SECTION 32 13 14 - CONCRETE PAVEMENT FOR VEHICULAR AREAS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. This Section specifies the requirements for forming and placing reinforced concrete curbs and vehicular pavement to the lines and grades shown on the drawings and constructed as specified herein.

1.2 APPLICABLE PUBLICATIONS

The following specifications and standards of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

A. Texas Department of Transportation 2004 Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges (TxDOT).

1. Item 360 - Concrete Pavement

2. Item 421 – Hydraulic Cement Concrete

B. American Society for Testing and Materials Standards (ASTM):

1. D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction

2. A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

3. C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

4. A 615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

5. C 94 – Standard Specification for Ready-Mixed Concrete

6. C 31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field

7. C 39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

8. A 185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

9. D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

10. D 994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Typed)

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 22 13 Site Grading

B. Section 31 32 13.16 Cement Stabilization

C. Section 31 32 13.19 Lime Stabilization

D. Section 31 32 13.26 Lime-Fly Ash or Fly Ash Stabilization

E. Section 32 17 23.13 Painted Pavement Markings

F. Section 32 17 23.33 Thermoplastic Pavement Markings

1.4 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. *[DESCRIBE ANY OTHER PROJECT CONDITIONS AND/OR CONSTRAINTS THAT THE CONTRACTOR NEEDS TO BE AWARE OF]

1.5 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. If there is an exposed aggregate finish the following sample shall be submitted . Samples: **10-lb (4.5-kg)** sample of exposed aggregate.

D. Material Test Reports: From a qualified testing laboratory indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

E. Material Certificates: Signed by manufacturers certifying that each of the following materials which are part of this project, complies with requirements:

1. Cementitious materials.

2. Steel reinforcement and reinforcement accessories.

3. Admixtures.

4. Curing compounds.

5. Applied finish materials.

6. Bonding agent or epoxy adhesive.

7. Joint fillers.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

PART 2 - PRODUCTS

2.1 CONCRETE

A. Cement, aggregates, admixtures, and water shall conform to the specifications of TXDOT, Item 421. Preparation of concrete mix shall be in accordance with article 360.4 of TxDOT, Item 360

B. Maximum size of aggregate 1-1/2 inches.

C. Slump shall range from 2 to 5 inches.

D. Air entrainment concrete mixture shall have an air content by volume of 4.5 percent plus or minus 1.5%.

E. Concrete shall be mixed in accordance with TxDOT, Item 421.

F. Ready mixed concrete conforming to ASTM C 94 may be used.

G. The concrete mix shall be designed by a commercial testing laboratory, and submitted for approval.

2.2 REINFORCEMENT

A. Reinforcing steel shall meet the specifications of ASTM A615, Grade 60. Bars shall be deformed billet steel free of defects.

2.3 BOARD FILLER

A. Filler board of selected stock. Use wood of density and type as follows:

1. Clear, all-heart cypress weighing no more than 40 pounds per cubic foot, after being oven dried to constant weight.

2. Clear, all-heart redwood weighing no more than 30 pounds per cubic foot, after being oven dried to constant weight.

B. Board filler shall be free of defects which will impair their usefulness as expansion joint fillers.

2.4 PREFORMED BITUMINOUS EXPANSION BOARD

A. Preformed bituminous expansion boards shall meet the specifications for ASTM D 994 and D 1751.

2.5 JOINT SEALING MATERIAL

A. Curb and Pavement joint sealing material shall meet the requirements and specifications of TxDOT Items 360.2F and 360.4D.

B. Sidewalk joint sealing materials shall be GC-9 synthacalk sealant as manufactured by Pecora or approved equal.

2.6 DEFORMED CONTRACTION JOINT METAL STRIPS

A. Deformed contraction joint metal strips shall be 28 ga. steel, galvanized 1.25 oz. per square foot or heavier and meet the specifications of ASTM A 653.

2.7 CURING COMPOUND

A. Curing compound shall conform to the specifications of ASTM C 309, Type 1 or Type 2, white pigmented.

2.8 LOAD TRANSMISSION DEVICES FOR EXPANSION AND CONTRACTION JOINTS

A. Load Transmission devices shall be as detailed on plans and conform to the properties specified in ASTM A615, Grade 60 steel.

