

MEMORANDUM OF UNDERSTANDING

On the 16th day of April, 2008, this memorandum of understanding is executed in favor of the City of Angleton, Texas, hereinafter referred to as the "City", and by Susser Petroleum Company LLC, a Texas Limited Liability Company, as owner and proposed developer of the proposed Angleton-Citgo, Section 1 development at the intersection of State Highway 288 and State Highway 35 in the city limits of the City of Angleton, Texas, hereinafter referred to as "Owner":

WHEREAS, the OWNER desires to develop certain land within the city of Angleton, located south of the intersection of State Highway 35 and State Highway 288, Angleton, Brazoria County, Texas, hereinafter referred to as "Subject Tract" and,

WHEREAS, at this stage OWNER acknowledges that the City has required additional infrastructure be constructed in order to meet the City's technical planning requirements for preliminary plat approval, or "Short Form Plat" approval; and

WHEREAS, OWNER needs to obtain approval of the preliminary and final plat in order to obtain financing for the development;

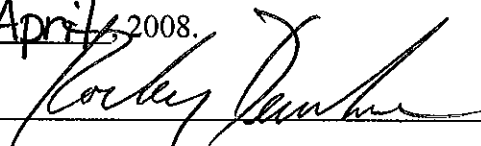
THEREFORE, OWNER agrees as follows:

- I. As a condition of City staff advising the Planning and Zoning Commission and the City Council that Owner has met the technical requirements of the City's planning requirements for preliminary plat approval; OWNER agrees to comply with the following conditions:
 - A) Owner to Improve Sebesta Road, also known as County Road 609 from the proposed entrance/exit from Owner's property to said Road and continuing to the intersection of said road with State Highway 35. Said improvements must meet City specifications for acceptance as a City street, including the standards and improvements set forth by the City Engineer attached hereto as "Exhibit A" and incorporated herein for all purposes. Said acceptance by the City must be obtained prior to Owner being issued a permit for the proposed new business.
 - B) Owner must not interfere with any existing utility lines.
 - C) Owner must submit a PDF format of the preliminary and any subsequent plats to the City.
 - D) All proposed and required drives and parking lots in the development must support all fire suppression equipment and Owner must submit satisfactory detailed plans to City of the proposed drives and parking lots.
 - E) Owner shall submit to City detailed plans to scale showing all

infrastructure and easements.

- II. If the above requirements have been met, City agrees to:
Begin review of the plans and provide timely feedback as to any issues which could delay or postpone permitting.
- III. The city further agrees to allow OWNER to construct the road improvements described above using his own forces as long as the City Engineer supervises the design and construction and certifies that the improved roadway meets City standards.
- IV. Owner agrees to provide City attorney satisfactory proof that the party signing this agreement has full authority to bind the developer, owner, general partner, and successor, assigns, etc. to the extent that the City is assured compliance with this agreement prior to the issuance of any certificate of occupancy or building permits; and Owner agrees that if it breaches any terms of this agreement in any form that it will be responsible for all reasonable attorneys fees and costs incurred by the CITY.
- V. OWNER acknowledges that City staff can only make recommendations regarding whether or not the proposed preliminary plat/short form plat satisfies the technical requirements of the city planning ordinances and applicable codes, and that the final decision on granting or denying the preliminary plat is solely within the discretion of the Planning and Zoning Commission and/or the Angleton City Council.

WITNESS our hands this 16th day of April, 2008.

By: 
Susser Petroleum Company LLC
A Texas Limited Liability Company
OWNER AND DEVELOPER OF
ANGLETON-CITGO, SECTION 1
ANGLETON, TEXAS 77515

CITY OF ANGLETON, TEXAS

BY _____
GREG SMITH, CITY MANAGER

APPROVED AS TO FORM:

KEITH VAUGHAN, CITY ATTORNEY

HERB SMITH, CITY ENGINEER

"EXHIBIT A"

THE IMPROVEMENTS REQUIRED BY THE CITY FOR COUNTY ROAD 609 A/K/A SEBESTA ROAD ARE:

30 ft wide

8 inch lime stabilized base

3 inch asphalt surface or 7 inch of reinforced concrete pavement

SAID IMPROVEMENTS MUST MEET THE TECHNICAL SPECIFICATIONS SET FORTH IN THE ATTACHED EXHIBIT 1 TO THIS EXHIBIT

'EXHIBIT 1'

TECHNICAL SPECIFICATION

ITEM 32

LIME TREATED BASE

The General Conditions, any Supplementary Conditions, and Division 1, General Requirements are hereby made a part of this section as fully as if repeated herein.

1 GENERAL

1.01 SCOPE

A Work included: Perform all work necessary and required for the construction of the project as indicated. Such work includes but is not limited to the following:

1 Treating the Base by mixing lime with the Base material and compacting the mixed material. The treated Base shall be constructed in accordance with the typical cross sections and to the lines and grades shown on the Drawings.

B Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:

1 Street and Roadway Excavation

2 MATERIALS

2.01 Lime shall meet the following requirements for Hydrated Lime and/or Lime Slurry.

2.02 Hydrated Lime shall consist of a dry powder obtained by treating quicklime with enough water to satisfy its affinity for water under the conditions of its hydration. This material is to consist essentially of calcium hydroxide or a mixture of calcium hydroxide and a small allowable percentage of calcium oxide, magnesium oxide and magnesium hydroxide.

2.03 The hydrated lime, when tested, shall conform to the following requirements as to chemical composition:

Hydrate alkalinity, percent by weight $CA(OH)_2$ - Min. 90%
Unhydrated lime content, percent by weight CAO - Max. 5%
"Free Water" content, percent by weight, H_2O - Max. 4%

- 2.04 The percent by weight of residue retained shall conform to the following requirements:

Residue retained on No. 6 (3360-micron) sieve - Max. 0.1%

Residue retained on No. 30 (590-micron) sieve - 3.0%

- 2.05 The above specifications specifically apply to the normal hydrate of lime made from "High-Calcium" type limestone. Hydrated Lime shall be applied as provided in these specifications, as a dry powder or mixed with water to form a slurry.
- 2.06 The use of commercial lime slurry is also acceptable under this specification. The lime slurry shall be a suspension of solids in water, capable of being pumped. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity and/or nature injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids content", shall consist principally of hydrated lime of a quantity of fineness sufficient to meet the following requirements:
- 2.07 Chemical Composition: The "solids content" of the lime slurry shall have a hydrate alkalinity $CA(OH)_2$ of not less than 87 percent by weight.
- 2.08 Residue: The percent by weight of the residue in the "solids content" of the lime slurry shall conform to the requirements listed above for Hydrated Lime.
- 2.09 The "Dry Solids Contents" shall be at least 31 percent by weight of the slurry.

3 EQUIPMENT

- 3.01 Equipment necessary for the proper construction of the work shall be on the project, in first-class condition, before construction operations will be permitted to begin. The CONTRACTOR shall at all times provide sufficient equipment to enable continuous prosecution of the work. The equipment shall be operated by experienced and capable workmen and shall be that necessary to provide a treated Base meeting the requirements herein specified.
- 3.02 If lime is furnished in trucks, each truck shall have the weight of lime certified on public scales and the discharge(s) sealed. If lime is furnished in bags, each bag shall bear the manufacturer's certified weight.

