

APPENDIX B

ROAD CONSTRUCTION SPECIFICATIONS

(Amended in its entirety February 26, 2007)

SECTION I

GENERAL

A. JURISDICTION

These rules and regulations governing the construction of roads and streets shall apply within the Tipton County, Tennessee Planning Region.

B. PURPOSE

The purpose of these specifications is to establish standards of design and construction, including construction procedures and quality of materials, that are adequate to assure the safety, convenience, and welfare of the people within the planning jurisdiction.

C. DEFINITIONS

1. Local Government - The city or county government having jurisdiction within the area where a development is located.
2. Engineer - An engineer certified and registered by the State Board of Architectural and Engineer Examiners pursuant to Section 62-202, Tennessee Code.
3. Standard Specifications - Standard Specifications for Road and Bridge Construction, Tennessee Department of Transportation, Bureau of Highways, Nashville, Tennessee, March 1, 1995, and subsequent revisions and additions.
4. A.A.S.H.T.O. - American Association of State Highway and Transportation Officials.
6. A.S.T.M. - American Society for Testing Materials.
6. Basic Regulations - The basic subdivision regulations of Tipton County Planning Region to which this material is attached as an appendix.

D. APPROVALS

All construction plans shall be prepared and submitted to the Director of Tipton County Public Works. The content and submission procedure shall be as set forth in SECTION II, PLANNING.

E. ACCEPTANCE

Acceptance for public maintenance of any facilities or improvements located within any subdivision may only be accomplished by formal action of the governing body in the manner established in Subsection 3-101.7, Basic Regulations. Any approval of plans, etc., submitted in conformance with these provisions, shall not in any manner bind or presuppose acceptance of these facilities by the governing body.

F. RESPONSIBILITY FOR COMPLIANCE

In all matters involving enforcement of, or compliance with, the provisions contained herein, the subdivider (as defined in Basic Regulations, Section 6-102) is considered as the party legally responsible for performance; and the use of engineers, contractors, or other agents shall in no way diminish or absolve the subdivider of this basic responsibility.

SECTION II

PLANNING

A. PLAN PREPARATION

All construction plans for improvements within land subdivisions shall be prepared by engineers registered to practice within the State of Tennessee. The plans shall bear the stamp and signature of the individual responsible for their preparation.

B. CONTENT

The information set forth in Section 5-102, Construction Plans, shall be required upon each and every plan submitted hereunder. In any instance where special conditions may warrant, additional data may be required. An addendum to Appendix B, Road Construction Specifications providing standard design detailed sections for roads, curbs, headwalls, etc. may be obtained at the Public Works Department located at 8279 Highway 51, Brighton, TN 38011.

C. SUBMISSION, REVIEW, AND APPROVAL

When the plans are complete, with all required data entered thereon, they shall be submitted to the office of the enforcing officer for review and comment fourteen (14) days prior to formal presentation before the Planning Commission. If the Director of Tipton County Public Works finds that the plans are in order and all required information is presented, he shall forward the plans to the Planning Commission for review and approval. Should any disagreement between the Director of Tipton County Public Works and the subdivider (or his engineer) arise as to the nature of, or requirement for, any particular improvement or facility, the plans may be forwarded to the Planning Commission for arbitration of the dispute.

Action by the Planning Commission may come in the form of unconditional approval of the plans as submitted, conditional approval, or disapproval. Should the commission's action come in the form of conditional approval, the applicant may modify and resubmit the plans to the Director of Tipton County Public Works for further review. Should the Director of Tipton County Public Works find that the conditions established by the commission have been met, he may so certify in which instance the plans shall be considered approved. Should the commission act to conditionally approve the plans and no subsequent action is pursued by the subdivider (or his engineer) for a period of six (6) months following the date on which action was taken by the Planning Commission, the plans shall become null and void and any subsequent action shall require submission of new plans.

D. ACTION UPON APPROVAL

Once the plans have received approval as set forth above, construction may begin.

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, insofar as possible, 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. 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 representative of Tipton County Public Works.

3. Removal of Obstructions

The subdivider shall be responsible for the removal, safeguarding, and replacement of fences, walls, structures, culverts, road signs, billboards, shrubs, mailboxes, or other obstructions that must be moved to facilitate construction. Such obstructions shall be restored to at least their original condition, and movement or removal of such items shall be coordinated with any affected adjacent property owners.

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.

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 representative of Tipton County Public Works, detouring of traffic to parallel routes cannot be done without hardship or excessive increase in travel by the public.

Where single-lane bypasses are provided the subdivider shall furnish signal men 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.

The subdivider shall install and maintain until acceptance of the roadways, all road name and traffic control (stop, yield, etc) signs. The signs must be erected prior to any certificate of occupancy for any dwellings within the section.

