PREFACE

The technical standards presented herein reflect the current policies and practices of the Transportation & Public Works Department. They cannot be considered comprehensive, and cannot address all possible situations. For standards not specifically covered here, the Department will rely on those found in the following sources:


- *Standard Specifications Construction of Transportation Systems*, most current edition, published by the Georgia Department of Transportation

- *Regulations for Driveway and Encroachment Control*, most current edition, published by the Georgia Department of Transportation


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ARTICLE 1 ROADWAYS

1.1 ROADWAY DESIGN

1.1.1 FUNCTIONAL CLASSIFICATION
Existing arterials and collectors are identified in the MACORTS 2030 Long Range Transportation Plan, as adopted by the MACORTS Policy Committee on August 25, 2004. All determinations of functional classification are subject to approval by the Transportation & Public Works Director. Estimated daily traffic volumes and zoning of the surrounding properties are key considerations.

1.1.2 RIGHT-OF-WAY & PAVEMENT

a. **Widths**
Right-of-way width for all roadway classifications and pavement width for local residential streets shall be in conformance with Section 9-26-3 of the Athens-Clarke County Code of Ordinances. Pavement width and curb & gutter requirements for all other classifications are as follows:

<table>
<thead>
<tr>
<th>ROADWAY CLASSIFICATION</th>
<th>TRAVEL LANE WIDTH* (feet)</th>
<th>CURB &amp; GUTTER REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>Major Collector</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>Local Urban Street</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Residential***</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>Residential***</td>
<td>**</td>
<td>Yes</td>
</tr>
<tr>
<td>Local Rural Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Residential***</td>
<td>12</td>
<td>No</td>
</tr>
<tr>
<td>Residential***</td>
<td>10</td>
<td>No</td>
</tr>
</tbody>
</table>

*Travel lane width does not include curb and gutter width.
**Pavement width shall be in conformance with Section 9-26-3 of the Athens-Clarke County Code of Ordinances.
***See T&PW Standard Detail 1-010.
b. **Turnarounds**

Dead-end streets designed to have one end permanently closed shall provide a turnaround. Cul-de-sac design for new streets or extensions of existing streets shall conform to the layout and dimensional requirements shown in T&PW Standard Detail 1-020, and require a right-of-way radius of 60 feet and a pavement radius of 45 feet. When turnaround provisions are required on existing streets, improvements that permit vehicles to turn around by backing only once may be permitted. Designs shall accommodate the turning movements of school buses and emergency vehicles in accordance with the standards of *A Policy on Geometric Design of Highways and Streets*, published by the American Association of State Highway and Transportation Officials (AASHTO), most current edition. See T&PW Standard Detail 1-021.

c. **Pavement Structure**

The following table shall be used to determine the required minimum pavement structure, based on the roadway functional classification; refer to **Section 1.1.1** for information on roadway classification. The pavement structure for development entrances shall be based on the functional classification of the adjacent mainline roadway.

<table>
<thead>
<tr>
<th>PAVEMENT COURSE</th>
<th>ROADWAY CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INDUSTRIAL/COMMERCIAL</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Graded Aggregate Base Course</td>
<td>10”</td>
</tr>
<tr>
<td>Asphaltic Concrete Base Course</td>
<td>6”</td>
</tr>
<tr>
<td>25 mm Superpave</td>
<td></td>
</tr>
<tr>
<td>Asphaltic Concrete Intermediate Course</td>
<td>3”</td>
</tr>
<tr>
<td>19 mm Superpave</td>
<td></td>
</tr>
<tr>
<td>Asphaltic Concrete Surface Course</td>
<td>1.5”</td>
</tr>
<tr>
<td>12.5 mm Superpave</td>
<td></td>
</tr>
<tr>
<td>Asphaltic Concrete Surface Course</td>
<td>___</td>
</tr>
<tr>
<td>9.5 mm Superpave</td>
<td></td>
</tr>
</tbody>
</table>

More substantial pavement structures may be required by A-CC for roadways with unusual or poor subgrade conditions. Said structures shall be designed by a registered professional engineer, licensed in Georgia, in accordance with AASHTO and GDOT design policies and procedures. Design data and calculations shall be provided with any alternative design. The design professional shall consult with the Transportation & Public Works Department.
Transportation & Public Works Department

Works Department on the appropriate design methodology and considerations.

d. **Curb & Gutter**
   All proposed streets or street widening sections shall be provided with curb and gutter except where noted otherwise within these standards, or where not required by zoning.

The residential typical minimum curb and gutter section shall be a 6” x 24” x 12” vertical curb and gutter. A 6” x 30” x 12” or 8” x 30” x 14” vertical curb and gutter section may be required on non-residential local and collector roads. Roll-back curb and gutter may be allowed in special situations upon approval by the Transportation & Public Works Director. Required dimensions are 6” x 24” x 9” with a 4” rise from the flow line to back-of-curb. Where a development ties-in to, or extends existing improvements, the curb and gutter section shall match the existing type and dimensions. In situations where the existing street pavement has been overlaid, new curb & gutter elevations shall conform with those of the existing. Existing asphalt shall be removed as necessary to accommodate the work. See T&PW Standard Detail 1-030.

1.1.3 **ALIGNMENT**

a. **Design Speed**
   Alignments shall be designed using design speed as the overall control. Design speeds shall be as follows:

<table>
<thead>
<tr>
<th>ROADWAY CLASSIFICATION</th>
<th>MINIMUM RADIUS</th>
<th>MAXIMUM SUPERELEVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Collector</td>
<td>200 Feet</td>
<td>5%</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>150 Feet</td>
<td>3%*</td>
</tr>
<tr>
<td>Local Street</td>
<td>125 Feet</td>
<td>0%</td>
</tr>
</tbody>
</table>

*No superelevation will be allowed on minor collectors in residential subdivisions.
2. Reverse Curves

Between reverse horizontal curves, there shall be not less than the minimum centerline tangent length as shown. Compound radii curves are prohibited.

Minimum Length Tangent Between Reverse Curves:

<table>
<thead>
<tr>
<th>ROADWAY CLASSIFICATION</th>
<th>ROADWAY USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RESIDENTIAL</td>
</tr>
<tr>
<td>Major Collector</td>
<td>200 Feet</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>100 Feet</td>
</tr>
<tr>
<td>Local Street</td>
<td>50 Feet</td>
</tr>
</tbody>
</table>

c. Vertical Alignment

See Section 1.1.5 (b) for further vertical alignment requirements at street intersections.

1. Minimum grade for all roadways shall be 1½ %.

Grades of less than 1½ % may be approved by the Transportation & Public Works Director, based on adequate engineering design, where 1½ % cannot be reasonably achieved due to topographical limitations imposed by the land. In such cases, an as-built drawing and such computations as necessary shall be provided after construction to establish that the street will drain in accordance with these regulations. Street sections where unacceptable pooling, excessive gutter spread, or other hazardous conditions occur shall be reconstructed or otherwise improved to eliminate such conditions. See Section 1.1.7 for parking bay drainage standard.

2. Maximum roadway grades shall be in accordance with Section 9-26-3 (N) of the Athens-Clarke County Code of Ordinances.

3. All transitions in profile grade, between successive vertical tangents having an algebraic difference greater than 1%, shall be by means of a parabolic curve.

Minimum vertical curve lengths shall be determined by applying the following formula, using ‘K’ values based on the street classification:
$L = K \times A$

Where:
- $L$ = Minimum length of vertical curve
- $K$ = taken from table below
- $A$ = Algebraic Difference in Grade

Minimum ‘$K$’ values

<table>
<thead>
<tr>
<th>Major Collector</th>
<th>$K = 120$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Collector</td>
<td>$K = 35$</td>
</tr>
<tr>
<td>Local Street</td>
<td>$K = 20$</td>
</tr>
</tbody>
</table>

A minimum profile grade of 0.30% should be achieved within 50 feet of the level point of all vertical curves to provide adequate pavement drainage. This corresponds to a maximum $K$ value of 167 feet for all vertical curve design.

1.1.4 GRADING

a. **General Requirements**

Roadway design and construction is to be accomplished with minimal earth moving and disruption to the natural topography. All construction shall provide positive drainage away from the road bed. Natural or man-made slopes shall be modified or designed so as to minimize the potential for erosion and to maximize ease of maintenance. All development shall be in conformance with the Athens-Clarke County Soil Erosion and Sedimentation Control Ordinance and the *Manual for Erosion and Sediment Control in Georgia*, most current edition.

Roadway shoulders and slopes shall be designed according to these standards; see T&PW Standard Detail 1-020. The extent of roadway grading shall not exceed the limitations imposed by the requirements of Section 9-26-2 (A) (6) (d), Athens-Clarke County Code of Ordinances for the applicable zoning classification.

b. **Shoulders**

Roadway shoulders shall have a minimum width of eight (8) feet. Where curb & gutter is not required, the shoulder shall slope away from the pavement at a slope of six percent (6%). Where curb & gutter is required, the shoulder shall slope toward the curb at a slope of four percent (4%).

c. **Cut & Fill Slopes**

No existing or proposed cut or fill slope shall exceed three (3) horizontal units to one (1) vertical unit within eleven (11) feet of the roadway shoulder as specified above. Beyond said eleven feet, the slope may increase to a maximum of two (2) horizontal units to one (1) vertical unit until intersecting existing grade. All cut and fill must be confined to the right-of-way or slope easements.
Retaining walls may be utilized to facilitate roadway grading but all construction, including footings, must be located a minimum of one foot outside the right-of-way. All retaining walls over four (4) feet high shall be designed by a professional engineer, licensed in the State of Georgia. Complete construction plans and details bearing the engineer’s seal and signature shall be provided in the construction plan set.

d. Guardrail
Guardrail shall be placed in accordance with the requirements of the Roadside Design Guide published by the American Association of State Highway and Transportation Officials (AASHTO), most current edition.

1.1.5 INTERSECTIONS

a. Horizontal Alignment

1. Centerline Offset
Roadway centerlines shall be aligned across intersections in accordance with Section 9-26-3 (E) of the Athens-Clarke County Code of Ordinances.