4 EXECUTION

- 4.01 Prior to beginning any lime treatment, the roadbed and/or foundation area shall be excavated and shaped in conformity with the typical sections shown and to the lines

and grades on the Drawings.

- 4.02 Lime shall be applied only to such area that the first mixing operations can be completed during the same working day.
- 4.03 The placing and mixing of the lime with the Base shall be obtained by the method hereinafter described as "Dry Placing" or the method hereinafter described as "Slurry Placing." If no particular method is shown on the Drawings, the CONTRACTOR may use his option of either method.
- 4.04 When the "Dry Placing" method is used, the following provisions shall govern:
- A The prepared Base shall be scarified to a depth as shown on the Drawings.
 - B The required amount of lime shall be uniformly spread on the Base by a screw type spreader, directly out of trucks or sack distribution. A maintainer shall not be used to spread the lime, and precautions shall be taken to reduce the scattering of lime by wind to a minimum.
 - C First Mixing. The lime shall then be placed and thoroughly mixed to the required depth by road mixers, disking, harrowing, plowing or other means of pulverizing and mixing. The Base shall be sprinkled during this operation until the proper moisture content has been secured.
 - D The lime mixed Base shall be allowed to cure for seventy-two (72) hours, during which time the mix shall be kept wet by sprinkling.
 - E After the curing time is completed, the final mixing may begin. The material shall be uniformly mixed.
 - F When the "Slurry Placing" method is used, the following provisions shall govern:
 - 1 The prepared Base shall be scarified to a depth as shown on the Drawings.
 - 2 The required amount of lime shall be applied by mixing with water in water trucks or distributor and applied as a mixture or slurry, with the distribution of the lime being attained by successive passes over a determined section of roadway. The water truck or distributor shall be so equipped with an agitator which will keep the lime and water in a consistent mixture.

- 3 The slurry shall then be placed and thoroughly mixed to the required depth by road mixers, disking, harrowing, plowing or other method of pulverizing and mixing.
 - 4 The lime mixed Base shall be allowed to cure for seventy-two (72) hours, during which time the mix shall be kept wet by sprinkling.
 - 5 After the curing time is completed, the final mixing may begin. The material shall be uniformly mixed.
- G During final mixing, the required amount of water necessary to provide the optimum moisture shall be added uniformly and thoroughly mixed with the soil and lime. The completed soil-lime mixture shall be spread evenly over the processed width of the Base and placed in a loose condition ready for immediate compaction by the rollers. Irrespective of the methods selected in mixing the materials, the completed soil-lime mixture shall be a homogenous, friable mixture and uniform in appearance. The completed soil-lime mixture shall be compacted immediately behind the final mixing operations. Compaction shall begin at the bottom and shall continue until the entire depth of soil-lime mixture is uniformly compacted to 95 percent Standard Proctor density.
- H The CONTRACTOR will be permitted to utilize alternate construction methods, provided such methods result in a mixed Base material meeting the specifications herein described. If the total thickness of the treated Base cannot be mixed in one operation, the previously mixed material shall be bladed to a windrow just beyond the area to be treated and the next layer mixed with lime as specified above. The Base shall be cut to the required lines and grades in accordance with the typical sections. The completed section shall then be compacted and rolled. The surface shall be protected against rapid drying by sprinkling.
- I Immediately after compaction, the Base shall be tested for density and moisture. Moisture shall be not less than, nor more than, 3% above optimum moisture. Density shall be not less than 95%, nor more than 100%. Material not within these limits shall be mixed and compacted to meet this requirement.
- J Traffic will not be permitted on the treated Base until it has been moist cured for seven (7) days. Only concrete pavement construction, without traffic, will be allowed to be performed on the treated Base in less than seven (7) days.

5 MEASUREMENT

- 5.01 Lime treated Base of the depth indicated on the Drawings shall be measured by the square yard to neat lines as shown on typical cross sections. Lime shall be measured by the ton of 2,000 pounds.
- 5.02 The lime may be either hydrated or in a slurry as specified on the Drawings. Hydrated lime shall be weighed on hopper scales or on truck scales in vehicles. The weight of the lime slurry shall be calculated from the number of gallons of slurry applied to the road. The calculation shall be based upon the solids by weight in the slurry that is to be furnished and certified by the producer.

6 PAYMENT.

- 6.01 Work performed and materials furnished as prescribed by this item and measured as provided under measurement will be paid for at the unit price bid for "Lime" and "Lime Treated Base", which price shall be full compensation for all labor, materials, tools, equipment, for loosening, mixing and pulverizing the Base and for all manipulations, and incidentals necessary to complete the work satisfactorily.

END

TECHNICAL SPECIFICATION

ITEM 33

FLEXIBLE BASE (LIMESTONE)

The General Conditions, any Supplementary Conditions, and Division 1, General Requirements are hereby made a part of this section as fully as if repeated herein.

1 GENERAL

1.01 SCOPE

A Work Included: Perform all work necessary and required for the construction of the project as indicated. Such work includes but is not limited to the following:

1 Construction of a foundation course for paving composed of crusher-run broken stone, constructed in one or more courses in conformity with the typical sections, lines and grade shown on the Drawings.

B Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:

- 1 Street and Roadway Excavation
- 2 Lime Treated Subgrade
- 3 Prime Coat
- 4 Hot Mix Asphaltic Concrete Pavement

2 MATERIAL

2.01 The material shall be crushed limestone and shall consist of durable particles of stone mixed with natural binder. The material shall be from a source that has been approved by the Texas Department of Transportation (TxDOT).

A When properly slaked and tested by standard laboratory methods the material shall meet the following requirements:

Retained on 1-3/4" sieve	0 to 10 percent
Retained on #4 sieve	45 to 75 percent
Retained on #40 sieve	60 to 85 percent

B Material passing the #40 sieve shall be known as "Soil Binder" and shall meet

the following requirements:

The Liquid Limit shall not exceed 40.

The Plasticity Index shall not exceed 12.

3 EXECUTION

- 3.01 Immediately before placing the base material, the subgrade shall be checked as to conformity with grade and section.
- 3.02 The material shall be deposited uniformly upon the subgrade in the required amount to complete the course. If the Drawings indicate the total base thickness to be six inches (6") or less the base may be placed in one course. The material shall be sprinkled, if needed, and shall then be bladed, dragged shaped and rolled to conform to the typical section shown on the Drawings until uniform compaction is secured. In the event inclement weather or other unforeseen circumstances render impractical the spreading of the material during the first 24 hour period, the material shall be scarified, spread, and aired as necessary. All areas of segregated coarse or fine material shall be corrected or removed and replaced with well graded material. Compacted density shall be not less than 95 percent of Modified Proctor density, unless otherwise indicated on the Drawings.
- 3.03 Throughout the entire operation the shape of the course shall be maintained by blading and the surface upon completion shall be smooth and in conformity with the typical sections, and to the established lines and grades. Any deviation in excess of 1/4-inch in cross section or in a length of 16 feet measure longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material, reshaping and recompacting.

4 MEASUREMENT

- 4.01 Work described to be accomplished under "Flexible Base (Limestone)" will be measured by one or more of the following methods:
- A Cubic Yard of material as delivered on the road
 - B Ton of 2000 pounds dry weight as delivered on the road
 - C Square Yard at the depth specified and conforming to proposed roadway sections shown on the Drawings.

