

SECTION III
MATERIALS SPECIFICATION
AND CONSTRUCTION PROCEDURES

A. PRELIMINARY WORK

1. Location and Protection of Underground Utilities

Prior to beginning excavation or grading, the subdivider shall determine, the actual locations of all underground utilities in the vicinity of his operations and shall clearly mark them so that they can be avoided by equipment operators. The subdivider must also call TN One Call at 1-800-351-1111. Where such utility lines or services appear to lie in the path of construction, they shall be uncovered in advance to determine their exact location and depth and to avoid damage due to excavation or grading operations. Existing facilities shall be protected during construction or removed and replaced in equal condition, as necessary.

Should any existing utility line or service be damaged during or as a result of the subdivider's operations, the subdivider shall take such emergency measures as may be necessary to minimize damage and shall immediately notify the utility agency involved. The subdivider shall then repair the damage to the satisfaction of the utility agency or shall pay the utility agency for making the repairs. In all cases the damaged structure shall be in as good or better condition as before the damage occurred.

2. Surveying and Staking

The subdivider shall be responsible for his own surveys and establish his own grades unless otherwise directed by the enforcing officer. All surveys shall be subject to review for compliance with construction plans.

3. Removal of Obstructions

The subdivider shall be responsible for the removal, safeguarding, and replacement of fences, walls, structures, culverts, street signs, billboards, shrubs, mailboxes, or other obstructions which must be moved to facilitate construction. Such obstructions shall be restored to at least their original condition.

4. Clearing and Grubbing

The subdivider shall be responsible for cutting, removing, and disposing of all trees, brush, stumps, roots, and weeds within the construction area. Disposal shall be by means of chippers, landfills, or other approved methods not in conflict with state or local ordinances. Burial shall not be an acceptable method for materials listed.

Care shall be taken to avoid unnecessary cutting or damage to trees not in the construction area. The subdivider shall be responsible for loss or damage to trees outside the permanent easement or rights-of-way.

5. Traffic Control and Safety

The subdivider shall provide and maintain access to and from all properties along the line of his work. The subdivider shall also provide temporary bypasses and bridges where necessary to route traffic and shall maintain them in a safe and usable condition whenever, in the opinion of the enforcing officer, detouring of traffic to parallel routes cannot be done without hardship or excessive increase in travel by the public.

Where single-lane by-passes are provided the subdivider shall furnish signalmen to control traffic operations and minimize delays.

The subdivider shall provide, erect, and maintain adequate barricades, warning signs, and lights at all excavations, closures, detours, points of danger, and uncompleted pavement.

B. ROADWAY CONSTRUCTION

1. Stripping, Stockpiling, and Placing Topsoil

All topsoil shall be stripped within the street right-of-way and from any other area designated by the enforcing officer. Topsoil shall be stored in stockpiles. All organic matter within the right-of-way shall be stripped and disposed of unless directed otherwise by the enforcing officer.

A two (2) or three (3) inch layer of topsoil shall be placed where seeding is required or where required by the enforcing officer.

After the stockpiled topsoil has been placed as specified above, the area where the topsoil was stockpiled shall be neatly graded and dressed.

2. Excavation

Excavation shall conform to limits indicated on the plans. Excavation materials shall be removed in such manner that the slopes can be neatly trimmed. Excavation shall not be made below grade except where rock or stone masonry is encountered or undercutting of unstable materials is required. Materials removed below grade shall be replaced with approved materials thoroughly compacted. Where borrow materials are required to complete embankments or fills the subdivider shall be responsible for providing them.

Rock excavation shall be removed to a minimum depth of twelve (12) inches below the subgrade and backfilled with approved materials which shall be thoroughly compacted.

Where a spring or seepage water is encountered that is not provided for on drainage plans it shall be reported to the enforcing officer.