2. Angle
Intersection angles shall meet the requirements of Section 9-26-3 (G) of the Athens-Clarke County Code of Ordinances.

3. Intersection Miter
Property lines at street intersections shall have a minimum miter in accordance with Section 9-26-3 (G) of the Athens-Clarke County Code of Ordinances. See T&PW Standard Detail 1-040.

b. Vertical Alignment

1. General
Street intersections should be designed with flat grades not exceeding 2%. In no case should the grade exceed 4% in topographic hardship situations on local streets.

2. Grades of 6% or Less
For intersections involving local or minor collector streets with approach grades of 6% or less, an intersection landing at a grade not exceeding 2% is required. The vertical curve effecting the transition from the approach grade to the landing grade may end at the edge-of-pavement of the intersecting street but must have a minimum length of 100 feet. See T&PW Standard Detail 1-040.
3. **Grades Above 6%**
For intersections involving local or minor collector streets with approach grades exceeding 6%, an intersection landing at a grade not exceeding 2% is required. The vertical curve effecting the transition from the approach grade to the landing grade must have a minimum length of 100 feet, and must end so as to provide a minimum tangent length of 25 feet for the landing, as measured from the point of vertical tangency to the edge-of-pavement of the intersecting street. See T&PW Standard Detail 1-040.

c. **Radii**
Intersection pavement radii shall be measured at back-of-curb on urban roadways. Minimum radii shall be as follows:

<table>
<thead>
<tr>
<th>Type of Roadway</th>
<th>Minimum Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Collector</td>
<td>40 feet</td>
</tr>
<tr>
<td>Minor Collector</td>
<td>35 feet</td>
</tr>
<tr>
<td>Local Street</td>
<td>25 feet</td>
</tr>
</tbody>
</table>

Larger radii will be required if channelized right-turn lanes are proposed, or if the angle of intersection is less than 85 degrees. See T&PW Standard Detail 1-040.

d. **Turn Lanes**
Auxiliary lanes to provide for deceleration and storage of vehicles waiting to turn right or left shall be provided in accordance with the requirements of the Georgia Department of Transportation’s (GDOT) *Regulations for Driveway and Encroachment Control* manual, most current edition.

e. **Visibility**

1. **Clear Sight Triangles**
   Clear sight triangles shall be provided in both directions at all roadway intersections. Sight triangle dimensions shall be 35 feet by 25 feet and defined as: 35 feet along the right-of-way line of the intersected roadway, and 25 feet along the right-of-way line of the approach roadway, both dimensions being measured from the intersecting point of the two right-of-way lines. See T&PW Standard Detail 1-040. Further information about Clear Sight Triangles may be found in *Section 7-2-7 (L)* of the Athens-Clarke County Code of Ordinances.

2. **Obstructions**
   A clear sight triangle shall be maintained free of any sight obstructions in conformance with *Section 7-2-7 (K)* and *Section 9-15-2 (C)* of the Athens-Clarke County Code of Ordinances.
1.1.6 ON-STREET PARKING

a. Location & Dimensions
On-street parking shall be provided in accordance with Section 9-26-3 (A) (3) and Section 9-26-4 of the Athens-Clarke County Code of Ordinances. All improvements must be entirely contained within the right-of-way. The minimum offset of parking bays from street intersections is 50 feet, as measured from the end of the intersection radius to the beginning of the parking bay taper. See T&PW Standard Detail 1-050.

b. Drainage
If the slope of the corresponding roadway centerline profile is less than 5% in front of a parking bay taper that is receiving runoff from the parking bay, then a curb inlet shall be provided in the bay before the taper begins. See T&PW Standard Detail 1-050.

1.1.7 SIDEWALKS
Sidewalks shall be provided in conformance with Section 9-25-8 (C) (2) and Section 9-26-3 of the Athens-Clarke County Code of Ordinances.

a. ADA Compliance
Sidewalks shall be designed and constructed in accordance with the Accessibility Guidelines of the Americans with Disabilities Act (ADA). Detectable warning surface treatment shall be truncated dome.

b. Dimensions & Cross Slope
The minimum sidewalk width shall be 5 feet, and the standard cross-slope shall be ¼ inch per foot toward the curb or ditch, as applicable.

c. Location
1. General
Sidewalk alignment shall parallel the roadway pavement in line and grade as much as possible.

2. Urban Roadway
For an urban street the desirable sidewalk offset, back-of-curb, is 5 feet in order to maintain a grass strip between. The minimum allowable offset for a grass strip is 3 feet. If a 3-foot offset cannot be obtained, then a 2-foot offset is required, and the offset must be paved to the same specification as the sidewalk, but in a contrasting finish and color. If street trees are to be located between the curb and the sidewalk, then the required minimum offset is 6 feet. See T&PW Standard Detail 1-060.
3. Rural Roadway
For a rural roadway, the sidewalk shall be located behind the ditch line wherever possible. When it must be located on the shoulder, the minimum allowable offset from edge-of-pavement is 7 feet. See T&PW Standard Detail 1-060.

1.1.8 BICYCLE PATHS & LANES
Bicycle paths shall be designed and constructed in accordance with the Guide for the Development of Bicycle Facilities, by the American Association of State Highway and Transportation Officials (AASHTO), most current edition. Construction shall be Portland Cement Concrete with a break strength of 3,000 psi at 28 days, or asphaltic concrete as approved by the Transportation & Public Works Director.

1.2 ROADWAY CONSTRUCTION
Materials, methods, and procedures for roadway construction not addressed in this document shall be in accordance with the Georgia Department of Transportation (GDOT) Standard Specifications Construction Of Transportation Systems, most current edition, with supplements and revisions.

1.2.1 GRADING & EMBANKMENTS

a. Clearing & Grubbing
All streets and roads shall be cleared and graded according to the approved cross-sections. The entire area within the graded cross-section shall be cleared and grubbed of all vegetation and debris. All such waste shall be disposed of in a lawful manner and shall not be buried in the right-of-way or within the project limits.

b. Fill
All fill shall be of suitable material and free of organic matter. Fill shall be placed in uniform eight-inch layers and compacted to at least 95% percent of maximum dry density throughout. Compaction testing shall be required. Compaction shall be tested according to the ASTM D698 standard. Compaction tests shall be taken at a rate of one test per four vertical feet of fill per 1,000 lineal feet of roadway, or one test per road, or as directed by the Public Works Inspector. Successive layers of material shall not be placed over previous layers that exhibit excessive pumping under construction equipment, regardless of compaction. The backfill of all storm drain and other underground utilities installed under the roadbed and the backfill in ditches shall be compacted to at least 95% of maximum dry density. Backfill compaction tests shall be taken at a minimum interval of not less than one (1) between any two structures. Compaction test results shall be reported to Athens-Clarke County immediately.
c. **Shoulders**  
Roadway shoulders shall have a minimum width of eight (8) feet and shall be compacted to at least 95% of maximum dry density. Where curb & gutter is not required, the shoulder shall slope away from the pavement at a slope of six percent (6%). Where curb & gutter is required, the shoulder shall slope toward the curb at a slope of four percent (4%). See T&PW Standard Detail 1-010.

d. **Slopes**  
No existing or proposed cut or fill slope shall exceed three (3) horizontal units to one (1) vertical unit within eleven (11) feet of the roadway shoulder as specified above. Beyond said eleven feet, the slope may increase to a maximum of two (2) horizontal units to one (1) vertical unit until intersecting existing grade. Retaining walls may be utilized to facilitate roadway grading, but they must be located entirely outside the right-of-way. All retaining walls over four (4) feet high shall be designed by a professional engineer, licensed in the State of Georgia. Construction details bearing the engineer’s seal and signature shall be provided in the plan set.

e. **Temporary Drainage**  
If paving is delayed at any point during roadway construction, provision shall be made to drain low points in the roadway. If curb has not been installed, a break in any berm section may be provided. If curb is in place, four (4) inch pipe sections shall be used to provide drainage under the curb to the side slope, or to a drainage structure. These pipe sections shall be removed or capped prior to paving.

f. **Certification**  
The developer shall provide the following:
- A statement of inspection completed by a professional engineer, licensed in the State of Georgia, that all construction requirements for roadway grading and embankments have been met. The statement must include certified copies of all compaction tests results.
- A certification completed by a professional land surveyor or engineer, licensed in the State of Georgia, that grading has been completed and conforms to the lines and grades of the approved plans within a tolerance of six (6) inches.
- Staking of the roadway centerline in conjunction with the above certification for verification by the Public Works Inspector.

All roadway grading and embankments must be approved by Athens-Clarke County prior to preparation of the subgrade.
1.2.2 SUBGRADE PREPARATION

a. **Material**
   All boulders, organic material, soft clay, spongy material, and any other objectionable material shall be removed and replaced with approved material.

b. **Construction & Surface Tolerance**
   The subgrade shall be properly shaped, rolled, and uniformly compacted with a “sheep’s foot” roller to conform with the lines, grades, and typical cross-sections shown on the approved plans. The subgrade centerline profile shall conform to the established elevations with an acceptable tolerance of +/− ½-inch. The acceptable tolerance under a template conforming to the design cross-section shall be +/− ¼-inch.

c. **Compaction**
   The subgrade shall be compacted to 100% of maximum dry density, within +/− 3% of the optimum moisture content.

Compaction testing shall be required. In areas of fill, subgrade compaction shall be determined by field testing at intervals not to exceed 1000 lineal feet, or one test per road, or as directed by the Public Works Inspector. Compaction testing in areas of fill shall be accomplished according to the ASTM D698 standard. Compaction test results shall be reported to T&PW immediately after results are obtained. In addition, all areas of the graded roadway must pass Roll Testing, as specified in Section 1.2.5 (b). The Transportation & Public Works Department retains the right to have any areas of fill scarified and re-compacted, as determined and directed by the Public Works Inspector.