5

PAYMENT

5.01 All work performed and measured as provided under "Measurement" will be paid will be paid for at the unit price bid, which price shall be full compensation for all tools, labor, equipment, materials and incidentals necessary to complete the work in accordance with this specification.

END

TECHNICAL SPECIFICATION

ITEM 51

PRIME COAT

The General Conditions, any Supplementary Conditions, and Division 1, General Requirements are hereby made a part of this section as fully as if repeated herein.

1 GENERAL

1.01 SCOPE

A Work Included: Perform all work necessary and required for the construction of the project as indicated. Such work includes but is not limited to the following:

1 An application of asphaltic material on the completed base course and/or designated area in accordance with these specifications.

2 Prime coat shall be placed only when weather conditions are favorable, generally when temperatures are above 60 degrees F and when surfaces are dry and no rain is apparent.

B Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:

1 Flexible Base (Limestone)

2 Cement Stabilized Base

2 MATERIALS

2.01 The asphaltic material shall be of the type and grade shown on the Drawings. Where the material is to be used primarily as a curing membrane, RC-250, SS-1 or MC-30 type oils may be substituted for plan type, if different therefrom.

3 EXECUTION

3.01 The base and/or area to be primed shall have been completed to plan section, graded and completed to insure a finished surface complying with specification tolerances, before prime coat operations are started. If necessary, the surface may be cleaned by sweeping and lightly sprinkled prior to asphalt application. The asphalt material shall

be applied by a self-propelled pressure distributor so adjusted and operated to distribute the asphalt evenly and at the specified temperature and rate. If deemed necessary, the CONTRACTOR may roll the freshly applied asphalt with a light pneumatic roller to more evenly distribute the material.

2.02 Temperature Application Range (deg.)

RC-250	125-180 (Max. 200)
SS-1	50-130 (Max. 140)
MC-30	70-150 (Max. 175)

2.03 The CONTRACTOR shall provide the equipment necessary for checking the temperature and rate. The distributor shall be equipped with a recording thermometer, as well as storage tanks, and a device for strapping the distributor tank.

2.04 The CONTRACTOR shall so arrange his operations to insure the least amount of inconvenience to traffic, resorting to one-half base width application as necessary.

2.05 The prime coat must be cured before the asphalt surface is applied. The curing time will be a minimum of 24 hours.

4 MEASUREMENT

4.01 Work described to be accomplished under "Prime Coat" will be measured in gallons at the applied temperature.

5 PAYMENT

5.01 All work performed and measured as provided under "Measurement" will be paid for at the unit price bid, of the type and grade specified, which price shall be full compensation for cleaning the surface area, for furnishing, heating, hauling and distributing the asphalt material, for all freight involved, for all manipulation, labor, tools, equipment and incidentals necessary to complete the work.

END

TECHNICAL SPECIFICATION

ITEM 60

HOT-MIX ASPHALTIC CONCRETE PAVEMENT

The General Conditions, any Supplementary Conditions, and Division 1, General Requirements are hereby made a part of this section as fully as if repeated herein.

1 GENERAL

1.01 SCOPE

A Work Included: Perform all work necessary and required for the construction of the project as indicated. Such work includes but is not limited to the following:

1 Construction of a base course, a leveling-up course, a surface course or any combination of these courses as shown on the Drawings, each to be composed of a compacted mixture of mineral aggregate and asphaltic material.

B Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:

1 Flexible Base (Limestone)
2 Cement Stabilized Base
3 Prime Coat

1.02 The pavement shall be constructed on the previously completed and acceptable subgrade, base, existing wearing surface, or in the case of a bridge, on the prepared slab or as otherwise specified herein and in accordance with the details shown on the Drawings.

2 MATERIALS

2.01 MINERAL AGGREGATE

A The mineral aggregate shall be composed of a coarse aggregate, a fine aggregate and if required, a mineral filler.

B Coarse Aggregate.

- 1 The coarse aggregate shall be that part of the aggregate retained on the No. 10 mesh sieve; and shall consist of clean, tough, durable fragments of stone, gravel, slag, iron ore or oyster shell or combinations thereof, as hereinafter specified. The aggregate shall be of uniform quality throughout, shall be practically free from clay, organic or other injurious matter occurring either free or as coating on the aggregate, and shall have an abrasion loss of not more than forty (40) when subjected to Los Angeles Abrasion Test (AASHTO T-96). Lightweight aggregate shall have an abrasion loss of not more than thirty-five (35).
- 2 When and where shown on the Drawings, the coarse aggregate used in the surface or finish course must meet the general requirements and one of the following conditions:
 - a Have a "polish value" of not less than the value shown on the Drawings. Where the coarse aggregates are supplied from two or more sources, the aggregate from each source shall meet the "polish value" shown on the plans prior to being combined with other aggregates. Polish values shall be determined in accordance with Texas Test Method Tex-438-A, Part I or,
 - b Have a "combined polish value" achieved by blending non-polishing aggregates with polishing aggregates in specific proportions as determined by Method "A" or Method "B" of Texas Test Method Tex-438-A, Part II.
 - c When the coarse aggregates are to be a blend of non-polishing aggregates with polishing aggregates to achieve a "combined polish value", the percent by volume of the non-polishing aggregate in the blend shall be that amount required to provide the polish value shown on the Drawings, when Method "A" is used. When Method "B" is used, the percent by volume of the non-polishing aggregate in the blend is determined by the formula based on the polish values of the aggregates to be blended. When indicated on the Drawings, the non-polishing aggregate must be equal to, or have greater resistance to loss by abrasion, than the polishing aggregate when tested by Texas Test Method Tex-438-A, Part III.
 - d That portion of the non-polishing aggregate retained on the No. 10 sieve shall comprise at least 20 percent by volume of

the total aggregate. In addition, the blended aggregates shall contain non-polishing aggregates of at least the minimum percent by volume of the critical size shown below for the specified mixture.

	<u>Type C</u>	<u>Type D</u>	<u>Type F</u>
Ret. #4 sieve	50%	50%	
Ret. #10 sieve			50%

C FINE AGGREGATE.

- 1 The fine aggregate shall be that part of the aggregate passing the No. 10 mesh sieve and shall consist of concrete sand, field sand, stone screenings or combinations thereof. Sand shall be composed of durable stone particles free from injurious foreign matter. Screenings shall be of the same or similar materials as specified for coarse aggregate. The plasticity index of that part of the fine aggregate passing the No. 40 sieve shall not be more than 6.
- 2 Where stone screenings are authorized on the Drawings, the stone screenings shall be the result of a crushing operation and meet the following requirements unless otherwise shown on the Drawings:

Percent by Weight

Passing the 3/8" sieve.....	100
Passing the No. 200 sieve.....	0-30

D MINERAL FILLER.

- 1 Mineral filler, when used, shall consist of thoroughly dry stone dust, slate dust, Portland cement, fly ash, or other mineral dust. The mineral filler shall be free from foreign and other injurious matter. When tested by standard laboratory methods, it shall meet the following grading requirements:

	Percent by Weight
Passing No. 30 sieve	95-100
Passing No. 80 sieve, not less than	75
Passing No. 200 sieve, not less than	55

E ASPHALTIC MATERIAL.

