTION METHODS** All suitable materials removed from the excavation shall be used, insofar as practicable, in the formation of embankments as required, or shall be otherwise utilized or satisfactorily disposed of as indicated on plans, or as directed, and completed work shall conform to the established alignment, grades and cross sections. During construction, the channel shall be kept drained, insofar as practicable, and the work shall be prosecuted in a neat and workmanlike manner.

Unsuitable channel excavation, or excavation in excess of that needed for construction, shall be known as "Waste" and shall become the property of the Contractor to be disposed of by him.

Channel Excavation shall include the removal and replacement of all fence lines crossing the channels and the installation of gates and water gaps as shown on the plans.

All channels and that area adjacent to them which has been disturbed by construction equipment shall be seeded. Seeding shall conform to item 164 of the TxDot most current Standard Specifications or applicable standards for the appropriate jurisdiction.

## **Item: 11.00 Clear Zones**

### **11.01 General**

The purpose of this section is to provide design criteria for establishing a roadway clear zone.

This section is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

## 11.02 Clear Zones

The term "clear zone" is used to describe the generally flat and unobstructed area that is provided beyond the travel lanes. The clear zone may include shoulders.

For urban streets, arterials, collectors and local streets, where curbs are used, available area for clear zones may be limited. A minimum offset distance of 18 inches (450 mm) should be provided between the face of curb and obstructions such as utility poles, lighting poles and fire hydrants (Local Urban Streets, Horizontal Clearance to Obstructions, Chapter 5 of AASHTO's, "A Policy On Geometric Design of Highways and Streets, 2001"). Greater offsets should be provided when possible to permit curbside parking.

Because most curbs do not have a capability to redirect vehicles, the minimum clear zone distance should be increased as directed by the County Engineer or designated representative commensurate with increases in traffic volumes and vehicle speeds.

## 11.03 Transportation Guidelines for Landscaping

### A. Roadsides

Safety shall be the foremost consideration in the placement and selection of plant material in the County's right-of-way. The main focus of these guidelines is the prevention of traffic hazards that can be created by the placement of landscaping which restricts the sight distance or creates roadside obstacles. The following addresses acceptable criteria for landscaping and planting on roadsides, within the median, and at intersections. All dimensions specified for trunk diameter and height will include plants at maturity unless it is stated otherwise on the Drawings.

1. Trees with = 6 Inches (150 mm) Mature Trunk Diameter. The following reflect minimum setback requirements for existing and newly planted trees.

50 MPH (80 KPH) or Greater Design Speed.

- Barrier curbs adjacent to travel lane.

Where there are barrier curbs adjacent to the travel lane, a minimum setback of two (2) feet (600 mm) for existing trees and four (4) feet (1.2 meters) for new trees behind the face of the curb shall be provided as shown in Table 6-1.

- Shoulder adjacent to travel lane.

Where there are shoulders adjacent to the travel lane, a minimum setback of ten (10) feet (3 meters) for existing trees and eighteen (18) feet (5.4 meters) for new trees from the edge of the travel lane shall be provided as shown in Table 6-1.

**TABLE 6-1 MINIMUM SETBACK REQUIREMENTS FOR EXISTING AND NEWLY PLANTED TREES**

Design Speed mph (KPH)	Tree Diameter At Maturity	Roadways with Barrier Curb		Roadways with Shoulders*	
		Existing (x)	New (y)	Existing (x <sub>i</sub> )	Tree (y <sub>i</sub> )
= 50 (80)	= 6" (150 mm)	2 (200 mm)	4 (1.20 m)	10 (3 m)	18 (5.4 m)
	>6" (150 mm)	6 (1.8 m)	6 (1.8 m) **	30 (9 m)	30 (9 m)
= 45 (72)	= 6" (150 mm)	1.5 (150 mm)	3 (900 mm)	8 (2.4 m)	10 (3 m)
	>6" (150 mm)	4 (1.2 m)	6 (1.8 m) **	18 (5.4 m)	25 (7.5 m)

\* Includes roadways with side slope of 6:1 or flatter and average daily traffic volumes of over 6000 vehicles. The values may be adjusted for lower traffic volumes with guidelines presented in Source #2.

\*\* For sidewalks 12 (3.6 m) or greater in width the 6 (1.8 m) minimum setback distance may be reduced, when appropriate measures, that are approved by the Engineer or designated representative, are adopted to protect the subgrade and base layer supporting the curb and gutter from tree root growth and water/moisture intrusions.

Sources:

- 1) Based on AASHTO - Geometric Design of Highways and Streets, 1984
- 2) Based on AASHTO - Guide for Selecting, Locating, and Designing Traffic Barriers, 1977
- 3) City of Austin, Department of Public Works and Transportation

**45 MPH (72 KPH) or Less Design Speed.**

- Barrier curbs adjacent to travel lane.

Where there are barrier curbs adjacent to the travel lane, a minimum setback of one and a half (1.5) feet (450 mm) for existing trees and three (3) feet (900 mm) for new trees behind the face of the curb shall be provided as shown in Table 6-1 and illustrated in Figure 6-1 in Appendix H of this manual.

- Shoulders adjacent to travel lane.