B. ROADWAY CONSTRUCTION

1. Stripping, Stockpiling, and Placing Topsoil

All topsoil shall be stripped within the road right-of-way and from any other area designated by the representative of Tipton County Public Works. 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 representative of Tipton County Public Works.

A two (2) or three (3) inch layer of topsoil shall be placed where seeding is required or where required by the representative of Tipton County Public Works.

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

Preparation: The entire right-of-way shall be cleared of all tree stumps, roots, brush and other objectionable materials and all trees not intended for preservation; and all tree stumps, boulders and other obstructions shall be removed to a depth of two (2) feet below the subgrade. Rock, when encountered, shall be scarified to a depth of one (1) foot below the subgrade; and no topsoil, soft clays or other organic matter shall be used in the subgrade.

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 spring or seepage water is encountered that is not provided for on drainage plans it shall be reported to the representative of Tipton County Public Works.

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 representative of Tipton County Public Works shall be used. Materials shall not be placed on frozen ground.

Where excavated materials are used in fill construction and the materials consist of earth and various grades of rock, the fills shall be carefully constructed with the larger or hard rock on the bottom followed by the smaller or soft rock and finally the earth fill to provide a well-compacted and void-free embankment.

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 and each lift of fill materials shall be rolled until the roller "walk out".

The finished grade shall be test rolled with a truck to be selected by the representative of Tipton County Public Works. 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. Where excavated materials consist mainly of rock too large to be placed in the normal eight (8) inch thickness without crushing or further breaking down the pieces, such materials shall be placed in the fill in layers not exceeding three (3) feet in depth. No rock larger than eighteen (18) inches in dimension shall be placed in fill. Care shall be taken to fill all voids between large rocks and to assure that fill materials are compacted such that settling is minimized. Compaction of the top six (6) inches of cuts or fills shall be accomplished with pneumatic-tire rollers.

Backfill around structures shall be of crushed stone or earth meeting the approval of the representative of Tipton County Public Works; and the fill shall be placed and compacted in eight (8) inch lifts and brought up evenly on all sides of the structure.

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.

Known areas to be undercut shall be designated on the materials approved by the representative of Tipton County Public Works. The backfill materials shall be placed in eight (8) inch lifts and compacted as specified for fill construction.

Disposal of unsatisfactory materials shall be approved by the representative of Tipton County Public Works.

5. Subgrade Construction and Preparation

The subgrade shall be prepared in reasonably close 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 representative of Tipton County Public Works.

Subgrade density tests shall be conducted by local testing laboratory, approved by the county and licensed by the State of Tennessee, and shall be furnished at the expense of the developer and submitted directly to the Tipton County Public Works Department, from the testing laboratory. A minimum of one subgrade density test for every five hundred (500) feet of roadway will be required.

The subgrade shall be checked and approved by the representative of Tipton County Public Works for adherence to the plans before any base materials are placed.

6. Shoulders and Slopes

All shoulders and slopes shall be trimmed and shaped to conform with the cross sections shown on the plans and as specified in Section C-5, below. Rock cuts shall be sealed of all loose fragments, projecting points, etc., so as to leave a clean and neat appearance. Shoulders shall be completed where required as shown on the plans with care being taken to protect the surface and edges of pavement. Shoulder materials shall be placed in uniform layers and compacted by overlapped rolling of both base course and pavement. The finished shoulder shall be firm against the pavement.

C. BASE AND PAVING

1. Base course

The base course of stone shall constitute either: (a) ten (10) inches of Class A aggregate, Grading D as defined for a Type A Base over the entire width of roadway and installed in four (4) inch compacted lifts as set forth in Section 303, Standard Specifications, or (b) six (6) inches of Grading D limestone over the entire width of roadway and installed in three (3) inch compacted lifts as set forth in Section 303, Standard Specifications; both shall be placed and compacted in layers or lifts upon the prepared subgrade to a finish thickness as described and shown on the plans.

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 mix. If the representative of Tipton County Public Works 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 ninety-eight (98) percent of the solid volume has been achieved. Placement and compaction of each layer shall be approved by the representative of Tipton County Public Works before materials for the next successive layer are placed.

Base course density tests shall be conducted by local testing laboratory, approved by the county and licensed by the State of Tennessee, and shall be furnished at the expense of the developer and submitted directly to the Tipton County Public Works Department, from the testing laboratory. A minimum of one base course density test for every five hundred (500) feet of roadway will be required.

No pavement shall be placed until the course base has been approved by the representative of Tipton County Public Works.

2. Binder

Upon completion of the application of the prime coat, an asphaltic concrete surface (hot mix) shall be applied. All materials and methods of installation shall conform to the technical specifications set forth in Section 307, Standard Specifications for asphaltic concrete surface. The binder shall be constructed of two (2) inches of a 307-BM2 hot mix course (i.e., 200lbs per square yard) as set forth in Section 307, Standard Specifications and shall be installed upon completion of the base course. The binder shall be installed prior to a certificate of occupancy being issued for any structure in the current section being developed. A letter authorizing the Tipton County Planning Department to issue the certificate of occupancy will be issued once the binder has been inspected and approved by the Tipton County Public Works Department.