- 1 Asphalt for the paving mixture shall be a standard grade oil asphalt having a penetration when heated to 77 degrees F. of not less than 25 or more than 135. The CONTRACTOR will be responsible for selecting the grade necessary to produce an asphaltic concrete that will meet all the requirements of these specifications. The oil asphalt material shall be homogeneous, shall be free from water and shall not foam when heated to 347 degrees F.
- 2 The asphaltic material for tack coat shall meet ASTM requirements for Emulsified Asphalt SS-1, or Cut-Back Asphalt RC-250.

3 PAVING MIXTURES

3.01 It is the intent of this specification to produce a mixture which when designed and tested in accordance with these specifications will have the following laboratory HVEEM density and stability, unless otherwise shown on the plans.

<u>Density, Percent</u>			<u>Stability, Percent</u>
Min.	Max.	Optimum	Not less than
96	98	97	35

3.02 Stability and Density are control tests. If the laboratory stability and/or density of the mixture produced has a value lower than specified and is not due to change in source or quality of material, production may proceed, and the mix shall be changed until the laboratory stability and density falls within the specified limits and as near the optimum value as is practicable. If there is a fundamental change in any material from that used in the design mixtures, production will be discontinued until a new design mixture is determined by trial mixtures. It is the intent of this specification that the mixture will be designed to produce a mixture of optimum density.

3.03 The paving mixture shall consist of a uniform mixture of coarse aggregate, fine aggregate and asphaltic material. Mineral filler, and/or additive may also be required. The grading of each constituent of the mineral aggregate shall be such as to produce, when properly proportioned, a mixture, which, when tested by standard laboratory methods, will conform to the following grading limitations, for the paving type specified.

Type "A" (Coarse Graded Base Course):	Percent Aggregate by Weight or Volume
Passing 2" sieve	100
Passing 1-3/4" sieve	95 to 100
Passing 1-3/4" sieve, retained on 7/8" sieve	16 to 42
Passing 7/8" sieve, retained on 3/8" sieve	16 to 42
Passing 3/8" sieve, retained on No. 4 sieve	10 to 26
Passing No. 4 sieve, retained on No. 10 sieve	5 to 21
Total retained on No. 10 sieve	68 to 84
Passing No. 10 sieve, retained on No. 40 sieve	5 to 21
Passing No. 40 sieve, retained on No. 80 sieve	3 to 16
Passing No. 80 sieve, retained on No. 200 sieve	2 to 16
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight or from 8 to 16 percent of the mixture by volume, unless otherwise specified on the Drawings.

Type "B" (Fine Graded Base or Leveling-Up Course):	Percent Aggregate by Weight or Volume
Passing 1" sieve	100
Passing 7/8" sieve	95 to 100
Passing 7/8" sieve, retained on 3/8" sieve	21 to 53
Passing 3/8" sieve, retained on No. 4 sieve	11 to 42
Passing No. 4 sieve, retained on No. 10 sieve	5 to 26
Total retained on No. 10 sieve	58 to 74
Passing No. 10 sieve, retained on No. 40 sieve	6 to 32
Passing No. 40 sieve, retained on No. 80 sieve	4 to 21
Passing No. 80 sieve, retained on No. 200 sieve	3 to 21
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight or from 8 to 16 percent of the mixture by volume, unless otherwise specified on the Drawings.

Type "C" (Coarse Graded Surface Course):	Percent Aggregate by Weight or Volume
Passing 7/8" sieve	100
Passing 5/8" sieve	95 to 100
Passing 5/8" sieve, retained on 3/8" sieve	16 to 42
Passing 3/8" sieve, retained on No. 4 sieve	11 to 37

Passing No. 4 sieve, retained on No. 10 sieve	11 to 32
Total retained on No. 10 sieve	54 to 74
Passing No. 10 sieve, retained on No. 40 sieve	6 to 32
Passing No. 40 sieve, retained on No. 80 sieve	4 to 27
Passing No. 80 sieve, retained on No. 200 sieve	3 to 27
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 7 percent of the mixture by weight or from 8 to 16 percent of the mixture by volume, unless otherwise specified on the Drawings.

Type "D" (Fine Graded Surface Coarse): Percent Aggregate
by Weight or Volume

Passing 1/2" sieve	100
Passing 3/8" sieve	85 to 100
Passing 3/8" sieve, retained on No. 4 sieve	21 to 53
Passing No. 4 sieve, retained on No. 10 sieve	11 to 32
Total retained on No. 10 sieve	54 to 74
Passing No. 10 sieve, retained on No. 40 sieve	6 to 32
Passing No. 40 sieve, retained on No. 80 sieve	4 to 27
Passing No. 80 sieve, retained on No. 200 sieve	3 to 27
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 4 to 8 percent of the mixture by weight, or from 9 to 19 percent of the mixture by volume, unless otherwise specified on the Drawings.

Type "F" (Fine Graded Surface Coarse): Percent Aggregate
by Weight or Volume

Passing 3/8" sieve	100
Passing No. 4 sieve	95 to 100
Passing No. 4 sieve, retained on No. 10 sieve	58 to 73
Passing No. 10 sieve, retained on No. 40 sieve	6 to 26
Passing No. 40 sieve, retained on No. 80 sieve	3 to 13
Passing No. 80 sieve, retained on No. 200 sieve	2 to 11
Passing No. 200 sieve	1 to 8

The asphaltic material shall form from 3.5 to 6.5 percent of the mixture by weight, or from 8 to 15 percent of the mixture by volume, unless otherwise specified on the Drawings.

The aggregate portion of the paving mixture produced shall not vary from the design gradation by more than the tolerances allowed herein.

	Percent by Weight or Volume as Applicable
Passing 1-3/4" sieve, retained on 7/8" sieve	Plus or minus 5
Passing 7/8" sieve, retained on 3/8" sieve	Plus or minus 5
Passing 5/8" sieve, retained on 3/8" sieve	Plus or minus 5
Passing 3/8" sieve, retained on No. 4 sieve	Plus or minus 5
Passing No. 4 sieve, retained on No. 10 sieve	Plus or minus 5
Total retained on No. 10 sieve	Plus or minus 5
Passing No. 10 sieve, retained on No. 40 sieve	Plus or minus 3
Passing No. 40 sieve, retained on No. 80 sieve	Plus or minus 3
Passing No. 80 sieve, retained on No. 200 sieve	Plus or minus 3
Passing No. 200 sieve	Plus or minus 3
Asphaltic Material	Plus or minus 0.5 by weight or 1.2 by volume

If the paving mixture produced varies from the design gradation and/or asphaltic material content by more than the above tolerances and restrictions, proper changes shall be made until the mixture meets these requirements.

4 MIXING

- 4.01 Mixing plants shall be capable of maintaining a uniform mixture of all materials, producing a homogeneous product that will at all times meet these specification requirements. Plants that will not continuously produce a mixture meeting all of the requirements specified herein, will be condemned for further use. Commercial producers will be subject to these same requirements.
- 4.02 The asphaltic mixture from each type of mixer shall be at a temperature between 225 degrees F and 350 degrees F when discharged from the mixer. The ENGINEER will determine the temperature, within the above limits, and the mixture when discharged from the mixer shall not vary from this selected temperature more than 25 degrees F.

5 EXECUTION

- 5.01 The asphaltic mixture and tack coat shall be placed only when the weather conditions are suitable.

