CONSTRUCTION SPECIFICATIONS

FOR

SUBDIVISIONS

(Sanitary Sewer and Water Specifications are not included)

KING ENGINEERING CONSULTANTS, Inc.
PROFESSIONAL ENGINEERS
3355 POPLAR AVENUE, SUITE 200
MEMPHIS, TENNESSEE 38111

MAY, 2011

CONSTRUCTION SPECIFICATIONS
FOR
SUBDIVISIONS

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SECTION 02210.1
GENERAL EARTHWORK

PART 1.00 NOTICE

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these Specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of all above-mentioned documents.

PART 2.00 APPLICABLE PUBLICATIONS

Standards of the American Society for Testing and Materials (ASTM), latest edition, and the Methods of Sampling and Testing of American Association of State Highway Officials (AASHO), latest edition.

PART 3.00 SCOPE OF WORK

The work in this section consists of furnishing all labor, equipment, tools, transportation, materials, accessories, services, and performing all operations in connection with general excavating, filling and grading in accordance with the lines, elevations, cross sections and notes as shown on the drawings and specified herein; including earth excavation and embankment construction on the project site and the shaping, trimming, and finishing thereof; removal of existing obstructions; removal and disposal of surplus, unstable and unsuitable material; top soil removal and conservation; borrow, protection of existing service lines, utilities structures and drainage facilities; shoulder construction; placing top soil; and protection of graded areas.

PART 4.00 JOB CONDITIONS

See General Conditions for detailed information regarding job conditions requirements.

PART 5.00 CLEARING AND GRUBBING

5.01 Clearing shall consist of felling and cutting of trees; the trimmings of trees left standing; and the satisfactory removal and disposal of all trees, logs, down timber, hedge, shrubs, brush, growing corn, weeds, grass, cornstalks, other herbaceous vegetation and rubbish.

5.02 Grubbing shall consist of the removal and disposal of stumps, hedges and roots.

5.03 Clearing and grubbing shall be performed:

A. In areas within the slope limits of embankments.

B. In areas to be excavated.

C. In other areas as designated on the drawings.

1) Down timber and logs shall be cleared from all areas within the slope limits of embankment, areas to be excavated and areas designated on the drawings.

2) Hedge or shrub shall be pulled or grubbed from all areas within the slope limits of embankments, areas to be excavated, and areas designated on the drawings.

3) Trees, stumps, shrubs, bushes, and roots shall be pulled, grubbed in all areas within the slope limits of embankments, areas to be excavated.

4) Trees, stumps, shrubs, bushes and roots as designated on the drawings shall be removed below the elevation of the sub-grade, unless otherwise directed by the Engineer.

5) All areas within the slope limits of embankments and areas to be excavated shall be cleared or stripped of any remaining vegetation such as bushes, growing corn, weeds, grass, cornstalks, roots and other herbaceous vegetation and all decayed vegetable matter, rubbish and similar unsuitable materials.

5.04 Trees, shrubs, and other vegetation to be left standing shall be protected from damage during clearing and other construction operations by methods subject to the approval of the Owner. Clearing and grubbing operations shall be performed in such a manner as to prevent damage to structures, trees, shrubs, and other vegetation to be left standing, and to provide for the safety of the employees and others. In the event that any tree or shrub designated to be left standing is damaged by the Contractor, such plants shall be repaired immediately or replaced, as directed by the Owner, in accordance with standard horticultural practices at the Contractor's expense and at no expense to the Owner.

5.05 The cleared and grubbed material shall in general be disposed of away from the site. Combustible materials may be disposed of by burning on the site, when approved by the appropriate governing body. Disposal of cleared and grubbed material shall be performed legally.

PART 6.00 EARTH EXCAVATION

6.01 Earth excavation shall consist of the excavation, removal and satisfactory disposal, all as specified herein, of all material regardless of its nature encountered within the area to be graded and/or in a borrow area except for Rock Excavation.

6.02 Excavation of materials shall be performed to the lines, elevations, and cross sections as shown on the drawings and as herein specified. Excavated materials that are suitable shall be used in the construction of embankments, so far as possible, and no such material shall be wasted without authority from the Engineer.

6.03 Excavation operations shall be conducted so that material outside of the limits of slopes will not be removed or disposed. In the event that such material is removed or loosened, it shall be replaced as directed by the Engineer.

6.04 Care shall be taken not to excavate material below the elevations and lines indicated on the drawings. If materials are excavated below the elevations and lines indicated on the drawings, the Contractor shall construct embankment to the said elevations and lines and/or in the case of ditches or waterways place stone or broken Portland cement concrete in the ditches or waterways, all at no expense to the Owner.

6.05 Excavated areas shall be continuously maintained such that the surface shall be smooth and have sufficient slope to allow water to drain from the surface. If the Contractor fails to maintain partly finished work in a satisfactory manner, excavation shall be discontinued, if so ordered in writing by the Engineer, until the work is in satisfactory condition.

PART 7.00 REMOVAL OF EXISTING OBSTRUCTIONS

All obstructions and accumulations of rubbish of whatever nature, and existing structures, the removal of which is not otherwise provided for in the contract, shall be removed from the grading site and disposed of, as directed by the Engineer.

PART 8.00 PROTECTION OF SERVICE LINES, UTILITIES STRUCTURES AND DRAINAGE FACILITIES

8.01 Existing utility lines which are to be retained, as well as utility lines constructed during excavation and filling operations, and if damaged, shall be repaired by the Contractor at his expense. In the event that existing utility lines are encountered at such locations or elevations that they must be relocated to avoid conflict with the new work, and where such relocation is not included as part of the proposed work, then the necessary relocation may be accomplished by "others" or by the Contractor.

8.02 If it is necessary in the prosecution of the work to interrupt natural drainage of the surface, or the flow of artificial drains, the Contractor shall provide temporary drainage facilities at his expense that will prevent damage to public or private interests, and shall restore the original drains at his expense that will prevent damage to public or private interests, and shall restore the original drains at his expense as the work will permit. The Contractor shall be liable for all damages which may result from his neglect to provide for either natural or artificial drainage which the work may have interrupted.

PART 9.00 REMOVAL AND DISPOSAL OF SURPLUS, UNSTABLE AND UNSUITABLE MATERIALS

9.01 Prior to starting excavation of soil material:

A. Existing oiled earth or bituminous surfaces may be broken into pieces not to exceed 2-inches in largest diameter, and unless otherwise noted on the drawings,

the material may be embedded in embankments, or otherwise shall be removed from the site.

B. Existing Portland cement concrete pavement, bituminous concrete pavement and existing sidewalks shall be removed from the site of the work and disposed of in a suitable manner by the Contractor.

9.02 Unstable material is soils material of such a nature that, in the opinion of the Engineer, it cannot be properly consolidated in embankments or material that will not or cannot be made to function to satisfy the project conditions.

A. Unstable materials shall be removed and disposed of. All the material of the same soil type as that indicated to be removed shall be removed to the limit of its existence regardless of the relationship between the actual limits of the type and the indicated limits shown on the drawings.

B. Where unstable material not shown on the drawings is encountered, at or below the elevation of the finished grade line, or at, or below the original ground line on which embankment is to be constructed, the Owner may direct the Contractor to, and the Contractor shall, when so directed, remove and dispose of the unstable material and backfill, to the finished grade line, with suitable material as specified by the Engineer.

9.03 Surplus excavated material shall be disposed of in the following locations, as noted on the drawings or directed by the Engineer:

A. Used to widen embankments or flatten slopes. Surplus materials disposed of in this manner will not be required to be rolled unless the widening is made at the same time the embankment is constructed.