2.9 STEEL DOWEL BARS

A. Steel dowel bars and steel reinforcement shall be deformed or smooth bars conform in properties to ASTM A 615 Grade 40. Unless otherwise shown on the plans all reinforcing steel shall be deformed bars, all dowel bars at joints shall be smooth bars, and all curb dowels shall be deformed bars.

B. Greenstreak two component speed dowel system can be used at construction joints pending engineer approval. Product submittal required for approval.

C. Greenstreak two component speed load system can be used at expansion joints pending engineer approval. Product submittal required for approval.

PART 3 - EXECUTION

3.1 GENERAL

A. The curb and sidewalk pavement shall be constructed to the lines and grades shown on the drawings.

3.2 PAVEMENT

A. Preparation of Subgrade

1. The subgrade shall be a previously prepared subgrade, stabilized if required, compacted to a minimum of 95% standard density ASTM D-698, and graded to the required section and grades shown on the drawings and as specified.

2. Rolling and sprinkling shall be performed to maintain the specified moisture content of the subgrade as necessary prior to placing the concrete curbs.

3. Refer to Section 32 22 13 Site Grading for applicable specifications for materials and placement.

B. Placing and Removing Forms

1. Forms shall be of wood or metal, properly treated to insure concrete does not adhere to the forms, straight, clean, free from warp or defect, and of sufficient depth.

2. The forms shall be so placed that when placed each form section will be firmly in contact for its whole length and base width and exactly at the established grade.

3. Any subgrade under the forms below established grade shall be corrected using suitable material, placed, sprinkled, and rolled.

4. Forms shall be securely staked and tightly jointed and keyed to prevent displacement.

5. Sufficient stability of forms to support equipment operated thereon and to withstand its vibration without springing shall be required.

6. Forms shall remain in place not less than 24 hours after concrete is placed.

C. Joints in Concrete Pavement

1. Shall be constructed in the pavement slab at locations and according to details as shown on the drawings. Stakes, braces, brackets or other devices shall be used as necessary to keep the entire joint assembly in true vertical and horizontal position.

2. When prefabricated plastic strips are used to form joints, they shall be placed after the concrete surface has been leveled and before the finishing is completed. The strips shall be of a type specifically manufactured for the purpose of forming joints in concrete pavement and to the dimensions as required to form the specified joints. The strips shall be removed after the concrete has set per the manufacturer's recommendations. Any blemishes caused by the removal of the strips shall be repaired immediately using approved methods.

D. Tie Bars and Load Transmission Devices shall be accurately placed and held securely (parallel to pavement surface and perpendicular to joint) during placing and finishing of pavement.

E. Expansion Joints shall be constructed with board filler and sealed at top. Board filler must be perpendicular to plane of concrete slab. Alignment of joint shall not vary more than 1/4 inch in 10 feet.

F. Reinforcing Steel shall be accurately placed as shown on drawings and secured in place. Each bar intersection shall be tied. All bars shall be supported on steel or plastic bar chairs. Laps shall be a minimum of ten (10) inches and tied. Wire fabric may not be used in vehicular pavement.

G. Concrete Placing and Finishing

1. Concrete not placed as herein prescribed within 90 minutes after mixing shall be rejected.

2. Concrete shall not be placed when temperature is below 40 degrees F and falling, but may be placed when the temperature is above 35 degrees F and rising, the temperature being taken in the shade and away from artificial heat.

3. Concrete shall not be placed before the time of sunrise, and shall not be placed later than will permit the finishing of the pavement during sufficient natural light.

4. Concrete shall be consolidated by a mechanical vibrator to remove all voids. Special care shall be exercised in placing and spading concrete against forms and at all joints to prevent the forming of honeycombs and voids and to prevent displacement of steel reinforcement and load transmission devices.

5. The concrete shall be struck off with an approved strike-off screed to such elevation that when consolidated and finished, the surface of pavement shall conform to the required section and grade. In no case shall the maximum ordinate from a 10 foot straight edge to the pavement be greater than 1/8 inch.

6. The strike template shall be moved forward with a combined transverse and longitudinal motion in the direction the work is progressing, maintaining the template in contact with the forms, and maintaining a slight excess of material in front of the cutting edge.

7. 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.

8. Workmen shall operate the float from approved bridges riding on the forms and spanning the pavement. The longitudinal float shall be held in contact with the surface and parallel to the center line, and operated with short longitudinal strokes while being passed from one side of the pavement to the other. If contact with the pavement is not made at all points, additional concrete shall be placed if required, and screeded, and the float shall be used to produce a satisfactory surface. After a section has been smoothed so that the float maintains contact with the surface at all points in being passed from one side to the other, the bridges may be moved forward half the length of the float, and the operations repeated.