In areas of cut, the subgrade shall be scarified to a depth of six (6) inches and inspected by the Public Works Inspector and a certified Geotechnical Technician. All unsuitable or non-structural soils shall be removed and replaced with suitable material. Following any such removal and replacement, compaction shall be achieved and tested in accordance with the procedures specified for areas of fill. In addition, all areas of the graded roadway must pass Roll Testing as specified in Section 1.2.5 (b).

d. **Certification**
   The Developer will provide to Athens-Clarke County a Statement of Inspection, sealed and signed by a professional engineer licensed in the State of Georgia, that all construction requirements have been met for roadway subgrade preparation. The statement must include certified copies of all compaction tests results. Successive layers of material shall not be placed over previous layers that exhibit excessive pumping under
construction equipment, regardless of compaction. Upon approval by
Athens-Clarke County, roadway construction may continue.

e. **Time Limit**
If the required graded aggregate base (GAB) course is not placed within
72 hours of subgrade approval, or if rainfall of ½-inch or more occurs
prior to GAB placement, the Public Works Inspector shall be notified, and
additional roll testing and deficiency correction may be required.

1.2.3 GRADED AGGREGATE BASE

a. **Material & Placement**
Graded aggregate base material shall meet the requirements of the GDOT
specification for Group 2 aggregate. All base course material shall be
deposited and spread by means of spreader boxes, or approved mechanical
equipment, or from moving vehicles equipped to distribute the material in
a uniform layer. The maximum allowable thickness to be placed in one
course is eight (8) inches. No graded aggregate base shall be placed on
muddy or frozen subgrade.

b. **Construction**
Immediately following spreading of the aggregate, all material placed
shall be compacted to the full width by rolling with a smooth-wheel power
roller of adequate size and weight to achieve compaction. Any
irregularities, areas of segregation, or depressions that develop under such
rolling shall be corrected by loosening the material at these places and
adding or removing material until the surface is smooth and uniform. The
application of water, applied uniformly over the base course, may be
required to achieve adequate compaction. Moisture content shall be
uniformly distributed. Shaping and rolling shall be performed alternately
as required to maintain a uniform compacted base until a surface has been
applied to the base. Along curbs, headers, and walls, and at all places not
accessible to the roller, the base course material shall be tamped
thoroughly with mechanical tampers or approved hand tampers.

c. **Compaction**
Compaction testing shall be required. After the material has been shaped
to line, grade, and cross-section, it shall be rolled until the course is
uniformly compacted to one-hundred percent (100%) of the maximum dry
density, within +/- 3% of the optimum moisture content. Compaction shall
be determined by field testing at intervals not to exceed one thousand
(1000) lineal feet, or one test per road, or as directed by the Public Works
Inspector. Compaction test results shall be reported to Athens-Clarke
County immediately after results are obtained.
d. **Thickness & Surface Tolerance**

Thickness testing shall be required and shall be tested at intervals not to exceed 1000 lineal feet, or one test per road, or as directed by the Public Works Inspector. Any area found to be deficient in thickness by more than ½-inch shall be corrected to the design thickness. The finished surface acceptable tolerance under a template conforming to the design cross-section shall be ¼-inch.

e. **Certification**

The Developer will provide to Athens-Clarke County a Statement of Inspection, sealed and signed by a professional engineer licensed in the State of Georgia, that all construction requirements have been met for roadway aggregate base preparation. Upon approval by Athens-Clarke County, roadway construction may continue.

### 1.2.4 ASPHALTIC CONCRETE

a. **Time Limit**

If more than 48 hours elapses from successful completion of the aggregate base construction, or if rainfall of ½-inch or more occurs prior to placement of asphalt, then the moisture content must be retested and determined to be within +/- 3% of optimum. If so determined by the Public Works Inspector, the aggregate base must be reshaped to conform with designated line, grade, and cross-section.

b. **Material**

Paving material shall consist of a conventional bituminous plant mix. The use of a “Superpave” mix design is required. Material, equipment, seasonal and weather limitations, preparation of road surface, material application, and construction methods shall be as specified in GDOT’s *Standard Specifications Construction of Transportation Systems*, most current edition, with supplements and revisions. Mix designs shall be provided to A-CC for approval a minimum of two (2) weeks prior to paving operations. One asphaltic concrete extraction and gradation test per mix design is required. Test results shall be reported to Athens-Clarke County immediately after results are obtained.

c. **Compaction**

All asphalt courses shall be compacted, and compaction testing shall be required. Compaction testing shall be accomplished in accordance with the appropriate standardized protocols of the GDOT *Sampling, Testing, and Inspection Manual*. Compaction tests for each mix shall be 6-inch core samples, taken at intervals not exceeding 1000 lineal feet per one lane of roadway, or one test per lane per roadway, or as directed by the Public Works Inspector. All asphalt core holes shall be filled with hot mix asphalt of similar grade prior to final acceptance.
The maximum in-place pavement mean air voids should not exceed 7.8%. In-place pavement mean air voids in the range of 8.3% to 13.5% will require a specific and separate three year Maintenance Bond in the amount of 50% of the total base and paving cost of the affected roadway. Alternatively, the deficient pavement may be removed and replaced. Any asphaltic concrete construction whose in-place mean air voids exceed 13.5% shall be removed and replaced for the full width of the affected lane and the length of the affected area. Additional core samples may be required.

d. Thickness
Thickness testing of asphaltic concrete course construction shall be required. Thickness tests for each mix shall be 6-inch core samples taken at intervals not exceeding 1000 lineal feet per one lane of roadway, or one test per lane per roadway, or as directed by the Public Works Inspector. All asphalt core holes shall be filled with hot mix asphalt of similar grade prior to final acceptance.

e. Tack
Prepare the existing surface and, prior to placement of any asphaltic concrete course, apply Bituminous Tack Coat according to Section 400 of GDOT’s *Standard Specifications Construction of Transportation Systems*, most current edition, with supplements and revisions.

f. Base Course
Base courses shall be 25 mm Superpave. Surface irregularities exceeding 3/16” in 10 longitudinal feet shall be corrected. Deficiencies in thickness greater than ½” shall be corrected. The deficient area shall be overlaid with the same mixture. The overlay shall extend for a minimum of 100 feet, for the full width of the course. Additional core samples may be required.

g. Intermediate Course
Intermediate courses shall be 19 mm Superpave. Surface irregularities exceeding 3/16” shall be corrected. Deficiencies in thickness greater than ½” shall be corrected. The deficient area shall be overlaid with the same mixture. The overlay shall extend for a minimum of 100 feet, for the full width of the course. Excess thickness greater than ½“ shall be milled to correct, or shall be sawcut, removed, and replaced. Additional core samples may be required.

Streets classified as either Local or Minor Collector shall receive their final surface course of asphaltic concrete no earlier than nine months and no later than twelve months after the intermediate course is placed, or when the project is 90% built-out, whichever occurs first.
Manhole covers and valve boxes projecting above the intermediate course shall have temporary ramps of cold mix asphalt placed at a five-foot radius. Prior to application of the surface course, the cold mix asphalt shall be removed. The elevation of the top-of-structure shall be checked by the Public Works Inspector and any needed adjustment to match the final pavement elevation shall be made.

The intermediate asphalt course shall be checked by the Public Works Inspector to determine surface uniformity and integrity. Any settlement or other deficiencies found shall be repaired to the Inspector’s satisfaction before placement of the surface course.

h. Surface Course
All roadway surface courses shall be 12.5 mm Superpave, except on those roadways classified as “Local Street” which shall be 9.5 mm Superpave. Surface irregularities exceeding 1/8” in 10 longitudinal feet shall be corrected. Deficiencies in thickness exceeding ¼” shall be removed and replaced. All removal and replacement of the surface course shall be from roadway intersection to intersection, or to the end-of-roadway, as applicable, and shall be for the entire lane width.

i. Certification
The Developer will provide to Athens-Clarke County a statement of inspection, sealed and signed by a professional engineer licensed in the state of Georgia, that all construction requirements have been met for roadway asphaltic concrete construction. Upon approval by Athens-Clarke County, roadway construction will be considered complete.

1.2.5 ADDITIONAL TESTING REQUIREMENTS

a. General
All testing shall be scheduled with the Public Works Inspector no less than 24 hours in advance. Compaction testing shall not be performed until the surface is to the lines, grades, and cross-sections shown on the plans. Once an embankment, subgrade, or base course has been certified, then that material shall not be disturbed, or additional testing will be required. All areas or sections of the subgrade and base course which do not pass compaction testing shall be corrected. When corrections have been made, it shall be the Developer’s responsibility to schedule any and all subsequent tests. In addition to the required compaction testing already described, the Public Works Inspector may require that a roll test be performed as described below.

b. Roll Testing
Both the subgrade and the base course, including those portions supporting curb & gutter, shall be load-tested, when required by the Public
Works Inspector, with a minimum 18 ton hauling capacity, fully loaded tandem dump truck, or equivalent. The test shall cover the material thoroughly to assure a maximum tolerance of one-half (1/2) inch settling and the absence of any cracking or pumping, prior to paving. The test shall be witnessed by the Public Works Inspector.

1.2.6 CURB & GUTTER

a. **Material**
   Curb & gutter material shall be Portland Cement Concrete, Class “A” as defined by GDOT, and shall have a minimum break strength of 3,000 psi at 28 days. All construction shall be in conformance with Section 430, GDOT *Standard Specifications Construction Of Transportation Systems*, most current edition, with supplements and revisions.

b. **Base**
   Roadway aggregate base 6 inches thick shall extend under the curb and gutter for a distance of 6 inches beyond the back-of-curb.

c. **Joints**
   ½-inch asphalt-impregnated expansion joints shall be provided at all structures and radius points, and at intervals not to exceed 100 feet in the remainder. Contraction joints shall be provided at intervals not to exceed 10 feet.

d. **Conform To Plans**
   Curb and gutter shall be set true to the line and grade of the street and finished to the section shown on the plans. Line and grade shall be field staked and set by the developer’s engineer or surveyor. All gutters shall drain positively with no areas of ponding.

e. **Workmanship**
   Inferior workmanship or unprofessional construction methods resulting in unacceptable curb and gutter will be cause for rejection of the finished work. Unacceptable construction shall be removed and replaced from joint to joint. Disturbed areas along all curbing shall be backfilled, stabilized, and grassed.