- 5.02 The asphaltic mixture, when placed with a spreading and finishing machine, or the tack coat shall not be placed when the air temperature is below 50 degrees F and is falling, but it may be placed when the air temperature is above 40 degrees F and is rising. The asphaltic mixture, when placed with a motor grader, shall not be placed when the air temperature is below 60 degrees F and is falling, but may be placed when the air temperature is above 50 degrees F and is rising. The air temperature shall be taken in the shade away from artificial heat. Mat thicknesses of 1-1/2 inches and less shall not be placed when the temperature of the surface on which the mat coarse aggregate shall be placed is below 50 degrees F. No mixture with lightweight coarse aggregate shall be placed when the temperature of the surface on which the mat is to be placed is below 50 degrees F. It is further provided that the tack coat or asphaltic mixture shall be placed only when the humidity, general weather conditions and temperature and moisture conditions of the base are suitable.
- 5.03 Before the asphaltic mixture is laid, the surface upon which it is to be placed shall be thoroughly cleaned and a uniform application of tack coat applied. The tack coat shall be applied with a sprayer in an amount required to insure adherence of the asphaltic concrete to the base surface. In general, the application shall not exceed 0.10 gallon per square yard of surface.
- 5.04 The asphaltic concrete shall be hauled to the site in tight vehicles previously cleaned of all foreign material. In general, the mixture shall be spread on the prepared surface with a laying machine, of the screeding and troweling type, in such a manner that when properly compacted the finished pavement will be smooth, of uniform density and will meet the requirements of the typical sections and surface tests. In cases where a level-up course is required, the course may be spread with a motor grader. Asphaltic concrete spreading and finishing machines shall be equipped with an automatic dual longitudinal screed control system. The longitudinal controls shall be capable of operating from any longitudinal grade reference including a string line, ski or other methods which the CONTRACTOR may elect; with the exception of a matching shoe which shall not be allowed. The CONTRACTOR shall furnish all equipment required for grade reference. It shall be the CONTRACTOR's full responsibility to construct a finished surface within the specified tolerances.
- 5.05 Control points and the grade reference, for the sensor of the automatic control to follow, from the control points shall be set with sufficient support so that the maximum deflection shall not exceed one-sixteenth inch (1/16") per twenty-five feet (25').
- 5.06 Immediately behind the spreading operation the pavement shall be thoroughly and uniformly compacted with suitable rollers. The rolling operation shall continue until no further compression can be obtained and all roller marks are eliminated. All surface areas not accessible to rollers shall be thoroughly compacted with lightly

oiled tamps. The surface of the pavement after compaction shall be smooth and true to line, grade and cross-section, and when tested with a sixteen foot (16') straight edge the maximum ordinate of deviation within a length of the straight edge shall not exceed one-fourth inch (1/4").

5.07 The "in-place" density of the material shall not be less than 97 percent HVEEM density of the laboratory control HVEEM density. "In-place" density tests are intended for compaction control tests. If the "in-place" density of the mixture produced has a lower value than that specified and is not due to a change in the quality of the material, production may proceed with subsequent changes in the mix and/or construction operations until the "in-place" density equals or exceeds the specified density.

5.08 If the temperature of the asphaltic mixture of a load or any part of a load becomes 50 degrees F, or more, less than the temperature selected by the Engineer, as described above; after being dumped from the mixer and prior to placing; while passing through the lay-down machine, all of the mixture so described will be rejected.

6 MEASUREMENT

6.01 Work described to be accomplished under "Hot Mix Asphaltic Concrete Pavement" will be measured by one of the following methods:

- A Ton of 2,000 pounds, made on certified invoice weights.
- B Square Yard of the depth specified, determined by in-place measurements.

7 PAYMENT

7.01 All work performed and measured as provided under "Measurement" will be paid for at the unit price bid, which price shall be full compensation for furnishing all materials; mixing; hauling; cleaning base; furnishing and applying tack coat; placing asphaltic concrete, rolling and finishing, and for all labor, tools, equipment, and incidentals necessary to complete the work.

END

TECHNICAL SPECIFICATION

ITEM 70

CONCRETE PAVEMENT

The General Conditions, any Supplementary Conditions, and Division 1, General Requirements are hereby made a part of this section as fully as if repeated herein.

1 GENERAL

1.01 SCOPE

A Work Included: Perform all work necessary and required for the construction of the project as indicated. Such work includes but is not limited to the following:

- 1 Constructing a pavement of Portland cement concrete, reinforced as shown on the plans, with or without attached concrete curbs, constructed as herein specified on the prepared subgrade in conformity with the thickness and typical cross-sections shown on plans and to the lines and grades established on the plans or as modified by the Engineer in writing.

B Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:

- 1 Reinforcing Steel
- 2 Lime Stabilized Subgrade

2 MATERIALS

2.01 CEMENT. The cement shall be either Type I or III, conforming to ASTM C 150. Any cement which contains hard lumps, cakes or is partially set, as indicated by a sieve analysis, shall not be used.

2.02 ADMIXTURES. Approved types of admixtures to improve workability, retard setting time, to entrain air or to reduce the amount of mixing water may not be used unless expressly approved in the "Construction Briefs" on the plans, or approved by the Engineer in writing. The admixtures, if used, shall comply with the producer's specifications and dispensed in accordance with producer's recommended quantity and procedures of application.

2.03 COARSE AGGREGATE.

- A Coarse aggregate shall consist of durable particles of gravel or crushed stone of reasonably uniform quality throughout, free from injurious amounts of salt, alkali, vegetable matter or other objectionable material, either free or as an adherent coating on the aggregate. It 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 5.0 percent by weight of laminated and/or friable particles.
- B Coarse aggregate shall have a wear of not more than 45 percent when tested according to ASTM C 131 and C 535 and when tested by standard laboratory methods shall meet the following requirements:
- | | |
|---|---------------------|
| Retained on 1-3/4" sieve | 0 percent |
| Retained on 1-1/2" sieve | 0 - 5 percent |
| Retained on 3/4" sieve | 30 - 65 percent |
| Retained on 3/8" sieve | 70 - 90 percent |
| Retained on No. 4 sieve | 95 - 100 percent |
| Loss by Decantation
(TxDOT Method TEX-406-A) | 1.0 percent Maximum |
- C The aggregate shall be stockpiled and maintained in such a manner to insure compliance with the above sieve analysis and cleanness at the time it enters the concrete mixture.

2.04 FINE AGGREGATE.

- A Fine aggregate shall consist of sand or a combination of sands, and shall be composed of clean, hard, durable, uncoated grains. Fine aggregate shall be free from injurious amounts of salt, alkali or vegetable matter. It shall not contain more than 0.5 percent by weight of clay lumps. The fine aggregate may be subjected to the color test for organic impurities.
- B When the fine aggregate is mixed with Type III cement in the proportion of 1:3, the average strength of not less than three standard mortar briquettes at the age of three (3) days shall be equal to or greater than the strength of Ottawa sand mortar briquettes of the same proportions and consistency when tested at the age of three (3) days.
- C Fine aggregate when tested in accordance with standard laboratory methods shall meet the following grading requirements:

Retained on 3/8" sieve	0 percent
Retained on No. 4 sieve	0 - 5 percent
Retained on No. 8 sieve	0 - 20 percent
Retained on No. 16 sieve	15 - 50 percent
Retained on No. 30 sieve	40 - 75 percent
Retained on No. 50 sieve	70 - 90 percent
Retained on No. 100 sieve	90 - 98 percent

D Mineral Filler. Mineral filler shall consist of clean stone dust, crushed sand, crushed shell or other approved inert material. When tested in accordance with TxDOT Test Method TEX-401-A, it shall meet the following requirements:

Retained on No. 30 sieve	0 percent
Retained on No. 200 sieve	0 - 35 percent

E Fine aggregate shall be stockpile and maintained in such a place and manner to prevent contamination.