3. Fills and Embankments

Embankment and fill materials shall be free from frost, stumps, trees, roots, sod, or muck. Only materials from excavation or borrow pits, or other materials approved by the enforcing officer shall be used. Materials shall not be placed on frozen ground.

All depressions or holes below the natural ground surface, whether caused by grubbing, rock removal, undercutting, or otherwise, shall be filled with suitable materials and compacted to ground surface before fill construction is started.

Backfilling around a structure shall have been completed and thoroughly compacted to ground surface before any embankment materials are placed thereon.

Embankments shall be so constructed that adequate surface drainage will be provided at all times.

Fill areas shall be compacted by a sheep's foot roller, to a density of not less than ninety-five (95) percent of optimum density and within three (3) percent of optimum moisture content per ASTM D 698.

The finished grade shall be proof rolled with a truck to be selected by the enforcing officer. Any areas found to be soft or "pumping" shall be cut out and replaced with suitable materials in lifts, each lift shall be compacted until the excavation has been brought back to finish grade.

Fill materials shall be placed in eight (8) inch lifts, maximum thickness.

4. Undercutting

This work shall consist of the removal and disposal of unsatisfactory materials below grade in cut sections or areas upon which embankments are to be placed. It shall also include undercutting for pipes and box culverts where required.

Disposal of unsatisfactory materials shall be approved by the enforcing officer.

5. Subgrade Construction and Preparation

The subgrade shall be prepared in conformity with the lines and grades as shown on the plans.

Grading of subgrade shall be performed in such manner as to provide ready drainage of water. Ditches and drains shall be maintained to provide proper drainage during construction.

Hauling over finished subgrade shall be limited to that which is essential for construction purposes, and all ruts or rough places that develop in a completed subgrade shall be smoothed and recompact. Soft areas shall be removed and replaced with crushed stone or as directed by the enforcing officer.

Subgrade density tests shall be conducted by a testing laboratory, licensed by the State of Tennessee, and shall be furnished at the expense of the subdivider and submitted directly to the Enforcing Officer from the testing laboratory. A minimum of one subgrade density test for every two hundred-fifty (250) feet of roadway will be required, except for undercuts, test interval shall be one hundred (100) feet.

The subgrade shall be checked and approved by a the enforcing officer for adherence to the plans before any base materials are placed.

6. Slopes

All slopes shall be trimmed and shaped to conform with the cross sections shown on the plans and as shown in Section V. Rock cuts shall be sealed of all loose fragments, projecting points, etc., so as to leave a clean and neat appearance.

C. BASE AND PAVING

1. Base Course

The base course of stone shall be placed and compacted in layers or lifts upon the prepared subgrade to a finish thickness as described and shown on the plans. No single layer or lift shall exceed four (4) inches in depth.

The base course shall be a pugmill mix of mineral aggregate conforming to the technical specifications set forth in Section 303, Standard Specifications. The aggregate base shall not be spread on a subgrade that is frozen or that contains frost. The base shall be placed and spread in uniform layers or lifts without segregation of size; each layer shall be compacted to a thickness no greater than four (4) inches. The stone shall be mixed with graders or other equipment until a uniform mixture is obtained. Each layer shall be compacted by rolling with alternate blading until a smooth, even, and uniformly compacted finish is obtained.

The base course shall be graded and rolled while it is still moist from the pugmill mixer. If the enforcing officer determines that the mix is too dry, water shall be added with a distributor tank truck while the stone is being graded and rolled. Compaction shall be uniform for the entire width of the roadway until a density of eighty (80) percent of the solid volume has been achieved. Placement and compaction of each layer shall be approved by the enforcing officer before materials for the next successive layer are placed.

Base course density tests shall be conducted by a testing laboratory, licensed by the State of Tennessee, and shall be furnished at the expense of the subdivider and submitted directly to the Enforcing Officer, from the testing laboratory. A minimum of one base course density test for every two hundred-fifty (250) feet of roadway will be required.