3a. Tack Coat

This work shall consist of furnishing and applying bituminous material to a previously prepared base or surface, to provide bond for a superimposed course, in accordance with the requirements of these Standard Specifications.

All equipment necessary for the satisfactory performance of this construction shall be on hand and approved before work will be permitted to begin. The required equipment shall include a power broom, equipment for heating bituminous material, a pressure distributor meeting the requirements of Subsection 402.03, Standard Specifications, and such other equipment and small tools as may be required to perform the work in a satisfactory manner.

The designated surface shall be prepared in accordance with the applicable provisions of Subsection 404.05, Standard Specifications. The surface shall be dry at the time the tack coat is applied.

Immediately after cleaning the surface, bituminous material shall be applied with the pressure distributor at a rate directed by the Engineer, but not to exceed 0.05 gallon of residual bitumen per square meter (per square yard) for all materials except asphalt cement. If the bituminous material is to be placed upon a milled surface, the rate of application shall be determined by the Engineer but shall not exceed 0.20 gallon of residual bitumen (per square yard).

When Asphalt Cement is used as a tack coat, the application rate shall be 0.05 to 0.10 gallon per square yard.

The tacked surface shall be allowed to dry until it is in a proper condition to receive the next course. Tack coat shall be applied only so far in advance of the paving operations as is necessary to obtain this proper condition of tackiness. The tack coat shall not be installed in more than 1000' lengths. The Contractor shall protect the tack coat from damage until the next course is placed.

3b. Wearing Surface

This work shall consist of an asphaltic concrete pavement composed of a mixture of coarse aggregate, fine aggregate, mineral filler if specified or required, and asphalt cement, constructed on a prepared roadbed in accordance with these Specifications and in reasonably close conformity with the lines, grades, typical cross section and rate of application shown on the Plans, or established by the Engineer. Typically, this surface shall be applied at a rate of 150 lbs./sq yd unless specified otherwise. This surface is to be installed once 85% of the structures in the subdivision have been completed. Application of the wearing surface may not be started until Tipton County Public Works has inspected the Binder Surface for areas of failure. Approval to pave must be obtained from the Tipton County Public Works Department prior to paving.

The provisions of Section 407, Standard Specifications, of these Specifications shall apply to this construction unless otherwise stipulated.

Composition of Mixtures.

- (a) Composition of mixtures used in this construction shall meet all applicable requirements of Subsection 407.03, Standard Specifications.
- (b) The specified mineral aggregate and asphalt cement shall be combined in such proportions as to produce mixtures within the following master composition limits.

Proportions of Total Mixture, Per Cent by Weight

| Surface Courses | Combined Mineral Aggregate | Asphalt Cement |
|------------------------|-------------------------------------------|---------------------------|
| Grading "D" | 93.0-94.7 | 5.3-7.0 |

In addition to the other requirements of these specifications where Grading "D" is used for the riding surface the composition of the mineral aggregate shall be such that when combined with the required amount of bitumen the resultant mixture shall have:

High Volume Roads (ADT over 1000)

| | |
|-------------------------------|------------|
| *Minimum Stability. kN (lbs)- | 9.0 (2000) |
| *Void Content (%)- | 3-5.5 |
| *Flow, mm (.01 inch)- | 2-4 (8-16) |
| *Minimum VMA (%) | 14 |

Low Volume Roads (ADT under 1000)

| | |
|-------------------------------|-------------|
| *Minimum Stability. kN (lbs)- | 6.75 (1500) |
| *Void Content (%)- | 2-5 |
| *Flow, mm (.01 inch)- | 2-4 (8-16) |

The equipment used in this construction shall meet the requirements of Subsection 407.04 through 407.08, Standard Specifications. All equipment necessary for the satisfactory performance of this construction shall be on the project and approved, before work will be permitted to begin.

The construction requirements for this work shall be as prescribed in Subsections 407.09, 407.11, 407.12, and 407.14 through 407.17, Standard Specifications and the following Subsections.

Preparation of the designated surface upon which the material is to be placed shall be performed in accordance with the applicable provisions of Subsection 404.05, Standard Specifications, of these Specifications.

The surface shall meet the requirements specified under Subsection 407.18, Standard Specifications, and when tested in accordance with the provisions of that Subsection, the deviation of the surface from the testing edge of the straightedge shall not exceed $\frac{1}{4}$ inch.

4. Shoulders

Shoulder construction shall be completed by blading, moistening as necessary, and by thoroughly compacting. The shoulders shall be the width and thickness shown on the typical section as required. All roadways shall have a minimum gravel shoulder two (2) feet wide on either side of the roadway with a minimum thickness of six (6) inches.