Where there are shoulders adjacent to the travel lane, a minimum setback of eight (8) feet (2.4 meters) for existing trees and ten (10) feet (3 meters) for new trees from the edge of the travel lane shall be provided as shown in Table 6-1 and illustrated in Figure 6-2 in Appendix H of this manual.

- Adjacent to parking lane on local street.

A two (2) foot (600 mm) setback distance behind the face of the curb is required where parking is permitted adjacent to the curb on local streets.

- Sidewalks adjacent to the curb.

Where there are sidewalks adjacent to the curb, no definite setback distance from the sidewalk is required. However, a two (2) foot (600 mm) setback distance is desirable. Trees shall not be allowed in sidewalks less than 12 (3.6 m) in width. Whenever possible sidewalks should be routed around trees on public property or private sidewalk easements if provided.

2. Trees With > 6 Inches (600 mm) Mature Trunk Diameter. The following reflect minimum setback requirements for existing and newly planted trees.

50 MPH (80 KPH) or Greater Design Speed.

- Barrier curbs adjacent to travel lane.

Where there are barrier curbs adjacent to the travel lane, a minimum setback of six (6) feet (1.8 meters) behind the face of the curb shall be provided for both existing and newly planted trees as shown in Table 6-1 and illustrated in Figure 6-1 in Appendix H of this manual.

- Shoulders adjacent to travel lane.

Where there are shoulders adjacent to the travel lane, a minimum setback of thirty (30) feet (9 meters) for both existing and newly planted trees from the edge of the travel lane shall be provided as shown in Table 6-1 and illustrated in Figure 6-2 in Appendix H of this manual.

- Sidewalks adjacent to the curb.

Where there are sidewalks adjacent to the curb, a minimum setback of six (6) feet (1.8 meters) behind the face of the curb shall be provided. All trees are required to be placed a minimum of 2 feet (600 mm) from the edge of sidewalk to the ultimate edge of the mature tree. Trees shall not be allowed in sidewalks less than 12 feet (3.6 m) in width. Whenever possible sidewalks should be routed around trees on public property or private sidewalk easements if provided.

When a tree is to be planted in a sidewalk that is 12 (3.6 m) or wider, the minimum setback distance may be reduced when appropriate measures, that are approved by the County Engineer or designated representative, are adopted to protect the subgrade and base layer supporting the curb and gutter from tree root growth and water/moisture intrusion from the newly planted tree area. The approval for reduction in the setback distance by the County Engineer or designated representative shall be in writing.

45 MPH (72 KPH) or Less Design Speed.

- Barrier curbs adjacent to travel lane.

Where there are barrier curbs adjacent to the travel lane, a setback of four (4) feet (1.2 meters) for existing trees and six (6) feet (1.8 meters) for newly

planted trees behind the face of the curb shall be provided as shown in Table 6-1 of this manual.

- Shoulders adjacent to travel lane.

Where there are shoulders adjacent to the travel lane, a minimum setback of eighteen (18) feet (5.4 meters) for existing trees and twenty-five (25) (7.5 meters) feet for newly planted trees from the edge of travel lane shall be provided as shown in Table 6-1 of this manual.

- Sidewalks adjacent to the curb.

Where there are sidewalks adjacent to the curb, a minimum setback of six (6) feet (1.8 meters) behind the face of the curb shall be provided. All trees are required to be placed a minimum of 2 feet (600 mm) from the edge of sidewalk to the ultimate edge of the mature tree. Trees shall not be allowed in sidewalks less than 12 feet (3.6 m) in width. Whenever possible sidewalks should be routed around trees on public property or private sidewalk easements if provided.

When a tree is to be planted in a sidewalk that is 12 (3.6 m) or wider, the minimum setback distance may be reduced when appropriate measures, that are approved by the County Engineer or designated representative, are adopted to protect the subgrade and base layer supporting the curb and gutter from tree root growth and water/moisture intrusion from the newly planted tree area. The approval for reduction in the setback distance by the Engineer or designated representative shall be in writing.

### 3. Side Slopes.

On roadways with shoulders having side slopes of 5 to 1 or steeper, no tree shall be planted or allowed to remain within the recommended clear zone as shown in Table 6-2 of this manual. The recommended distances may be adjusted if the trees are located in the ditch or if the average daily traffic volume of the roadway is less than 6000. These adjustments shall be made using the guidelines presented in AASHTO, Guide for Selecting, Locating, and Designing Traffic Barriers, 1977.

### 4. Clearance Height.

A minimum clearance height of eight (8) feet (2.4 meters) above the street level must be provided and maintained for all existing and newly planted trees if adjacent to a sidewalk. However, if the limbs of trees overhang the curb line or edge of travel lane of any street, a minimum clearance height of fourteen (14) feet (4.2 meters) is required.

**TABLE 6-2 RECOMMENDED LATERAL CLEARANCE ON CUT AND FILL SECTIONS \***

Design Speed Mph (KPH)	Fill Section Side Slope (b/a)				Cut Section Side Slope (b/a)			
	5:1	4:1	3:1	&	5:1	4:1	3:1	&
	Steeper				Steeper			

□45 (80)	18 (5.4 m)	19 (5.7 m)	20 (3 m)	16 (4.8 m)	16 (4.8 m)	16 (4.8 m)
55 (88.5)	24 (7.2 m)	30 (9 m)	56 (16.8 m)	19 (5.7 m)	18 (5.4 m)	17 (5.1m)
□65 (105)	37 (11.1 m)	45 (13.5 m)	100 (30 m)	27 (8.1 m)	22 (6.6 m)	20 (6m)

\*These values may be adjusted for roadways with less than 6000 daily traffic volumes with guidelines presented in the Source below.