1.2.7 SIDEWALKS

a. **Material**
   Sidewalks shall be constructed of Portland Cement Concrete, Class “A,” as defined by GDOT, and shall have a minimum break strength of 3,000 psi at 28 days. The minimum thickness shall be 4 inches. All construction shall be in conformance with Section 430, GDOT *Standard Specifications*
Construction Of Transportation Systems, most current edition, with supplements and revisions.

b. Cross Slope
Sidewalk cross slope shall be ¼ inch per foot toward the curb or the ditch, as applicable.

c. Joints
Contraction joints shall be placed on a 5-foot interval. Expansion joints shall be placed on a 50-foot interval and at all intersections with curbs, ramps, driveways, and other structures. Sidewalk construction shall be in accordance with Section 430 of the GDOT Standard Specifications Construction of Transportation Systems, most current edition.

d. Conform To Plans
Sidewalk shall be set true to the line and grade of the street and finished to the section shown on the plans. Line and grade shall be field staked and set by the developer’s engineer or surveyor. All sidewalk shall drain positively with no areas of ponding.

e. Workmanship
Inferior workmanship or unprofessional construction methods resulting in unacceptable sidewalk will be cause for rejection of the finished work. Disturbed areas along all sidewalk shall be backfilled, stabilized, and grassed.

1.2.8 UTILITY INSTALLATION
No open-cut utility installation shall be permitted on any roadway whose surface course is less than three years old. Normal pot-holing to facilitate locating existing lines or making connection thereto is permitted, provided the pavement disturbance is the minimum needed. See T&PW Standard Detail 1-070.

All operations involving roadway pavement removal and restoration shall conform to T&PW Standard Detail 1-070 and the following work sequence:

1. Sawcut existing pavement for necessary trench width only, and excavate trench.
2. Complete utility installation.
3. Backfill trench by placing suitable material and compacting in 6-inch lifts to at least 95% theoretical maximum dry density.
4. Sawcut, in a neat straight line, an additional one-foot pavement width on each side of trench to provide undisturbed shoulders for concrete trench cap. Excavate trench and shoulders to proper depth for installation of concrete trench cap and asphalt inlay, per detail.
5. Place 8-inch thick, 3000 psi, high early strength portland cement concrete trench cap. Screed and level concrete to a consistent depth of 1 ½ inches for subsequent asphalt inlay. Do not apply a smooth trowel finish.
6. Plate or otherwise protect from traffic for a 7-day cure time.*
7. Apply asphalt tack coat to edges of existing pavement and top of concrete trench cap.
8. Place Asphalt Type ‘F’ (Superpave 9.5 mm) 1 ½ inches thick and compact.

*GDOT twenty-four hour accelerated strength concrete (GDOT Standard Specifications Construction of Transportation Systems, 2001 Edition, Section 504) may be substituted for 3000 psi concrete. A six hour cure time is applicable under this condition.

Roadway pavement cuts that disturb more than 150 lineal feet of roadway shall normally require full-width milling and subsequent resurfacing of the road for the entire length of the disturbance. See T&PW Standard Detail 1-070.
ARTICLE 2 ACCESS

A driveway is an access constructed within a public right-of-way, connecting a public roadway with adjacent property. This connection functions as a low-volume intersection. These standards address the design and construction of driveway access in order to promote the safe and efficient movement of vehicular and pedestrian traffic.

2.1 GENERAL DESIGN STANDARDS
The standards presented in this section apply to access design for all properties.

2.1.1 NUMBER
The number of driveways permitted to access a property is given in Chapter 7-2 of the Athens-Clarke County Code of Ordinances. This number shall not vary unless the Traffic Engineer deems it necessary that more be allowed to provide reasonable access to the property and that such allowance can be made without jeopardizing the safety, convenience, and maintenance of the public roadway.

When, in the judgement of the Traffic Engineer, it is necessary for safety purposes, a driveway may be designated as Entrance-Only or Exit-Only.

2.1.2 LOCATION

a. General
A driveway shall be located and its dimensions restricted so that the entire design is contained within the property being served. A driveway shall not encroach upon right-of-way areas deemed necessary for effective traffic control, highway signs, or signals. A driveway shall be located and designed so that adequate sight distance is provided in either direction.

b. Spacing
A driveway serving a corner lot shall not provide direct access into the street intersection, but shall be located away from the intersection. Adequate separation between driveways and street intersections, and between adjacent driveways, shall be provided and maintained in conformance with Section 7-2-7 of the Athens-Clarke County Code of Ordinances.

Required separation distances are measured from the end of radius or taper of the existing street or driveway intersection, along the edge-of-pavement, to the end of the nearest radius or taper of the proposed driveway intersection. See T&PW Standard Detail 2-010.

In general a new driveway should be located to align with any existing driveway that may be located on the opposite side of the roadway, provided that other requirements can be met.
c. **Restricted Areas**
   A driveway shall maintain adequate offset from any side property line, in accordance with Section 7-2-7 of the Athens-Clarke County Code of Ordinances. See T&PW Standard Details 2-010 and 2-020.

   The area within the right-of-way between successive driveways shall be left unimproved for vehicular travel or parking. This restricted area shall be graded down to grades approved by the Transportation & Public Works Director only if necessary to improve sight distance.

2.1.3 **ANGLE**
   The angle of intersection with the public roadway shall be 90 degrees wherever possible. Acute angles of intersection create clear sight limitations that should be avoided.

   In those cases where a 90 degree intersection cannot be achieved, the angle of intersection shall conform with the standards contained in the Georgia Department of Transportation’s (GDOT) *Regulations for Driveway and Encroachment Control*, most current edition.

   When the angle of intersection is less than 90 degrees, the driveway radii shall be determined by the Traffic Engineer.

   When, in the judgment of the Traffic Engineer, it is necessary for safety purposes, a driveway may be designated as Entrance-Only or Exit-Only.

2.1.4 **GRADE**
   Driveway grade shall be in conformance with Section 9-15-13 of the Athens-Clarke County Code of Ordinances and these standards.

2.1.5 **VISIBILITY**

   a. **Clear Sight Triangles**
      A driveway connection to a public roadway functions as an intersection, and adequate sight distance must be provided. Clear sight triangles are therefore required in both directions at the roadway intersection. Sight triangle dimensions shall be 35 feet by 25 feet and defined as: 35 feet along the property line from the intersecting point of the driveway centerline and the right-of-way or property line, and 25 feet along the driveway centerline from the intersecting point of the driveway centerline and the right-of-way or property line toward the interior of the property. See T&PW Standard Details 2-010 and 2-020. Further information about Clear Sight Triangles may be found in Section 7-2-7 (L) of the Athens-Clarke County Code of Ordinances.
b. **Obstructions**
   A clear sight triangle shall be maintained free of any sight obstructions in conformance with **Section 7-2-7 (K)** and **Section 9-15-2 (C)** of the Athens-Clarke County Code of Ordinances.

2.1.6 **ENTRANCE APRON**
All driveway construction shall include a paved entrance apron to connect to the public roadway pavement. The apron shall serve to delineate and control access to the roadway, to maintain roadway runoff within the right-of-way, and to protect the roadway edge-of-pavement.

a. **Urban Roadway**
Urban roadways are characterized by the provision of curb & gutter and storm sewer systems to convey storm water runoff.

   Driveways shall not obstruct or impede drainage in the street gutter. Driveway apron radius or taper construction shall terminate a minimum distance of 5 feet from the nearest end of any storm drain inlet, as measured along the gutter flow line.

   The maximum algebraic change in driveway centerline valley grade shall be 15 percent, and the maximum algebraic change in break-over grade shall be 12 percent. There shall be a minimum horizontal distance of 10 feet between grade changes. See T&PW Standard Detail 2-010.

b. **Rural Roadway**
Rural roadways are characterized by the provision of ditches and culverts to convey storm water runoff.

   Driveways shall not obstruct or impede drainage in roadside ditches or roadside drainage areas. Driveway culverts shall be provided, shall be sized to convey the 25-year return frequency storm event, and shall in no case be less than 15 inches in diameter. Driveway culvert material, design, and construction shall conform with the standards of **Article 4**. Minimum pipe cover shall be 12 inches. Driveway culverts shall be of sufficient length and their installation shall not result in slopes steeper than 3H:1V. Existing roadside ditches shall be extended, relocated, and/or improved as necessary to accommodate driveway culvert installation in conformance with these standards and those of **Section 1.1.4**. The horizontal distance between culverts under successive driveways shall be not less than 30 feet.

   The maximum algebraic change in driveway centerline valley grade shall be 15 percent, and the maximum algebraic change in break-over grade shall be 12 percent. There shall be a minimum horizontal distance of 10 feet between grade changes. See T&PW Standard Detail 2-020.
c. **Pedestrians**

All driveway construction shall provide for the safety of pedestrians. Whenever a driveway with curb intersects a pedestrian sidewalk or walkway, the driveway curb shall be handicap modified in conformance with the standards established by the Americans with Disabilities Act (ADA). All construction shall be in conformance with GDOT Special Details A1, A2, A3, and A4 as applicable.

### 2.2 SPECIFIC DESIGN STANDARDS

#### 2.2.1 SINGLE-FAMILY & TWO-FAMILY RESIDENTIAL

<table>
<thead>
<tr>
<th>a.</th>
<th>Driveway Width</th>
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</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>8 feet</td>
</tr>
<tr>
<td>Maximum</td>
<td>12 feet*</td>
</tr>
</tbody>
</table>

When, in the judgment of the Traffic Engineer, it is necessary for safety purposes, a driveway may be designated as Entrance-Only or Exit-Only.

*If the street has more than 1500 A.D.T., then multifamily design requirements must be used.