Immediately after spreading and brooming the cover aggregate, the entire surface shall be rolled, beginning at the edges and progressing to the edge of the pavement. Rolling shall begin within thirty (30) minutes after the aggregate has been spread. The same rolling and curing procedures required in making the first application shall be repeated in making the second application.

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 404, Standard Specifications.

5. Testing

The developer will provide proper testing and inspection of asphalt material at the plant and at the project site at his expense. Certification that the asphalt meets regulations will be supplied to the Tipton County Public Works Department.

D. DRAINAGE SYSTEM DESIGN

1. 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. All drainage conveyances that are not located within the road Right-Of-Way, shall be indicated on the plans as drainage easements.

2. Stabilization of Ditches

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

| Size of Nearest Culvert (Upstream) | Seeding Required | Sod Required | 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% |

3. 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 representative of Tipton County Public Works.

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. All concrete used in ditch linings and detention basins shall be air entrained and have fiber reinforcement. The backfilled materials shall be thoroughly compacted. Expansion joints shall be located as directed by the representative of Tipton County Public Works.

4. Culverts and Storm Drains

All culverts shall be approved for size and gage by the Tipton County Public Works Department, and the installation of the culvert shall be inspected by the Tipton County Public Works Department prior to final driveway surface installation (See Form Number 6 in Appendix A). Any culvert that does not meet the specifications of the Tipton County Public Works Department shall be removed and reinstalled prior to acceptance of the roadways within the section being developed.

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

Driveway culverts shall be a minimum diameter of fifteen (15) inches and a minimum length of twenty (20) 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:

| Rounded 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 sub-grade. A minimum cover of two (2) feet is required for pipes forty-eight (48) inches in diameter and larger. All pipes shall be built on straight line and grade and shall be laid with the spigot end pointing in the direction of the flow, with the ends fitted and matched to provide tight joints and smooth uniform invert.

Pipes shall be bedded on a six (6) inch thickness of Class B materials and backfilled to a depth of thirty (30) percent of the diameter of the pipes. Recesses shall be dug in the bedding materials to accommodate the fill. Class B, bedding shall be Size No. 7, as shown in Chart No. 903.23, Standard Specifications. Culverts and storm drains in existing roadways shall be backfilled to the depth of the cut.

5. Headwalls

Concrete headwalls shall be constructed at both ends of cross drains as shown and detailed on the standard drawings included herein.

6. Catch Basins

This work shall consist of constructing catch basins complete 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.

7. Box Culverts and Bridges

Design of box culverts and bridges shall be submitted to the representative of Tipton County Public Works for approval before construction is permitted.

8. Roadside Ditches

Roadside ditches, in conventional sections, shall be built to a grade that will permit good drainage, and in no case shall the slope of the ditch be less than one-half (0.50%) percent. All drainage ditches shall be stabilized, as indicated in these specifications.

9. Changes in Water Channels

Where the subdivider rechannelizes through a subdivision he will be responsible for replacing cross drains under roads, as directed by the representative of Tipton County Public Works. This work shall be done at the expense of the subdivider. Also, any alterations to existing channels or streams shall require the approval of the Tennessee Department of Environment and Conservation. An Aquatic Resource Alteration Permit (ARAP) shall be required for such activities and must be approved prior to the approval of the construction drawings.

10. Curb and Gutter (Formed)

Concrete curbs and gutters shall conform to the standard drawings as detailed herein, and shall be required for all major subdivisions when any lot is created under .75 acres (32,670 square feet). Concrete for curbs and gutters shall be Class A, at 3500 psi with air entrainment and fiber reinforcement.

Curbs and gutters shall be constructed to the lines and grades shown on the plans, or as designated by the representative of Tipton County Public Works. The final sub-grade for curbs and gutters shall be carefully graded and compacted to an even density and shall be smooth and true to grade. Curbs and gutters shall be constructed with materials and methods that conform to the technical specifications set forth in Section 702, Standard Specifications.

Concrete driveway ramps shall be required on all curbs and gutters roads. The ramps shall extend a minimum of five (5) feet behind the curb. Materials for the remaining portion of the driveway shall be determined by the sub-divider. Driveway ramp construction shall conform to detailed standard drawings included herein.

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 sub-divider at his expense and shall be enforced under provision of the maintenance bond.

11. Drainage Easements

All drainage easements are either private or public. The maintenance of Private drainage easements is the sole responsibility of the property owner, developer or homeowners association, and shall be noted as such on the plat to be recorded. The Tipton County Public Works Department shall approve all public drainage easements through the construction plans and shall be noted as such on the plat to be recorded. All drainage easements prior to the passage of this amendment shall be considered as private unless the Tipton County Public Works Department approves and accepts the dedication of the private drainage easement.

12. Detention

Approval of Design and Construction.