B. Disposed of within and/or adjacent to the job site.

C. Disposed of within a waste area noted on the drawings.

D. Disposed of, in a legal manner, outside the limits of the job site at a location chosen by the Contractor and approved by the Owner, at the Contractor's expense.

PART 10.00 TOP SOIL REMOVAL AND CONSERVATION

Top soil shall be removed from areas to be graded and spread on areas already graded and prepared for top soil or shall be removed, transported and deposited in storage piles for use at such time as the graded area is ready for such placement. Top soil shall be stripped to a sufficient depth to yield a quantity of top soil sufficient to provide 4-inches of top soil cover. Top soil shall be free to subsoil, stones and other undesirable material.

PART 11.00 BORROW

11.01 When the quantity of material required for embankments is not available within the limits of the job site, the Contractor shall provide sufficient material to construct the

embankments to the lines, elevations and cross sections as shown on the drawings from borrow areas. Borrow material shall be provided which meets the requirements and conditions of the embankment in which it is to be deposited. Borrow areas selected by the Contractor and the materials contained therein shall be approved by the Owner prior to the placing of any such materials excavated from the borrow pit in embankment.

11.02 Procedures and requirements specified herein for other excavation are also applicable to excavation from borrow areas.

11.03 The Contractor shall notify the Owner at least ten (10) days in advance of the opening of any borrow pit to permit any necessary elevations or measurements to be taken or any desired material tests to be made.

PART 12.00 EMBANKMENTS

12.01 The construction of embankments shall consist of the preparation of the site and the placement and compaction of excavated materials, including earth, stone, gravel or other materials of acceptable quality, as specified herein, and to the lines, elevations and cross sections as shown on the drawings.

12.02 Before embankment is constructed all Clearing and Grubbing, Top Soil Removal and Conservation, and Removal and Disposal of Unstable and Unsuitable Material shall be performed as specified in this section on the area which is to receive the fill material.

12.03 The surfaces upon which embankment is to be constructed shall be loosened by scarifying, discing, or by other approved methods to provide bond between existing ground and the embankment. Wherever an embankment is to be constructed on or against a slope steeper than four (4) horizontally to one (1) vertically, the slope shall be cut into steps having horizontal dimension of not less than 1-foot and a vertical rise, as the construction of the new embankment progresses.

12.04 Snow and ice, if present, shall be removed from the area to be covered by embankment. Embankment shall not be constructed on frozen ground nor shall frozen materials be deposited in embankments.

12.05 Embankments shall be constructed by depositing excavated materials in horizontal layers not exceeding 6-inches loose thickness. So far as practicable, each layer shall extend the full width of the embankment. The material shall be leveled before compaction by means of bulldozers, blade graders, or other equipment. The surface of the material shall be continuously maintained smooth and have sufficient slope to allow water to drain from the surface. If the Contractor fails to maintain partly finished work in a satisfactory manner, embankment construction shall be discontinued, if so ordered in writing by the Owner, until the work is in satisfactory condition. The paths of the hauling equipment shall be distributed over the width of the embankment.

12.06 After each layer is leveled and before the next layer is deposited, the entire area of each layer shall be compacted to the following compaction requirements, or to compaction requirements otherwise noted on the drawings or specified in the contract documents. A

qualified testing laboratory may determine the standard proctor density by the Standard Methods of Test, AASHO, unless another method is specified or is determined to be more applicable by the Owner. The determination that the compacted embankment material meets the compaction requirements may be performed by a qualified testing laboratory by the Standard Methods of Test, AASHO. The Contractor shall provide the qualified testing laboratory with sufficient opportunity to perform this determination test before proceeding with additional layers of materials. Testing included in this provision will be paid for by the Developer.

PART 13.00 COMPACTION REQUIREMENTS

13.01 Fill:

TYPE OF FILL	STANDARD PROCTOR AASHTO T-99
Compacted fill under buildings and structures	95
Compacted fill under roadway* and other areas to be paved except the uppermost 6-inches of the subgrade.	95
The uppermost 6-inches forming subgrade for roadway and other pavements.	95
Compacted fill in levees and dikes.	95
Compacted fill in overlot areas.	80

*In overlot areas where the roadway or other paving section is not well defined, the boundary for this compaction requirement shall be defined by planes sloping outward from the pavement section on 1:1 slopes beginning at lines in the finished surface located 4-feet outside of the edge of the pavements.

13.02 Compaction shall be obtained by rolling with tamping type rollers, pneumatic-tired rollers, or three-wheel rollers. In general, a tamping type roller will be required and each layer of embankment material will be compacted until the full weight of the roller is supported by the tamping feet of the roller or the compaction requirement is reached.

13.03 If the moisture content of the deposited material is such that the above compaction requirements cannot be obtained without drying or wetting the materials, the Contractor shall dry the material by discing, harrowing or other approved method, or wet the material uniformly by the application of water, whichever is necessary.

13.04 In the construction of levee embankments and where fill materials from excavation and borrow have decidedly different values of permeability when compacted, the most pervious materials shall be placed in the waterside face of the embankment.

13.05 Materials used for embankment construction may contain stones smaller than 6-inches in diameter, and such stones shall be interspersed through the soil. If these stones interfere with the compaction of the embankment, they shall be removed and otherwise disposed of. Stones larger than 3-inches in diameter will not be permitted in the uppermost 1-foot of embankment.

PART 14.00 SHOULDER CONSTRUCTION

14.01 At locations where shoulders are to be constructed adjacent to a rigid type surfacing, such as Portland cement concrete pavement, or any bituminous surface course constructed on a Portland cement concrete base course, or adjacent to curb, gutter, or curb and gutter, the following shall apply:

A. After surfacing, curb, gutter or curb and gutter have been constructed, the placing of earth for the shoulders shall be completed and the earth compacted, shaped, and finished to the lines, elevations and cross sections shown on the drawings.

14.02 At locations where shoulders are to be constructed adjacent to a non-rigid type surfacing, such as gravel or crushed stone base of surface course, or any bituminous surface course not constructed on a Portland cement concrete course, the following shall apply:

A. When the elevation of the shoulder is to be at, or near to the surface elevation of the surface or base course, the earth for the shoulders shall be roughed in before the material for the base or surface course is deposited. The edge of the shoulder abutting the base or surface course shall be constructed as nearly vertical as practicable. The earth shall be placed so that it will be possible to retain and compact the edges of the base or surface course against the shoulder. After the base or surface course is constructed, the balance of the earthwork required to complete the shoulders shall be performed, and the shoulders shall be compacted, shaped and finished to the lines, elevations and cross sections shown on the drawings.

B. When the elevation of the shoulder is below the surface elevation of the surface course, the earthwork required to complete the shoulders shall be performed before the surface course is constructed. The shoulders shall be compacted, shaped and finished to the lines, elevations and cross sections shown on the drawings.

14.03 The Contractor shall at all times perform his shoulder construction operations in a manner such that the finished pavement, base or surface course, curb, gutter, curb and gutter or any structure will not be damaged. Any damage occurring shall be either repaired, or removed and replaced by the Contractor.

14.04 The shoulders shall be rolled with an approved pneumatic-tired roller.

PART 15.00 FINISHING

15.01 Excavation and embankment areas, including all earth areas disturbed by the construction work, shall be shaped, trimmed, smoothed, and finished uniformly in a workmanlike manner to the lines, elevations and cross sections shown on the drawings. The degree of finish for grading shall be that ordinarily obtainable through the use of a blade grader or similar power equipment operating under favorable conditions and operated by skilled workmen. Other methods, including hand methods, will be required in the event satisfactory finishing is not otherwise obtained.