<table>
<thead>
<tr>
<th>b.</th>
<th>Entrance Apron</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Urban Street (curb &amp; gutter)</td>
</tr>
<tr>
<td>The design shall conform with the standards contained in the Georgia Department of Transportation’s (GDOT) <em>Regulations for Driveway and Encroachment Control Manual</em>, latest edition and shall incorporate a tapered entrance valley gutter in accordance with T&amp;PW Standard Detail 2-010.</td>
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</table>

2. **Rural Roadway (ditches and culverts)**

The design shall conform with the standards contained in the Georgia Department of Transportation’s (GDOT) *Regulations for Driveway and Encroachment Control Manual*, latest edition. A tapered entrance may be utilized, rather than radii, upon the approval of the Transportation & Public Works Director. See T&PW Standard Detail 2-020.

Apron construction shall extend from the roadway edge-of-pavement the greater of:

- 10 horizontal feet
- To the back-of-sidewalk
- To a point that is 5 horizontal feet beyond the centerline of the driveway culvert
The driveway centerline profile shall maintain a negative slope of \(\frac{1}{2}\)-inch per foot or steeper, from the roadway edge-of-pavement to a low point at the centerline of the driveway culvert. Thereafter the centerline profile shall transition to a positive slope and achieve a minimum rise of 6 inches above the low point within the right-of-way.

3. Radii

Minimum: 5 feet  
Maximum: 15 feet

Where right-of-way is inadequate for complete construction of driveway radii within the right-of-way, the property owner shall allow completion of the radii on the property being accessed.

c. Parking

A driveway shall provide access to parking improvements on private property, such as a parking pad or garage. No parking shall be allowed within five feet of the right-of-way.

2.2.2 MULTIFAMILY, COMMERCIAL, OFFICE-INSTITUTIONAL, INDUSTRIAL

a. Driveway Width

<table>
<thead>
<tr>
<th></th>
<th>One-Way</th>
<th>Two-Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>12 feet</td>
<td>20 feet</td>
</tr>
<tr>
<td>Maximum</td>
<td>16 feet</td>
<td>36 feet</td>
</tr>
</tbody>
</table>

When, in the judgment of the Traffic Engineer, it is necessary for safety purposes, a driveway may be designated as entrance-only or exit-only.

b. Entrance Apron

1. Urban Street (curb & gutter)

The design shall conform with the standards contained in the Georgia Department of Transportation’s (GDOT) *Regulations for Driveway and Encroachment Control Manual*, latest edition and incorporate either a tapered entrance valley gutter or one with radii, in accordance with GDOT Special Detail Drawings A1 or A2, as approved.

Apron construction shall extend from the roadway edge-of-pavement to the end of the entrance radii or to the back-of-sidewalk, whichever distance is greater.

2. Rural Roadway (ditches & culverts)
The design shall conform with the standards contained in the Georgia Department of Transportation’s (GDOT) Regulations for Driveway and Encroachment Control Manual, latest edition, and these standards. A tapered entrance may be utilized, rather than radii, upon the approval of the Transportation & Public Works Director.

Apron construction shall extend from the roadway edge-of-pavement the greater of:
- 10 horizontal feet
- To the back-of-sidewalk
- To a point that is 5 horizontal feet beyond the centerline of the driveway culvert

The driveway centerline profile shall maintain a negative slope of \( \frac{1}{2} \)-inch per foot or steeper, from the roadway edge-of-pavement to a low point at the centerline of the driveway culvert. Thereafter the centerline profile shall transition to a positive slope and achieve a minimum rise of 6 inches above the low point within the right-of-way.

3. Radii
   Minimum: 15 feet
   Maximum: 35 feet

Where right-of-way is inadequate for complete construction of driveway radii within the right-of-way, the property owner shall allow completion of the radii on the property being accessed.

c. Parking
   A driveway shall provide access to parking improvements on private property. Parking shall be provided off the right-of-way and located so as to prevent the storage of vehicles in the driveway and the backup of traffic into the street. No parking shall be allowed within five feet of the right-of-way.

d. Island Areas (Channelization)
   1. Treatment Of Islands As Buffer Areas
      The unimproved island areas defined by the limits of roadway pavement, driveway pavement, and onsite parking pavement function as buffer areas that are necessary for safe and effective traffic control. If site development necessitates the re-grading of buffer areas, such work shall be done in a manner to ensure:
      - Adequate visibility clearance for traffic operations as defined in Section 2.1.5 above;
• Proper drainage of all affected areas;
• Suitable slopes for maintenance operations and good appearance in accordance with Section 1.1.4 (c).
Buffer areas shall be treated as necessary to prevent use by vehicles. This may be accomplished by grading or by the placement of curbs, rails, posts, low walls, or low shrubs in such a manner that will not impair clear sight across the area and meets the requirements of Section 2.1.5.

2. Minimum Island Dimensions
The minimum distance between entrance and exit driveways shall be 5 feet at the narrowest point, as measured between the tangent points of the inside radii.

The minimum distance between two one-way driveways, or between the drive aisles of a single two-way divided driveway, shall be 5 feet, as measured at the narrowest point of separation.

The minimum island depth to extend beyond the right-of-way for both driveway and parking islands is 5 feet.

e. Auxiliary Lanes
Auxiliary lanes (left-turn, right-turn, acceleration, deceleration) shall be provided in accordance with the standards contained in the Georgia Department of Transportation’s (GDOT) Regulations for Driveway and Encroachment Control, most current edition.

2.3 CONSTRUCTION STANDARDS

2.3.1 MATERIAL
All apron construction shall be Portland Cement Concrete with a break strength of 3,000 psi at 28 days. Minimum concrete thickness:
- Single- and Two-family Residential Properties: 6 inches
- All Other Properties: 8 inches

2.3.2 ROADWAY PAVEMENT REMOVAL
Urban entrance apron construction shall require complete removal of the existing curb and gutter for the entire width of the apron, including flares or radii. To accommodate forms for apron construction on all roadways, the roadway pavement shall be sawcut in a neat line and removed for the entire width of the apron at a minimum offset of one foot from the edge-of-pavement. See T&PW Standard Detail 2-010.

2.3.3 SUBGRADE PREPARATION
All unsuitable material shall be removed and replaced with suitable soil or aggregate. Subgrade material shall be compacted to 95 percent of maximum dry
density. Compaction testing may be required by the Public Works Inspector, and test results shall be reported immediately. The subgrade shall be wetted before placing concrete within forms. Concrete shall not be placed on a muddy or frozen surface.

2.3.4 CONCRETE WORK
The excavation, construction of concrete forms, placing, finishing, and curing of concrete shall be performed by a concrete finisher, skilled in the trade. All construction shall be conducted so as to produce an impervious stone, having a uniform texture throughout and true to the specified shape, line, dimensions, and surface finish.

Membrane-forming curing compound shall be placed immediately after the surface finish is applied and shall continue for five days. Compound shall be applied at a rate not less one gallon per 300 square feet of surface area. No vehicular traffic shall be allowed on the surface for five days, unless the surface is protected by one-inch thick plywood. This protection shall not be placed within 12 hours of application of the curing compound. Concrete judged to be improperly cured by the Public Works Inspector shall be removed and replaced.

No concrete shall be placed when the atmospheric temperature is below 35 degrees Fahrenheit. If the temperature drops below 35 degrees after concrete has been placed, the Contractor shall provide sufficient canvas and frame work, or other type of housing, to enclose and protect the work, and shall maintain the enclosed air at a temperature not less than 45 degrees Fahrenheit for a period of five days. The Contractor shall assume all risks associated with placing concrete in cold weather, and concrete judged to be improperly cured by the Public Works Inspector shall be removed and replaced.

2.3.5 CLEANUP & BACKFILL
All materials used in driveway construction shall be removed from the site upon completion of the work. Backfilling, dressing, and final stabilization of all disturbed areas shall be completed immediately and before final acceptance of the work.
ARTICLE 3  SITE GRADING

3.1 GENERAL

The standards in this section apply to any land disturbance operation, regardless of size.

Land development is to be accomplished with minimal earth moving and alteration of natural topography. Modifications to existing natural or man-made slopes should be designed in such a way as to minimize potential for erosion and to maximize ease of maintenance. Grading and drainage design shall be in accordance with all provisions of the Athens-Clarke County Code of Ordinances, including *Chapter 5-4 Stormwater Management, Chapter 8-2 Flood Protection, Chapter 8-3 Soil Erosion and Sedimentation Control, Chapter 8-6 Protected Environmental Areas*, the *Manual for Erosion and Sediment Control in Georgia*, most current edition, and the *Georgia Stormwater Management Manual*, most current edition.

All fill of a structural nature must be entirely confined to the property under development.

No grading shall be allowed to encroach any environmental buffer established by the State of Georgia or by the Unified Government of Athens-Clarke County, unless the specified activity is exempt from any variance requirement, or else all required variances have been obtained.

All infrastructure grading associated with a development shall conform to the requirements of *Section 9-26-2 (A) (6) (d) (2)* of the Athens-Clarke County Code of Ordinances.

Grading shall be accomplished in accordance with the lines and grades shown on the approved Grading & Drainage Plan.

3.2 SLOPES

No proposed cut or fill slopes shall exceed three (3) horizontal units to one (1) vertical unit within nineteen (19) feet of the edge-of-pavement or back-of-curb of any roadway.

Maximum cut and fill slopes shall be 2H:1V, except within and adjacent to all open drainage facilities where maximum slopes shall be 3H:1V.

Flatter slopes than those described in the foregoing paragraph may be required when the general nature of the soil warrants a flatter slope. If a slope steeper than 3H:1V shows evidence of shearing, non-cohesiveness, sliding, or inability to maintain compaction, the slope shall be stabilized at 3H:1V or by using mechanical methods such as retaining walls, or “grow mats” stapled in place. To control surface drainage on existing and proposed slopes, berms and/or diversion channels shall be required at the top-of-slope for every 15-foot change in elevation, and at the intersection of the slope with existing ground. The engineer shall provide velocity calculations, based on the design storm, for
all channel flows to determine whether a paved or vegetative surface is appropriate. Permanent down-drain or grade stabilization structures shall be required.