Source: Based on AASHTO - Guide for Selecting, Locating, and Designing Traffic Barriers, 1977.

## 5. Curve Section of Roadways with Shoulder.

The setback requirements for landscaping on roadways with shoulders should be increased on the outside of curves. The required setback varies with the design speed as presented in the AASHTO, Guide for Selecting, Locating, and Designing Traffic Barriers, 1977.

- 45 mph (72 KPH) or Less Design Speed.

Where the horizontal curve of the roadway through lanes is designed with a 45 mph (72 KPH) or less design speed, the setback distance should be increased from a point one hundred fifty (150) feet (45 meters) beyond the point of curvature (PC) to a point one hundred fifty (150) feet (45 meters) beyond the point of tangency (PT).

- 50 mph (80 KPH) or Greater Design Speed.

Where the horizontal curve of the roadway through lanes is designed with a 50 mph (80 KPH) or greater design speed, the setback distance should be increased from a point two hundred eighty (280) feet (84 meters) beyond the point of curvature (PC) to a point two hundred eighty (280) feet (84 meters) beyond the point of tangency (PT).

□ On curves, the sight distance requirements presented in Section 1.3.1.C.6 of this manual must be maintained. Only low growing shrubs not greater than two (2) feet (600 mm) in height or small plants shall be considered in areas where horizontal sight distance is a factor.

### B. Median

#### 1. Lateral Landscaping Placement Requirements.

All planting (existing and new trees) in the median shall comply with the same lateral placement requirements as set forth in the Roadsides Section (11.03).

## 2. Longitudinal Landscaping Placement Requirements.

- All plantings, except ground covers with no more than twelve (12) inches (300 mm) in height, shall be located greater than seventy-five (75) feet (22.5 meters) from the end of the median nose.
- Ground covers with no more than twelve (12) inches (300 mm) in height and trees with a mature trunk diameter of six (6) inches (150 mm) or less is recommended in the area from a point seventy-five (75) feet (22.5 meters) to one hundred fifty (150) feet (45 meters) from the nose of the median. All trees shall be maintained to provide an eight (8) foot (2.4 meters) minimum foliage clearance height. A minimum 15 feet (4.5 meters) spacing (center-to-center) shall be provided for all trees.
- In the area beyond 150 feet (45 meters) from the nose of the median, any planting shall be allowed as long as the minimum sight distance requirements are provided. Although not required, maintaining an eight (8) foot (2.4 meters) or greater clearance height is desirable.

## C. Intersection.

No landscaping of any type shall obstruct vision. The criteria for a sight triangle is presented in Section 1.3.1.C.6 of this manual. These requirements will apply to any material from a height of two (2) feet (600 mm) to a clearance height of eight (8) feet (2.4 meters) above the top of curb, including, but not limited to full grown trees, full-grown shrubs, fences, structures, any signs except traffic control signs, etc.

## D. General Requirements

The following requirements will apply to all landscaping within the right-of-way along roadsides, median and intersection.

### 1. Railroad Crossing.

Only low growing shrubs no greater than a height of two (2) feet (600 mm) and small trees are recommended within two hundred fifty (250) feet (75 meters) of a railroad crossing to assure adequate sight visibility.

### 2. School Crossing.

Only small trees and low growing shrubs no greater than two (2) feet (600 mm) in height are recommended within one hundred fifty (150) feet (45 meters) of a school crossing to assure pedestrian safety by not restricting the sight visibility of motorists.

### 3. Traffic Control Devices.

No vegetation from a height of seven (7) feet (2.1 meters) to a height of fourteen (14) feet (4.2 meters) is recommended within twenty-five (25) feet

(7.5 meters) of any existing or proposed traffic signal, regulatory or warning signs, or other traffic control devices.

4. Right-of-Way.

Where limited right-of-way or the necessity for planting would result in less clearance, all factors in a specific area should be weighed to decide if a special exception is justified. Such an exception must be approved by the County Engineer.

E. General Note.

Any landscaping that is not in compliance with the requirements stated in this criteria or has been planted without an approved License Agreement from the County shall be removed by the sponsoring organization or individual at their cost. The required License Agreement may be obtained from the Hays County Road and Bridge Department.

F. Maintenance Requirements

1. The adjacent property owner(s) or civic organization will be expected to maintain the landscaping located between curb or edge of pavement and the property line. The adjacent property owner or civic organization shall also be responsible for trimming tree limbs from trees located on private property, which cause an obstruction of the right-of-way.

2. The County reserves the right to prune or remove any vegetation, at the cost of the sponsoring organization or individual, as determined necessary for visibility and ease of maintenance.

**Item: 12.00 MISCELLANEOUS**

**12.01 SIGNAGE** Street name signs, traffic control signs, speed limit signs, etc., shall all conform to the requirements of the TxDot most current Standard Specifications and the "Uniform Manual of Traffic Control Devices".