15.02 The finished surface of areas on which base and/or surface courses are to be constructed shall be constructed so that the average surface elevation of the earth shall not be higher than the average elevation of the subgrade and shall not be lower than 0.15-feet below this elevation. All other surfaces shall not vary in elevation more than 0.15-feet above or below the elevation or cross section as shown on the drawings or as established by the Engineer.

15.03 All earth surfaces shall be shaped and finished so that proper drainage is assured.

PART 16.00 PLACING TOP SOIL

16.01 Top soil shall not be placed until the area to be covered has been shaped, trimmed and finished. If the surface which is to receive the top soil is hardened or crusted, it shall be raked or otherwise broken up as to provide sufficient bond with the top soil to be placed thereon.

16.02 Top soil shall be spread over the area and to the depth indicated on the drawings.

PART 17.00 PROTECTION OF GRADED AREAS

Newly graded areas shall be protected from traffic and erosion, and any settlement or washing away that may occur for any cause, prior to final acceptance, shall be repaired by the Contractor at his expense. Such repairs shall begin within twenty-four (24) hours after notification by the Owner.

END OF SECTION

SECTION 02510.1
CONCRETE SIDEWALKS

PART 1.00 NOTICE

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these Specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of all above-mentioned documents.

PART 2.00 DESCRIPTION

Concrete sidewalks shall consist of a sidewalk, except sidewalk that is integrally a part of a structure, constructed of Portland cement, concrete Class A, at the locations and to the dimensions, lines, grades and cross section indicated on the plans or as directed by the Engineer, and in conformity with the provisions and requirements set out in these Specifications.

PART 3.00 CONCRETE

Concrete for sidewalks shall be as specified in Concrete Section.

PART 4.00 FORMS

4.01 All forms shall be set up on the prepared subgrade, true to line and grade, and held rigidly in place so as not to be disturbed or displaced during the placing of the concrete. Top of the forms shall be set to exact grade and the height shall be equal to not less than the thickness of the proposed concrete.

4.02 All forms shall be constructed as to form the cross section, contour, etc., of the proposed construction.

PART 5.00 EXPANSION JOINTS

5.01 Unless otherwise indicated on the plans or as directed by the Engineer, pre-molded expansion joint filler, ¾-inch in thickness, shall be placed at the locations and in line with the expansion joints in the adjoining pavement, gutter or curb. When expansion joints are not required in the adjoining pavement or gutter and not otherwise indicated on the plans, ¾-inch pre-molded expansion joint filler shall be placed at intervals of not over 30-feet apart. All pre-molded expansion joint filler must be cut to full width or length of proposed construction and shall extend to within ½-inch of the top of finished surface. All longitudinal expansion joints shall be placed as indicated on the plans. All expansion joints shall be true, even and present a satisfactory appearance.

5.02 Any expansion joint material protruding after the concrete has been finished shall be trimmed smooth.

PART 6.00 FINISHING

6.01 Finishing shall be done as described below:

A. The surface of the sidewalk shall be divided into blocks by use of a grooving tool or saw. Groove shall be placed so as to cause expansion joints to be placed at a grooved line where practical. The groove shall be spaced approximately 5-feet apart, and the blocks shall be rectangular unless otherwise ordered. The groove shall be cut to a depth of not less than 1-inch. The edges of the groove shall be edged with an edging tool having a radius of ¼-inch and any marks caused by edging or otherwise shall be removed with a wetted brush or wooden float so as to give the surface a uniform texture and finish.

PART 7.00 BACKFILLING AND CLEAN-UP

7.01 Immediately after the concrete has set sufficiently, the spaces along the sides and edges of the sidewalk shall be refilled with suitable material. This material shall be compacted in layers of not over 4-inches each until firm and solid.

7.02 All excess or unsuitable materials shall be removed and disposed of in a manner satisfactory to the Engineer.

END OF SECTION

SECTION 02511.10
ASPHALTIC CONCRETE PAVING

PART 1.00 NOTICE

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these Specifications and of the Contract. Submission of proposal implies tha the Bidder is fully conversant with all requirements of all above-mentioned documents.

PART 2.00 GENERAL

2.01 REFERENCES:

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and GENERAL CONDITIONS, shall be included in and made a part of this Section.

B. Examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

PART 3.00 WORK INCLUDED

Provide all equipment and materials and do all work necessary to construct the asphaltic concrete paving, as indicated on the drawings and as specified.

PART 4.00 REFERENCED STANDARDS

4.01 American Society for Testing and Materials (ASTM).

D1557	Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb. (4.5-kd) Hammer and 18" (475 mm) Drop

4.02 Tennessee Department of Transportation Bureau of Highways Nashville (TDOT):

Specifications	Standard Specifications for Road and Bridge Construction

PART 5.00 QUALITY ASSURANCE

5.01 Unless otherwise specified, work and materials for construction of the asphaltic concrete paving shall conform to the applicable portions of TDOT Specification Sections 307 and 411 for pavement.

5.02 Paving work, base course, etc. shall be done only after excavation and construction work which might injure them has been completed. Damage caused during construction shall be repaired before acceptance.

5.03 Repair and replace existing paving areas damaged and removed during this project. Workmanship and materials for such repair and replacement shall match those employed in existing work, except as otherwise noted.

5.04 Pavement subbase shall not be placed on a muddy or frozen sub-grade.

5.05 Existing pavement under state or local jurisdiction shall, if damaged or removed during the course of this project, be repaired or replaced under this section of the specification in conformance with applicable codes, standards, and practices.

5.06 Subbase under proposed soil cement shall not move under the weight of heavy equipment or loaded trucks. Subbase under proposed gravel base shall not deform enough to decrease the thickness of gravel below the finished base elevations.

PART 6.00 PRODUCTS

6.01 Asphaltic Concrete: Use T.D.O.T. 411-E for surface course. Use T.D.O.T. 307-B for base course.

6.02 Complete job mix formula, listing quantities and pertinent ingredient properties, shall be submitted to and approved by Engineer at least two (2) weeks before work is scheduled to begin.

PART 7.00 ASPHALTIC PAVING AND EQUIPMENT

7.01 Asphaltic paving mixture, equipment, methods of mixing and placing, and precautions to be observed as to weather, condition of base etc., shall conform to standard practice for first class roadwork.

7.02 Asphaltic base and surface courses shall each be applied individually, in single lifts of full thickness indicated on the drawings.

7.03 Work shall not be performed during rainy weather. The ambient temperature shall be 40° F and rising.

7.04 Adjacent concrete work, etc., shall be protected from stain and damage during entire operation. Damaged and stained areas shall be replaced or repaired to equal their original condition.

7.05 Deliveries shall be timed to permit spreading and rolling all material during daylight hours, unless artificial light, satisfactory to Engineer, is provided. Loads which have been wet by rain or otherwise will not be accepted. Hauling over freshly laid or rolled material will not be permitted.

7.06 Placing and rolling of mixture shall be as nearly continuous as possible. Rolling shall begin as soon after placing as mixture will bear the operation without undue displacement. The surface will be rolled with a tandem roller weighing not less than ten (10) tons. Rolling shall proceed longitudinally, starting at edge of newly placed material and proceeding toward previously rolled areas. Rolling overlap on successive strips shall be greater than or

equal to one-half (½) width of roller rear wheel. Alternate trips of roller shall be of slightly different lengths. Corrections required in surface shall be made by removing or adding materials before rolling is completed. Course shall be subjected to diagonal rolling, crossing lines of the first rolling while mixture is hot and in compactable condition. Displacement of mixture or other fault shall be corrected at once by use of rakes and application of fresh mixture or removal of mixture, as required. Rolling of each course shall be continued until roller marks are eliminated. Roller shall pass over unprotected edge of course only when paving is to be discontinued for sufficient time to permit mixture to become cold.