No pavement shall be placed until the stone base has been approved by the enforcing officer.

2. Prime Coat

After the base stone has been prepared as outlined above, a bituminous prime coat shall be applied uniformly over the surface of the base by the use of an approved bituminous distributor. The prime coat shall be applied at the rate of the three-tenths (3/10) gallon per square yard, using Grade RC-70 or RC-250, or refined tar Grade RT-2, RT-3, or emulsified asphalt, Grade AE-P. If, after the bituminous materials have been applied, they fail to penetrate before the time that the roadway is to be used by traffic, dry cover materials shall be spread at a rate established by the enforcing officer, (between eight (8) and twelve (12) pounds per square yard) to prevent damage to the primed surface. An excess of cover materials shall be avoided. No succeeding stage of construction shall be placed upon the prime coat until it has properly cured. Aggregate for cover materials shall be Size No. 78 or 8.

In addition to these general requirements, unless otherwise stipulated, all materials and methods of installation shall conform to the technical specifications set forth in Section 402, Standard Specifications.

3. Binder Course

A binder course of asphalt shall be applied upon completion of the prime coat. The binder mix shall be asphalt concrete "B" modified in the thickness shown on the detail sheet for that class street. The binder course shall be considered as described in Section 903.11, Standard Specifications.

4. Tack Coat

A tack coat shall be applied to old or existing pavement surface or to a previously prepared base or surface to provide bond for an overlaid course. The tack coat shall be applied at the rate of one-tenth (1/10) gallon per square yard using materials and methods of installation set forth in Section 403, Standard Specifications.

5. Surface Course

Upon completion of the application of the prime coat, or tack coat, an asphaltic concrete surface (hot mix) shall be applied. The surface course shall be the thickness shown on the detail sheet for that class street (**Refer to Section IV - Drawings, for appropriate specifications**). All materials and methods of installation shall conform to the technical

specifications set forth in Section 411, Standard Specifications, for asphaltic concrete surface. The wearing surface shall be constructed of Grade D or E materials, described in Section 903.11, Standard Specifications, and shall utilize asphaltic cement Grade RT-4 or 5, or TRCB-5 or 6, as set forth in Section 904, Standard Specifications.

6. Testing

The subdivider will provide proper testing and inspection of asphalt material at the plan and at the project site at his expense. Certification that the asphalt meets specifications will be supplied to the Enforcing Officer.

D. DRAINAGE SYSTEM DESIGN

1. Design Criteria

Storm facilities shall be designed for a twenty-five (25) year return frequency, with an evaluation of the impact of the one hundred (100) year storm drainage system shall be designed by a registered professional and approved prior to construction.

2. Ditching and Channelization

This work shall consist of the construction of ditches adjacent to roadway shoulders and feeding to and from culverts under or adjacent to the roadway. All drainage ditches shall be graded in their entirety during the time the roadways are being graded; such grading shall be completed prior to final inspection of the roadways.

3. Stabilization of Ditches

All open ditches shall be stabilized in accordance with the following requirements:

Size of Nearest Culvert (Upstream)	Seeding Required	Sod Required Or Concrete	To be Concrete Lined
15"	Grades 1.00%-3.00%	Grades 3.00%-12.00%	Grades Exceeding 12.00%
18" thru 24"	Grades 1.00%-1.50%	Grades 1.50%-7.00%	Grades Exceeding 7.00%
30" thru 36"	Grades 1.00%-1.50%	Grades 1.00%-4.00%	Grades Exceeding 4.00%
42" thru 72"	Grades	Grades 2.50% or Less	Grades Exceeding 2.50%

4. Concrete Ditch Pavings

Concrete ditch paving shall consist of the construction of paved ditches on a prepared subgrade. The subgrade shall be shaped and compacted to a firm even surface.

All soft materials shall be removed and replaced with acceptable materials and compacted as directed by the enforcing officer.