2.05 FLY ASH. Fly ash shall come from a single known and consistent source. It shall make up from 20 - 25% by volume of the specified cement volume and shall conform to ASTM C 618, Class F.

2.06 WATER. Water shall meet the requirements of AASHTO T-26 and shall be potable, reasonably clean, and free from excessive amounts of oil, acid, salt, alkali, organic matter or other deleterious substances.

2.07 JOINT SEALING MATERIAL.

A Hot Applied Rubber - Asphalt compound conforming to ASTM D 3407. Compound to be H.R. Meadows Sealtight No. 164; Trumbell 3405 or approved equal.

B Cold Applied two component low modulus horizontal sealant conforming to ASTM D 3407. Compound to be W.R.Grace Sealtight No. 223 or approved equal.

C Cold Applied two component polyurethane self-leveling sealant conforming to ASTM C 920, Type M, Grade P as manufactured by W.R. Grace, Gardox, Shepler's Chop - Chaulk 55 or approved equal.

2.08 JOINT FILLER.

- A Boards for expansion joint filler and for contraction joints required shall be of size, shape and type indicated on the plans.
 - B Boards shall be obtained from Redwood timber. They shall be sound heartwood and shall be free from sapwood, knots, clustered birdseye, checks and splits. Occasional sound or hollow birdseye, when not in clusters, will be permitted provided the board is free from any other defects that will impair its usefulness as a joint filler.
 - C Preformed expansion joints (bituminous type, sponge rubber and cork) where particularly specified on the plans shall be of recognized standard construction and design. They shall meet the requirements of ASTM D 1751 or D 1752.
- 2.09 LOAD TRANSMISSION DEVICES FOR EXPANSION JOINTS. The load transmission devices shall be of the type and design as shown on the plans or of a design of proven equivalent load transmission capacity and approved by the Engineer. In any case the devices shall be so constructed to insure rigid location control during concrete placing operations.
- 2.10 STEEL REINFORCEMENT. Steel reinforcing bars as required, including tie bars, shall be of the type and size as shown on plans and shall meet the requirements of Technical Specification, Item 88, "Reinforcing Steel".
- 2.11 STEEL TONGUE-AND-GROOVE FORM FOR LONGITUDINAL JOINTS. The trapezoidal key joint form shall conform to plan requirements and shall be made of flat hot-rolled carbon steel sheets conforming to minimum requirements of ASTM A 245 or an approved equivalent thereof. The gage or thickness of the material shall be at least the minimum indicated on the Drawings.
- 2.12 MEMBRANE CURING COMPOUND. The membrane curing compound shall comply with the requirements of the Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete", ASTM C 309, Type I, clear or translucent or Type II with white pigment. The material shall have a minimum flash point of 80 degrees F. when tested in accordance with ASTM D 93.

3 EQUIPMENT

- 3.01 GENERAL. All equipment required, including weighing, mixers, hauling, subgrade planers and templates, forms, mechanical vibratory equipment, mechanical finishing equipment, both transverse and longitudinal and minor incidental equipment shall be of recognized good and appropriate design by the paving industry and in good working condition. The poor condition of any equipment or lack of required

equipment on the job will be justifiable grounds for the suspension of the work by the Engineer.

4 PROPORTIONING AND DESIGN OF CONCRETE MIX

4.01 GENERAL. Concrete for paving shall contain no less than 5.0 sacks of cement per cubic yard and water shall not exceed 7.0 gallons per sack, except when approved by the Engineer. The cement factor may be reduced by the addition of "wetting" agents and corresponding reduction of water content. It is the intention of this specification to design and produce concrete that will attain a flexural strength of 500 psi at twenty-eight (28) days. For the purposes of this project, the concrete will be considered satisfactory if the average flexural strength of three consecutive sets of beams exceeds 500 psi and the flexural strength of no one beam is below 420 psi.

4.02 PROPORTIONS. Concrete shall be composed of Portland cement, coarse aggregate, fine aggregate, mineral filler and /or admixture if used and water, mixed in the proportions designated by the Engineer and in the manner set forth in this specification. On the basis of job and laboratory investigations of the proposed materials, the Engineer will fix the proportions by weight of water, coarse aggregate, fine aggregate, cement, admixture and mineral filler where required, in order to produce concrete of the specified strength and workability.

4.03 CONCRETE STRENGTH

A The concrete mix will be designed with the intention of producing a minimum average compressive strength specified in "Construction Briefs" shown on plans. The coarse aggregate factor (dry, loose volume of coarse aggregate per unit volume of concrete) shall not exceed 0.85. The concrete shall contain not less than the number of sacks of cement per cubic yard of concrete as specified in "Construction Briefs" shown on the Drawings.

B Trial batches, prior to the beginning of paving operations, if required, shall be made from materials proposed for use in the job. The CONTRACTOR shall be obligated for the making of these trial batches and shall bear all expense involved. The testing will be the responsibility of the Engineer.

4.04 WORKABILITY OF CONCRETE

A Concrete shall be uniformly plastic, cohesive and workable. Workable concrete is defined as concrete which can be placed without honeycomb and without voids in the surface of the pavement after the specified finishing machine has been over a given area twice. Workability shall be obtained

without producing a condition such that free water appears on the surface of the slab when being finished as specified. Where water appears on the surface of the concrete after finishing and this condition cannot be corrected by reasonable adjustment in the batch design, the bleeding will be immediately corrected by one of the following measures or a combination of two or more of the following listed measures:

- 1 Redesign of the batch.
- 2 Addition of mineral filler to fine aggregate.
- 3 Increase of cement content.
- 4 Use of and approved air-entraining agent or other approved admixture.

- B The mix will be designed with the intention of producing concrete which will have a slump of not less than two inches (2") nor more than five inches (5") as might be selected by the Engineer.

4.05 MIX DESIGN

- A The concrete mixture will be designed by the absolute volume method in accordance with the procedure outlined in TxDOT Bulletin C-11. If the CONTRACTOR elects to use materials that have been in common use in the area and information is available to indicate material combinations that will produce concrete of the specified strength, no test batches will be required. If such information is not available on materials proposed for use, the Engineer may require the preliminary test specimens be made and tested as outlined under (2) above. When such information is available for a local production facility, proportions shall be selected so that the maximum permitted water cement ratio is not exceeded and so as to produce an average strength exceeding the specified strength by the amount indicated below. Where the production facility has a standard deviation record determined in accordance with ACI 214, based on 30 consecutive strength tests of similar mixture proportions as proposed, obtained within one year of the time when concrete placing is expected, it shall be used in selecting average strength. The average strength used as the basis for selecting proportions shall exceed specified strength by at least:

- 350 psi if standard deviation is less than 300 psi
- 550 psi if standard deviation is 300 to 450 psi
- 750 psi if standard deviation is 450 to 600 psi
- 900 psi if standard deviation is 600 to 750 psi

- B If the standard deviation exceeds 750 psi or if a standard deviation record is

not available, proportions shall be selected to produce an average strength at least 1,000 psi greater than the specified strength. The strength of the concrete in the completed pavement will be determined by compressive test specimens, made, cured and tested as provided in accordance with ASTM C 31 for "Basis of Acceptance". Modifications of the mix design will be made when directed by the Engineer on the basis of the conformity of the strength of these test specimens with the requirements and intent of this specification.