7.07 In places not accessible to roller, mixture shall be compacted with hand tampers. Hand tampers shall weigh at least fifty-pounds (50-lbs.) and shall have a tamping face less than or equal to one-hundred square inches (100-sq. in.). Mechanical tampers capable of equal compaction will be acceptable in areas in which they can be employed effectively.

7.08 Portions of pavement courses which become mixed with foreign material or are in any way defective shall be removed, replaced, replaced with fresh mixture, and compacted to density of surrounding areas. Asphaltic material spilled outside lines of finished pavement shall be immediately and completely removed. Such material shall not be employed in the work.

7.09 Joints shall present same texture, density, and smoothness as other sections of the course. Continuous bond shall be obtained between portions of existing and new pavements and between successive placements of new pavement. New material at joints shall be thick enough to allow for compaction when rolling. Compaction of pavement, base, and subgrade at joints shall be such that there is no yielding of new pavement relative to existing pavement when subjected to traffic.

7.10 The paving machine shall be equal or better than a road type paving machine having a 40-foot ski pole. Small paving machines will not be allowed.

PART 8.00 SMOOTHNESS TESTS

A. For projects having three miles or more of asphalt roadways:

8.01 Completed pavement surfaces including bridge deck surfaces of mainline travel ways and ramps with design speed of at least 60 mph and 50 mph, respectively, shall be tested for smoothness with the Mays Meter in accordance with T.D.O.T. procedures.

8.02 The Contractor shall construct the pavement surface to attain a pavement roughness index not to exceed 25-inches per mile when measured with the Mays Meter. No adjustments of the pay for surface items will be made if the pavement roughness index is from 20 to 30-inches per mile.

8.03 For any lane mile area that has a roughness index less than 20-inches per mile, the Owner will add one percent of the monies due the Contractor for each whole number the roughness index is less than 20-inches per mile for the surface items used in the mix.

8.04 For any lane mile area that the roughness index is between 30 and 60-inches per mile, the Owner will deduct one percent of the monies due the Contractor for each whole number the roughness index exceeds 30-inches per mile for the surface items used in the mix.

8.05 For any lane mile area that the roughness index equals or exceeds 60-inches per mile, the surface pavement will be considered to be unacceptable and will be corrected by removal and replacement or by an overlay at the Contractor's expense. No surface skin patches will be allowed. No payment will be made for surface pavement that does not have an acceptable roughness index.

8.06 Lane miles shall be determined consecutively from the beginning of the project. Any fraction of a lane mile at the end of the project shall be treated as a lane mile.

B. For subdivision streets or other hot mix asphalt surfaces of less than three miles:

8.07 The test for smoothness shall be at 30 mph in a vehicle having normal shocks. The ride shall be reasonably smooth.

C. For all work:

8.08 Variations in smoothness of finished surface shall be less than or equal to ¼-inch when tested with a 10-foot straightedge, paved area. At joint with existing pavement, and at other locations where an essentially flush transition is required, pavement elevation tolerance shall not exceed 0.01-feet. At other areas pavement elevation tolerance shall not exceed + 0.05-feet. Irregularities exceeding these amounts or which retain water on surface shall be corrected by removing defective work and replacing with new material conforming to this section.

PART 9.00 SAMPLES

As a part of this contract, the Contractor shall repair/fill in the holes in the asphalt that result in core sampling.

END OF SECTION

SECTION 02519
SOIL CEMENT

PART 1.00 GENERAL

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of all said documents.

PART 2.00 SCOPE OF WORK

This work shall consist of furnishing and placing soil cement as roadway base all in accordance with these Specifications.

PART 3.00 QUALITY CONTROL

3.01 Contractor/developer shall be responsible for coordinating with one of the following two laboratories the quality control measures regarding soil cement that are listed below:

PSI
4161 Ridgemoor Avenue
Memphis, TN 38118
901-365-1802
901-366-7233 (fax)
marshal.sharkey@psiusa.com

TOC
3144 Stage Post Drive
Suite 114
Bartlett, TN 38133-4039
901-259-2362, Ext. 114
901-259-2364 (fax)
901-230-8287 (cell)
dschmidt@toceng.com

3.02 Prior to installation of soil cement, the sub base shall be proof rolled with a 4000-gallon water truck or with a dual axle dump truck loaded to the top. Proof roll shall be done in the presence of the Owner's inspector. It is also necessary for lab to be present.

3.03 During construction, the lab shall be present to assure 7.05-pounds minimum of cement per square yard per inch or 56-pounds per square yard minimum of cement for 8-inches of base and to verify mixture depth.

3.04 During construction, the lab shall be present to ensure proper moisture content of the mixed material prior to compaction.

PART 4.00 MATERIALS

4.01 Lab shall prepare a mix design that provides optimum moisture content having 10% minimum cement by volume that will achieve 350 psi compressive strength. Lab shall be given two weeks notice prior to construction of soil cement base.

4.02 Materials shall meet requirements as stated in Section 304.02 of TDOT Standard Specifications for Roads and Bridges.

PART 5.00 EQUIPMENT AND PROCEDURE

5.01 Compaction shall be accomplished by use of steel wheel or wobble wheel roller. Compaction should continue until 95% of the maximum dry density is achieved.

5.02 After installation of soil cement, apply tack spray.

5.03 After installation of soil cement, second proof roll shall be taken seven days (no less) with 4000-gallon full water truck or with dual axle dump truck loaded to the top.

5.04 At the Owner's option, core samples may be taken to verify soil cement depth.

PART 6.00 TDOT SPECIFICATIONS

Except where there are conflicts, the following Sections of TDOT Standard Specifications for Roads and Bridges shall apply:

304.03
304.04
304.05
304.06
304.07
304.09
304.10
304.11
304.13
304.15

END OF SECTION

SECTION 02725.2
SITE DRAINAGE

PART 1.00 NOTICE

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these Specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of all above-mentioned documents.

PART 2.00 SCOPE OF WORK

The work in this section consists of furnishing all materials, accessories, equipment, tools, transportation, service and performance of all operations required to execute the construction of the complete system of site drainage as shown, and including all excavation, backfill structures and catch basins, grading, pipe and connections and all other items shown are required.

PART 3.00 PIPE

3.01 All storm drainage pipe shall be ADS corrugated polyethylene pipe or tongue and groove reinforced concrete, conforming to ASTM Specifications C76. ADS pipe shall not be used where fill over soffit is 6-feet deep or more.

3.02 Joints for concrete pipe shall be rubber gasket joints.

3.03 Rubber Gasket Joints - rubber gaskets shall conform to ASTM Specification C443 and shall be continuous rubber rings fitting snugly into the annular space between the parallel surfaces of the tongue and groove ends of the pipe to form a flexible and watertight seal under all conditions of service. Make rubber gasket joints as recommended by the gasket manufacturer and generally as follows: prior to installing the pipe and when recommended by the gasket manufacturer, the gasket shall be cemented to the tongue end of the pipe with a special rubber cement furnished by the manufacturer of the gasket. When placing gasket, the pipe tongue surface shall be dry and clean. Affix gasket to the pipe not more than 24-hours prior to installation. Before installing pipe, the entire interior of the groove shall be cleaned and lubricated as well as the gasket over installed pipe, and the joint pulled together tightly. If the gasket becomes loose or displaced, the pipe section shall be removed and the joint remade satisfactorily. All joints shall be inspected both inside and outside for gasket faulting or displacement.

3.04 All concrete pipe shall be Class III. Use RCP where fill over soffit is 6-feet deep or more.

PART 4.00 EXCAVATION

4.01 Excavate trenches to the required lines and grades as indicated on drawings. Excavated materials not required or acceptable for backfill shall be disposed of as directed by the Owner. All excavation which is carried below the required depth shall be backfilled at the

Contractor's expense with selected material compacted to the density of the surrounding earth.