For all developments proposing new street construction, the developer's engineer shall provide - as part of the construction plans - a narrative statement in recordable format, to be recorded with the final plat, listing the type and location of all proposed signs for directing and controlling traffic.

**12.02 COMPLETION CERTIFICATE** At the time a final inspection and release of performance security is requested; the design engineer shall prove a complete set of "as-built" construction drawings and shall certify that all road and drainage construction has been completed in substantial accordance with previously approved plans and specifications, except as noted. No performance security will be released without this exhibit.

**12.03 SAFETY** At any time the County Engineer has the Authority to shut a job down due to unsafe work practices.

**12.04 EROSION CONTROL** At any time the County Engineer or Representative has the Authority to shut a job down due to failure to maintain sufficient erosion/sedimentation control.

#### **12.05 Testing Requirements**

1. All construction materials shall be tested and monitored by an A2LA or AASHTO accredited laboratory approved by the County Engineer.
2. Any engineering technician performing testing in accordance with these rules shall be proficient for the type of testing required as deemed by the Engineer in-charge of the accredited laboratory.
3. Upon completion but prior to acceptance of the work by Hays County Road Department, the accredited materials engineering laboratory shall submit to Hays County Road Department a written statement of substantial compliance which has been sealed by a professional engineer licensed in the state of Texas. The written statement of substantial compliance must acknowledge that all construction materials and operations used in the project were tested and inspected by accredited laboratory and that they comply with all the specifications applicable to the project.

#### **12.06 Construction Inspection**

The construction of improvements shall be conducted under the supervision of a licensed engineer who shall ensure the work is performed in accordance with the approved drawings. Monitoring shall be performed by the following:

1. The Design Engineer shall provide a qualified onsite inspector throughout the construction project for all significant operations.
2. A construction materials technician, proficient for the type of testing being performed, as deemed by the engineer-in-charge of the accredited laboratory.
3. An Inspector from Hays County Road and Bridge Department.

#### **12.07 Notice of Start**

The contractor shall notify the Hays County Road Department in writing (facsimile acceptable) a minimum of twenty-four (24) hours in advance of the work commencing on the project. The notice shall include the development permit number issued under the Regulations of Hays County, Texas. Failure to follow these requirements may result in the County not accepting the paving and drainage facilities for maintenance upon completion.



**REGULATIONS OF HAYS COUNTY, TEXAS, FOR THE  
CONSTRUCTION OF DRIVEWAYS AND CULVERT IN  
COUNTY EASEMENTS AND RIGHTS-OF-WAY**

**SECTION 1. DEFINITIONS**

As used in these Regulations, the following words and phrases have the following meanings:

- A. "County or public easements or rights-of-way" mean any right, title or interest in land acquired, claimed or maintained by Hays County for road and road drainage.
- B. "Person" means any individual, corporation, partnership, limited partnership, joint venture or other entity.
- C. "County Engineer" means the County Engineer of Hays County, Texas.
- D. "Roadway" means the portion of the improved surface of the County or public easement or right-of-way used for travel by vehicular traffic which is usually constructed of concrete, asphalt, gravel, shell or other material providing a hard surface.
- E. "Driveway" means an improved surface used for vehicular access from the edge of a County roadway to the right-of-way or easement line.
- F. "Culvert" means a hollow structure of concrete or corrugated metal which provides waterway openings to conduct water for drainage purposes.
- G. "Start of Construction" means the commencement of any grading, excavation, removal of concrete curb, or setting of culvert pipe on County or public easements or rights-of-way.

**SECTION 2. GENERAL PROVISIONS**

- A. Construction of driveways, culverts whenever applicable, or the replacement of existing driveways or culverts on County or public easements on rights-of-way without first securing a permit is prohibited.
- B. Applications for permits for the construction of driveways and culverts on County or public easements or rights-of-way shall be made to the County Engineer.

- C. When an application for a driveway with or without culvert is filed, the applicant will provide the County Engineer with the data needed to determine the following:
1. The location of the driveway and/or culvert within the County or public easement and right-of-way.
  2. The location of all physical objects such as drainage inlets or catch basins within the portion of the driveway which is within the County or public easement or right-of-way that might conflict with the construction of the driveway. The applicant must provide the location of all man-made objects within the portion of the driveway which is within the County or public easement or right-of-way.
  3. That a driveway connecting to a concrete curb and gutter street or road is designed in accordance with City of Austin Specifications.
  4. That a driveway constructed over a roadside ditch culvert conforms to at least the geometric requirements of the aforementioned drawings.
  5. That the maximum width of a driveway serving a single family dwelling or an agricultural property and connected to a County street or road with roadside ditches shall not exceed thirty-six (40) feet.
  6. That the maximum width of a commercial driveway over a roadside ditch shall not exceed ninety-six (96) feet.
  7. That an island proposed within a commercial driveway on a curb and gutter street has a maximum width of two (2) times the total width of the driveway, including the return radii, divided by eight (8). No island shall be placed inside the curb line on a concrete curb and gutter street or no closer than six feet to the edge of pavement on a street with roadside ditches. No island shall be allowed within the right-of-way of a residential street.
  8. That driveways proposed to be located on a corner lot is not shown to be located within any portion of public street curb radii.
  9. Whether a special design is required whenever the driveway may be proposed in a location hazardous to traffic safety.