All retaining walls over four feet in height shall be designed by a professional engineer, licensed in the State of Georgia, with complete construction plans and details bearing the engineer’s seal and signature provided in the site construction plan set. No portion of any retaining wall structure, including the footing, may encroach any existing or proposed right-of-way.

3.3 STABILIZATION
All slopes, created or existing, within any land development project shall be planted or otherwise protected form erosion and failure. Such planting or other protection shall be undertaken immediately upon creation of any slope steeper than 3H:1V and shall be completed without delay. Graded slopes of 3H:1V or steeper shall receive mat blanket treatment.

Subdivision developers shall not in any event transfer title, sell, or otherwise divest themselves of the land without making any such transfer subject to the subdivider’s right to re-enter the land to carry out the foregoing provisions. In addition, the subdivider may be required to provide a fence, guardrail, or other protective device specified by the Director, along slopes in excess of 2H:1V, or elevation changes greater than three feet.

3.4 FLOOD PROTECTION
All proposed development shall be in accordance with Chapter 8-2 Flood Protection, of the Athens-Clarke County Code of Ordinances.

No structure shall be located within ten horizontal feet of any Area of Special Flood Hazard, as defined in Chapter 8-2 of the Code.

The lowest finished floor, including basement, of any structure shall be elevated a minimum of 2 feet above the base flood elevation.

Proposed lowest finished floor elevations and existing lowest floor elevations shall be shown for all structures within or adjacent to any Area of Special Flood Hazard.

The limits of any Areas of Special Flood Hazard, as well as any FEMA-identified Floodway, shall be delineated on the plans, and the Base Flood Elevation noted. Any plan citing FEMA data shall reference the current Flood Insurance Rate Map (FIRM) and cite the appropriate community panel number.

If site development encroaches into a FEMA-regulated Area of Special Flood Hazard which has been studied by detailed methods and includes a regulatory Floodway, it will be necessary to perform a hydraulic HEC-2 analysis to demonstrate a “No-Rise” condition. A Conditional Letter of Map Revision (CLOMR) from FEMA is required in order to obtain development permits, and an approved Letter of Map Revision (LOMR) will be required prior to issuance of any Certificate of Occupancy.
Any grading proposed within an Area of Special Flood Hazard to accommodate development requires a compensatory grading plan and associated calculations. A Conditional Letter of Map Revision based on Fill (CLOMR-F) will be required to obtain development permits, and a Letter of Map Revision based on Fill (LOMR-F) will be required prior to issuance of any Certificate of Occupancy.

No development will be permitted downstream of a lake, pond, or reservoir dam unless documented approval is provided from the Georgia Safe Dams Program and/or a dam break analysis is provided. The resulting water surface from the dam break analysis shall be shown on the plans.
ARTICLE 4    STORMWATER MANAGEMENT

4.1    GENERAL
The standards in this article apply to any land development activity that causes a change in stormwater runoff characteristics from previously existing conditions.

Post-development stormwater runoff must be managed so as to prevent damage to public and private property and infrastructure; safeguard public health, safety, and general welfare; and protect the environment, including water and aquatic resources. Pre-development surface runoff characteristics should be maintained to the maximum practical extent. Stormwater management shall be accomplished in accordance with all applicable provisions of the Athens-Clarke County Code of Ordinances including, but not limited to, Chapter 5-4 Stormwater Management, Chapter 8-2 Flood Protection, Chapter 8-3 Soil Erosion and Sedimentation Control, and Chapter 8-6 Protected Environmental Areas.

Stormwater management design shall utilize the policy, criteria, and technical standards and specifications of the Georgia Stormwater Management Manual (GSMM), most current edition, the Manual for Erosion & Sediment Control in Georgia, most current edition, and this document, including any addenda or updates. Wherever these documents overlap, the more stringent requirement or guideline shall apply.

4.2    MINIMUM STANDARDS
The following standards are the minimum performance requirements for new development or redevelopment as defined in Chapter 5-4 of the Athens Clarke County Code of Ordinances:

4.2.1 BETTER SITE DESIGN PRACTICES
Site designs should preserve the natural drainage and treatment systems and reduce the generation of additional stormwater runoff and pollutants to the fullest extent practicable.

4.2.2 WATER QUALITY (WQ)
All developed area runoff resulting from a rainfall depth of 1.2 inches must receive water quality treatment. No impervious area runoff may bypass treatment. Water quality treatment requires reduction of the post-development total suspended solids (TSS) loadings by 80%, as measured on an average annual basis.

Water quality volume and peak flow rate shall be calculated according to the guidelines and procedures of the Georgia Stormwater Management Manual. Where development results in multiple drainage areas, water quality volume and peak flow rate shall be calculated and treated separately for each drainage area. Where the Athens-Clarke County Code of Ordinances allows a reduction in water quality volume based on a percentage of site impervious area, the reduction shall
be taken in the impervious area calculation and then the water quality volume calculated accordingly.

Water quality treatment shall be provided utilizing one or more of the structural controls described in the GSMM to demonstrate the required TSS reduction in post-development runoff. All controls shall be designed in conformance with the guidelines and recommendations of the GSMM. TSS removal capacity, including the capability credited to each control, the evaluation of controls in series (treatment train approach), and the application of any site design credits shall be in strict accordance with GSMM guidelines and recommendations.

The use of any proprietary stormwater treatment technology will be considered only after the following minimum requirements have been met:

- Performance claims have been verified by field testing, performed according to Georgia Technology Assessment Protocols (GTAP);
- Satisfactory performance with respect to maintenance requirements, potential for failure, and durability has been demonstrated;
- The technology has been reviewed by the Technology Review Committee of the Metropolitan North Georgia Water Planning District and the results, including any recommended use restrictions, have been made publicly available on the District website (www.northgeorgiawater.org).

In all cases, the Department will make the final determination as to credited performance and application suitability.

4.2.3 CHANNEL PROTECTION (CP)
Steam channel protection shall be provided by using all of the following:
1. 24-hour extended detention storage of the 1-year, 24-hour return frequency storm;
2. Erosion prevention measures such as energy dissipation and velocity control;
3. Preservation of all applicable stream buffers.

All developed area runoff resulting from the 1-year, 24-hour rainfall event must be captured and detained for a minimum 24-hour period. The channel protection volume must be calculated and the required release rate provided separately for each drainage area.

Storage and release rate requirements should be determined according to the methods of the GSMM. Routing of the 1-year event through the facilities must be provided to verify capacity and release rate.

4.2.4 OVERBANK FLOOD PROTECTION (Qp25)
Downstream overbank flood protection shall be provided by controlling the post-development peak discharge rate to the pre-development rate for the 25-year, 24-hour return frequency storm. This requirement shall be met at every location along the site boundary where runoff leaves the site unless a downstream hydrologic assessment, performed in accordance with the GSMM, demonstrates
that such control will increase the peak flow at the prescribed downstream tributary junctions.

4.2.5 EXTREME FLOOD PROTECTION ($Q_f$)
All stormwater management facilities must be designed to safely handle the post-development runoff from the 100-year, 24-hour return frequency storm. This is accomplished by:
- Controlling developed runoff to the pre-developed rate; or
- Sizing onsite conveyances to safely pass the developed peak runoff and discharging it to a receiving system that is demonstrated to be sufficiently sized to convey the increased flows without causing damage or increasing flood heights or widths.

4.3 HYDROLOGY

4.3.1 RUNOFF ESTIMATION

a. Water Quality Volume ($WQ_v$) and Peak Flow Rate ($Q_{wq}$) shall each be calculated according to the methods of Section 2.1.7 of the GSMM.

b. Channel Protection Volume ($CP_v$) may be calculated according to the method in Section 2.2.5 of the GSMM. The SCS Method or USGS Method shall be used to verify the routing.

c. The Rational Method may be used to estimate peak runoff rates for the design of gutters, storm drain inlets, storm drain pipe, culverts, and small ditches. Runoff coefficients shall be consistent with those in the GSMM. Use of the appropriate frequency factor for the 25-year and less-frequent events, per the GSMM, is required. The method shall not be applied to any drainage area over 25 acres, and it shall not be used for storage design or any application that requires routing.

d. The Soil Conservation Service (SCS) Hydrologic Method may be used to estimate peak runoff rates and to generate hydrographs for the purpose of designing storage facilities and routing runoff flows. It is applicable to drainage areas up to 2000 acres. This method may be used for the design of all drainage structures except water quality facilities. Runoff curve numbers shall be consistent with those in the GSMM.

e. The U.S. Geological Survey (USGS) Peak Flow and Hydrograph Method may be used to estimate peak runoff rates and hydrographs. Its application must be in conformance with the all limitations and guidelines specified in the GSMM. This method may be used for the design of all drainage structures except water quality facilities.
4.3.2 PRECIPITATION
All runoff calculations shall utilize the rainfall data for Athens found in Table A-3, Appendix A, of the GSMM, or as updated. The 24-hour values are as follows:

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<th>Return Period (year)</th>
<th>24-Hour Precipitation (inches)</th>
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<tr>
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<td>7.20</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

4.4 COLLECTION & CONVEYANCE

4.4.1 GENERAL
Storm water collection and conveyance facilities include, but are not limited to, swales, channels, ditches, headwalls, street gutters, catch basins, drop inlets, storm drainage pipes, junction boxes, and culverts. These improvements shall be provided to protect the public right-of-way, as well as private properties adjoining project sites or public right-of-way. Existing natural drainage channels shall be improved as deemed necessary by the Director to prevent erosion, flooding, or other hazard.

The Transportation & Public Works Director may require that any spring or surface water that may previously exist or result from development be intercepted and conveyed by pipe or open channel. Such drainage facilities shall be located in the right-of-way where feasible, or in perpetual drainage easements of appropriate width.

Collection and conveyance facilities shall be large enough to accommodate the runoff from their entire contributing drainage areas, including offsite. Offsite runoff rates shall be determined based on the maximum potential development density allowed by the zoning ordinance.

Major and minor drainage system design shall be in accordance with the recommendations, guidelines, procedures, and methodologies presented in Chapter 4 of the GSMM and the standards and specifications of this document. Wherever these documents overlap, the more stringent requirement or guideline shall apply.