Any person, firm, or corporation proposing to construct any stormwater detention facility within Tipton County shall apply to the Director of Tipton County Public Works for approval of the location, dimensions, design and construction methods, and materials of such facility. The application shall be in writing, and shall contain such information including maps, plats, diagrams, design data, detailed drawings, specifications, and calculations as herein required.

If the Director of Tipton County Public Works finds that a proposed stormwater detention facility will conform to acceptable standards, the Director of Tipton County Public Works shall issue his approval in writing.

If the Director of Tipton County Public Works finds that a proposed stormwater detention facility will not conform to acceptable standards, the Director of Tipton County Public Works shall issue his notice of disapproval in writing.

Purpose.

The overall purpose of urban stormwater detention facilities is to control and utilize runoff in a sound manner such that the people and property of the areas, both upstream and downstream of changes in land use, experience only minor inconvenience. The effect of temporary storage of runoff on the shape of a hydrograph is pronounced and significant.

All stormwater detention facilities constructed within Tipton County shall be in accordance with the minimum design requirements and specifications as set forth in this chapter.

Applicability.

Whenever the calculated stormwater runoff, considering the fully developed basin at proposed zoning for the ten year storm, exceeds the capacity of the downstream pipes or channels, detention facilities shall be utilized. Drainage culverts or bridges installed by the State, County, or Cities in connection with a roadway project which do not have improvements beyond the right-of-way lines shall not be considered as permanent downstream restrictions, and shall not be considered in the determination of the need for detention.

Exemptions.

Where detention would be required by the preceding applicability section, if one of the following conditions applies, then the Engineer will not require that detention be utilized unless known downstream drainage problems would warrant such:

- (a) The runoff of a 10-year storm from the proposed project exceeds the maximum release rates by less than 10%.
- (b) The runoff of a 10-year storm from the proposed project exceeds the maximum release rate by less than 1.5 CFS.
- (c) A residential project of less than 2 AC in size with a rational runoff coefficient of .58 or less and with no underground drainage system available on or adjacent to the project.
- (d) A re-subdivision or re-development which does not change the usage or density, either existing or allowed, in such a manner as to increase or potentially increase the runoff.
- (e) Where the Engineer deems detention impractical.

Definitions.

For purposes of this chapter the following definitions of words and terms shall apply:

- (a) Dam – an artificial barrier or embankment having greater than six feet difference in elevation between the crest of the emergency spillway and the lowest point in the cross section taken along the centerline of the dam and which does or may impound water.
- (b) Detention Basin – any man-made area or structure that serves as a means of temporarily storing stormwater runoff.
- (c) Detention Storage – the temporary detaining or storage of stormwater on or beneath the ground surface, on rooftops, parking lots, or by other means under predetermined or controlled conditions.
- (d) Development – any change in land use, or improvement on any parcel of land that increases stormwater runoff.
- (e) Discharge – the rate of outflow of water from detention storage.
- (f) Drainage Area – the geographical area contributing stormwater runoff to a point under consideration, i.e., a watershed, tributary area, or catchment area.
- (g) Dry Bottom Basin – a detention basin or facility not intended to have a permanent pool.
- (h) Ten Year Storm – a rainstorm of a given duration and depth of precipitation having a ten percent chance of occurrence in any given year.
- (i) Freeboard – the difference in elevation between the design water surface in the detention facility and the elevation at which uncontrolled overtopping of the facility begins.
- (j) Hyetograph – intensity distribution of a rainfall event with respect to time.
- (k) Hydrograph – flow rate distribution of stormwater runoff with respect to time at the point under consideration, or of detention basin outflow.
- (l) One Hundred Year Storm – a rainstorm of a given duration and depth of precipitation having a one percent chance of occurrence in any given year.
- (m) Project – any development involving the construction, reconstruction, or improvement of structures and/or grounds.
- (n) Stormwater Runoff – the waters derived from precipitation falling within a drainage area, flowing over the surface of the ground or collected in channels or conduits.
- (o) Wet Bottom Basin – a detention basin intended to have a permanent pool.

Maximum Release Rate.

The maximum allowable release rate of stormwater runoff originating within the proposed development shall be the quantity of flow computed using the allowable storm, as defined below, and the characteristics of the development drainage area, i.e., area, percent impervious, time of concentration, runoff coefficient, curve number and channel condition. The allowable storm is defined as the year storm which the controlling downstream pipe or improved channel could facilitate considering a fully developed upstream drainage basin at present or proposed zoning. Drainage culverts or bridges installed by the State or County in connection with roadway project that do not have improvements beyond the right-of-way lines shall not be considered in determining the maximum allowable release rate.

Detention Storage Volume.

The volume of storage provided in detention basins shall be sufficient to store the stormwater runoff generated by the development during a ten-year storm, less the discharge as permitted in the maximum release rate section of this chapter. Storage volume shall be sufficient to store excess flows resulting from a ten-year storm using a 24-hour rainfall distribution or other approved methods.

Stormwater Runoff Not Detained.