10. The proposed culvert conforms to Section 3D of these Regulations.
  11. That driveways located on the same property shall be separated by a minimum spacing as called out in Article 7.4 of the Subdivision and Development Regulations.
- D. When an application for only a culvert is filed, the applicant will provide the County Engineer with the data needed to determine the following:
1. The location of the culvert by staking the beginning and the end of the proposed culvert on the ground and showing the distance from the nearest property corner or intersecting street or road.
  2. Whether the culvert will provide ultimate access to a single family dwelling or whether it will serve another type of land use.
  3. The type of culvert structure. All culverts shall be constructed of reinforced concrete or corrugated metal. All pre-cast conduits or corrugated metal pipe shall be new. An exception may be granted for the use of used reinforced concrete pipe or corrugated metal pipe for residential use only after an inspection of the pipe by a County Representative and County Engineer determines that the quality of the used pipe is equivalent to new pipe.
  4. The length of the proposed culvert based on the following standards:
    - a. Single Family Dwellings:
 

(1) Minimum for walkway:	one joint of pipe
(2) Minimum for driveway:	20 feet
(3) Maximum for driveway:	40 feet
    - b. All Other Driveways:
 

(1) Minimum for driveway:	40 feet
(2) Maximum for driveway:	100 feet
    - c. New Street Crossings or Connections to Existing Streets:
      - (1) Length to be determined by the County Engineer

- d. Minimum driveway surface width for single family dwellings is  
16'
  - e. Minimum driveway surface width for commercial driveways is  
32'
- E. The County Engineer shall review the application and supporting information and determine the following:
- 1. The size of culvert. [The minimum culvert diameter shall be eighteen (18) inches.] **DESIGNED PIPES PREFERRED**
  - 2. Whether the proposed culvert conforms to all other requirements of these regulations.
- F. Permits shall stipulate that construction pursuant to the permit will be commenced within six (6) months and be completed within nine (9) months from the date of the permit.
- G. Permits for the installation of driveways or culverts must be obtained from the County Engineer prior to the start of construction.
- H. All permits issued by the County Engineer for the construction of driveways or culverts on a County or public easement or right-of-way shall require conformance with these Regulations.
- I. The County Engineer shall promulgate forms to be used in the administration of these Regulations.

### **SECTION 3. CONSTRUCTION & INSPECTION**

- A. Driveways connecting to concrete curb and gutter roadways shall be inspected after the placement of reinforcing steel and prior to the placing of concrete, and again after the concrete placement for conformance with County standards.
- B. Driveways connecting to asphalt roadways without curbs and gutters will be inspected after the placement of materials for conformance with the geometric requirements of these Regulations.
- C. The installation of culverts shall be governed by the following procedures:

1. Culverts shall not be backfilled until an inspection is conducted by Hays County to determine that the elevation and grade of the culverts have been correctly set.
  
- D. All driveways requiring special geometric design shall be inspected for conformance with drawings.
  
- E. The County Engineer may make any additional inspections deemed necessary to administer these Regulations.

#### **SECTION 4. ENFORCEMENT**

The County Engineer shall be charged with the enforcement of these Regulations. If any person violates any provision of these Regulations the County Engineer will attempt to obtain compliance with these Regulations. In the event the County Engineer is unable to obtain compliance within a reasonable time the County Engineer may so report to the Commissioners' Court and the following remedies may be pursued:

- A. If any person engages in the construction or repair of a driveway or culvert crossing a County easement or right-of-way without a permit, the Commissioners' Court may direct the County Attorney to file suit to enjoin the violation of these Regulations.
  
- B. If any person engages in the construction or repair of a driveway or culvert in any manner except as specified in the permit issued therefore by the County Engineer, the Commissioners' Court may direct the County Attorney to file suit to enjoin the violation of these Regulations.
  
- C. If any person engages in the construction of a driveway or culvert crossing a County easement or right-of-way without a permit, or if any person engages in the construction or repair of a driveway or culvert in any manner except as specified in the permit issued therefore by the County Engineer, the Commissioners' Court may order the landowner to remove or repair the driveway or culvert at the landowner's expense.

[Texas Local Government Code §81.025, 1987 Tex. Sess. Law, Serv. 1557 (Vernon), provides that the Commissioners' Court may punish contempt by fine not to exceed twenty-five dollars (\$25.00), or by imprisonment not to exceed twenty-four (24) hours and in case of fine, the party may be held in custody until the fine is paid.]

- D. Any person securing a permit under these Regulations must certify to Commissioners' Court that the terms, provisions and conditions of the permit will be complied with. Violation of this certification constitutes contempt of Commissioners' Court.
- E. If the Commissioners' Court finds a person to be guilty of contempt, it may enter such orders consistent with general law as it deems appropriate to punish the person guilty of contempt, and may enter such order and further orders enforceable by civil and criminal contempt, and consistent with its authority under general law, as Commissioners' Court deems necessary to enforce and protect its jurisdiction over the matter and to uphold the integrity of these Regulations.
- F. The procedure for contempt proceedings before Commissioners' Court will be consistent with procedures in actions before other courts in this state for enforcement of court orders, and for the protection of the jurisdiction of courts by process of contempt. Provided, however, that the person shall be given ten (10) days notice of said contempt proceeding by certified or registered mail, return receipt requested.