Concrete ditch pavement shall be four (4) inches in thickness throughout and shall be backfilled immediately after the concrete has set and the forms have been removed. The backfilled materials shall be thoroughly compacted. Expansion joints shall be located as directed by the enforcing officer.

5. Culverts and Storm Drains

This work shall consist of the construction of pipe culverts and storm sewers as shown on the plans.

Driveway culverts, where required, shall be a minimum diameter of fifteen (15) inches and a minimum length of sixteen (16) feet; cross drains shall be a minimum diameter of eighteen (18) inches.

Reinforced concrete pipes shall conform to minimum standards for Class III, Reinforced Pipes, A.S.T.M. C76. Corrugated metal pipes shall conform to Section 915.02 or 915.04, Standard Specifications and to gage as follows:

Round Corrugated Metal Pipes

Size	Gage
15" - 24"	16
30"	14
36" - 48"	12
54" - 72"	10
78" - 84"	8

Arch Corrugated Metal Pipes

Size	Gage
18" x 11" - 22" x 13"	16
25" x 16" - 36" x 22"	14
43" x 27" - 65" x 40"	12
72" x 44" or Larger	10

For pipes smaller than forty-eight (48) inches in diameter, a minimum cover of one (1) foot, exclusive of base and paving, is required from top of pipes to finished subgrade. A minimum cover of two (2) feet is required for pipes forty-eight (48) inches in diameter and larger.

Pipes shall be bedded on a six (6) inch thickness of crushed limestone 1/2 maximum size (crusher run). Trench back fill may be compacted earth except all trenches under pavement shall be backfilled completely with crushed limestone.

6. Headwalls

Concrete headwalls shall be constructed at both ends of cross drains as storm and sewer outlets may be precast or formed and poured in place.

7. Catch Basins

Catch basins shall be completed within inlets, outlets, and inverts. Tops and inlets shall be constructed to conform to roadway grade so that drainage can easily be caught and no ponding created. Catch basins shall be constructed as shown and detailed on the standard drawings contained herein.

8. Box Culverts and Bridges

Design of box culverts and bridges shall be prepared by a registered professional submitted to the enforcing officer for approval before construction is permitted.

9. Changes in Water Channels

Where the subdivider rechannelizes through a subdivision he will be responsible for replacing cross drains under streets, as directed by the enforcing officer. This work shall be done at the expense of the subdivider.

10. Curb and Gutter Formed and Extruded

Concrete curbs and gutters and extruded curbs shall conform to the dimensions shown on street cross section. Concrete for curbs and gutters shall be Class A, at 3000 psi.

Concrete driveway ramps shall be required on all curbed streets. The ramps shall extend a minimum of five (5) feet behind the curb.

Any driveway ramp to be placed after initial laying of curb shall require a permit and shall be installed in accordance with the standard drawings included herein.

Any ramp not conforming to the foregoing requirements shall be removed and replaced by the subdivider at his expense and shall be enforced under provision of the maintenance bond.

E. FINAL DRESSING, SEEDING, AND SODDING

1. Final Dressing

This work shall consist of dressing all slopes and areas to within reasonable close conformity to the lines and grades indicated on the plans, or as directed by the enforcing officer. Final dressing shall be performed by hand or machine to produce a uniform finish to all parts of the roadway including embankments, ditches, etc. Rock cuts shall be cleaned of all loose fragments; side slopes shall be laid back to a three to one (3:1) slope and seeded as described in these specifications.

The entire right-of-way shall be cleaned of all weeds and brush and all structures both old and new shall be cleared of all brush, rubbish, sediment, or other objectionable materials.

2. Seeding

In all areas damaged or disturbed by the construction operation where established ground cover was present before beginning of construction, the subdivider shall be responsible for restoring the ground cover after completion of construction, unless noted otherwise on drawings. All areas seeded shall be graded smooth prior to seeding and the subdivider shall be responsible for maintenance of the smooth finished grade until grass is established.