The rate of discharge from a detention facility and the rate of discharge of stormwater runoff from areas of the development not controlled by the detention facility shall not collectively exceed the maximum release rate.

Project Site Information.

Detention basin storage type, capacity required and release rates are to be determined by the Design Engineer. To assist in the review of the proposed system the following project information shall be provided to Director of Tipton County Public Works by the Design Engineer:

- (a) A topographic map of the project site and immediately adjacent areas, of suitable scale and contour interval, which shall define the location of streams, extent of floodplains and calculated high water elevations, and shorelines of lakes and ponds.
- (b) The size, location, and flowline elevations of all existing sanitary and storm sewers, which fall within the project limits and within a distance of five hundred feet beyond the boundaries of said project.
- (c) A proposed grading plan and/or site plan showing existing and proposed contours, buildings, parking lots, and other development features.

- (d) Proposed areas and/or methods to be used for detention facilities. The developer's engineer shall coordinate with the Director of Tipton County Public Works on the location, size, shape, or other desired design features of proposed detention basins.
- (e) Drainage area map showing upstream drainage area tributary to the development, and to each proposed detention facility along with the location and size of the controlling downstream drainage structures.
- (f) Special Study to determine effects of development, if required by Director of Tipton County Public Works.

Plans, Specifications and Calculations.

Based on design data furnished, plans and specifications for detention facilities and appurtenances shall be submitted to the Director of Tipton County Public Works for approval prior to construction.

The following plan and design information shall be provided.

- (a) Finalized site plan, development plan, and facilities information as furnished pursuant to the previous section;
- (b) Complete plans for grading, storm sewers, inlets, outflow structures, dams, emergency spillways, and other appurtenances;
- (c) Slope, type, size, and complete flow calculations (if requested) for all existing and proposed storm sewers, outlet structures, spillways, and waterways,
- (d) The grading plan shall show existing and final contours, and a line defining the high water elevations to be expected during the one hundred year flood. Proposed cross sections and grades of overflow swales shall also be included;
- (e) Stage-outflow curves for proposed detention facilities plotted in units of detention facility water surface elevation (and depth).
- (f) Stage-outflow curves for outlet works plotted in units of detention facility water surface elevation (and depth).
- (g) Inflow and outflow hydrographs plotted in units of cubic feet per second of inflow and outflow as ordinates.
- (h) Inflow and outflow hydrographs, detention pond elevations, and storage in tabular form. The elevation at which the peak discharge occurs should be included.

Method of Detention.

The following conditions and limitations shall be observed in selection and use of method of detention.

- (a) General Location – Detention facilities shall be located within the parcel limits of the project under consideration. No detention or ponding will be permitted within public road right-of-ways except for singular in line oversized pipe systems. Location of detention facilities immediately upstream or downstream of the project will be considered by special request if proper documentation is submitted with reference to practicality, feasibility, and proof of ownership or right-of-use of the area proposed. Conditions for general location of detention facilities are identified in the following sections.
- (b) Dry Reservoirs – Dry reservoirs shall be designed with proper safety, stability, and ease of maintenance facilities, and shall not exceed eight (8) feet in depth. Maximum side slopes for grass reservoirs shall not exceed one (1) foot vertical for three (3) feet horizontal (3:1) unless adequate measures are included to provide for the above noted features. Minimum bottom slope of the grass reservoirs shall be 1 %, unless a concrete swale is provided. In no case shall the limits of maximum ponding elevation (100 year storm) be closer than thirty (30) feet horizontally from any building and less than one (1) foot vertically below the lowest sill or floor elevation. The entire reservoir area shall be seeded, fertilized, mulched, sodded or paved as required prior to issuance of certificate of occupancy. Any area susceptible to, or designed as, overflow by higher design intensity rainfall (100 year frequency) shall be sodded.
- (c) Open Channels – Normally permitted open channels may be used as detention areas provided that the limits of the maximum ponding elevation (100 year storm) are not closer than thirty (30) feet horizontally from any buildings, and less than one (1) foot below the lowest sill or floor elevation of any building. No ponding will be permitted within public road right-of-way unless approval is given by the Director of Tipton County Public Works.

For design of other typical channel sections, the features of safety, stability, and ease of maintenance shall be observed by the Design Engineer.

The entire reservoir area of the open channel shall be seeded, fertilized, mulched, sodded or paved as required in the original design. The hydraulic or water surface elevations resulting from channel detention shall not adversely affect adjoining properties.