9. After completion of the straightedge testing, a pass with a burlap drag shall be made as soon as construction operations permit and before the water sheen has disappeared from the surface. This shall be followed by as many passes of the drag as required to produce the desired surface texture.

10. After completion of dragging and about the time the concrete becomes hard, the edge of the slab and joints shall be left smooth and true to line.

H. Curing

1. Concrete pavement shall be cured by protecting it against excessive loss of moisture for a period of not less than 72 hours from the beginning of curing operation.

2. Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered and cured in accordance with the requirements of "Membrane Curing", TxDOT Item 360.4I.

3. Special care should be exercised to keep spraying curing compound out of pavement joints.

3.3 CURBS

A. Dowelled on Curb

1. After curing the concrete pavement, doweled on curbs, using secure forms shall be constructed to the size shown on the plans.

2. Dowels may be placed in the pavement slab before the concrete has set, or placed in drilled holes using epoxy adhesive to secure the bars in place.

3. Pavement joints shall extend through the curbs. Expansion joint material shall be the same thickness, type and quality as specified for the pavement.

4. When sawed joints are provided, the placement of curb shall be delayed until all transverse joints are sawed.

5. Weakened plane joints shall be formed by inserting an asphaltic board strip cut to conform to the shape of the curb.

6. All joints should be tool finished after sufficient curing of the concrete.

7. The concrete, reinforcement and curing of the curbs shall conform to the requirements specified for the concrete pavement.

8. In finishing the curbs, a thin coating of mortar shall be worked into the exposed face of the curb in order to obtain a brush finish free of all blemishes and form or tool marks.

9. Curbs shall have a straightness tolerance of 1/8 inch in 10 feet, measured longitudinally along the back and face of the curb.

10. The top of the curb shall not vary vertically in height more than 1/8" when measured up from the concrete pavement.

B. Monolithic Curbs and Curb and Gutter

1. Monolithic curb and curb and gutter shall conform to the specifications for doweled on curb and the details shown on the plans.

2. Monolithic curb and curb and gutter shall be constructed after final grading of the subgrade and before placement of the base material.

3. These curbs shall be cured for at least 72 hours and shall be properly backfilled behind the curb by hand tamping to 95% standard proctor density ASTM D 698 before placing the base material.

3.4 APPLICATION OF JOINT SEALING COMPOUND

A. Joints shall be thoroughly cleaned of loose scale, dirt, dust and curing compound. When necessary, existing joint material shall be removed to the depth as shown on the plans.

B. Joints shall be filled to the full depth of the joint opening. Pouring shall be done in a neat and workman like manner to give satisfactory results. Sufficient joint sealer shall be poured into the joints so that upon the completion of the work the surface of sealer within the joint shall be 1/4" above top of the pavement surface.

3.5 TESTS

A. Concrete Test Specimens

1. Test cylinders for compressive strength shall be taken and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

2. At least 3 cylinders shall be made for each day for each 100 c.y. of concrete or fraction thereof, placed.

3. Laboratory technician will prepare concrete test cylinders.

B. Testing of Concrete Surface

1. After finishing is complete and while the concrete is still workable, the surface shall be tested for trueness with an approved 10' steel straightedge.

2. The straightedge shall be operated from the side of the pavement placed parallel to the pavement center line and passed across the slab to reveal any high spots or depressions.

3. The straightedge shall be advanced along the pavement in successive stages of not more than 1/2 its length. A tolerance of 1/8" in 10' must be met.

4. Any correction of the surface required shall be accomplished by adding concrete if required and by operating the longitudinal float over the area.

5. The surface test with the straightedge shall then be repeated.

3.6 OPENING PAVEMENT TO TRAFFIC

A. The pavement shall be closed to all traffic, including vehicles of the Contractor, until the concrete is at least 7 days old or has attained a minimum average of 3000 psi compressive strength.

B. Any damage to the pavement prior to acceptance by the Owner shall be repaired by the Contractor at no extra cost to the Owner.

C. This does not relieve the Contractor from the normal liabilities and maintenance responsibilities, implied or otherwise, for the pavement or other items.

END OF SECTION