4.4.2 GUTTER SPREAD
Gutter spread shall be measured from face-of-curb, and all calculations shall utilize a Manning’s roughness coefficient (“n” value) of 0.016. Inlets shall be placed to limit flow spread to the following:
a. Local Streets
12 feet total at any given section, but in no case more than 9 feet on one side of the street.

b. Collector & Arterial Roadways
One-half of the travel lane on a 2-lane roadway or one travel lane on a 4-lane roadway.

4.4.3 INLETS

a. Inlets On Grade shall be designed and spaced so that gutter spread is within the allowable limits specified in 4.4.2 for the 25-year return frequency storm.

b. Inlets In Sag shall be designed so that gutter spread is maintained within the limits specified in 4.4.2 for the 50-year return frequency storm.

4.4.4 STORM DRAIN PIPE
These include minor drainage system pipe, including lateral system pipe, and driveway pipe, and do not function to convey flows under public roadways.

a. Capacity
Storm drain pipes shall be designed to convey the 25-year discharge without being placed under pressure head. The Manning Formula should be used for capacity calculations. For the design flow, the hydraulic grade line may not exceed any of the following:
• one foot below ground elevation
• the top-of-pipe
• the gutter flow line

b. Slope & Velocity
Storm drain pipes shall be designed so that flow velocities are a minimum of 2.5 feet per second when the pipe is flowing full. The minimum allowable pipe slope is 1.0% for corrugated pipe, and 0.5% for smooth-wall (n = 0.012), provided the minimum velocity standard is met.

The maximum flow velocity in any pipe of any material shall be 15 feet per second or the manufacturer’s recommendation, whichever is less. Velocities over 8 feet per second in any pipe or culvert shall require additional attention to the following:
• Pipe or structure invert protection
• Increasing the ability of the receiving waterway or facility to accept the flow without damage
• Improvements to increase fill slope, stream bed, and/or stream bank stability
The maximum allowable slope for concrete pipe is 10% and for corrugated metal and polyethylene pipe is 14%. Corrugated metal pipe on any slope greater than 10% requires a paved invert.

4.4.5 ROADWAY CULVERTS
These are cross drain facilities that convey flows through roadway embankments.

a. Live Stream Flow
A culvert conveying a live stream shall be aligned with the natural channel, both horizontally and vertically. Open-bottom culvert designs are preferred. In a curved stream section, the culvert shall be aligned with the upstream channel. Closed-bottom culvert design shall require additional capacity allowance for siltation.

b. Capacity
Roadway culverts shall be designed to convey the 100-year return frequency storm. The maximum allowable headwater is that which meets all of the following criteria:

- Headwater causes no damage to upstream properties
- For local streets, the maximum ponding elevation does not encroach a travel lane at any point
- For collector and arterial roadways, the maximum ponding elevation results in a minimum 18-inch freeboard to the low point of the roadway pavement
- Maximum ponding elevation does not result in any flow diverting around the culvert
- Maximum ponding elevation does not exceed the FEMA base flood elevation

c. Slope & Velocity
Roadway culverts shall be designed so that flow velocities are a minimum of 2.5 feet per second for the 2-year discharge. The minimum allowable pipe slope is 1.0% for corrugated pipe, and 0.5% for smooth-wall (n = 0.012), provided the minimum velocity standard is met.

The maximum allowable flow velocity is 15 feet per second or the manufacturer’s recommendation, whichever is less. Velocities over 8 feet per second shall require additional attention to the following:

- Pipe or structure invert protection
- Increasing the ability of the receiving waterway or facility to accept the flow without damage
- Improvements to increase fill slope, stream bed, and stream bank stability
The maximum slope using concrete pipe is 10% and for corrugated pipe is 14%. Steeper slopes may be considered if installation is in accordance with manufacturer’s recommendations and pipe restraining measures are provided.

d. **Headwalls** are required at both the inlet and outlet of all roadway culverts.

### 4.4.6 OPEN CHANNELS

These include drainage ditches, grass channels, dry and wet enhanced swales, riprap channels, and concrete-lined channels. These shall be designed to convey the 25-year return frequency storm and in accordance with the criteria, methodologies, and guidelines of Section 4.4 of the GSMM.

### 4.4.7 ENERGY DISSIPATION

Storm drain outlet protection (St) shall be provided for all concentrated discharges and shall be designed to accommodate the 25-year return frequency storm. The design shall be in accordance with the guidelines of both the *Manual for Erosion and Sediment Control in Georgia*, most current edition, and the GSMM. In cases where these documents differ, the more stringent requirement shall prevail.

### 4.4.8 CONSTRUCTION STANDARDS

Storm drain system material and construction shall be in accordance with these standards and those of the Georgia Department of Transportation’s *Standard Specifications Construction of Transportation Systems*, most current edition with supplements and revisions. Wherever these documents overlap, the more stringent requirement or guideline shall apply.

a. **Inlets and Junctions**

In order to facilitate maintenance, inlet design for existing or proposed publicly-maintained roadways shall normally utilize GDOT 1033 or 1034 series standard catch basins, unless otherwise approved. If a bicycle lane is located adjacent to the curb, then GDOT 1033-F/1034-F standard inlets should be used. GDOT 1019 inlets with slotted grates may be used on steeper grades if increased interception is demonstrated.

All inlets, junction boxes, and outlet control structures shall have manhole frames and lids for access. These shall bear the Athens-Clarke County Stormwater logo and shall be of U.S. manufacture only. See T&PW Standard Detail 4-010.

All structures shall have paved inverts.

b. **Reinforced Concrete Box Culverts**

Culvert construction shall be in complete accordance with the Georgia Department of Transportation’s *Standard Specifications Construction of*
Transportation & Public Works Department

Transportation Systems, most current edition with supplements and revisions.

c. Pipe and Pipe Arch
The minimum pipe diameter allowed in any publicly-maintained right-of-way is 15 inches.

Reinforced Concrete Pipe (RCP) shall conform with AASHTO-M170 and/or ASTM C-76 with installation in accordance with GDOT Standard 1030D, Table 1. Minimum class of pipe shall be Class III. All joints shall be bell and spigot type with o-ring gaskets conforming to ASTM C-443.

Bituminous Coated Corrugated Steel Pipe (BCCSP) and Pipe Arch shall be in accordance with AASHTO M-36 Type I or II with a minimum zinc coating of two ounces per square foot and bituminous coated in accordance with AASHTO M190. Minimum wall thickness is 12 gauge.

Aluminized Corrugated Steel Pipe (ACSP) and Pipe Arch shall be in accordance with AASHTO M274. Minimum wall thickness is 14 gauge.

Corrugated Aluminum Alloy Pipe (CAAP) and Pipe Arch shall be in accordance with AASHTO M196.

High Density Polyethylene Pipe (HDPEP) through 48-inch diameter shall be in accordance with AASHTO M294. Use of HDPE over 48-inch diameter is not permitted.

d. Installation
All storm drain installations shall be in accordance with the Georgia Department of Transportation’s Standard Specifications Construction of Transportation Systems, most current edition with supplements and revisions. Use of the above-listed culvert and pipe construction is restricted by location as follows:

1. Local street rights-of-way and drainage easements: All referenced materials are acceptable when outside the limits of roadway pavement. When roadway crossings are made at substantially right angles, all referenced materials, except steel pipe, are acceptable. Essentially longitudinal (parallel to roadway) installations should be outside the pavement limits. Longitudinal installations under roadway pavement require reinforced concrete pipe.

2. Collector, arterial, commercial, and industrial street rights-of-way: All referenced materials are acceptable when outside the limits of roadway pavement. At roadway crossings and under roadway pavement, reinforced concrete pipe or box culvert is required.
3. **Conveying perennial or intermittent streams (state waters):** Open-bottom culvert, embedded reinforced concrete box culvert, or embedded reinforced concrete pipe are the only allowable installations.

4. **Principal spillway pipe:** Reinforced concrete construction with anti-seep collar is required.

5. **Driveway pipe:** All referenced materials are acceptable.

### 4.5 TREATMENT & CONTROL FACILITIES

#### 4.5.1 GENERAL

Structural stormwater controls are necessary, both to remove pollutants from stormwater runoff and to mitigate the effects of increased runoff peak rate, volume, and velocity caused by land development. All structural controls shall be designed in conformance with Volume 2 of the *Georgia Stormwater Management Manual* (GSMM) and these design standards. Chapter 3 of the GSMM defines three categories of structural controls, according to applicability and ability to meet stormwater management requirements:

a. **General Application Structural Controls** are recommended for a wide variety of land uses and development types. They are credited with the ability to remove 80% of the average annual total suspended solids (TSS) when designed, constructed, and maintained in accordance with the recommended specifications. Several of these can be designed to also provide runoff rate control. General application structural controls are the recommended facilities to use wherever possible.

b. **Limited Application Structural Controls** are those recommended only for limited use or for special site or design conditions. These practices generally:
   - Cannot alone achieve the 80% TSS removal standard
   - Are intended to address hotspot or specific land-use constraints or conditions
   - May have high or special maintenance requirements that may preclude their use

These controls are typically used for water quality treatment only. Some of them can be used as a pretreatment measure or in series with other structural controls to meet the pollutant removal standard. Limited application structural controls should be considered primarily for commercial, industrial, or institutional developments.

c. **Detention Facilities** may be used to provide runoff rate control (CP, $Q_{p25}$, and/or $Q_f$) only and are typically used downstream of a general or limited application structural control providing water quality treatment.
d. **Access**

Driveable access from a public right-of-way shall be provided to all structural control facilities. Twenty-foot wide Access Easements shall be provided for all route segments on private property. The maximum driveable slope along any unimproved portion of the route shall be 10%.

For all impoundment facilities, driveable access shall extend along the top-of-dam or around the outside of a retaining wall to the location nearest the Outlet Control Structure. Driveable access must also be provided into the facility.

### 4.5.2 DESIGN CRITERIA

a. **Ponds**

1. **Application**

   The minimum allowable drainage area for a wet pond is 5 acres. Any drainage area less than 10 acres requires a water balance analysis and justification, and requires an impervious liner design for the permanent pool.