- C Changes in the water-cement ratio and the mix design, including an increase in cement factor if necessary, will be made when the average 28-day compressive strength of the concrete, as indicated by the last six (6) compressive strength tests obtained from test cylinders made from concrete of the same water-cement ratio, departs from the desired minimum average strength by more than five percent (5%). Three (3) test specimens will be made and tested for each 500 square yards or less of pavement placed each day.

5 EXECUTION

- 5.01 **PREPARATION OF SUBGRADE.** Prior to the placing of concrete, the roadbed shall have been completed in accordance with the pertinent specifications and the base, subbase or roadbed treatment material, as the case might be, placed and compacted to density specified on plans and/or specifications. The CONTRACTOR shall "blue top" the subgrade at edge of pavement, quarter points, and centerline and shape and compact the subgrade to these "blue tops" which shall be set at intervals not to exceed one hundred feet (100'). In lieu of blue topping, an alternate form of grade control may be used when approved in writing by the Engineer. The forms shall then be placed to the line and grade established on the plans and set by the Engineer. A subgrade planer or template shall be then operated from these forms and the subgrade finished to the exact section of the bottom of the pavement as shown on the plans. Slight fill areas will be permitted up to a maximum depth of one-half inch (1/2") provided the fill material is the same as the base or treatment material. The subgrade surface, after being planed to proper depth and section shall then be sprinkled and lightly rolled to insure a uniform density. The subgrade shall be checked with a scratch template operated and maintained by the CONTRACTOR immediately ahead of reinforcing placement operations. No equipment or hauling shall be permitted on the thus prepared subgrade.
- 5.02 **PLACING AND REMOVING FORMS.** The forms may be of either wood or steel but for either type they shall be so set to insure the maintaining of line and grade during concrete placement operations. This will require that sufficient bearing resistance is provided to support the finishing equipment. Forms shall be set for a sufficient distance in advance of concrete placing operations to permit the proper

completion of the subgrade and in general, not less than 200 feet. Forms shall remain in place at least eight (8) hours after the concrete has been placed. Any honeycombed areas exposed upon removal shall be pointed up with approved mortar.

5.03 CONCRETE MIXING AND PLACING.

- A The concrete may be mixed in either road pavers of 27-E capacity or greater, truck mixers or stationary mixers. Any mixer selected for use by the CONTRACTOR shall be in good working condition and shall comply with all requirements of proficiency as established by Mixer Manufacturer's Bureau of the A.G.C. and/or the Truck Mixer Manufacturer's Bureau of the National Ready Mix Concrete Association. The maximum batch size for pavers and stationary mixers shall not exceed 120 percent of the rated capacity and for truck mixers no greater than that recommended by the manufacturer.
- B All concrete shall be placed as herein specified within one and one-half (1-1/2) hours after the cement has been introduced to the mixing cycle. The CONTRACTOR will be responsible for analyzing weather conditions and to suspend operations during periods when adverse weather conditions appear likely. No concrete shall be placed when the temperature is below 40 deg. F. and falling, but may be placed when the temperature is 35 deg. F. and rising. The CONTRACTOR shall keep sufficient length of covering material on the job site to place over and protect the surface of "fresh" concrete during periods of unpredicted rains. Concrete placing temperature shall not exceed 85 deg. unless it contains an approved retarding admixture.
- C Concrete shall be placed on the approved subgrade in such a manner as to require as little rehandling as possible. The width of the section to be placed monolithically shall be approved by the Engineer prior to the starting of operations. If the width proposed to be placed monolithically exceeds one-half (1/2) of the full pavement width, the CONTRACTOR shall core and test the first placement, at his expense, at 50 foot intervals. Additionally, the crown of the pavement will be checked to verify that it conforms to the specified section. Should either the crown or pavement depth not conform to the plans and specifications the CONTRACTOR shall not be allowed to continue full width paving. Unless specifically approved by the Engineer in writing, the mixer will not be allowed to operate from the surface of completed pavement.
- D Concrete shall be distributed to such depth that when consolidated and finished, the slab thickness required by plans will be obtained at all points and the surface shall not, at any point, be below the established grade.

Special care shall be exercised in placing and spreading concrete against the forms and at all joints to prevent the forming of honeycombs and voids.

- E Concrete for the monolithic curbs shall be the same as for the pavement and if carried back from the paving mixer shall be placed within twenty (20) minutes after being mixed. It may be placed from a separate mixer if desired but in any case must be placed while the pavement concrete is still plastic. Curbs doweled on and placed separately may be placed with an extrusion machine utilizing concrete meeting these specifications.

5.04 REINFORCING STEEL AND JOINT ASSEMBLIES

- A All reinforcing steel, including steel wire fabric reinforcement, tie bars, dowel bars, and load transmission devices used in accordance with plan provisions shall be accurately placed and secured in position in accordance with details shown on plans. Reinforcing bars shall be securely wired together at all intersections and splices, and shall be securely wired to each dowel intersected.
- B When wire fabric is used, it replaces only the longitudinal and transverse bars and shall be securely wired together at all splices and to each dowel intersected. Tie bars shall be installed in the required position by the method and device shown on the plans, or by approved method and device equivalent thereto. Bar coatings required by plans, and for material specified, shall be completed and the bars and coating shall be free of dirt or other foreign matter at the time of installation in the concrete. All reinforcement shall be clean and free of loose rust at time of use. Where plans require an assembly of parts at pavement joints, the assembly shall be completed, placed at required location and elevation, and all parts rigidly secured in required position by the method and devices shown on the plans or by approved method and devices equivalent thereto. All load transmission devices shall be free of loose rust and clean when installed in the concrete.

5.05 CONSTRUCTION JOINTS. Intentional stoppage of the placing of the concrete shall be either an expansion joint or at a location at least ten feet (10') removed from an expansion joint. In the latter case the construction shall comply with "Construction Joint Detail" as shown on the plans.

5.06 EXPANSION JOINTS. Transverse expansion joints shall be formed perpendicular to the centerline and surface of the pavement, and shall be constructed in accordance with the sequence of operations shown on the plans. The joint sealing space shall be formed by a wood, or approved material, template that shall remain in place until the sealing material is placed. The template shall be temporarily attached to the joint

filler by nails or other approved devices. The joint sealing space shall be thoroughly cleaned before sealing material is poured. Spacing of expansion joints shall be as shown on the plans.