- (d) Permanent Lakes – Existing permanent lakes with fluctuating volume controls may be used as retention areas provided that the limits of maximum ponding elevations (100 year storm) are no closer than thirty (30) feet horizontal from any building and less than one (1) foot below the lowest sill or floor elevation of any building.
- (e) Paved Parking Lots – Paved parking lots may be designed to provide temporary detention storage of stormwater on a portion of their surfaces. Generally such detention areas shall be in the more remote portions of such parking lots. Depths of storage shall be limited to a maximum depth of six inches in parking areas. Where storage is to be deeper than six inches, such areas shall be precluded from parking use, and shall be located so that access to and from parking areas is not impaired. In no case should the maximum limits of ponding be designed closer than ten (10) feet from a building for the 100-year storm. The lowest sill or floor elevation shall be one (1) foot above the 100-year storm ponding elevation.
- (f) Underground Systems – Underground storage systems may be used and shall be designed to provide storage for at least the 10-year storm. These systems shall be designed so that water surface from the 10 year storm; does not exceed the elevation of the top of the storage pipe or vault, or come within 6 inches of the bottom of any inlet grate, or exceed the top of any upstream pipes (unless these are privately maintained and the system and pipes are designed to operate as a pressure system).

These systems shall be designed to be relatively maintenance free by; using adequate trash screens at all inlets to the system and at the control structures; avoiding the use of moving parts; avoiding the use of small control pipes and narrow weir openings; maintaining a minimum low flow velocity of 4 FPS at a reasonable frequent reoccurring storm.

When an underground storage system is used in a public right-of-way or public maintenance easement it shall be constructed of the same material as all public maintained systems and the minimum pipe diameter shall be 15 inches. These systems are to be singular (not multiple or paralleling) in line pipe systems. When the underground storage system is to be privately maintained and located on private property it shall be constructed of materials that have a similar expected life as that of the project. Tanks, vaults, or oversized pipes and multiple paralleling pipes may be used in the private systems.

All underground storage systems shall be provided with a reasonable number and type of access locations to allow easy inspection and maintenance.

Construction.

Standards for construction of inlets, pipes, manholes, paved ditches and other detention basin appurtenances shall be approved by the Director of Tipton County Public Works in accordance with the appropriate section of this manual and the County's construction specifications.

Emergency Spillways.

Emergency spillways shall be sized to carry the one hundred year flood assuming the detention basin is already filled to design storage capacity.

Freeboard for earthen detention basins shall be a minimum of one-foot difference in elevation between the top of the settled embankment and the water surface, with the emergency spillway flowing at design depth.

Slopes.

For wet or dry bottom basins, if side slopes exceed one foot vertical to three foot horizontal, both erosion control and safety measures shall be provided. In no case shall earthen slopes exceed one foot vertical to two foot horizontal at any point.

If vertical walls are used, the basin must be fenced, with steps, ramps or other means of egress provided.

Appearance.

The use of detention facilities for purposes other than the temporary storage of runoff is encouraged. Whenever possible, the designer should incorporate detention basins in parking lots, playgrounds, ponds, private lots or common areas to enhance the esthetic appearance of a facility. Pipes, drainage structures, outlet works, or other necessary structural features of detention ponds shall be devised so as to be minimum in number and inconspicuous.

Access.

Provisions shall be made to permit access and use of auxiliary equipment to facilitate emptying, cleaning, maintenance, or for emergency purposes.

Control Structures.

Detention facilities shall be provided with obvious and effective control structures. Plan view and section of the structure with adequate details shall be included in plans.

The maximum design discharge (Q) for the low-flow pipe shall not exceed the allowed maximum release rate when considering a 10-year storm.

Sizing of the low-flow pipe shall be by inlet control or hydraulic control or hydraulic gradient requirements as appropriate. Low-flow pipes or constrictions shall not be smaller than fifteen (15) inches in diameter on public maintained systems to minimize maintenance and operating problems. An adequately sized bar-screen on a minimum 2:1 slope to reduce blockage by debris is suggested on the low-flow pipe and control structures.

Detention basin outflow shall discharge directly into the downstream drainage system. Structures that create a point source discharge shall connect to public conveyances as determined by the County Engineer.

(Amended 1/26/09)

Easements.

Two types of easements shall be provided in plans for detention facilities.

- (a) Private Drainage Easements – Private drainage easements will be required on all portions of the detention system that are not incorporated in a public drainage easement. Such areas shall be denoted on the development plat by “Reserved for Storm Water Detention”. The facilities located in these private easements shall be the responsibility of the property owner or owner’s association to maintain.
- (b) Public Drainage Easement – A public drainage easement will be accepted by the County for all components of the detention facilities which are standard Tipton County drainage structures; i.e., pipes, concrete channel lining, outlet structures and spillways.

Maintenance.

Detention facilities, when mandatory, are to be built in conjunction with storm sewer installation and/or grading. Since these facilities are intended to control increased runoff, they must be partially or fully operational soon after the clearing of the vegetation. Silt and debris connected with early construction shall be removed periodically from the detention area and control structure in order to maintain maximum storage capacity.