   Permanent pool volume shall be at least 30% of the WQc, and its minimum depth shall be 4 feet.

2. **Grading**

   See T&PW Standard Detail 4-020.

   All pond grading, including dam toe-of-slope and/or retaining wall construction must terminate a minimum of 10 horizontal feet from any property line.

   Maximum cut and fill slopes shall be 3H:1V.

   Minimum top-of-dam width is 10 feet for driveable access.

   The permanent pool of all water quality ponds shall have an aquatic bench (shallow littoral zone) extending a minimum distance of 15-feet into the pool at a maximum slope of 10%. The subsequent maximum slope to the bottom of the pool shall be 3H:1V. The bench shall completely surround the deeper portion of the pool. See T&PW Standard Detail 4-020.

   Pond safety benches shall be provided in accordance with the guidelines of the *Georgia Stormwater Management Manual*. Dams for impoundment of shall be earthen construction and, at minimum, any retaining wall construction associated with a pond providing water quality treatment shall lie a minimum distance of
15 horizontal feet beyond the permanent pool design water surface contour.

3. Principal Spillway
Principal spillway construction shall be reinforced concrete throughout. See T&PW Standard Detail 4-020.

Outlet control risers shall have solid tops with manhole access. Manhole covers shall be lockable, shall bear the A-CC Stormwater logo, and shall be of U.S. manufacture. Pedestal top supports shall be cast into the top and mechanically secured to the riser in an acceptable manner. Ladder rungs shall be provided both outside and inside the riser to facilitate access. Inside rungs shall be located conveniently with respect to the manhole location and safely away from all outlet structure control devices. See T&PW Standard Detail 4-020.

All spillway pipe shall be reinforced concrete with anti-seep collars to protect against piping failure. See T&PW Standard Detail 4-020.

Permanent pool facilities shall be provided with a gravity flow emergency drain capable of completely draining the pool within 24 hours. See T&PW Standard Detail 4-020.

All Water Quality Extended Detention volumes shall be discharged through a reverse-slope pipe attached to the riser with its inlet submerged one foot below the permanent pool water surface elevation. The inlet of the reverse-slope pipe shall be adequately supported. See T&PW Standard Detail 4-020.

All adjustable valves associated with discharge control or emergency drain functions shall be ductile iron gate valves located inside the riser structure. A gate wrench extension stem to the top of the structure with adequate supports is required for the emergency drain. See T&PW Standard Detail 4-020.

Adequate anti-clogging design shall be provided for all outlet control devices and emergency drains. See T&PW Standard Detail 4-020.

4. Emergency Spillway
An emergency spillway is required for all ponds and must be completely separate from the principal spillway structure. The
entire flow area of the emergency spillway should be constructed in undisturbed ground (not fill) wherever possible. If any part of the spillway must be located on fill, then all spillway construction shall be reinforced concrete. Emergency spillways shall be trapezoidal in cross-section with a minimum bottom width of eight (8) feet. The spillway channel shall have a straight control section at least twenty (20) feet in length, and a straight outlet section for a minimum distance of twenty-five (25) feet.

5. **Safety Fence**
   A minimum 4-foot high chain-link fence is required to surround stormwater management ponds if slopes exceeding 4H:1V are permitted. The fence must be located outside the driveable access around the facility, including along the top-of-dam. A 12-foot wide vehicular access gate located appropriately to access the facility interior is required.

b. **Bioretention Facilities**
   These shall be designed and constructed in complete accordance with all guidelines and recommendations of Section 3.2.3, Volume 2, of the GSMM. Adequate pretreatment, per the GSMM, is always required. The maximum contributing drainage area for offline design shall be 5 acres. Online designs shall be limited to a maximum contributing drainage area of 0.5 acres. The maximum ponding depth in all cases shall be limited to 6 inches.

c. **Porous Pavements**
   These may be utilized to reduce impervious site coverage and the volume of runoff that must be controlled. They require a minimum runoff curve number of 61 in hydrologic calculations. Porous pavements shall be designed in accordance with the guidelines and information found in the publication entitled *Porous Pavements*, by Bruce K. Ferguson, most current edition.

d. **Underground Detention Facilities**
   Underground storage facilities may be provided to satisfy release rate requirements, but not water quality treatment requirements. Design shall be in conformance with the guidelines and recommendations of Section 3.4.3, Volume 2, of the GSMM. Standard manhole access with ladder rungs extending to the invert is required for all storage chambers. Pipe storage construction must utilize watertight joints throughout the system.
4.6 **LANDSCAPING**
Landscaping shall be provided for all stormwater facilities, as necessary to adequately address the following functions:
- Prevent the erosion of bare soil
- Slow and retard flows by increasing hydraulic roughness
- Enhance infiltration of runoff into the soil
- Provide pollutant removal through vegetative uptake
- Contribute to wildlife and fish habitat
- Improve the overall appearance of the facilities

All landscaping designs, including choice of plant species, for facilities providing water quality treatment shall be in accordance with Appendix F, Volume 2, of the GSMM. The following guidelines from Appendix F, pertaining to any stormwater control or conveyance facility, shall apply. Do not:
- Plant trees, scrubs, or any woody vegetation on any fill embankment that functions as an impoundment
- Plant trees and shrubs within 15 feet of the toe-of-slope of a dam
- Plant trees or shrubs known to have long tap roots within the vicinity of an earthen dam or embankment, or subsurface drainage facilities
- Plant trees and shrubs within 25 feet of any principal spillway structure
- Plant trees and shrubs within 25 feet of perforated pipes
- Block maintenance access to structures with trees or shrubs

4.7 **DISCHARGE**

4.7.1 **OFFSITE DRAINAGE FACILITIES**
Where the offsite, receiving drainage system is determined to be inadequate to accommodate the project design discharge in accordance with the standards of [Section 4.4](#), the receiving system shall be improved to the extent necessary to meet these standards. The project developer shall bear all costs associated with providing such offsite improvements and shall acquire any necessary temporary or permanent easements.

4.7.2 **ENERGY DISSIPATION**
For open channel or surface flows, the maximum developed condition flow velocity at any discharge location along the project site boundary shall not exceed the maximum pre-developed flow velocity. In all cases, the post-developed flow velocity shall be non-erodeable, and improvements to the existing condition will be required if downstream areas have erosion problems.

Energy dissipation design for concentrated discharges of the 25-year return frequency storm shall be provided in accordance with the *Georgia Stormwater Management Manual*, as well as the *Manual for Erosion and Sediment Control in Georgia*. 
4.7.3 SURFACE DISCHARGE INTO ROADWAYS
The discharge of concentrated stormwater flows into public roadways shall be avoided. In no case shall such flows, including those from swales, ditches, draws, driveways, or pipe systems, exceed 1.0 cfs in the 25-year return frequency event or cause any increase in gutter spread.

4.7.4 RESIDENTIAL SUBDIVISION LOTS
In residential subdivisions, the drainage area contributing to the flow along any property line between lots, where the flow is within 50 feet of the building setback line of either lot, shall not exceed 2 acres unless contained within a piped drainage system or maintained in a natural watercourse. The stormwater conveyance shall be contained within a drainage easement.

4.8 EASEMENTS

4.8.1 CONVEYANCE
Where it is impossible or impractical to include a drainage conveyance within road rights-of-way, a perpetual unobstructed Drainage Easement, at least twenty (20) feet in width, shall be provided to accommodate the facilities. Stormwater Drainage Easements shall be separate and independent of any Sanitary Sewer Easements and shall be shown and dedicated on the Site Plan and Final Plat. Where a development project is traversed by a watercourse, drainage way, channel, or stream, a Drainage Easement shall be provided conforming substantially to the lines of such watercourse, and of width that is adequate for the purpose.

4.8.2 FACILITY
All structural control facilities shall be contained within a Stormwater Management Facility Inspection & Maintenance Easement. The easement shall extend a minimum distance of 10 horizontal feet beyond the toe-of-slope of any dam, the footing of any retaining wall, and the 100-year water surface contour.

4.8.3 ACCESS
Driveable access to all structural control facilities shall be provided by a 20-foot wide Stormwater Management Facility Access Easement from Athens-Clarke County right-of-way to the Inspection & Maintenance Easement described above. Any slopes proposed to be driveable that exceed 10% must have an improved all-weather surface.
4.9 MAINTENANCE

4.9.1 OPERATION & MAINTENANCE PLAN
An Operation & Maintenance Plan is required for all facilities, in accordance with Section 5-4-6 of the Athens-Clarke County Code of Ordinances. The plan must address the following points:

- Name the parties responsible for operation and maintenance, and describe how this work will be funded.
- Identify all components of the facilities that need to be periodically inspected and maintained.
- Describe in detail exactly how the facilities will be accessed by personnel, equipment, and vehicles, and any issues or concerns.
- Describe in detail the ongoing operation and maintenance procedures necessary to ensure continued function as designed.
- Describe in detail the equipment, skills, and training necessary for successful inspection and maintenance.
- Note and describe any and all possible safety issues.
- Include a detailed inspection and maintenance procedure schedule.
- Include provisions for the periodic review and evaluation of the maintenance program to determine the need for revisions or additional maintenance procedures.

4.9.2 STORMWATER MANAGEMENT FACILITY INSPECTION & MAINTENANCE AGREEMENT
A Stormwater Management Facility Inspection & Maintenance Agreement must be executed by the Owner of any development site that requires stormwater management facilities, in accordance with Section 5-4-6 of the Athens-Clarke County Code of Ordinances. A copy of the approved Operation & Maintenance Plan must be attached to the Agreement.

5.0 AS-BUILT PLANS
As-built drawings and information, demonstrating that construction is in accordance with approved plans, are required for all stormwater management facilities and practices. These facilities and practices include, but are not limited to, collection and conveyance facilities, storage facilities, treatment facilities, and permanent erosion and sediment control measures. They also include the composition, volume, and placement of any engineered soils required by the plans. As-built plans and information must be certified by a professional engineer, licensed in the State of Georgia.