4.02 The minimum width of the trench at the top of the pipe shall be a width which will permit the proper construction of joints and compaction of backfill around the pipe, but shall be at least equal to the outside pipe diameter plus 12-inches. The trench shall be excavated accurately to the established line to provide at least a 6-inch space between the side of the trench and the side of the pipe. The trench sides shall be vertical unless otherwise approved by the Town. The maximum allowable trench width shall not exceed the outside pipe diameter plus 24-inches to 6-inches above the top of the pipe.

4.03 Make shallow excavations under each joint as required for proper jointing. Otherwise, the bed for the storm drainpipe shall be shaped to keep the lower quarter of the pipe in continuous contact with the trench bottom.

4.04 Provide trench bracing, sheathing, or shoring necessary to perform and protect the excavation for the safety of personnel and adjacent structures, and to conform to governing laws. Unless otherwise directed, all bracing, sheathing, or shoring shall be removed after the completion of backfill to at least 6-inches over the tops of the pipes for storm drains.

4.05 Provide all pumping and other de-watering equipment required for the removal of water from the excavations. Do not install any pipe until the trenches are free of water and mud. Do not lay pipe on frozen ground.

PART 5.00 PIPE LAYING

5.01 Provide the necessary mason's lines and supports to insure the installation of the pipe to proper line and grade as indicated on the drawings. Provide approved facilities for lowering pipe into the trench without causing damage to pipe or trench.

5.02 Begin laying pipe in finished trench at the lowest points, proceeding upgrade. Set pipe firmly and accurately to grade so that the invert will be smooth and uniform.

5.03 All pipe which is not true in alignment or which shows any settlement after laying shall be taken up and replaced without extra compensation.

PART 6.00 PIPE FOUNDATIONS

6.01 Wherever the Engineer finds the bottom of the trench to be an insufficient foundation for the pipe, he will determine the locations and dimensions of the necessary foundations for the pipe, which shall be one of the following types, as directed:

A. Concrete saddles consisting of 2,000 minimum psi concrete, poured full width of trench bottom, extending not less than ¼ outside pipe diameter below the outside bottom of the pipe, and extending not less than ¼ outside pipe diameter above and outside bottom of pipe, or other dimensions as directed.

B. No. 57 washed gravel river run, full width of trench bottom, and thickness as directed.

PART 7.00 BACKFILL, STORM SEWERS

7.01 All trenches and excavations shall be backfilled after inspection by the Owner and in a reasonable time after the pipes are installed. The backfill material shall be selected materia from excavation, and that which is placed within a nominal pipe diameter distance at the sides of the pipe and 1-foot over the top shall be material which can be readily compacted. It shall not contain stone which will be retained on a 3-inch ring, frozen lumps, chunks of highly plastic clay or any other material which is objectionable in the opinion of the Owner.

7.02 The backfill shall be placed in loose layers not exceeding 6-inches in depth under and around the pipe and not exceeding 8-inches over the pipe. Successive layers shall be added and thoroughly compacted by hand and power pneumatic tampers until the trench is complete and brought to the elevation as directed. Backfilling shall be done in such a manner as to avoid injurious top or side pressures on the pipe.

PART 8.00 HEADWALLS

8.01 Construct headwalls as indicated on Drawings.

8.02 Concrete and reinforcing steel for drainage structures shall be in accordance with Concrete Section.

PART 9.00 CATCH BASINS/INLETS

Brick for catch basins shall be ASTM C-139 concrete masonry units for construction of catch basins and manholes or other approved units. Mortar for catch basins, walls and drainage structures shall meet the requirements of the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction Specifications. Concrete for catch basins shall meet the requirements of the Concrete Section of these specifications. The inlet grades shall be roadway type cast iron as shown on the Standard Detail Sheet. Inlets shall be City of Memphis standards.

END OF SECTION

SECTION 02902
EROSION CONTROL

Erosion control measures at all construction sites shall be in accordance with the State of Tennessee's "Erosion and Sediment Control Handbook".

A "Notice of Intent" and "Storm Water Pollution Prevention Plan" shall be prepared in accordance with the requirements of Tennessee Department of Environment and Conservation.

Upon completion of a new subdivision, a silt fence shall be erected along the entire perimeter of the property as well as adjacent to and behind all curb and gutter. Type "A" fence is defined as shown on the following two pages.

The Developer will install and maintain this fence. However, once lots are sold the responsibility to erect and maintain fence becomes the responsibility of the landowner.

Silt Fence Specifications

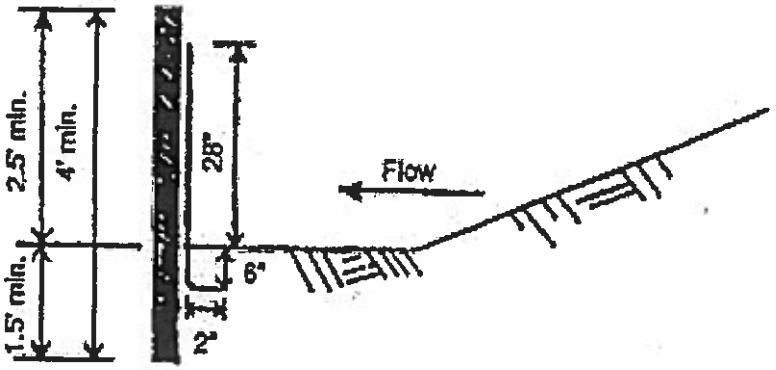
TYPE FENCE	A	B	C
Tensile Strength (Lbs. Min.) (1) (ASTM D-4632)	Warp - 120 Fill - 100	Warp - 120 Fill - 100	Warp - 260 Fill - 180
Elongation (% Max.) (ASTM D-4632)	40	40	40
AOS (Apparent Opening Size) (Max. Sieve Size) (ASTM D-4751)	#30	#30	#30
Flow Rate (Gal/Min/Sq. Ft.) (GDT-87)	25	25	70
Ultraviolet Stability (2) (ASTM D-4632 after 300 hours weathering in accordance with ASTM D-4355)	80	80	80
Bursting Strength (PSI Min.) (ASTM D-3786 Diaphragm Bursting Strength Tester)	175	175	175
Minimum Fabric Width (Inches)	36	22	36

(1) Minimum roll average of five specimens.
(2) Percent of required initial minimum tensile strength.

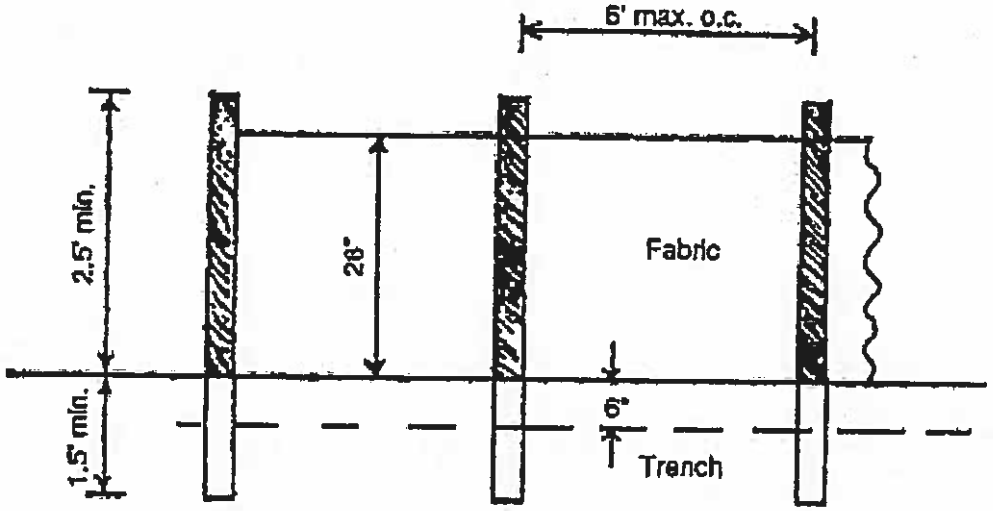
Table 2

Source: GA SWCC

Silt Fence – Type A



SIDE VIEW



FRONT VIEW

Figure 1

Source: GA SWCC

SECTION 03001
CONCRETE

PART 1.00 NOTICE

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these Specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of all above mentioned documents.