## **SECTION 5. EXCEPTIONS**

An appeal for exception to these Regulations will be considered on the following basis and only after good and sufficient cause has been demonstrated by the applicant for an exception:

- A. Upon denial of permit, the applicant may appeal the County Engineer's decision by stating and submitting his reasons in writing to the County Engineer and within ten (10) days of the denial of said permit.
- B. The County Engineer shall review the appeal and submit his findings and recommendation to Commissioners' Court. The applicant shall be provided with a copy of the County Engineer's recommendations and may appear before Commissioners' Court to support his appeal.

## **SECTION 6. RECORDS**

All applications and file copies of permits issued pursuant to these Regulations shall be maintained by the County Engineer as part of the permanent records of his office.

## **SECTION 7. EFFECTIVE DATE**

These revised Regulations shall become effective upon adoption by Commissioners' Court.

## **SECTION 8. SEVERABILITY**

The provisions of these Regulations are severable. If any word, phrase, clause, sentence, section, provision, or part of these Regulations should be held invalid or unconstitutional, it shall not affect the validity of the remaining provisions, and it is hereby declared to be the intent of the Commissioners' Court that these Regulations would have been adopted as to the remaining portions, regardless of the invalidity of any part.

**STEPS TO FOLLOW IN OBTAINING A CULVERT PERMIT  
FOR THE INSTALLATION OF CULVERTS ON COUNTY ROADS  
(WITHIN COUNTY RIGHTS-OF-WAY OF EASEMENTS)**

**1. OBTAIN PERMIT APPLICATION**

Call Hays County Road and Bridge at (512) 393-7385 with the address, and legal description of your property. The County will mail you an application for completion and return to Hays County Road and Bridge, P.O. Box 906 San Marcos, TX 78676. Driveway Standards will be included if one is being installed.

**2. STAKE LOCATION OF CULVERTS**

After your call to the Road Department, stake the location of both ends of your proposed culvert in the County road ditch. To assist County Personnel in identifying the correct site, you are requested to mark the location of the culvert with a small, temporary sign or banner displaying the address shown on your application.

**3. REQUEST PIPE SIZE FROM PRECINCT**

Call the Road Department to notify them that the location is staked and you are ready for the size to be determined. The Representative conducting the inspection or survey to determine the pipe size **will need at least 2 weeks to complete his/her work.** The precinct will report the required size to the Road Department.

Office: 512-393-7385  
Fax: 512-393-7391

**4. AWAIT PREPARATION OF PERMIT**

The pipe size will be given to the Road Department and your application will be processed in 7 to 14 days

5. **CONTACT ROAD DEPARTMENT FOR INSTALLATION OF PIPE**

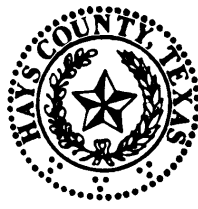
After receiving your permit and after you have had your pipe delivered to your property, call the Road Department and tell them that you are ready for inspection. The County **may need up to five (5) days** to perform this operation after receiving your call. Driveways must not be installed until after inspection and approval of the culvert installation.

6. **CALL PERMIT DIVISION FOR DRIVEWAY INSPECTION**

If you are installing a driveway over the culvert, it must meet all the requirements of the **Regulations of Hays County, Texas for the Construction of Driveways and/or Culverts on County Easements and Rights of Way**. For the required inspections, call the Road Department, Inspection Section, at **(512) 393-7385** at least **twenty-four (48) hours in advance**.

**FOR CONCRETE DRIVEWAYS:** The driveway must be inspected after the installation of forms and prior to the pouring of concrete and again after the pouring of concrete only when connecting to a curb and gutter street.

**FOR FLEXIBLE BASE OR EARTHEN DRIVEWAYS:** One inspection must be made after the driveway is installed.



## **Specifications for Placement of Utilities Within County right-of-way**

### **Intent:**

It is the intent of these specifications to describe the uniform manner in which public utilities will be located, placed and maintained within Hays County road right-of-way.

### **Stake Out:**

It will be the responsibility of the utility company requesting permission, to stake out the proposed work in the field; so that it can be readily seen what affect this proposed work will have on the existing county road, road way drainage and the adjacent property owners. Stakes will be no further apart than 50'.

### **Right-of-way:**

Hays County makes no warranty herein as to availability of right-of-way for utility purposes. The utility company must secure all easements and submit to Hays County Road Department a letter, signed by a responsible person on their staff, stating that they have notified all property owners abutting their work area along our right-of- way. The permittee shall make a reasonable effort to contact all abutting property owners and inform them of the scope of the work and the timing of construction prior to commencing any work on the site. If it becomes necessary to work outside of the right-of-way or easement, the permittee must obtain written permission from the property owner and submit a copy to Hays County Road Department.

### **Guarantee:**

Hays County reserves the right to require improper work to be immediately removed and replaced; with emphasis on earth compacted in trenches. If proper repairs are not made within a reasonable time, Hays County reserves the right to make all necessary repairs and to restore property to a condition satisfactory to the County and charge all cost incidentals thereto to the agency that required that the original cut is made.