Maintenance of the portion of the detention facilities not located in a public drainage easement is the responsibility of the property owners or association. Maintenance shall consist of but not be limited to the following items:

1. Outlet cleaning
2. Mowing
3. Herbicide spraying
4. Litter control
5. Removal of sediment from basin and outlet control structure.
6. Repair of drainage structures.

The responsibility of all maintenance of the detention facilities and subdivision projects shall remain with the developer until the County has accepted the project. Upon acceptance of the subdivision by the County, maintenance responsibility shall transfer to the County for all components located in the public drainage easements and to the property owner or owner's association for all components of the detention system located in the private easement

The following note shall be clearly placed on the final plat of any development requiring on-site stormwater detention facilities.

The areas denoted by "Reserved for Stormwater Detention" shall not be used as a building site or filled without first obtaining written permission from the Director of Tipton County Public Works, as applicable. The stormwater detention systems located in these areas, except for those parts located in a public drainage easement, shall be owned and maintained by the property owner and/or owner's association. Such maintenance shall be performed so to ensure that the system operates in accordance with the approved plan located in the Tipton County Public Works Department. Such maintenance shall include, but not be limited to; removal of sedimentation, fallen objects, debris and trash; mowing; outlet cleaning; and repair of drainage structures.

Variances.

Any variance of these regulations shall be submitted to and approved by the Director of Tipton County Public Works.

Detention Basin Design.

The design of a detention basin involves the following steps:

1. Determine the purposes for which the basin will be used.
2. Determine the inflow hydrograph to the basin for the design storm.
3. Determine the maximum release rate.
4. Estimate the volume of storage needed.
5. Determine the depth-storage relationship for the basin.
6. Select the outlet structure(s) compatible with the basin uses and determine the depth-outflow relationship.
7. Determine the outflow hydrograph by performing the routing for the basin.

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 representative of Tipton County Public Works. 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.

After designated areas have been carefully hand graded, soil shall be prepared for fertilizing and seeding. Fertilizer shall be a standard commercial fertilizer Grade 15-15-15, or equivalent, and shall be applied at a rate of not less than ten (10) pounds per one thousand (1,000) square feet. The fertilizer shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of approximately one half (1/2) inch. The subdivider shall be responsible for any regrading or reseeding required to produce an acceptable grass cover. Rutting and washing shall be restored by reseeding and strawing; in areas of extreme erosion sodding may be required. The seed shall be as follows:

| <u>Name</u> | <u>In the Spring</u> | <u>Percent by Weight</u> |
|--------------------|-----------------------|--------------------------|
| Lespedeza | | 20 |
| Sericea Lespedeza | | 15 |
| Kentucky 31 Fescue | | 40 |
| English Rye | | 15 |
| White Dutch Clover | | 5 |
| Weeping Love Grass | | 5 |
| | <u>Or in the Fall</u> | |
| Kentucky 31 Fescue | | 55 |
| Redtop | | 15 |
| English Rye | | 20 |
| White Dutch Clover | | 5 |
| Weeping Love Grass | | 5 |

The seed shall be sown uniformly at the rate of one and one-half (1 1/2) pounds per one thousand (1,000) square feet.

3. Sodding

Sodding shall consist of furnishing and placing sod at all locations shown on the plans, or as directed by the representative of Tipton County Public Works. Work shall include the furnishing and placing of new sod, consisting of live, dense, well-rooted growth of permanent grasses free from johnson grass and other obnoxious grasses or weeds, well suited for the soil on which it is placed. All sod shall be cleanly cut in strips having a uniform thickness of not less than two and one-half (2 1/2) inches. Sod shall be set when the soil is moist and favorable to growth. No setting shall be done between October 1 and April 1, without permission of the representative of Tipton County Public Works. The area to be sodded shall be brought to the lines and grades shown on the plans, or as directed by the representative of Tipton County Public Works.

The surface of the ground to be sodded shall be loosened to a depth of not less than one (1) inch with a rake or other device. If necessary, it shall be sprinkled until saturated for a minimum depth of one (1) inch and kept moist until the sod is placed. Immediately before placing the sod, fertilizer and lime shall be applied uniformly to the prepared surface of the ground. Fertilizer shall be applied at the rate of eight pounds of Grade 15-15-15, or equivalent, per one thousand (1,000) square feet.

Sod shall be placed as soon as practical after removal from the point of origin; it shall be kept in a moist condition during the interim. Sod shall be carefully placed by hand on the prepared ground surface with the edges in close contact and, as far as possible, in a position to break joints. Each strip of sod laid shall be fitted into place and tamped. Immediately after placing, the sod shall be thoroughly wetted and rolled with an approved roller. On slopes of two to one (2:1) or steeper, pinning or pegging may be required to hold the sod in place.

The sod shall be watered as directed by the representative of Tipton County Public Works for a period of two (2) weeks. The subdivider shall not permit any equipment or materials to be placed on any planted area and shall erect suitable barricades and guards to prevent equipment, labor, or the public from traveling on or over any area planted with sod.