PART 2.00 SCOPE OF WORK

Work covered by this section consists of furnishing all plant, labor, equipment, appliances and material and in performing all operations in connection with the installation of concrete work complete, in strict accordance with this section of the specifications and applicable drawings and subject to the terms and conditions of the contract.

PART 3.00 APPLICABLE SPECIFICATIONS

The Standard Specifications of the American Society for Testing and Materials (ASTM) and the American Concrete Institute (ACI) as they appear herein or on the Plans by reference form a part of this specification.

PART 4.00 SHOP DRAWINGS

Submit for the Engineer's review complete shop drawings for all reinforcing steel required for this project. Refer to the General Conditions for detailed information regarding shop drawings requirements. Detail wall reinforcement in elevation views and slab reinforcement in plan views.

PART 5.00 GENERAL

Full cooperation shall be given other trades to install embedded items. Suitable templates or instructions or both will be provided for setting items in place in the forms. Embedded items shall have been inspected and tests for concrete or other materials or for mechanical operation shall have been completed and approved before concrete is placed.

PART 6.00 JOB CONDITIONS

Refer to the General Conditions for detailed information regarding job conditions requirements.

PART 7.00 MATERIALS

7.01 Ready-mix concrete shall be used. Ready mixed concrete shall conform to ASTM Standard C94, latest revision. Submit proposed mix designs, tested per ACI 350 or ACI 318, a minimum of thirty (30) days prior to concrete placement for engineer's review. Type II cement shall be used for all tanks and basins.

7.02 CURING MATERIALS:

A. Waterproof Paper - ASTM C171, latest revision, Type I.

B. Membrane Curing Compound - ASTM C309, latest revision, Type I.

7.03 Expansion joints shall be premolded, and shall conform to ASTM D1751, latest revision.

7.04 Dumbbell water stops shall be vertical and horizontal, of required types, shapes, sizes as indicated, (Neoprene Rubber). Provide corner and "L" members (flat or horizontal), tees, unions, and split dumbbell. Install per the manufacturer's printed instructions in all joints of liquid containment structures.

7.05 Joint sealer shall be cold application type or hot poured elastic type as approved by the Engineer. Concrete joint sealer cold application type shall conform to ASTM D1850, latest revision. Concrete joint sealer, hot poured elastic type, shall conform to ASTM D1854, latest revision.

7.06 Forms shall be wood, metal or other approved material and shall conform to the following requirements:

A. WOOD:

1. Unexposed Concrete Surfaces - No. 2 common or better lumber.

2. Exposed Concrete Surfaces - dressed and matched boards of uniform thickness of a width not exceeding 10-inches, or plywood.

7.07 Form ties shall be suitable for the purpose of the structure. In liquid containment structures, the portions of single rod ties that remain in the wall shall be provided with an integral waterstop at mid point. The assembly shall provide cone shaped depressions at the surface, at least 1-inch in diameter and 1½ -inches deep, to allow filling and patching.

Through ties that are to be entirely removed shall be tapered over the portion that passes through the concrete. The large end shall be on the liquid side of the wall.

All tie depressions and/or holes shall be filled. The Contractor shall demonstrate and submit for review the methods and materials used for filling the voids formed by the ties. Filling material shall be non-shrink.

7.08 FORM OIL:

Commercial quality, colorless, mineral oil, free of kerosene and of a viscosity suitable for the intended use.

7.09 REINFORCEMENT:

See Structural drawings.

PART 8.00 CLASSES OF CONCRETE AND USAGE

8.01 See table below for requirements of strength, maximum water cement ratio, and slump. Concrete of the various classes required shall be proportioned in such manner to give the following tabulated minimum strength and shall not exceed the listed maximum water cement ratios shown.

Class of Concrete	Compressive Strength PSI at 28 Days	Maximum Water Cement Ration Gal/Bag	Slump	Coarse Aggregate (1½" Max.)
Class A	4000	0.48	4"	Limestone
Class C	3000	0.59	8"	Contractor's Option

8.02 USAGES:

Concrete of the various classes shall be used as follows:

A. Class A Concrete:

For general concrete work, including all steel reinforced structural elements of buildings, tanks and appurtenant structures, slabs, on grade and sidewalks.

B. Class C Concrete:

For all concrete not reinforced including fill concrete in hydraulic structures.

PART 9.00 AIR-ENTRAINED CONCRETE

9.01 Unless otherwise stated, all structures and all concrete exposed to the weather shall be air-entrained.

9.02 Total air content shall be 4½% for 1-inch and 1½-inch aggregates, and 5% for ¾-inch aggregate, with a tolerance of ± 1½%.

9.03 All equipment and labor necessary to determine air content of the concrete shall be furnished by the Contractor. If the Contractor is unable to perform the test, then the Contractor shall coordinate with a Testing Laboratory to perform the necessary tests.

PART 10.00 TESTS

10.01 The Owner shall, as part of this Contract, pay costs of all laboratory and other tests. Contractor shall be responsible for taking cylinders and for notifying Testing Lab when their services are required. At least one (1) sample shall be taken consisting of three (3) cylinders for each twenty-five (25) cubic yards or a minimum of one (1) sample per day. Testing shall be as follows:

One (1) seven (7) days in laboratory.
One (1) twenty-eight (28) days in laboratory (hold as reserve).
One (1) twenty-eight (28) days in laboratory.

10.02 Cylinders shall be properly identified as to placement location of the concrete sampled and cured in the field until the Testing Laboratory takes possession of the cylinders. Cylinders should be covered with damp burlap until initial set occurs. Once initial set occurs, the cylinders should be immersed in water, which is similar to the process used by Testing Laboratories.

PART 11.00 REMOVAL OF FORMS

11.01 Wall and column forms shall remain in place a minimum of seven (7) days. During this time, the forms shall be kept wet. Other forms may be removed at any time that removal does not cause damage to the slab edges. The forms shall be removed carefully so as to avoid damage to the concrete. After the forms have been removed, the sides shall be cured as outlined in one of the methods indicated below. Major honeycombed areas will be considered as defective work, and all unsound material shall be removed and replaced with satisfactory material at the Contractor's expense.

11.02 Remove from work carefully, without using wrecking tools or crowbars directly against concrete. The Contractor shall make good at his own expense, without extra cost to the Owner, all damages to concrete and building occasioned by removal of forms and shores. No wood forms shall remain in place.

PART 12.00 CURING

12.01 In all cases in which curing requires the use of water, the curing shall have prior right to all water supply or supplies. Failure to provide a sufficient quantity of one of the curing materials or lack of water to adequately take care of both curing and other requirements shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than one-half (½) hour between stages of curing or during the curing period. Immediately after the finishing operations have been completed and as soon as marring of the concrete will not occur, the entire surface of the newly placed concrete shall be covered and cured in accordance with one of the following methods:

A. COTTON OR BURLAP MATS:

The surface of the slab shall be entirely covered with mats. The mats used shall be of such length (or width) that, as laid, they will extend at least twice the thickness of the pavement beyond the edges of the slab. The mats shall be placed so that the entire surface and both edges of the slab are completely covered. Prior to being placed, the mats shall be saturated thoroughly with water. The mats shall be so placed and weighted down as to cause them to remain in intimate contact with the surface covered, and the covering shall be maintained fully wetted and in position for seventy-two (72) hours after the concrete has been placed or the forms have been removed unless otherwise specified.