### **Request for Permission:**

Permission to open trenches in any county maintained right-of-ways, shall be requested at least 15 working days in advance of starting work. Permission may be granted after procedures have been developed to maintain all traffic with full regard to hours of working, rush hours, use of steel plates for trench cover and safety precautions. Starting of work within the County's right-of-way, or any occupancy thereof, including ingress and egress, by the Permittee and/or their agents, constitutes full acceptance of all the terms of the permit. Failure to comply with any of the terms of this permit constitutes a violation of the entire permit and could result in the termination thereof and denials of access until such time as the terms are complied with.

**Depth:**

All utilities in Hays County right-of-way to have 36” of impervious cover.

**Permission for Emergency Work:**

Emergency type work, which is for the restoration of interrupted service, may begin immediately with verbal approval of the Hays County Road Department authorized representative.

**Location of Water and Sewer Lines and Major Duct Line Facilities:**

Water lines and sewer lines and major duct line facilities may be located within the paved section of county road with the following provisions:

Trench and manhole areas will be compacted as specified in these specifications. The owner of the utility lines will be responsible for trench settlement and patching for a period of two (2) years beginning at the date of acceptance. Manholes and valve boxes will be kept 1/4 inch below the finished pavement. At the end of the two (2) year period the road will be milled 1/2” and at least a 1” thickness of SF asphalt shall be placed over the entire roadway to restore it to the cross sectional configuration that currently exist along this section of road. Manholes will be raised to conform to the newly established grade. If the county anticipates a profile change in the road, the utilities will be installed in accordance with the anticipated profile change, at no cost to the county.

**Location of Water and Sewer Lines (Existing Roads)**

All new work running parallel with existing roadway shall be placed on the back slope of the ditch area. All laterals will be pushed or bored. No open cuts will be allowed. It will be the responsibility of the permittee to acquire all easements and right of ways needed.

**Utility-Relocation**

By locating utility facilities within county right of way the utility owner or his assignees, agrees to relocate these facilities at no cost to the county. Should the county request such relocation? The county could request relocation because of but not limited to roadway improvements, drainage improvements, installation of county owned water and or sewer lines, etc.

**New Subdivision Streets:**

Those utilities, which are to be installed in new subdivision streets. Shall be installed in the following manner:

If the base bituminous concrete roadway has been placed, no open cutting will be allowed, it will be the responsibility of the utility company to either bore or push utilities in these locations. This applies to all streets where it is anticipated that these streets will eventually be taken into the County System for maintenance. Any trenching shall be accomplished before the shoulder work and seeding and mulching are accomplished.

**Existing Roadways:**

All utility crossings under existing county roadways shall be bored or pushed

across. No open cutting will be permitted. The utility owner or his assignee must make at minimum of (3) three attempts to bore and at least (2) two of them must have a Hays County representative present.

Where utilities have been placed under the paved section of county roads and because of maintenance purposes it is necessary to disturb a section of county roads the following provisions will be followed:

The disturbed area will be patched and crack sealed, then maintained by the utility owner for a period of two (2) years. At the end of the two (2) year period an additional overlay of at least 1" thickness shall be placed Over the entire roadway to restore it to the cross sectional configuration that currently exist along this section of road.

### **Longevity of Patch and Trench Responsibility:**

The agency making the trench, cut or patch shall be responsible for the trench, patch or cut for a period of two (2) years dated from the day the work had final inspection, and partial acceptance. It will be the responsibility of the agency making the trench, patch or cut to notify in writing, the Hays County Road Department as to the date the work was permanently completed. This responsibility will include any necessary resurfacing of patched area; repatching and the reshaping and filling of any trenched areas which are a direct result of the utility installation. It shall be the responsibility of the Permittee to notify the Hays County Road Department upon completion of the work, so that a final inspection may be made, and for the two-year warranty to start.

### **Other Utilities**

The Utility Company is responsible for:

a. Insuring that their proposed installation and construction activities will not interfere with the maintenance or functioning of existing utility facilities already located within the right of way.

b. Any damage to existing utility facilities already within the right of way.

### **Improperly Installed Facilities**

The owner of improperly installed facilities located within county right of way shall be liable for any resulting damage to the county maintained roadway and appurtenances. Additionally, the owner of the facilities shall also be liable for any damage to county equipment or injuries to county staff resulting from improperly installed facilities. If the county becomes aware that the utilities facilities were not installed at the agreed to location or depth, the county will notify the utility and the utility shall propose corrective action within two (2) weeks of notification. The utility shall bear all financial responsibility with any such relocation. Additionally, failure by the utility to respond within the two (2) week period and or to proceed with corrective action within a reasonable period of time (6 weeks) shall result in the county suspending review of all current and future permit submittals by the utility in question, and suspension of all approved permits held by the utility. This shall remain in effect until the utility complies with the requirements of this section of the permit.

### **Drainage:**

Existing drainage along County right-of-way is not to be disturbed, or rerouted. The Permittee will assume the responsibility for damages to adjoining property,

which may be the result of any changes to the present drainage conditions, and agrees to hold Hays County harmless from any action resulting from the changes. All disturbed areas within the County right-of-way (shoulders, ditch lines and slopes) will be seeded and mulched or armored to prevent erosion and to stabilize the disturbed areas.