- 5.07 **LONGITUDINAL JOINTS.** Longitudinal joints shall be of the type or alternate types shown on the plans and shall be constructed of specified materials in accordance with provisions of the plans. Longitudinal joints shall be constructed accurately to required lines, shall be perpendicular to the pavement surface at the joint, and the pavement surface over and adjacent to the joint shall be finished as specified. In those cases where the longitudinal joint also served as a construction joint, the keyway section may be formed by a template attached to the side of the form and removed with the form. Both sides of the joint shall be edged as shown on the plans in cases where the longitudinal joint is a construction joint.
- 5.08 **JOINT SEALER.** The joint sealing material shall be as specified under Paragraph 2.06 of these specifications. The material shall be mixed and applied in accordance with the manufacturer's recommendations and as approved by the Engineer. The material shall be poured with such equipment and in such a manner to confine it to the joint section.
- 5.09 **CURBS**
- A The curb shall be constructed in length equal to the adjoining pavement slab length, and expansion joints shall be provided in the curb opposite each transverse expansion joint in the pavement. Expansion joint material shall be of the same thickness, type and quality as specified for the pavement and shall be of the section as shown for the curb. All expansion joints shall be carried through the curb.
- B The curbs may be constructed either monolithically with the pavement section or separately, if dowel bars are shown on the plans.
- C A finish coat of mortar shall be applied on the exposed surfaces of the curbs. The mortar shall be composed of one part of Portland cement and two parts of fine aggregate. A mortar coat will not be required for extruded curbs.
- D The curb face and top of curb shall be plastered with the sand-cement mortar. The mortar shall be applied with a template or "mule" made to conform to the curb dimensions shown on the plans. All exposed surfaces of the curb shall be finished with a steel trowel and brushed to a smooth and uniform surface. The mortar finish as required shall be subsidiary to the Bid Item, "Concrete Curb."

5.10 FINISHING

- A All concrete pavement shall be finished mechanically with approved power-driven machines except for residential subdivision streets (other than major thoroughfares) and vertical and horizontal transition sections.
- B Machine finishing of pavement shall include the use of power-driven vibrators, power-driven transverse strike-off, and screed, and a power driven longitudinal float; or such alternate equipment as may be substituted and approved by the Engineer. All the equipment shall be operated in such a manner to produce a thoroughly compacted concrete mass with a riding surface complying to the requirements of these specifications.
- C When hand finishing is permitted, the concrete shall be struck-off with an approved strike-off screed to such elevation that when consolidated and finished the surface of the pavement shall conform to the required section and grade. The consolidation may either be accomplished with a tamping template or vibratory screed.
- D After completion of a strike-off, consolidation and transverse screeding, a hand-operated longitudinal float shall be operated to test and level the surface to the required grade. The final finishing operations shall include the use of hand floats, straight-edges and other hand tools as needed or required to produce an acceptable surface. The surface shall be belted unless otherwise directed by the Engineer in writing. The surface, when tested with a sixteen foot (16') straight-edge shall not vary more than 1/16th inch per foot from the nearest point of contact, and in no case shall the maximum ordinate from the sixteen foot (16') straight-edge to the pavement exceed 1/8th inch.

- 5.11 CURING. All concrete pavement shall be cured by protecting it against loss of moisture for a period of not less than 72 hours from the beginning of curing operations. Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered and cured with wet cotton mats, air-control coverings, such as waterproofed paper or polyethylene film, or membrane curing compound. When membrane curing is used, the pavement surface shall be sprayed uniformly with the compound immediately after the free surface moisture has disappeared. The compound shall meet the requirements specified under Article 70.2(11) and shall be applied at the rate recommended by the manufacturer, but in no case not less than (1) gallon per 180 square feet of area. Should the membrane be damaged from any cause prior to the 72 hour curing time, the membrane shall be repaired by applying additional curing compound.

6 PROTECTION OF PAVEMENT

6.01 If the location of the pavement placed is such that it is subject to traffic use, then the CONTRACTOR shall erect and maintain barricades to protect the pavement against possible use for a minimum of seven (7) days after placement or until the concrete has reach da compressive strength of eighty percent (80%) of design 28 day strength. the use of the pavement by the CONTRACTOR's equipment will also be restricted for the same period and under the same criteria. The pavement may be used by all traffic fourteen (14) days after placement without strength tests, provided joints have been sealed, pavement cleaned, edge of pavement backfilled and all other traffic safety work has been performed. Barricades shall be supplemented by lights or flares at night, if required in the opinion of the Engineer.

7 DEFICIENT PAVEMENT THICKNESS

7.01 GENERAL. It is the intent of this specification that the pavement be constructed in strict conformity with the thickness and typical sections shown on the plans. Where isolated length(s) of any pavement is found not so constructed, the following rules to adjustment of payment for acceptable pavement and to replacement of faulty pavement shall govern:

- A The pavement will be core drilled prior to final acceptance. The thickness of the pavement will be determined by measurement of the cores taken at such points as the Engineer may select. Cores will be drilled from the width of normal thickness of section, and the thickness of individual cores will be determined by averaging at least three measurements.
- B Pavement of thickness within 1/8 inch of the thickness, required by plans will be considered of a satisfactory thickness, and the contract unit price shall be used in payment.
- C Pavement of a thickness less than the thickness shown on plans by more than 1/8 inch, but less than or equal to 1/2 inch, will be considered of a deficient thickness, and an adjusted unit price shall be used in payment, which price shall be as follows:

Deficiency in Thickness (In.)	Percent of Unit Price Payment Allowed
1/8	100 percent
1/8 - 1/4	85 percent
1/4 - 1/2	70 percent

The length of the area of such deficient thickness shall be determined by additional cores taken at intervals of ten feet (10') along the length of the

pavement in each direction until cores are obtained which are at least plan thickness. The width of such area shall be the entire width of pavement as placed in one operation, and within one length thus determined.

- D Payment will not be made for pavement which is found deficient in thickness of more than 1/2 inch. The width of such area shall be the entire width of pavement placement width within the length thus determined. Such pavement shall be removed and replaced by the CONTRACTOR with pavement of the specified thickness at his expense for the removal and replacement.
- E No additional payment over the contract unit price will be made for any pavement of a thickness exceeding that required by the plans.
- F Additional cores required to determine lengths of pavement to be removed shall be at the CONTRACTOR's expense.

8 MEASUREMENT

- 8.01 Work described to be accomplished under "Concrete Pavement" will be measured by the square yard of surface area of completed and accepted work. The surface area will be so construed to also include that portion of the pavement slab extending beneath the curb.
- 8.02 When monolithic curb or "Concrete Curb" is required, measurements will be by the linear foot complete in place.

9 PAYMENT

- 9.01 All work performed and measured under "Measurement" will be paid for at the unit price bid for "Concrete Pavement (High Early Strength)", "Monolithic Curb" and "Concrete Curb", as required, or the adjusted unit price for pavement of deficient thickness as provided under Paragraph 7, DEFICIENT PAVEMENT THICKNESS, which price shall be full compensation for shaping and fine grading the roadbed, furnishing and placing roadbed treatment material including furnishing and applying all water required, shaping and compacting; for furnishing, loading and unloading, storing, hauling and handling all concrete ingredients, including all freight and cleaning and sealing joints, and curing all concrete; for furnishing and installing all reinforcing steel; for furnishing all materials for sealing joints and placing longitudinal and expansion joints, including steel dowel caps and load transmission devices required, and wire and devices for placing, holding and supporting the steel bars, load transmission devices and joint filler material in proper position; for coating steel bars where required by plans, and for all manipulations, labor, equipment,

appliances, tools, traffic provisions and incidentals necessary to complete the work.

END