B. IMPERVIOUS MEMBRANE METHOD:

1. The entire surface of the slab or wall shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place, or if the slab or wall is cured initially with jute or cotton mats, it may be applied upon removal of the mats. The curing compound shall not be applied during rainfall.

2. Curing compound shall be applied under pressure by mechanical sprayers at the rate recommended by the manufacturer but in no case at a rate less than one (1) gallon to each 150 square feet. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application, the compound shall be stirred continuously by effective mechanical means. Hand spraying of odd widths or shapes will be permitted. Curing compound shall not be applied to the inside faces of joints to be sealed. Should the film become damaged, portions shall be repaired immediately with additional compound.

3. Upon removal of side forms, the sides of the slabs exposed shall be protected immediately by applying curing treatment equal to that provided for the surface.

C. WHITE POLYETHYLENE SHEETING:

The tip surface and sides of the slab or wall shall be entirely covered with polyethylene sheeting. The units used shall be lapped at least 18-inches. The sheeting shall be so placed and weighted down as to cause it to remain in intimate contact with the surface covered. The sheeting, as prepared for use, shall have such dimension that each unit as laid will extend beyond the edges of the slab at least twice the thickness of the pavement. The surface of the slab or wall shall be thoroughly wetted prior to placing the sheeting. Unless, otherwise specified, the covering shall be maintained in place for seventy-two (72) hours after the concrete has been placed.

D. REQUIREMENTS:

1. For requirements for cold weather concreting, comply with ACI 306, "Cold Weather Concreting", latest edition.

2. For requirements for hot weather concreting, comply with ACI 305, "Hot Weather Concreting", latest edition.

3. Copies of the above publications shall be obtained by the Contractor and kept on the jobsite for reference.

PART 13.00 FINISHES OF CONCRETE OTHER THAN SLABS

13.01 Immediately after removal of the forms, all fins and loose materials shall be removed; honeycomb aggregate pockets, voids and holes of ½-half-inch in diameter or greater shall be cut out to solid concrete or to the limits defined by the Engineer and patched with an approved patching material.

13.02 The surfaces shall be rubbed with a carborundum brick and watered to produce a uniform plane surface free from form marks and other blemishes. Cement mortar or grout shall not be added to the surface during the rubbing operation. Particular care shall be exercised to preserve chamfer lines, mouldings and other treatments at the intersection of two (2) plane or curved surfaces.

13.03 In the event that the Contractor elects to use membrane curing compound, all patchwork noted above shall be completed within one (1) day after removal of forms and before application of curing compound.

PART 14.00 CONCRETE SLAB FINISHES

14.01 Finished slab surfaces shall be true plane surfaces with a tolerance of 1/8-inch in 10-feet, unless otherwise indicated on the drawings. The dusting of finished surfaces with dry cement will not be permitted. All slab surfaces shall be monolithic finish produced as follows:

A. Immediately after placing the concrete, the surface of the slab shall be screeded and floated with highway straight edges to bring the surface to the required finish level. While the concrete is still green, but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood floated to a true, even plane with no coarse aggregate visible. After surface moisture has disappeared, surface shall again be wood floated to a smooth even finish, free from float and shall then be followed by a light coverage with a steel trowel.

PART 15.00 FINISHES FOR CONCRETE SIDEWALK AND DRIVEWAY

Concrete sidewalk and driveway shall be finished true to sections shown on the drawings as specified for concrete slab finished except that the final coverage with steel trowel shall be replaced by a light brushing with a stiff bristled brush.

END OF SECTION

SECTION 03103.1
CONCRETE CURB, GUTTER AND WATER TABLE

PART 1.00 NOTICE

The General Conditions, Special Conditions and all other herein bound and accompanying documents are part of these Specifications and of the Contract. Submission of proposal implies that the Bidder is fully conversant with all requirements of all above-mentioned documents.

PART 2.00 SCOPE

The work in this section consists of furnishing all materials, accessories, equipment, tools, transportation, service and performance of all operations required to execute the construction of the curb, gutter and water table for this project, all as shown and detailed on the drawings, approved shop drawings and as herein specified.

PART 3.00 SHOP DRAWINGS

Before commencing work, submit for Engineer's approval, shop drawings and illustrations as required for curb, gutter, and water table work and appurtenances. Refer to General Conditions for detailed information regarding shop drawings requirements.

PART 4.00 TESTING OF MATERIALS

4.01 The Owner shall employ the services of an Independent Testing Laboratory to test all materials specifically called for hereinafter to be tested, to set the mix design to obtain 3,000 psi concrete in 28 days specifications, and to test a set of two (2) cylinders for each 40 cubic yards of concrete poured on the work, or each day concrete is poured, to determine that the mix constantly yields the required design strength. The cylinders will be made by the Engineer in forms furnished by the Contractor. It shall be the Contractor's responsibility to transport the cylinders to the laboratory for testing.

4.02 Certificates of material and cylinder tests shall be issued by the laboratory in three (3) copies each and mailed to the Engineer.

4.03 Costs for making these tests shall be borne by the Developer.

PART 5.00 EXPANSION OF JOINT MATERIAL

All expansion joint material shall be "Elastite" or equal, pre-cut to exact cross-section of the curb and gutter or the valley gutter section. Expansion joint material shall be ½-inch in thickness and shall be placed at intervals of 40-feet in both the curb and gutter and the valley gutter extending the full depth of both curb and gutter.

PART 6.00 CONCRETE

All concrete used on the work shall conform to Concrete Section of these Specifications.

PART 7.00 FORMED HEADWALL CONCRETE

Where indicated on the plans or staked in the field, all headwalls shall be constructed as shown on the plans. All corners shall be chamfered 1-inch, and the exposed faces shall be dressed by rubbing with a stone immediately after the forms are stripped. All concrete used to construct these headwalls shall be 3,000-pound concrete.

PART 8.00 MISCELLANEOUS CAST IRON

8.01 The cast iron gratings, rim, and manhole covers shall be dense, grey cast iron free from blowholes and shrinkage cracks. Each casting shall be hot dipped in asphalt paint.

8.02 The angle irons shall be provided with two (2) countersunk head bolts. The irons shall be asphalt paint coated.

PART 9.00 BRICK

All brick used in masonry structures shall be hard burned common brick or solid concrete brick.

PART 10.00 CEMENT

Cement shall be a standard Portland cement which at the time it is incorporated in the mixture shall conform to the Standard Specifications and tests for Portland cement (Serial Designation: C 150-47) of the American Society for Testing Materials, and subsequent revisions thereof.

PART 11.00 FINE AGGREGATE

11.01 The fine aggregate shall consist of sand, conforming to the following requirements:

A. Sand - the sand shall consist of clean, hard, durable grains, graded from coarse to fine, with the coarser particles predominating, and shall be free from lumps of clay and all vegetable or other deleterious substances. When dry, it shall pass a laboratory screen having circular openings ¼-inch in diameter; not more than twenty-eight percent (28%), by weight, shall pass a Standard No. 50 laboratory sieve; not more than seven percent (7%) by weight, shall pass a no. 100 laboratory sieve. It shall contain not more than three percent (3%), by weight, of earth, clay or loam.