**Shoulders and Ditches:**

All disturbed shoulders, side slopes and side ditches shall be restored to original grade and section or better. Portland Cement Concrete or asphalt paving shall be placed in badly disturbed side ditches, where restoration in kind cannot be satisfactorily made as a result of grade or water flow conditions

**Equipment Required:**

All equipment employed by the utility company shall be capable of performing the required work and shall be equipped to prevent extraneous surface damage coincident with construction.

**Pavement Cutting Method:**

Macadam pavements, bituminous pavements shall be Cut to neat lines with a saw 18” wider than the trench width on both sides. Pavement excavation shall be limited to half the roadway width at any one time. Only dirt roads can be cut using the backhoe method

**Overlay:**

The area to be milled and with an additional 1” of bituminous concrete shall be described as follows:

**WIDTH** -entire width of riding surface.

**LENGTH**-the length of the overlay shall extend from a point 15’ back of the place where the existing pavement was first disturbed and cover the entire construction area to a point of 15’ beyond the last place existing pavement was disturbed. This is to be measured parallel to the centerline of the existing road with the end points being at 90E to the centerline. The beginning and ending points of the overlay are to be “milled” into the existing pavement so not to create a hump or bump in the road surface.

**Cutting and Permanently Repairing Two Coarse Roadways:**

On Two Coarse roadways the patch shall receive a single surface treatment using #4 stone, 20 pounds per square yard and an asphalt emulsion HFRS-2 at the rate of 0.35 gallons per square yard. Permanent repairing upon removal of temporary patch, the subgrade and/or new fill shall be checked and tamped, if required, to assure compaction density. Backfill in trenches shall be acceptable material removed there from (or better) and shall be mechanically tamped in 6-inch maximum spread layers to a density of 95%. Compaction shall be 100% for trenching dug previous to new paving. Puddling will not be permitted. Barricades, signs and lights shall be maintained at the patch until the surface course has been completed.

### **Cutting and repairing Bituminous Roadways:**

On Bituminous roadways, patch shall be cut back 18 inches on either side of trench (6' min). Backfill in trenches shall be acceptable material removed there from (or better) and be mechanically tamped in 6-inch maximum spread layers to a density of 95%. 6-inches of BF Asphalt shall be placed in two 3" lifts, then rolled or tamped. Two inches of SF asphalt shall be placed so finish of patch conforms to adjacent pavement. Patch will be cracked sealed, within two weeks after completion.

### **Temporary Patching:**

Temporary patches shall be made immediately on the completion of the backfill and shall consist of suitable materials (bituminous patches, stone or crusher run) as appropriate in a thickness consistent with requirements for maintenance of the patch pending final paving. The utility shall maintain all temporary patching, and shall make all repairs needed within 48 hours after being contacted by Hays County Road Department.

### **Inspection:**

Inspection of cuts, backfill and surface repairs will be made by a Hays County representative. A qualified Testing Lab in accordance with recognized methods will perform compaction test. 48-hrs notice is required to schedule Inspection. The utility company will pay for all compaction tests. The utility company will also be charged for continual reinspection of the same problem (nuisance inspections). **Preconstruction meeting required prior to construction.**

### **Safety Requirements:**

The utility shall take every necessary precaution to prevent damage to property and injury to the public who may be in the area. The utility shall be governed by all requirements covering protection of the public, and comply with all local and state laws and regulations. Barricades, signs and lights shall be used, as required certificate of insurance shall be provided to the county before any work can begin. The utility shall hold Hays County harmless from all liability for damages arising from or due to their work. Flagmen will be required where one-way traffic is necessary because of utility work. A standard maintenance of traffic plan and a proposed detour plan will be submitted to the Hays County Road Department, if a road closure is needed, signs and flashing light barricades shall be used. All signs and barricades shall be fully reflectorized for night visibility. All warning signs shall conform to the latest "Uniform Traffic Control Devices for Streets and Highways" All mud and debris tracked and/or spilled on the County Roadway shall be removed promptly to eliminate potential hazards. Hays County requires a Traffic Control plan to be submitted at time of application.

### **General Requirements:**

The Contractor shall plan and schedule his work to cause a minimum interference with other work being done in the area. Equipment and excavated materials shall be placed not to obstruct traffic or drainage. All sidewalk, curb and gutter and driveways disturbed or damaged shall be replaced in complete sections on a compacted base. All joints and material shall be replaced for full joint effectiveness. Access shall be maintained to all driveways during non-work periods. No materials or equipment shall be stored in the county road right-of-way during non-work periods. All excavation shall be backfilled or plated prior to the end of any work period. Two-way traffic shall be maintained at all times. At least one-half of the roadway (pavement and shoulder) shall be

available for traffic at all times. No equipment with cleated wheels or tracks is permitted on roadway or shoulder pavement, and any damage done to Hays County's property will be the responsibility of the Permittee. It is the responsibility of the Permittee to make his agent, or contractor, familiar with the terms of these specifications.

If you have questions for the Hays County Road Department, you may contact Todd Spencer, Inspector, at:

Mobile: 512-738-2555

Office: 512-393-7385

Fax: 512-393-7391

E-Mail: [todd\\_spencer@co.hays.tx.us](mailto:todd_spencer@co.hays.tx.us)