B. Strength - mortar composed of one (1) part, by weight, of Portland cement and three (3) parts, by weight, of sand, shall have a tensile strength at the age of seven (7) and twenty-eight (28) days of not less than one hundred percent (100%) of that developed by mortar of the same proportions and consistency, made of the same cement and standard Ottawa Sand.

PART 12.00 COARSE AGGREGATE

12.01 The coarse aggregate shall be the result of crushing clean, tough, durable limestone or trap rock. When tested according to standard methods shall have a percent of wear of not more than five (5). It shall be free from the dust of fracture and an excess or flat or elongated pieces. Coarse aggregate shall range in size from fine to coarse within the following limits:

A. Passing 3 ¼", retained on 1 ½", not more than 30%
B. Passing 1 ½", retained on ¾", 25% to 50%
C. Passing ¾", retained on ¼", 22% to 45%
D. Passing ¼", not more than 5%

12.02 Regardless of wear on quarry screens, not more than ninety-eight percent (98%) of the sample material shall pass a laboratory screen having a circular opening of 2¼-inches. Any tendency toward an excess of material passing the ¼-inch opening, and not included in the representative samples, will result in the rejection of the material.

12.03 Maximum size of stone may be decreased with written permission of the Engineer.

PART 13.00 WATER

Water used for this work shall be clean, free from oil, acid, alkali, or vegetable substance. Water shall be tested and approved before being used in concrete.

PART 14.00 DEVICES FOR MEASURING MATERIALS

The accurate measurement of each of the materials composing the concrete and the production of uniform mixture of the concrete is essential. The Contractor shall furnish and use approved boxes, pans or specially constructed wheelbarrows or other devices of such dimensions as will give, when filled and struck off, the exact volume of aggregate required by the Engineer. Every box, barrow or other measuring device shall be struck off before emptying. Ordinary wheelbarrows shall not be used unless in connection with approved measuring boxes.

PART 15.00 MEASUREMENTS

All measurements of cement, fine and coarse aggregates, shall be made separately. The materials shall be measured loose, and not compacted. The measurements shall be made at the proportioning plant or at the place of loading, and in an approved measuring device. The Engineer may vary the coarse aggregate up to five percent (5%), in order to secure maximum density and strength of the concrete.

PART 16.00 CONSISTENCY

16.01 The amount of water used shall be such that the consistency of all batches will be uniform. A consistency in which there is any tendency towards a segregation of the aggregate will not be permitted.

16.02 The consistency of the concrete under a visual examination shall conform to the following:

The batch of concrete when deposited upon the subgrade shall tend to settle slowly. The concrete at the edges of the batch shall have a tendency to roll rather than to run. As the batch settles, the individual pieces of aggregate, which should be thoroughly coated with mortar, should crack or break away from adjoining pieces of aggregate. The concrete should be of such consistency that there will be no glistening of the mortar from an excess of water.

16.03 The consistency of the concrete shall be determined by the following test:

A frustum of a cone, 4-inches and 8-inches in diameter, top and bottom, respectively, and 12-inches in height, shall be placed on its base and filled with concrete which shall be tamped until all voids are filled and a slight film of mortar appears on the surface. The cone shall then be slowly removed and the vertical settlement of "slump" of the concrete noted. This settlement shall not exceed 2-inches nor shall it be less than ½-inch.

PART 17.00 MIXING CONDITIONS

No materials containing frost shall be used. Cement or fine aggregate containing lumps of crusts of hardening materials shall not be used. The concrete shall be mixed in such quantity only as is required for immediate use, and any concrete which has been mixed longer than twenty (20) minutes shall not be used.

PART 18.00 MIXING CONCRETE

Concrete shall be mixed in a batch mixer of a type approved by the Engineer.

PART 19.00 RETEMPERING

Retempering, that is, remixing with additional water, mortar or concrete that has partially hardened will not be permitted.

PART 20.00 CURB AND GUTTER CONSTRUCTION

20.01 Construction of the curb and gutter shall commence on a street after all trees, power poles, bulk concrete, etc., have been removed from the limits of the improvements. Power poles shall be relocated by the Memphis Light, Gas, and Water Department. The other items will have to be cleared by the Contractor.

20.02 The curb and gutter grade shall be firm and cut or filled to the proper grade as staked in the field.

20.03 The forms shall be set from grade stakes set on a suitable off-set and listed on a "cut-sheet" showing the cut or fill for the top of the curb. This "cut-sheet" shall be approved by the Engineer before any curb and gutter construction begins. Alignment shall be controlled from a string set from a tack point on the grade stake. Before any forms are

set, at least 100-feet of grade shall be ready, and after the form string is set, it shall be checked by eye for any errors which might have been made by the Contractor.

20.04 Forms shall be set to true line and grade and shall be so pegged and braced as not to yield off line or grade during the process of the pouring operation. The face and back of the form shall be plumb in order that the pitch of the water table may be obtained.

20.05 Steel templates of the proper section shall be placed in the form such that the joint which is made shall be at 90 degrees with a horizontal plane, and at 90 degrees with the form plan. These templates shall be set at intervals not to exceed 10-feet nor less than 5-feet. The latter shall occur only at ends or at driveways. At expansion joints, the expansion material shall be held in place immediately adjacent to the template.

20.06 The forms shall remain in place until the concrete has sufficiently hardened so as not to cause damage to the concrete when the forms are removed.

20.07 All curb stones which settle shall be removed and re-poured at the Contractor's expense.

20.08 The concrete shall be placed in the forms by dumping or with shovels. It shall then be worked and cut to form a dense mass free from honeycomb. The surface of the concrete in the forms shall be tamped and vibrated. The face of the gutter shall be spaded and cut to eliminate all honeycomb or the necessity for covering the surface with a mortar coat.

20.09 The face form shall be removed when the concrete has set sufficiently to hold its weight, and before hardening.

20.10 The sub-grade receiving the concrete shall be wetted before the concrete is placed in the forms.

20.11 The surface of the curb and gutter shall be given a smooth steel trowel finish, and then lightly brushed with a white wash brush. All workmanship going into the finish shall be that of skilled concrete curb and gutter finish. When finished, the stone shall have a pleasing and good workmanship appearance.

20.12 The Contractor shall coat the surface of the new poured curb and gutter with approved curing compound sprayed on the curb and gutter in a uniform covering coat.

PART 21.00 PROOF ROLL

Prior to pouring curb and gutter, proof roll subgrade with a 4000-gallon, full water truck or with dual axle dump truck loaded to the top. Repair failures.

PART 22.00 FREEZING TEMPERATURE

22.01 No concrete shall be mixed while the air temperature is below 32° F., and if this temperature is reached at any time before the work shall have been thoroughly set, it shall be immediately provided with such covering as will protect it from all damage. In no event shall concrete be laid on a frozen sub-grade.

22.02 The Engineer or Inspector in charge of the work on the street will indicate to Contractor the location of all driveways or other openings to be left in the curb, and no additional compensation will be allowed other than actual quantities of curb and gutter contained therein.

22.03 Where curbs are not laid to line and grade, or where gutters are not laid to correct slope and grade, or where work is damaged before acceptance, they shall be removed and replaced at the expense of the Contractor.

PART 23.00 CONTROL JOINTS

Control joints in exposed aggregate concrete curb surface shall be made by saw cutting concrete surface. Saw cut shall be done following finishing as soon as the concrete surface is firm enough not to be torn or damaged by the blade, and before random shrinkage cracks can form in the concrete surface. Saw cut shall be ½-inch wide by ½-inch deep. Distance between control joints shall be 5-feet minimum and in no case greater than 10-feet.

PART 24.00 CURING

See Concrete Section of these specifications, Part 12.

PART 25.00 CURB MACHINE

If a curb machine is used, the quality of construction shall meet or exceed these specifications.

END OF SECTION